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CA Product References

This document references the following CA products:

- CA Datacom®
- CA Endevor® Software Change Manager (SCM)
- CA Ideal™
- CA IDMS™
- CA Librarian®
- CA Mainframe Application Tuner (CA MAT)
- CA Optimizer®
- CA Optimizer®/II
- CA Panvalet®
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Chapter 1: Introduction

This chapter provides an overview of CA Mainframe Application Tuner (CA MAT). The following topics are discussed:

This section contains the following topics:

Conventions (see page 15)
What is CA Mainframe Application Tuner (see page 16)
The Interface (see page 16)
Internal Operation (see page 18)
Basic Tasks (see page 18)
The Interactive Analysis Menu Options (see page 21)
Other Features (see page 24)

Conventions

This book uses the following general conventions:

The following syntax notation is used in this manual. Do not enter the special characters.

- Brackets, [ ], enclose optional parameters or keywords.
- Braces, { }, enclose a list of parameters; one must be chosen.
- A vertical line, |, separates alternative options; one can be chosen.
- An italicized or underlined parameter is the default.
- AN ITEM IN CAPITAL LETTERS must be entered exactly as shown.
- Items in lowercase letters are values you supply.
What is CA Mainframe Application Tuner

CA Mainframe Application Tuner is a CA Technologies product that identifies application performance delays and utilization.

CA Mainframe Application Tuner monitors application programs to pinpoint delays. It observes and samples program activity, showing you the application’s view of performance. CA Mainframe Application Tuner presents detailed application-specific delay information, allowing you to improve the performance of your application.

From a single program–monitoring session, CA Mainframe Application Tuner can answer questions for the application programmer, systems programmer, and database administrator. This ability saves time and reduces machine resources that are used in resolving program bottlenecks or delays.

Application Tuning

Application tuning is the process of analyzing and adjusting the performance of an application with the goal of maximizing efficiency and effectiveness. By focusing on the major causes of delay associated with an application, CA Mainframe Application Tuner leads you to the best solutions for your worst problems. Consider the following reasons for tuning your applications:

- To improve the success of a business
- To meet increasing performance demands
- To reduce costly, highly-visible delays due to inefficient applications
- To evaluate applications under development and compare third-party software
- To identify the source of batch, CICS, DB2®, and IMS loops and waits
- To plan and position for a shrinking batch timeframe

This book includes several chapters devoted to aiding the user with specific application–tuning issues.

The Interface

CA Mainframe Application Tuner uses an easy-to-understand ISPF interface called the TSO Client. The TSO Client consists of a series of panels. Each panel is designed to link to the next logical panel, enabling you to focus on finding straightforward answers to performance questions. When CA Mainframe Application Tuner is invoked, the first panel you see is the Primary Option Menu.
The chapter "Working in the Environment" describes the Primary Option Menu in detail, as well as how to use other aspects of the interface.

Point and Shoot

Where possible, panels make use of ISPF’s point and shoot facility. This lets you place the cursor on most menu items and primary commands, and then press ENTER to choose the menu item or execute the command.

You can place the cursor on the desired location by pointing a device like a mouse, by using the arrow keys, or by using the TAB key if Tab to point-and-shoot fields has been enabled in your ISPF settings.

One exception to using point-and-shoot is the AddHelp command. This command expects the cursor to be on the item for which help is needed.

Online Tutorial

CA Mainframe Application Tuner contains an online tutorial that guides you through the main features of CA Mainframe Application Tuner, including the process of setting up a monitor and analyzing the resulting data to help solve performance problems. CA Technologies recommends that you view this tutorial before using CA Mainframe Application Tuner for the first time. Select Option T from the Primary Option Menu to begin the tutorial.
Internal Operation

The Server Space, a multi-address space structure, provides for noninvasive observation and sampling of the target application address space. Monitor sessions are defined and analyzed by using the TSO Client.

CA Mainframe Application Tuner observes and samples the target application by using a DIE/SRB routine to determine which program is running for each task, where the program is executing, and if and why it is waiting. Samples are written to a file for later analysis, along with CSECT, STEPLIB, LINKLIB, and other information related to the job.

See the Installation Guide for a detailed description of the internal operation of CA Mainframe Application Tuner.

Basic Tasks

You can perform the following tasks with CA Mainframe Application Tuner:

- Creating monitor definitions
- Invoking a monitor
- Analyzing monitor data

Monitor Definitions

A monitor definition is the set of information that CA Mainframe Application Tuner uses when taking observations and sampling an application. A monitor definition is identified by its profile name. You create a monitor definition by specifying a set of monitoring criteria. Monitoring criteria include

- A description of the monitor
- Whether a batch report is generated
- The job name of the target application
- The system on which the target is running
- The job step, procedure step, and program name to monitor
- The duration, number of observations, start delay, and time range of the monitor
- The schedule for the monitor
- Multiple monitoring sessions for a single execution of a job step
- The number of times a job step is monitored
Basic Tasks

Chapter 1: Introduction

- The names of the multiple job steps to be monitored
- Environment-specific information involving CICS, IMS, ADABAS, DB2, Natural, CA Ideal, and CA Datacom

The chapter "Setting up a Monitor Definition" describes in detail how to set up and use monitor definitions.

Invoke a Monitor

When you invoke a monitor, you use the specified criteria to start the observation and sampling of the target application. A monitor request is passed to the Server Space. The Server Space manages pending and active monitor sessions. See the Installation Guide for a detailed description of how the Server Space monitors an application.

Invoke a monitor in one of the following ways:
- By invoking a monitor definition for managed or scheduled monitor
- By choosing a job which is actively running for immediate results
- By invoking a monitor from outside the TSO Client for automated operations

The chapters "Invoking a Monitor" and "Open Application Program Interface" describe how to start a monitor session.

Monitor Data

After the monitor has completed, sample data that has been stored in the monitor data can be analyzed. The monitor data set is pointed to by either the User Information File (UIF) or the Global Information File (GIF). The Interactive Analysis Facility formats this data into a set of panels that Displays the information in a format that you can use to solve performance problems.

Report Results

CA Mainframe Application Tuner reports delay information as percentages of the total monitored period. Program activity is divided between active and wait states, where the delay related to a particular module is shown as a percentage of the monitored period when the module was actively using a CPU and when it was waiting for a CPU. The combined percentage is also reported.
Autonavigation

The Autonavigation feature helps you find the information you are looking for quickly and directly. By placing the cursor on an item in a display panel and pressing Enter, the next most logical panel is displayed, based on the selected content. For more information, see Autonavigation.

Different Analysis Types

You can choose to display monitor results in one of several ways:

- **Analyze Normal** - Information that is not directly related to the target application is eliminated. Data is reported as follows:
  - Samples related to delay categories such as Waiting for CPU, LPAR delay, and Swap delay are omitted from reports.
  - DelayView, TimeView, DataView, and ModView show all relevant delays for the application. All relevant samples for both Active and Wait are reported.
  - CodeView and related histograms report only active samples that emphasize the most CPU-intensive portions of the program code. Wait samples, which can mask this activity, are not included.

- **Analyze All** - Percentages are calculated based on all samples. This data allows you to compare delays occurring when the program is executing in both active and wait states.

- **Analyze Active** - Percentages are calculated based on samples where the program was actively using CPU. Samples that contain only wait information are filtered out, which allows you to make normalized CPU comparisons of program activity.

- **Analyze Wait** - Percentages are calculated based on samples where the program was in a wait state. Samples that contain only active information are filtered out, which allows you to make normalized comparisons of program wait activity.

For more information about the Interactive Analysis Facility, see the chapter "Analyzing Monitor Data."

CA Mainframe Application Tuner can produce batch reports based on this data. For more information about producing batch reports, see the chapter "Generating Batch Reports."
The Interactive Analysis Menu Options

After you have specified an analysis option for a monitor definition, CA Mainframe Application Tuner loads the data and displays the Interactive Analysis menu. Each option on this menu displays the data from a different perspective.

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<td>19  NAT - Natural Activity</td>
</tr>
</tbody>
</table>

ACTIVE - switch mode to ACTIVE
NORMAL - switch mode to NORMAL
ALL - switch mode to ALL

Press END to exit analysis.

These menu options are described next.

**OverView option 0**

Displays information about the monitoring process, as well as key global statistics about the monitored application.

These statistics can help you determine the next most logical panel to display as you continue your analysis effort.

**TaskView option 1**

Displays information about the performance of each z/OS task in the monitored address space.

If you select a task, CA Mainframe Application Tuner recomputes the values by using only samples from the selected task on all subsequent screens that you display, which enables you to focus on the performance of that task.

**DelayView option 2**

Divides the program into functional delay types.

Delay types comprise everything that contributes to the elapsed time of the program, including the time that the program was executing. See the chapter "Tuning Your Applications" for a comprehensive list of delay types identified by DelayView.
The Interactive Analysis Menu Options

CodeView option 3

Displays the execution and wait time of each module used by the program.

You can display this information in greater detail down to the CSECT level. You can define Pseudo Groups, which are specific to your environment, to summarize the information for multiple modules. This feature enables you to identify time consuming areas of code and to associate subroutines within a program and program modules within an application framework.

TimeView option 4

Displays program activity in time sequence.

Each row of information represents a single sample taken during the monitored period. This format helps you determine a program's execution path and looping logic. This format also gives a good indication of which code sections executed and when they executed during the monitored period.

DataView option 5

Displays data sets, databases, IMS, and DB2 statements that caused activity during the monitored period.

The data is sorted in descending order by activity. You can select a particular data set, database, IMS, or DB2 statement to display greater detail.

TranView option 6

Shows IMS or CICS activity in terms of individual transactions

It displays the percentage of time CA Mainframe Application Tuner detected activity for each transaction in the six major activity and delay categories. If you select a transaction, CA Mainframe Application Tuner recomputes the values on all subsequent screens that you display by using only samples from the selected transaction. This feature enables you to focus on the performance of that transaction.

ModView option 7

Displays the activity of each load module.

From ModView, you can hyperlink to module details or to a panel that suggests a linkage order for reducing system paging.

PoolView option 8

Displays statistics about IMS VSAM/LSR and VSAM/GSR buffer pool usage.

PoolView provides information about hit ratios, size and number of buffers, and total space requested. You can also display information about the data sets attached to a pool.
USSView option 9
Displays information about USS activity on a process basis
This option allows you to see delay information by process, code details by process, and process level information.

DB2 option 10
Displays statistics about DB2 activity.

IMS option 11
Displays statistics about IMS activity.

JVM option 12
Displays statistics about Java Virtual Machine (JVM) activity.

WAS option 13
Displays statistics about WebSphere Application Server activity.

CIC option 14
Displays summary statistics about CICS activity.

IDMS option 15
Displays statistics about CA IDMS activity.

DCM option 16
Displays statistics about CA Datacom activity.

IDL option 17
Displays statistics about CA Ideal activity.

ADA option 18
Displays statistics about Adabas activity.

NAT option 19
Displays statistics about Natural activity.

Switch between Interactive Analysis Modes

You can easily switch between the different analysis modes that are accessed from the Interactive Analysis menu without having to return to that menu. For example, if you are viewing samples that are actively using CPU and want to see those that are waiting, you can enter one of the following commands to switch analysis modes.
Use the commands listed next to switch between the different analysis modes.

**ACTIVE**

Delay percentages are calculated using only the samples found to be actively using CPU. By running CA Mainframe Application Tuner with this option multiple times, you can make normalized CPU comparisons of program activity.

**WAIT**

Delay percentages are calculated using samples found to be in a wait state. By running CA Mainframe Application Tuner with this option multiple times, you can make normalized comparisons of program wait activity.

**NORMAL**

All wait-related delays which are not controlled by the application are removed. The CodeView panel is sorted based on Active samples (where the application was actively using CPU). This option will provide the best view of the data for normal use.

**ALL**

Delay percentages are calculated using every sample collected.

---

**Other Features**

CA Mainframe Application Tuner has several additional features that can assist you with tuning your applications to get the maximum benefit. These features are described in the following sections:

**Analyzing monitor data sets**

You can analyze data from a monitor data set that is created by someone else by adding it to your list of external monitor data sets.

For more information, see Analyze Monitor Data Sets Created by Other Users.

**Registering program listings**

By registering program listings, CA Mainframe Application Tuner can relate program activity to actual high-level language statements, instead of to CSECT offsets only. You can register program listings in Assembler, COBOL, PL1, NATURAL, FORTRAN, IBM® C/C++, and SAS C. Programs must be compiled with specific compiler options before they can be registered.

You can register a program online with the TSO Client, or offline by using the batch registration procedure `hilevel.TNBATREG`. When registering a program online through the TSO Client, you can choose to register the listings locally or globally. A listing that is registered locally is only available to the TSO Client that performed the program registration; a listing that is registered globally is available to all users.

For more information about registering a program listing, see Register Source Program Listings.
Associating functional descriptions of CSECTs

You can define functional descriptions for CSECTs. These descriptions appear on interactive analysis panels, such as CodeView, DelayView, and ModView. During analysis, you can use these functional descriptions to identify what each CSECT does. CA Mainframe Application Tuner supplies over 5000 functional descriptions for system, COBOL, PL/1, and LE routines.

For more information about defining CSECTs, see Add CSECT Descriptions.

Grouping related program modules by using pseudo groups

By grouping related program modules into pseudo groups, CA Mainframe Application Tuner can provide summarized reporting on these modules in the CodeView panel. This feature allows data representation by functions rather than by module/CSECT names alone. CA Mainframe Application Tuner supplies many pseudo groups for IBM modules.

For more information about using Pseudo Groups, see Define Pseudo Groups.

Adding content-sensitive Help

To add online Help information for specific CSECTs, pseudo groups, and delay categories, CA Mainframe Application Tuner provides help members that you can modify. This help information is accessed by placing the cursor on a highlighted field and pressing PF1 on the DelayView, CodeView, Histogram, or DataView panels.

For more information about adding content-sensitive help, see the chapter "Updating Content-sensitive Help."

Using global monitors

You can also define and start monitor sessions without using the TSO Client. Monitor sessions invoked from outside the TSO Client are called global monitors. Global Monitor Definitions are associated with the Server, not a specific user, and are primarily used when the monitor sessions are invoked outside of the TSO Client by using the Open Application Program Interface (Open API). This Open API allows you to monitor an application when conditions are most critical, for example when a critical performance threshold is exceeded.

The information that is collected by a global monitor is analyzed and administered by using the Global Monitoring Menu option. Because global monitors are not assigned to a specific user, the data is written to the Global Monitors data set.

For more information about using global monitors, see Create and Use Global Monitors.

For more information about the Open API, see the chapter "Open Application Program Interface."
**Creating monitor schedules**

By creating a schedule for a monitor session, you can define when a program is to be monitored. While creating a monitor definition, you can specify monitoring by day-of-week, time and date. You can specify scheduling criteria for individual monitor definitions, or select from permanent "shift" definitions defined by the administrator. For example, you might have schedules for weekend processing that can be reused every weekend.

For more information on creating schedules, see Create a Monitor Schedule.

**Monitoring a multistep job**

If you would like to create monitors for an entire region rather than just for specific job steps, you can create a group of monitor definitions (or profiles) that are activated by a trigger monitor. This monitor ensures that you have the necessary data for analysis of all job steps in a multistep process.

For more information on grouping monitor definitions, see Create a Multijob Monitor: Grouping.

**Performing system administration**

CA Mainframe Application Tuner is typically used by a group of users. To facilitate consistency, the Administration option allows viewing only of System and User default parameters. These are the default parameters that are specified for all users in a group.

For more information about system and user default parameters, see the Installation Guide.

**Displaying messages**

The Messages option shows all of the messages that can be issued by the Server Space during routine operation. You can select a message to display further detail.

For more information, see Message Help.

**Using the online tutorial**

If you are new to CA Mainframe Application Tuner, complete the online tutorial that is provided with CA Mainframe Application Tuner. The tutorial introduces the features and operation of CA Mainframe Application Tuner and demonstrates an example application.
Chapter 2: Working in the CA Mainframe Application Tuner Environment

This chapter shows you how to use the basic features of CA Mainframe Application Tuner.

When you finish reading this section, you should be able to understand and effectively use the interface.

This section contains the following topics:

**Start from a TSO Session** (see page 27)
**Navigation** (see page 29)
**Online Help** (see page 32)
**Scroll Panels** (see page 35)
**Use PF Keys** (see page 35)
**Locate a String in a Display** (see page 36)
**Sort the Display** (see page 36)
**Autonavigation** (see page 37)
**Display Column Totals** (see page 39)
**Filter the Display** (see page 40)
**Customize Panels** (see page 44)
**Save the Information on a Panel** (see page 46)
**Issue Commands in a Sysplex Environment** (see page 50)

### Start from a TSO Session

To invoke CA Mainframe Application Tuner under TSO, you must be running ISPF.

CA Mainframe Application Tuner requires a TSO region size of at least 4 MB.

### Start from ISPF

Type the following TSO command on the ISPF COMMAND line:

```
TSO EXEC 'hilevel.UTRSAMP(MATUNERC)'
```

where MATUNERC is the name of the TSO REXX EXEC specified during customization.

The TSO EXEC is used to execute the CLIST that was created during the customization process (see the *Installation Guide*). Consult your System Administrator for the correct name and location of the CLIST.
You can copy the start-up procedure from hilevel.UTRSAMP to a library used by your TSO users to execute CLISTS or REXX procedures.

The first time each user invokes CA Mainframe Application Tuner, the User Information File Allocation panel is displayed.

Set Up User Options

The User Information File Allocation panel enables you to automatically copy your existing monitor definitions from your current tables data set to the new User Information File.

```
CA MAT ------------ User Information File Allocation ------------
COMMAND ==>

CA MAT requires a User Information File to store user-specific data. The name of this data set is: 'prefix.userid.MAT85.TABLES'
This data set must be allocated before you can use CA MAT.
If you choose not to allocate this data set, CA MAT will terminate.

Do you want CA MAT to allocate this data set now ? ===> YES (Yes or No)
Allocate data set on volume ===> * (Required for non-SMS or * for SMS)
Number of tracks to allocate ===> 90 (Required)
  SMS Management Class ===>          (Optional for SMS data sets)
  SMS Storage Class ===>          (Optional for SMS data sets)
  SMS Data Class ===>          (Optional for SMS data sets)

A table was found for your TSO user ID from a previous release of CA MAT. The data set is: 'prefix.userid.MAT85.TABLES'
Would you like to have the entries from the previous release of the CA MAT tables data set migrated to the new CA MAT release of the User Information File? ===> YES (Yes or No)

Press HELP for more information
Press END to cancel data set allocation and exit without starting CA MAT
```

This panel is not displayed if the system default DISPLAY_ALLOC_PANEL = NO is specified in the Global Tables Data Set (using hilevel.UTRPARM member TUNSDEFS). The User Information File is allocated by using the default values. See the Installation Guide for more information.

If you select YES to the question about migrating the User Information File from a previous versions, the following message is received:

TN007I Migration of User Information File in progress from release 3.3.01
If you select NO to the question about migrating the User Information File from a previous version, the following message is received:

TN0004I Please wait while User Information File is initialized (TPNnnnn).

If the data set is to be managed by SMS, you can specify an * as the volume serial ID.

**Navigation**

After invoking CA Mainframe Application Tuner, the first panel displayed is the Primary Option Menu. You access all functions from this menu.

<table>
<thead>
<tr>
<th>OPTION</th>
<th>Action</th>
<th>Details</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>Parameters</td>
<td>Enter user-specific parameters</td>
</tr>
<tr>
<td>1</td>
<td>Monitor</td>
<td>Create and analyze Monitor Sets</td>
</tr>
<tr>
<td>2</td>
<td>Active</td>
<td>Select an active job to monitor</td>
</tr>
<tr>
<td>3</td>
<td>Registration</td>
<td>Register source listings</td>
</tr>
<tr>
<td>4</td>
<td>Grouping</td>
<td>Define groups of monitors</td>
</tr>
<tr>
<td>5</td>
<td>External</td>
<td>Analyze other user's monitor files</td>
</tr>
<tr>
<td>S</td>
<td>Status</td>
<td>Display and manage invoked monitors</td>
</tr>
<tr>
<td>G</td>
<td>Global</td>
<td>Global monitoring and listing registration</td>
</tr>
<tr>
<td>A</td>
<td>Administration</td>
<td>CA MAT system administration</td>
</tr>
<tr>
<td>M</td>
<td>Messages</td>
<td>List CA MAT messages</td>
</tr>
<tr>
<td>T</td>
<td>Tutorial</td>
<td>CA MAT tutorial</td>
</tr>
</tbody>
</table>

This ISPF menu is standard. You can type either ISPF commands or options in the OPTION field.

The fields in the upper right corner of the menu display the following information:

- Your User ID
- Server Space ID and Status, which is active or inactive
- Release level
The options available from the Primary Option Menu are described next. You can specify any option at any time.

**Option 0 (Parameters)**

Displays the Profile Parameters panel that allows you to set defaults for various options of CA Mainframe Application Tuner.

See the *Installation Guide* for more information.

**Option 1 (Monitor)**

Displays the Monitor Definition panel that enables you to create, invoke, and display a monitor definition.

You can use one of the three analysis line commands, A, AA, or AW, to analyze the data from a particular monitor definition.

See Appendix 3, "Setting up a monitor definition." for more information.

**Option 2 (Active)**

Displays the Active Jobs panel that allows you to create and invoke a monitor session for any active job.

For more information, see the chapter "Invoking a Monitor".

**Option 3 (Registration)**

Displays the Program Listing Registration panel that allows you to register program listings to relate program activity to actual high-level language statements.

See Register Source Program Listings for more information.

**Option 4 (Grouping)**

Displays the Monitor Profile Groups panel that allows you to define groups of job steps that can be monitored together while also specifying the job step that initiates (or "triggers") the monitoring of the group.

For more information, see "Create a Multijob Monitor: Grouping".

**Option 5 (External)**

Displays the External Data Set List panel that allows you to analyze monitor data sets created by other users.

See Analyze Monitor Data Sets Created by Other Users.

**Option 5 (Status)**

Displays the Invoked Monitors panel that shows information on the progress of each active monitor request.
Option G (Global)

Displays the Global Monitoring Menu panel that allows you to set up a monitor definition, invoke a monitor session or analyze data gathered during a monitor session.

For more information, see Use the Global Monitoring Menu.

Option A (Administration)

Displays the Administration Option Menu. From this menu, you can perform a variety of administrative functions, such as register source program listings, create CSECT associations, define pseudo groups, schedule monitor requests, and update content-sensitive help.

For more information, see Perform Administrative Functions.

You can also view global system and user default values (see the Installation Guide).

Option M (Messages)

Displays the Messages panel that contains a list of messages and their message IDs. The message text explains the message and suggests actions that you can take. For more information, see Message Help.

Option T (Tutorial)

Launches the online tutorial that provides a guided tour through many of the features and functions.

Move forward through the tutorial by pressing Enter and backwards by pressing PF10. The tutorial takes approximately 30 minutes to complete. If you are using CA Mainframe Application Tuner for the first time, it is recommended that you complete the tutorial.

Display Status

To display a current list of all active and deferred monitor requests, enter the primary command STATUS from any ISPF panel.
Online Help

CA Mainframe Application Tuner features an extensive online Help facility that explains all of the panels and fields. The Help facility uses pop-up panels with hyperlinks to related topics. There are four types of Help information:

- Screen help
- Field help
- Content-sensitive help
- Message help

Screen Help

Screen Help is information relating to a panel. To display Help from anywhere in CA Mainframe Application Tuner, press PF1 for Help.

A Help pop-up panel overlays the panel.

Hyperlinked fields are highlighted on the Help panel. To hyperlink to related Help text:

1. Place the cursor on the highlighted field and press Enter.
2. Press End to exit the Help facility and return to CA Mainframe Application Tuner.
3. To exit the Help facility if multiple help panels are displayed, you can either press End multiple times or type QUIT on the Help panel’s COMMAND line and press Enter.
Field Help

Field Help is information related to a specific field on a panel. To display field Help:

1. Place the cursor on the name of the field for tabular panels or in the input area of the field for data-entry panels. You may also use the Tab key to position the cursor.
2. Press PF1 for Help. Help information is displayed.

Content-Sensitive Help

If the content of a field is colored red, yellow, or white, content-sensitive Help is available. When you place the cursor on one of these fields and press PF1, the Help that is displayed is specific to that content. See "Updating content-sensitive Help" on page 219 for more information.

Message Help

During operation, the Server Space might generate a message to alert you of any problems that have occurred. You can obtain additional information about the message.

1. Record the Message ID. This ID is used to link to the correct information.
2. On the Primary Option Menu, select Option M.

The Messages panel is displayed:

<table>
<thead>
<tr>
<th>Msg ID</th>
<th>Message Text</th>
</tr>
</thead>
<tbody>
<tr>
<td>DAUxxxx</td>
<td>Internal error messages</td>
</tr>
<tr>
<td>TN0001E</td>
<td>TUNLEVEL member of TRSAMP not found -- CA MAT terminating</td>
</tr>
<tr>
<td>TN0002I</td>
<td>Content-sensitive help is being initialized</td>
</tr>
<tr>
<td>TN0003I</td>
<td>Content-sensitive help is being updated (TPNnnnn)</td>
</tr>
<tr>
<td>TN0004I</td>
<td>Please wait while User Information file is being initialized</td>
</tr>
<tr>
<td>TN0005I</td>
<td>User Information File update in progress (TPNnnnn)</td>
</tr>
<tr>
<td>TN0006E</td>
<td>Table create requested for 'table' is not known</td>
</tr>
<tr>
<td>TN0007I</td>
<td>Migration of User Information File in progress from release xxx</td>
</tr>
<tr>
<td>TN0008E</td>
<td>User Information File allocation error</td>
</tr>
<tr>
<td>TN0009E</td>
<td>Open failed for Content-sensitive help table RC= cc RS= rr</td>
</tr>
<tr>
<td>TN0010E</td>
<td>Unable to allocate 'tuntable' on 'volser' ( 'trks' tracks )</td>
</tr>
<tr>
<td>TN0011E</td>
<td>Syntax error in record: 'record'</td>
</tr>
<tr>
<td>TN0012E</td>
<td>Profile 'profile' not found -- batch reporter terminating</td>
</tr>
<tr>
<td>TN0013E</td>
<td>Monitor data set 'data set' is not found or not available</td>
</tr>
</tbody>
</table>
3. Use the LOCATE primary command to find a specific message ID.
4. You can also place a filter on the Msg ID or Message Text fields to find a message.
5. Type S in the LC field of the desired message and press Enter.
   A Help pop-up panel is displayed for the message. This panel will include an explanation of the message, as well as suggested actions to take.
6. Use the PMSG command to copy the Help text (for all messages) to a printable data set.
7. Type S in the LC field of the desired message and press Enter.
   A Help pop-up panel is displayed for the message. This panel will include an explanation of the message, as well as suggested actions to take.
   Use the PMSG command to copy the Help text (for all messages) to a printable data set.

```
CA MAT    --------- Print CA MAT Messages --------------------------------
COMMAND ===> 
ISPF library:
  Project ===> 
  Group ===> 
  Type ===> 
  Member ===> (Blank or pattern for member selection list)
Other partitioned or sequential dataset:
  Dataset name ===> 'CAMAT.MSGS.PRINT'
  Volume serial ===> dev220 (If not cataloged)
Lines per page: 66
Press END to print messages or CANCEL to exit

Please wait while messages are written to:
   'CAMAT.MSGS.PRINT'
```

The information that is displayed in the Messages Help panel includes:

- **Reason** - a detailed description of the message, including why the message was issued
- **System Action** - an explanation of what action is taken by CA Mainframe Application Tuner when the message is issued
- **User Action** - the required or suggested steps to take
- **Origin** - the module that generated the message

8. Press End to exit the Help facility and return to CA Mainframe Application Tuner.
Scroll Panels

To scroll the contents of a panel, use the standard ISPF scroll commands: UP (PF7), DOWN (PF8), LEFT (PF10), and RIGHT (PF11). When you scroll right, the fixed fields remain at the left margin. If more fields are available, the panel displays an arrow on the far left between the column header and the data rows. The arrow indicates which direction you can scroll to see more fields:

- > indicates that more fields are available by scrolling right
- < indicates that more fields are available by scrolling left
- <> indicates that more fields are available by scrolling left or right

Use PF Keys

Because CA Mainframe Application Tuner is an ISPF application, the definitions you set for your PF keys are completely independent from other applications. To set your PF keys for use with CA Mainframe Application Tuner:

1. From any panel, type KEYS.
2. Press Enter.
   The PF Key Definitions and Labels panel is displayed:

   ![PF Key Definitions and Labels Panel]

   Press ENTER key to display alternate keys. Enter END command to exit.

3. Define your PF keys.
4. Press End.
Locate a String in a Display

To locate a particular string and move it to the top of a display, on the command line type L target.

where target is a jobname, module, or other type of information in the leftmost field.

If you change the sort value of a panel, target is the field by which the panel is sorted.

The Locate command supports wildcard characters (*, %, ?). If the target you specify does not appear, the message LOCATE ARG NOT FOUND appears in the upper right corner.

Some panels do not support the Locate command. Issuing Locate from these panels produces the message INVALID OPTION in the upper right corner.

Sort the Display

You can sort the information displayed on a panel by any field using the SORT primary command. With the SORT command, you have the power to display the most over- or under-utilized resources at a glance. To sort a display:

1. On the COMMAND line, type SORT A to sort in ascending order or SORT D to sort in descending order. The default is A.
2. Place the cursor on the field that you want to sort.
3. Press Enter.
   You can sort only one field per panel. If you type the SORT command for a second field, the first sort criterion is replaced.
4. To remove sort criteria from a panel, type NOSORT on the COMMAND line and press Enter. CA Mainframe Application Tuner returns to its initial sort order.
   You can also add or remove sort criteria using the Screen Customization panel.
## Autonavigation

The DelayView, CodeView, and DataView panels feature Autonavigation. This feature allows you to go directly to the next most logical panel, based on a selected content.

**To use Autonavigation:**

1. Place the cursor anywhere in the line containing the information for which you want more detail.
2. Press Enter.

A panel is displayed based on the type of information you selected.

Place the cursor anywhere on the Data Delay - IO Queued line in the DelayView panel.

| CA MAT ------------------------------- DelayView --------------- Row 1 to 11 of 11 |
|----------------------------------------|-------------------|-------------------|-------------------|
| COMMAND ====>                           | SCROLL ====> CSR  |
| Primary commands: DETail on/off         | Module: *         | Profile: TUNIVP1   |
| ADDHelp                                 | Csect: *          | Options: NORMAL   |
| Line commands: A - Address              | Offset: *         | Detail: ON        |
| S - Distribution                        |                   |                   |

<table>
<thead>
<tr>
<th>LC Major category</th>
<th>Minor category</th>
<th>Actv%</th>
<th>Wait%</th>
<th>Totl%</th>
<th>Visual</th>
</tr>
</thead>
<tbody>
<tr>
<td>Program Active</td>
<td>Program Active</td>
<td>53.34</td>
<td>0.00</td>
<td>53.34</td>
<td>--------</td>
</tr>
<tr>
<td>System Active</td>
<td>Getmain SVC</td>
<td>20.86</td>
<td>0.00</td>
<td>20.86</td>
<td>--------</td>
</tr>
<tr>
<td>System Active</td>
<td>Regmain SVC</td>
<td>13.18</td>
<td>0.00</td>
<td>13.18</td>
<td>--------</td>
</tr>
<tr>
<td>Data Delay</td>
<td>IO Queued</td>
<td>0.00</td>
<td>7.11</td>
<td>7.11</td>
<td>--------</td>
</tr>
<tr>
<td>File Mgmt Delay</td>
<td>Eov SVC</td>
<td>0.24</td>
<td>4.22</td>
<td>4.46</td>
<td></td>
</tr>
<tr>
<td>System Active</td>
<td>Protect SVC</td>
<td>0.00</td>
<td>0.68</td>
<td>0.68</td>
<td></td>
</tr>
<tr>
<td>File Mgmt Delay</td>
<td>Close SVC</td>
<td>0.00</td>
<td>0.16</td>
<td>0.16</td>
<td></td>
</tr>
<tr>
<td>Data Delay</td>
<td>Excpvr SVC</td>
<td>0.08</td>
<td>0.00</td>
<td>0.08</td>
<td></td>
</tr>
<tr>
<td>DASD Mgmt Delay</td>
<td>Obtain SVC</td>
<td>0.04</td>
<td>0.00</td>
<td>0.04</td>
<td></td>
</tr>
<tr>
<td>Resource Conflict</td>
<td>Global Serialization</td>
<td>0.04</td>
<td>0.00</td>
<td>0.04</td>
<td></td>
</tr>
<tr>
<td>System Active</td>
<td>Getmain 120 SVC</td>
<td>0.04</td>
<td>0.00</td>
<td>0.04</td>
<td></td>
</tr>
</tbody>
</table>
When you press Enter, the DataView panel is displayed:

```
CA MAT -------------------------- DataView ------------------ ROW 1 to 4 of 4
COMMAND ===>                     SCROLL ===> CSR
Primary commands: LINKlist on/off Profile: TUNIVP1
   Options: NORMAL
Line commands: S - Select          Linklist: OFF
LC DD name Dataset name Delay% Visual
-------- ------------------------ ------- -------------
   UNBLOCK SYS99140.T113840.RA000.TUNIVP1.DOUT3.H03 18.11
   BIGBLOCK SYS99140.T113840.RA000.TUNIVP1.DOUT1.H03 0.67
   STEPLIB TR.XTST1.COBLOAD
   STEPLIB SYS1.VSCOBII.SYS.COB2LIB
```

If you place the cursor anywhere on the UNBLOCK line and press Enter, the Data Set Details panel for UNBLOCK is displayed.

```
CA MAT --------------------- Data Set Details ---------------- Row 1 to 27 of 30
COMMAND ===>                     SCROLL ===> PAGE
DDNAME: UNBLOCK                  Profile: TUNIVP1
Opened for: PUT LOCATE           Access Method: QSAM Concatenation Count: 0
     Data Set Information for: SYS03182.T133728.RA000.TUNCOB01.DOUT3.H03
     File Type: Physical Sequential
     Description: Fixed
     ------ SMS ------- ------ Allocation ------ ----------- Format ----------------
     DATACLAS: **NONE** Unit:                TRK DS Org:         PS Rec FM:        F
     STORCLAS: **NONE** Primary:               5 Log Rec Len:   200 Blk Size:    200
     MGMTCLAS: **NONE** Secondary:             5 Buffer Count:    5 Buf Size:   1000
     Volume Count:          1 Stripes:         0 Concat #:      0
     Curr Extent Count:     1
     ---------------- Data Set Performance ----------------
     Avg Response Time:       2.34  Avg IOSQ Time:   0.00
     Active Rate:      22.03  Avg Pend Time:   1.12
     Total EXCPs:       3150  Avg Disc Time:   0.05
     Total Connect Time:           823.94  Avg Conn Time:   1.17
     Volume Information for Volume PUBA01 -------------------------
     Unit No.: 8359            Avg Resp Time:   1.72     Avg IOSQ Time:   0.00
     Dev Type: 3390-380         Active Rate:  72.00     Avg Pend Time:   0.20
     Alloc Cnt: 0                Dev Res:   0.00     Avg Disc Time:   0.03
     Open Cnt: 0                 Dev Util:   0.00     Avg Conn Time:   1.50
     Mounted: PUBLIC
     Cache Act.: CFW CAC DFW
```

When you press End, you return to the previous panel.
Display Column Totals

You can display numeric totals and subtotals for any tabular panel. Column totals are the sum of all lines in the table, not just the lines displayed on the screen. Column subtotals are displayed when a panel is filtered. Column totals are fixed and remain on the screen when you scroll through the data.

You can display column totals by default. See the *Installation Guide*.

**To display column totals:**

1. On the COMMAND line, type TOTals. The numeric totals for the panel will appear at the bottom of the panel.

```
CA MAT -------------------------- TaskView --------- Screen CUSTOMIZ changed
COMMAND ===>                     SCROLL ===> CSR
Primary commands: SElect, RECall, ADDHelp
Line commands: T - Tag    C - Code Details
               U - Untag  D - Delay Details
Options: NORMAL

LC Program  T Actv% Data% System% VolWait% InvWait% Other% Total%
>03

|    |        |    |    |    |
|--------------------------|--------------------------|--------------------------|--------------------------|--------------------------|--------------------------|
| DFHD2EX3                | 8.31 44.21 0.00 0.06 0.00 0.00 52.58 |
| DFHD2EX3                | 0.82 13.22 0.00 0.01 0.00 0.00 14.06 |
| DFHD2EX3                | 0.66  8.80 0.00 0.06 0.22 0.00  9.74 |
| DFHD2EX3                | 0.32  4.06 0.00 4.78 0.00 0.00  9.16 |
| DFHKETCB                | 0.19  3.00 0.00  0.20 0.00 0.00  3.38 |
| DFHD2EX3                | 0.69  2.29 0.00 0.01 0.00 0.00  3.00 |
| DFHD2EX3                | 0.13  2.64 0.00 0.04 0.00 0.00  2.61 |
| DFHD2EX3                | 0.09  0.68 0.00 0.01 0.00 0.00  0.78 |
| DFHD2EX3                | 0.84  0.39 0.00 0.12 0.14 0.00  0.69 |
| DFHD2EX3                | 0.43  0.22 0.00 0.03 0.00 0.00  0.68 |

Subtotals and Totals --------------------------

<p>| | | | | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>11.72 79.95 0.00 5.33 0.36 0.00 97.36</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>11.88 82.24 0.00 5.49 0.39 0.00 100.00</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
```
If you specify a filter for a field, the subtotals, which are the totals for the filtered data only, are displayed above the totals for all of the data.

Filter the Display

You can filter the information on a panel. By filtering on a field, you can alter the displayed data to the specific data you are interested in.

To add a filter:
1. Choose a field with underscores beneath its title.
2. Press the Tab key to move to the underscores.
3. Type an operand and the filter criteria.
4. Press Enter.

The display contains only data matching the filter criteria you specified.

2. To remove the totals from the display, type TOTals again.
Rules for Setting Filters

Use any of the following operands to filter information in a panel:

<table>
<thead>
<tr>
<th>Operand</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>&gt;</td>
<td>greater than</td>
</tr>
<tr>
<td>&lt;</td>
<td>less than</td>
</tr>
<tr>
<td>=</td>
<td>equals; the default</td>
</tr>
<tr>
<td>¬</td>
<td>not equal to</td>
</tr>
<tr>
<td>¢</td>
<td>not equal to</td>
</tr>
<tr>
<td>~</td>
<td>not equal to</td>
</tr>
<tr>
<td>&gt;=</td>
<td>greater than or equal to</td>
</tr>
<tr>
<td>&lt;=</td>
<td>less than or equal to</td>
</tr>
</tbody>
</table>

Valid wildcard characters are asterisk (*), percentage (%), and question mark (?).

**Asterisk**: Use an asterisk at the beginning, middle, or end of a string to indicate the minimum acceptable string; for example:
- *XYZ displays anything that ends with the characters XYZ, regardless of what the string begins with.
- ABC*XYZ displays anything that begins with ABC and ends with XYZ, regardless of how many characters are in between.

**Percent**: Use a % sign to indicate that the position must be occupied by a number; for example:

The filter criterion XYZ%% displays all instances of XYZ followed by two numbers. XYZ30 and XYZ42 satisfy the condition, but XYZ173 and XYZ2A do not.

**Question mark**: Use a question mark to indicate that a given position must be occupied by any character, regardless of its type.

The filter JOB?A% displays all jobs that have JOB in the first three positions, any character in the fourth, an A in the fifth, and a number in the last position. JOB1A6 and JOB#A7 are displayed, but JOB1Z is not.
If you use a wildcard within a numeric value, that number is treated as a character string. For example, you can use the filter ??9 to filter a field to show only three-digit numeric values that end with the number 9.

If more than one filter is established for a panel, both conditions must be satisfied for the data to appear. If you want to use a filter that is wider than a column, you must use screen customization.

**Filter Example**

The Active Jobs panel is shown following without any filters in place. All jobs running on SYSI, SYSM and SYSO are shown.

```
CA MAT  ------------------------- Active Jobs ------------- Row 1 to 11 of 774
COMMAND ====>                SCROLL ===> CSR

Primary commands: STAtus                                                Server ID: MATUNER
Status: ACTIVE
Line commands: M - Display Monitoring Criteria                         Local SYSID: SYSO
I - Invoke Monitor
S - Display Active Select Command

<table>
<thead>
<tr>
<th>LC</th>
<th>Jobname</th>
<th>Stepname</th>
<th>Procstep</th>
<th>Sysplex</th>
<th>SysName</th>
<th>A/S</th>
<th>Type</th>
<th>Cur</th>
<th>Pos</th>
<th>REAL</th>
<th>Rate</th>
<th>Rate</th>
<th>SMFID</th>
</tr>
</thead>
<tbody>
<tr>
<td><em>MASTER</em></td>
<td>SYSI</td>
<td>1 STC</td>
<td>NS</td>
<td>1633</td>
<td>SYSI</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><em>MASTER</em></td>
<td>SYSM</td>
<td>1 STC</td>
<td>NS</td>
<td>3210</td>
<td>SYSM</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><em>MASTER</em></td>
<td>SYSO</td>
<td>1 STC</td>
<td>NS</td>
<td>5721</td>
<td>SYSO</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>PCAUTH PCAUTH</td>
<td>SYSI</td>
<td>2 STC</td>
<td>NS</td>
<td>55</td>
<td>SYSI</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>PCAUTH PCAUTH</td>
<td>SYSM</td>
<td>2 STC</td>
<td>NS</td>
<td>55</td>
<td>SYSM</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>PCAUTH PCAUTH</td>
<td>SYSO</td>
<td>2 STC</td>
<td>NS</td>
<td>56</td>
<td>SYSO</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>RASP RASP</td>
<td>SYSI</td>
<td>3 STC</td>
<td>NS</td>
<td>120</td>
<td>SYSI</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>RASP RASP</td>
<td>SYSM</td>
<td>3 STC</td>
<td>NS</td>
<td>122</td>
<td>SYSM</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>RASP RASP</td>
<td>SYSO</td>
<td>3 STC</td>
<td>NS</td>
<td>122</td>
<td>SYSO</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>TRACE TRACE</td>
<td>SYSI</td>
<td>4 STC</td>
<td>NS</td>
<td>113</td>
<td>SYSI</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>TRACE TRACE</td>
<td>SYSM</td>
<td>4 STC</td>
<td>NS</td>
<td>137</td>
<td>SYSM</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
```
By placing \( >2 \) in the CPU Rate field, the display is limited to active jobs with a CPU Rate of over 2 percent, as shown next.

<table>
<thead>
<tr>
<th>CA MAT</th>
<th>-------------------------</th>
<th>Active Jobs</th>
<th>------------</th>
<th>Row 1 to 11 of 774</th>
</tr>
</thead>
<tbody>
<tr>
<td>COMMAND ==&gt;&gt;</td>
<td>SCROLL ==&gt;&gt;</td>
<td>CSR</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Primary commands: STAtus</td>
<td>Server ID: MATUNER</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Status: ACTIVE</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Line commands: M - Display Monitoring Criteria</td>
<td>Local SYSID: SYSO</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>I - Invoke Monitor</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>S - Display Active Select Command</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>LC Jobname</td>
<td>Stepname</td>
<td>Procstep</td>
<td>Sysplex</td>
<td>SysName</td>
</tr>
<tr>
<td>__________</td>
<td>__________</td>
<td>__________</td>
<td>________</td>
<td>________</td>
</tr>
<tr>
<td><em>MASTER</em></td>
<td>SYSI</td>
<td>1 STC</td>
<td>NS</td>
<td>1633</td>
</tr>
<tr>
<td><em>MASTER</em></td>
<td>SYSM</td>
<td>1 STC</td>
<td>NS</td>
<td>3210</td>
</tr>
<tr>
<td><em>MASTER</em></td>
<td>SYSO</td>
<td>1 STC</td>
<td>NS</td>
<td>5721</td>
</tr>
<tr>
<td>PCAUTH PCAUTH</td>
<td>SYSI</td>
<td>2 STC</td>
<td>NS</td>
<td>55</td>
</tr>
</tbody>
</table>

By adding SYSO to the field for Sysplex SysName, only the jobs running on SYSO with a CPU Rate of over 2 percent are displayed, as shown next.

<table>
<thead>
<tr>
<th>CA MAT</th>
<th>-------------------------</th>
<th>Active Jobs</th>
<th>------------</th>
<th>Row 131 of 779</th>
</tr>
</thead>
<tbody>
<tr>
<td>COMMAND ==&gt;&gt;</td>
<td>SCROLL ==&gt;&gt;</td>
<td>CSR</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Primary commands: STAtus</td>
<td>Server ID: MATUNER</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Status: ACTIVE</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Line commands: M - Display Monitoring Criteria</td>
<td>Local SYSID: SYSO</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>I - Invoke Monitor</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>S - Display Active Select Command</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>LC Jobname</td>
<td>Stepname</td>
<td>Procstep</td>
<td>Sysplex</td>
<td>SysName</td>
</tr>
<tr>
<td>__________</td>
<td>__________</td>
<td>__________</td>
<td>________</td>
<td>________</td>
</tr>
<tr>
<td>MMASYSO MMASYSO</td>
<td>SSASYSPO</td>
<td>SYSO</td>
<td>49 STC</td>
<td>NS</td>
</tr>
<tr>
<td>MV$PASK PASO PA</td>
<td>SYSO</td>
<td>230 STC</td>
<td>NS</td>
<td>28K</td>
</tr>
<tr>
<td>MV$CASK CASO CA</td>
<td>SYSO</td>
<td>236 STC</td>
<td>NS</td>
<td>28K</td>
</tr>
</tbody>
</table>

The filters established for both the CPU Rate and Sysplex SysName fields remain visible, so that you can always see the filters currently in effect.
Customize Panels

You can modify the display properties for each panel using the Screen Customization panel. This panel allows you to define how information is presented when a panel is displayed.

1. On the COMMAND line of the panel, type CUST.
2. Press Enter.
   The Screen Customization panel is displayed.
3. Use the table in the Fixed Fields section to define how you want the panel to display data.
4. Press End to return to the panel.
   You will see the customized display; however, the customization has not been saved. The customization is saved when the panel is exited.

The section Reset the Display shows the Screen Customization panel for the Active Jobs panel. The contents of the FIELD column are almost identical to the fields on the panel. These are the internal field names used by the SORT command.

<table>
<thead>
<tr>
<th>FIELD</th>
<th>SORT</th>
<th>INCL/FLD</th>
<th>FILTER</th>
</tr>
</thead>
<tbody>
<tr>
<td>LC</td>
<td>INCL</td>
<td>CHR</td>
<td></td>
</tr>
<tr>
<td>JOBNAME</td>
<td>INCL</td>
<td>CHR</td>
<td></td>
</tr>
<tr>
<td>STEPNM</td>
<td>INCL</td>
<td>CHR</td>
<td></td>
</tr>
<tr>
<td>PROCSTEP</td>
<td>INCL</td>
<td>CHR</td>
<td></td>
</tr>
<tr>
<td>SYSID</td>
<td>INCL</td>
<td>CHR</td>
<td></td>
</tr>
<tr>
<td>ASID</td>
<td>INCL</td>
<td>NUM</td>
<td></td>
</tr>
<tr>
<td>ASIDX</td>
<td>EXCL</td>
<td>HEX</td>
<td></td>
</tr>
<tr>
<td>TYP</td>
<td>INCL</td>
<td>CHR</td>
<td></td>
</tr>
<tr>
<td>POS</td>
<td>INCL</td>
<td>CHR</td>
<td></td>
</tr>
<tr>
<td>DPAR</td>
<td>INCL</td>
<td>NUM</td>
<td></td>
</tr>
<tr>
<td>REAL</td>
<td>INCL</td>
<td>NUM</td>
<td></td>
</tr>
<tr>
<td>CPURATE</td>
<td>INCL</td>
<td>NUM</td>
<td></td>
</tr>
<tr>
<td>CPU TIME</td>
<td>EXCL</td>
<td>NUM</td>
<td></td>
</tr>
<tr>
<td>TCB TIME</td>
<td>EXCL</td>
<td>NUM</td>
<td></td>
</tr>
<tr>
<td>SB TIME</td>
<td>EXCL</td>
<td>NUM</td>
<td></td>
</tr>
<tr>
<td>DCPUTIME</td>
<td>EXCL</td>
<td>NUM</td>
<td></td>
</tr>
<tr>
<td>DTCB TIME</td>
<td>EXCL</td>
<td>NUM</td>
<td></td>
</tr>
<tr>
<td>DSPTIME</td>
<td>EXCL</td>
<td>NUM</td>
<td></td>
</tr>
<tr>
<td>EXCP</td>
<td>EXCL</td>
<td>NUM</td>
<td></td>
</tr>
<tr>
<td>DELT EXCP</td>
<td>EXCL</td>
<td>NUM</td>
<td></td>
</tr>
</tbody>
</table>

Press ENTER and END to apply changes or CANCEL to exit with no change.
Fixed Fields

Notice that the first two fields, LC and JOBNAME, are highlighted. This highlighting identifies those fields as fixed fields. A fixed field remains at the left margin when you scroll the panel to see additional columns so that you can relate a jobname or other type of identifying information to the data being displayed.

Fixed fields are established by CA Mainframe Application Tuner and cannot be included, excluded, or moved. In addition, other fields cannot be moved in front of a fixed field. See Scroll Panels for more information on fixed fields.

<table>
<thead>
<tr>
<th>To</th>
<th>Do this</th>
</tr>
</thead>
<tbody>
<tr>
<td>sort the data on a panel</td>
<td>In the S column next to the field you want to sort by, type <strong>SD</strong> to sort in descending order or <strong>SA</strong> to sort in ascending order. In addition: If a sort condition already exists for a panel, an A or a D appears in the SORT field. A panel can be sorted by only one field at a time. To remove sort criteria from a panel, type <strong>NOSORT</strong> on the <strong>COMMAND</strong> line.</td>
</tr>
<tr>
<td>exclude or include fields from the display</td>
<td>To exclude a field from view, type an <strong>E</strong> in the S column next to the field. To include a previously excluded field, type an <strong>I</strong> next to the field.</td>
</tr>
<tr>
<td>reorder fields</td>
<td>Type <strong>M</strong> in the S column next to the field to be moved. Type <strong>A</strong> for after or <strong>B</strong> for before to indicate where the field should go.</td>
</tr>
<tr>
<td>add a filter</td>
<td>To add a filter, type the operand and the value in the <strong>FILTER</strong> field; for example, &gt;2, =15, =MAK*. The following wildcards are valid for the FILTER field: * Indicates any character. % Indicates any single digit. ? Indicates any single character.</td>
</tr>
<tr>
<td>remove a filter</td>
<td>To remove a filter, blank out the filter in the <strong>FILTER</strong> field.</td>
</tr>
<tr>
<td>display field help</td>
<td>In the S column next to a field, type <strong>H</strong> to display the Help pop-up panel for that field. Press <strong>End</strong> to return to the Screen Customization panel.</td>
</tr>
</tbody>
</table>
Reset the Display

To delete changes made to the display, type RESET on the COMMAND line and press Enter. The display reverts to the previously saved customization format. If customization changes have not been added and saved, the RESET command reverts to default parameters.

Customization changes are saved in your ISPF PROFILE in a member called TUNPROF. To restore all panels to their original configuration, delete the TUNPROF member from your ISPF profile data set.

Confirm Screen Customization

Only changes made using the Screen Customization pop-up panel can be saved. Changes made by altering the filter or sort criteria directly on a panel are discarded as soon as another panel is displayed.

When you exit a panel you have customized, the Confirm Screen Customization pop-up panel is displayed:

| CA MAT  --------- Confirm Screen Customization ----------------|
|                                                               |
| Screen TUNDACT has been customized. To save the customized   |
| screen, press ENTER. To cancel any changes, enter END.       |

- To save your changes, press Enter
  The next time you access CA Mainframe Application Tuner, the customized version of the panel is displayed.
- To discard your customized panel and restore the original version, press End.

Save the Information on a Panel

CA Mainframe Application Tuner allows you to save the data displayed on any panel for later use by exporting the information to an ISPF data set. You can then include the data in another report, download the data for use in a PC spreadsheet program, or perform many other operations.
Export a Panel

1. Display the panel that you want to export; for example, CodeView.
2. On the COMMAND line, type EXPORT.
3. Press Enter.

The Screen Export Information panel is displayed:

```
CA MAT --------- Screen Export for: CodeView ---------
COMMAND ===>  

ISPF library:
  Project ===>  
  Group ===>  
  Type ===>  
  Member ===>  
  (Blank or pattern for member selection list)

Other partitioned or sequential data set:
  Dataset name ===>  
  Volume serial ===>  
  (If not cataloged)

Export options:
  Disposition ===> REPLACE  (Replace or Append)
  Edit after export ===> NO  (Yes or No)
  Output format ===> CSV  (CSV or ASIS)
  Rows ===> ALL  (All or Filtered)

Press ENTER to export screen or END to exit with no export
```

4. Type the name of the data set and member to which you want to export the panel in the ISPF library fields or Other partitioned or sequential data set field.

5. Specify the four parameters for Export options, as described next.

**Disposition**

Specify **Replace** if you want to replace an existing data set.

Specify **Append** to add the data at the bottom of the existing data set or member.

**Edit after export**

- Specify **NO** to transfer the data to the specified data set and return to the panel. You may edit the data at a later time.
- Specify **YES** to transfer to the data set and member in standard ISPF edit mode.

Note that for performance reasons, CA Mainframe Application Tuner sets the ISPF RECOVERY parameter to OFF.
Output format

Specify ASIS if you want the format to appear as it does online.

Specify CSV if you want the exported data to be in Comma Separated Value format. The CSV format is useful if you are downloading data to a spreadsheet.

Note that if you have set your ISPF decimal delimiter variable (ZDEC) to a value other than a decimal point (.), a semicolon (;) is used instead of a comma (,) to separate the values.

Rows

Specify ALL if you want to ignore any filters that might be in effect and export all the data.

Specify FILTERED to export the data as displayed on the panel.

The amount of data exported is determined by the size of the data set to which you export, not by the size of your terminal display. For example, suppose you have an 80-byte terminal monitor and must scroll to the right to see all the fields on a particular panel.

When you export the panel to a 121-character data set, CA Mainframe Application Tuner exports the full 121 characters worth of data, not just the 80 bytes currently visible.

If you are planning to create a data set expressly to export panels, it is recommended that the data set be allocated with a logical record length of 589 characters, which will accommodate the widest panel.

6. Press End to end the edit session and save the data or type CANCEL to quit without saving.
Write Data from a Table to SYSOUT

The Report primary command enables you to write the data displayed in a panel to a SYSOUT data set.

1. On the COMMAND line on a panel, type REPORT.
2. Press Enter.

The Screen Report Information panel is displayed:

If the Report command is not available for a particular panel,

<table>
<thead>
<tr>
<th>CA MAT</th>
<th>Report for: CodeView</th>
</tr>
</thead>
<tbody>
<tr>
<td>COMMAND</td>
<td>====&gt;</td>
</tr>
</tbody>
</table>

Output Information:

| SYSOUT class  | ====> A              |
| Lines per page| ====> 60             |
| Report width  | ====> 133            |
| Carriage control | ====> ANSI          |
| Destination ID | ====>                |
| Report form   | ====>                |

Table Format Information:

| Include rows | ====> FILTERED (ALL or FILTERED) |

User Data:

User heading ====>

Press ENTER to generate report or END to exit with no report

3. Specify each of the fields as explained next.

SYSOUT class

Specify the JES SYSOUT class for the printed report.

Lines per page

Specify the number of lines, including the header, to be written to a single page before a new page is initiated.

Report width

Specify the width of the report. If there are columns to the left of the panel, they are included in the report up to the width of the report.

Carriage control

Specify whether ANSI or MACHINE carriage control characters are to be used.

Destination ID

Specify the one- to eight-character node name of the JES destination that the SYSOUT report is to be written to. In addition, you can specify a one- to eight-character user ID. If you specify a user ID, it must follow the node name and must be separated from the node name with a period.
Report form

Specify a one- to four-character JES form name for the destination that the report is to be written to.

Include rows

Specify ALL if you want to report on all the data, regardless of the filters in effect. Specify FILTERED to report on just the data that satisfies the filter criteria.

User heading

Specify a user title of up to 47 characters to be included as part of the report heading.

Issue Commands in a Sysplex Environment

The following console commands are specific to use of CA Mainframe Application Tuner in a sysplex environment. These commands permit you to shut down all servers within the sysplex group or temporarily change a parameter for one or more servers in an XCF group.

To shut down all servers, issue the following command:

F MATUNER,PERFORM SHUTDOWN TARGSYS1(*)

To change a parameter for one or more servers in an XCF group, issue the following command:

F MATUNER,PERFORM SETPARM TARGSYS1(*) parameter(operand)

where the asterisk is a wild card used to represents the target system names, parameter represents the parameter to be changed, and the operand is the new value.

The following example demonstrate the use of the SETPARM command to change the MAXACT parameter from its current setting to 10 for all servers in the XCF group.

F MATUNER,PERFORM SETPARM TARGSYS1(*) MAXACT(10)

To change the MAXACT value for a single server, you would identify the server using the TARSYS1 operand rather than inserting a wild card, as shown in the following example.

F MATUNER,PERFORM SETPARM TARGSYS1(SYSA) MAXACT(10)

Using SETPARM temporarily changes the parameter value for the selected server. To permanently change the parameter value, edit TUNSSP00.

The available parameters for use with the SETPARM command are discussed next.

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Value</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>MAXACT</td>
<td>nnn</td>
<td>The maximum number of active monitor requests.</td>
</tr>
<tr>
<td>Command</td>
<td>Description</td>
<td></td>
</tr>
<tr>
<td>----------</td>
<td>------------------------------------------------------------------------------</td>
<td></td>
</tr>
<tr>
<td>QTLIMIT</td>
<td>nnn</td>
<td>The maximum number of hours before CA MAT automatically stops the waiting monitor (168 hours is one week).</td>
</tr>
<tr>
<td>CAFSTALL</td>
<td>nnn</td>
<td>The maximum number of seconds CA MAT will catalog records as it waits for DB2® to respond. It is recommended that this value be set to at least 90 seconds.</td>
</tr>
<tr>
<td>DSNPREFIX</td>
<td>ssss</td>
<td>1-8 character name used as the first qualifier of the monitor data set names.</td>
</tr>
<tr>
<td>CICSNAME</td>
<td>ssss</td>
<td>The CICS start-up program if it is not the standard CICS name of DFHSIP.</td>
</tr>
<tr>
<td>CAPS</td>
<td>ON</td>
<td>Indicates if CA MAT is set to translate all messages to uppercase (ON) or not (OFF). The purpose of this feature is to make sure CA MAT is compatible with katakana consoles.</td>
</tr>
<tr>
<td>LOGGING</td>
<td>L1</td>
<td>Indicates whether internal logging is to be turned on or off and at what detail level. Log records are written to TUNLOG.</td>
</tr>
</tbody>
</table>
Chapter 3: Setting up a Monitor Definition

This chapter describes how to create and manage monitor definitions.

This section contains the following topics:

- **Samples and Observations** (see page 53)
- **What is a Monitor Definition?** (see page 54)
- **Analyze Monitor Data** (see page 55)
- **Create a Monitor Definition** (see page 56)
- **Create a Multijob Monitor: Grouping** (see page 75)
- **Create a Monitor Schedule** (see page 79)

**Samples and Observations**

Starting with release 4.0 of CA Mainframe Application Tuner, there is a change in the definition of how samples are gathered.

Formerly, when you requested the number of samples to be gathered, the request was actually for the number of times CA Mainframe Application Tuner observes the complete activity of the address space. That is, the request was for the number of times the address space is swapped out, nondispatchable, delayed by LPAR/disabled work, actively using CPU, and waiting. Only the last two activities (actively using CPU and waiting) actually generate samples.

Because of this situation, CA Mainframe Application Tuner is introducing the concept of **Observations** and **Samples**. When you define how an address space is to be monitored (measured), you will request the number of times the address space activity is observed. Observations and observation rate are the only things you can influence, because you cannot predict beforehand the number samples that CA Mainframe Application Tuner will gather.

A sample within CA Mainframe Application Tuner reflects the activity of a TCB during an observation. The number of samples per observations can fluctuate tremendously from 0 to the total number of TCBs attached at the time of the observation.

So, an **observation** is the number and rate that CA Mainframe Application Tuner will examine the activity of the address space to be measured. A **sample** is created to reflect the activity of a TCB during an observation. There can be many samples gathered during an observation or 0 samples gathered, depending on the activity.
What is a Monitor Definition?

A monitor definition tells CA Mainframe Application Tuner which program to monitor. It specifies details about the job step and its programs, transactions, 4GL languages, or external databases. You create a monitor definition by specifying a set of monitoring criteria. You invoke a monitor definition to collect a set of sample data for analysis.

CA Mainframe Application Tuner maintains monitor definitions across sessions. This feature allows you to reuse the same monitor definition when you want to repeat a certain analysis after making changes to the program code based on a previous analysis. You can examine the impact of your changes by using this iterative approach to performance tuning. For each subsequent invocation of a monitor definition, you do not need to respecify data which ensures that CA Mainframe Application Tuner uses the same monitoring criteria.

Invoke a Monitor Definition

A monitor definition becomes a monitor request from the time it is invoked until the observation and sampling processes are complete. The Server Space tracks the monitor requests of all users on the z/OS image on which CA Mainframe Application Tuner is active. Any number of monitor requests can be active at the same time, depending on the value that is specified on the MAXACT TRPARM parameter. See the *Installation Guide*.

Sampling Rules

When samples are created to reflect the activity of a TCB, there are certain rules which determine if the sample shows any noteworthy activity. These rules are as follows:

- If a TCB is actively using the CPU, a sample is always written for the TCB.
- If the TCB is waiting and is not the jobstep task (subtask) and the ECB that the TCB is waiting for cannot be related to anything that CA Mainframe Application Tuner reports (file activity, database activity, and so on), the sample is discarded. For instance, if a subtask is waiting for an ECB for an internal work queue that is only known to the application, the sample is discarded. If the ECB relates to file activity, the sample is considered noteworthy and is written to the monitor file.
- If the TCB is the jobstep TCB, all waiting activity is recorded with one exception. If the ECB or an ECB within an ECB list contains the termination ECB of a subtask, the waiting sample for the jobstep TCB is discarded. It is assumed by CA Mainframe Application Tuner that if a task waits for a subtask to be completed, it is performing the same functionality as a LINK but doing it with ATTACH instead.

Because of these rules, there can be large fluctuations in % Samples Active and % Samples Waiting. Without knowledge about the application and the address space type, the numbers might appear to be invalid in a multitasking and multi-CPU environment.
A monitor can be invoked in the following ways:

- By invoking a monitor definition for managed or scheduled monitoring
- By choosing a job that is actively running for immediate results
- From outside the TSO Client for automated operations

Monitor requests are written to the Global Information File (GIF), which allows for persistence of the request, even if the Server Space is deactivated or if the entire system is shut down. When the Server Space is started through a batch job or during IPL, it reads the monitor request from the GIF and reinstates any waiting monitor requests.

See the chapter "Invoking a Monitor" for more information.

You can invoke a monitor automatically when you exit the Monitoring Criteria panel. Specify YES or CONFIRM in the Invoke Monitor field on the Profile Parameters panel.

See the Installation Guide for a complete description of the Profile Parameters panel.

**Analyze Monitor Data**

After the monitor request terminates, you can analyze the data you collected by using the Interactive Analysis Facility. See the chapter "Analyzing Monitor Data" for more information.
Create a Monitor Definition

Before CA Mainframe Application Tuner begins monitoring a program, you must create a monitor definition that describes the target program and the observation criteria.

**To create a monitor definition**

1. From the Primary Option Menu, select Option 1.
   
   The Monitor Definition panel displays.

   ![](image)

   The following table lists the commands on the Monitor Definition panel.

<table>
<thead>
<tr>
<th>For information about</th>
<th>See</th>
</tr>
</thead>
<tbody>
<tr>
<td>ADD</td>
<td>Add a Monitor Definition</td>
</tr>
<tr>
<td>STAtus</td>
<td>Display Monitor Request Status</td>
</tr>
<tr>
<td>S - Select</td>
<td>Edit a Monitor Definition</td>
</tr>
<tr>
<td>I - Invoke</td>
<td>Invoke a Monitor from the TSO Client</td>
</tr>
<tr>
<td>H - History</td>
<td>Display Monitor History</td>
</tr>
<tr>
<td>C - Copy</td>
<td>Copy a Monitor Definition</td>
</tr>
<tr>
<td>A - Analyze Normal</td>
<td>Start Interactive Analysis</td>
</tr>
<tr>
<td>AL - Analyze All</td>
<td>Start Interactive Analysis</td>
</tr>
<tr>
<td>AA - Analyze Active</td>
<td>Start Interactive Analysis</td>
</tr>
<tr>
<td>AW - Analyze Wait</td>
<td>Start Interactive Analysis</td>
</tr>
<tr>
<td>D - Delete</td>
<td>Delete a Monitor Definition</td>
</tr>
<tr>
<td>DD - Delete w/ dsns</td>
<td>Delete a Monitor Definition</td>
</tr>
</tbody>
</table>
The fields on the Monitor Definition panel are described next.

**Profile**

Profile name specified when you created the monitor definition.

This field is also referred to as the Monitor Definition name.

**Status**

Status of the monitor request.

Status is refreshed each time you press Enter. Status contains one of the following values:

- **Waiting** - The request has been submitted to CA Mainframe Application Tuner but the target is not active. CA Mainframe Application Tuner is waiting for an opportunity to begin monitoring the target application.

- **Active** - CA Mainframe Application Tuner is actively monitoring the indicated target. (Observations are being taken and samples are being collected.)

- **Inactive** - The monitor definition is available, but the Server Space has not been requested to begin monitoring.

- **Delete** - The request is no longer tracked by the Server Space. Output data is available in the monitor data set.

- **Incomplete** - The request is no longer tracked by the Server Space. The output data set is not found.

- **Unknown** - Communications could not be established with the Server Space. The Server Space might need to be activated.

**Schedule**

Name of an associated schedule for the monitor to run.

**Runs**

Number of monitor invocations since the definition was created.

This value is the number of data sets that are available in the Monitor History panel.

**Description**

Text describing the monitor definition.

**Batch**

Indicates whether a preset series of reports are created in batch mode after the monitor is complete.
Create a Monitor Definition

Jobname
Name of the job to be monitored

Scroll right to display the following fields:

Procstep
Name of the procedure step to be monitored if the job step uses a cataloged or in-stream procedure.

Stepname
Name of the job step to be monitored.
If no cataloged procedure is used, displays the step name on the EXEC statement that invoked the program. If a cataloged procedure is used, displays the name of the step that invoked the procedure.

Program
Name of the program on the JCL EXEC statement of the job to be monitored.

Multi-Step Monitoring
Indicates if the profile has multistep monitoring specified.

Step Monitoring
Indicates if the profile specifies that the entire job step is to be monitored.

Date
Date of the last monitor to be analyzed.

Time
Time of the last monitor to be analyzed.

Monitor Dataset
Data set name of the file to monitor for each profile.
This name will generally contain variables. For a complete description, see the table in the section Add a Monitor Definition.

Actual Dataset
Data set name of the monitor data set with variables substituted.

TCB incl-1 to TCB incl-4
Tasks identified by these names are included in the monitor.
No other tasks are monitored.
TCB excl-1 to TCB excl-4
Tasks identified by these names are excluded from the monitor.
All other tasks are monitored.

Observation Interval
Number of milliseconds between observations.
CA Mainframe Application Tuner calculates this number and adjusts it during the monitoring period.

Observations
Number of observations requested.

Elapsed
Amount of time in seconds that the job step is monitored.

Strt Delay
Delay in seconds for startup of the monitor request.
You might want to specify a delay in order to skip monitoring the initialization functions within the job step.

Monitors per job step execution
Number of monitoring sessions to be started for a single execution of a job step.
When a monitor session reaches its target observation count, CA Mainframe Application Tuner closes the monitor data set, and continues monitoring with a new monitor data set. When a monitor data set is closed, it is available for analysis. This process is known as successive monitoring.
The number is specified on the "Job Monitoring Criteria" panel (which appears from the All Jobs field of the Monitoring Criteria panel).
To specify successive monitoring, enter a value equal to or greater than 1 in the following field:
Run up to 0 monitors per job step execution

Number of job step runs to monitor
Number of times a monitor is to be run for a job step.
This field allows for multiple monitor runs for only one invocation.
The number is specified on the "Job Monitoring Criteria" panel (which appears from the All Jobs field of the Monitoring Criteria panel).
To specify recurrent monitoring, enter a value equal to or greater than 1 in the following field:
Monitor this job the next 0 times it runs
Create a Monitor Definition

**Strt Window**
Start of a time range during which the monitor request is valid.
If the job step to be monitored ends before the start time, the monitor will not start. If the job step is running at the start time, monitoring begins at that time.

**End Window**
End time of a time range during which the monitor request is valid.
If the job step to be monitored does not start before the end time, the monitor request is cancelled.

**DB exit**
Name of the exit routine for monitoring non-DB2 databases.

**4GL exit**
Name of the exit routine for monitoring 4GL languages.

**Target 1- Target 4**
Target systems in a sysplex where a job will be monitored.
Blank specifies local system only. "**" specifies all systems in the sysplex.

**Trans. 1 - Trans. 4**
Transaction codes to be monitored for IMS and CICS jobs only.

**Term 1 - Term 4**
Terminal IDs to be monitored for IMS and CICS jobs only.

**User 1 - User 4**
User IDs to be monitored for IMS and CICS jobs only.

**OLTP**
Type of transaction processing system, if any, that was monitored for IMS and CICS jobs only.

**Tasklib**
Specifies the name of an alternate DDNAME from which the monitored program loads other programs.
CA Mainframe Application Tuner requires the location of program load modules to obtain the information required to display CSECT offsets during analysis.
WAS Expert

Whether or not to enable PSW sampling when a WebSphere application server application is monitored.

Specify Y to enable this feature, N to disable it.

Disabling this feature will reduce the amount of data collected. CA Mainframe Application Tuner analysis will be limited to WebSphere data only.

Created By

Defines the TSO User ID of the creator of this monitor definition.

Date Created

Defines the date on which this monitor definition was created.

Time Created

Defines the time at which this monitor definition was created.

Changed By

Defines the TSO User ID of the last person to change this monitor definition.

Date Changed

Defines the date on which this monitor definition was last changed.

Time Changed

Defines the time at which this monitor definition was last changed.
Add a Monitor Definition

1. On the COMMAND line, type ADD xxxx to add a new monitor definition where xxxx is a one- to eight-character unique identifier for the monitor definition.

   The identifier is maintained as the profile name for the monitor you are adding. Profile names are displayed on the Monitor Definition panel and are sorted alphabetically.

2. Press Enter.

   The Monitoring Criteria panel displays.

   ![Monitoring Criteria Panel]

3. Specify all required information for your monitor definition.

   Fields identified as Optional might narrow down the selection and generate fewer but more precise samples.

4. Press End to save your changes, or type CANCEL to exit without saving changes.

   The fields in the Monitoring Criteria panel are described next.

   **Specify parameters for monitoring session**

   **Profile**

   Indicates the profile name specified with the ADD xxxx command.

   **Description (Optional)**

   Specify a 1 to 24 character description of the monitor definition.

   The description appears in the Monitor Definition pane.
Batch reports (Optional)

Specify Y or N to determine if CA Mainframe Application Tuner creates a user-defined series of reports in batch mode after the monitor is completed. This setting overrides the default set on the Profile Parameters panel. See Chapter 8, "Generating Batch Reports" for information about defining batch reports.

Monitor dataset

Specify the name of the data set to receive the output data from the monitor request. Each node of the monitor data set might contain either fixed text or one of the following variables:

- **&USERID** - TSO ID of the user who initiated the monitor request
- **&PREFIX** - TSO prefix or value specified in TUNCALL PREFIX keyword
- **&PGMNAME** - program name obtained at ATTACH time
- **&PROFILE** - name of the monitor definition profile used to start the request
- **&SYSTIME** - time that a request was initiated, in the following format: 'T'hhmmss
- **&SYSDATE** - date that a request was initiated, in the following format: 'D'ccyyddd
- **&SYSNAME** - z/OS system name
- **&JOBNAME** - name of the job
- **&STEPNAME** - name of the job step
- **&PROCSTEP** - name of the procedure step
- **&JOBID** - JES job identification number

If the data set name is not enclosed in quotation marks, the user prefix is appended as the first node of the name. See the Installation Guide for more information.

Specify target name

Job (Required)

Type the name of the job to monitor. Use the * wildcard character to match multiple characters and the + wildcard character to match any single character.

Step (Optional)

Type the name of the step to monitor. Within a multistep job that uses cataloged procedures, you must specify a Step name and a Pstep name or a Program name to select the correct program.

If the target of the Step name is a cataloged procedure or an instream procedure, you must further define the step that you want to monitor by using Pstep name.
Create a Monitor Definition

P-step (Optional)
Type the name of the procedure step to monitor. Use this parameter only if the job step uses a cataloged or instream procedure.

Prog (Optional)
Type the name of the program to monitor.

If you do not specify Program name, you must specify Step name, as well as Pstep name, when appropriate.

Multi-Step Monitoring
Specify **YES** if CA Mainframe Application Tuner is to monitor every job step that matches the criteria that is specified in the Step, Pstep, and Prog fields of the Monitoring Criteria panel.

Specify **NO** if only the first job step that matches the criteria should be monitored.

If you specify YES, the results will be collected into multiple data sets and each data set will have to be analyzed.

Specify target systems in SYSPLEX

System
Type the name of the target systems in the System fields. You can specify up to four system names. Each name can specify a single system or a generic name by using a wildcard indicator; for example, PR*. The default is blank, which specifies the local system only. "*" specifies all systems in the sysplex. See Specify Target Systems for Parallel Sysplex.

Specify parameters for target job name

Monitor duration
Specify the duration in seconds for which the observation process is active. You can also specify minutes by appending an uppercase M to the numeral: 10M. Monitor duration must be a numeric value from 1 to 999997 (16,666 minutes). The default is 60 seconds.

This value is used to set the observation rate based on the number of observations requested.

Specify NA to request that the monitor collect a number of samples equal to the number of Observations Requested regardless of how many observations or how much time it takes to collect that number of samples.

The value NA will not be honored if CA Mainframe Application Tuner detects we are monitoring a Websphere servant and the Websphere Application Server Criteria Expert Mode option is set to N.
Monitor entire step

Specify YES in this field to gather information about an entire job step.
Specify NO to monitor until the requested number of observations are made.

It is recommended that you do not use YES in this field for long-running jobs because this option causes significant delays in loading the data for interactive analysis.

For more information, see Determine Number of Observations to Take and Total Time to Monitor.

Observations Requested

Specify the number of observations to take during the monitor period. The default value is 6000 observations.

For more information, see Determine Number of Observations to Take and Total Time to Monitor.

DD name for load modules (Optional)

Select an additional DD name to consider for load modules. Some applications load programs from a specific DD name. CA Mainframe Application Tuner will search the PDSs allocated to this DD name to get module and CSECT information during the monitor session.

Additional monitoring options

ALL JOBS (Optional)

Use the Tab key to move to this field and press Enter to display a pop-up panel that allows you to choose tasks to include or exclude. For more information, see Monitor Criteria for ALL JOBS.

CICS (Optional)

Use the Tab key to move to this field and press Enter to display a pop-up panel that allows you to specify transaction codes, terminal IDs, and user IDs. For more information, see Monitor Criteria for CICS.

IMS (Optional)

Use the Tab key to move to this field and press Enter to display a pop-up panel that allows you to specify IMS transaction codes, terminal IDs, and user IDs. For more information, see Monitor Criteria for IMS.
Create a Monitor Definition

WebSphere Application Server (Required for monitoring WebSphere Application Server)

Use the Tab key to move to this field and press Enter to display a window that allows you to specify application URL and system class filters for monitoring WebSphere Application Server. You can also specify whether or not you want to collect PSW samples and enable Expert Mode.

For more information about this application, see Monitor Criteria for WebSphere Application Server.

Specify Target Systems for Parallel Sysplex

CA Mainframe Application Tuner allows you to view an entire sysplex as a single system. If you want to monitor a job that is running on a specific system (or one of several systems), type the name of the system in the System field. You can specify up to four system names. Each name can specify a single system or a generic name by using a wildcard indicator; for example, PR*.

Depending on what you specify for System, CA Mainframe Application Tuner will monitor a job as follows:

- **No target systems specified (blank):** CA Mainframe Application Tuner monitors jobs that are running in the local system only. This option is known as a local request. No target systems specified is the default.
- **One target system:** CA Mainframe Application Tuner monitors a job only if it is running in the specified system. Any jobs with the same name that are executing on a different system are ignored. This option is known as a target request.
- **Multiple target systems:** CA Mainframe Application Tuner monitors the first job to execute on any of the specified systems. CA Mainframe Application Tuner only monitors the first job to start, and any other matching jobs are ignored.
- **All systems:** (*) CA Mainframe Application Tuner monitors jobs that are running on all systems in the sysplex. CA Mainframe Application Tuner only monitors the first job to start, and any other matching jobs are ignored.

Data is sent back to the local system for recording because allocation of a data set on the target system might be precluded by shared DASD restrictions, security, or SMS DASD policies. If the local system is not available, recording takes place on the target system.
Determine Number of Observations to Take and Total Time to Monitor

The accuracy of analysis by CA Mainframe Application Tuner is determined primarily by the number of observations taken over a specified period. The number of observations made, and subsequently the number of samples taken, are determined by the values that you supply in the Monitor duration and the Observations Requested fields on the Monitor Criteria panel. The observation rate, which is how often an observation is taken, is calculated internally by CA Mainframe Application Tuner.

For example, if you specify 6000 observations to be taken in 60 seconds, CA Mainframe Application Tuner automatically calculates the observation rate as follows:

\[
\text{observation rate} = \frac{60 \text{ seconds}}{6000 \text{ observations}} = .01 \text{ seconds}
\]

For this situation, CA Mainframe Application Tuner makes one observation every 10 milliseconds in the address space (if only one task is found).

If you want to monitor the entire duration of a job step, specify YES in the Monitor entire step field.

As a minimum, CA Mainframe Application Tuner takes the requested number of observations over a variable time frame. The actual number of observations taken might exceed the requested number of observations, but the number of observations considered for the reports is between the number of observations requested and no more than a maximum of 2 times the number of observations requested minus 1. This result assumes that the job step ran long enough to allow CA Mainframe Application Tuner to capture the requested number of observations at the highest observation rate.

Under certain circumstances, you might need to take significantly more observations. However, taking more observations requires more analysis time. It is recommended that you take between 3000 and 10000 observations for an effective balance of accuracy and performance.

Specify Additional Monitoring Criteria

The Monitoring Criteria panel contains fields that enable you to specify information specific to a particular environment. Navigate to the environment that you plan to monitor and press Enter to display a pop-up panel. Use the fields in the pop-up panel to specify the monitoring conditions to CA Mainframe Application Tuner.
Monitor Criteria for ALL JOBS

Regardless of the type of job you are monitoring, you can select ALL JOBS to display the Job Monitoring Criteria panel.

```
CA MAT ----------------- Job Monitoring Criteria -----------------
COMMAND ===>
Scheduling:
  Current schedule ===>          (enter a / for schedule list or + for the schedule only for this monitor)

Additional monitoring criteria:
  Run up to 1    monitors per jobstep execution
  Monitor this job the next 1    times it runs
  Delay monitoring 0    seconds after step start
  Call user written 4GL exit programs for this monitor    1:
    2:
  Call user written Data Base exit program for this monitor:

For all jobs:
  Tasks to include ===>          >          >          >
  Tasks to exclude ===>          >          >          >

Press END to return to Monitor Criteria.
```

Scheduling

You can limit the period where CA Mainframe Application Tuner attempts to schedule a monitor session by either associating the request with a specific Schedule or specifying scheduling criteria that is specific to this monitor definition only. To use an existing schedule, either enter the name of the schedule, or enter a slash (/) to see a list of exiting Schedules. To specify unique scheduling criteria for this monitor definition, enter a plus sign (+).

For more information about schedules, see Create a Monitor Schedule.
Additional Monitoring Criteria

With these fields, you can specify whether the profile has successive or recurrent monitoring associated with it.

Run up to

Specify the number of monitoring sessions to be started for a single execution of a job step. When a monitor session reaches its target observation count, CA Mainframe Application Tuner closes the monitor data set, and continues to monitor with a new monitor data set. The range is 1 to 9999.

When a monitor data set is closed, it is available for analysis.

Monitor this job

Specify the number of times this job step will be monitored. The range is 1 to 9999. The default is 1. Specifying a larger value causes CA Mainframe Application Tuner to monitor each recurrent execution of this job step until the specified limit is reached. This monitoring is especially useful for jobs that execute in response to some external event or job steps that you want to monitor every time they run. Specifying a value greater than 1 removes the need for reinvoking the monitor after the job has run the first time.

Delay monitoring

Specify the delay (specified in seconds) for the startup of the monitor session. You might want to specify a delay in order to skip monitoring the initialization functions within the job step. The range is 1 to 9999.

Call user written 4GL

Specify the name of a 4GL program to be called by CA Mainframe Application Tuner during the monitor session.

4GL Exits allow CA Mainframe Application Tuner to relate activity to the user-written Fourth-Generation Language statements that caused the activity, instead of the default of identifying only the service routines of the 4GL Language being used.

Call user written Data Base

Specify the name of a database exit to be called by CA Mainframe Application Tuner during the monitor session.

Database Exits allow CA Mainframe Application Tuner to relate the database activity to the application components responsible for the activity, such as SQL statements of database calls invoked by application programs.
Include and Exclude Tasks

A subtask is a uniquely dispatchable unit of work within z/OS. Some jobs might have active serial subtasks to perform various work for the application.

Use the Tasks to include field to restrict monitoring to specific subtasks within the address space. Specify up to four tasks to be sampled in a multitasking environment.

Use the Tasks to exclude field to omit up to four tasks from sampling in a multitasking environment. You might not want to monitor all subtasks within the address space if their functions have nothing to do with your application.

Use the * wildcard character to match multiple characters and the + wildcard character to match any single character.

After sampling is complete and you begin your analysis, use TaskView to display a list of the tasks that are monitored by CA Mainframe Application Tuner. See "Interactive Analysis Option 1 - TaskView" for more information.

If the Tasks to include field on the Job Monitoring Criteria panel contains an entry for DSNECP10, only one sample can be collected per observation taken into the region.

Monitor Criteria for CICS

If you are monitoring a CICS job, select the CICS field to display the CICS Monitoring Criteria panel.

```
CA MAT ---------------- CICS Monitoring Criteria ----------------
COMMAND ===> 
For CICS transactions:
  Transaction codes ===> > > >
  Terminal IDs ===> > > >
  User IDs ===> > > >
Specify values. Press END to return to Monitoring Criteria
```

Only one online transaction processing system can be specified within a monitor definition. If you enter any information into the CICS Monitoring Criteria panel, the IMS option cannot be selected. To cancel CICS, blank out all Transaction codes, Terminal IDs, and User IDs, and exit the panel.
Transaction codes

Specify up to four CICS transaction codes to monitor. If you specify multiple transaction codes, they are ORed together.

Use the * wildcard character to match multiple characters and the + wildcard character to match any single character.

Terminal IDs

Specify up to four CICS terminal IDs to monitor. If you specify multiple terminal IDs, they are ORed together.

Use the * wildcard character to match multiple characters and the + wildcard character to match any single character.

User IDs

Specify up to four CICS user IDs to monitor. If you specify multiple user IDs, they are ORed together.

Use the * wildcard character to match multiple characters and the + wildcard character to match any single character.

If you specify a combination of transaction codes, terminal IDs, and user IDs, all criteria must be met.

Monitor Criteria for IMS

If you are monitoring an IMS job, you can select the IMS field to display the IMS Monitoring Criteria panel.

```
CA MAT ----------------- IMS Monitoring Criteria -----------------
COMMAND ===> 

For IMS transactions:
  Transaction codes ===> > > >
  Terminal IDs ===> > > >
  User IDs ===> > > >

Specify values. Press END to return to Monitoring Criteria
```

The fields in the IMS Monitoring Criteria panel are described next.
Only one online transaction processing system can be specified within a monitor definition. If you enter any information into the IMS Monitoring Criteria panel, the CICS option cannot be selected. To cancel IMS, blank out all Transaction codes, Terminal IDs, and User IDs, and exit the panel.

**Transaction codes**

Specify up to four IMS transaction codes to monitor.

Use the * wildcard character to match multiple characters and the + wildcard character to match any single character.

**Terminal IDs**

Specify up to four IMS terminal IDs to monitor.

Use the * wildcard character to match multiple characters and the + wildcard character to match any single character.

**User IDs**

Specify up to four IMS user IDs to monitor.

Use the * wildcard character to match multiple characters and the + wildcard character to match any single character.

**Monitor Criteria for Adabas**

As of CA Mainframe Application Tuner release 8.5, it is no longer necessary to install or use user exits to measure an address space issuing Adabas direct calls. Support for Adabas is now fully integrated with CA Mainframe Application Tuner.

**Monitor Criteria for Natural**

As of release 8.5, it is no longer necessary to install or use user exits to measure an address space executing Natural programs. Support for Natural is now fully integrated with CA Mainframe Application Tuner.

**Monitor Criteria for CA DATACOM**

As of release 8.5, it is no longer necessary to install or use user exits to measure an address space running CA Datacom programs. Support for CA Datacom is now fully integrated with CA Mainframe Application Tuner.
Monitor Criteria for CA Ideal

As of release 8.5, it is on longer necessary to install or use user exits to measure an address space running CA Ideal programs. Support for CA Ideal is now fully integrated with CA Mainframe Application Tuner.

Monitor Criteria for WebSphere Application Server

Select the WebSphere Application Server field to display the WebSphere Application Server Monitoring Criteria panel.

```
CA MAT ------------- WebSphere Application Server Criteria -------------
COMMAND ===> 
Expert Mode ===> N  Y - Collect PSW samples
               N - Disable PSW sampling

Specify Application URL Filters:
  => url1*
  => url2*
  => url3*
  => url4*

Specify System Class Filters:
  => sys1*
  => sys2*
  => sys3*

Specify values. Press END to return to Monitoring Criteria
```

If you are monitoring a WebSphere Application Server application, specify Y or N to indicate whether you want to run in Expert Mode. You can also specify up to four application URL filters and up to three system class filters. For a description of each of these keywords, see the WebSphere Monitoring Criteria section.

When no URL filters are specified in the WebSphere monitoring criteria panel, CA Mainframe Application Tuner does not collect Class data (Application, Via, or Current) or activity statistics. Only WebSphere transactions, garbage collection, environment, and SQL data is collected. In this case, a list of transactions displays, which you can use to define URL filters for subsequent monitors.

Press End to return to the Monitor Criteria panel.
Copy a Monitor Definition

The C line command is useful if you want to create multiple versions of the same monitor definition without having to retype all the monitoring criteria. For example, if you wanted to monitor individual steps of the same job, you could create one monitor definition for the first step that you want to monitor, copy each of the original steps, and change only the step names.

To copy a monitor definition:

1. In the LC field next to the profile that you want to copy, type C and press Enter. The Copy Profile pop-up panel displays.

   ![Copy Profile Pop-up Panel]

2. In the Profile Name field, specify the name of the profile that you want to use.

3. Press Enter to return to the Monitor Definition panel, which displays the new profile.

Edit a Monitor Definition

To edit an existing monitor definition:

1. Select the corresponding profile name on the Monitor Definition panel by using the Select line command. The Monitoring Criteria panel displays with the current parameters listed for the selected monitor definition.

2. Type over the existing data in the fields that you want to change.

3. Press End.

   Your changes are saved when you press End to return to the Monitor Definition panel.

   Type CANCEL to return to the Monitor Definition panel without saving any changes.
Delete a Monitor Definition

When you no longer need a particular monitor definition, you can remove it by using the delete request. There are two forms of the delete request.

- The Delete line command (D) removes the monitor definition and the monitor’s history but does not delete the associated monitor data sets.
- The Delete w/dsns line command (DD) deletes the data sets that were created by monitoring sessions under that definition and then deletes the monitor definition.

The following shows how to remove only the monitor definition while keeping the monitor data sets that existed for that definition.

1. Type D on the Monitor Definition panel for the definition that you want to delete.
   Depending on your profile settings, a panel might appear prompting you to confirm your delete request before actually executing the operation.

2. Confirm the delete request by typing YES or cancel the request by typing NO.
   To delete the monitor definition, as well as all of its associated monitor data sets, perform the procedure described above by using the DD line command.

   You can reuse the same data set as many times as you want. However, CA Mainframe Application Tuner overwrites the data set anytime you invoke a monitor definition that points to this data set.

Create a Multijob Monitor: Grouping

If you would like to create monitors for an entire region and not just for specific job steps, you can create a group of monitor definitions (or profiles) that are activated by a trigger monitor. This method ensures that you have the necessary data for analysis of all job steps in a multistep process.
To create a group of monitors that are triggered by a grouping monitor:

1. From the Primary Option menu, select Option 4, Grouping.

The Monitor Profile Groups panel displays.

```
CA MAT ----------------- Monitor Profile Groups ------------- Row 1 to 1 of 1
COMMAND ===>                                                  SCROLL ===> CSR
Primary commands: ADD name                                 Server ID: MATUNER
                 Line commands: S - Edit  D - Delete  U - Update Entry
                 C - Copy  I - Invoke

Line commands: S - Edit  D - Delete  U - Update Entry
C - Copy  I - Invoke
LC Group    Description                    Associated Schedule Modified
Profiles            By:
______________________________ ____________________________________
 >------------------------------------------------------------------------------
 __ TUNCIC61                                         8          TAC0011
```

The commands and fields available on this panel are described next.

**ADD**

Specify a new group name (1- to 8-characters) to create a monitor group. The Group Definition panel displays, where you can specify a monitor schedule and a description.

**S - Edit**

Edit the profiles included in the group.

**C - Copy**

Copy the profile group, with a new group name.

**D - Delete**

Delete the profile group.

**I - Invoke**

Invoke a monitoring session for the profile group. The session will begin immediately (does not use the specified schedule).

**U - Update Entry**

Update the schedule or description for the monitor group.

**Group**

Displays the 1- to 8-character name of the group.

**Description**

Displays a description of the group.
Associated Profiles

Displays the number of associated profiles.

Schedule

Displays the name of the schedule that is associated with the group.

Modified By

Displays the user ID of the person who last modified the group profile.

2. To create a trigger monitor, type ADD xxxxxxxx to add a new monitor definition.

   The Group Definition panel displays and you can specify a schedule name and enter a brief description.

   CA MAT ---------------- Group Definition ---------------------------------
   COMMAND ===>
   Group name ===> TUNTEST
   Schedule ===> (enter a / for a list of schedules or a + to display the schedule for this group)
   Description ===>
   Press END to save or type CANCEL to discard changes.

   For more information about schedules for monitors, see Create a Monitor Schedule.

3. Enter the ADD primary command to display a list of the available monitor definitions, and use the S (select) line command to add profiles to be included in the group.

   CA MAT --------------- Monitor Profile Groups --------------- Row 1 to 2 of 2
   COMMAND ===>         SCROLL ===> CSR
   Primary commands: ADD name          Server ID: MATUNER
                        Status: ACTIVE
   Line commands: S - Edit  D - Delete  U - Update Entry
                  C - Copy  I - Invoke
   LC Group    Description                    Associated Schedule Modified
   Profiles            By:__________________________ __________________________
   >------------------------------------------------------------------------------
   __ TUNCIC61                                         8          TUNUSER
   __ TUNTEST                                          0          TUNUSER
   ********************************* End of Table ********************************

Chapter 3: Setting up a Monitor Definition  77
4. To assign (or remove) a profile to be a trigger, use the T (trigger) line command on
the Group Monitor List panel.

<table>
<thead>
<tr>
<th>Primary commands: ADD</th>
<th>Server ID: MATUNER</th>
</tr>
</thead>
<tbody>
<tr>
<td>Line commands: R - Remove  T - Trigger</td>
<td>Status: ACTIVE  Group: TUNCIC61</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>LC Profile</th>
<th>Description</th>
<th>Trigger</th>
<th>Batch Jobname</th>
<th>Procstep</th>
<th>Stepname</th>
</tr>
</thead>
<tbody>
<tr>
<td>GPCIC611 TPNS Gend - GPCIC611</td>
<td>Y</td>
<td>N</td>
<td>TUNCIC61</td>
<td></td>
<td></td>
</tr>
<tr>
<td>GPCIC612 TPNS Gend - GPCIC612</td>
<td>N</td>
<td>N</td>
<td>TUNCIC61</td>
<td></td>
<td></td>
</tr>
<tr>
<td>GPCIC613 TPNS Gend - GPCIC613</td>
<td>N</td>
<td>N</td>
<td>TUNCIC61</td>
<td></td>
<td></td>
</tr>
<tr>
<td>GPCIC614 TPNS Gend - GPCIC614</td>
<td>N</td>
<td>N</td>
<td>TUNCIC61</td>
<td></td>
<td></td>
</tr>
<tr>
<td>GPCIC615 TPNS Gend - GPCIC615</td>
<td>N</td>
<td>N</td>
<td>TUNCIC61</td>
<td></td>
<td></td>
</tr>
<tr>
<td>GPCIC616 TPNS Gend - GPCIC616</td>
<td>N</td>
<td>N</td>
<td>TUNCIC61</td>
<td></td>
<td></td>
</tr>
<tr>
<td>GPCIC617 TPNS Gend - GPCIC617</td>
<td>N</td>
<td>N</td>
<td>TUNCIC61</td>
<td></td>
<td></td>
</tr>
<tr>
<td>GPCIC618 TPNS Gend - GPCIC618</td>
<td>N</td>
<td>N</td>
<td>TUNCIC61</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

The trigger profile name turns blue and the value in the Trigger field changes from
N to Y.

<table>
<thead>
<tr>
<th>Primary commands: ADD</th>
<th>Server ID: MATUNER</th>
</tr>
</thead>
<tbody>
<tr>
<td>Line commands: R - Remove  T - Trigger</td>
<td>Status: ACTIVE  Group: TUNCIC61</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>LC Profile</th>
<th>Description</th>
<th>Trigger</th>
<th>Batch Jobname</th>
<th>Procstep</th>
<th>Stepname</th>
</tr>
</thead>
<tbody>
<tr>
<td>GPCIC611 TPNS Gend - GPCIC611</td>
<td>N</td>
<td>N</td>
<td>TUNCIC61</td>
<td></td>
<td></td>
</tr>
<tr>
<td>GPCIC612 TPNS Gend - GPCIC612</td>
<td>Y</td>
<td>N</td>
<td>TUNCIC61</td>
<td></td>
<td></td>
</tr>
<tr>
<td>GPCIC613 TPNS Gend - GPCIC613</td>
<td>N</td>
<td>N</td>
<td>TUNCIC61</td>
<td></td>
<td></td>
</tr>
<tr>
<td>GPCIC614 TPNS Gend - GPCIC614</td>
<td>N</td>
<td>N</td>
<td>TUNCIC61</td>
<td></td>
<td></td>
</tr>
<tr>
<td>GPCIC615 TPNS Gend - GPCIC615</td>
<td>N</td>
<td>N</td>
<td>TUNCIC61</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

To stop a multijob monitor, issue the STAtus primary command from the Monitor
Definition or Active Jobs panel. The Display Server Space Requests panel displays. In the
LC column, type P next to the waiting monitor request.
Create a Monitor Schedule

While creating a monitor definition, you can specify monitoring by day-of-week, time, and date. You can specify scheduling criteria for individual monitor definitions, or select from permanent "shift" definitions that are defined by the administrator. For example, you might have schedules for weekend processing that can be reused every weekend.

To create a schedule for a monitor:

1. From the Primary Option menu, select Option A, Administration.

   The Administration Option Menu displays.

   | CA MAT ------------------ Administration Option Menu ------------------------ |
   | OPTION  ====> |
   | 1  Associations     - Define module/Csect functions        Userid: TUNUSER |
   | 2  Pseudo           - Define pseudo groups                  Server ID: MATUNER |
   | 3  Content Help     - Update content-sensitive help          Status: ACTIVE |
   | 4  Scheduling       - Create monitor schedules              Release: 8.5.00 |
   | 5  Registration     - Shared source listing registration     |
   | S  System Settings  - View system settings for clients       |
   | U  User Settings    - View user settings for clients         |
   | I  Environment      - Display CA MAT and environmental information |

   Enter an option or press END to return to the CA MAT Primary Option Menu

2. Select Option 4, Scheduling.

   The Monitor Schedules panel displays.

   | CA MAT ------------------ Monitor Schedules --------------- Row 1 to 4 of 4 |
   | COMMAND ====> SCROLL ====> HALF |
   | Primary commands: ADD name Server ID: MATUNER Status: INACTIVE |
   | Line commands: S - Edit D - Delete C - Copy |

<table>
<thead>
<tr>
<th>LC Schedule Description</th>
<th>Modified</th>
<th>By:</th>
<th>On:</th>
<th>At:</th>
</tr>
</thead>
<tbody>
<tr>
<td>__ SCHED1</td>
<td>Weekdays after 1800</td>
<td>BMJMJ</td>
<td>2005/06/27 09:56:47.2</td>
<td></td>
</tr>
<tr>
<td>__ SCHED2</td>
<td>Weekends</td>
<td>BMJMJ</td>
<td>2005/06/27 09:58:00.9</td>
<td></td>
</tr>
<tr>
<td>__ SCHED3</td>
<td>0600 to 1700</td>
<td>BMJMJ</td>
<td>2005/06/27 09:58:23.0</td>
<td></td>
</tr>
<tr>
<td>__ SCHED4</td>
<td>2005/07/01</td>
<td>BMJMJ</td>
<td>2005/06/27 10:00:56.9</td>
<td></td>
</tr>
</tbody>
</table>

   ********************************* End of Table ********************************
The commands and fields that are available on this panel are described next.

**ADD name**

This field is used to specify a new schedule name (1- to 8-characters). The Monitor Scheduling Criteria panel displays, where you can specify the days and times for a monitor to run.

**S - Edit**

This field is used to edit an already existing schedule.

**D - Delete**

This field is used to delete the schedule.

**C- Copy**

This field is used to copy the schedule.

**Schedule**

This field displays the 1- to 8-character name of a schedule.

**Description**

This field displays the up-to 25-character optional description of the schedule (up to 25 characters).

**Modified By**

This field displays the user ID of the last user who edited or created the schedule.

**On**

This field displays the date the schedule was created or last edited.

**At**

This field displays the time the schedule was created or last edited.
3. To create a new schedule, use the ADD xxxxxxx primary command where xxxxxxx is a user-specified one- to eight-character name of a schedule.

The Monitoring Scheduling Criteria panel displays.

```
CA MAT ---------------- Monitoring Scheduling Criteria ------------------------
COMMAND ===>

Schedule: SCHDA01

Description ===> Monday

Date range:
Valid dates       Starting ===> $MONDAY   Ending ===> $MONDAY   (YYYY/MM/DD)
Monitor request valid for ===> (days)

Day of week settings:
Day of week selection criteria      Weekdays          / Monday      Thursday   Sunday
                                      Weekends or       Tuesday     Friday
                                      / Specific days   Wednesday   Saturday

Generic time ranges:
Monitor valid during time ranges of
   1 ===>      ===>      (hhmm 24 hour clock)
   2 ===>      ===>      
   3 ===>      ===>      
   4 ===>      ===>      

Enter END to save parameters or CANCEL to exit without change.
Trilog AG., Confidential and Proprietary Information
```

The commands and fields that are available on this panel are described next.

**Schedule**

Indicates the name of the schedule.

**Starting**

Enter a starting date in YYYY/MM/DD format for the monitor schedule to begin.

**Ending**

Enter an ending date in YYYY/MM/DD format for the monitor schedule to end. CA Mainframe Application Tuner will not start a monitor session on or after this date.
You can also use the following variables instead of dates in the Starting and Ending fields:

-&MONDAY
-&TUESDAY
-&WEDNESDAY
-&THURSDAY
-&FRIDAY
-&SATURDAY
-&SUNDAY
-&TODAY
-&TOMORROW

CA Mainframe Application Tuner calculates these variables into the correct dates for you.

When using a variable for the starting date, the current day is always used as the starting date, or the next occurrence of that day. For example, if the current day is Wednesday and you specify &WEDNESDAY as the variable, the schedule starts that day. However, if the current day is Wednesday and you specify &MONDAY as the variable, the schedule starts the following Monday.

**Monitor Request valid for (days)**

Specify from 1 to 9999 days duration for the monitor. This field is used in conjunction with the Starting field only. When you use this field, do not use the Ending field.

**Weekdays**

Specify a slash (/) if you want the schedule to run on weekdays during the period.

**Weekends**

Specify a slash (/) if you want the schedule to run on weekends during the period.

When creating the schedule, place a slash (/) next to Weekdays or Weekends or, select specific days by placing a slash next to **Specific days** and also placing a slash next to names of the days.

**Specific days**

Specify a slash (/) if you want the schedule to run on certain days during the period. You must select each day with a slash.

**Monday - Friday**

Specify a slash (/) next to each day that you want the monitor to run.
Time ranges

Specify in HHMM format (up to four times) during which you want the monitor to run. If no range is specified, the monitor is valid for the entire 24 hour day.

The table in the section Create a Monitor Schedule shows an example of a completed Monitoring Scheduling Criteria panel.

| CA MAT ---------------- Monitoring Scheduling Criteria ---------------------------- |
| COMMAND =>                | Schedule: SCHONE                                      |
| Description =>             |                                                         |
| Date range:                |                                                         |
| Valid dates                | Starting => 2007/06/16 Ending => (YYYY/MM/DD)          |
| Monitor request valid for => 20 (days) |
| Day of week settings:      |                                                         |
| Day of week selection criteria | Weekdays or Specific days . . |
|                           | Monday      Thursday  Sunday                        |
|                           | Tuesday / Friday   Wednesday / Saturday         |
| Generic time ranges:       |                                                         |
| Monitor valid              | 1 ===> 1200 ===> 1300 (hhmm 24 hour clock)         |
| during time                | 2 ===>        ===>                                  |
| ranges of                  | 3 ===>        ===>                                  |
|                           | 4 ===>        ===>                                  |

When you invoke a monitor with a schedule, the monitor remains invoked until the end of the schedule. However, the monitor only starts if the target job is executed during the specified time range of the schedule. After the end of the schedule is reached, the monitor is stopped automatically.

To exit this panel without specifying a schedule, press Cancel. Pressing End associates a schedule with the monitor request.
Chapter 4: Invoking a Monitor

After you create the monitor definition, you can start making observations and collecting sample data about your target program. You start the observation and sampling process by invoking a monitor definition. You might also define and invoke monitors offline by using the Open Application Interface. See the chapter, "Open Application Program Interface" for more information.

For a description of the internal operation of CA Mainframe Application Tuner, including what happens when a monitor is invoked, see the Installation Guide.

This section contains the following topics:

Invoke a Monitor from the TSO Client (see page 85)
Invoke a Monitor for an Active Job (see page 94)

Invoke a Monitor from the TSO Client

1. From the Primary Option Menu, select Option 1.
   The Monitor Definition panel displays.

   CA MAT --------------  Monitor Definition --------------- Row 1 to 9 of 16
   COMMAND ===>  SCROLL ===> CSR
   Primary commands: ADD xxxx, STAte
   Server ID: MATUNER
   Status: ACTIVE
   Line commands: S - Select   A - Analyze Normal   D - Delete
   I - Invoke AL - Analyze All   DD - Delete w/dsns
   H - History AA - Analyze Active B - Batch Reports
   C - Copy   AW - Analyze Wait V - CSV Reports
   X - Export Monitor Data J - Display Job Card
   LC Profile Status Schedule Runs Description Jobname
   ________________________________________________________________________
   __ ADACICS Inactive 8 Adabas CICS CICSC9NZ
   __ ADATEST Inactive 2 Adabas USER014X
   __ ADATEST1 Inactive 3 Adabas USER014X
   __ CA11 Waiting 0 DEFINED WITH OLD CLIENT X
   __ CA31 Waiting 0 DEFINED WITH NEW CLIENT X
   __ DATACOM Inactive 1 Datacom USER014X
   __ DCOMEXIT Inactive 1 datacom missing exit tst USER014X
   __ IDLBATCH Inactive 18 Ideal Batch USER014X
   __ IDLCICS Inactive 11 Ideal CICS CICSC9NZ

   This panel is the same panel where you set up monitor definitions. Table 9 on page 70 describes this panel's fields.
Invoke a Monitor from the TSO Client

2. To start a monitor by using the existing monitoring criteria, type I next to the profile name of the monitor definition that you want to monitor and press Enter.

3. To view or change the monitoring criteria, type S next to the profile name of the monitor definition.

   The Monitoring Criteria panel is displayed. Change the criteria as required.

4. Press End to return to the Monitor Definition panel.

   If a Started Task that you are monitoring has a jobname that is the same as another active job, you must invoke the monitor from the Active Jobs panel to ensure that the correct address space is monitored. For instructions, see Invoke a Monitor for an Active Job.

Invoke a Monitor Automatically

You can invoke a monitor automatically when you exit the Monitoring Criteria panel.
Specify YES or CONFIRM on the Profile Parameters panel.

Monitor Request

When you invoke a monitor definition, it is called a monitor request. A monitor request is active from the time you invoke the monitor definition until one of the following situations occurs:

- Observations and sampling are complete.
- The monitor request is canceled.
- The schedule expires.

If the target is active, CA Mainframe Application Tuner starts making observations and collecting sample data immediately. If CA Mainframe Application Tuner cannot find the target at the time you invoke the monitor definition, it sends a message back to your TSO session that your request was deferred, and the monitor request status on the Monitor Definition panel is shown as Waiting.

CA Mainframe Application Tuner continuously monitors the job step initiation activity on the z/OS system on which it is running. When CA Mainframe Application Tuner detects that the requested target is available, it activates the observation and sampling process automatically. The monitor starts immediately, unless you specified a delay after step start. When CA Mainframe Application Tuner begins monitoring a target address space, the status of the request on the Monitor Definition panel switches from Waiting to Active.
After you invoke a monitor request, you no longer need to be connected to CA Mainframe Application Tuner or even logged on to TSO. However, if you remain connected to TSO/ISPF, CA Mainframe Application Tuner notifies you when the monitoring terminates.

See the *Installation Guide* for more information.

**Monitor Persistence**

Monitor requests are written to the Global Information File (GIF), which allows for persistence of the request, even if the Server Space is deactivated or if the entire system is shut down. When the Server Space is started through a batch job or during IPL, it reads the GIF and reinstates any active monitor requests.

**Display Monitor Request Status**

To obtain information about the progress of the observation and sampling process that is associated with all monitor requests, issue the STAtus primary command on the Monitor Definition panel.

The Invoked Monitors panel displays.

```
CA MAT --------------------- Invoked Monitors --------------- Row 1 to 2 of 2
COMMAND ===>                                                  SCROLL ===> CSR
Line commands: P - Stop      J  - Display Job Card         Server ID: TUN85JQ
LC Profile  Jobname  Stepname Procstep PGMname  SysName  Status   Complete
________ ________ ________ ________ ________ ________ _________
>------------------------------------------------------------------------------
__ CA11     X                                   CA11     Waiting          0
__ CA31     X                                   CA11     Waiting          0
********************************* End of Table ********************************
```
The Invoked Monitors panel displays the following information:

- All monitor requests currently queued or being processed by the Server Space for all users
- The status of the monitoring process
- An estimate of the percentage of completion of a monitor request
- The number of observations (scroll right to display this field)
- The token assigned to the monitor profile (scroll right to display this field)

The remainder of the fields on the Invoked Monitors panel are identical to those on the Monitor Definition panel.

Press Enter to update the displayed information.

If the target address space terminates before CA Mainframe Application Tuner makes the requested number of observations, the monitor request terminates, such as when a batch job terminates before reaching the end of the range that is specified in the Monitor time range field.

**Stop a Monitor Request**

1. From the Monitor Definition or Active Jobs panel, issue the STAtus primary command.
   
   The Display Server Space Requests panel is displayed.

2. Type P next to the monitor request that you want to stop. The job status can be either active or waiting.
   
   You can only stop a monitor request that you invoked and has your User ID.

   A message will be displayed indicating that the monitor has been stopped. The monitor request is removed from the display. Any data that has already been gathered is retained and is available for analysis.

**Analyze Monitor Results**

To analyze the monitoring results, use one of the analysis line commands (A, AL, AA, or AW) to display the Interactive Analysis menu. The chapter "Analyzing Monitor Data" describes how to analyze the data that you collected.
Display Monitor History

The monitor history is a record of all the instances that you invoked for a particular monitor profile. To see the history of a monitor profile from the Monitor Definition panel, enter line command H (History) next to the profile and press Enter.

The Monitor History panel is displayed. This panel lists all data sets for the selected monitor profile.

For more information about the collected data, see Samples and Observations, and Sampling Rules.

| CA MAT ------------------------ Monitor History -------------- Row 1 to 1 of 1 |
| COMMAND ===>                                                  SCROLL ===> CSR |
| Line commands: A - Analyze Normal    D - Delete                Profile: VSAMPGM1 |
| AA - Analyze Active          B - Batch Reports |
| AL - Analyze All            V - CSV Reports |
| AW - Analyze Wait          X - Export Monitor Data |
| J - Display Job Card |
| Measured Run  Start  CPU  EXCP  SIO  Percent Percent Percent |
| LC Job    Date    Time    Count Rate  Active  Wait  NonDisp |
| ________________________________________________________________________ |
| USER014V  1 2010/10/28 00:00:22.1 50162 820.98 35.58 64.41 0.00 |
| ********************************* End of Table ******************************** |

Press PF11 to scroll right and see more fields.

The fields on the Monitor History panel are described next:

**Measured Job**

Name of the job being measured by CA Mainframe Application Tuner.

**Run**

Number of active runs for this profile.

**Start Date**

Date this monitor instance was run.

**CPU Time**

Length of time this monitor session ran in HH:MM:SS format.
EXCP Count
Number of input/output operations for the job step during the monitored period.
This number includes I/O counts that are not reflected in the I/O counts at the DD name level.

SIO Rate
Number of start I/O operations per second for the job during the monitored period.

Percent Active
Percentage of the monitored period during which one or more CPUs were in use by application tasks within the address space.
This number is the ratio of samples with CPU active to the total number of samples.

Percent Wait
Percentage of the monitored period during which application tasks within the address space were not using CPU.
This number is the ratio of samples with CPU not active to the total number of samples.

Percent NonDisp
Percentage of samples where CA Mainframe Application Tuner detected the address space to be dispatchable but not dispatched.
This number is the ratio of samples in which the address space was dispatchable but not dispatched to the total number of samples.

Percent ProcDelay
Percentage of the monitored period when CA Mainframe Application Tuner detected the address space was unable to be dispatched because a processor could not be made available.
While this situation is occurring, the application is unable to execute.

Percent Swapped
Sample SWAPPED percentage.
This number is the ratio of samples when the job was swapped out to the total number of samples.

Observation Rate
Final observation rate, which is the number of observations per millisecond, calculated by CA Mainframe Application Tuner.
CA Mainframe Application Tuner might have adjusted this rate during the monitor.
For information about monitoring the entire duration of a job step, see Determine Number of Observations to Take and Total Time to Monitor.
Samples Collected

Number of samples collected during the monitored period.

A significant difference between samples collected and samples used might be noted during step-level monitoring.

Samples Used

Number of samples used in the last analysis request.

Elapsed Time

Length of time the monitor session ran in HH:MM:SS format.

Measured Job ID

JES job identifier of the job that was monitored.

This field is valid for jobs that were initiated under a job entry subsystem.

Measured Step

Name of the job step that was monitored.

Measured ProcStep

Name of the job step within a cataloged procedure that was monitored.

Measured Program

Name of the program on the EXEC statement of the JCL of the job that was monitored.

Measured ASID

Address space identifier of the job that was monitored.

System

Name of system where job was monitored.

SMF ID

One- to four-character name assigned with the system.

The SMFID is written as a field in any SMF record created by this system.

Exists

Indicator of data set availability.

You can display the following values in this field:

- **YES** - The data set containing the sample data for the monitor instance is available and has not been migrated.
- **NO** - The data set is not found.
- **ML1** - The data set containing the sample data for the monitor instance exists but is migrated to the DFSMShsm ML1 migration pool. ML1 migration generally goes to disk.
- **ML2** - The data set containing the sample data for the monitor instance exists but is migrated to the DFSMShsm ML2 migration pool. ML2 migration generally goes to tape.
- **INV** - The data set name is invalid. If this value is displayed, check the entry to make sure the data set name is valid before continuing.
- **PER** - A program error occurred. This value can indicate a catalog error other than the data set not being found. See your technical support staff for more information.

**Dataset name**
Data set name of the monitor data set.

**Invocation Time**
Date this sample monitor was invoked.

**Invocation Date**
Time this sample monitor was invoked.

**Requested Observations**
Number of observations requested in the monitor definition.

**Error samples**
Number of samples that contain errors.
The samples are not included in the monitor data set.

**Storage Above**
High-water amount of virtual storage above the 16MB line that is used by the job.

**Storage Below**
High-water amount of virtual storage below the 16MB line that is used by the job.

**Page in Count**
Number of page-in operations for the job.
A high value in this field can indicate job delays.

**z/OS level**
Release level of the operating system where the target job was executed.

**CPU type**
CPU type of the system on which this monitor instance executed.

**CPU Mdl**
CPU model number of the system on which this monitor instance executed.

**CPU Serial**
CPU serial number of the system on which this monitor instance executed.
The following table lists the Monitor History panel line commands and describes where to find more information about each command.

<table>
<thead>
<tr>
<th>For information about</th>
<th>See</th>
</tr>
</thead>
<tbody>
<tr>
<td>A - Analyze Normal</td>
<td>Start Interactive Analysis in the next chapter.</td>
</tr>
<tr>
<td>AA - Analyze Active</td>
<td>Start Interactive Analysis in the next chapter.</td>
</tr>
<tr>
<td>AL - Analyze All</td>
<td>Start Interactive Analysis in the next chapter.</td>
</tr>
<tr>
<td>AW - Analyze Wait</td>
<td>Start Interactive Analysis in the next chapter.</td>
</tr>
<tr>
<td>D - Delete</td>
<td>Delete a Monitor Definition in the previous chapter</td>
</tr>
<tr>
<td>B - Batch Reports</td>
<td>Submit a Job to Generate Batch Reports.</td>
</tr>
<tr>
<td>V - CSV Reports</td>
<td>Accesses the CSV_Reporting panel that allows you to submit a batch job to create comma-separated value output of analysis reports for the selected profile. These reports can be imported for use with the Spreadsheet Converter.</td>
</tr>
<tr>
<td>X - Export Monitor Data</td>
<td>Export Monitor Data in the next chapter.</td>
</tr>
<tr>
<td>J - Display Job Card</td>
<td>Start Interactive Analysis in the next chapter.</td>
</tr>
</tbody>
</table>

If the monitor request has not been completed, or has been abnormally terminated, these fields might appear as BLANK, ZERO, or NA. The fields will be populated the first time you analyze the monitor.
Invoke a Monitor for an Active Job

CA Mainframe Application Tuner allows you to start or to view information about a
monitor for any job, Started Task, or TSO user currently executing in the system. From
the Primary Option Menu, select Option 2 to display the Active Jobs panel.

The section Active Job Fields contains a description for each field in the Active Jobs
panel. Fields marked with an asterisk (*) are excluded from view by default.

To display these fields, you must use the CUST primary command.

**To monitor a job by using default monitoring criteria:**

1. Type I in the LC field next to the profile name of the job that you want to monitor.
2. Press Enter.

**To monitor a job by using criteria other than the defaults:**

1. Type M in the LC field next to the profile name of the monitor definition that you
want to invoke.
2. Press Enter.
   
   The Monitoring Criteria panel is displayed. The profile name will be the same as the
job name.
3. Change the monitoring criteria as needed
4. Press End to save your changes, or type CANCEL on the COMMAND line and press
Enter to return to the Active Jobs panel without starting a monitor.
5. Type I in the LC field next to the profile name of the job

6. Press Enter.

After a monitor has been invoked for an active job, you can display its progress or cancel the request by using the STAtus primary command. For more information, see Display Monitor Request Status.

If multiple active address spaces have the same job name, you must invoke the monitor from the Active Jobs panel to ensure that the correct address space is monitored.

**Jobname**

Job name of the address space.

**Stepname**

Job step name or TSO procedure name for TSO users.

**Procstep**

Procedure step name or terminal name for TSO users.

**Sysplex SysName**

One- to eight-character name that is associated with the currently running system within the sysplex.

**ASID**

Numeric identifier, between 1 and 32766, of the address space.

**ASID (hex)**

Hexadecimal identifier of the address space.

This number can be between x'0001' and x'FFFF'.

**A/S Type**

Type of address space:

- **ASC** - APPC server address space
- **BAT** - job initiated in an initiator
- **MNT** - mount in progress
- **OMV** - USS address space
- **STC** - Started Task
- **TSU** - TSO user
Cur Pos

Current position of the job. Possible values are as follows:
- IN - in Storage
- OT - swapped out and ready
- LO - logically swapped out
- NS - non-swappable
- WM - wait queue: MSO
- WL - wait queue: long wait
- WT - wait queue: terminal wait
- WO - wait queue: reasons other than WM, WL, or WT
- DL - RTO delay
- PR - privileged
- >> currently being swapped out
- << currently being swapped in

Dsp Pri

Dispatching priority of the address space.

This value determines the ability of the address space to gain control of the CPU resource when competing with other jobs in the system.

REAL

The total amount of storage backed by central (real) storage that is currently in use by the address space.

CPU Rate

Percentage of CPU time that is used by the job.

The value is updated when you press Enter and indicates the CPU Rate since the last time you pressed Enter. The value is adjusted for multiple CPUs, if applicable.

Excp Rate

Number of SSCH instructions issued per second for the current transaction or job step.

CPU Time

Amount of processor time, including both TCB and SRB, that is used by the current job step.

TCB Time

Amount of TCB processor time in seconds that is used by the current job step.
SRB Time

Amount of SRB time in seconds that is used by the current job step.

Delta CPU Time

Number of CPU seconds that is used by the job.

The value is updated when you press Enter and indicates the number of CPU seconds that were used since the last time you pressed Enter. The value is adjusted for multiple CPUs, if applicable.

Delta TCB Time

Number of TCB seconds that were used by the job.

The value is updated when you press Enter and indicates the number of TCB seconds that were used since the last time you pressed Enter.

Delta SRB Time

Number of SRB seconds that were used by the job.

The value is updated when you press Enter and indicates the number of SRB seconds that were used since the last time you pressed Enter.

EXCP Count

Total number of EXCPs that were issued by the current job step.

Delta EXCP

Number of SSCH instructions that were issued by the job.

The value is updated when you press Enter and indicates the number of SSCH instructions that were issued since the last time you pressed Enter.

Scroll right to display the following fields:

SMFID

One- to four- character name assigned with the currently running system.

The SMFID is written as a field in any SMF record that is created by this system.

FF Bel

Number of fixed-storage frames below 16 megabytes that are held by the job.

If the data gathered for this value is not valid, this field is blank. Fixed storage refers to frames in central storage that cannot be paged-out. Fixed storage is used by programs that cannot tolerate a page fault.
**XM**

Cross memory address space.

This field contains an X for address spaces considered to be 'cross memory address spaces'. An X implies that the address space provides services that are used by other address spaces, and that the address space is accessed in cross memory mode. If the address space is not a cross memory address space, this field is blank.

**Priv FF**

Number of private fixed-storage frames that are held by the job.

If the data gathered for this value is not valid, this field is blank.

**Prf Grp**

One-to-four digit number of the performance group that is associated with the address space.

Performance groups are used to assign specific service objectives and execution priority to a group of address spaces.

**Dmn**

One-to-three digit number of the domain.

A domain is a collection of performance groups that is defined by a system administrator.

**Lst Swp**

Last swap out that is associated with the job.

If the current position of the job is NS, IN, or PR, this field is blank. Possible values are as follows:

- **TI** - terminal wait
- **TO** - terminal output wait
- **LW** - long wait
- **XS** - auxiliary storage shortage
- **RS** - central storage shortage
- **DW** - detected wait
- **RQ** - requested swap
- **NQ** - enqueue exchange
- **EX** - exchange swap based on recommendation value
- **US** - unilateral
- **TS** - transition swap
- **IC** - improve central storage usage
Invoke a Monitor for an Active Job

- **IP** - improve system paging rate
- **MR** - make room to swap in a user that has been swapped out too long
- **AW** - APPC wait
- **IW** - USS input wait
- **OW** - USS output wait

**Service Class**

One-to-eight character name of the service class.

A service class is a group of work within a workload with similar performance goals and characteristics; for example, average response time. You can further divide a service class into performance periods. Periods assign different service objectives and execution priorities to a transaction within a service class, based on the transaction's resource consumption.

**Service Period**

Performance period of a service class.

Possible values range from 1 to 8, which specify varying performance goals and characteristics of transactions of a service class. While executing and consuming resources, transactions can move to a higher period.

**Workload**

One-to-eight character name of the workload that is assigned to the address space.

A workload is a group of work to be monitored, managed, and reported. It consists of one or more service classes.

**Resource Group**

One-to-eight character name of the resource group.

Assigning a service class to a resource group effectively guarantees a minimum capacity and sets a maximum capacity for the transactions belonging to the service class.

**Analyze Monitor Results**

You cannot display the results of your analysis directly from the Active Jobs panel. However, when you invoke a monitor from Active Jobs, CA Mainframe Application Tuner adds the profile to the Monitor Definition panel automatically.
Invoke a Monitor for an Active Job

To analyze the monitoring results, return to the Primary Option Menu and select Option 1. Look for the profile with the name of the job or address space that you monitored. Use one of the analysis line commands (A, AA, AL or AW) to display the Interactive Analysis menu.

The chapter "Analyzing Monitor Data" describes how to analyze the data that you collected.

Active Jobs Select Command

Type S next to a Jobname and press Enter to invoke the Display Active Select command that is specified in your user profile (see the Installation Guide). The command will be issued on the local system, even if the selected job is running on a different system in the sysplex.

Split screen mode might not be available when you invoke the Display Active Command.
Chapter 5: Analyzing Monitor Data

This chapter describes how to use the Interactive Analysis Facility to analyze the data that is collected during a monitor session.

This section contains the following topics:

Start Interactive Analysis (see page 102)
Overview of the Interactive Analysis Options (see page 105)
Interactive Analysis Option 0 - OverView (see page 112)
Interactive Analysis Option 1 - TaskView (see page 123)
Interactive Analysis Option 2 - DelayView (see page 127)
Interactive Analysis Option 3 - CodeView (see page 145)
Interactive Analysis Option 4 - TimeView (see page 154)
Interactive Analysis Option 5 - DataView (see page 157)
Interactive Analysis Option 6 - TranView (see page 172)
Interactive Analysis Option 7 - ModView (see page 179)
Interactive Analysis Option 8 - PoolView (see page 185)
Interactive Analysis Option 9 - USSView (see page 186)
What Next? (see page 193)
Start Interactive Analysis

1. From the Primary Option Menu, select Option 1.

   The Monitor Definition panel displays:

   CA MAT ------------------------ Monitor Definition ------------------- Row 1 to 9 of 16
   COMMAND ===>                                                  SCROLL ===> CSR
   Server ID: TUN853I0
   Status: ACTIVE

   Primary commands: ADD xxxx, STAT
   Status: ACTIVE

   Line commands: S - Select   A - Analyze Normal   D - Delete
   I - Invoke      AL - Analyze All   DD - Delete w/dsns
   H - History     AA - Analyze Active    B - Batch Reports
   C - Copy        AW - Analyze Wait     V - CSV Reports
   X - Export Monitor Data J - Display Job Card

   LC Profile Status Schedule Runs Description Jobname
   ________ __________ ________ ____ _________________________ ________
   >------------------------------------------------------------------------------
   __ ADACICS Inactive 8 Adabas CICS CICSC9NZ
   __ ADATEST Inactive 2 Adabas USER014X
   __ ADATEST1 Inactive 3 Adabas USER014X
   __ CAII Waiting 0 DEFINED WITH OLD CLIENT X
   __ CAIII Waiting 0 DEFINED WITH NEW CLIENT X
   __ DATACOM Inactive 1 Datacom USER014X
   __ DCOMEXIT Inactive 1 datacom missing exit tst USER014X
   __ IDLBATCH Inactive 18 Ideal Batch USER014X
   __ IDLCICS Inactive 11 Ideal CICS CICSC9NZ

2. Type one of the following line commands in the LC field next to the profile that you want to analyze.

   H

   History - This command displays the Monitor History panel, which lists information about each monitor session invoked for the monitor profile selected. From here, you might analyze the data that is gathered during any monitor session.

   Refer to "Displaying monitor history" for more information.
A

**Analyze Normal** - Information that is not directly related to the target application is eliminated. Data is reported as follows:

The following samples are eliminated from analysis: Non-dispatched (.NONDISP), No CPU available (.DISPWT), Processor Delay (.PROCDLY), Page wait (.PAGEWT), Swapped (.SWAPWT), and No activity (.OTHERWT). These samples are considered for the overall OverView activity percentages and runtimes.

CodeView and related histograms are sorted based on Active percentages, not total percentages. The Visual field reflects the Active percent only. Wait samples are included. Percentages are calculated on total samples; all activity values have equal weight.

AL

**Analyze All** - Percentages are calculated based on all samples. This command allows you to compare delays occurring when the program is executing in both active and wait states.

AA

**Analyze Active** - Percentages are calculated based on samples where the program was actively using CPU. Samples that contain only wait information are filtered out, which allows you to make normalized CPU comparisons of program activity.

AW

**Analyze Wait** - Percentages are calculated based on samples where the program was in a wait state. Samples that contain only active information are filtered out which allows you to make normalized comparisons of program wait activity.

X

**Export Monitor Data** - This command creates an export file of the monitor data set suitable for electronic transmission. Use this command when sending monitor data to Customer Support.

J

**Display Job Card** - This command displays the batch reports job card that is associated with the selected Monitor profile.
3. Press Enter.

The Interactive Analysis menu displays:

```
CA MAT  --------------------- Interactive Analysis ---------------------------
OPTION ===>

Enter option to analyze the monitored job:                   Profile: DCOMIDL
Options: NORMAL

CA MAT  Monitor Information                   Subsystem Details
-------------------------------------------   ------------------------------
0  OverView   - Monitor session information   10  DB2 - View all SQL
1  TaskView   - Activity by task              11  IMS - IMS Transactions
2  DelayView  - Program delays                12  JVM - Java Virtual Machine
3  CodeView   - Program activity              13  WAS - WebSphere Trans.
4  TimeView   - Samples by time               14  CIC - CICS Summary Stats
5  DataView   - Dataset information           15  IDMS - CA-IDMS Activity
6  TranView   - Activity by transaction       16  DOM - CA-Datacom Activity
7  ModView    - Module layout                 17  IDL - CA-Ideal Activity
8  PoolView   - Buffer pools                  18  ADA - Adabas Activity
9  USSView    - Unix System Services          19  NAT - Natural Activity

ACTIVE - switch mode to ACTIVE      WAIT - switch mode to WAIT
NORMAL - switch mode to NORMAL      ALL  - switch mode to ALL

Press END to exit analysis
```

4. To display current analysis information, place the cursor on the Options field and press Enter.

A pop-up panel displays that shows the analysis type and any tasks or transactions selected.

5. To select an analysis option, type the number of the option and press Enter.

Each option is described in the following sections.

6. To switch between Interactive Analysis modes, use the commands listed in the following section.

You can easily switch between the different analysis modes that are accessed from the Interactive Analysis menu without having to return to that menu. For example, if you are viewing samples that are actively using CPU and want to see those that are waiting, you can enter one of the following commands to switch analysis modes.

**ACTIVE**

Delay percentages are calculated using only the samples found to be actively using CPU. By running CA Mainframe Application Tuner with this option multiple times, you can make normalized CPU comparisons of program activity.

**WAIT**

Delay percentages are calculated using samples found to be in a wait state. By running CA Mainframe Application Tuner with this option multiple times, you can make normalized comparisons of program wait activity.
NORMAL

All wait-related delays which are not controlled by the application are removed. The CodeView panel is sorted based on Active samples (where the application was actively using CPU). This option will provide the best view of the data for normal use.

ALL

Delay percentages are calculated using every sample collected.

Overview of the Interactive Analysis Options

The following table describes each interactive analysis option, including the available line commands and subsequent displays with page number in parenthesis. The line commands (LC) are listed for each panel, followed by the panel or pop-up panel that displays when you press Enter. If more than one panel is listed for a single line command, the panel that displays depends on the type of information selected.

<table>
<thead>
<tr>
<th>Analysis option</th>
<th>LC</th>
<th>Displays</th>
<th>LC</th>
<th>Displays</th>
<th>LC</th>
<th>Displays</th>
</tr>
</thead>
<tbody>
<tr>
<td>0 - OverView</td>
<td>—</td>
<td>Monitor OverView panel</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1 - TaskView</td>
<td>T</td>
<td>TaskView for selected tasks only</td>
<td>U</td>
<td>TaskView for selected tasks only (minus cleared tasks)</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>C</td>
<td>Code Details for selected task</td>
<td>A</td>
<td>CSECT Associations panel</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>C</td>
<td>Caller ID panel</td>
<td>L</td>
<td>ISPF program listing</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>D</td>
<td>Delayed Resources panel</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>I</td>
<td>Module/CSECT Info panel</td>
<td></td>
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<td></td>
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<tr>
<td></td>
<td>L</td>
<td>ISPF program listing</td>
<td></td>
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<td></td>
</tr>
<tr>
<td></td>
<td>S</td>
<td>Delay Distribution panel</td>
<td></td>
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<tr>
<td></td>
<td>H</td>
<td>Histogram</td>
<td>D</td>
<td>DelayView panel</td>
<td></td>
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</tr>
</tbody>
</table>
### Overview of the Interactive Analysis Options

<table>
<thead>
<tr>
<th>Option</th>
<th>Panel Description</th>
<th>NH</th>
<th>L</th>
<th>ISPF program listing</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>D - DelayView</strong></td>
<td>DelayView Details for selected task</td>
<td>A</td>
<td></td>
<td>Note: See the line command A description for Option 2 - DelayView</td>
</tr>
<tr>
<td><strong>2 - DelayView</strong></td>
<td>Delay Locations panel</td>
<td>L</td>
<td>ISPF program listing</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Delayed Resources panel</td>
<td>S</td>
<td>Data Set Details panel</td>
<td></td>
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<td></td>
<td></td>
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<td>Delayed Resource panel</td>
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<td></td>
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<td></td>
<td>Delay Detail Data panel</td>
<td></td>
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<tr>
<td></td>
<td>Callerid panel</td>
<td>L</td>
<td>ISPF program listing</td>
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<td></td>
<td>Extended Callerid panel</td>
<td>A</td>
<td>Callerid Activity panel</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Module/CSECT Info panel</td>
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<tr>
<td><strong>S - Delay Distribution panel or IDMS Delays panel</strong></td>
<td></td>
<td>D</td>
<td>IDMS Detail panel</td>
<td></td>
</tr>
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<td></td>
<td><strong>I - CodeView</strong></td>
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<tr>
<td><strong>3 - CodeView</strong></td>
<td>CSECT Associations panel</td>
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<tr>
<td></td>
<td>Callerid panel</td>
<td>L</td>
<td>ISPF program listing</td>
<td></td>
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<td></td>
<td>Extended Callerid panel</td>
<td>A</td>
<td>Callerid Activity panel</td>
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</tr>
<tr>
<td><strong>D - DelayView panel</strong></td>
<td></td>
<td>S</td>
<td>Delay Distribution panel or IDMS Delays panel</td>
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</tr>
<tr>
<td></td>
<td></td>
<td>D</td>
<td>IDMS Detail panel</td>
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<tr>
<td><strong>I - Module/CSECT Info panel</strong></td>
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<tr>
<td><strong>L - ISPF program listing</strong></td>
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</tr>
<tr>
<td>Option</td>
<td>Code Distribution panel</td>
<td>H, NH</td>
<td>Histogram panel</td>
<td>D</td>
</tr>
<tr>
<td>--------</td>
<td>--------------------------</td>
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</tr>
<tr>
<td>4 - TimeView</td>
<td>D</td>
<td>Delayed Resources panel</td>
<td>S</td>
<td>Data Set Details panel</td>
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<tr>
<td>5 - DataView</td>
<td>S</td>
<td>Data Set Details panel</td>
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<td>C</td>
<td>Code Details</td>
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<td>IMS Statements panel</td>
<td>S</td>
<td>Segment Search Arguments panel</td>
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<td>Adabas Statements panel</td>
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<td>CA Datacom Statements panel</td>
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<td></td>
<td>IDMS Delays panel</td>
<td>D</td>
<td>IDMS Detail panel</td>
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<td>6 - TranView</td>
<td>T</td>
<td>TranView for selected transactions only</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>U</td>
<td>TranView for selected transactions only (minus cleared transactions)</td>
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## Overview of the Interactive Analysis Options

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<th>Code Details for selected task</th>
<th>A</th>
<th>CSECT Associations panel (</th>
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<tbody>
<tr>
<td>C</td>
<td><strong>Code Details for selected task</strong></td>
<td>A</td>
<td><strong>CSECT Associations panel (</strong></td>
<td></td>
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<tr>
<td></td>
<td></td>
<td></td>
<td><strong>L</strong> ISPF program listing</td>
<td></td>
</tr>
<tr>
<td>D</td>
<td>Delayed Resources panel</td>
<td>I</td>
<td>Module/CSECT Info panel</td>
<td></td>
</tr>
<tr>
<td>L</td>
<td>ISPF program listing</td>
<td>S</td>
<td>Delay Distribution panel</td>
<td></td>
</tr>
<tr>
<td>H, NH</td>
<td>Histogram</td>
<td>D</td>
<td>DelayView panel</td>
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<td></td>
<td></td>
<td>L</td>
<td>ISPF program listing</td>
<td></td>
</tr>
<tr>
<td>D</td>
<td>DelayView Detail for selected task</td>
<td>A</td>
<td><strong>Note:</strong> See line command A for Option 2 - DelayView.</td>
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<tr>
<td>N</td>
<td>Data details for selected task</td>
<td>S</td>
<td>additional transaction statistics for the selected transaction</td>
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</tr>
<tr>
<td>S</td>
<td></td>
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</tr>
<tr>
<td>7 - ModView</td>
<td>S</td>
<td>Module/CSECT Info panel</td>
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<td>U</td>
<td>Link Suggestions panel</td>
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<td>8 - PoolView</td>
<td>S</td>
<td>Shared Pools panel</td>
<td>S</td>
<td>Pool Details panel</td>
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<td></td>
<td></td>
<td>D</td>
<td>Pooled Data Sets panel</td>
<td>S</td>
</tr>
<tr>
<td>9 - USSView</td>
<td>C</td>
<td>Code Details for selected task</td>
<td>A</td>
<td>CSECT Associations panel</td>
</tr>
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<td></td>
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<td>C</td>
<td>Callerid panel</td>
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<td>Delayed Resources panel</td>
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<td>I</td>
<td>Module/CSECT Info panel</td>
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<td>L</td>
<td>ISPF program listing</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>S</td>
<td>Delay Distribution panel</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>H, NH</td>
<td>Histogram</td>
<td>D</td>
<td>DelayView panel</td>
<td></td>
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<td>L</td>
<td>ISPF program listing</td>
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</tr>
<tr>
<td>D</td>
<td>DelayView Detail for selected task</td>
<td>A</td>
<td>Note: See line command A for Option 2 - DelayView</td>
<td></td>
</tr>
<tr>
<td>T</td>
<td>USS Threads panel</td>
<td>C</td>
<td>Code Details</td>
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<td>Note: See the line commands description for Option 3 - CodeView</td>
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</tr>
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<td>D</td>
<td>DelayView Detail</td>
<td></td>
<td>Note: See line command A for Option 2 - DelayView.</td>
<td></td>
</tr>
<tr>
<td>F</td>
<td>USS Functions panel</td>
<td>C</td>
<td>Code Details</td>
<td></td>
</tr>
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<td></td>
<td></td>
<td></td>
<td>Note: See the line commands description for Option 3 - CodeView.</td>
<td></td>
</tr>
<tr>
<td>S</td>
<td>Process Information</td>
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<tr>
<td>F</td>
<td>Function information</td>
<td>C</td>
<td>Code Details</td>
<td></td>
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<tr>
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<td></td>
<td>Note: See the line commands description for Option 3 - CodeView.</td>
<td></td>
</tr>
</tbody>
</table>

See the following chapters for more information about

- Option 10 - DB2: see the chapter "Using the Product in a DB2 environment."
- Option 11 - IMS: see the chapter "Using the Product in an IMS environment."
- Option 12 - JVM: see the chapter "Using the Product in a Java Virtual Machine (JVM) environment."
Overview of the Interactive Analysis Options

- Option 13 - WAS: see the chapter "Using the Product in a WebSphere Application Server environment."
- Option 14 - CIC: see the chapter "Using the Product in a CICS environment."
- Option 15 - IDMS: see the chapter "Using the Product in a CA IDMS environment."
- Option 16 - DCM: see the chapter "Using the Product with Other Databases."
- Option 17 - IDL: see the chapter "Using the Product with Other Databases."
- Option 18 - ADA: see the chapter "Using the Product with Other Databases."
- Option 19 - NAT: see the chapter "Using the Product with Other Databases."

Navigate with Interactive Analysis Primary Commands

The menu items on the Interactive Analysis menu can be selected from any analysis panel by entering one of the commands (or first three characters) shown following on the command line.

Following lists the available commands you can use to navigate between the interactive analysis views.

**OVerview**
- Monitor session information

**TASKview**
- Activity by task

**DElayvie**
- Program delays

**CODEview**
- Program activity

**TIMEview**
- Samples by time

**DATaview**
- Data set information

**TRANview**
- Activity by transaction

**MODview**
- Module layout
POOlview
  Buffer pools

USSview
  Unix System Services

DB2view
  SQL statements

IMSview
  IMS transactions

JVMview
  Java Virtual Machine activity

WASview
  WebSphere transactions

CICsview
  CICS summary statistics

IDMsvview
  CA IDMS activity
### Interactive Analysis Option 0 - OverView

The OverView option displays the Monitor OverView report, which includes information about the monitoring process, key global statistics about the monitored application, as well as sampler messages related to the analysis of your job.

These statistics can help you determine the next most logical panel to display as you continue your analysis.

Scroll down to view the entire report. Monitor Overview Fields Part 1 explains the information on the Monitor OverView report.

#### Monitor OverView Report

<table>
<thead>
<tr>
<th>Field</th>
<th>Value</th>
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<tbody>
<tr>
<td>Monitor DSN</td>
<td>USERO14.TUN85JQ.DATA.COM.D2010273.T1507036</td>
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<tr>
<td>Profile</td>
<td>DATA.COM</td>
</tr>
<tr>
<td>Options</td>
<td>NORMAL</td>
</tr>
<tr>
<td>Jobname</td>
<td>USERO14X</td>
</tr>
<tr>
<td>TCB Time</td>
<td>00:00:01.02</td>
</tr>
<tr>
<td>Start Date</td>
<td>2010/09/30</td>
</tr>
<tr>
<td>Stepname</td>
<td>STEP2</td>
</tr>
<tr>
<td>SRB Time</td>
<td>00:00:01.23</td>
</tr>
<tr>
<td>Start Time</td>
<td>15:07:03</td>
</tr>
<tr>
<td>Proctstep</td>
<td>COBSAMG</td>
</tr>
<tr>
<td>Duration</td>
<td>00:01:01</td>
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<tr>
<td>Program</td>
<td>DBSPCPR</td>
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<tr>
<td>ECPU Time</td>
<td>00:00:02.25</td>
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<tr>
<td>zAAP Time</td>
<td>00:00:00.00</td>
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<td>Observations</td>
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<td>ASID</td>
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<tr>
<td>zAAP Time</td>
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<td>Final rate</td>
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<td>USERO14</td>
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<td>zIIP Time</td>
<td>00:00:00.00</td>
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<td>Requested</td>
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<tr>
<td>Job ID</td>
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<td>Elig zIIP Time</td>
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<tr>
<td>Used</td>
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<td>Datacom Lvl</td>
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<td>Swapped Out</td>
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<tr>
<td>Samples</td>
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<tr>
<td>Non Disp</td>
<td>00:00:00.00</td>
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<td>Used</td>
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<td>LPAR/DIS Delay</td>
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<td>% Active</td>
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<td>Wait</td>
<td>00:00:59.82</td>
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<td>CPU Svc Units</td>
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<td>EXCP rate</td>
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<td>Avg TCBs Act</td>
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<td>CMN HWM Used</td>
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<tr>
<td>Rgn Limit</td>
<td>8168K</td>
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<tr>
<td>&lt; Rgn Used HWM</td>
<td>308K</td>
</tr>
<tr>
<td>Rgn Request</td>
<td>GM</td>
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<tr>
<td>&gt; Rgn Limit</td>
<td>1107M</td>
</tr>
<tr>
<td>&gt; Rgn Used HWM</td>
<td>596K</td>
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<td>Dynamic Linklist</td>
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#### System Information

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<td>OS FMID</td>
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<td>CPU Version</td>
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<td>CPU Serial</td>
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<td>OS Owner</td>
<td>IBM CORP</td>
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<tr>
<td>CPU Rate Adj</td>
<td>404</td>
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</table>
Chapter 5: Analyzing Monitor Data

--- Working Set Size Chart ---

Min = 346  Max = 385  Frames per Row = 4

Avg. Frame Count

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<thead>
<tr>
<th></th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
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<td>346</td>
<td></td>
<td></td>
<td></td>
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<td></td>
</tr>
</tbody>
</table>

--- Resource Demand Chart ---

Resource Type  | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 0
---|---|---|---|---|---|---|---|---|---|---
VSAM3100 CPU  | 1.1| ...| ...| ...| 1.1| ...| ...| ...| ...| 1.1|
VSAMDATA I/O  | ...| ...| ...| ...| ...| ...| ...| ...| ...| ...

--- Monitor Messages ---

TN0495I Profile: PRDVSM01 CAMAT ECSA packet initialized at 1B973000
TN0101I Profile: PRDVSM01 now monitoring JOB: PRDVSM01 PGM: VSAM3100
TN0102I Profile: PRDVSM01 USERID: USRLKS1 Data set: PRDVSM01.VSAM3100.D2009319.T1358292
TN0104I Profile: PRDVSM01 Initial Observation rate: 0010, Observations: 000000, Elapsed: 00000
TN8090I Profile: PRDVSM01 Monitoring completed for JOB: PRDVSM01
TN8091I Profile: PRDVSM01 Monitor counters: 000000/000000/000000/000000/000000
TN0106I Profile: PRDVSM01 Final Observation rate: 0010, Observations: 000000, Elapsed: 00000
TN0108I Profile: PRDVSM01 ECSA Used: 132848 (bytes); SRB CPU time: 00:00:02.259

--- Monitor Options from Profile ---

Jobname  . . . PRDVSM01    Incl Task1 .    Excl Task1 .
Step Name  . .              Incl Task2 .    Excl Task2 .
Program Name .              Incl Task4 .    Excl Task4 .
Incl Tran 1  .   User ID 1  .        Term ID 1  .
Incl Tran 2  .   User ID 2  .        Term ID 2  .
Determine the Validity of the Sample Data

The Monitor Overview report presents a high-level view of the application you are monitoring, gives you a preliminary indication of job performance, and helps you determine if the sample is valid for the unit of work you have targeted. See "Samples and observations" and "Sampling rules" for more information about the collected data.

Check the following fields to determine if the monitor is valid.

**Samples Used**

Number of samples should be enough to ensure accurate data.

The number should be greater than 1000. A number closer to 10000 is preferred.

**Program**

Name of the program that you intended to monitor displays.

**Sampler Messages**

Number of recoverable errors is less than one percent of the total number of samples.

For message TN8091I, ensure that samples were collected; for example, ensure the monitor target address space was not swapped or non-dispatchable each time the DIE routine was executed.

Message TN8091I indicates:

- The number of times the DIE routine executed
- The number of times the SRB executed
- The number of times the SRB had a recoverable error
- The number of times the DIE routine executed and the target address space was swapped out
- The number of times the DIE routine executed and the target address space was non-dispatchable

The fields of the Monitor Overview panel are described next.

**Monitor Data Set**

Name of the data set containing the sample data from the monitor.
Profile
Name of the profile that you specified when you created the monitor definition.

Options
Type of analysis in effect: NORMAL, ALL, ACTIVE, or WAIT.
An asterisk (*) following the value indicates that tasks or transactions have been selected for analysis. Place the cursor on the **Options** field value and press **Enter** to display a pop-up panel listing the selected tasks/transactions.

Job Information

Jobname
Name of the job that was monitored.

Stepname
Step name on the EXEC statement that invoked the program (if no cataloged procedure is used).
Name of the step that invoked the procedure (if a cataloged procedure is used).

Procstep
Procedure step name (if a cataloged procedure is used).

Program
Name of the program on the EXEC statement of the JCL for the job.

ASID
Address space identifier of the job that was monitored.

User ID
Identifier of the user who requested the monitor.
If the monitor was invoked by a batch job using TUNDCALL, this field displays the name of the batch job.

Job ID
JES job identifier of the job that was monitored.

Comp Code
The 3-digit system and 4-digit user completion codes for the job being monitored.

CICS Lvl
Release level of the CICS system that was used by the job.
This field is not displayed unless CICS was detected for the job being monitored.
DB2 Lvl
Release level of the DB2 system that was used by the job.
This field is not displayed unless DB2 was detected for the job being monitored.

IMS Lvl
Release level of the IMS system that was used by the job.
This field is not displayed unless IMS was detected for the job being monitored.

MQS Lvl
Release level of the MQ Series (MQS) system that was used by the job.
This field is not displayed unless MQS was detected for the job being monitored.

SAP Lvl
Release level of the SAP® system that was used by the job.
This field is not displayed unless SAP was detected for the job being monitored.

USS Lvl
Release level of the UNIX® System Services (USS) system that was used by the job.
This field is not displayed unless USS was detected for the job being monitored.

WAS Lvl
Release level of the WebSphere Application Server (WAS) system that was used by the job.
This field is not displayed unless WAS was detected for the job being monitored.

IDMS Lvl
Release level of the CA IDMS system that was used by the job.
This field is not displayed unless CA IDMS was detected for the job being monitored.

Datacom Lvl
Release level of the CA Datacom system that was used by the job. This field is not displayed unless CA Datacom was detected for the job being monitored.

Ideal Lvl
Release level of the CA Ideal system that was used by the job. This field is not displayed unless CA Ideal was detected for the job being monitored.

Adabas Lvl
Release level of the Adabas system that was used by the job. This field is not displayed unless Adabas was detected for the job being monitored.

Natural Lvl
Release level of the Natural system that was used by the job. This field is not displayed unless Natural was detected for the job being monitored.
< Rgn Lim
  Requested region size for the step being measured below the 16 MB line.

> Rgn Lim
  Requested region size for the step being measured above the 16 MB line.

Rgn Request
  Amount of storage requested by the job being monitored.

Dynamic Linklist
  Eser-specified dynamic linklist, if using a linklist other than that specified during IPL.

Job Statistics

TCB Time
  Amount of CPU time that was used by execution of code in task mode during the monitored period.
  This value is obtained from the ASCB.

SRB Time
  Amount of SRB time used by this address space during the time it was being measured.
  The SRB time used by CA Mainframe Application Tuner is not reflected in this value.

ECPU Time
  Amount of CPU time used within this address space in HH:MM:SS.TH format.

zAAP Time
  Amount of CPU time used by this address space in a zSeries Application Assist Processor (zAAP) in HH:MM:SS.TH format.

Elig zAAP Time
  Total time that there was Java work eligible to run on a zSeries Application Assist Processor (zAAP).

Within a particular application, some work might be Java and the JVM has designated the work as zAAP-eligible, while other work might be non-Java, or might be Java work that was not marked zAAP-eligible by the JVM. The zAAP-eligible work can be switched to a zAAP for processing, and when the work that is not zAAP-eligible is ready to execute, this work would execute on a standard CP. A Switch Service is in place to work with the z/OS Dispatcher, managing the dispatching of zAAP-eligible work between the standard CPs and the zAAP Engines.

This field can help identify opportunities where a zAAP processor would benefit processing as well as identify issues with available zAAP processors not being fully utilized. New zAAP users should refer to the JVM Startup Options for zAAPs such as -Xifa: as well as new parameters in the IEAOPTxx of SYS1.PARMLIB such as IFACrossover.
**zIIP Time**

Amount of CPU time that was spent actually executing on an Integrated Information Processor (zIIP) in HH:MM:SS.TH format.

**Elig zIIP Time**

Total time that there was work eligible to run on a zSeries Integrated Information Processor (zIIP) engine.

Note that only enclave SRB work is eligible to run on the zIIP. DB2 and IPSEC are two of the initial exploiters.

Within a particular application or subsystem, only the Enclave SRB work is designated as zIIP-eligible. A Switch Service is in place to work with the z/OS Dispatcher, managing the dispatching of zIIP-eligible work between the standard CPs and the zIIP engines.

This field can help identify opportunities where a zIIP processor would benefit processing, as well as identify issues with available zIIP processors not being fully utilized. There is one external tuning option, zIIPAWMT, which controls the needs help dispatcher. Also note APAR OA20045 that enables the IIPHONORPRIORITY=Yes/No Specification for z/OS 1.8.

**Swapped Out**

Amount of time the address space was observed to be swapped out during the measurement in HH:MM:SS.TH format.

**Non Disp**

Amount of time the address space was observed to be nondispatchable (the ASCB nondispatchability flags were on) during the measurement in HH:MM:SS.TH format.

**LPAR/DIS Delay**

Amount of time the address space was observed to be delayed because of either LPAR delay or other disabled work on the processor during the time of the measurement in HH:MM:SS.TH format.

**Wait**

Elapsed time that this monitor spent waiting.

Normally, this is the time that is not reflected in the CPU time, Swapped Out, Non Disp, and LPAR/DIS Delay fields.

**CPU Svcs Units**

CPU Service units, which are an interval of CPU time normalized by a CPU processor specific adjustment rate.

**EXCP count**

Number of EXCPs or I/Os issued by the address space during the duration of the measurement.
EXCP Rate
Number of EXCPs or I/Os per second being issued by the address space during the duration of the measurement.

<Rgn Used HWM
High-water-mark value for the used region size below the 16 MB line.
This value might actually be larger than the requested size if modified by other products or SMF exits.

>Log Used HWM
High-water-mark value for the used region size above the 16 MB line.
This value might actually be larger than the requested size if modified by other products or SMF exits.

Page-ins
Number of page-in operations for the job.
A high value in this field can indicate job delays.

Page-in Rate
Number of page-in operations per second.
A high rate can indicate job delay due to storage constraints.

When reference is made to a page of virtual storage that does not appear in central storage, the page is brought in from DASD or expanded storage to replace a page in central storage. The newly referenced page is said to have been paged in. It is the page-in (not page-out) rate that is of primary concern because page-in activity occurs synchronously (for example, the task stops until the page fault is resolved).

Monitor Statistics
Start Date
Date the monitor started.

Start Time
Time the monitor started.

Duration
Duration of time the address space was measured by CA Mainframe Application Tuner for this monitor in HH:MM:SS format.

Observations: Final Rate
Final rate at which CA Mainframe Application Tuner observed the activity of the address space.

Note: This value was formerly known as the sampling rate. See "Specifying additional monitoring criteria" for more information.
Observatons: Requested
Number of requested observations in the monitor profile as requested by the user.

Observatons: Used
Actual number of observations made by CA Mainframe Application Tuner.

Samples: Used
Number of samples used from the measurement.
See "Specifying additional monitoring criteria" for more information.

Samples: % Active
Percentage of samples used that were recorded when the application was actively using CPU.

Samples: % Wait
Percentage of samples used that were recorded when the application was not using CPU and was waiting on a resource.

Avg TCBs Act
Average number of TCBs that were actively using the CPU during an observation.
This value can be from 0 up to the number of online CPUs.

CMN HWM Used
High-water-mark amount of common (ECSA) storage used by CA Mainframe Application Tuner to measure the job.
This value can be used for planning purposes on setting the maximum active number of monitors allowed.

System Information

System Name
Eight-character system name identifier for the z/OS image on which the monitor was executed.

SMFID
Four-character System Management Facility identifier for the z/OS image on which the monitor was executed.

OS FMID
Release level of the MVS system where the target job executed.

OS Name
Name of the operating system.

OS Level
Release level of the operating system.
OS Owner  
Name of the operating system owner.

CPU Model  
CPU model number of the system on which the monitor was executed.

CPU Version  
CPU version of the system on which the monitor was executed.

CPU Serial  
Serial number of the processor on which the monitor was executed.

CPU Rate Adj  
Processor-specific adjustment rate used in the calculation of CPU service units.
This value is based on the number of instructions per CPU second for a given processor.

Working Set Size Chart  
The Working Set Size Chart displays the average frame count usage over time. The total monitor period is divided into 50 equal intervals. Each + on the chart represents the average frame count for an interval.
The chart contains ten rows whose range is determined by the minimum and maximum average frame count used for the monitored period. The number of frames per row is calculated as  
(Max Avg. Frame Count - Min Avg. Frame Count)/9

Resource Demand Chart  
Approximate percentage of time the application spent either running on a CPU or being delayed for data over the life of the monitor run. The total monitor run is split into 50 equal periods, each period being 2% of the total run. The activity is summarized into each slot by resource type. In this way, you see an overview of the resource demands during the monitor run.

Resource  
Task name, file name, or database ID that uniquely identifies the resource being reported.

Type  
Type of resource, which can be one of the following types:
- CPU—application active on processor for a task resource
- I/O—application delayed for I/O on a DD name resource
- DB2—application delayed for a DB2 statement on a DBRM resource
- MQS—application delayed for MQSeries resources
- SAP—application delayed for SAP resources
- ADA—application delayed for an Adabas statement
- DCM—application delayed for a Datacom statement
- IMS—application delayed for an IMS segment on a PSB resource
- OTHR—application delayed for an unidentifiable resource

**Chart**

Fifty columns of numbers and/or symbols depicting the time spent by the program either executing on a CPU or delayed for data for each period.

The values shown represent from 0% to 100% of the total resource demand. When the percentage of resource demand is 0%, a blank displays. When the percentage of resource demand is greater than 0% but less than 5%, a period (.) displays. When the percentage of resource demand is 5% or greater but less than 95%, a single digit from 1 to 9 displays. When the percentage of resource demand is 95% or greater, a plus sign (+) displays.

**Monitor Messages**

Messages that are issued by the Server Space during the monitored period are displayed here. These messages provide additional information about execution and completion.

**Monitor Options from Profile**

Monitor options that you specified in the Monitor Criteria panel are displayed here.

**DB2 Monitoring, Intercept, and Flag settings**

Monitoring parameters specifying DB2 data collection information are displayed here. The values are defined in UTRPARM member TUNSSP00 (see the *Installation Guide* for more information about parameters in TUNSSP00).
Interactive Analysis Option 1 - TaskView

TaskView provides information about the components of the monitored address space. When first invoked, the TaskView panel displays all of the monitored tasks. You might select specific tasks to focus your analysis.

<table>
<thead>
<tr>
<th>CA MAT</th>
<th>TaskView</th>
<th>COMMAND</th>
<th>SCROLL</th>
<th>CSR</th>
</tr>
</thead>
<tbody>
<tr>
<td>Primary commands: SElect, REcall, ADDHelp</td>
<td>Profile: DB2SAMP</td>
<td>Options: NORMAL</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Line commands: T - Tag</td>
<td>C - Code Details</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>U - Untag</td>
<td>D - Delay Details</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>LC Program</td>
<td>T Actv%</td>
<td>Data%</td>
<td>System%</td>
<td>VolWait%</td>
</tr>
<tr>
<td>__________</td>
<td>__________</td>
<td>__________</td>
<td>__________</td>
<td>__________</td>
</tr>
<tr>
<td>DFHKETCB</td>
<td>13.47</td>
<td>38.37</td>
<td>0.00</td>
<td>33.88</td>
</tr>
<tr>
<td>DFHD2EX3</td>
<td>3.67</td>
<td>0.00</td>
<td>0.00</td>
<td>3.27</td>
</tr>
<tr>
<td>DFHD2EX3</td>
<td>1.63</td>
<td>0.00</td>
<td>0.00</td>
<td>2.45</td>
</tr>
<tr>
<td>DFSPAT00</td>
<td>0.41</td>
<td>2.45</td>
<td>0.00</td>
<td>0.00</td>
</tr>
<tr>
<td><strong>N/A</strong></td>
<td>0.41</td>
<td>0.00</td>
<td>0.00</td>
<td>0.00</td>
</tr>
</tbody>
</table>
TaskView displays one line for each unique task that is detected during the monitored period. From this perspective, you see which tasks are delayed and the reasons for the delay. CA Mainframe Application Tuner reports on all tasks in the address space except the initiator and dump services.

The available commands for TaskView are described next.

**SELect**

Selects only the tagged tasks for analysis.

**RECall**

Displays all tasks for analysis.

**ADDHelp**

Invokes the content-sensitive Help application to update or create a help entry for the selected content.

**T**

Tag line command that is used to select up to five tasks for analysis.

**U**

Untag line command that is used to clear a selected task.

**C**

CodeView Detail line command that is used to display the CodeView Detail panel showing activity detected by CA Mainframe Application Tuner.

The CodeView Detail panel is described next.

**D**

DelayView Detail line command that is used to display the DelayView Detail panel showing the types of delays encountered by CA Mainframe Application Tuner.

The DelayView Detail panel is described later.

The delay information that displays on the TaskView panel is described next.

**Profile**

Name of the profile that you specified when you created the monitor definition.

**Options**

Type of analysis in effect: NORMAL, ALL, ACTIVE, or WAIT.

An asterisk (*) following the value indicates that tasks or transactions have been selected for analysis.

Place the cursor on the **Options** field value and press **Enter** to display a pop-up panel listing the selected tasks/transactions.
Program

Program name associated with the task.

If a program name cannot be identified, the value **n/a** is substituted.

T

"X" indicates that the task has been tagged for analysis.

Actv%

Percentage of the monitored period that the CPU was actively processing the monitored application.

Data%

Percentage of the monitored period that the application was delayed because of an I/O request.

System%

Percentage of the monitored period that the application used system services.

Examples of these services are storage management and security checking.

VolWait%

Percentage of the monitored period that the application voluntarily waited for an event

InvWait%

Percentage of the monitored period that the application waited because one of the following situations occurred:

- The address space was swapped out and unable to run.
- The address space was swapped in, but was not given control of the CPU.

Other%

Percentage of the monitored period that was not attributable to any of the categories known to CA Mainframe Application Tuner.

Total%

Sum of the other six categories of delay.

Visual

Graphical representation of the Total% field.
Select Tasks for Analysis

1. Type T next to the tasks that you want to select for analysis.
2. Press Enter.
   
   An X will be displayed in the T column indicating which tasks are selected.
   
   To clear a task, type U next to it and press Enter.
3. Type SEL.
4. Press Enter.
   
   The TaskView panel shows only the selected tasks, with all percentages calculated for the selected tasks only.
5. To redisplay all tasks, type REC and press Enter.
   
   The task **N/A** (not associated) is calculated from samples representing activity not associated with any particular task; for example, address space swapping.

CodeView Detail

Use the CodeView Detail (C) line command from the TaskView panel to display the program activity that is associated with a specific task.

<table>
<thead>
<tr>
<th>CA MAT</th>
<th>CodeView Detail</th>
<th>Task: DFHKETCB</th>
<th>Profile: DB2SAMP</th>
<th>Command ====&gt;</th>
<th>Scroll ====&gt;</th>
<th>CSR</th>
</tr>
</thead>
<tbody>
<tr>
<td>Task:</td>
<td>CodeView Detail</td>
<td>Task: DFHKETCB</td>
<td>Profile: DB2SAMP</td>
<td>Command ====&gt;</td>
<td>Scroll ====&gt;</td>
<td>CSR</td>
</tr>
<tr>
<td>Pseudo/Module/Csect/4GL,</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pseudo, REGister, ADDHelp</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Primary commands: MOde Pseudo/Module/Csect/4GL,</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>PSEudo, REGister, ADDHelp</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Line commands: A - Associate</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>C - Callerid</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>D - Delays</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>N - Long Name</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>I - Info</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>L - Listing</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>S - Distribution</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>H - Histogram</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>NH - Normalized Histogram</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>LC Module</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Csect</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Description</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>L C Actv% Wait% Totl% Visual</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

| ------------------------ | | ------------------------ | | ------------------------ | | ------------------------ |
| DFHSIP | DFHDSSR | DS domain - suspend/resum | A Y | 0.00 | 41.63 | 41.63 | =========> | | |
| DFHSIP | DFHDSDS3 | DS domain - main dispatch | A Y | 1.22 | 25.31 | 26.53 | =========> | | |
| JIMSDATE | JIMSDATE | In common space | A Y | 2.04 | 0.00 | 2.04 | =========> | | |
| IDA019R1 | IDA019R3 | VSAM I/O driver | A Y | 0.00 | 1.63 | 1.63 | =========> | | |
| .NUCLEUS | ISGGRHS1 | Global resource serialization | B Y | 0.00 | 1.22 | 1.22 | =========> | | |
| DFHSIP | DFHSMGF | SM domain - getmain/freem | A Y | 1.22 | 0.00 | 1.22 | =========> | | |
| .COMMON | .COMMON | In common space | Y | 1.22 | 0.00 | 1.22 | =========> | | |
| .NUCLEUS | IEACVT | Supervisor services | B Y | 0.00 | 0.82 | 0.82 | =========> | | |
This panel identifies modules and CSECTs that delayed a task in the Task: field. The commands you can issue and field headings are identical to the CodeView panel. All subsequent associated panels report information for the specified task.

The CodeView Detail panel reports both Active and Wait activity percentages for Analyze Normal mode, which accounts for all activity reported in TaskView.

**DelayView Detail**

Use the DelayView Detail (D) line command to display the delay categories that are associated with a specific task and detected by CA Mainframe Application Tuner.

<table>
<thead>
<tr>
<th>LC Major Category</th>
<th>Minor Category</th>
<th>Actv%</th>
<th>Wait%</th>
<th>Totl%</th>
<th>Visual</th>
</tr>
</thead>
<tbody>
<tr>
<td>Voluntary Wait</td>
<td>Wait/Waitr SVC</td>
<td>0.00</td>
<td>75.77</td>
<td>75.77</td>
<td>====&gt;</td>
</tr>
<tr>
<td>Data Delay</td>
<td>IDMS Delay</td>
<td>0.00</td>
<td>24.15</td>
<td>24.15</td>
<td>=&gt;</td>
</tr>
<tr>
<td>Program Load Delay</td>
<td>LOAD SVC 122-9</td>
<td>0.00</td>
<td>0.05</td>
<td>0.05</td>
<td></td>
</tr>
<tr>
<td>System Active</td>
<td>WTO SVC</td>
<td>0.00</td>
<td>0.02</td>
<td>0.02</td>
<td></td>
</tr>
<tr>
<td><strong>End of Table</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

This panel displays information about what caused a task to be delayed in its execution. The commands you can issue and field headings are identical to the DelayView panel. All subsequent associated panels report information for the specified task.

**Interactive Analysis Option 2 - DelayView**

CA Mainframe Application Tuner divides program delays into delay categories. The DelayView option shows the percentage of the monitored period that the program was in a wait state for each category. From the DelayView panel, you can further investigate a delay, by using the Delay Locations, Delayed Resources, Delay Distribution, and Data Set Details panels.
CA Mainframe Application Tuner uses the term delay to encompass all aspects of elapsed time, including time that the program was using CPU.

```
CA MAT -------------------------- DelayView ----------------- Row 1 to 5 of 5
COMMAND ===>                                                  SCROLL ===> CSR
Primary commands: DETail on/off           Module: *          Profile: DB2SAMP
ADDHelp                  Csect: *          Options: NORMAL
Offset: *           Detail: OFF
Line commands:  A - Address
                S - Distribution
LC Major category       Actv%  Wait%  Totl%  Visual
____________________ ______ ______ ______ __________
-------------------------------------------------------------------------------
__ Voluntary Wait         0.00  39.59  39.59 =========>
__ CICS File Ctl Delay    0.00  38.37  38.37 ========>
__ Program Active        15.92   0.00  15.92 ===>
__ Data Delay             1.63   2.45   4.08 >
__ System Active          2.04   0.00   2.04
```

The available commands for DelayView are described next.

**DETail on/off**

ON displays minor delay reasons; OFF summarizes minor delay reasons by major categories.

**ADDHelp**

Invokes the content-sensitive Help application to update or create a Help entry for the selected content.

**A**

*Address* - shows all code locations associated with this type of delay.

Displays the Delay Locations panel (see Display Delay Locations).

**S**

*Distribution* - shows the tasks or transactions that have this type of delay.

Displays the Delay Distribution application (see Display Delay Distribution) or the CA IDMS Delays application (see Display CA IDMS Delays).

The information that displays on the DelayView panel is described next.

**Module**

Asterisk (*) means all modules in the sample set were considered.

For more information about displaying information about a particular module, see Display Delay Locations.
CSECT
Asterisk (*) means all the CSECTs in the sample set were considered.
For more information about displaying information about a particular CSECT, see Display Delay Locations.

Offset
Asterisk (*) means all the offsets in the sample set were considered.
For more information about displaying information about a particular offset, see Display Delay Locations.

Profile
Name of the profile that you specified when you created the monitor definition.

Options
Indicates the type of analysis in effect: NORMAL, ALL, ACTIVE, or WAIT.
An asterisk (*) following the value indicates that tasks or transactions have been selected for analysis. Place the cursor on the Options field value and press Enter to display a pop-up panel listing the selected tasks/transactions.

Detail
Indicates the display mode of ON or OFF for delay details.

Major category
Six major categories of delays are shown here:

- **Program Active** - The application or a called support routine is using CPU.
- **Data Delay** - The application is accessing a file.
- **Voluntary Wait** - The application is voluntarily waiting for resources.
- **File Mgmt Delay** - The application is preparing a file for processing.
- **System Active** - The application is using operating system functions such as storage administration or system security.
- **Other Delays** - The application is delayed by a category unknown to CA Mainframe Application Tuner.

See the chapter, "Tuning Your Applications" for a complete list of categories.

Minor category
More detailed delay category classification.
This field is blank if DETAIL OFF is specified. To view the minor delay categories, use the primary command DETAIL ON.

Actv%
Percentage of the monitored period that CA Mainframe Application Tuner detected CPU usage for this category of delay.
Interactive Analysis Option 2 - DelayView

Wait%
Percentage of the monitored period that CA Mainframe Application Tuner detected that the program was in a wait state for this category of delay.

Totl%
Summation of the Actv% and Wait% fields.

Visual
Graphical representation of the Totl% field.

Display Minor Delay Categories

DelayView divides each major delay category into minor categories. Minor delay categories are only displayed if Detail: ON is specified for the panel. The default display value is specified on the Profile Parameters panel. You can change the display by using the DETail on/off primary command.

Both major and minor delay categories are shown in the previous panel, as indicated by Detail: ON on the right side of the screen. To see only major delay categories, use the primary command DETail OFF.
Display Delay Locations

To find the location of a specific delay, type A next to a delay category and press Enter. For example, type A next to the Data Delay line on the DelayView panel and press Enter.

The Delay Locations panel displays.

| CA MAT ----------------------- Delay Locations ----------- Row 1 to 14 of 786 |
| COMMAND ===>                             SCROLL ===> HALF |
| Delay type: Program Active                  Profile: CALUSS1 |
| Primary commands: REGister, ADDHelp, LONgname |
| Line commands: L - Listing D - Details A - Associate |
| C - Callerid I - Info N - Long Name |
| Extended Callerid: CA - Application CC - Current CV - Via |
| LC Module Csect Offset Csect Description Stmt D C X Pct Visual |
| ____________________________________________________________________________ |
| IBMPEV11 @BMPHZIQ 000000F2 Y Y Y 2.01 => |
| IBMPEV11 @BMPHZIQ 000000D8 Y Y Y 1.95 => |
| IBMPEV11 @BMPHZIQ 000000DC Y Y Y 1.66 => |
| IBMPEV11 @BMPHZIQ 00000356 Y Y Y 1.22 => |
| IBMPEV11 @BMPHZIQ 000000DE Y Y Y 1.05 => |
| IBMPEV11 @BMPHZIQ 000000EA Y Y Y 1.05 => |
| IBMPEV11 @BMPHZIQ 000000EC Y Y Y 0.99 => |
| IBMPEV11 @BMPHZIQ 000000D2 Y Y Y 0.93 => |
| IBMPEV11 @BMPHZIQ 00000388 Y Y Y 0.79 => |
| IBMPEV11 @BMPHZIQ 000005E6 Y Y Y 0.64 => |
| IBMPEV11 @BMPSMOA 0000055C Y Y Y 0.49 => |
| IBMPEV11 @BMPHZIQ 0000035A Y Y Y 0.47 => |
| IBMPEV11 @BMPSMOA 00000068 Y Y Y 0.47 => |
| IBMPEV11 @BMPSMOA 0000006A Y Y Y 0.44 => |

The Delay Locations panel displays a list of CSECT module names, CSECTs, and offsets where the delays were detected. If CA Mainframe Application Tuner finds more than one location where a data delay took place, the data is listed in order of decreasing significance.

The available commands for the Delay Locations panel are described next.

REGister

Displays the Program Listing Registration panel, where you can register a program with CA Mainframe Application Tuner.

ADDEHelp

Invokes the content-sensitive Help application to update or create a help entry for the selected content.

L

Listing - displays the program listing if the program has been registered.
The information displayed on the Delay Locations panel is described next.

**Profile**

Name of the profile that you specified when you created the monitor definition.

**Module**

Module name.

**CSECT**

Control section within the module.

**Offset**

Hexadecimal offset within the CSECT, or, if the CSECT is not known, the module.

**CSECT Description**

Description of the CSECT, if available.
Stmt

Number of the high-level language statement.
This field displays information only for registered programs. For information about registering a program, see Register Source Program Listings.

D

Y in the D (Detail) column indicates that additional information is available by using the Details line command to help isolate the cause of the delays.

C

Contains a Y if Callerid information is available for this CSECT.
Callerid provides detailed information about which programs called the CSECT being queried.

X

Contains a Y if Extended Callerid information is available for this CSECT.

Pct

Percentage of the monitored period that a delay for this offset is detected.

Visual

Graphical representation of the Pct field.

Display Delayed Resources

If a Y appears in the D column on the Delay Locations panel, you can view another level of information. Type D and press Enter.

The Delayed Resources panel displays.

```
CA MAT ---------------------- Delayed Resources ------------- Row 1 to 4 of 4
COMMAND ===>                                                  SCROLL ===> CSR
Delay type: IO Queued                                     Profile: DB2SAMP
Line commands: S - Select                                      Csect: IGG019AR
Offset: 0000084
LC Resource             Component                           Pct   Visual
____________________ ___________________________________ _____ __________
>------------------------------------------------------------------------------
  __ SKWAO                FILE LIST                           40.74 =========>
  __ SIWA30               FILE LIST                            6.82 >
  __ SKWAI                FILE LIST                            0.05
  __ ITRANS               FILE LIST                            0.02
```
The Delayed Resources panel shows resources and components that are related to a delay. Based on the type of delay, the Resource field contains different types of information. Use the Select line command to display more information about the selected resource.

The information displayed on the Delayed Resources panel is described next.

**Delay type**
Category of delay from the DelayView panel for which details are now displayed.

**Profile**
Name of the profile that you specified when you created the monitor definition.

**Module**
Module name.

**CSECT**
Control section within the module.

**Offset**
Hexadecimal offset within the CSECT, or, if the CSECT is not available, within the module.

**Resource**
Resources delaying the program.

Resources vary depending on the delay category. For more information about the types of resources that can cause delays, see the chapter “Tuning Your Applications.”

**Component**
Component of the resource delaying the program. Components vary based on the resource.

**Pct**
Percentage of time during the monitored period that this resource delayed the application.

**Visual**
Graphical representation of the Pct field.
Display Delay Detail

You can display further information about the source of a delay. Type S next to a resource on the Delayed Resources panel and press Enter. Depending on the type of resource, one of three panels displays.

If the resource is a data set, the Data Set Details panel displays.

```
CA MAT  --------------------- Data Set Details ------------ Row 1 to 19 of 38
COMMAND ===>                                                  SCROLL ===> CSR
DNAME: SKWAO                                               Profile: DB2SAMP
Opened for: PUT LOCATE   Access Method: QSAM  Concatenation Count: 0
Data Set Information for: FW.FW008.FW660.TSKWA3.G3056V00
  File Type: Physical Sequential
  Description: Fixed

----- SMS ------- ------ Allocation ------ ----------- Format --------------
DATACLAS: **NONE** Unit:                CYL DS Org:         PS Rec FM:       FB
MGMTCLAS: MA@NODEL Secondary:          250 Buffer Count:    8 Buf Size: 222680
  Volume Count:          2 Stripes:         0 Concat #:      0
  Curr Extent Count:     7

*************** Data Set Performance ***************
  Avg Response Time: 14.91  Avg IOSQ Time:  0.00
  Active Rate: 9.29  Avg Pend Time:  0.38
  Total EXCPs:          0  Avg Disc Time:  0.23
  Total Connect Time: 125583.10  Avg Conn Time: 14.30
```
If the resource is not a data set, the Delay Locations panel displays.

```plaintext
CA MAT ---------------------- Delay Locations ------------- Row 1 to 14 of 786
COMMAND ===> SCROLL ===> HALF

Delay type: Program Active Profile: CALUSS1
Primary commands: REGister, ADDHelp, LONGname
Line commands: L - Listing  D - Details  A - Associate
               C - Callerid  I - Info  N - Long Name
Extended Callerid: CA - Application  CC - Current  CV - Via
LC Module  Csect  Offset  Csect Description  Stmt  D  C  X  Pct  Visual
____________________ ___________________________________ _____ __________
>------------------------------------------------------------------------------
  __ IBMPEV11 @BMPHZIQ 000000F2                           Y Y Y  2.01 =========>
  __ IBMPEV11 @BMPHZIQ 000000D8                           Y Y Y  1.95 =========>
  __ IBMPEV11 @BMPHZIQ 000000DC                           Y Y Y  1.66 =========>
  __ IBMPEV11 @BMPHZIQ 00000356                           Y Y Y  1.22 =========>
  __ IBMPEV11 @BMPHZIQ 000000DE                           Y Y Y  1.05 =========>
  __ IBMPEV11 @BMPHZIQ 000000EA                           Y Y Y  0.99 ======>
  __ IBMPEV11 @BMPHZIQ 000000EC                           Y Y Y  0.93 ======>
  __ IBMPEV11 @BMPHZIQ 00000388                           Y Y Y  0.79 ===>
  __ IBMPEV11 @BMPHZIQ 000000DE                           Y Y Y  0.64 ===>
  __ IBMPEV11 @BMPHZIQ 00000356                           Y Y Y  0.49 =>
  __ IBMPEV11 @BMPHZIQ 0000005E6                          Y Y Y  0.47 =>
  __ IBMPEV11 @BMPHZIQ 0000006A                           Y Y Y  0.47 =>
  __ IBMPEV11 @BMPHZIQ 0000006A                           Y Y Y  0.44 =>
```

If the resource includes multiple data sets, the Delay Detail Data panel displays. From this panel, you can use the Select line command to display the Data Set Detail panel.

```plaintext
CA MAT ---------------------- Delayed Resources ------------- Row 1 to 4 of 4
COMMAND ===> SCROLL ===> CSR

Delay type: VSAM I/O Wait Profile: DB2SAMP
Module: IDA019L1
Line commands: S - Select Csect: IDA019R3
               Offset: 000000EC
LC Resource  Component  Pct  Visual
_________________________  ________________________ __________
>------------------------------------------------------------------------------
  S  MDYU1000                  0.41 =========>
  __ MDYU2000                  0.41 =========>
  __ MDYU3000                  0.41 =========>
  __ MDYU3000                  0.41 =========>
```
Display Callerid and Extended Callerid

If the C column contains a Y for a module on the Delay Locations panel, you can display a list of callers for the Module or CSECT. The list of callers is ordered by activity. Type C in the LC field for a module and press Enter.

The Callerid panel displays.

```
CA MAT -------------------------- Callerid ------------------ ROW 1 to 2 of 2
COMMAND ===>                                                  SCROLL ===> CSR
Primary commands: REGister, ADDHelp                          Profile: TUNIVP1
    Line commands: L - Listing                                Module: TUNCOB01
    Csect: IGZCINI1
LC Module   Csect    Offset   Stmt  Csect Description         Pct   Visual
________ ________ ________ _____ _________________________ _____ __________
-------------------------------------------------------------------------------
__ TUNCOB01 TUNCOB01 000008C6   157 Cobol test program distri 17.27 =========>
__ TUNCOB01 TUNCOB01 0000088C   148 Cobol test program distri  0.88
```

The fields on the Callerid panel are the same as on the Delay Locations panel.

Extended Callerid

Extended Callerid provides a sampling of application program functions using the caller’s chain of save area (SA) and Language Environment (LE) dynamic save area (DSA). At interval sample time the SA/DSA chain is scanned to identify and provide the load module and function names for up to three program entries.

If the X column contains a Y for a module on the Delay Locations panel, you can display information about the load modules and functions of the following programs:

- **Current (CC)** - module that is in control at the time of the sample
  
  The current or active SA and module is identified utilizing the current PSW and registers for the sampled environment. The current module is the active program or last program at the end of the save area chain.

- **Application (CA)** - the lowest level non-system module is identified as application code or previous non-system if two in sequence
  
  The application module is identified by back tracing through previous callers in the chain and identifying the first application (non-system) module. If the previous module to this one is also an application module, it will be identified as the application and the first one found will be the via (CV) module.

- **Via (CV)** - most recent module called by the user application code
  
  The via module is the last program called by the application function.

Type CA, CC, or CV in the LC field for a module and press Enter.
The Extended Callerid panel displays.

```
CA MAT ------------------ Extended CallerID ---------------- Row 1 to 4 of 4
COMMAND ===>                                                SCROLL ===> HALF

Display Mode: Current                                    Profile: CALUSS2
Options: NORMAL                                     Module: CEEPLPKA
Primary Commands: CURrent, APPlication, VIA         Csect: CEE4DSQT
Line Commands: M - Module Name       A - Activity         Offset: *
F - Function Name

 LC Load Module       Function            Actv% Wait% Totl% Visual

-------------------------------------------------------------------------------
__ rjrf1/u/ctest/uss3bp27 thread                  5.30 18.44 23.74 =========>
__ CEEPLPKA               CEEOTERM                0.28  0.00  0.28
__ CEEPLPKA               CEEOPE                  0.02  0.00  0.02
__ CEEPLPKA               CEEOXKTD                0.01  0.00  0.01

********************************************************** End of Table **************
```

You can use line command A from the Extended Callerid panel to see the Callerid Activity shown next.

```
CA MAT ------------------ Callerid Activity -------------- Row 1 to 15 of 17
COMMAND ===>                                                SCROLL ===> CSR

Display Mode: Current                                    Profile: USS3BP27
Options: NORMAL                                     Module: CEEPLPKA
Primary Commands: M - Module Name       A - Activity         Offset: 00000320
F - Function Name

 LC Load Module       Function     Function Module   Actv% Wait% Totl% Visual

-------------------------------------------------------------------------------
__ est/uss3bp27 thread                   00000000 00000AB8  8.99  0.00  8.99 =========>
__ 00000000 00000B76                  0.33  0.00  0.33
__ 00000000 00000B72                  0.27  0.00  0.27
__ 00000000 00000B7E                  0.27  0.00  0.27
__ 00000000 00000B6                   0.14  0.00  0.14
__ 00000000 00000BAE                  0.14  0.00  0.14
__ 00000000 00000BA                    0.13  0.00  0.13
__ 00000000 00000B7A                   0.08  0.00  0.08
__ 00000000 00000B8A                   0.06  0.00  0.06
__ 00000000 00000B6E                   0.06  0.00  0.06
__ 00000000 00000B6                    0.05  0.00  0.05
__ 00000000 00000B6                   0.04  0.00  0.04
__ 00000000 00000B9C                   0.03  0.00  0.03
__ 00000000 00000B8                   0.03  0.00  0.03

--------------------------------------------------- Totals ----------------------
```

You can use line command A from the Extended Callerid panel to see the Callerid Activity shown next.
The fields that are displayed on the Extended Callerid panel are described next.

**Display Mode**
- Current display mode: Current, Application, or Via.

**Profile**
- Name of the profile that you specified when you created the monitor definition.

**Options**
- Type of analysis in effect: NORMAL, ALL, ACTIVE, or WAIT.
  - An asterisk (*) following the value indicates that tasks or transactions have been selected for analysis. Place the cursor on the Options field value and press Enter to display a pop-up panel listing the selected tasks/transactions.

**Module**
- Module name.

**Csect**
- Control Section within the module.

**Load Module**
- Name of the LE load module.
  - If this value is truncated, use the M line command to display the full name.
  - If it is a USS module, the path name is also shown.

**Function**
- LE function name.
  - If this value is truncated, use the F line command to display the full file name.
  - For LE compliant modules, the function name is shown.

**Actv%**
- Percentage of the monitored period when the calling module was using CPU.
  - CA Mainframe Application Tuner calculates this value as the ratio of samples in which it detected callerid activity to the total number of samples.

**Wait%**
- Percentage of the monitored period when the module was not using CPU.
  - CA Mainframe Application Tuner calculates this value as the ratio of samples in which it detected no activity to the total number of samples. This field is not displayed for Analyze Normal mode.

**Totl%**
- Summation of the Actv% and Wait% fields.
Visual

Graphical representation of the Totl% field.

The fields that are displayed on the Callerid Activity panel are described next.

Display Mode

Current display mode: Current, Application, or Via.

Profile

Name of the profile that you specified when you created the monitor definition.

Options

Type of analysis in effect: NORMAL, ALL, ACTIVE, or WAIT.

An asterisk (*) following the value indicates that tasks or transactions have been selected for analysis. Place the cursor on the Options field value and press Enter to display a pop-up panel listing the selected tasks/transactions.

Module

Module name.

Csect

Control Section within the module.

Load Module

Name of the LE load module.

If this value is truncated, use the M line command to display the full name.
If it is a USS module, the path name is also shown.

Function

LE function name.

If this value is truncated, use the F line command to display the full file name.
For LE compliant modules, the function name is shown.

Function Offset

Address offset from the beginning of the LE function of the last call (branch) made from this load module function.

This offset provides the displacement within the function in order to identify the source statement using the compiler pseudo assembler listing output.

Module Offset

Address offset from the beginning of the load module of the last call (branch) made from this load module function.

This offset provides the displacement within the load module for non-LE modules.
**Actv%**

Percentage of the monitored period when the calling module was using CPU.

CA Mainframe Application Tuner calculates this value as the ratio of samples in which it detected callerid activity to the total number of samples.

**Wait%**

Percentage of the monitored period when the module was not using CPU.

CA Mainframe Application Tuner calculates this value as the ratio of samples in which it detected no activity to the total number of samples. This field is not displayed for Analyze Normal mode.

**Totl%**

Summation of the Actv% and Wait% fields.

**Visual**

Graphical representation of the Totl% field.

**Display Program Listings**

The Callerid panel provides the names of callers of a particular routine. This interaction can be especially helpful when identifying which program called a high level language library routine. To view the program listing, type L and press Enter.

The program listing displays in ISPF Browse mode, at the location of the routine.
The program must be registered with CA Mainframe Application Tuner to view the listings. If you keep your program listings in PROTSYM or CA Endevor with footprinting enabled, CA Mainframe Application Tuner can register these listings automatically, using dynamic registration support. For more information, see the Installation Guide, "Customization", under the section heading Set Up Profile Parameters.

**TUNCOB01 program listing**

```
PP 5655-G53 IBM Enterprise COBOL for z/OS and OS/390 3.2.0               Date 11
Invocation parameters:
OBJECT, LIST, SOURCE
Options in effect:
   NOADATA
   ADV
   QUOTE
   ARITH(COMPAT)
   NOAWO
   BUFSIZE(4096)
   NOCICS
   CODEPAGE(1140)
   NOCOMPILE(S)
   NOCURRENCY
LineID   PL   SL  ----+*A-1-B--+----2----+----3----+----4----+----5----+----6---
000001   000100 IDENTIFICATION DIVISION.
000002   000200 PROGRAM-ID. TUNCOB01.
000003   000300*--------------------------------------------------------
000004   000400*  THIS TEST PROGRAM IS USED TO VERIFY THE INSTALLATION O
000005   000500*     CA MAT AND TO DEMONSTRATE ITS CAPABILITIES.
000006   000600*  1. FILE I/O AND BLOCKING OF SEQUENTIAL FILES
000007   000700*     WRITE A RECORD TO TWO FILES 3000 TIMES
000008   000800*     A. USE OF INSPECT VERB
000009   000900*     B. SUBSCRIPTING
000010   001000*     C. INDEXING
000011   001100*     D. INLINE CODING
```

000012   001200*  2. CODING TECHNIQUES
000013   001300*     WRITE A RECORD TO TWO FILES 3000 TIMES
000014   001400*     A. USE OF INSPECT VERB
000015   001410*     B. SUBSCRIPTING
000016   001500*     C. INDEXING
000017   001600*     D. INLINE CODING
Display Module/CSECT Information

To view detailed information about a load module and CSECT that is listed on the Delay Locations panel, type I for a module and press Enter.

The Module/CSECT Info panel displays.

![Module/CSECT Info Panel]

The information in the Module/CSECT Info panel is similar to the information that displays in the ModView panel.

If a CA Endevor footprint was captured for the CSECT, the word AVAILABLE appears in reverse video next to the heading CA Endevor SCM Footprint. Display the footprint by placing the cursor on the word AVAILABLE and pressing Enter.
The CA Endevor SCM Footprint panel displays:

```
CA MAT -------------------------- CodeView ----------------- Row 1 to 8 of 8
C +-------------------------------------------------------------------------+
| CA MAT ------------------- Module/Csect Info ------------------------ |
| Command ===>                                                      |
P |   | CA MAT  ------------ CA Endevor SCM Footprint ------------------  |
|   |       Subsystem Name: ORDERS        Version.Level: 01.01          |
|   |         Element Name: VSAMPGM1            Site ID: 0              |
|   |         Element Type: ASM          Footprint Date: 2011/03/11     |
|   |     Environment Name: PROD         Footprint Time: 10:42          |
|   |                                                                   |
| L |   +-------------------------------------------------------------------+ |
|   |                   Length: 00000E66            Type: SD                  |
|   |            Translator id: 566895801                                     |
|   |             Compile Date: 2011/03/11                                    |
|   | CA Endevor SCM Footprint: Available                                     |
|   | +-------------------------------------------------------------------------+
| IGG0193B IGG019TV 00005658 00056C QSAM EOB I/O DASD          0.10 |
| VSAMPGM1          00007DC8 002238                         B  0.00 |
| VSAMPGM1 VSAMPGM1 00000000 002238                           99.58 =========>
```

For more information on CA Endevor footprints, see the *CA Endevor® Software Change Manager Footprints Guide*.

**Display Delay Distribution**

To find the tasks that are causing a specific delay, type S next to a delay category on the DelayView panel and press Enter. The Delay Distribution panel displays (and overlayed on the DelayView panel as a pop-up panel):

```
CA MAT -------------------------- DelayView ----------------- Row 1 to 11 of 11
C +-------------------------------------------------------------------------+ SCROLL ===> CSR
| CA MAT  ------- Delay Distribution ------------------ Profile: TUNCOB01 SCROLL ===> CSR |
| COMMAND ===>                    Options: NORMAL      Delay type: Program Active |
|                                                      Detail: ON              |
|                                                      % Totl% Visual         |
L |   +-------------------------------------------------------------------+ End of Table ***************|
|   |   TUNCOB01 100.0 ==========>                                      |
```

The Delay Distribution panel displays the distribution of samples that were attributed to a specific task during the monitored period. The percentage of the number of samples that relate to each task displays.

For IMS or CICS, the display shows the distribution of samples for the specific transactions run by the transaction manager and not for the tasks in the address space.
Interactive Analysis Option 3 - CodeView

CodeView displays the execution and wait time of each module that is used by the program. You can display this information in greater detail. You can define Pseudo Groups specific to your environment to summarize the information for multiple modules. This summarization enables you to identify time-consuming areas of code and to associate subroutines within a program and program modules within an application framework.

The CodeView panel displays information from the perspective of the monitored program.

```
CA MAT --------------------------- CodeView --------------- Row 1 to 13 of 46
COMMAND ===>                                                  SCROLL ===> HALF
Primary commands: MOde Pseudo/Module/Csect/4GL,              Profile: CALUSS1
PSEudo, REGister, ADDHelp                  Options: NORMAL
Mode: CSECT
Line commands: A - Associate     C - Callerid     D - Delays   N - Long Name
I - Info          L - Listing S - Distribution
H - Histogram    NH - Normalized Histogram
Extended Callerid: CC - Current CA - Application CV - Via

<table>
<thead>
<tr>
<th>LC Module</th>
<th>Csect</th>
<th>Description</th>
<th>L</th>
<th>C</th>
<th>X</th>
<th>Actv%</th>
<th>Wait%</th>
<th>Totl%</th>
<th>Visual</th>
</tr>
</thead>
</table>
| IBMPEV11 @BMPHZIQ PL/I support routines | A | Y | Y | 25.31 | 6.11 | 31.41 | =========>
| IBMPEV11 @BMPSDM PL/I support routines | A | Y | Y | 10.62 | 2.04 | 12.65 | =========>
| IBMPEV11 @BMPSDAA PL/I support routines | A | Y | Y | 9.98  | 2.65 | 12.62 | =========>
| IBMPEV11 @BMPSOAO PL/I support routines | A | Y | Y | 7.27  | 1.51 | 8.78  | =========>
| IBMPEV11 @BMPSEDB PL/I support routines | A | Y | Y | 4.77  | 0.99 | 5.76  | =========>
| IBMPEV11 @BMPSIAO PL/I support routines | A | Y | Y | 3.90  | 0.79 | 4.60  | =========>
| IBMPEV11 @BMPSHDK PL/I support routines | A | Y | Y | 3.26  | 0.81 | 4.07  | =========>
| IBMPEV11 @BMPSHDP PL/I support routines | A | Y | Y | 3.00  | 0.64 | 3.64  | =========>
| IBMPEV11 @BMPSXBC PL/I support routines | A | Y | Y | 2.47  | 0.52 | 3.00  | =========>
| IBMPEV11 @BMPSAOA PL/I support routines | A | Y | Y | 2.15  | 0.32 | 2.47  | =========>
| IBMPEV11 IBMPFFP PL/I support routines | A | Y | Y | 1.16  | 0.16 | 1.43  | =========>
| CIDTS2F CICTS21                          | A | Y | Y | 1.13  | 0.20 | 1.40  | =========>
| IBMPEV11 @BMPSIOT PL/I support routines | A | Y | Y | 1.11  | 0.44 | 1.54  | =========>
```

The primary and line commands that are available for CodeView are described next.

**MOde**

specifies the way module/CSECT information displays

Type one of the following commands and press **Enter**:

- **MODE PSE** - to display a summarization of module activity by pseudo group. The CSECT field will not be displayed.
- **MODE MOD** - to display the activity of each module detected by CA Mainframe Application Tuner during the monitored period. The CSECT field will not be displayed.
Interactive Analysis Option 3 - CodeView

- **MODE CSE** - to display the activity of each CSECT detected by CA Mainframe Application Tuner during the monitored period. This setting is the default.

- **MODE 4GL** - to display the activity of Adabas, Natural, and CA Datacom routines. See the chapter "Using the Product with Other Databases" for more information.

**PSEudo**

Displays the Pseudo Group Definitions panel, where you can group Modules into functional groups.

For more information, see Define Pseudo Groups.

**REGister**

Displays the Program Listing Registration panel, where you can register a program with CA Mainframe Application Tuner.

**ADDHelp**

Invokes the content-sensitive Help application to update or create a help entry for the selected content.

**A**

**Associate** - accesses the CSECT Associations application.

**I**

**Info** - retrieves information such as size, location, and link date for the selected load module.

**H**

**Histogram** - creates an address execution map of the program.

Shows where the application was executing or waiting for data or service.

**C**

**Callerid** - identifies the callers of this module/CSECT by name and offset.

**L**

**Listing** - displays the program listing.

Valid only if the listing is registered with CA Mainframe Application Tuner, or if dynamic registration support is enabled.

**NH**

**Normalized Histogram** - creates an address execution map of the program that shows where the application was executing or waiting for data or service.

This command is the same as the H line command except the percentages shown are normalized for the selected CSECT.
Interactive Analysis Option 3 - CodeView

Chapter 5: Analyzing Monitor Data

D
**Delays** - provides detailed location information about delays within this delay type.

S
**Distribution** - shows the proportion of time a specific module or module/CSECT that are executed under a task or transaction.

CA
**Application** - displays the Extended Callerid panel in Application mode, which shows information about the lowest level module identified as application code (non-system). For more information, see Display Callerid and Extended Callerid.

CC
**Current** - displays the Extended Callerid panel in Current mode, which shows information about the module that is in control at the time of the sample. For more information, see Display Callerid and Extended Callerid.

CV
**Via** - displays the Extended Callerid panel in Via mode, which shows information about the most recent module called by the user application code. For more information, see Display Callerid and Extended Callerid.

The fields that are displayed on the CodeView panel are described next.

**Profile**
Name of the profile that you specified when you created the monitor definition.

**Options**
Type of analysis in effect: NORMAL, ALL, ACTIVE, or WAIT.

An asterisk (*) following the value indicates that tasks or transactions have been selected for analysis. Place the cursor on the Options field value and press Enter to display a pop-up panel listing the selected tasks/transactions.

**Mode**
Current display mode: PSUEDO, MODULE, CSECT, or 4GL.

**Group**
Pseudo group name defined for the module.
For more information, see Define Pseudo Groups.

**Module**
Module name.

**CSECT**
Control Section within the module.
CSECT Description

Description of CSECTs, if available.
Scroll right to display the extended description.

L
If the program was loaded above the 16MB line in extended virtual memory, this field contains the "greater than" symbol (>).
If the program was loaded below the 16MB line, this field contains the symbol <. If CA Mainframe Application Tuner cannot detect where the program was loaded, this field is blank.

C
If Callerid information is available, this field contains a Y; otherwise, this field is blank.

X
Contains a Y if Extended Callerid information is available for this CSECT.

Actv%
Percentage of the monitored period when a CPU was in use.
CA Mainframe Application Tuner calculates this value as the ratio of samples in which it detected CPU activity to the total number of samples.

Visual
Graphical representation of the Totl% field.

Overlap%
Percentage of the monitored period when both the CPU was active and file access was occurring.
Scroll right to display this information.

Wait%
Percentage of the monitored period when the CSECT was not using CPU.
CA Mainframe Application Tuner calculates this value as the ratio of samples in which it detected no activity to the total number of samples. This field is not displayed for Analyze Normal mode.

Totl%
Summation of the Actv% and Wait% fields.
Display CSECT Activity Locations

The Histogram panel shows the activity that is associated with a CSECT. A CSECT is divided into segments of a specified size in bytes, and the activity detected in each segment displays. To view activity locations:

1. Use either the **Histogram** or the **Normalized Histogram** line command.
   - If you use the H line command, the values displayed in Histogram add up to the value of the selected CSECT (from the Totl% field).
   - If you use the NH line command, the values displayed in Histogram add up to 100 percent.

2. Press Enter.

The Histogram panel displays:

```
CA MAT  -------------------------- Histogram --------------- Row 1 to 13 of 15
COMMAND ===>                                                  SCROLL ===> CSR
Group ===> 32     (Group size in bytes or STMT)            Profile: TUNIVP1
Normalized: NO
Primary commands: REGister, ADDHelp                      Module name: TUNCOB01
Line commands: D - Delays  L - Listing
LC Csect    Offset   Length Actv% Wait% Totl% Visual
________ ________ ______ _____ _____ _____ __________
-------------------------------------------------------------------------------
__ TUNCOB01 00000000   1696  0.00  0.00  0.00
__          000006A0     32  0.08  0.00  0.08
__          000006C0     64  0.00  0.00  0.00
__          00000700     32  0.15  0.23  0.38
__          00000720    128  0.00  0.00  0.00
__          000007A0     32  0.15  0.00  0.15
__          000007C0     64  0.00  0.00  0.00
__          00000800     32 2.86  1.58  4.44 =>
__          00000820     32 10.08  3.61 13.68 =====>
__          00000840     32  7.14 14.51 21.65 =========>
```

Specify Histogram Group Size

The group size defines the resolution of the histogram. The initial size is set by using the Instruction group field of the Profile Parameters panel (see the **Installation Guide**). The default value is 32 bytes.

1. To change the value of the group size, type over the existing value and press Enter. The minimum size accepted is 2 bytes.

   Specify 2 in the GROUP field to analyze execution at the lowest possible level.
2. If the source code for the program is registered with CA Mainframe Application Tuner, or if dynamic registration support is enabled, specify STMT in the Group field to display the verb that is associated with the statement, as shown next.

```
CA MAT ------------------------------- Histogram ---------------- Row 1 to 11 of 11
COMMAND ===> SCROLL ===> CSR
Group ===> STMT   (Group size in bytes or STMT)    Profile: TUNIVP1
Normalized: NO    Module name: TUNCOB01
Primary commands: REGISTER, ADDHelp
Line commands: D - Delays  L - Listing

LC  Csect   Stmt   Verb         Actv% Wait% Totl% Visual
________ ______ ____________ _____ _____ _____ __________
----------------------------------------------------------------------
__ TUNCOB01    100 PERFORM       0.08  0.00  0.08
__             102 PERFORM       0.15  0.23  0.38
__             131 MOVE          0.15  0.00  0.15
__             134 GO            0.15  0.00  0.15
__             135 GO            0.00  0.08  0.08
__             142 ADD          20.38 19.70 40.08 =========>
__             143 ADD           0.30  0.45  0.75
__             144 IF            0.15  0.00  0.15
__             145 MOVE          0.08  0.00  0.08
__             152 MOVE          1.20  0.38  1.58
__             153 INSPECT       0.15  0.00  0.15
********************************* End of Table ********************************
```
Display the Program Listing

If the program you are analyzing has been registered with CA Mainframe Application Tuner, you can display the program listing at the module/CSECT. To view the program listing, type L and press Enter. The program listing displays in ISPF Browse mode.

The program must be registered with CA Mainframe Application Tuner to view the listings. If you keep your program listings in PROTSYM or CA Endevor with footprinting enabled, CA Mainframe Application Tuner can register these listings automatically, using dynamic registration support. For more information, see the Installation Guide, "Customization", under the section heading Set Up Profile Parameters.

**TUNC0B01 listing**

000155  011600*--------------------------------------------------------
000156  011700* INSPECT AGAIN
000157  011800*--------------------------------------------------------
000158  011900
000159  011910  INSPECT1-100.
000160  012000  MOVE    "EVEN MORE DATA FOR THE INSPECT TO DO" TO DA
000161  012100  INSPECT DATA-CONST2 TALLYING COUNT-03 FOR CHARACTERS
000162  012200  AFTER INITIAL "E" REPLACING ALL "0" BY "Z".
000163  014910
000164  015100  STOP-100.
000165  015200  CLOSE BIGBLOCK.
000166  015300  CLOSE UNBLOCK.
000167  015400  STOP RUN.
Display Delay Location Information

From the CodeView panel, you can link to the DelayView panel to display the locations and categories for a module/CSECT. Type D next to a module and press Enter. The DelayView panel displays.

```
CA MAT -------------------------- DelayView --------------- Row 1 to 10 of 10
COMMAND ====>  SCROLL ====> CSR
Primary commands: DETail on/off Module: * Profile: TUNIVP1
ADDHelp Csect: * Options: NORMAL
Offset: * Detail: ON
Line commands: A - Address (AutoNav enabled) S - Distribution
LC Major Category Minor Category Actv% Wait% Totl% Visual
-------------------------------------------------------------------------------
__ Other Delays Waiting for CPU 0.00 56.31 56.31 =========>
__ Program Active Program Active 24.18 0.00 24.18 =====>
__ System Active Getmain SVC 12.47 0.00 12.47 ===> 
__ System Active Regmain SVC 6.28 0.00 6.28 >= 
__ File Mgmt Delay Eov SVC 0.00 0.33 0.33 
__ PC routine delay PC Call 0.09 0.06 0.15 
__ Data Delay IO Queued 0.00 0.12 0.12 
__ File Mgmt Delay Close SVC 0.00 0.09 0.09 
__ DASD Mgmt Delay Obtain SVC 0.03 0.00 0.03 
__ System Active Protect SVC 0.00 0.03 0.03
*******************************************************************************
```

For complete information about using DelayView, see Interactive Analysis Option 2 – DelayView.
Display Code Distribution

To display the Code Distribution panel, use the S (Distribution) line command for a specific module or CSECT. This panel displays the selected module and CSECT name, along with all associated tasks or transactions. CA Mainframe Application Tuner attributes each sample to one of these tasks or transactions and displays the percentage of samples that are associated with each.

```
CA MAT -------- Code Distribution ---------------
COMMAND ===>                      SCROLL ===> CSR
Module: DB2SMPGM      Csect: DB2SAMP
Trancode Pct   Visual
-------------------------------------------------
         DTED     100.0 =========>
```

For IMS or CICS, the display shows the distribution of samples for the specific transactions run by the transaction manager, not for the tasks in the address space.

Display Callerid and Extended Callerid

From CodeView, you can use Callerid to determine which programs called various subroutines that are causing delays. Callerid information is available if a Y appears in the C column on the CodeView panel.

Extended Callerid information is available if a Y appears in the X column on the CodeView panel.

Extended Callerid provides a sampling of application program functions using the caller’s chain of save area (SA) and Language Environment (LE) dynamic save area (DSA). At interval sample time the SA/DSA chain is scanned to identify and provide the load module and function names for up to three program entries.

You can display information about the load modules and functions of the following programs:

- Current (CC) - module that is in control at the time of the sample

  The current or active SA and module is identified utilizing the current PSW and registers for the sampled environment. The current module is the active program or last program at the end of the save area chain.
■ Application (CA) - the lowest level non-system module is identified as application
code or previous non-system if two in sequence

The application module is identified by back tracing through previous callers in the
chain and identifying the first application (non-system) module. If the previous
module to this one is also an application module, it will be identified as the
application and the first one found will be the via(CV) module.

■ Via (CV) - most recent module called by the user application code

The via module is the last program called by the application function.

Callerid and Extended Callerid are also available from the Delay Locations panel. For a
complete description, see Display Callerid and Extended Callerid.

Interactive Analysis Option 4 - TimeView

TimeView displays program activity in time sequence. Each row of information on the
TimeView panel represents a single sample taken during the monitored period. This
format helps you determine a program’s execution path and looping logic. This format
also gives a good indication of which code sections executed and when they executed
during the monitored period.

| CA MAT --------------- | TimeView ------------ Row 1 to 13 of 3147 |
| COMMAND ===> | SCROLL ===> CSR |

Primary commands: ADDHelp
Profile: TUNCBO01
Options: NORMAL

Line commands: D - Details (Auto-Navigation)

<table>
<thead>
<tr>
<th>LC Sequence</th>
<th>Observation Module</th>
<th>CSECT</th>
<th>Offset</th>
<th>S Det</th>
<th>Calling Module</th>
<th>Calling CSECT</th>
</tr>
</thead>
<tbody>
<tr>
<td>__________</td>
<td>__________</td>
<td>__________</td>
<td>__________</td>
<td>__________</td>
<td>__________</td>
<td>__________</td>
</tr>
<tr>
<td>1</td>
<td>1</td>
<td>IGZCPAC</td>
<td>IGZCIN1</td>
<td>00000B9C</td>
<td>W</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>2</td>
<td>TUNCBO01</td>
<td>TUNCBO01</td>
<td>000009E2</td>
<td>A</td>
<td>TUNCBO01</td>
</tr>
<tr>
<td>3</td>
<td>3</td>
<td>TUNCBO01</td>
<td>TUNCBO01</td>
<td>000009E2</td>
<td>A</td>
<td>TUNCBO01</td>
</tr>
<tr>
<td>4</td>
<td>4</td>
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<td>TUNCBO01</td>
<td>000009DA</td>
<td>W</td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>5</td>
<td>IGZCPAC</td>
<td>IGZCIN1</td>
<td>00000B9E</td>
<td>A</td>
<td>TUNCBO01</td>
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<tr>
<td>6</td>
<td>6</td>
<td>IGZCPAC</td>
<td>IGZCIN1</td>
<td>00000868</td>
<td>W</td>
<td></td>
</tr>
<tr>
<td>7</td>
<td>7</td>
<td>IGZCPAC</td>
<td>IGZCIN1</td>
<td>000006D0</td>
<td>A</td>
<td>TUNCBO01</td>
</tr>
<tr>
<td>8</td>
<td>8</td>
<td>TUNCBO01</td>
<td>TUNCBO01</td>
<td>00000A7C</td>
<td>A</td>
<td>TUNCBO01</td>
</tr>
<tr>
<td>9</td>
<td>9</td>
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<td>IGZCIN1</td>
<td>0000077E</td>
<td>A</td>
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</tr>
<tr>
<td>10</td>
<td>10</td>
<td>IGZCPAC</td>
<td>IGZCIN1</td>
<td>000006D0</td>
<td>A</td>
<td>TUNCBO01</td>
</tr>
<tr>
<td>11</td>
<td>11</td>
<td>TUNCBO01</td>
<td>TUNCBO01</td>
<td>000009AE</td>
<td>A</td>
<td>TUNCBO01</td>
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</tr>
<tr>
<td>13</td>
<td>13</td>
<td>IGZCPAC</td>
<td>IGZCIN1</td>
<td>00000792</td>
<td>A</td>
<td>TUNCBO01</td>
</tr>
</tbody>
</table>
The primary and line commands available for TimeView are described next.

**ADDHelp**

Invokes the content-sensitive Help application to update or create a help entry for the selected content.

**D**

**Details** - provides detail data for the sample.

Detail data is available if the **Det** column displays YES.

The data that displays on the TimeView panel is described next.

**Profile**

Name of the profile that you specified when you created the monitor definition.

**Options**

Type of analysis in effect: NORMAL, ALL, ACTIVE, or WAIT.

An asterisk (*) following the value indicates that tasks or transactions have been selected for analysis. Place the cursor on the **Options** field value and press **Enter** to display a pop-up panel listing the selected tasks/transactions.

**Sequence Number**

Sample sequence numbers, listed consecutively, from one to the number of samples that you requested.

**Observation Number**

Number of the observation.

There can be multiple occurrences of the same observation number in a multiple-TCB environment, such as CICS.

There also might be multiple samples taken, potentially one for each TCB seen during an observation.

**Module**

Name of the load module related to the collected sample.

**CSECT**

Name of the control section that was in control for the sample.

**Offset**

Offset where the interrupt occurred for the sample.

The offset begins from the start of the control section shown in the CSECT field. Offset displays in hexadecimal notation.
S(tatus)
Indicates the status, which can be either A (Active) or W (Wait).
Active indicates that the CSECT was executing on a CPU.
Wait indicates that the CSECT was not executing on a CPU.

Det
YES in the Det column indicates that additional information is available by using the Details line command to isolate the cause of delays.

Calling Module
Name of the module that issued a call for the module in control during the sample.

Calling CSECT
Name of the control section that called the routine that was in control during the sample.
You might need to scroll right to display the following fields:

Caller Offset
Offset from the start of the control section shown in the Calling CSECT field where the call to the current module was made.
Caller Offset displays in hexadecimal notation.

Task ID
Name of the program (including the TCB address) controlling the MVS task associated with this sample.

Transact Code
Transaction code from either an IMS/TM or a CICS environment.

Display Detail Data
If the DET field contains YES, you can display additional detail information about the data set or resource. Use the Details line command to display the Delayed Resources panel, as described in Display Delayed Resources.
Interactive Analysis Option 5 - DataView

DataView displays data sets, databases (IMS, Adabas, and CA Datacom), DB2 statements, and CA IDMS requests that caused activity during the monitored period. The data on the DataView panel is sorted in descending order by activity. You can select a data set, database, DB2 statement, or CA IDMS request to display greater detail.

<table>
<thead>
<tr>
<th>LC DD name</th>
<th>Dataset name</th>
<th>Delay% Visual</th>
</tr>
</thead>
<tbody>
<tr>
<td>s_ .IDMS</td>
<td>CA IDMS Delay</td>
<td>24.16</td>
</tr>
<tr>
<td></td>
<td>ACCOUNTB CAI.IDMS.DBCRAPPL.ACCT.B</td>
<td>0.70</td>
</tr>
<tr>
<td></td>
<td>ACCOUNTH CAI.IDMS.DBCRAPPL.ACCT.H</td>
<td>0.68</td>
</tr>
<tr>
<td></td>
<td>ACCOUNTC CAI.IDMS.DBCRAPPL.ACCT.C</td>
<td>0.67</td>
</tr>
<tr>
<td></td>
<td>ACCOUNTI CAI.IDMS.DBCRAPPL.ACCT.I</td>
<td>0.63</td>
</tr>
<tr>
<td></td>
<td>ACCOUNTG CAI.IDMS.DBCRAPPL.ACCT.G</td>
<td>0.60</td>
</tr>
<tr>
<td></td>
<td>ACCOUNTF CAI.IDMS.DBCRAPPL.ACCT.F</td>
<td>0.52</td>
</tr>
<tr>
<td></td>
<td>ACCOUNTA CAI.IDMS.DBCRAPPL.ACCT.A</td>
<td>0.50</td>
</tr>
<tr>
<td></td>
<td>ACCOUNTD CAI.IDMS.DBCRAPPL.ACCT.D</td>
<td>0.50</td>
</tr>
<tr>
<td></td>
<td>ACCOUNTE CAI.IDMS.DBCRAPPL.ACCT.E</td>
<td>0.50</td>
</tr>
<tr>
<td></td>
<td>Totals</td>
<td>30.44</td>
</tr>
</tbody>
</table>

Display Linklist Information

To display information about LINKLIST and LPALIST data sets, use the primary command LINKlist ON. To hide the information after it displays, use the primary command LINKlist OFF.

Display Data Set Information

To display relevant information about a data set, use the Select line command to display the Data Set Details panel. If the data set is a VSAM data set, you might see an enhanced Data Set Details panel.

Data set statistics might not be available for very short measurements, or for data sets that are allocated and unallocated for brief intervals (less than two seconds).
The fields in the DataView panel are described next.

**Profile**
Name of the profile that you specified when you created the monitor definition.

**Options**
Type of analysis in effect: NORMAL, ALL, ACTIVE, or WAIT.

An asterisk (*) following the value indicates that tasks or transactions have been selected for analysis. Place the cursor on the **Options** field value and press Enter to display a pop-up panel listing the selected tasks/transactions.

**Linklist**
Current Linklist setting of ON or OFF.

**DD name**
DDNAME that was used to allocate the data set.

For a concatenation, multiple lines are displayed with identical DDNAMEs for each associated data set. For I/O that CA Mainframe Application Tuner cannot identify, the pseudo-DDNAME .IOnnnn appears in this field, where nnnn is the unit address.

**Dataset name**
Full name of the data set.

For a concatenation, multiple lines are displayed with identical DDNAMEs for every data set that is associated with the DDNAME.

**Delay%**
Percentage of the monitored period that activity was detected against the DD statement shown.

If several data sets are allocated to a single DD statement, this number is repeated for every data set.

**Visual**
Graphical representation of Delay%.

Scroll right to display the following fields:

**Block Size**
Block size of the data set.

**Record Length**
Logical record length of the records that were created by the application.
RECFM

Format of the records that were written to the data set. The following list explains each value:

- **F** - fixed records
- **FB** - fixed blocked records
- **V** - variable records
- **VB** - variable blocked records
- **U** - undefined records

EXCPs

Number of EXCPs that were issued during the monitor period for this data set. An EXCP is equivalent to reading or writing a single block to or from the data set.

Connect Time

Number of milliseconds during the monitored period that represents the end-to-end time for transferring data to or from the external media and memory.

**Note:** This time might exceed the monitored period because of data overlap. This overlap occurs when multiple blocks of data are moved to or from memory concurrently.

Open Intent

If the DDNAME is for a data set, this field displays the intention of the program in opening the data set.

If the DDNAME is for a database, this field displays the type of database. For data sets, this field contains one of the following values: DIRECT, GET MOVE, GET LOCATE, PUT MOVE, PUT LOCATE, READ, WRITE, MEMBER READ, MEMBER WRITE, PROGRAM LOADING, UNDETERMINED. For databases, this field contains one of the following values: ADA, DB2, DCM, IMS

DSORG

Organization of the data set. The following list explains the possible values:

- **DA** - direct access
- **PS** - physical sequential
- **IS** - indexed sequential
- **VSAM** - virtual sequential access method
- **PO** - partitioned organization
- **Access Method**
  - access method that was used to read from or write to the data set
  - Possible values are
    - **BPAM** - basic partitioned access method
    - **BTAM** - basic telecommunications access method
    - **EXCP** - execute channel program
    - **GRPH** - graphics access method
    - **DA** - direct access method
    - **ISAM** - indexed sequential access method
    - **SAM** - sequential access method
    - **SUBS** - JES subsystem access
    - **TAP** - TCAM application access
    - **TCAM** - telecommunications access method
    - **VSAM** - Virtual Sequential Access Method
    - **VTAM** - Virtual Telecommunications Access Method

- **Buffer Size**
  - Buffer size for the data set.
  - This size is generally the same as the Block Size.

- **Buffer Number**
  - Number of buffers that are allocated for the data set.

- **Number Extents**
  - Number of physical extents that are allocated to the data set.
  - For non-VSAM data sets, this number might be in the range of 1 to 16. VSAM allows up to 128 extents for a data set.

- **Alloc Unit**
  - Allocation unit for the data set. This field contains one of the following values:
    - **BLK** - Space is allocated in blocks.
    - **CYL** - Space is allocated in cylinders.
    - **TRK** - Space is allocated in tracks.
    - **DSN** - The DDNAME indicates a database rather than a data set.
    - (blank) - CA Mainframe Application Tuner did not detect the unit of allocation.
PRI Size

**Primary Unit** - the initial allocation of cylinders, tracks, or blocks for a data set on direct access

Depending on the allocation unit, this field contains the following value:

- For CYL, the number of cylinders allocated.
- For TRK, the number of tracks allocated.
- For BLK, the number of blocks allocated.

SEC Size

**Secondary Unit** - The secondary allocation of cylinders, tracks, or blocks for a data set on direct access

Depending on the allocation unit, this field contains the following value:

- For CYL, the number of cylinders allocated.
- For TRK, the number of tracks allocated.
- For BLK, the number of blocks allocated.

Seq Nr.

CA Mainframe Application Tuner sequence number of the record

This sequence number is incremented by CA Mainframe Application Tuner for each scheduling of the sampler into the target address space.

UCB Addr

Unit Control Block number for this data set.

The UCB is the logical device number, expressed in hexadecimal, on which this data set resides.

VOLSER(s)

First six volume serial numbers on which this data set resides.

The volume serial numbers are not separated by commas.
Display Detail and Performance Information

The following describes detail and performance data returned for non-VSAM and VSAM data sets.

The following panel shows an example of the Data Set Details panel containing data for a non-VSAM data set.

```
CA MAT --------------------- Data Set Details ------------ Row 1 to 19 of 64
COMMAND ===>                                                  SCROLL ===> CSR
DONAME: MDYU3000                                            Profile: DB2SAMP
Access Method: VSAM        Cluster: CAMAT.TUNCIC61.MDYUDATA.CC3000
Opened for: DIRECT         Data: CAMAT.TUNCIC61.MDYUDATA.CC3000.DATA
Share Options: 2 3           Index: CAMAT.TUNCIC61.MDYUDATA.CC3000.INDEX
Organization: KSDS

Data Component Information for: CAMAT.TUNCIC61.MDYUDATA.CC3000.DATA

----- SMS ------ ----- Allocation ------ ------------ Format ------------
DATACLAS: **NONE** Unit:               CYL Rec Len:         43 CI Size:  4096
STORCLAS: **NONE** Primary:            5 # CIs per CA:   180 Strings: 0
MGMTCLAS: **NONE** Secondary:          2 CA Freespace:     0 Buffers: 2
                                   Volume Count:   1 CI Freespace: 0
                                   Total Extent Count: 1 Stripes: 0

---- VSAM Statistics -----------------------------------------------
Number of records: 0
Records Read: 0          Records Updated: 0          CA Splits: 0
Records Added: 0          Records Deleted: 0          CI Splits: 0
```

For field related information for the Allocation and Format sections, see the previous section. Field descriptions for the Data Set Performance fields section for non-VSAM data set are described next.

**SMS Fields**

**DATACLAS**

For Systems Managed data sets, this class is a named collection of data set and space attributes.

**STORCLAS**

For Systems Managed data sets, this class is a named collection of performance and device availability attributes.

**MGMTCLAS**

For Systems Managed data sets, this class is a named collection of migration, backup, and expiration attributes.
Data Set Performance Fields

Avg Resp Time
Average data set response time during the monitoring interval.

Active Rate
Average number of I/Os per second being performed against the file during the monitoring interval.

Total EXCPs
Total number of EXCPs (I/Os) performed against the file during the monitoring period.

Total Conn Time
Total data set connect time during the monitoring interval.
This value is expressed in 128 milliseconds units and includes data transfer time, connect search time, protocol, and reconnect time.

Avg IOSQ Time
Average IOS Queue Time experienced by the data set during the monitoring interval expressed in ms units. IOSQ TIME is computed by using the formula:

\[
\frac{QC}{S} R
\]

where
- QC is the total number of requests found on the IOS queue
- S is the total number of samples taken
- R is the active rate

Avg Pend Time
Average number of milliseconds that an I/O request remains queued to the channel.

This value reflects the amount of time that elapses between when the SSCH (Start SubChannel) function is accepted by the subchannel and when the first command that is associated with the SSCH function is accepted at the device.

Pending time accrues when the request is waiting for an available channel path or control unit, as well as when shared DASD contention occurs.
### Avg Disc Time

Average number of milliseconds that the device had an active I/O request but was disconnected from the channel path.

Disconnect time includes:

- Time waiting to be reconnected after a SET SECTOR, this time is called rotational position sensing (RPS) delay
- Head Movement time (SEEK TIME) between cylinders
- Latency or search time

### Avg Conn Time

Average number of milliseconds the device was connected to a channel path and actively transferring data between the device and central storage.

This value is calculated as follows:

Average Connect time = Total connect time / Measurement Even count

An example of the Data Set Details panel containing data for a VSAM data set follows.

---

### Data Component Information for: TAC.H159NPS.SESS.MGR.SESSION3.DATA

<table>
<thead>
<tr>
<th>CA MAT</th>
<th>--------------------- Data Set Details ------------ Row 1 to 19 of 35</th>
</tr>
</thead>
<tbody>
<tr>
<td>DDNAME: NSUSSN3</td>
<td>Profile: TUNSAMP</td>
</tr>
</tbody>
</table>

Access Method: VSAM  Cluster: TAC.H159NPS.SESS.MGR.SESSION3.CLUS
Opened for: DIRECT  Data: TAC.H159NPS.SESS.MGR.SESSION3.DATA
Share Options: 2 3  Index: N/A
Organization: ESDS

--- VSAM Statistics ------------------------------

| Number of records: 28776 |
| Records Read: 1895  Records Updated: 835  CA Splits: 0 |
| Records Added: 0  Records Deleted: 0  CI Splits: 0 |

--- Data Set Performance -------------------------

| Avg Resp Time: 4.39  Avg IOSQ Time: 0.00 |
| Active Rate: 0.68  Avg Pend Time: 0.29 |
| Total EXCPs: 2727  Avg Disc Time: 1.51 |
| Total Conn Time: 7062.53  Avg Conn Time: 2.59 |
The field descriptions for the Data Set Performance fields section for VSAM data set are described next.

**Access Method**
Identifies the access method used to read from or write to the data set.

**Opened For**
Intention of the program when performing I/Os for this data set. Valid values are:
- READ
- WRITE
- DIRECT

**Share Options**
Displays two numeric values.
The first value is the level (1, 2, 3, or 4) of cross-region sharing allowed by VSAM.
The second value is the level (3 or 4 only) of cross-system sharing allowed by VSAM.
- At level 1, the data set can be shared by any number of users for read processing, or can be accessed by only one user for read and write.
- At level 2, the data set can be accessed by any number of users for read processing, and can also be accessed by one user for write processing.
- At level 3, the data set can be fully shared by any number of users.
- At level 4, the data set can be fully shared by any number of users, and buffers used for direct processing are refreshed for each request.

**Organization**
Physical organization of the data stored in this data set.
Can be one of the following types:
- KSDS
- ESDS
- RRDS

**Cluster**
Full name of the data set.
If this organization is KSDS, CA Mainframe Application Tuner displays the names of the DATA and INDEX components.

**Data**
Is the data set name of the DATA component of the VSAM file.
Index
Is the data set name of the INDEX component of the VSAM file.

VSAM KSDS data sets are indexed using a multilevel structure. The number of levels can have an impact on the performance of the data set if there are insufficient index buffers.

Format
Rec Len
Specified length of the records that are residing in this data set.

Cls per CA
Count of Cls allocated within a control area for the data in this data set.

CA Freespace
Percentage of free space in the control area.
Defined when the data set was created.

Cl Freespace
Percentage of free space in the control interval.
Defined when the data set was created.

Stripes
For extended sequential data sets, the number of stripes that are used to read/write the data.
This number will be nonzero if the extended sequential data set is allocated with multiple stripes.

Cl Size
Size of the control interval for the data in this data set.

Strings
Number of strings for the data set.
This value indicates the number of concurrent operations that might be started for the data set.

VSAM Statistics
Records Read
Total number of records that were retrieved during the monitored period.

Records Added
Total number of records that were added during the monitored period.

Records Updated
Total number of records that were written during the monitored period.
Records Deleted
Total number of records that were deleted during the monitored period.

CA Splits
Total number of control area splits that have occurred since the file was defined.

CI Splits
Total number of control interval splits that have occurred since the file was defined.

Data Set Performance Fields

Avg Resp Time
Average data set response time during the monitoring interval.

Active Rate
Average number of I/Os per second being performed against the file during the monitoring interval.

Total EXCPs
Total number of EXCPs (I/Os) being performed against the file during the monitoring period.

Total Conn Time
Total data set connect time during the monitoring interval.
This value is expressed in 128 milliseconds units. Includes data transfer time, connect search time, protocol, and reconnect time.

Avg IOSQ Time
Average IOS Queue Time that was experienced by the data set during the monitoring interval expressed in ms units. IOSQ TIME is computed by using the formula:

\[
\text{Average IOS} = \frac{QC}{S} R
\]

where
- QC is the total number of requests found on the IOS queue
- S is the total number of samples taken
- R is the active rate
**Avg Pend Time**

Average number of milliseconds that an I/O request remains queued to the channel.

This value reflects the amount of time that elapses between when the SSCH (Start SubChannel) function is accepted by the subchannel and when the first command associated with the SSCH function is accepted at the device. Pending time accrues when the request is waiting for an available channel path or control unit, as well as when shared DASD contention occurs.

**Avg Disc Time**

Average number of milliseconds that the device had an active I/O request but was disconnected from the channel path.

Disconnect time includes:
- Time waiting to be reconnected after a SET SECTOR; this time is called rotational position sensing (RPS) delay.
- Head Movement time (SEEK TIME) between cylinders
- Latency or search time.

**Avg Conn Time**

Average number of milliseconds that the device was connected to a channel path and actively transferring data between the device and central storage.

This value is calculated as follows:

Average Connect time = Total connect time / Measurement Even count.

**Buffer Performance**

**Pool ID**

Pool identifier that was used to satisfy requests for this file.

**Buffer Size**

Size of the buffer that was used from the pool identified by ‘Pool ID’.

**Ratio**

Percentage of READ requests that were satisfied from the buffer pool without an EXCP.

**# of Buffers**

Number of buffers that are available in the shared pool.

**Steal Writer**

Number of non–user-initiated WRITES that were initiated for this buffer pool.

A value here usually indicates a serious performance consideration. (LSR/GSR).
For either a non-VSAM or VSAM data set, you can scroll down to see additional volume information:

```
Volume Information for Volume PUBA01 -------------------------------

Unit No.: 8359            Avg Resp Time:  40.41     Avg IOSQ Time:  086.30
Dev Type: 3390-380          Active Rate:  239.66     Avg Pend Time:  23.71
Alloc Cnt: 12                 Dev Res: 0.03           Avg Disc Time: 1.61
Open Cnt: 1                   Dev Util: 400.01        Avg Conn Time: 15.08
Mounted: PUBLIC
Cache Act.: CFW CAC DFW
```

The field descriptions for the Data Set Performance fields section for VSAM data sets are described next.

Volume Information Fields.

These statistics are for the entire volume and not just for the data set. This way, you can use CA Mainframe Application Tuner to determine reasons for data sets not performing correctly and compare the performance of the data set with the entire volume.

**Volume**

Volume serial name

**Unit Number**

UCB Unit number (address)

**Dev Type**

Device type

**Alloc Count**

Number maximum number of users allocated to the volume during the monitoring period.

**Open Count**

Maximum number of open data sets on the volume during the monitoring period.

The open count directly influences the IOS Queue time to the device.

**Mounted**

Method that the volume was mounted to z/OS. Can be PRIVATE, PUBLIC, or STORAGE. This value is used to determine how data sets are allocated on the device.
Cache Act

Indicates active caching options for the device. If present, the option is active. The options are as follows:

- CFW Cache Fast-Write is active.
- CAC basic caching is active.
- DCP is active.
- DFW Device Fast Write is active for the device.

These options can greatly affect the performance of the volume.

Avg Resp Time

Average data set response time during the monitoring interval.

This value is in milliseconds units.

Active Rate

Average number of I/Os per second being performed against the volume during the monitoring interval.

Dev Res

Percentage of time the device was found to be reserved during the monitored period.

Dev Util

Percentage the device was in use during the monitoring period.

This value includes both the time the device was performing I/O operations and the time that the device was reserved, but not necessarily active. The calculation is

Device Utilization Percentage  = 100 * [(DCT + TDT / T) + (RS / S)]

where

- DCT is the device connect time
- TDT is the device disconnect time
- T is the length of the monitoring session
- RS is the number of times the device was reserved but not busy
- S is the total number of samples
**Avg IOSQ Time**

Average IOS Queue Time experienced by the data set during the monitoring interval expressed in ms units. IOSQ TIME is computed by using the formula:

\[
\text{Average IOS} = \frac{QC}{S} \frac{\text{queue time}}{R}
\]

where

- QC is the total number of requests found on the IOS queue
- S is the total number of samples taken
- R is the active rate

**Avg Pend Time**

Average number of milliseconds that an I/O request remains queued to the channel.

This value reflects the amount of time that elapses between when the SSCH (Start SubChannel) function is accepted by the subchannel and when the first command that was associated with the SSCH function is accepted at the device. Pending time accrues when the request is waiting for an available channel path or control unit, as well as when shared DASD contention occurs.

**Avg Disc Time**

Average number of milliseconds that the device had an active I/O request but was disconnected from the channel path.

Disconnect time includes

- Time waiting to be reconnected after a SET SECTOR; this time is called rotational position sensing (RPS) delay.
- Head movement time (SEEK TIME) between cylinders
- Latency or search time

**Avg Conn Time**

Average number of milliseconds the device was connected to a channel path and actively transferring data between the device and central storage.

This value is calculated as follows:

\[
\text{Average Connect time} = \frac{\text{Total connect time}}{\text{Measurement Even count}}
\]
Display DB2, IMS, Adabas, or CA Datacom Information

If you are monitoring an IMS, DB2, Adabas, CA Ideal or CA Datacom application, one of the rows contains a value in the DD name field that corresponds to the application. When you select this field, CA Mainframe Application Tuner displays a screen with more detailed information about that application.

<table>
<thead>
<tr>
<th>For the application</th>
<th>DD name field contains</th>
<th>Selecting this field displays</th>
<th>For more information, see</th>
</tr>
</thead>
<tbody>
<tr>
<td>DB2</td>
<td>.DB2</td>
<td>DB2 Statements</td>
<td>Chapter &quot;Using the Product in a DB2 Environment&quot;</td>
</tr>
<tr>
<td>IMS</td>
<td>.IMS</td>
<td>IMS Statements</td>
<td>Chapter &quot;Using the Product in an IMS Environment&quot;</td>
</tr>
<tr>
<td>Adabas</td>
<td>.Adabas</td>
<td>ADABAS Statements</td>
<td>Chapter &quot;Using the Product with Other Databases&quot;</td>
</tr>
<tr>
<td>CA Datacom</td>
<td>.DCOM</td>
<td>CA DATACOM Statements</td>
<td>Chapter &quot;Using the Product with Other Databases&quot;</td>
</tr>
</tbody>
</table>

Interactive Analysis Option 6 - TranView

TranView shows IMS or CICS activity in terms of individual transactions. It displays the percentage of time that CA Mainframe Application Tuner detected activity for each transaction in the six major activity and delay categories. If you select a transaction, CA Mainframe Application Tuner recomputes the values by using only samples from the selected transaction on all subsequent screens that you display. Using TranView enables you to focus on the performance of that transaction.
For information about using the TranView display with CICS, see TranView for CICS.

The available commands for TranView are described next.

**SE lect**
Selects only the tagged transactions for analysis.

**RE Call**
Reverses the effect of the SE lect line command.
This command recalls any excluded transactions.

**ADDHelp**
Invokes the content-sensitive Help application to update or create a help entry for the selected content.

**STC**
Displays CICS summary statistics For more information, see CICS Summary Statistics.

**IDL**
Displays statistics about CICS Idle Time For more information, see CICS Idle Time.

**T**
(Tag line command) selects up to five tasks for analysis.

**U**
(Untag line command) clears a selected task.

**C**
(CodeView Detail line command) displays the CodeView Detail panel showing activity detected by CA Mainframe Application Tuner.

---

```
<table>
<thead>
<tr>
<th>CA MAT</th>
<th>TranView</th>
<th>Row 2 to 7 of 7</th>
</tr>
</thead>
<tbody>
<tr>
<td>COMMAND</td>
<td>SCROLL</td>
<td>CSR</td>
</tr>
<tr>
<td>Primary commands: SE lect, RE call, ADDHelp</td>
<td>Profile: CICSTS32</td>
<td></td>
</tr>
<tr>
<td>STC - CICS Summary Stats</td>
<td>IDL - CICS Idle Time</td>
<td></td>
</tr>
<tr>
<td>Options: NORMAL</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Line commands: T - Tag</td>
<td>U - Untag</td>
<td>D - Delay Details (Auto-Navigation)</td>
</tr>
<tr>
<td>C - Code Details</td>
<td>N - Data Details</td>
<td></td>
</tr>
<tr>
<td>P - CallerID Details</td>
<td>S - Additional Tran Statistics</td>
<td></td>
</tr>
<tr>
<td>LC TRAN</td>
<td>T</td>
<td>D</td>
</tr>
<tr>
<td>--------</td>
<td>---</td>
<td>---</td>
</tr>
<tr>
<td>MV82</td>
<td>Y</td>
<td>1</td>
</tr>
<tr>
<td>MV83</td>
<td>Y</td>
<td>1</td>
</tr>
<tr>
<td>MV84</td>
<td></td>
<td>1</td>
</tr>
<tr>
<td>MV85</td>
<td>Y</td>
<td>3</td>
</tr>
<tr>
<td>MV81</td>
<td>Y</td>
<td>0</td>
</tr>
<tr>
<td>CATR</td>
<td></td>
<td>1</td>
</tr>
</tbody>
</table>
```

---

The available commands for TranView are described next.

**SE lect**
Selects only the tagged transactions for analysis.

**RE Call**
Reverses the effect of the SE lect line command.
This command recalls any excluded transactions.

**ADDHelp**
Invokes the content-sensitive Help application to update or create a help entry for the selected content.

**STC**
Displays CICS summary statistics For more information, see CICS Summary Statistics.

**IDL**
Displays statistics about CICS Idle Time For more information, see CICS Idle Time.

**T**
(Tag line command) selects up to five tasks for analysis.

**U**
(Untag line command) clears a selected task.

**C**
(CodeView Detail line command) displays the CodeView Detail panel showing activity detected by CA Mainframe Application Tuner.
**Profile**

Name of the profile that you specified when you created the monitor definition.

**Options**

Type of analysis in effect: NORMAL, ALL, ACTIVE, or WAIT.

An asterisk (*) following the value indicates that tasks or transactions have been selected for analysis. Place the cursor on the **Options** field value and press **Enter** to display a pop-up panel listing the selected tasks/transactions.

**Tran**

Name of a transaction that was detected by CA Mainframe Application Tuner during the monitoring of an IMS or CICS region.

If a transaction name cannot be identified, the value **n/a** is substituted.

**T**

"X" indicates the transaction has been tagged for analysis.

**#Trans**

Number of times the transaction completed processing during the monitored period.

**Avg RESP**

Average time (in seconds) for this transaction during the monitored period.

**Tot CPU**

Cumulative CPU seconds for this transaction during the monitored period.

**AVG CPU**

Average CPU time required for this transaction during the monitored period.
Actv%
Percentage of time during the monitored period that the CPU was actively processing the monitored transaction.

Data%
Percentage of time during the monitored period that the transaction was delayed because of an I/O request.

Other%
Percentage of time during the monitored period that was not attributable to any of the categories known to CA Mainframe Application Tuner.

Totl%
Summation of the categories of delay.

Visual
Graphical representation of the total delay that was associated with the transaction.

Total SUs
Total amount of CPU time in service units used by this transaction.
CA Mainframe Application Tuner calculates this amount by using the following formula:

\[(\text{Tot CPU} \times 16000000) / \text{CPU Adjustment Rate}\]

The CPU Adjustment Rate can be seen on the OverView report.

Average SUs
Average number of CPU Service Units required to process a transaction.
CA Mainframe Application Tuner calculates this amount by using the following formula:

\[(\text{Avg CPU} \times 16000000) / \text{CPU Adjustment Rate}\]

The CPU Adjustment Rate can be seen on the OverView report.
CodeView Detail

Use the CodeView Detail (C) line command from the TranView panel to display the program activity that is associated with a specific transaction.

<table>
<thead>
<tr>
<th>LC Module</th>
<th>Csect</th>
<th>Description</th>
<th>L C Actv% Wait% Totl% Visual</th>
</tr>
</thead>
<tbody>
<tr>
<td>DSNVSR</td>
<td>DSNVSR</td>
<td>ASM-SUSPEND/RESUME/CANCEL</td>
<td>0.41 2.86 3.27</td>
</tr>
<tr>
<td>DFHD2EX1</td>
<td>D2EX1</td>
<td>CICS-DB2 Task Related Use</td>
<td>0.82 0.00 0.82 =&gt;</td>
</tr>
<tr>
<td>DFHD2EX3</td>
<td>DFHD2EX3</td>
<td>CICS-DB2 subtask program</td>
<td>0.82 0.00 0.82 =&gt;</td>
</tr>
<tr>
<td>.NUCLEUS</td>
<td>IXLRQLC</td>
<td>Cross-system extended ser</td>
<td>0.41 0.00 0.41 &gt;</td>
</tr>
</tbody>
</table>

This panel displays the modules and CSECTs that delayed a task which is identified in the Transaction field. The commands you can issue and field headings are identical to the CodeView panel. All subsequent associated panels report information for the specified task.

The CodeView Detail panel reports both Active and Wait activity percentages for Analyze Normal mode, which accounts for all activity reported in TaskView.
DelayView Detail

Use the DelayView Detail (D) line command to display the delay categories that were detected by CA Mainframe Application Tuner and associated with a specific task.

<table>
<thead>
<tr>
<th>Major category</th>
<th>Minor category</th>
<th>Actv%</th>
<th>Wait%</th>
<th>Totl%</th>
<th>Visual</th>
</tr>
</thead>
<tbody>
<tr>
<td>Program Active</td>
<td>Program Active</td>
<td>5.71</td>
<td>0.00</td>
<td>5.71</td>
<td>=======</td>
</tr>
<tr>
<td>Voluntary Wait</td>
<td>Wait/Waitr SVC</td>
<td>0.00</td>
<td>2.86</td>
<td>2.86</td>
<td>=======</td>
</tr>
<tr>
<td>Data Delay</td>
<td>DB2 Statement</td>
<td>0.82</td>
<td>0.00</td>
<td>0.82</td>
<td>&gt;</td>
</tr>
<tr>
<td>System Active</td>
<td>Post SVC</td>
<td>0.41</td>
<td>0.00</td>
<td>0.41</td>
<td></td>
</tr>
</tbody>
</table>

This panel displays what caused a task to be delayed in its execution. The commands you can issue and field headings are identical to the DelayView panel. All subsequent associated panels report information for the specified task.

The Delay Detail panel does not support the S (Distribution) line command.
DataView Detail

Use the DataView Detail (N) line command to display the DataView Detail panel that shows CA Mainframe Application Tuner has collected data set information for a specific transaction. If a Y appears in the D column on the TranView panel, data set information exists for that transaction, as shown next.

```
CA MAT ------------------- DataView Detail ---------------- Row 1 to 10 of 10
COMMAND ===>                                                  SCROLL ===> CSR
Primary commands: LINKlist on/off                            Profile: DB2SAMP
   Line commands: S - Select                                   Options: NORMAL
          Transaction: DTEU

LC DD name  Dataset name                                 Delay% Visual
---------------- ------------------------------------ -------------
     MDYU3000 CAMAT.TUNCIC61.MDYUDATA.CC3000                5.31 =====>
     JULU3000 CAMAT.TUNCIC61.JULUDATA.CC3000                4.49 ====>
     MDYU1000 CAMAT.TUNCIC61.MDYUDATA.CC1000                2.86 ==>
     JULU1000 CAMAT.TUNCIC61.JULUDATA.CC1000                2.45 >
     JUL1000 CAMAT.TUNCIC61.JULDATA.CC1000                 1.63 >
     MDYU2000 CAMAT.TUNCIC61.MDYUDATA.CC2000                1.63 >
     JULU2000 CAMAT.TUNCIC61.JULUDATA.CC2000                1.22 >
     MDY3000 CAMAT.TUNCIC61.MDYDATA.CC3000                  0.82
     JUL3000 CAMAT.TUNCIC61.JULDATA.CC3000                  0.41
```
Interactive Analysis Option 7 - ModView

ModView displays the linkage editor map for all load modules that are located in the target address space. Only load module entries and those CSECTs with detected activity are listed. From ModView, you can hyperlink to module details or to a panel that suggests a linkage order for reducing system paging.

<table>
<thead>
<tr>
<th>ModView</th>
<th>COMMAND</th>
<th>SCROLL</th>
<th>Profile: DB2SAMP</th>
<th>Options: NORMAL</th>
</tr>
</thead>
</table>

Primary commands: USAge, SEQ, ADDHelp

Line commands: S - Select  U - Suggest

A - Associate

<table>
<thead>
<tr>
<th>Module</th>
<th>Csect</th>
<th>Offset</th>
<th>Length</th>
<th>Csect Description</th>
<th>L Pct</th>
<th>Visual</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>DFHSIP</td>
<td>DFHDSSR</td>
<td>0000E168</td>
<td>001D60 DS domain - suspend/res</td>
<td>41.63</td>
<td>=========&gt;</td>
</tr>
<tr>
<td></td>
<td>DFHSIP</td>
<td>DFHDSDS3</td>
<td>00010FA0</td>
<td>002128 DS domain - main dispat</td>
<td>26.53</td>
<td>=========&gt;</td>
</tr>
<tr>
<td></td>
<td>DSNVSR</td>
<td>DSNVSR</td>
<td>00008100</td>
<td>001C20 ASM-SUSPEND/RESUME/CANC</td>
<td>6.53</td>
<td>&gt;</td>
</tr>
<tr>
<td></td>
<td>DSNVSR</td>
<td>DSNVSR</td>
<td>00008100</td>
<td>001C20 ASM-SUSPEND/RESUME/CANC</td>
<td>6.53</td>
<td>&gt;</td>
</tr>
<tr>
<td></td>
<td>DFSREP00</td>
<td>DFSREP00</td>
<td>00000000</td>
<td>002FF8 IMS dispatcher internal</td>
<td>1.63</td>
<td></td>
</tr>
<tr>
<td></td>
<td>IDA019L1</td>
<td>IDA019R3</td>
<td>00007330</td>
<td>0006C8 VSAM I/O driver</td>
<td>1.63</td>
<td></td>
</tr>
<tr>
<td></td>
<td>DFHSIP</td>
<td>DFHSMGF</td>
<td>000230F8</td>
<td>002960 SM domain - getmain/fre</td>
<td>1.22</td>
<td></td>
</tr>
<tr>
<td></td>
<td>.NUCLEUS</td>
<td>ISGGRHS1</td>
<td>0000726C</td>
<td>000694 Global resource seriali</td>
<td>1.22</td>
<td></td>
</tr>
<tr>
<td></td>
<td>.NUCLEUS</td>
<td>IEACVT</td>
<td>000090D3</td>
<td>0005E4 Supervisor services</td>
<td>0.82</td>
<td></td>
</tr>
</tbody>
</table>

The primary and line commands that are available for ModView are described next.

**USAge**

Sorts the display by activity within a load module in descending order. CSECTs that executed most within a load module are shown first.

**SEQ**

Sorts the display by CSECT location within a load module in ascending order.

**ADDHelp**

Invokes the content-sensitive Help application to update or create a help entry for the selected content.

**S**

**Select** - provides detailed information about the selected load module, such as the library from which it was loaded, the module load address, length, date of link edit, component identifier of linkage editor, and the data set of origin.

**U**

**Suggest** - suggests an improved link order for the selected load module based upon the frequency of execution of its CSECTs during the monitored period.
The fields in ModView are described next.

**Profile**
Name of the profile that you specified when you created the monitor definition.

**Options**
Type of analysis in effect: NORMAL, ALL, ACTIVE, or WAIT.
An asterisk (*) following the value indicates that tasks or transactions have been selected for analysis. Place the cursor on the **Options** field value and press Enter to display a pop-up panel listing the selected tasks/transactions.

**Sort**
Display mode (USAGE or SEQ).

**Module**
Name of the load module.

**CSECT**
Name of the CSECT within the load module.

**Offset**
For modules, the hexadecimal address in virtual storage where the module was loaded.
For CSECTs, the hexadecimal offset of the CSECT within the module.

**Length**
Hexadecimal length of the module or the CSECT.

**CSECT Description**
Description of the CSECT, if available.

**L**
Location of the module in virtual memory:
< indicates the module resides below the 16MB line
> indicates the module resides above the 16MB line

**Pct**
Percentage of the monitored period that CA Mainframe Application Tuner detected that this CSECT was in use.

**Visual**
Visual representation of the Pct field.
Scroll right to display the following fields:

**Entry Type**
Type of Module/CSECT name. This value might be the name of a pseudo CSECT that was created by the linkage editor and compiler. This entry can be one of several types:

- **CM** - common code section
- **ER** - strong external reference
- **LL** - load module entry (versus an ESD entry)
- **LR** - label reference
- **NU** - null entry
- **PC** - private code section
- **SD** - code section
- **WX** - weak external reference

**Date Stamp**
Linkage editor date in Julian format for the load module.

**Processor ID**
Component identifier of the translator that created the CSECT, or the component identifier of the linkage editor that assembled the load module.

**Processor Version**
Component release of the translator that created the CSECT.

**AMODE**
Addressing mode specifies the address length a program is prepared to handle upon entry.

Valid addressing modes are

- **24** - 24-bit addressing
- **31** - 31-bit addressing
- **ANY** - Either 24-bit or 31-bit addressing

**RMODE**
Residence mode. Specifies where the module is to be loaded in virtual storage:

- **24** - Indicates the module must be loaded within 24-bit addressable virtual storage below the 16-megabyte virtual storage line.
- **Any** - Indicates the module might be loaded anywhere in virtual storage either above or below the 16-megabyte virtual storage line.
RN
Reentrant option.
Displays Y if the module is link-edited with the reentrant option. Displays N if the module is not reentrant.

RU
Reusable option.
Displays Y if the module is link-edited with the reusable option. Displays N if the module is not reusable.

OV
Overlay.
Displays Y if the module is link-edited in the overlay format. Displays N if the module is not in the overlay format.

LD
Loadable.
 Displays Y if the module is loadable. Displays N if the module is not loadable.

EX
Executable.
Displays Y if the module is executable. Displays N if the module is not executable.

Dataset
Data set from which the module was loaded.

Determine Addressing Mode (AMODE):
The loader determines the addressing mode for the entry point as follows:
- The default AMODE of 24 is assumed.
- If the AMODE is specified in the ESD data for the entry point as an assembler statement, that specification replaces the default. The loader assigns the AMODE value from the control section or private code that contributes to the loaded module, ignoring identically named control sections and private code, which are replaced.
- If AMODE is specified as a parameter in the PARM field of the EXEC statement, that specification replaces the previously determined value.
Determine Residence Mode (RMODE):

The loader determines the residence mode for the loaded program as follows:

- The default RMODE of 24 is assumed.
- If the RMODE is specified in the ESD data for the first control section or private code that contributes to the loaded module as an assembler statement, that specification replaces the default.
- If the RMODE is specified as a parameter in the PARM field of the EXEC statement, that specification replaces the previously determined RMODE.
- If the ESD data for any subsequent control section or private code that contributes to the loaded module specifies an RMODE of 24, the RMODE for the entire module is reset to 24. If loading begins above the 16-megabyte virtual storage line on the basis of an early determination of RMODE=ANY, and the RMODE is later reset to 24, an error message is issued and loading is restarted below the 16-megabyte virtual storage line.
Link Suggestions

To display the Link Suggestions panel, use the U (Suggest) line command for a module. This panel shows the suggested link order for a previously selected load module, based upon the execution frequency of its CSECTs during the measurement period. This suggestion minimizes paging and reduces the working set that is size required.

You can create linkage editor ORDER statements by using the EXPORT command. These statements should be included in your linkage editor deck to gain improved performance. See Save the Information on a Panel.

```
CA MAT ---------------------- Link Suggestions ------------ Row 1 to 16 of 19
COMMAND ===>                                                  SCROLL ===> CSR
Primary Commands: ADDHelp                                    Profile: DB2SAMP
Module: DFSREP00
Csect    Offset   Length   Pct   Visual
________ ________ ________ _____ __________
DFSIINIT 00000000 00000000  0.00
DFSIDMID 00000000 00000000  0.00
DFSIDMIR 00000000 00000000  0.00
DFSKSETL 00000000 00000000  0.00
DFSIDSDW 00000000 00000000  0.00
DFSIDSMW 00000000 00000000  0.00
DFSIDKCM 00000000 00000000  0.00
DFSIDPOTC 00000000 00000000  0.00
DFSIDUSP 00000000 00000000  0.00
DFSIDP00 00000000 00002FF8  1.63 =========>
DFSN0113 00002FF8 00000000  0.00
DFSNORES 00002FF8 00000000  0.00
DFSKTECB 00002FF8 00000000  0.00
DFSKM5WC 00002FF8 00000000  0.00
DFSIPOFN 00002FF8 00000000  0.00
DFSIPEXT 00002FF8 00000000  0.00
```

The fields in the Link Suggestions panel are described next.

Profile

Name of the profile that you specified when you created the monitor definition.

CSECT

Control section within the module and linked from a subroutine library.

If CSECT is blank, the entry is for the load module.

Offset

Hexadecimal offset within the CSECT, or, if the CSECT is not available, within the module.

Length

Hexadecimal length of the CSECT or load module.
Interactive Analysis Option 8 - PoolView

PoolView displays statistics about VSAM/LSR and VSAM/GSR buffer pool usage. The PoolView panel provides information about hit ratios, size and number of buffers, and total space requested. You can also display information about the data sets attached to a pool.

If no pool data is in the monitor data set, the PoolView option is not available.

```
CA MAT -------------------------- PoolView ------------------ Row 1 to 1 of 1
COMMAND ===>                                                  SCROLL ===> CSR
Line commands: S - Select                                    Profile: IMSDLI81
Options: NORMAL
LC Type Group Category

-------------------------------------------------------------------------------
s_ VSAM LSR   VSAM Local Shared Resource pool

CA MAT ------------------------ Shared Pools ---------------- Row 1 to 6 of 6
COMMAND ===>                                                  SCROLL ===> CSR
Pool type: LOCAL                        Profile: IMSDLI81
Total pool size: 134348                       Options: NORMAL
Hit ratio for all subpools: 0   %

Line commands: S - Select, D - Datasets

Pool  No. of  Buffer Buffer No. Requests  Requests  Hit
LC Type Group SP  Type  Buffers size   fixed  Str w/read    wo/read   Ratio
____ _____ ___ _____ _______ ______ ______ ___ _________ _________ _____
>------------------------------------------------------------------------------
__ VSAM LSR     0 BOTH       64    512 NO       3         0         0 *N/A*
__ VSAM LSR     0 BOTH       64  1,024 NO       3         0         0 *N/A*
__ VSAM LSR     0 BOTH       64  2,048 NO       3         0         0 *N/A*
__ VSAM LSR     0 BOTH       64  4,096 NO       3       161         0 0   %
__ VSAM LSR     0 BOTH       10 32,768 NO       3         0         0 *N/A*
```

For information about using PoolView with CICS, see Use PoolView. For information about using PoolView with IMS, see Analyze IMS Batch Performance Information.

Each field in PoolView is described next.

**Profile**

Name of the profile that you specified when you created the monitor definition.
Interactive Analysis Option 9 - USSView

Options

Type of analysis in effect: NORMAL, ALL, ACTIVE, or WAIT.

An asterisk (*) following the value indicates that tasks or transactions have been selected for analysis. Place the cursor on the Options field value and press Enter to display a pop-up panel listing the selected tasks/transactions.

Type

Type of pool, either IMS or VSAM.

Group

Defines the group as LSR or GSR.

LSR refers to VSAM Local Shared Resources where the buffer pool is maintained in the user’s storage (PRIVATE). GSR refers to VSAM Global Shared Resources where the buffer pool is maintained in z/OS common storage (ECSA).

Category

Literal name of the pool.

Interactive Analysis Option 9 - USSView

The USSView option displays information about USS activity on a process basis (which is very similar to having a TaskView for USS display).

The USSView panel provides information about delay information by process, code details by process, and process level information. The DelayView and Delay Locations displays include information for all processes. Process level delays would look similar.

If no USS data is in the monitor data set, the USSView option is not available.

CA MAT -------------------------- USSView ------------------ Row 1 to 2 of 2
COMMAND ===>                                                SCROLL ===> CSR
Primary commands: ADDHelp                                        Profile: USS
Options: NORMAL
Line commands: C - Code Details  T - Threads
D - Delay Details S - Process Info F - Functions
LC Process ID Initial Command                Actv% Wait% Total% Visual
___________________________________________________________
_ t 33685520                                  0.00  10.00 10.00  ====>
__   131092                                  0.00  10.00 10.00  ===>
********************************* End of Table ********************************
The available commands for USSView are described next.

**ADDHelp**
Invokes the content-sensitive Help application to update or create a help entry for the selected content.

**C**
(CodeView Detail line command) displays the CodeView Detail panel showing activity detected by CA Mainframe Application Tuner.

**D**
(DelayView Detail line command) displays the DelayView Detail panel showing the types of delays encountered by CA Mainframe Application Tuner.

**T**
Displays the Thread IDs associated with the selected Process ID.

**S**
Displays statistics and information about the selected Process ID.

**F**
Displays the USS Functions associated with the selected Process ID.

Each field in USSView is described next.

**Process ID**
Numerical Process ID value.

**Initial Command**
Program (or CSECT) that invoked USS.

If CA Mainframe Application Tuner cannot determine the program name, this field can be blank.

**Activ%**
Percentage of the monitored period when a CPU was in use.
CA Mainframe Application Tuner calculates this value as the ratio of samples in which it detected CPU activity to the total number of samples.

**Wait%**
Percentage of the monitored period where CA Mainframe Application Tuner detected USS waiting for resources.

**Total%**
Sum of the Activ% and Wait% fields.

**Visual**
Graphical representation of the Total% field.
**CodeView Detail**

Use the CodeView Detail (C) line command from the USSView panel to display the program activity that is associated with a specific task.

```
CA MAT ------------------- CodeView Detail ------------------ Row 1 to 1 of 1
COMMAND ===>                                                  SCROLL ===> CSR
Process ID: 33685520         Function: select          Profile: USS
Thread ID: 133F14F000000002                           Options: NORMAL
Mode: CSECT
Primary commands: MOde Pseudo/Module/Csect/4GL,
                 PSEudo, REGister, ADDHelp
Line commands: A - Associate     C - Callerid     D - Delays   N - Long Name
                 I - Info          L - Listing      S - Distribution
                 H - Histogram    NH - Normalized Histogram
LC Module   Csect    Description               L C Actv% Wait% Totl% Visual
________ ________ _________________________ _ _ _____ _____ _____ __________
>------------------------------------------------------------------------------
__ .NUCLEUS BOPJCST  OS/390 UNIX system servic B Y  0.00 10.00 10.00 =========>
```

This panel displays the modules and CSECTs that delayed a task which is identified in the Process ID: field. The commands you can issue and field headings are identical to the CodeView panel. All subsequent associated panels report information for the specified task.

The CodeView Detail panel reports both Active and Wait activity percentages for Analyze Normal mode, which accounts for all activity reported in USSView.

**DelayView Detail**

Use the DelayView Detail (D) line command to display the delay categories that are associated with a specific task and detected by CA Mainframe Application Tuner.

```
CA MAT ------------------ DelayView Detail ------------------ Row 1 to 3 of 3
COMMAND ===>                                                  SCROLL ===> CSR
Process ID: 50331728                                   Profile: USS
Detail: ON
Primary commands: DETail on/off,  Module: *
ADDHelp               Csect: *
Offset: *
Line commands: A - Address
LC Major category      Minor category       Actv% Wait% Totl% Visual
____________________ ____________________ _____ _____ _____ __________
-------------------------------------------------------------------------------
__ Unix System Services pfsctl (BPX1PCT)      0.01  0.54  0.54 =========>
__ Unix System Services Unix System Services  0.00  0.01  0.01
__ Unix System Services w_getpsent (BPX1GPS)  0.01  0.00  0.01
******************************************************************************
```

This panel displays the delays detected by CA Mainframe Application Tuner and associated with a specific task.
This panel displays information about what caused a task to be delayed in its execution. The commands you can issue and field headings are identical to the DelayView panel. All subsequent associated panels report information for the specified task.

**Threads Panel**

Issuing the Threads line command displays the USS Thread panel where the IDs that are associated with the selected Process ID are shown.

<table>
<thead>
<tr>
<th>CA MAT</th>
<th>USS Threads</th>
<th>Row 1 to 1 of 1</th>
<th>COMMAND ====&gt;</th>
<th>SCROLL ====&gt;</th>
<th>CSR</th>
</tr>
</thead>
<tbody>
<tr>
<td>Primary Commands: PROcess Info</td>
<td>Profile: USS</td>
<td>Options: NORMAL</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Line Commands: C - Code Detail</td>
<td>Process ID:</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>33685520</td>
<td>D - Delay Detail</td>
<td>F - Functions</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>LC Thread ID</td>
<td>Activ% Wait% Total% Visual</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>f__ 133F14F000000002</td>
<td>0.00 10.00 10.00 ======&gt;</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

The available commands for USS Threads are described next.

**PRO**

Displays Process statistics and information about the selected Thread ID.

**C**

(CodeView Detail line command) displays the CodeView Detail panel showing activity detected by CA Mainframe Application Tuner.

**D**

(DelayView Detail line command) displays the DelayView Detail panel showing the types of delays encountered by CA Mainframe Application Tuner.

**F**

Displays the USS Functions associated with the selected Process ID.

Each field in USSView is described next.

**Thread ID**

Numerical Thread ID value.

**Activ%**

Percentage of the monitored period when a CPU was in use.

CA Mainframe Application Tuner calculates this value as the ratio of samples in which it detected CPU activity to the total number of samples.
**Wait%**

Percentage of the monitored period where CA Mainframe Application Tuner detected USS waiting for resources.

**Total%**

Sum of the Activ% and Wait% fields.

**Visual**

Graphical representation of the Total% field.

## Process Information Panel

Issuing the **S - Process Info** line command displays the Process Information panel where the IDs that are associated with the selected Process ID are shown.

<table>
<thead>
<tr>
<th>CA MAT</th>
<th>Process Information</th>
<th>Row 1 to 18 of 18</th>
<th>COMMAND</th>
<th>SCROLL</th>
</tr>
</thead>
<tbody>
<tr>
<td>Primary Commands: <strong>THReads</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Process ID</td>
<td>50331728</td>
<td>USS Real User ID</td>
<td>. . .</td>
<td>0</td>
</tr>
<tr>
<td>Process Group Number</td>
<td>50331728</td>
<td>USS Real Group ID</td>
<td>. . .</td>
<td>0</td>
</tr>
<tr>
<td>Parent Process ID</td>
<td>1</td>
<td>Session ID</td>
<td>. . .</td>
<td>50331728</td>
</tr>
<tr>
<td>Kernal CPU Time</td>
<td>.00:00:00.018</td>
<td>Callable Services Count</td>
<td>. . .</td>
<td>1513</td>
</tr>
<tr>
<td>I/O Block Counts</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>DIR Read</td>
<td>472</td>
<td>Logical look-up Calls</td>
<td>. . .</td>
<td>0</td>
</tr>
<tr>
<td>Standard Read</td>
<td>262</td>
<td>Physical look-up Calls</td>
<td>. . .</td>
<td>0</td>
</tr>
<tr>
<td>Standard Write</td>
<td>0</td>
<td>Logical Generation Calls</td>
<td>. . .</td>
<td>48</td>
</tr>
<tr>
<td>Char Special Read</td>
<td>0</td>
<td>Physical Generation Calls</td>
<td>. . .</td>
<td>118</td>
</tr>
<tr>
<td>Char Special Write</td>
<td>0</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pipe Read</td>
<td>0</td>
<td>Message Send Bytes</td>
<td>. . .</td>
<td>0</td>
</tr>
<tr>
<td>Pipe Write</td>
<td>0</td>
<td>Message Receive Bytes</td>
<td>. . .</td>
<td>0</td>
</tr>
<tr>
<td>Remote Socket Read</td>
<td>0</td>
<td>Sync() Calls</td>
<td>. . .</td>
<td>0</td>
</tr>
<tr>
<td>Remote Socket Write</td>
<td>0</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

The available command for USS Threads is described next.

**THR**

Displays the USS Threads panel.

Each field in the Process Information panel is described next.

**Process ID**

OpenMVS process ID number

**Process Group Number**

OpenMVS process group ID number
**Parent Process ID**
OpenMVS parent process ID number

**USS Real User ID**
OpenMVS real user ID number

**USS Real Group ID**
OpenMVS real group ID number

**Session ID**
OpenMVS session ID number

**Kernel CPU Time**
Total CPU time spent in OpenMVS kernel

**Callable Services Count**
Total OpenMVS callable services.
This value includes callable services performed internally by the kernel. It does not include all trivial callable services.

**DIR Read**
Directory read I/O blocks

**Standard Read**
Standard file read I/O blocks

**Standard Write**
Standard file write I/O blocks

**Char Special Read**
Character special read I/O blocks

**Char Special Write**
Character special write I/O blocks

**Pipe Read**
Pipe read I/O blocks

**Pipe Write**
Pipe write I/O blocks

**Remote Socket Read**
Remote socket read I/O blocks

**Remote Socket Write**
Remote socket write I/O blocks
Logical look-up Calls
Path name lookup calls to logical file system lookup routine

Physical look-up Calls
Path name lookup calls to physical file system lookup routine

Logical Generation Calls
Path name generation calls to logical file system

Physical Generation Calls
Path name generation calls to physical file system lookup routine

Message Send Bytes
Number of message send bytes

Message Receive Bytes
Number of message receive bytes

Sync() Calls
Number of calls to sync()

USS Functions

Issuing the F - Functions line command displays the USS Functions panel where the functions that are associated with the selected Process ID are shown.

<p>| CA MAT --------------------- USS Functions ----------------- Row 1 to 3 of 3 |
|-----------------------------|-----------------------------|
| COMMAND ====&gt; | SCROLL ====&gt; CSR |
| Primary Commands: PROcess Info | Profile: USS |
| Options: NORMAL | Process ID: 50331728 |
| Line Commands: C - Code Detail |</p>
<table>
<thead>
<tr>
<th>LC Function</th>
<th>Program</th>
<th>Actv%</th>
<th>Wait%</th>
<th>Total%</th>
<th>Visual</th>
</tr>
</thead>
<tbody>
<tr>
<td>__ pfsctl</td>
<td>BPX1PCT</td>
<td>0.01</td>
<td>0.54</td>
<td>0.54</td>
<td>=========&gt;</td>
</tr>
<tr>
<td>__ Unix</td>
<td>System</td>
<td>0.00</td>
<td>0.01</td>
<td>0.01</td>
<td></td>
</tr>
<tr>
<td>__ w_getpsent</td>
<td>BPX1GPS</td>
<td>0.01</td>
<td>0.00</td>
<td>0.01</td>
<td></td>
</tr>
</tbody>
</table>
| ********************************* End of Table ********************************

192 User Guide
The available commands for USS Functions are described next.

**PRO**
Displays Process statistics and information about the selected Thread ID.

**C**
(CodeView Detail line command) displays the CodeView Detail panel showing activity detected by CA Mainframe Application Tuner.

Each field in USSView is described next.

**Function**
Function name

**MVS Program**
MVS programs name for the USS function

**Activ%**
Percentage of the monitored period when a CPU was in use.
CA Mainframe Application Tuner calculates this value as the ratio of samples in which it detected CPU activity to the total number of samples.

**Wait%**
Percentage of the monitored period where CA Mainframe Application Tuner detected USS waiting for resources.

**Total%**
Sum of the Activ% and Wait% fields.

**Visual**
Graphical representation of the Total% field.

**What Next?**

Now that you have used some of the Interactive Analysis panels, you can find specific information about other features in the chapters listed in the following table.

<table>
<thead>
<tr>
<th>Task</th>
<th>Reference</th>
</tr>
</thead>
<tbody>
<tr>
<td>Learn how to get the most out of CA MAT.</td>
<td>Chapter &quot;Using Additional Features&quot;</td>
</tr>
<tr>
<td>Invoke monitors from outside the TSO Client.</td>
<td>Chapter &quot;Open Application Program Interface&quot;</td>
</tr>
<tr>
<td>Create a set of batch reports.</td>
<td>Chapter &quot;Generating Batch Reports&quot;</td>
</tr>
<tr>
<td>Look up delay categories and determine reasons for specific types of delays.</td>
<td>Chapter &quot;Tuning Your Applications&quot;</td>
</tr>
<tr>
<td>---</td>
<td>---</td>
</tr>
<tr>
<td>Use the product with DB2.</td>
<td>Chapter &quot;Using the Product in a DB2 Environment&quot;</td>
</tr>
<tr>
<td>Use the product with CICS.</td>
<td>Chapter &quot;Using the Product in a CICS Environment&quot;</td>
</tr>
<tr>
<td>Use the product with IMS.</td>
<td>Chapter &quot;Using the Product in an IMS Environment&quot;</td>
</tr>
<tr>
<td>Use the product in a Java Virtual Machine (JVM) environment</td>
<td>Chapter &quot;Using the Product in a Java Virtual Machine (JVM) Environment&quot;</td>
</tr>
<tr>
<td>Use the product in a WebSphere Application Server environment</td>
<td>Chapter &quot;Using the Product in a WebSphere Application Server Environment&quot;</td>
</tr>
<tr>
<td>Use the product in a WebSphere for MQ environment</td>
<td>Chapter &quot;Using the Product in a WebSphere for MQ Environment&quot;</td>
</tr>
<tr>
<td>Use the product in a CA IDMS environment</td>
<td>Chapter &quot;Using the Product in a CA IDMS Environment&quot;</td>
</tr>
<tr>
<td>Use the product in an SAP environment</td>
<td>Chapter &quot;Using the Product in an SAP Environment&quot;</td>
</tr>
<tr>
<td>Use the product with Adabas, Natural, CA Ideal or CA Datacom.</td>
<td>Chapter &quot;Using the Product with other Databases&quot;</td>
</tr>
</tbody>
</table>
Chapter 6: Using Additional Features

In addition to the basic tasks of defining, invoking, and analyzing monitors, several features are available that can assist you with tuning your applications. This section provides information about these features, which are accessed from the Primary Option Menu.

This section contains the following topics:

Create and Use Global Monitors (see page 195)
Analyze Monitor Data Sets Created by Other Users (see page 197)
Perform Administrative Functions (see page 202)
Register Source Program Listings (see page 220)
Export a Monitor Data Set (see page 221)

Create and Use Global Monitors

Global Monitoring Definitions are associated with the Server and not a specific user. Use the Global Monitoring Menu to manage monitor information that is located in the Global Information File (GIF). This information includes monitors invoked by using the Open API.

Global Monitoring Menu

The Global Monitoring Menu is used to set up a new monitor definition; to modify or delete existing definitions; to invoke a monitor, and to check the status of data collection for monitor definitions. After data collection is complete, use the External option to analyze the results.

Select Option G to display the Global Monitoring Menu.

<table>
<thead>
<tr>
<th>OPTION</th>
<th>Description</th>
<th>Status</th>
<th>Userid: TUNUSER</th>
<th>Server ID: MATUNER</th>
<th>Release: 8.5.00</th>
</tr>
</thead>
<tbody>
<tr>
<td>0  Parameters</td>
<td>Enter global monitor parameters</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1  Monitor</td>
<td>Create and analyze Monitor Sets</td>
<td>ACTIVE</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2  Active</td>
<td>Select an active job to monitor</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3  Registration</td>
<td>Shared listing registration</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4  Grouping</td>
<td>Define groups of monitors</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Enter an option or press END to return to the CA MAT Primary Option Menu
The options available on the Global Monitoring Menu are described next.

**Option 0 (Parameters)**

Displays the Profile Parameters panel where you can modify the default display settings.

These global parameters are identical to the user profile parameters. See the *Installation Guide* for complete information.

**Option 1 (Monitor)**

Displays the Monitor Definition panel where you can set up a new monitor definition, modify or delete an existing definition, and view the status of data collection.

**Option 2 (Active)**

Displays the Active Jobs panel, which allows you to create and invoke a monitor session for any active job.

Refer to Chapter 4, "Invoking a monitor" for more information.

**Option 3 (Registration)**

Displays the Program Listing Registration panel where you can specify program listings for Assembler and high-level languages with CA Mainframe Application Tuner.

This option allows CA Mainframe Application Tuner to correlate program activity to the high-level language statements instead of to only offsets with modules or CSECTs.

**Option 4 (Grouping)**

Displays the Monitor Profile Groups panel that allows you to define groups of job steps that can be monitored together while also specifying the job step that initiates (or "triggers") the monitoring of the group.

Refer to "Creating a multijob monitor: grouping" on page 91 for more information.

**Change the Global Monitor Definition Default Criteria**

When you invoke a monitor using TUNCALL, default monitoring criteria are used unless otherwise specified. The default values are contained in the Global Profile Parameters table. To change the default values:

1. From the Global Monitoring Menu, select Option 0.
2. Press Enter.

The Profile Parameters panel displays.
3. Change the criteria as required.
   See the Installation Guide for more information.
4. Press End to exit the panel and save the default values.

**Analyze Global Monitor Data Sets**

Global monitor data sets are analyzed the same way as normal monitors. You can display the Interactive Analysis menu by using the A, AL, AA, or AW line commands for the data set name. These line commands work the same way as they do for the Monitor Definition panel, as described in Starting interactive analysis.

**Analyze Monitor Data Sets Created by Other Users**

CA Mainframe Application Tuner allows you to analyze monitor data sets that are created by other users. From the Primary Option Menu, select Option 5.

The External Data Set List panel displays:

```
CA MAT  ---------------- External Data Set List ------------- Row 1 to 3 of 3
COMMAND ==> SCROLL ==> CSR
Primary commands: ADD - Manually add an external monitor data set
                    INCLude - Include monitor profiles from other users
Line commands: A - Analyze Normal  B - Batch Reports
               AL - Analyze All    V - CSV Reports
               AA - Analyze Active R - Remove
               AW - Analyze Wait  HR - DFHSM Recall
               X - Export Monitor Data
LC Monitor Data Set Name Exists Profile User ID
>---------------------------------------------------------------------------
__ 'CAMAT.C822519.DB2.MONITOR1'              NO     JPDBMON1 TUNUSER2
__ 'CAMAT.C822519.DB2.MONITOR1'              YES    JPNOEXPL TUNUSER2
__ 'CAMAT.C903991.MONITOR'                   YES    KKH      TUNUSER2
```
The fields in the External Data Set List panel are described next.

**Monitor Data Set Name**

Data set name of the monitor data set.

**Exists**

Indicates data set availability.

The following values can be displayed in this field:

- **YES**: the data set containing the sample data for the monitor instance is available and has not been migrated
- **NO**: the data set is not found
- **ML1**: the data set containing the sample data for the monitor instance exists but is migrated to the DFSMShsm ML1 migration pool
  
  ML1 migration generally goes to disk.
- **ML2**: the data set containing the sample data for the monitor instance exists but is migrated to the DFSMShsm ML2 migration pool
  
  ML2 migration generally goes to tape.
- **INV**: the data set name is invalid. If this value displays, check the entry to make sure the data set name is valid before continuing
- **PER**: a program error occurred

  This value can indicate a catalog error other than the data set not being found. See your technical support staff for more information.

**Profile**

Displays the unique identifier that designates a particular monitor definition. This identifier can be one to eight alphanumeric characters.

**User ID**

Displays the identifier of the person (or batch job) who last invoked the monitor definition.

The identifier can be one of the following types:

- A TSO user ID if the request was submitted from the Monitor Definition panel or the Display Active panel.
- A batch job name if the request was submitted from TUNCALL in a batch job.

**User Prefix**

Displays the TSO data set prefix.

This prefix is a one-to-seven character alphanumeric value saved as part of the user's TSO profile.
Analyze Monitor Data Sets Created by Other Users

Date
Displays the date on which the monitor was started.

Time
Displays the time when the monitor was started.

Description
Displays the user-specified description of the monitor definition.

Include a Monitor Data Set from an External User

When you first display the External Data Set List panel, it does not contain any monitor data set names. You must add the names of the data sets that you want to include. Monitor data sets are listed in the User Information File for each user. You can access another user’s User Information File by using the INCLude primary command:

1. On the COMMAND line, type INCL.
2. Press Enter.

The Include Monitor Data Set panel displays:

```
CA MAT  ----------------- External Data Set List ------------- ROW 0 to 0 of 0

CA MAT  ----------------- Include Monitor Data Set -----------------------
COMMAND ===>                                                               
User Identification:                                                       
    User ID ===> MATUSER                                                   
    Prefix  ===> MATUSER                                                   
User Information File                                                      
    Data set name  ===>                                                      
        Type GLOBAL for Global Monitor Definitions                         
Note: If a User Information File name is not provided, the name is         
      constructed from the User ID and Prefix fields.                      
Press ENTER to continue or END to cancel.                                  
```

3. Specify the data set name of the monitor data sets that you want included.

By default, a user’s tables’ data set name is `prefix.userid.TRI85.TABLES`. If your site uses the default tables data set names, access a user’s data set by specifying the user’s TSO user ID and prefix in the User Identification fields. If your site does not use the default tables data set names, you must specify the correct value in the Data set name field.

To add Global monitor data sets, specify GLOBAL. See the chapter, "Open Application Program Interface" for more information.
4. Press Enter to display the Monitor Profiles panel.

   This panel displays the profiles that are available within the specified User Information File.

   ![Monitor Profiles Panel]

5. To select the most recent monitor data set for a profile, type S next to the appropriate profile name and press Enter.

6. To display a list of all monitor data sets that are associated with a profile, type H next to the appropriate profile name and press Enter.

   The Monitor History panel displays:

   ![Monitor History Panel]

7. Type S next to the appropriate data sets and press Enter.

8. Press End to return to the External Data Set List panel.

   The monitor data sets for the selected profile have been added to the External Data Set List.
Add a Monitor Data Set

You can also manually enter a specific data set name of a monitor data set to analyze monitor data that is not associated with a particular User or Global Information File. To add a monitor data set manually:

1. On the COMMAND line, type ADD.
2. Press Enter.

The Manual Monitor Data Set Add panel displays.

```
CA MAT --------------- Manual Monitor Data Set Add ----------------------
COMMAND ➔
Profile Name ➔
Monitor Data Set ➔
Description ➔
```

3. Enter the profile name and the monitor data set name.
4. (Optional) Enter a description for the profile.
5. Press End to return to the External Data Set List panel.

Analyse External Data Sets

Now that the External Data Set List contains monitor data sets, you can display the Interactive Analysis menu by using the A, AL, AA, or AW line commands for the data set name. These line commands work the same way as they do for the Monitor Definition panel, as described in Start Interactive Analysis.

To recall in the background a data set that has been migrated, type HR next to the appropriate profile name and press Enter.

Remove External Data Sets

To remove an external data set from your list, type R next to it and press Enter. The original data set will not be deleted.
Perform Administrative Functions

The following sections describe these functions:

- The Administration Option Menu
- Register Source Program Listings
- Define Pseudo Groups
- Update Content-Sensitive Help
- Display CA Mainframe Application Tuner and environmental Information

Administration Option Menu

If you are an administrator, use the Administration Option Menu panel to register program listings for Assembler and high-level languages with CA Mainframe Application Tuner. Registration allows CA Mainframe Application Tuner to relate program activity to the high-level language statements instead of to offsets within modules and CSECTs.

<table>
<thead>
<tr>
<th>CA MAT ------------------- Administration Option Menu ------------------------</th>
</tr>
</thead>
<tbody>
<tr>
<td>OPTION  ====&gt;</td>
</tr>
<tr>
<td>1  Associations     - Define module/Csect functions Userid: TUNUSER</td>
</tr>
<tr>
<td>2  Pseudo           - Define pseudo groups Server ID: MATUNER</td>
</tr>
<tr>
<td>3  Content Help     - Update content-sensitive help Status: ACTIVE</td>
</tr>
<tr>
<td>4  Scheduling       - Create monitor schedules Release: 8.5.00</td>
</tr>
<tr>
<td>5  Registration     - Shared source listing registration</td>
</tr>
<tr>
<td>S  System Settings  - View system settings for clients</td>
</tr>
<tr>
<td>U  User Settings    - View user settings for clients</td>
</tr>
<tr>
<td>I  Environment      - Display CA MAT and environmental information</td>
</tr>
</tbody>
</table>

Enter an option or press END to return to the CA MAT Primary Option Menu

The options available on the Administration Option Menu panel are described next.

Option 1 (Associations)

Displays the CSECT Associations panel, which allows you to assign functional descriptions to CSECTs.

These functional descriptions appear on analysis panels, such as CodeView, DelayView, and ModView. See Add CSECT Descriptions for more information.

Option 2 (Pseudo)

Displays the Pseudo Group Definitions panel, which allows you to group related program modules into pseudo groups.

Pseudo groups enable CA Mainframe Application Tuner to provide simplified reporting on these modules. See Define Pseudo Groups for more information.
Option 3 (Content Help)
Displays the Content-sensitive Help panel, which allows you to add content-sensitive online Help.

By updating Help, you can provide specific information about delay causes, pseudo groups, and CSECTs. For more information about content-sensitive Help, see Update Content-Sensitive Help.

Option 4 (Scheduling)
Displays the Schedule Definitions panel where you can create shifts/schedules for monitoring activity.

For information, see Creating a monitor schedule.

Option 5 (Registration)
Displays the Program Listing Registration panel, which allows you to register program listings to relate program activity to actual high-level language statements.

For more information, see Register Source Program Listings.

Option 5 (System Settings)
Displays the default parameter values set for a system.

These values are set with the TUNSDEFS batch procedure (they cannot be changed from this panel). See the Installation Guide.

Option U (User Settings)
Displays the default parameter values set for new users.

These values are set with the TUNUDEFS batch procedure (they cannot be changed from this panel). See the Installation Guide.

Option I (Environment)
Displays CA Mainframe Application Tuner and environmental information that should be examined with the assistance of Customer Support personnel.

This option contains information such as the maintenance level, storage blocks, and the z/OS environments in which the server and client are running. See Display and Environmental Information.
CSECT Associations

Associating functional descriptions to CSECTs aids you during analysis in identifying what each CSECT does. These CSECT descriptions appear on the CodeView, ModView, and Callerid analysis panels.

CA Mainframe Application Tuner comes with thousands of IBM® system routines, COBOL library routines, PL1®, DB2® routines, and CICS routines already defined.

The CSECT Associations application is also available using the Associate line command (A) when you are displaying either the TimeView panel, or the CodeView panel with CSECT=ON.

Add CSECT Descriptions

1. From the Administration Option Menu, select Option 1.

   The Csect Associations panel displays:

   The Csect Associations panel allows you to enter new descriptions of CSECTs or to modify existing CSECT descriptions. The CSECT field lists the names of CSECTs for which a reference has been established.

   The CSECT Description field lists the description for the CSECT. Many of the common CSECTs found while monitoring programs in COBOL, CICS, or DB2 environments are listed on the Csect Associations panel already.
2. To add a new CSECT description, type ADD on the COMMAND line and press Enter. The CSECT Associations pop-up panel displays.

3. To modify an existing CSECT description, use the Select line command (S). The Csect Associations pop-up panel displays with the description of the current CSECT.

4. Type both the name of the CSECT and a description for the new CSECT, or edit the existing CSECT description.

You can type up to 57 characters for the description. CA Mainframe Application Tuner displays the CSECT description on the initial panel display on the Delay Locations, Callerid, CodeView, and ModView panels.

Due to screen width limitations, the CSECT Description field shows a truncated version of the description on some terminal types. To view the full text of the description, scroll right until you see the Extended CSECT Description field where the entire 57 character description displays.

5. To add content-sensitive Help for the CSECT, specify YES in the Update Help field. See Update Content-Sensitive Help for more information.

6. Press Enter when finished.

The new or updated CSECT description will appear on the Csect Associations panel.

Define Pseudo Groups

CA Mainframe Application Tuner uses the concept of pseudo groups to treat related modules as a single group in the CodeView application. Elapsed time in all modules within a pseudo group is reported by using the pseudo group name.

A pseudo group contains modules with names that start with the prefix or prefixes that are assigned to the pseudo group. You can include any number of prefixes in a single pseudo group, but the same prefix should not be a part of multiple pseudo groups.
Associate Modules with Pseudo Groups

1. From the Administration Option Menu, select Option 2.
   The Pseudo Group Definitions panel displays.

   You can also access the Pseudo Group Definitions panel directly from CodeView by using the PSEudo primary command. Refer to

<table>
<thead>
<tr>
<th>Module</th>
<th>Pseudo</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>ACF</td>
<td>CA ACF2</td>
<td>CA ACF2</td>
</tr>
<tr>
<td>ADF</td>
<td>TSO</td>
<td>TSO/E</td>
</tr>
<tr>
<td>ADR</td>
<td>DSS</td>
<td>DF/DSS</td>
</tr>
<tr>
<td>ADY</td>
<td>DAE</td>
<td>DAE</td>
</tr>
<tr>
<td>AHL</td>
<td>GTF</td>
<td>Generalized Trace Fac</td>
</tr>
<tr>
<td>AKJ</td>
<td>LINKDGO</td>
<td>Link/Edit/Go</td>
</tr>
<tr>
<td>AMA</td>
<td>SPZAP</td>
<td>Superzap</td>
</tr>
<tr>
<td>AMB</td>
<td>AMBLIST</td>
<td>AMBLIST</td>
</tr>
<tr>
<td>AMD</td>
<td>SADUMP</td>
<td>Stand-Alone Dump</td>
</tr>
<tr>
<td>AMS</td>
<td>RMFSAM</td>
<td>RMF</td>
</tr>
<tr>
<td>ANT</td>
<td>SDM</td>
<td>SDM</td>
</tr>
<tr>
<td>AOM</td>
<td>AOM</td>
<td>AOM</td>
</tr>
<tr>
<td>ARC</td>
<td>HSM</td>
<td>DFSMShsm</td>
</tr>
<tr>
<td>ASA</td>
<td>REUSE</td>
<td>REUS</td>
</tr>
</tbody>
</table>

   The Module column contains the module prefix for a module or group of modules beginning with this prefix that are to be included in the pseudo group.

   The Pseudo column contains the name of the pseudo group to which you have assigned the module.

2. To add a new module to a pseudo group, type the ADD primary command.

3. To change an existing entry, type S next to the module that you want to modify.

4. Press Enter.
   The PSEUDO Group Definition panel displays.

<table>
<thead>
<tr>
<th>Module pattern</th>
<th>PSEUDO group</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

   Press ENTER to save; enter END to cancel.
5. In the Module pattern field, type one to eight characters of the module name to be associated with an existing or new pseudo group. For IBM modules, this name is usually three characters; for example, TSO modules begin with IKJ.

6. In the PSEUDO group field, type the name of the pseudo group to which the module is to be associated. The name entered in this field can be either a new pseudo group name or the name of an existing pseudo group.

7. *(Optional)* In the Description field, you can include a description of the pseudo group (25 character maximum). This description displays in CodeView - Pseudo Mode.

8. The name for the pseudo group must not be longer than seven characters. A pseudo group name is always prefixed by a period (.). Do not type the period in this field; it is added automatically.

**Add Help Information for Pseudo Groups**

You can add content-specific Help for a pseudo group by using the ADDHelp primary command. See Update Content-Sensitive Help for more information. When using the CodeView application with MODULE: OFF, the module’s activity displays with its specified pseudo group.

**Display Pseudo Groups**

Pseudo groups are displayed in the CodeView interactive analysis panel, based on the display mode selected.

**PSEUDO mode:**

Activity displays by pseudo group.

Use the MOde PSEudo primary command. Pseudo descriptions are displayed.

**MODULE mode:**

Activity displays by module, with pseudo group information included.

Module descriptions are displayed.

**CSECT mode:**

Pseudo group information is not displayed.
Update Content-Sensitive Help

CA Mainframe Application Tuner features content-sensitive, online Help information for CSECTs, pseudo groups, and delay categories. To display this information, place the cursor on a highlighted field and press PF1. You can add to the Help topics provided by CA Mainframe Application Tuner by writing your own help for any topic to customize the information to your site.
There are two components for content-sensitive Help information:

**Entry**

Identifies the Help information by Content, Content Type, Help Member, Help Topic, and Info Level.

This information displays in the Content Sensitive Help panel.

**Text**

Is the actual Help information displayed when content-sensitive Help is requested.

Help text is located in a Help member. Each Help member can contain several Help topics. Help members are located in the hilevel.UTRHELP data set for your site.

To display content-sensitive Help, select Option 3 from the Administration Option Menu. The Content-sensitive Help panel displays:

```
CA MAT ----------------- Content-sensitive Help ---------- Row 1 to 12 of 298
COMMAND ===>                                                SCROLL ===> CSR
Primary commands: ADD
Line commands: CE - Copy entry  DE - Delete entry  UE - Update entry
                BT - Browse help text  ET - Edit help text
LC Field Specific Contents          Type     Help     Help     I S LAST
Member   Topic    L L USER
________________________________ ________ ________ ________ _ _ ________
>-------------------------------------------------------------------------------
  ACCEPT                           COBVERB  TUCCBLNG ACCEPT   3 D CAMAT
  ADD                              COBVERB  TUCCBLNG ADD      3 D CAMAT
  ALTER                            COBVERB  TUCCBLNG ALTER    3 D CAMAT
  CALL                             COBVERB  TUCCBLNG CALL     3 D CAMAT
  CANCEL                           COBVERB  TUCCBLNG CANCEL   3 D CAMAT
  CLOSE                            COBVERB  TUCCBLNG CLOSE    3 D CAMAT
  COMPUTE                          COBVERB  TUCCBLNG COMPUTE  3 D CAMAT
  CONTINUE                         COBVERB  TUCCBLNG CONTINUE 3 D CAMAT
  DELETE                           COBVERB  TUCCBLNG DELETE   3 D CAMAT
  DISPLAY                          COBVERB  TUCCBLNG DISPLAY  3 D CAMAT
  DIVIDE                           COBVERB  TUCCBLNG DIVIDE   3 D CAMAT
  ENTRY                            COBVERB  TUCCBLNG ENTRY    3 D CAMAT
```

The available line commands are described next.

**CE - Copy entry**

Displays the Content Help Copy panel, which allows you to copy the selected table entry and Help text.

**DE - Delete entry**

Removes a user-created Help topic.

This line command is not valid if the SL field contains the value D.
Perform Administrative Functions

**UE - Update entry**
Displays the Content Help Update panel.
Use this panel to change information for an existing entry. You can change the information level, the Help member, or the Help topic, and edit the Help text. This line command is not valid if the SL field contains the value D.

**BT - Browse help text**
Displays a pop-up panel with the Help text for the topic.
Use this panel to verify that the Help text is formatted correctly.

**ET - Edit help text**
Displays the Help member in edit mode.
See Write Content-Sensitive Help Text for information about typing Help text. This line command is not valid if the SL field contains the value D.

Each field in the Content-sensitive Help panel is described next.

**Field Specific Contents**
- contents of the field for which the Help topic was written

**Type**
- Category for the Help information; valid types are:
  - **CSECT**: load module CSECTs
  - **DB2PLAN**: DB2 plan names
  - **DB2TYPE**: DB2 calls
  - **MAJDELAY**: major delay descriptions
  - **MINDELAY**: minor delay descriptions
  - **MODULE**: load module names
  - **TRANCODE**: CICS/IMS transaction names

**Help Member**
- Member name of the hilvel.UTRHELP data set in which the text for the topic is found.

**Help Topic**
- one- to eight-character identifier for the Help information
The Help Topic is a subtopic of the Help Member.
IL

Information level of the Help information.

This value indicates the importance or severity of the information and defines the highlight color of the field content:

- Info level 1 (red) indicates a known cause of problems
- Info level 2 (yellow) indicates a potential cause of problems
- Info level 3 (white) indicates informational content.

SL

Source level of the available Help:

- U indicates user-written Help information that is provided by your site
- D indicates distributed Help information that is provided by CA Technologies

Last User

User ID of the last person to update the Help topic.

For distributed Help information, the user ID is CA MAT.

Date

Date that the Help was last updated.

Time

Time that the Help was last updated.
Following, the Help text is shown for the Attach SVC minor delay category. The text is located in hilevel.UTRHELP member TUCMALOD under the topic ATTACHSV. The type of Help is MINDELAY.

<table>
<thead>
<tr>
<th>CA MAT</th>
<th>Attach SVC</th>
<th>More: +</th>
</tr>
</thead>
<tbody>
<tr>
<td>Command ===&gt;</td>
<td>Scroll ===&gt;</td>
<td>PAGE</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Create a new unit of work in the system and start that unit of work. The Attach SVC will perform the following functions:
- Create the task management control blocks
- Determine if the module is in memory
- Locate the module in the specified library
- Allocate storage for the module
- Read the module into storage and relocate addresses
- Build and update control blocks to track the module
- Place the new unit of work on the MVS/ESA dispatcher queues.

CA MAT TIP:
Use the A - Address line command to determine which programs were waiting for the Attach SVC. If Detail data is available, you can view the names of the modules that were attached that caused the delay.

### Add Content-Sensitive Help

You can add Help information for a specific content either from the Content-sensitive Help panel or from the DelayView, CodeView, Histogram, or DataView interactive analysis panels (see the chapter, "Analyze Monitor Data").

1. On the COMMAND line, type ADD.

The Content Help Addition panel displays.
2. Specify the following values in the fields:

   **Content**
   Specify the content for which the Help topic is to be written; for example, if you are writing Help for the IGZXCIDI CSECT, type IGZXCIDI in this field.

   **Content Type**
   Specify the type of content; for example, if you are providing Help for Data Delay (a major category), type MAJDELAY in this field.

   **Help Member**
   Specify the eight-character name of the hilevel.UTRHELP member into which this Help topic will be written.
   You can have several Help topics in one Help member.

   **Help Topic**
   Specify the eight-character name of the subtopic in the Help member.
   Typically, this name is the same or similar to the name of the content.

   **Info Level**
   Specify 1 (red), 2 (yellow), or 3 (white).

   **Edit after Add**
   Specify YES to display an edit session for the Help topic; specify NO to create the new Help topic without adding Help text at this time.

3. When the panel is completed, press Enter.

4. If you specified YES in the Edit after Add field, type the information that you want displayed when a user is seeking information about the specific content.
   You can use text only, or you can use a set of control characters to format the text. See Write Content-Sensitive Help text for more information.

5. When you have completed writing the Help text, press End to return to the Content-sensitive Help panel.

---

**Copy a Content-Sensitive Help Entry**

To change a distributed Help entry and text, you must first make a copy of the information. You cannot edit distributed Help topics directly.

1. Type CE next to the Help topic that you want to copy and press Enter.
   The Content Help Addition panel displays with the current information for the topic.

2. Change Help Member to a new name.
   The new name must be a valid PDS or PDSE name, and cannot begin with the letters TUC.
3. In the Edit after Add field, specify YES if you want to edit the Help topic text. See Edit Content-Sensitive Help Text.
4. When you have finished, press End to return to the Content-sensitive Help panel. The edited Help topic will appear on the Content-sensitive Help panel with the Source Level field set to U. The original entry remains unchanged. When you display content-sensitive Help information, the user-level text displays.

**Update a Content-Sensitive Help Entry**

1. Type UE next to the Help topic that you want to update and press Enter. The Content Help Addition panel displays with the current information for the topic.
2. Change the information as required. Specify YES in the Edit after Add field to edit the Help text.
3. When you have finished, press End to return to the Content-sensitive Help panel.

**Edit Content-Sensitive Help Text**

1. Type ET next to the existing topic on the Content-sensitive Help panel and press Enter. The member displays in ISPF edit mode.
2. Using ISPF edit, edit the text as required. You can use text only, or you can use a set of control characters to format the text.
3. When you have finished editing the Help text, press End to return to the Content-sensitive Help panel.

**Write Content-Sensitive Help Text**

Before you begin writing Help, you need to understand the following features of the Help processor:

- An :H1 tag is added automatically to the selected member of hilevel.UTRHELP. This tag has an associated ID= attribute. The ID= attribute contains the Help topic member and the name of the content. You must not change this ID= attribute or CA Mainframe Application Tuner will not be able to locate the Help text.

- A :p. tag is added automatically to the line after the :H1 tag. This tag acts as a separator between the header and the Help text.

Type your Help text below the :p. tag. See the table in Edit Help Text for information about using markup tags to format your text.

CA Mainframe Application Tuner automatically adds one space between each continuous word or character string, regardless of the actual number of spaces or line breaks. If you need to display text exactly as typed, use the example tag, :xmp.
When you are finished writing the Help for the topic, press End to return to the Content-sensitive Help panel.

---

When you are finished writing the Help for the topic, press End to return to the Content-sensitive Help panel.

---

The tags that are available for writing content-sensitive Help are described next.

**H1**

- **H1** creates a heading and is followed by an ID= attribute, which is automatically filled in with the same value that is specified in the Topic field of the Content-sensitive Help panel.
- Do not change this value. CA Mainframe Application Tuner relies on this value to find the correct Help text.
- This value is followed by a period, followed by the title that is to appear in the Help panel. The value that you specify in the Content field of the Content-sensitive Help panel is used automatically as the title. To change the title, overtype this value.

**p.**

- Creates a blank line between paragraphs.

**dl.**

- Creates a definition list and must also be used with the :dt. (topic) and :dd. (description) tags and followed with the :edl. (end definition list) tag.

**ul.**

- Creates a bulleted list and must also be used with :li. (list item) tags and must be followed by the :eul. (end unordered list) tag.

**hp1.**

- Highlights text following the tag and must be followed with the :ehp1. tag after the text that you want highlighted.

**xmp.**

- Creates text that shows an example and must be followed by the :exmp. tag following the example text.
- Text displays exactly as typed, including spaces.
Perform Administrative Functions

::note.

Creates a note and must be followed by the :enote. tag.

::suggest.

Creates a suggestion and the text within is highlighted in yellow.
The suggestion text must be followed by the :esuggest. tag.

::hottip.

Creates a tip where the tip heading is highlighted in yellow, the text is highlighted in
white and must be followed with a :ehottip. tag.

::warning.

Creates a warning where the text is highlighted in red and the warning text must be
followed by the :ewarning. Tag.

Content-Sensitive Help Example

The following panel shows the Content Help Addition panel for an example topic.

```
CA MAT ------- Content Help Addition ---------------
COMMAND ===>                                           
                                                        
| Content ===> EXAMPLE                                   |
| Content Type ===> CSECT                                 |
| Help Member ===> SAMPLE                                |
| Help Topic ===> SAMPLE                                 |
| Info Level ===> 3 (1, 2, or 3)                        |
|                                                        |
| Edit after Add ===> YES (Yes or No)                    |
|                                                        |
| Press ENTER to add; press PF3 or enter                 |
| CANCEL to exit without adding.                         |
```

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The following example shows an example of how you can use the tags described in the table in Edit Help Text to create your own Help text.

```
[H1 id=SAMPLE.EXAMPLE]

Here is an example of how you use the tags to write help text. We'll start with a definition list:

```
[dl]
[dt.Term1]
[dd.Explanation1]
[dt.Term2]
[dd.Explanation2]
```

Next we'll create a bulleted list:

```
[ul]
[li.Item1]
[li.Item2]
```

This is an example. It appears exactly as typed.

```
[xmp]
This is an example. It appears exactly as typed.
```

Here is an example of a note. The word highlighted.

```
[enote]
```

This is a suggestion. It is displayed in yellow.

```
[esuggest]
```

This is a tip. It includes useful information.

```
[ehottip]
```

This is a warning. It is displayed in red.

```
[ewarning]
```
The following panel shows the Help text as it displays on the screen.

Here is an example of how you use the tags to write help text. We'll start with a definition list:

Term1          Explanation1
Term2          Explanation2

Next we'll create a bulleted list:
- Item1
- Item2

This is an example. It appears exactly as typed.

Note: Here is an example of a note. The word note is highlighted.

Suggestion:
This is a suggestion. It is displayed in yellow.

CA MAT TIP:
This is a tip. It includes useful information.

WARNING:
This is a warning. It is displayed in red.

The following panel shows the example listed on the Content-sensitive Help panel.
Display Environmental Information

The Environment panel displays CA Mainframe Application Tuner and environmental information that should be examined with the assistance of Customer Support personnel. It contains information such as the maintenance level, storage blocks, and the z/OS environments in which the server and client are running. The following panel shows an example of the panel.

To display the Environment panel, select Option 1 from the Administration Options Menu.

| CA MAT --------------------- CA MAT Environment ---------------------------- |
| COMMAND ==⇒ More: + |
| CA MAT Information |
| Server ID : SPTRITUN | Job Name : SPTRITUN |
| Status : ACTIVE | JES Job ID : STC04339 |
| Server Release : 4.4.00 | ASID : 189 (00B |
| Client PTF Level : BASEBS |
| Server GIF name : CAMAT.V85.UTRGIF |
| Client GIF name : CAMAT.V85.UTRGIF |
| MVS Information |
| MVS system name . . . : SJSE |
| SMFID . . . . . . . . : SJSE |
| MVS . . . . . . . . . : SP7.0.7 |
| MVS FMID . . . . . . . : HBB7720 |
| OS/390 release . . . . : Z/OS 01.07.00 |
| CPU . . . . . . . . . : 2094-00 |
| CPU serial number . . : 1622EA |
| TSO and ISPF Information |
| TSOE . . . . . . . . . : 3.06.0 |
| ISPF (internal number) : 5.7 |
| OS/390 ISPF component : ISPF FOR Z/OS 01.07.00 |
| Misc. Component Information |
| RACF . . . . . . . . . : 7.72.0 |
| DFHSM . . . . . . . . . : 0.3.0 |
| Primary JES ID . . . . : JES2 |
| Primary JES Release : Z/OS 1.7 |
| SMS Information |
| DFSMS . . . . . . . . . : 1.7.0 |
| Subsystem ID . . . . . : SMS |
| CA MAT Internal Information |
| PSX Address : 04B6F140 | SVC 85 ICB : 00F92D00 |
| PSD Address : 00820800 | SVC 85 ICB STATUS : -ACTIVE |
| OMB Address : 7E770000 | SVC 85 Owning Server : SPTRITUN |
| Mon DS Prefix : | SVC 85 ICB Intercept : 84B0F190 |
| ASCB Address : 00F90100 | SVC 85 Old Address : 84D078A0 |
| | SVC 85 Jobsteps : 125 |
| | SVC 42 Matches : 1 |
The specific information on this panel are described next.

**Server ID**
Alphanumeric identifier for the Server Space.

**Status**
Status of the Server Space; possible values are.
- Active
- Inactive

**Server Release**
Release level of the Server Space.

**Server GIF name**
Data set name of the Global Information File for the Server Space.

**Client GIF name**
Data set name of the Global Information File for the TSO Client.

**Job Name**
z/OS job name of the Server Space.

**JES Job ID**
Job number assigned by the Job Entry Subsystem (JES).

**ASID**
Number for the address space that is associated with the job.

**Client PTF level**
Latest PTF level of the TSO Client.

---

**Register Source Program Listings**

If you use PROTSYM or CA Endevor with footprinting enabled to store program listings, you do not have to manually register any listings. Simply enable the dynamic registration support. For more information, see the *Installation Guide*, "Customization", under the section heading Set Up Profile Parameters.

Even if you use dynamic registration support, review the Compile the Program section. You must set compilation options as indicated for the various languages regardless of the repository used for the listing.
By registering source program listings, you allow CA Mainframe Application Tuner to relate program activity to high-level language statements, instead of only CSECT offsets. When you register a program, you are requesting a routine to read the listing of the compiled program and create a table, which is used during interactive analysis.

You can register a program online with the TSO Client, or offline by using the sample batch registration procedure `hilevel.TNBATREG`. You set up the batch registration procedure during installation by using the product customization facility.

When registering a program online through the TSO Client, you can choose to register the listings locally or globally. A listing that is registered locally is available only to the TSO Client that performed the program registration; a listing that is registered globally is available to all users. If a listing is registered both locally and globally, CA Mainframe Application Tuner selects one, based on the following rules:

- If the monitor you are analyzing is a global monitor, CA Mainframe Application Tuner looks for a global registration. If one is not found, and dynamic registration support is enabled, CA Mainframe Application Tuner looks for a listing in the repository that is defined in the global profile parameters. Otherwise, CA Mainframe Application Tuner issues a message.

- If the monitor you are analyzing is local to the TSO Client, CA Mainframe Application Tuner looks for a local registration. If a local registration is not found, CA Mainframe Application Tuner looks for a global registration for that program. If no registration is found, and dynamic registration support is enabled, CA Mainframe Application Tuner looks for a listing in the repository that is defined in the local profile parameters. Otherwise, CA Mainframe Application Tuner issues a message.

You can register program listings for Assembler, COBOL, PL/1, NATURAL, Fortran, IBM C/C++, and SAS C. There are two steps for registering program listings:

- Compiling the program
- Registering the listings

**Export a Monitor Data Set**

Use this procedure to export a data set.

To export a monitor data set

1. Locate the data set you wish to export from any of the following panels:
   - Monitor Definition panel
   - Monitor History panel
   - External Data Set List panel
2. Type the line command X next to the profile or data set name.

If the data set exists, the Monitor Data Set Export panel appears with the selected data set name near the top. If you typed the command from the Monitor Definition panel, the latest monitor data set for that profile will be used.

```
CA MAT  ------------------ Monitor Data Set Export --------------------------
COMMAND ===> 
Preparing: '&USERID.&PROFILE.&SYSDATE.&SYSTIME.'

This feature will prepare the selected data set for download and Internet transmission to Customer Support. The original data set is not altered.

Enter the data set name and allocation parameters for the output data set (to contain the exported data). If the data set does not exist, it will be allocated. If the data set already exists, it must be a sequential data set with 80-byte fixed length records.

Required Information:
  Data set name ===> '&USERID.&PROFILE.&SYSDATE.&SYSTIME.EXP'
  Tracks Primary ===> 45
  Secondary ===> 30

  Volume Serial ===> or Storage Class ===> 
  Unit ===> SYSALLDA Data Class ===> 
  Management Class ===> 

Scroll UP or DOWN for more options. Press ENTER to prepare dataset; press END to cancel.
```

3. Verify the exported data set name and allocation information at the bottom of the panel. Change it as needed according to your site conventions, and press Enter.

The monitor data set will be prepared for download and a confirmation panel opens.

```
CA MAT  ------------------ Monitor Data Set Export --------------------------
COMMAND ===> 

The Monitor Data set has been prepared for download and created in: 

   '&USERID.&PROFILE.&SYSDATE.&SYSTIME.EXP'

Download the above data set to your workstation as a binary file. Do not download the data set with the options of ASCII and CRLF. Once downloaded, the file can be attached and sent by e-mail to Customer Support. Large files can be compressed using WINZIP before Internet transmission.

Be sure to include the ticket number in the subject line of your e-mail.
```
Compile the Program

Compile the program with specific options, as shown in the following table. If you make changes to the program, you must recompile and reregister the program to maintain accuracy.

The compilation step that produces the input to the registration routine must be the same as the compilation step that produces the object code seen by the measurement routines. If the compilation steps are not the same, the statement numbers that are identified by the analysis routines could be incorrect.

<table>
<thead>
<tr>
<th>Compiler</th>
<th>Levels supported</th>
<th>Required options</th>
</tr>
</thead>
<tbody>
<tr>
<td>Assembler</td>
<td>VS, F, G, H</td>
<td>LIST, ESD, PRINT GEN</td>
</tr>
<tr>
<td>AD/Cycle</td>
<td>1.2 and later</td>
<td>LIST</td>
</tr>
<tr>
<td>COBOL</td>
<td>VS, ANSI versions 2, 3, 4</td>
<td>SOURCE, PMAP, VERB</td>
</tr>
<tr>
<td></td>
<td>VS COBOL II</td>
<td>SOURCE, LIST, NOOFFSET</td>
</tr>
<tr>
<td></td>
<td>COBOL for z/OS and VM</td>
<td>SOURCE, NOLIST, OFFSET, NONUMBER</td>
</tr>
<tr>
<td></td>
<td>CA OPT 5.3</td>
<td>SOURCE, NOCLIST, PMAP</td>
</tr>
<tr>
<td></td>
<td>CA OPTII 1.1</td>
<td></td>
</tr>
<tr>
<td>PL/1</td>
<td>Enterprise 3.2.0</td>
<td>OBJECT, LIST, NOSTMT, OPTIONS</td>
</tr>
<tr>
<td></td>
<td>Visual Age 2.3.0</td>
<td>SOURCE, LIST, STMT, MACRO</td>
</tr>
<tr>
<td></td>
<td>Enterprise V3 releases 5, 6, and 7</td>
<td>SOURCE, OBJECT, OFFSET</td>
</tr>
<tr>
<td></td>
<td>Note: LIST option required with V3.R5 to correctly</td>
<td></td>
</tr>
<tr>
<td></td>
<td>register internal procedure offsets to correct</td>
<td></td>
</tr>
<tr>
<td></td>
<td>statements.</td>
<td></td>
</tr>
<tr>
<td>Fortran</td>
<td>2.2.0 and later</td>
<td>XREF, LIST, MAP</td>
</tr>
</tbody>
</table>
List Managers

CA Mainframe Application Tuner supports listings stored in
- IBM PDS and PDS/Es
- DDIO by Compuware
- Computer Associates Librarian
- Panvalet files
- Serena ChangeMan
- CA Endevor
- CA Ideal
- PROTSYM files

If your listings are stored in DDIO format, you must use the DDIO Enhanced Listing format for registration and list the program with the following DDIO options:
- COBOL (OUTPUT(PRINT))
- COBOL (OUTPUT (NODDIO))
- PROCESSOR (OUTPUT(DDIO))
- PROCESSOR (TEXT(ALL))
- DDIO (OU(NOLI, NOPM, NOOF, NOCL, NOXR, NODM, FIND, CO))

If you recompile a program, you must reregister it with CA Mainframe Application Tuner to maintain accurate statement information.

Register IBM C/C++ Listings with Language Environment Support

IBM C/C++ support is implemented in a similar manner to the other compilers. One notable exception is the need to enter the name of the load module that reflects the IBM C/C++ listing. Unlike non-Language Environment compiler support where a listing is related to a CSECT, Language Environment (LE) support relates a listing to a load module, not a CSECT. Depending on your site's data set naming standards, the load module name might not match the listing member name. During registration, a small pop-up panel appears, asking you to specify the load module name.

When you register a listing from the Histogram panel, the pop-up panel does not appear because CA Mainframe Application Tuner automatically assigns the load module name from the Histogram report to the listing for you.
When analyzing an IBM C/C++ program with LE, CA Mainframe Application Tuner automatically detects that the listing is registered to the load module, instead of the CSECT, and makes the proper adjustments to the analysis reports. During analysis, no intervention is required on your part.

Register the Listing

1. Select one of the following menu options:
   - Option 3 from the Primary Option Menu
   - Option 5 from the Administration Option Menu (for global registrations)
   - Option 3 from the Global Monitoring Menu (for global registrations)

   The Program Listing Registration panel displays.

   CA MAT  ----------------- Program Listing Registration -----------------------

   OPTION ===> I
   
   A  ASM       - Assembler listings
   C  COBOL     - ANS and COBOL II listings
   P  PL/I      - IBM optimizing PL/I listings
   F  Fortran   - VS Fortran listings
   N  Natural   - Software AG Natural listings
   C1 IBM C/C++ - IBM C/C++ with Language Environment
   C2 SAS C/C++ - SAS C/C++ listings
   C3 AD/Cycle  - AD/Cycle C listings
   I  IDEAL     - IDEAL listings

   Listing manager ===> IDEAL    (PDs, DDio, ENdevor, PRotsym, PAnvalet,
                                 Librarian, CHangeman, or IDEal)

   Enter an option or press END to exit
Register the Module

The output listing from the final link-edit of the load module needs to be registered in order to successfully register CSECT listings. The MAP option must be used to obtain a map of generated CSECT names.

Generated CSECT names are linked to the actual CSECT listing based on the CSECT length. If more than one CSECT has the same length, the incorrect CSECT listing might be used.

1. Select the **Registration** option.
2. Select option **C1 - IBM/C** from the Program Listing Registration menu.
   The Registered Listings: IBM/C panel displays.
3. Issue the **MOD**ule primary command.
   The Registered Listings: Modules panel displays.
4. Issue the **ADD** primary command.
5. Specify the data set information for the Link-edit output listing.
6. If the module listing is in a PDS, a list of members displays from which you can select the correct member.
7. Press **Enter** to register the listing.
8. A message indicates whether the module has been registered successfully and you can return to the Registered Listings: IBM/C panel to register the CSECT listings that are included in the registered module normally. There are a few considerations:
   - If a CSECT cannot be found in the load module listing, the Completion field indicates this situation, and the CSECT is not registered. Verify that the correct CSECT or Module listings are being used.
   - If a data set contains multiple CSECT listings, or if multiple listing members are processed (using the 'REGister All' command), each listing is registered by using the same module.
   - A new command has been added to the 'Member List' panel. Use the **REG**ister all command to register all members that are displayed on the panel.
   - For Language Environment C++ listings, all CSECTs will be registered by using the same module. You will only need to specify the module name.
9. To select the language of the program that you want to register, type the code in the Option field.
10. To select the listing manager that you want to register, type the first two letters of the manager. The listing manager indicates where the listings reside.
   - **PDs** - Listings are stored in PDSs or PDSEs.
- **DDio** - Program listings are stored in the Compuware Common Services DDIO file. You must know the name of the listing and the DDIO file in which it resides before you can register the program.

- Only COBOL listings can be registered from DDIO files.

- **Endeovor** - Program listings are stored and managed by CA Endeovor. You must know which member and library the program listing is in before it can be registered.

- **Panvalet** - Program listings are stored and managed by CA Panvalet. You must know which member and library the program listing is in before it can be registered.

- **ProtSym** - Program listings are stored and managed by ProtSym. You must know which member and library the program listing is in before it can be registered.

- **Librarian** - Program listings are stored and managed by CA Librarian. You must know which member and library the program listing is in before it can be registered.

- **Changeman** - Program Listings are stored and managed by Serena Changeman. You must know the Changeman Link Library where the SERCOPY program is located (default: 'serena.CHGMAN.LINKLIB', where serena is the high-level qualifier), the listing data sets, and member name where the program listings are stored.

Depending on the language you select and the listing manager, a panel showing all COBOL, Assembler, PL/1, Fortran, IBM C/C++, NATURAL, or SAS C programs that are currently registered with CA Mainframe Application Tuner displays. From this panel, you can either add new listings or delete old listings. If you add a listing that already exists, the new listing replaces the existing listing.

11. Press Enter to register the listings. A message indicates when the registration is complete.
Example: Registering COBOL listings

1. Select Option C and any one of the listing managers.
2. Press Enter.

The Registered Listings: COBOL panel displays.

```
CA MAT -------- Registered Listings: COBOL  ------------- ROW 0 to 0 of 0
COMMAND ===>                                                  SCROLL ===> CSR
Primary commands: ADD, REBuild, ADDHelp
Line commands: B - Browse  R - Register  D – Delete
LC CSECT    Type   Dataset name

>------------------------------------------------------------------------------
********************************* END OF TABLE ********************************
```

The commands available for the Registered Listings panel are described next.

**ADD**

Registers a new listing.

CA Mainframe Application Tuner prompts for the data set in which the listing resides.

**REBuild**

Registers all listings that are displayed in the Administration panel.

This command is helpful when working with a larger application.

**ADDHelp**

Invokes the content-sensitive Help application to update or create a Help entry for the selected content.

**Browse**

Displays the registered listing.

**Register**

Reregisters the listing.

Use this option if you modify a program after registering it with CA Mainframe Application Tuner.

**Delete**

Deletes the listing registration table for the selected program.

The fields on the Registered Listings panel are described next.
CSECT

Displays the CSECT name of the program that you have registered.
The name is extracted from the listing and might not be the member name of
the listing data set.

Type

Displays the compiler type that created the listing.

data set name

Displays the data set name where the program listing resides.

VOLSER

Displays the Volume serial number of the listing data set.
The serial number displays only for uncataloged data sets.

CompDate

Displays the date that the listing was compiled.
This date is extracted from the listing.

CompTime

Displays the time that the listing was compiled.
This date is extracted from the listing.

Listing Manager

Listing manager in which the program listing resides.

3. On the COMMAND line, type ADD.

4. Press Enter.
The COBOL Map Resolution panel displays.
Each listing manager has its own map resolution panel.
5. **PDS only**: if you select the PDS listing manager, type the name of the data set containing the listings and press Enter.

The Member List panel for PDS displays.

![Member List Panel]

6. Type S next to the source module names that you want to register with CA Mainframe Application Tuner and press Enter.

A message indicates when the listing has been registered. It might take several seconds for the source member to complete registration.

The fields in the Member List panel are described next.

**Name**

Displays the name of the member in the listing data set.

This name is specified during the execution of the compiler on the SYSPRINT DD statement.

**Completion**

Displays the status of the listing registration.

The text can be one of the following statements

- Successfully registered
- Not a program listing
- No offset map found

**VV**

Displays the version level for the member when changed with ISPF EDIT.

If the member was not changed by using ISPF EDIT, this field is blank.
MM
Displays the modification level for the member when changed with ISPF EDIT.
If the member was not changed by using ISPF EDIT, this field is blank.

Created
Displays the time this member was created by using ISPF EDIT.
If the member was not created by using ISPF, this field is blank.

Change Date
Displays the date the member was last modified or created by using ISPF EDIT.
If the member was not created or modified by using ISPF EDIT, this field is blank.

Change Time
Displays the time the member was last modified or created by using ISPF EDIT.
If the member was not created or modified by using ISPF EDIT, this field is blank.

User
Displays the TSO user ID of the user that created or last modified this member by using ISPF EDIT.
If the member was not created or modified by using ISPF EDIT, the field is blank.

Size
Displays the number of lines that the member currently contains.
If the member was not changed by using ISPF EDIT, this field is blank.

Init
Displays the initial size of the member when it was created by using ISPF EDIT.
If the member was not created by using ISPF EDIT, this field is blank.

Mod
Displays the number of lines that are marked as modified when using ISPF EDIT.
If the member was not changed by using ISPF EDIT, this field is blank.
7. DDIO, ProtSym, Panvalet, Librarian, CA Endevor, or ChangeMan: If you select Option C and the DDIO, ProtSym, Panvalet, Endevor, Librarian or ChangeMan listing manager, a COBOL Map Resolution panel similar to the example shown following displays.

```
CA MAT ------------------- COBOL Map Resolution      ---------------
COMMAND ==>

Specify DDIO listing data set and member below:
Listing data set choice ==>(1 through 8)
Member name ==>

Listing data sets 1 ==>
2 ==>
3 ==>
4 ==>
5 ==>
6 ==>
7 ==>
8 ==>

Press ENTER to register listing
Enter END to cancel
```

8. Specify the data set that contains the program listing and press Enter.

It might take several seconds for the source member to complete registration.

Register Natural Programs

In order to register a Natural program, you must first extract the listing into either a sequential data set or a member of a partitioned data set (PDS). (See instructions to Extract the Listing following.)

Once that step is completed, you can register the program by using the TSO client. (See instructions to Register the Program.)
Extract the Listing

An example of the JCL that can be used to extract the listing to a sequential data set is shown following.

```plaintext
//xxxxxxxx JOB (job card info)
//NATBAT  EXEC PGM=NATvrmBA,
//         PARM=(Natural parameters)
//* STEPLIB   DD DISP=SHR,DSN=SAGLIB.NATvrm.LOAD
//DDPRINT DD SYSOUT=*  
//DDRUCK   DD SYSOUT=* 
//CMPRINT   DD DISP=(,CATLG,DELETE),
//           DSN=yourhlq.NATURAL.LISTING, 
//           UNIT=SYSDA,SPACE=(TRK,(15,15),RLSE)
//CMPT01   DD SYSOUT=* 
//CMSYNIN   DD *
LOGON <Natural-Library-Name>
LIST PROGRAM <Natural-Program-Name>
```

In order to use this JCL, you must change it as follows:

1. A valid job card must be supplied.
2. The correct name of the Natural batch program must be provided on the EXEC PGM= statement.
   Refer to the person who installed Natural at your company for more information. The JCL shows the default naming convention used in the Software AG installation materials.
3. Any Natural parameters that your installation requires must be provided on the PARM= statement.
   Refer to the person who installed Natural at your company for more information. CA Mainframe Application Tuner requires no special Natural parameters.
4. If the Natural load library is not part of the system linklist concatenation, then the STEPLIB DD statement must be uncommented and the name of the Natural load library must be specified.
   Refer to your system programmer or Natural installer for more information. The JCL shows the default naming convention used in the Software AG installation materials.
5. A valid high-level qualifier must be provided for the data set named on the CMPRINT DD statement.
   This is the data set that will be used in the registration process.
   A sequential data set is shown in the JCL; however, a PDS can be used if desired. Simply make the appropriate changes to the JCL.
6. On the Natural LOGON statement, in place of the term `<Natural-Library-Name>`, substitute the actual name of the Natural library that contains the program to be registered.

7. On the Natural LIST PROGRAM statement, in place of the term `<Natural-Program-Name>`, substitute the actual name of the Natural program to be registered.

After these changes have been made, execute the job.

The job should finish with condition code zero, and it should produce a data set that contains a listing of the program to be registered.

In addition to the program listing, this data set will contain certain messages from Natural. This situation is normal and completely expected.

**Register the Program**

Once the job has finished successfully, you can register the program by using the TSO client, as follows:

1. Select one of the following menu options:
   - Option 3 from the Primary Option Menu
   - Option 5 from the Administration Option Menu (for global registrations)
   - Option 3 from the Global Monitoring Menu (for global registrations)

   The Program Listing Registration panel displays.

   ![Program Listing Registration Panel]

2. Specify PDS for the Listing Manager.
   
   When PDS is specified, the input data set can be either a partitioned or a sequential data set.
3. Select option N for Natural.

The Registered Listings: Natural pane displays.

```
CA MAT ----- Registered Listings: Natural ----- Row 1 to 1 of 1
COMMAND ===>                                 SCROLL ===> CSR
Primary commands: ADD, REBuild, DELe te, ADDHe lp
Line commands: B - Browse  R - Register  D - Delete
LC Csect    Dataset name                                   Type
________ ______________________________________________ ______
>-----------------------------------------------------------------
__ AQMTEST USRJEQ1.NAT.LST(AQMTEST)                       NAT
*************************** End of Table *************************
```

4. Issue the ADD primary command.

The NATURAL Map Resolution panel displays.

```
CA MAT ------------ NATURAL Map Resolution    -------------------
COMMAND ===>
Specify listing dataset below:
Project ===>
Group   ===>          ===>          ===>          ===>
Type    ===>
Member  ===>
Other partitioned or sequential dataset:
Dataset name  ===>
Volume serial ===>        (If not cataloged)
Press ENTER to select members
Enter END to cancel
```

5. Under the section Other partitioned or sequential dataset:, next to Dataset name ===>, enter the same data set name that you used on the CMPRINT DD statement in the batch job used earlier.

If the listing data set is a PDS, you can specify the member name in parenthesis, or you can omit it to obtain a list from which you can select the correct member.

If the data set name does not begin with the high-level qualifier that matches the user ID or TSO prefix of the TSO user who is logged on, then you must enclose the data set name in single quotes ("').

6. Press Enter to register the listing.

A message indicates whether the listing has been registered successfully.

7. Press PF3 to return to the Registered Listings: Natural panel.

You should see the Natural program name appearing in the Csect column, the name of the listing data set in the Dataset Name column, and NAT in the Type column.
Register CA Ideal Programs

The CA Ideal utility calculates offsets during measurement, since statement numbers are not readily available.

There are two ways to register CA Ideal program listings. One is a manual process, and the other happens automatically when a histogram displays.

Manual Process

Navigate to the registration panel within CA Mainframe Application Tuner in several ways. Registration stores the registered listing in the User Information file (UIF) when called from the Primary Option Menu, Administration Option Menu, and during analysis with the REGister primary command. When called from the Global Monitoring Menu, listings are stored in the Global Information file (GIF).
To register program listings manually

1. Access the Program Listing Registration panel in one of the following ways by:
   - Choosing option 3 from the Primary Option Menu and pressing Enter.
   - Choosing option 3 from the Global Monitoring Menu and pressing Enter.
   - Choosing option 3 from the Administration Option Menu and pressing Enter.
   - Choosing the REGister primary command during analysis from any of the following panels: CodeView, CallerID, and Histogram and pressing Enter.

   The Program Listing Registration panel opens:

   | CA MAT  ----------------- Program Listing Registration -----------------  |
   | OPTION  ===> I              |  |
   | A  ASM       - Assembler listings |
   | C  COBOL     - ANS and COBOL II listings |
   | P  PL/I      - IBM optimizing PL/I listings |
   | F  Fortran   - VS Fortran listings |
   | N  Natural   - Software AG Natural listings |
   | C1 IBM C/C++ - IBM C/C++ with Language Environment |
   | C2 SAS C/C++ - SAS C/C++ listings |
   | C3 AD/Cycle - AD/Cycle C listings |
   | I  IDEAL     - IDEAL listings |
   |                        Listing manager ===> IDEAL |
   |                        (PDs, DDio, ENdevor, PAAnvalet, LIbrarian, CHangeman or IDEal) |

   Enter an option or press END to exit

2. In the Program Listing Registration panel that opened, select option I, set the Listing manager field to IDEAL, and press Enter.

   **Note:** Using incorrect combinations of Option and Listing manager causes the Unsupported List Manager message to appear. Pressing PF1 provides a more detailed error message.
The Registered Listings: IDEAL panel opens:

```
CA MAT --------- Registered Listings: IDEAL      ------------- Row 0 to 0 of
COMMAND ====>                                                  SCROLL ====> CSR
Primary commands: ADD, REBuild, DELETE
          Line commands: B - Browse  R - Register  D - Delete
Obj Src Sys
LC Program  Ver  Ver ID  Object Data Set Name
>-------------------------------------------------------------
--------------------------------------------------------------
End of Table -----------------------------------------------------
```

**Note:** An empty table indicates that no listings have been registered.

3. Choose the ADD primary command and press Enter to register a listing.

The CA Ideal Map Resolution panel opens.

```
CA MAT --------------------- CA Ideal Map Resolution -------------------------
COMMAND ===>
Specify CA Ideal program information below:
          Program name ===>
          Object version ===>
          Source version ===>
          System ID ===>
          Object Data Set Name ===>
          Source Data Set Name ===>
Press ENTER to register program
Enter END to cancel
```

**Note:** To register a CA Ideal program manually, gather all of the requested information. Press PF1 on the CA Ideal Map Resolution panel to display a help pop-up panel that explains the requested information.

4. Press Enter.

The program source is obtained from the CA Ideal subsystem. If the process takes more than a few seconds, the REGISTERING message appears. Once the registration is complete, you see the CA Ideal Map Resolution panel with the information retained. You can use the retained information to register another program.
5. Press PF3 once all programs have been registered.

You return to the Registered Listings: IDEAL panel, where you can see the registered listings.

```
CA MAT ----------- Registered Listings: IDEAL     ------------- Row 1 to 1 of 
COMMAND ===>                                                  SCROLL ===> CSR
Primary commands: ADD, REBuild, DELEte
    Line commands: B - Browse  R - Register  D - Delete
    LC Program  Ver  Ver ID  Object Data Set Name
>---------------------------------------------------------------------
  _ CUSTLIST PRD 003 $ID 'APM.IDEL.R11.ID$IDOBJ'
*---------------------------------------------------------------------
```

Scrolling to the right shows the remaining column of the Registered Listings: IDEAL panel.

```
CA MAT ----------- Registered Listings: IDEAL     ------------- Row 1 to 1 of 
COMMAND ===>                                                  SCROLL ===> CSR
Primary commands: ADD, REBuild, DELEte
    Line commands: B - Browse  R - Register  D - Delete
    LC Source Data Set Name
<---------------------------------------------------------------------
  _ 'APM.IDEL.R11.ID$IDSRC'
*---------------------------------------------------------------------
```

**Note:** The REBuild command works only if there are listings registered. The command causes looping through the entries on the panel and the reregistration of each program.

**Note:** The DELEte command works only if there are listings registered. The command causes looping through the entries on the panel and the deletion of each program.

**Note:** Place the cursor on any field of the CA Ideal Map Resolution panel and press F1 to display help panels that describe the individual fields.
Automated Process

You can register CA Ideal program listings manually or automatically. This topic describes the automated way.

To register program listings automatically

1. Access the CodeView panel in 4GL mode.

The CodeView panel opens:

```
CA MAT -------------------------- CodeView ----------------- Row 1 to 1 of 1
COMMAND ==> SCROLL ==> CSR
Primary commands: MOde Pseudo/Module/Csect/4GL,
PSEudo, REGister, ADDHelp                  Profile: IDLBATCH
Options: NORMAL
Mode: 4GL
Line commands: A - Associate
               I - Info
               H - Histogram   NH - Normalized Histogram
Extended Callerid: CC - Current  CA - Application  CV - Via
                   Obj Pgm Src Pgm
LC Language System Program  Version Version Actv% Wait% Totl% Visual
>------------------------------------------------------------------------------
__ IDEAL    $ID    CUSTLIST PRD     003      1.57  8.07  9.63 =========>
********************************* End of Table ********************************
```
2. Type H (Histogram) or NH (Normalized Histogram) on the command line.

If the program listing is not available, CA Mainframe Application Tuner will automatically register the listing using information found in the monitor data set. The Registering message pop-up appears, followed by the Histogram:

```
<table>
<thead>
<tr>
<th>Stmt</th>
<th>Actv%</th>
<th>Wait%</th>
<th>Totl%</th>
<th>Visual</th>
<th>Source line</th>
</tr>
</thead>
<tbody>
<tr>
<td>201</td>
<td>0.00</td>
<td>0.05</td>
<td>0.05</td>
<td></td>
<td>SET LINE-NUM = 99</td>
</tr>
<tr>
<td>218</td>
<td>2.02</td>
<td>19.79</td>
<td>21.82</td>
<td></td>
<td>MOVE CUSTOMERS TO DTL BY NAME</td>
</tr>
<tr>
<td>221</td>
<td>2.32</td>
<td>22.54</td>
<td>24.86</td>
<td></td>
<td>FOR FIRST SALESMAN-DW</td>
</tr>
<tr>
<td>223</td>
<td>0.15</td>
<td>0.47</td>
<td>0.62</td>
<td></td>
<td>MOVE SALESMAN-DW.NAME TO DTL.SA</td>
</tr>
<tr>
<td>606</td>
<td>0.05</td>
<td>0.07</td>
<td>0.12</td>
<td></td>
<td>SET TOT.SALES = $EDIT(TOT-SALES,</td>
</tr>
<tr>
<td>607</td>
<td>2.80</td>
<td>22.81</td>
<td>25.61</td>
<td></td>
<td>MOVE TOT TO PRT-LINE</td>
</tr>
<tr>
<td>704</td>
<td>0.02</td>
<td>0.07</td>
<td>0.10</td>
<td></td>
<td>SET HDR1-PAGE = $EDIT(PAGE-NUM)</td>
</tr>
<tr>
<td>708</td>
<td>2.17</td>
<td>21.06</td>
<td>23.24</td>
<td></td>
<td>IF $SUBSTR(HDR1-PAGE,START=1,LEN</td>
</tr>
<tr>
<td>720</td>
<td>0.02</td>
<td>0.32</td>
<td>0.35</td>
<td></td>
<td>MOVE HDR1 TO PRT-LINE</td>
</tr>
</tbody>
</table>
```

**Use Interactive Analysis with Registered Programs**

After you have registered a program, you can view a CSECT’s source code directly by using the Listing line command (L) on the Delay Locations, Histogram, and CodeView interactive analysis panels. CA Mainframe Application Tuner also provides statement references in the Stmt field on the Delay Locations and Histogram panels. Refer to Chapter 5, "Analyzing monitor data" for more information. Several examples follow.
The following panel shows the statement information on the Delay Locations panel, which displays when you issue the Address line command (A) for a specific delay category on the DelayView panel.

The Stmt field is an 8-digit number for the registered listing. Most panels display only the low order 6 digits. For Enterprise PL/I listings, the statement number (Stmt field) consists of a file number in the 3 high order digits and a line number in the low order 5 digits.

The following panel shows the CodeView panel. Issue the Listing line command (L) to display the source code listing.
Register Listings during Interactive Analysis

When measuring the performance of programs in online subsystems consisting of many different load modules with each module possibly containing several CSECTs, you seldom need to register every CSECT. If you find that you need CSECT information on a specific module, you can register the module by using the following Interactive Analysis panels:

- Delay Locations
- CodeView
- Histogram
- Callerid

Compare Dates, Sizes and Compiler Types

CA Mainframe Application Tuner compares the dates, CSECT sizes, and compiler types of registered listings to the monitored program when the Histogram line command is entered from the CodeView panel.

Registered listing dates are stored in the following format: yyyy/mm/dd.

If a mismatch is detected, a warning message, such as the one below, is issued:

Dates do not match

Press PF1 to get additional information; for example:

Dates do not match - The date of the running program, 2007/06/12, and the registered listing, 2007/06/07, do not match. This might cause misleading or inaccurate information to be displayed.

CA Mainframe Application Tuner does not attempt to validate CSECT sizes for COBOL VS, CA OPTIMIZER 5, CA OPTIMIZER/II, or Enterprise PL/1 compiled with the NOLIST option.
Chapter 7: Open Application Program Interface

This section contains the following topics:

What is the Open Application Program Interface? (see page 245)
TUNCALL Verbs and Keywords (see page 248)

What is the Open Application Program Interface?

In addition to defining and invoking monitor sessions online with the TSO Client, you can start a session by using the Open Application Program Interface (Open API). This feature allows you to monitor an application when conditions are most critical, including:

- When a critical performance threshold is exceeded
- When a program is executed under specific conditions
- If you are using a console automation tool
- If you are using a program change control system

Invoke the TUNCALL Program

The TUNCALL program is used to define and start a monitoring session and you can invoke it different ways:

- As a TSO command (from either REXX or CLIST EXECs)
- As a batch job
- As a called program

TUNCALL

The TUNCALL program is a single load module with several aliases that resides in hilevel.CESPLD. You can copy TUNCALL into your Link Pack Area (LPA) for convenient access, but remember to also copy the alias definitions as well.
What is the Open Application Program Interface?

TUNCALL Functions

TUNCALL supports several types of requests:

- Invoking new monitors (measurement sessions)
- Obtaining the status of a pending or active monitor session
- Canceling a pending or active monitor

What Global Monitors Are

When you use TUNCALL, all monitor-related actions are associated with global monitors. Just as each user has his or her own set of monitor definitions that are stored in the UIF (User Information File), monitors that are managed by TUNCALL are collected together in a GIF (Global Information File).

Because TUNCALL users might not be defined users with UIFs, TUNCALL-managed monitors are considered to be global and do not belong to any specific user. You can view the global monitors from the Primary Menu under Global Monitors.

Global Monitors are the exact same as local or user (level) monitors with two exceptions:

- Definitions are stored in the GIF (Global Information File), not in a UIF.
- All users have access to global monitor definitions (provided proper security access has been granted).

When using TUNCALL, remember to use the Global Monitor option from the Primary Menu to view the results of the monitor session.

TUNCALL Syntax

TUNCALL syntax is similar to z/OS utilities such as IDCAMS. The basic syntax for each TUNCALL statement is as follows:

```
serverid, verb keyword(operand1, operand2, operand3, ...) keyword(operand1, operand2, operand3, ...)
```

The TUNCALL syntax is described next.

`serverid`

Name of the server that is locally running on the same system where TUNCALL is executing.
verb

Type of request.

MONITOR is the only supported verb.

MONITOR: Specifies how to manage monitor requests

You must put a comma between the serverid keyword and the verb keyword. The serverid and the verb keywords are positional and the serverid must be the first word followed by the verb with a comma between the two.

Spaces are supported.

additional keywords

After the verb, enter the keywords with the associated operands.

Each keyword must be separated by at least one space and the operands must be enclosed in parentheses. You must separate multiple operands with a comma.

Any number of spaces can be included with the comma.

In addition, character strings can be specified by enclosing the string with either single ('') or double quotation marks (""); however, the quotation marks must be paired. The string does not need to be quoted if it contains only alphanumeric characters. In the latter case, the string is translated automatically to uppercase characters as well.

If you provide commands to TUNCALL with the TUNIN DD-statement, the commands can be continued to the next statement with a dash (-) as the last character on the line.

Blank lines are ignored, and comment lines can begin with an asterisk (*) or be embedded with paired slashes and asterisks (/*, */).

The following example is a valid monitor request:

```
//SMON JOB 1, 'TUNCALL IT', MSGCLASS=A, CLASS=A
/*
//TUNCALL EXEC PGM=TUNCALL
//STEPLIB DD DISP=SHR, DSN=CAMAT.V85.CEESPLD
/*
//TUNPRINT DD SYSOUT=*  
//TUNIN DD *
  * This is a comment line
  /* This is another comment */
CA MAT, -
MONITOR -
INVOC -
JOBNAME(PROD01) /* Another comment */
```
Wildcard Characters

Certain keywords permit wildcard characters. These characters areas follow:

- Asterisk (*) indicates the generic end or start of a string
  
  For example, if you select an item with ABC* all items starting with the character string ABC will match the wildcard character string. Specifying *ABC will match all items ending with ABC. Two other cases are also possible: *ABC* will match any string with the characters ABC anywhere in the string and A*C will match any string starting with A and ending with C.

- Pound (#) indicates a numeric/nonblank must reside in the position
  
  For example, ABC### will match ABC123 but not ABC12 or ABCA12.

- Question mark (?) indicates a nonblank must reside in the position
  
  This placeholder ensures a specific length. For example, ???? will match ABCD, as well as AB12, but will not match ABC. The content of the character position does not matter as long as it is a nonblank character.

TUNCALL Verbs and Keywords

The following sections describe keywords that can be used with the TUNCALL verb MONITOR.

MONITOR INVOKE

The INVOKE keyword specifies that a monitor request is queued to measure one or more jobs. The parameters indicate the jobs and how they will be measured.

When invoking a monitor you must specify a profile name, an address space ID, or a job name. If you specify a job name or an address space ID, a profile is created by using the address space name. If the profile already exists, it will be updated.

If you specify a profile name, the jobs to be measured are taken from that profile. Similar to invoking a monitor with the ISPF client, if no matching job is found, the monitor is queued and waits until the start of a matching job step is detected.

When invoking monitors other options help refine the job or jobs to be measured, the number of jobs to be measured, the job steps, and the duration of the measurement.
With CA Mainframe Application Tuner, the address spaces can be selected on one of five different keywords:

<table>
<thead>
<tr>
<th>Keyword</th>
<th>Definition</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>ASID</td>
<td>address space ID</td>
<td>When this option is used, the other four are ignored. ASID is a length of 4. for example, 0473,</td>
</tr>
<tr>
<td>JOBNAME</td>
<td>name of the address space</td>
<td>This field can contain wildcard characters. Max length is 8.</td>
</tr>
<tr>
<td>STEPNAME</td>
<td>step currently executing</td>
<td>This field can contain wildcard characters. Max length is 8.</td>
</tr>
<tr>
<td>PROCSTEP</td>
<td>if there are JCL procedures involved, the current procedure step</td>
<td>This field can contain wildcard characters. Max length is 8.</td>
</tr>
<tr>
<td>PROGRAM</td>
<td>name of the program at job step start</td>
<td>Normally this keyword is on the EXEC PGM=name JCL statement. Max length is 8.</td>
</tr>
</tbody>
</table>

Because some of these options can contain wildcard characters, it is possible that multiple jobs might match the criteria at the same time. If this situation occurs, CA Mainframe Application Tuner will select the job with the lowest address space ID (ASID). If JOBNAME, STEPNAME, PROCSTEP, or PROGRAM is blank, none of those steps are considered when locating a matching job to measure.

Schedules can also be associated with the monitor as well but the schedule is not stored with the monitor profile. It exists only for the life of the measurement request.

The following table shows the list of valid keywords for MONITOR INVOKE:

<table>
<thead>
<tr>
<th>Keyword</th>
<th>Default</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>PROFILE</td>
<td>none</td>
<td>name of the monitor profile to be used</td>
</tr>
<tr>
<td></td>
<td></td>
<td>if no monitor profile exists with this name, one will be created</td>
</tr>
<tr>
<td></td>
<td></td>
<td>field cannot contain wildcard characters</td>
</tr>
<tr>
<td></td>
<td></td>
<td>1-8 characters in length</td>
</tr>
<tr>
<td>JOBNAME</td>
<td>none</td>
<td>name of the address space to be measured</td>
</tr>
<tr>
<td></td>
<td></td>
<td>if the ASID keyword is used, this keyword is ignored</td>
</tr>
<tr>
<td></td>
<td></td>
<td>can contain wildcard characters</td>
</tr>
<tr>
<td></td>
<td></td>
<td>1-8 Characters in length</td>
</tr>
<tr>
<td>Verbs and Keywords</td>
<td>none</td>
<td></td>
</tr>
<tr>
<td>--------------------</td>
<td>------</td>
<td></td>
</tr>
<tr>
<td>STEPNAME</td>
<td>name of the job step to be measured</td>
<td></td>
</tr>
<tr>
<td></td>
<td>if the ASID keyword is used, this keyword is ignored</td>
<td></td>
</tr>
<tr>
<td></td>
<td>can contain wildcard characters</td>
<td></td>
</tr>
<tr>
<td></td>
<td>1-8 Characters in length</td>
<td></td>
</tr>
<tr>
<td>PROCSTEP</td>
<td>name of the procedure-step to be measured</td>
<td></td>
</tr>
<tr>
<td></td>
<td>if the ASID keyword is used, this keyword is ignored</td>
<td></td>
</tr>
<tr>
<td></td>
<td>can contain wildcard characters</td>
<td></td>
</tr>
<tr>
<td></td>
<td>1-8 Characters in length</td>
<td></td>
</tr>
<tr>
<td>PROGRAM</td>
<td>name of the program at step-initiation time to be measured</td>
<td></td>
</tr>
<tr>
<td></td>
<td>if the ASID keyword is used, this keyword is ignored</td>
<td></td>
</tr>
<tr>
<td></td>
<td>can contain wildcard characters</td>
<td></td>
</tr>
<tr>
<td></td>
<td>1-8 Characters in length</td>
<td></td>
</tr>
<tr>
<td>ASID</td>
<td>absolute ASID of the job to be measured</td>
<td></td>
</tr>
<tr>
<td></td>
<td>4 characters in length</td>
<td></td>
</tr>
<tr>
<td>FROMUSER</td>
<td>TSO User ID that will receive any messages issued on behalf of the monitor request</td>
<td></td>
</tr>
<tr>
<td></td>
<td>1-8 characters in length</td>
<td></td>
</tr>
<tr>
<td>ELAPSTIME</td>
<td>Monitor duration in seconds for which the observation process is active</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Normal duration is 60 seconds</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Specify the duration in seconds for which the observation process is active; the default value is 60 seconds. You can also specify minutes by appending an uppercase M to the numeral: 10M. Monitor duration must be a numeric value from 1 to 999997 (16,666 minutes).</td>
<td></td>
</tr>
<tr>
<td></td>
<td>This value is used to set the observation rate based on the number of observations requested.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Specify NA to request that the monitor collect a number of samples equal to the number of Observations Requested regardless of how many observations or how much time it takes to collect that number of samples.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>The value NA will not be honored if CA MAT detects we are monitoring a Websphere servant and the Websphere Application Server Criteria Expert Mode option is set to N.</td>
<td></td>
</tr>
<tr>
<td>Verb/Keyword</td>
<td>Operands</td>
<td>Description</td>
</tr>
<tr>
<td>-------------</td>
<td>----------</td>
<td>-------------</td>
</tr>
</tbody>
</table>
| SAMPLECNT  | 6000     | number of observations requested  
|             |          | use this keyword with ELAPSTIME to set an initial observation rate  
|             |          | defaults will cause CA Mainframe Application Tuner to observe the address space every 10 minutes  
|             |          | range is 10-999999  
|             |          | **Note:** SAMPLECNT is being retained as a parameter for compatibility with other products. |
| DUMP        | no operands | does not require any operands  
|             |          | directs CA Mainframe Application Tuner to take an SVC dump when the measurement session ends  
|             |          | for diagnostic purposes only |
| RECCNT      | 1        | number of job steps to measure  
|             |          | you can start multiple measurement sessions with a single command by specifying RECCNT greater than 1, and by using wildcard characters on one of the job selection fields  
|             |          | range is 1-9999 |
| SUCCNT      | 1        | number of times the same job step is successively measured  
|             |          | when a measurement session ends, another starts immediately if the same job step is executing and the SUCCNT count has not been reached  
|             |          | range is 1-9999 |
| DESCRIPTION | none     | 24-character description that can be associated with the monitor profile  
|             |          | if the profile already exists, this field updates its contents |
| SCHEDULE    | none     | name of the schedule  
|             |          | 1- to 8-character field  
|             |          | for TUNCALL requests, this keyword is for documentation purposes only, and indicates the scheduling fields are to be used and validated  
|             |          | if the scheduling fields are nonblank and SCHEDULE is blank, the scheduling fields are ignored |
| MSTEP       | NO       | indicates that four job selection keywords (JOBNAME, STEPNAME, PROCSTEP, and PROGRAM) are to be used to select all steps within the job to be measured  
|             |          | specify YES to monitor all steps in the job that match any Step/Procstep/Program criteria specified |
| SMON        | NO       | entire job step is to be measured  
<p>|             |          | if YES, ELAPSTIME is used as an estimate of the job step execution time to set the initialing observation rate only |</p>
<table>
<thead>
<tr>
<th><strong>TUNCALL Verbs and Keywords</strong></th>
</tr>
</thead>
</table>
| **SAMPDELAY** | 0 | number of seconds CA MAT delays measuring the job after the job step starts  
- this feature helps bypass measuring one-time events like housekeeping routes  
- range is 0-999  
| **INCTASK1-4** | none | 1 to 4 different tasks are measured within the job step  
- tasks are identified by the program name provided as part of the ATTACH macro  
- fields can contain wildcard characters  
- 1 to 8 characters in length  
| **EXCTASK1-4** | none | 1 to 4 different task names are excluded from sampling  
- tasks are identified by the program name provided as part of the ATTACH macro  
- this feature helps eliminate unwanted wait-time or active time that is not pertinent to the measurement  
- fields can contain wildcard characters  
- 1 to 8 characters in length  
| **TRAN1-4** | none | specific CICS or IMS transactions measured  
- if the transaction is not running, no sample is taken  
- fields can contain wildcard characters  
- 1 to 8 characters in length  
| **TERM1-4** | none | specific CICS or IMS terminal measured  
- if there is no activity on the specified terminal, no sample is taken  
- fields can contain wildcard characters  
- 1 to 8 characters in length  
| **USERID1-4** | none | specific CICS or IMS user IDs measured  
- if the listed user IDs have no activity, no sample is taken  
- 1 to 8 characters in length  
| **TASKLIB** | none | DD statement in the measured address space from where programs are loaded  
- the libraries included in this DD statement are used to assist in CSECT-level resolution of program activity and wait time  
- 1 to 8 characters in length  

| **MONDSN** | user default | - name of the monitor data set or a monitor data set name pattern used to create a new monitor data set when the measurement starts  
- certain data set name node variables can be used to keep the name dynamic, such as &SYSTEM, &SYSDATE, or &SYSTIME  
- see Monitor Data Set Name in the *Installation Guide* for additional information |
| **USEREXIT1-2** | none | - name of a user exit that CA MAT calls during the measurement session  
- this exit is loaded into common storage and is called for each matching TCB in the address space for each observation made of the target job |
| **JOBCARD1-4** | none | - if BATCHREPORTS is also indicated, these are the job cards used when CA MAT submits the batch jobs to generate the batch reports at the end of a measurement session  
- 1 to 8 characters in length |
| **MONDSTRKS** | 20 tracks | - number of tracks CA MAT allocates as the monitor data set's primary space allocation |
| **MONDSSEC** | 20 tracks | - number of tracks CA MAT allocates as the monitor data set's secondary space allocation |
| **MONDSGEN** | SYSDA | - device generic name where the data set is allocated |
| **MONDSVOL** | none | - optional volume-serial name where the data set resides |
| **MONDCLAS** | none | - name of an SMS Data construct for the monitor data set |
| **MONMCLAS** | none | - name of an SMS Management construct for the monitor data set |
| **MONSCLAS** | none | - name of an SMS Storage construct for the monitor data set |
| **TARGSYS1-4** | none | - 1 to 4 names of matching sysplex images where the monitor request is sent  
- these fields can contain wildcard characters  
- if blank, the request is sent only to the local system |
| **BATCH REPORTS** | none | - sets CA MAT to submit a batch job to generate batch reports at the end of a measurement session |
| **REPDSN** | none | - specify a data set name to receive the generated batch report  
- leave this field blank to write the report to SYSOUT  
- specify.MONDSN to use the data set name of the monitor file  
- a .BAT node will be appended to the monitor file name to create the file name  
- some truncation may occur if the resulting name is longer than 44 characters  
- if the data set is not found, it will be created |
### REPSTRKS
- **20 tracks**
- number of tracks CA MAT allocates as the report data set's secondary space allocation

### REPUNIT SYSDA
- none
- device generic name where the report data set is to be allocated

### REPVOL
- none
- optional volume-serial name where the report data set resides

### REPDATA
- none
- name of an SMS Data construct for the report data set

### REPMGMT
- none
- name of an SMS Management construct for the report data set

### REPSTOR
- none
- name of an SMS Storage construct name for the report data set

#### Scheduling Fields

<table>
<thead>
<tr>
<th>Field</th>
<th>Value</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>STARTDATE</td>
<td>none</td>
<td>starting date for the schedule</td>
</tr>
<tr>
<td></td>
<td></td>
<td>must be in CCYY/MM/DD format</td>
</tr>
<tr>
<td>ENDDATE</td>
<td>none</td>
<td>ending date of the schedule</td>
</tr>
<tr>
<td></td>
<td></td>
<td>must be in the format of CCYY/MM/DD</td>
</tr>
<tr>
<td></td>
<td></td>
<td>mutually exclusive with DAYS</td>
</tr>
<tr>
<td>DAYS</td>
<td>1</td>
<td>number of days the schedule is active</td>
</tr>
<tr>
<td></td>
<td></td>
<td>if the monitor session is still waiting at the end of the schedule, it is</td>
</tr>
<tr>
<td></td>
<td></td>
<td>automatically terminated</td>
</tr>
<tr>
<td></td>
<td></td>
<td>range 1-999</td>
</tr>
<tr>
<td>WEEKDAYS</td>
<td>no operands permitted</td>
<td>schedule checks only for days that are part of weekdays</td>
</tr>
<tr>
<td></td>
<td></td>
<td>mutually exclusive with SPECIFICDAYS</td>
</tr>
<tr>
<td>WEEKENDS</td>
<td>no operands permitted</td>
<td>schedule checks only for days that are part of weekends</td>
</tr>
<tr>
<td></td>
<td></td>
<td>mutually exclusive with SPECIFICDAYS</td>
</tr>
<tr>
<td>SPECIFICDAYS</td>
<td>no operands permitted</td>
<td>schedule is to be active only on specific dates</td>
</tr>
<tr>
<td></td>
<td></td>
<td>one of the following days must be specified if SPECIFICDAYS is used: MONDAY,</td>
</tr>
<tr>
<td></td>
<td></td>
<td>TUESDAY, WEDNESDAY, THURSDAY, FRIDAY, SATURDAY, or SUNDAY</td>
</tr>
<tr>
<td>MONDAY,</td>
<td>no operands permitted</td>
<td>specific days of the week where the request is active (looking for a</td>
</tr>
<tr>
<td>TUESDAY,</td>
<td></td>
<td>matching job)</td>
</tr>
<tr>
<td>WEDNESDAY,</td>
<td></td>
<td>if one or more of these are listed, SPECIFICDAYS must also have been</td>
</tr>
<tr>
<td>THURSDAY,</td>
<td></td>
<td>specified</td>
</tr>
<tr>
<td>FRIDAY,</td>
<td></td>
<td></td>
</tr>
<tr>
<td>SATURDAY,</td>
<td></td>
<td></td>
</tr>
<tr>
<td>SUNDAY</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>STARTTIME1-4 and ENDTIME1-4</strong></td>
<td><strong>0000 - 2359</strong></td>
<td>■ up to 4 different panels within a day where the schedule panel is open for matching jobs</td>
</tr>
<tr>
<td>-------------------------------</td>
<td>----------------</td>
<td>---------------------------------------------------------------------------------</td>
</tr>
<tr>
<td><strong>GROUP</strong></td>
<td>none</td>
<td>■ 1-8 character name assigned to the profile group</td>
</tr>
<tr>
<td><strong>TRIGGER</strong></td>
<td>NO</td>
<td>■ YES indicates that the profile is a trigger for the group</td>
</tr>
<tr>
<td></td>
<td></td>
<td>■ Y means that monitor sessions is started for all profiles in the group when the trigger profile is started</td>
</tr>
</tbody>
</table>

**WebSphere Monitoring Criteria**

| **WAEXPRT** | **N** | ■ WebSphere Expert Mode  
| specify Y to collect normal PSW sample data when a WebSphere application is monitored  
| specify N to disable PSW sampling (CA MAT will only collect WebSphere samples) |
| **URLFILT1** | none | ■ transaction URL filter pattern 1  
| specify filters for the application-level transaction URL names that you want to monitor (up to 72 bytes)  
| use * as a wildcard  
| you can specify several filters and separate each pattern with a comma  
| each URL filter field (1 through 4) will be concatenated together  
| any transaction not matching a filter pattern will not be monitored |
| **URLFILT2** | none | ■ transaction URL filter pattern 2  
| specify filters for the application-level transaction URL names that you want to monitor (up to 72 bytes)  
| use * as a wildcard  
| you can specify several filters and separate each pattern with a comma  
| each URL filter field (1 through 4) will be concatenated together  
| any transaction not matching a filter pattern will not be monitored |
| **URLFILT3** | none | ■ transaction URL filter pattern 3  
| specify filters for the application-level transaction URL names that you want to monitor (up to 72 bytes)  
| use * as a wildcard  
| you can specify several filters and separate each pattern with a comma  
| each URL filter field (1 through 4) will be concatenated together  
| any transaction not matching a filter pattern will not be monitored |
### URLFILT4

| none | - transaction URL filter pattern 4  
- specify filters for the application-level transaction URL names that you want to monitor (up to 72 bytes)  
- use * as a wildcard  
- you can specify several filters and separate each pattern with a comma  
- each URL filter field (1 through 4) will be concatenated together  
- any transaction not matching a filter pattern will not be monitored |

### SYSFILT1

| none | - system class filter pattern 1  
- specify filters for any system class names that you do not want to monitor (up to 72 bytes)  
- use * as a wildcard  
- you can specify several filters and separate each pattern with a comma  
- any system class URL matching a filter will not be sampled  
- these filters are used in conjunction with the Global system class filters that are defined in TRPARM member TUNWSC00 |

### SYSFILT2

| none | - system class filter pattern 2  
- specify filters for any system class names that you do not want to monitor (up to 72 bytes)  
- use * as a wildcard  
- you can specify several filters and separate each pattern with a comma  
- any system class URL matching a filter will not be sampled  
- these filters are used in conjunction with the Global system class filters that are defined in TRPARM member TUNWSC00 |

### SYSFILT3

| none | - system class filter pattern 3  
- specify filters for any system class names that you do not want to monitor (up to 72 bytes)  
- use * as a wildcard  
- you can specify several filters and separate each pattern with a comma  
- any system class URL matching a filter will not be sampled  
- these filters are used in conjunction with the Global system class filters that are defined in TRPARM member TUNWSC00 |
Example 1

This example shows a request that invokes a monitor for the job PROD01 where 6000 observations are to be made within 60 seconds. The output is to be sent to the monitor data set of 'CAMAT.&PROFILE.&SYSDATE.&SYSTIME'.

The variables within the monitor data set name are substituted at the time the monitor actually starts measuring the job. Because no profile name was specified, the profile name of PROD01 (the job name) is used.

The double quotation marks around monitor data set name ensures the single quotation marks around the monitor data set name are preserved. All messages are to be sent to the TSO user named PCNTL01.

```
MONITOR Invoke -
   JOBNAME(PROD01) -
   SAMPLECNT(6000) -
   ELAPSTIME(60) -
   MONDSN("'CAMAT.&PROFILE.&SYSDATE.&SYSTIME'") -
   FROMUSER(PCNTL01)
```

Example 2

This example shows a request that measures the next five jobs in which the first four characters of the job name starts with PROD and in which the program names start with PAY. Each step is to be measured three times successively.

This monitor has a schedule associated with the monitor request as well. This schedule, called PAYROLL, looks only for matching jobs on Monday nights starting at 11:00 PM until Tuesday morning at 3:00 AM and on Wednesday nights starting at 11:00 PM until Thursday morning at 3:00 AM.

The monitor data set name is to be set. Each measurement session is to last three minutes and will make 9000 observations. The schedule starts on the day the monitor is invoked and lasts for seven days.

```
MONITOR Invoke -
   JOBNAME(PROD*) -
   PROGRAM(PAY*) -
   SAMPLECNT(9000) -
   ELAPSTIME(3M) -
   MONDSN("'CAMAT.&PROFILE.&SYSDATE.&SYSDATE'") -
   SCHEDULE(PAYROLL) - /* USED AS DOCUMENTATION */
   STARTDATE(&TODAY) -
   DAYS(7) -
   SPECIFICDAYS MONDAY WEDNESDAY -
   STARTTIME(2330) ENDTIME(0300)
```
MONITOR CANCEL

If you want to cancel a monitor that is currently measuring an address space or a monitor that is pending, you can do so with TUNCALL. When CA Mainframe Application Tuner queues up an invoked monitor request, a unique token number is assigned to the request. You can see the token number on the Monitor Status screen. TOKEN is the only required field.

The following table shows a list of valid keywords for MONITOR CANCEL.

<table>
<thead>
<tr>
<th>Keyword</th>
<th>Default</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>TOKEN</td>
<td>none</td>
<td>CA Mainframe Application Tuner assigned request number for the pending or active monitor request (required field)</td>
</tr>
<tr>
<td>PROFILE</td>
<td>none</td>
<td>additional field to verify that the request pending or active monitor is the one to be stopped</td>
</tr>
<tr>
<td>MONDSN</td>
<td>none</td>
<td>additional field to verify that the request pending or active monitor to be stopped is the desired one</td>
</tr>
</tbody>
</table>
| TARGSYS1-4| none    | the system where the request is to be stopped  
 if a single monitor request is scheduled for multiple systems, they will all contain the same TOKEN number  
 this keyword will permit you to cancel a monitor on a specific system within the sysplex  
 if blank, the request is sent only to the local system |
| JOBNAME   | none    | additional field to verify that the requestor has the authority to cancel this pending request or active monitor |

MONITOR STATUS

You can use TUNCALL to determine the status of a specific monitor. When CA Mainframe Application Tuner queues up an invoked monitor request, a unique token number is assigned to the request. You can see the token number on the Monitor Status screen. TOKEN is the only required field.

The following table shows a list of valid keywords for MONITOR STATUS.

<table>
<thead>
<tr>
<th>Keyword</th>
<th>Default</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>TOKEN</td>
<td>none</td>
<td>CA Mainframe Application Tuner assigned request number for the pending or active monitor request (required field)</td>
</tr>
</tbody>
</table>
Invoke a Monitor from a TSO Command, CLIST, or REXX EXEC

TUNCALL requests can also be made as normal TSO commands. The following example shows TUNCALL being executed as a TSO command from a REXX EXEC:

/* Rexx */
address TSO "TUNCALL CAMAT, MONITOR INVOKE PROFILE(PAYPROD1)"
rc /= 0 then do
say 'TUNCALLED FAILED'
exit rc
end

Invoke TUNCALL from a Batch Job

You can execute TUNCALL from a batch job as shown in the following example:

//JOBNAME JOB (ACCT), 'CALL CAMAT',CLASS=A,MSGCLASS=A
//'*
//TUNCALL EXEC PGM=TUNCALL,
// PARM='CAMAT,MONITOR INVOKE PROFILE(PAYPROD1)'

This example writes the messages to the console and can process only a single request.
Route Message Output to a File

To route the output of the log to a file instead of the console and to specify more than a single TUNCALL request, use syntax shown in the following example:

```plaintext
//JOBNAME JOB (ACCT), 'CALL CAMAT', CLASS=A, MSGCLASS=A
//*
//TUNCALL EXEC PGM=TUNCALL,
//TUNPRINT DD SYSOUT=* 
//TUNIN DD*
/* Monitor the next payroll job */
MATUNER,MONITOR INVOKE PROFILE(PAYPROD1)
MATUNER,MONITOR INVOKE PROFILE(ABC*) -
     FROMUSER(TEST1) -
     ELAPSTIME(90) SAMPLECNT (9000)
```

This example processes multiple requests and sends all messages and results to the TUNPRINT DD statement.

Invoke a Monitor from Within a Program

When invoking CA Mainframe Application Tuner as a called program, you must pass it the following parameter list:

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Value</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Parameter 1</td>
<td>(+0)</td>
<td>Value must point to a fullword with an integer of 1. Value indicates the TUNCALL parameter list format.</td>
</tr>
<tr>
<td>Parameter 2</td>
<td>(+4)</td>
<td>This value is a pointer to the start of the command being processed. The command being sent to TUNCALL in this manner is a single buffer. No comments or continuation cards are allowed. Buffer can be up to 32K in size.</td>
</tr>
<tr>
<td>Parameter 3</td>
<td>(+8)</td>
<td>This value is the address of an integer fullword containing the length of the command buffer specified in parameter 2.</td>
</tr>
<tr>
<td>Parameter 4</td>
<td>(+12)</td>
<td>This value is the address of a 16 byte area where the token is to be returned for MONITOR INVOKE. Currently, only the first 4 bytes of the area is actually used.</td>
</tr>
<tr>
<td>Parameter 5</td>
<td>(+16)</td>
<td>This value is the address of 2 consecutive 112 byte fields that contain messages upon return from TUNCALL.</td>
</tr>
</tbody>
</table>
Parameter 6 (+20)

This value is the address of a fullword of storage that contains the return code passed back by the server as a response to the request. If TUNCALL ends with a return code of 16, this field should be examined further.

Parameter 7 (+24)

This value is the address of a fullword of storage to contain the reason code passed back by the server as a response to the request. If TUNCALL ends with a return code of 16, this field should be examined further.

Return and Reason Codes

All requests sent to CA Mainframe Application Tuner that use TUNCALL have two levels of responses. The first level is from TUNCALL and this return code represents any errors that occurred when sending the request to the server. The following table lists the return codes.

<table>
<thead>
<tr>
<th>Return code</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>TUNCALL execution was successful. The results of the STATUS command execution will be reflected in the Reason Code in Register 0 or the parameter list (see below).</td>
</tr>
<tr>
<td>4</td>
<td>Server was found but was inactive.</td>
</tr>
<tr>
<td>8</td>
<td>Server was not found or has never been started.</td>
</tr>
<tr>
<td>12</td>
<td>TUNCALL release did not match that of the server.</td>
</tr>
<tr>
<td>16</td>
<td>Request ended with a nonzero return code. The results of the command execution will be reflected in the Reason Code in Register 0 or the parameter list (see below).</td>
</tr>
<tr>
<td>24</td>
<td>User is not authorized to access the requested server.</td>
</tr>
<tr>
<td>28</td>
<td>Insufficient storage available to queue request to server.</td>
</tr>
<tr>
<td>32</td>
<td>Internal error occurred. Error code in Register 0 indicates the type of error. Provide this code when contacting Customer Support.</td>
</tr>
<tr>
<td>36</td>
<td>An abend occurred while processing request within the server.</td>
</tr>
<tr>
<td>40</td>
<td>Request was sent to the server, but has timed out.</td>
</tr>
</tbody>
</table>

If the request has been successfully sent to the server, and the request was completed with a nonzero return code, TUNCALL ends by issuing a return code of 16. This response indicates that the return code field provided in the parameter list was not zero.
In general, if TUNCALL returns anything other than a 16 in Register 15, you do not need to examine the reason code in Register 0, or the return and reason code fields that are provided in the parameter list. However, the STATUS command will return a 0 in Register 15, and the status will be indicated by a reason code in register 0 and in the reason code field in the parameter list. If TUNCALL ends with register 15 containing 16, the return code and reason code fields provided in the parameter list indicate the reason for the failure.

The following table provides a complete list of command return and reason codes.

<table>
<thead>
<tr>
<th>Return code</th>
<th>Reason code</th>
<th>MONITOR command</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>0</td>
<td>INVOKE</td>
<td>Command successful. Monitor Token is provided in R0 and in messages when TUNCALL is invoked with a TSO command, CLIST, Rexx Exec, or batch job. Monitor Token is provided in R0 and return area pointed to by parameter 4 when TUNCALL is invoked from within a program.</td>
</tr>
<tr>
<td>0</td>
<td>0</td>
<td>CANCEL</td>
<td>Command successful. Monitor is cancelled.</td>
</tr>
<tr>
<td>0</td>
<td>0</td>
<td>STATUS</td>
<td>Monitor is waiting.</td>
</tr>
<tr>
<td>0</td>
<td>4</td>
<td>STATUS</td>
<td>Monitor is active.</td>
</tr>
<tr>
<td>0</td>
<td>8</td>
<td>STATUS</td>
<td>Monitor is inactive.</td>
</tr>
<tr>
<td>0</td>
<td>12</td>
<td>STATUS</td>
<td>Monitor was cancelled.</td>
</tr>
<tr>
<td>0</td>
<td>16</td>
<td>STATUS</td>
<td>Monitor has completed.</td>
</tr>
<tr>
<td>0</td>
<td>&gt;16</td>
<td>STATUS</td>
<td>Monitor was not found.</td>
</tr>
<tr>
<td>16</td>
<td>4</td>
<td>INVOKE</td>
<td>Duplicate monitor already exists.</td>
</tr>
<tr>
<td>16</td>
<td>8</td>
<td>CANCEL</td>
<td>Matching monitor was not found.</td>
</tr>
<tr>
<td>16</td>
<td>12</td>
<td>INVOKE</td>
<td>Maximum number of queued or active monitor requests have been reached. This value is set in the TUNSSPxx member with the MAXREQ keyword.</td>
</tr>
<tr>
<td>16</td>
<td>16</td>
<td>All</td>
<td>The user's UIF (User Information File) could not be allocated or opened by the server. A message with additional information is sent to the user by way of TPUT if this condition is raised.</td>
</tr>
<tr>
<td>Code</td>
<td>Description</td>
<td>Scope</td>
<td></td>
</tr>
<tr>
<td>------</td>
<td>----------------------</td>
<td>-------</td>
<td></td>
</tr>
<tr>
<td>16</td>
<td>Syntax error was detected. The message areas pointed to by the parameter list contain detailed information on the nature of the syntax error.</td>
<td>All</td>
<td></td>
</tr>
<tr>
<td>16</td>
<td>A general failure of TUNCALL occurred. Review the messages returned in the message areas that are provided for detailed information regarding the failure.</td>
<td>Not listed above</td>
<td></td>
</tr>
<tr>
<td>24</td>
<td>The user is not permitted access to the function requested.</td>
<td>NA</td>
<td></td>
</tr>
<tr>
<td>28</td>
<td>The server did not have enough storage to process request.</td>
<td>NA</td>
<td></td>
</tr>
<tr>
<td>32</td>
<td>An internal error occurred. Review messages that are provided in the areas passed in the parameter list for more information.</td>
<td>NA</td>
<td></td>
</tr>
<tr>
<td>36</td>
<td>An abend occurred while processing a request. A small indicative dump is provided by CA MAT. This indicative dump is written out to SYSLOG.</td>
<td>NA</td>
<td></td>
</tr>
<tr>
<td>52</td>
<td>When sending the request to a specific system within the sysplex, no matching systems were found.</td>
<td>NA</td>
<td></td>
</tr>
<tr>
<td>56</td>
<td>The request was queued when the system was being shut down and the request is not honored.</td>
<td>NA</td>
<td></td>
</tr>
</tbody>
</table>
Assembler Example:

The following figure shows an example of TUNCALL being used from assembler coding.

```
... R14,F'1' Parameter List Type
LA R15,CMD Point to command.
LA R0,CMDL Point to command length.
LA R1,RETOKEN Point to area to receive token.
LA R2,MSGS Point to message areas.
LA R3,OIRC Point to return code area.
LA R4,OIRS Point to reason code area.
STM R14,R4,PLIST Save parameter list.
O1 PLIST+24,X'80' Mark end of Parameter list.
LA R1,PLIST Point to start.
LINK EP=TUNCALL Invoke TUNCALL.
LTR R15,R15 Worked ok?
BZ CONT1 Yes, no need to check further.
CH R15,H'16' Request accepted by CA MAT?
BE REQFAIL Yes, see why it failed in server.
Request did not make it to Server. Indicate why.
Check return code in R15.
B CONT2 Request went to server but failed. Determine why.
REQFAIL DC 0H'0'

MVC WTOL+4(112),MSG1 Copy message one to WTO area
WTO mf=(E,WTOL) Issue message in return area 1.
MVC WTOL+4(112),MSG2 Copy message two to WTO area.
WTO mf=(E,WTOL) Issue message in return area 2.
B CONT2 Continue processing.

CMD DC C'MONITOR INVOKE PROFILE(PAYPROD)'
CMDL DC A(L'CMD)
RETOKEN DC CL16'
MSGS DC CL224'
MSG1 DC CL112'
MSG2 DC CL112'
OIRC DC F'0'
OIRS DC F'0'
PLIST DC 7A(0)
WTOL WTO ','MF=L
...
Chapter 8: Generating Batch Reports

This chapter explains how to set up and generate batch reports. These reports contain information similar to that in the Interactive Analysis panels. You can generate batch reports automatically each time you invoke a monitor, or anytime after a monitor has collected data.

This chapter also contains information about how to use the Spreadsheet Converter.

This section contains the following topics:

- Generate Batch Reports Automatically (see page 265)
- Submit a Job to Generate Batch Reports (see page 265)
- Set up a Batch Report Definition (see page 267)
- Create Spreadsheet Reports (see page 275)

Generate Batch Reports Automatically

You can generate batch reports automatically each time you invoke a monitor definition.

1. In the Profile Parameters panel, specify Y in the Batch Reports field.

2. Set up a batch report definition for the job, as described in Set up a Batch Report Definition.

   You can override the batch reports setting for a specific monitor definition by specifying YES or NO on the Monitor Criteria panel.

   If you issue the Stop line command against a monitor request, the batch reports are not generated.

Submit a Job to Generate Batch Reports

You can generate batch reports any time after you invoke the monitor and data collection has been completed.

1. From the Monitor Definition panel, type B in the LC field next to the profile for the job.

2. Press Enter.

   The Batch Report panel displays.

3. Set up a batch report definition for the job, as described in Set up a batch report definition.
4. Submit the job using one of the following ways:
   ■ On the command line, type SUBmit.
      A message appears indicating that the job has been submitted.
   ■ On the Command line, type EDIt.
      An ISPF Edit panel displays with the generated JCL for the batch reports. Make any further changes, then use the ISPF SUBmit command to submit the changed JCL.
      The changed JCL will be retained in a work data set that you can use outside of CA Mainframe Application Tuner as a model for future reports. You cannot save this changed JCL within CA Mainframe Application Tuner.
      Press END when done. You return to the Batch Reports panel.

5. Press End to return to the Monitor Definition panel.
Set up a Batch Report Definition

You can use the Batch Report panel for a job at any time. The default values for batch reports can be set globally (see the Installation Guide). Global defaults can be changed for each user through the Profile Parameters panel.

1. From the Monitor Definition panel, type B next to the profile name of the job for which you want to generate batch reports.

2. Press Enter.

   The Batch Report panel displays.

   CA MAT ------------------------ Batch Report -----------------------------
   Profile: TUNCIC
   More:
   Output Data Set Options  (scroll down for allocation parameters)
   Report Dataset Name ===> (Blank for SYSOUT, Dataset name, or .MONDSN)
   CSV Dataset Name ===> 'MATUSER.TUNCIC.CSV'
                       (Blank for default, .TEMP or .MONDSN)
   Job Cards  (scroll down for JES Parameters)
   ===> //JOBNAME JOB (ACCT),'TUNBATCH',CLASS=Q,
       ===> //       MSGLEVEL=1,MSGCLASS=X
       ===> /*
       ===> /*TUNJCL JCLLIB ORDER=V85.UTRSAMP
   Report Title ===> 
   Report Thresholds (Minimum percentages for Summary and detail reports)
   Active Threshold ===> 5   (CPU activity for Summary and Delay Details)
   Wait Threshold ===> 10   (Wait activity for Summary and Delay Details)
   Detail Threshold ===> 1   (Total activity for Summary and Detail reports)
   Transact Threshold ===> 10   (Transaction activity for Summary report)
   Reporting options
   Analysis Mode ===> NORMAL         Analysis Summary ===> Y
   Monitor History ===> Y              DelayView ===> Y
   CodeView ===> Y                    DataView ===> Y
   TaskView ===> Y                    TranView ===> Y
   ModView ===> Y                     PoolView ===> Y
   USSView ===> Y
   Subsystem Details
   DB2View ===> Y                     IMS Transactions ===> Y
   JVM Information ===> Y             WebSphere ===> Y
   Options for DelayView
   Delay details ===> ON
Set up a Batch Report Definition

Options for CodeView

<table>
<thead>
<tr>
<th>Option</th>
<th>Value</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Threshold</td>
<td>1</td>
<td>CodeView mode</td>
</tr>
<tr>
<td>All or top 5</td>
<td>Y</td>
<td>Csect Y</td>
</tr>
<tr>
<td>Histogram Csect 1</td>
<td></td>
<td>Module N</td>
</tr>
<tr>
<td>Histogram Csect 2</td>
<td></td>
<td>Pseudo N</td>
</tr>
<tr>
<td>Histogram Csect 3</td>
<td></td>
<td>4GL Y</td>
</tr>
<tr>
<td>Histogram Csect 4</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Options for DataView

<table>
<thead>
<tr>
<th>Option</th>
<th>Value</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Linklist</td>
<td>N</td>
<td>DB2 Code Detail Y</td>
</tr>
</tbody>
</table>

Options for TranView

<table>
<thead>
<tr>
<th>Option</th>
<th>Value</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Code Detail</td>
<td>Y</td>
<td>Delay Detail N</td>
</tr>
<tr>
<td>Data Detail</td>
<td>ALL</td>
<td></td>
</tr>
<tr>
<td>Transaction 1</td>
<td>*</td>
<td>Transaction 2</td>
</tr>
<tr>
<td>Transaction 3</td>
<td></td>
<td>Transaction 4</td>
</tr>
</tbody>
</table>

Options for TaskView

<table>
<thead>
<tr>
<th>Task</th>
<th>Value</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>*</td>
<td>Task 2</td>
</tr>
<tr>
<td>2</td>
<td></td>
<td></td>
</tr>
<tr>
<td>3</td>
<td></td>
<td>Task 4</td>
</tr>
<tr>
<td>4</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Report Scope

<table>
<thead>
<tr>
<th>Option</th>
<th>Value</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Report Detail</td>
<td>Y</td>
<td>(Y for full report, N to omit detail reports)</td>
</tr>
<tr>
<td>Field Detail</td>
<td>Y</td>
<td>(Y for full report, N to omit trivial fields)</td>
</tr>
</tbody>
</table>

JES Parameters

<table>
<thead>
<tr>
<th>Option</th>
<th>Value</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lines per page</td>
<td>66</td>
<td>Sysout class *</td>
</tr>
<tr>
<td>Column width</td>
<td>132</td>
<td>Sysout form</td>
</tr>
<tr>
<td>JES writer-name</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Destination</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Dataset Allocation Parameters (for report datasets and CSV files)

<table>
<thead>
<tr>
<th>Option</th>
<th>Value</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tracks: Primary</td>
<td>15</td>
<td>Secondary 15</td>
</tr>
<tr>
<td>Volume Serial</td>
<td></td>
<td>or Storage Class</td>
</tr>
<tr>
<td>Unit</td>
<td>SYSALLDA</td>
<td>Data Class</td>
</tr>
<tr>
<td>Management Class</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Scroll UP or DOWN for more options. Enter SUBmit to submit a batch job, EDIt to edit the batch job before submitting, press END to exit and save changes, or enter CANCEL to exit without saving.

3. Specify the report title, report format, output destination, and the reports that you want to include.

The fields in the Report Definition panel are described next.

**Output Data Set Options**

Save the output file for the Batch Reports in CSV format.

**Job Cards**

Modify the default ISPF job card as needed.

Note that you can use the JCL ORDER statement to specify the library from which the batch programs are fetched, as shown in the panel Batch Report panel: top portion.
Report Title

Specify a unique title to appear at the top of each page of the report.

Report Dataset Name

Specify a data set name to receive the generated batch report.

Leave this field blank to write the report to SYSOUT.

Specify .MONDSN to use the data set name of the monitor file. A .BAT node will be appended to the monitor file name to create the file name. Some truncation may occur if the resulting name is longer than 44 characters. If the data set is not found, it will be created.

Reporting Thresholds

Active Threshold

Specify the minimum percentage of CPU activity for Summary and Detail reports (default is 5).

Wait Threshold

Specify the minimum percentage of wait activity for Summary and Detail reports (default is 10).

Detail Threshold

Specify the minimum percentage of combined CPU and wait activity for Summary and Detail reports (default is 1).

Transact Threshold

Specify the minimum percentage of transaction activity for Summary reports (default is 10).

Reporting Options

Analysis Mode

Specify one of the following values:

- **NORMAL**: Information that is not directly related to the target application is eliminated; data is reported as follows:
  - Samples related to delay categories such as Waiting for CPU, LPAR delay, and Swap delay are omitted from reports.
  - DelayView, TimeView, DataView, and ModView show all relevant delays for the application. All relevant samples, both active and wait, are reported.
  - CodeView and related histograms report only active samples to emphasize the most CPU-intensive portions of the program code. Wait samples, which can mask this activity, are not included.
Set up a Batch Report Definition

- **ALL**: The results of the analysis reflect all samples that were obtained during the monitor period.
- **ACTIVE**: The results of the analysis reflect only those samples in which the program was actively using CPU.
- **WAIT**: The results of the analysis reflect only those samples in which the program was in a wait state.

**Analysis Summary**
Specify Y (default) to include the Analysis Summary report in the Batch Reports.
This report shows the highest delay causes, and therefore the programs and resources that might best benefit from tuning, in one report.

**Monitor History**
Specify Y (default) to generate the batch history report.
Specify N for no report.

**DelayView**
Specify Y (default) to generate a DelayView report.
Specify N for no DelayView report.

**CodeView**
Specify Y (default) to generate a CodeView report.
Specify N for no CodeView report.

**DataView**
Specify Y (default) to generate a DataView report.
Specify N for no DataView report.

**TaskView**
Specify Y (default) to generate a TaskView report.
Specify N for no TaskView report.

**TranView**
Specify Y to generate a TranView report.
Specify N (default) for no TranView report.

**ModView**
Specify Y (default) to generate a ModView report.
Specify N for no ModView report.
PoolView
Specify Y to generate a PoolView report.
Specify N (default) for no PoolView report.

USSView
Specify Y to generate a USSView report.
Specify N (default) for no USSView report.

Subsystem Details
DB2View
Specify Y to generate a DB2® Subsystem report.
Specify N for no DB2 Subsystem report.

IMS Transactions
Specify Y to generate a IMS Subsystem report.
Specify N for no IMS Subsystem report.

JVM Information
Specify Y to generate a JVM Subsystem report.
Specify N for no JVM Subsystem report.

WebSphere
Specify Y to generate a WebSphere Application Server report.
Specify N for no WebSphere Application Server report.

Options for DelayView
Detail
Specify ON if you want the DelayView report to contain detailed information about the delay causes.
Specify OFF if you want the DelayView report to contain only high-level information about delay causes (default is ON).

Options for CodeView
Threshold
Specify the threshold value (0 to 100) for CodeView.
Modules or CSECTs that have a total activity percentage below this value are not included in the batch CodeView report (CSECT and Module modes only). The sum total of all activity below the threshold is included as Module/CSECT **N/A**. Specify a threshold of 0 (zero) to include all modules or CSECTs. The default is 1 (1%).
All-User-Top 5

You can specify one of the following choices:

■ Specify the threshold value (0 to 100) for CodeView.
  Modules or CSECTs that have a total activity percentage below this value are not included in the batch CodeView report (CSECT and Module modes only). The sum total of all activity below the threshold is included as Module/CSECTs **N/A**. Specify a threshold of 0 (zero) to include all modules or CSECTs. The default is 1 (1%).

■ Specify Y to create histograms for the five CSECTs showing the greatest activity or delay in CodeView.

■ CSECTs with total activity below the CodeView Detail Threshold are omitted.

■ Specify A to create histograms for all CSECTs reported by CodeView.

■ Specify U to create histograms for User CSECTs only (only those CSECTs which do NOT have an associated base-level CSECT description).

■ Specify N to suppress generation of histograms.
  CSECT histograms are produced in order of descending activity. Histograms are not produced for CSECT that show no activity.

CodeView mode

Specify the mode for CodeView batch reports.

Possible modes are CSECT, MODULE, PSEUDO, or 4GL. The default is CSECT. See "Interactive analysis option 3 - CodeView" on page 157 for more information.

Histogram CSECT 1- Histogram CSECT 4

Specify up to four CSECT names for which you want to create histograms.

To suppress the generation of histograms for certain classes of CSECTs, you can specify the leading characters of the CSECTs to exclude. In the Options for CodeView section, the four Histogram CSECT fields have been updated to allow the user to exclude CSECTs, as follows:

■ Enter the NOT character " (SHIFT+6), followed by the initial characters of the Csect names that you want to exclude.
  As an example, IBM® will exclude any CSECTs that begin with IBM (such as IBMRBGK1).

■ If the 'TOP 5' option is selected, excluded CSECTs will not be counted as part of the five CSECTs.

■ Do not use any wildcard characters ('*', '#'). You can use as many characters as needed.

Excluded CSECTS can be specified in the Profile Parameters panel (Option 0), to be used for all new batch reports (existing profiles will need to be updated separately).
Options for DataView

Linklist
Specify Y to include the names of the LINKLIST libraries for your installation as part of the DataView report
Specify N (default) for no LINKLIST information

DB2 Code Detail
Specify Y (default) to generate the DB2 Code Detail report
Specify N for no report

Options for TranView

Code Detail
Specify Y to generate the batch report
Specify N (default) for no report

Delay Detail
Specify Y to generate the batch report
Specify N (default) for no report

Data Detail
Specify the transactions on the TranView panel that will have a link to the DataView Detail panel, if data set information is available for that transaction
Specify Y (yes) for the top five transactions, N for none, or ALL for all transactions that have data set information.

Transaction 1 – Transaction 4
Select up to four specific transactions to appear in the following reports:
- CodeView (including histograms)
- DelayView
- TaskView
- TranView
This field supports the use of the * wildcard character to match multiple characters and the + wildcard character to match any single character. If you want all transactions to appear, specify an asterisk (*) in this field. Asterisk is the default.

Options for TaskView

Task 1 – Task 4
Select up to four specific tasks to appear in the following reports:
- CodeView (including histograms)
Set up a Batch Report Definition

- DelayView
- TaskView
- TranView

This field supports the use of the * wildcard character to match multiple characters and the + wildcard character to match any single character. If you want all tasks to appear, specify an asterisk (*) in this field. Asterisk is the default.

Options for Report Scope

Report Detail

Specify the overall level of detail that is included in the Batch Report

Specify Y to include all reports. To omit the Delay Distribution, Delay Detail, and Code Detail reports, specify N. The default is Y.

Field Detail

Specify the field-level of detail that is included in the DataView and ModView reports

Specify Y to include all fields. To omit the noncritical fields, specify N. The default is Y.

JES Parameters

Lines per page

Specify the number of lines on each page of the batch report (the default is 66).

Sysout class

Specify an output destination for the batch reports (default is an asterisk (*))

The asterisk (*) ensures that CA Mainframe Application Tuner generated reports use the same SYSOUT class as the job card.

Column width

Specify the width of the batch reports.

The default is to 132.

Sysout form

Specify a one- to four-character form name for the destination to which the report is written.

JES writer-name

Specify a program name as part of the SYSOUT definition that JES uses to process the data set.

Some SYSOUT management products use the writer-name as routing information instead of using an actual program name.
Destination

Specify the one- to eight-character node name of the JES destination.

In addition, you can specify a one- to eight-character user ID to which the SYSOUT report is written. If you specify a user ID, it must follow the node name and must be separated from the node name with a period.

The following panel shows the Analysis Summary Report that is created by CA Mainframe Application Tuner when you specify Y on the Batch Report panel.

```
*-------------------------------->  SUMMARY  <---------------------------------*
TRANSACTION INFORMATION *******************************************************
(TRANSACTIONS ACCOUNTING FOR OVER 10.00% OF ACTIVITY)

<table>
<thead>
<tr>
<th>TRANSACTION</th>
<th>TRANS</th>
<th>TOT CPU</th>
<th>AVG CPU</th>
<th>ACTV%</th>
<th>WAIT%</th>
<th>TOTL%</th>
<th>VISUAL</th>
</tr>
</thead>
<tbody>
<tr>
<td>Q904</td>
<td>4361</td>
<td>33.60</td>
<td>0.0077</td>
<td>37.06</td>
<td>30.06</td>
<td>67.12</td>
<td>=====&gt;</td>
</tr>
<tr>
<td>M710</td>
<td>544</td>
<td>8.93</td>
<td>0.0164</td>
<td>2.71</td>
<td>14.58</td>
<td>17.30</td>
<td>&gt;</td>
</tr>
</tbody>
</table>

DB2 DELAYS ************************************************************
(REPRESENTING 59.33% OF TOTAL DELAYS)

<table>
<thead>
<tr>
<th>COLLECTION PACKAGE</th>
<th>STMT</th>
<th>TYPE</th>
<th>ACTV%</th>
<th>WAIT%</th>
<th>TOTL%</th>
<th>VISUAL</th>
</tr>
</thead>
<tbody>
<tr>
<td>BWOGACO</td>
<td>QX2CBWI</td>
<td>SELECT</td>
<td>16.43</td>
<td>0.60</td>
<td>17.02</td>
<td>&gt;</td>
</tr>
<tr>
<td>BWOBGCO</td>
<td>BG2C706</td>
<td>FETCH</td>
<td>3.21</td>
<td>0.03</td>
<td>3.25</td>
<td></td>
</tr>
<tr>
<td>BWOBGCO</td>
<td>BG2C401</td>
<td>SELECT</td>
<td>0.00</td>
<td>3.19</td>
<td>3.22</td>
<td></td>
</tr>
<tr>
<td>BWOBGCO</td>
<td>BG2C401</td>
<td>SELECT</td>
<td>0.00</td>
<td>3.21</td>
<td>3.21</td>
<td></td>
</tr>
<tr>
<td>BWOBGCO</td>
<td>BG7C573</td>
<td>INSERT</td>
<td>0.04</td>
<td>2.28</td>
<td>2.32</td>
<td></td>
</tr>
<tr>
<td>BWOBGCO</td>
<td>BG7C573</td>
<td>INSERT</td>
<td>0.01</td>
<td>1.11</td>
<td>1.12</td>
<td></td>
</tr>
<tr>
<td>BWOBGCO</td>
<td>BG2C401</td>
<td>SELECT</td>
<td>0.00</td>
<td>1.11</td>
<td>1.11</td>
<td></td>
</tr>
</tbody>
</table>

PROGRAM ACTIVE DELAYS ********************************************************
(REPRESENTING 23.10% OF TOTAL DELAYS)

<table>
<thead>
<tr>
<th>MODULE</th>
<th>CSECT</th>
<th>OFFSET</th>
<th>STMT</th>
<th>TOTAL%</th>
<th>CSECT DESCRIPTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>DFHD2EX3</td>
<td>DFHD2EX3</td>
<td>000003B8</td>
<td></td>
<td>11.37</td>
<td>CICS-DB2 SUBTASK PROGRAM</td>
</tr>
<tr>
<td>DFPSSIP</td>
<td>DFPSSD53</td>
<td>00000940</td>
<td></td>
<td>8.95</td>
<td>DS DOMAIN - MAIN DISPATCH LOOP</td>
</tr>
</tbody>
</table>

IO WAIT DELAYS ***************************************************************
(REPRESENTING 0.74% OF TOTAL DELAYS)

<table>
<thead>
<tr>
<th>MODULE</th>
<th>CSECT</th>
<th>OFFSET</th>
<th>STMT</th>
<th>TOTAL%</th>
<th>CSECT DESCRIPTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>DFPSSIP</td>
<td>DFPSSD53</td>
<td>00000186</td>
<td></td>
<td>1.26</td>
<td>DS DOMAIN - MAIN DISPATCH LOOP</td>
</tr>
</tbody>
</table>

END OF SUMMARY REPORT *******************************************************
```

Create Spreadsheet Reports

This section describes how to use the Spreadsheet Converter (for Microsoft Excel 2000) to export data from the Interactive Analysis panels into Microsoft Excel spreadsheets.
After you have converted the data to Microsoft Excel spreadsheets, you can use the functions within Microsoft Excel to create reports, graphs, and otherwise manipulate your data. For information about using Microsoft Excel, refer to your Microsoft Excel documentation.

The Spreadsheet Converter for Microsoft Excel supports different number formats, as defined by the Windows Regional Settings control panel. The numbers displayed will conform to the regional setting (example - use comma as the decimal point).

This following sections are included:

- Installing the spreadsheet converter for Microsoft Excel 2000
- Generating spreadsheet reports
- Maintenance and support

## Install the Spreadsheet Converter for Microsoft Excel 2007

To use the Spreadsheet Converter, you must first download and install the Spreadsheet Converter Add-In. Once installed, you can use simple menu commands to import the monitor data into Microsoft Excel spreadsheets.

This section describes how to install the Spreadsheet Converter Add-In and how to remove it:

- Download the Spreadsheet Converter for Microsoft Excel
- Install the Spreadsheet Converter Add-In
- Removing the Add-In

## Download the Spreadsheet Converter for Microsoft Excel 2007

The Spreadsheet Converter Add-In is delivered with CA Mainframe Application Tuner as a member (TUNSSC) in hilevel.CEESDATA. You need to download the Excel Add-In to your PC.

1. Create a folder on your PC to be used for storing the spreadsheet converter and the converted reports.
2. Transfer the TUNSSC member of data set hilevel.CEESDATA to your PC by using a file transfer program such as IND$FILE.
   
   To ensure Microsoft Excel will be able to read the file, you must first transfer the file in BINARY format with NO CRLF codes and then use the XLA file extension when naming the new file.

3. Name the new file on your PC:

   TUNSSC.XLA
Install the Spreadsheet Converter Add-In

After the Spreadsheet Converter Add-In is downloaded to your PC, it must be installed. See your Microsoft Excel documentation for information, if necessary.

1. Open Microsoft Excel (Office2007 or later).
2. Click the Office Button in the upper-left corner of the screen.
3. Click Excel Options on the bottom of the drop-down list.
   The Excel Options dialog opens.
4. Click the Add-Ins menu item in the left pane.
   The View and manage Microsoft Office add-ins dialog displays in the right pane.
5. Click the Manage drop-down list at the bottom of the pane, highlight Excel Add-Ins, and click Go.
   The Add-Ins dialog opens.
6. Click Browse and navigate to the directory where you installed the Spreadsheet Converter Add-In, and select TUNSSC.XLA.
7. Click OK.
   The CA MAT Spreadsheet Converter is included in the list of Add-Ins.
8. Click OK.

The Add-Ins selection is included on the menu bar.

9. Click the Add-Ins menu item.

The CA MAT custom command item opens.

Remove the Add-In

To remove the Spreadsheet Converter Add-In

1. Click the Office Button in the upper left corner of the screen.
2. Click the Excel Options button on the bottom of the drop-down list.
3. Click the Add-Ins menu item in the left pane on the Excel Options panel.

The View and manage Microsoft Office add-ins displays in the right pane.
4. Click the Manage drop-down list at the bottom of the pane, highlight Excel Add-Ins, and click Go.
5. Uncheck the Spreadsheet Converter entry on the Add-Ins dialog, and click OK.
6. Click the Add-Ins item on the menu bar.
7. Right click the custom command item.
   The sub menu opens.
8. Click the Delete Custom Command item.
9. In the Delete Custom Command confirmation dialog, click YES.
   If CA Mainframe Application Tuner was the only add-in, the Add-Ins menu item
   disappears from the menu bar.
   The Spreadsheet Converted Add-In remains in the directory where you installed it,
   and on the Add-in selection list.
   To re-install, see Install the Spreadsheet Converter for Microsoft Excel 2007.

Generate Spreadsheet Reports

Using the Spreadsheet Converter, you can upload data into Microsoft Excel and
generate a set of basic reports. Using the functions within Microsoft Excel, you can also
modify these basic reports, or create new ones by using the data.

Export Monitor Data

You can export data from the Monitor Definition panel, the Monitor History panel, or
the External Data Set List panel.
1. Issue the V (CSV Export) line command for the monitor profile that you want to
   export.
   The CSV Reporting panel displays. The CSV options are identical to the Batch
   options.
2. Select the Data Set and Reporting options that you want to export.
3. Issue the SUBmit command.
   The data is exported to the specified data set.
4. Using a file transfer program, transfer the data set to your PC in ASCII format (text). It is recommended that you create a special folder to contain your data.
Create Reports

To create reports with the Spreadsheet Converter Add-In

1. Open Microsoft Excel (Office 2007 or later).
2. Click the Add-Ins menu item in the menu bar.
3. Click the menu command.
4. In the drop-down list, click Convert CA MAT Reports.
5. Navigate to the directory where you stored the downloaded CSV file and select it.
6. Click OK.

The data is loaded, and you see the Conversion Log, which lists the reports generated, and any errors encountered.
Maintenance and Support

Because the Spreadsheet converter is distributed as a mainframe file, it is maintained by using standard SMP/E tools.

Maintenance

Updates to the spreadsheet converter are distributed by way of PTF maintenance. The instructions for applying the SMP/E PTFs are in the "Installing Maintenance" section of the Installation Guide.

Whenever a spreadsheet converter PTF is received, the HOLDDATA file will alert you that an updated version needs to be downloaded. Use the same procedures for downloading as described in Install the Spreadsheet Converter for Microsoft Excel 2000.

Customer Support

For incidents with the spreadsheet converter, Customer Support personnel need a copy of the reports. Because the report and spreadsheet files reside on your PC, you should be able to send them as an attachment to an email message, or place them on the FTP server.
Chapter 9: Tuning Your Applications

CA Mainframe Application Tuner measures delays incurred by an application program, both from outside sources and within the program’s own code. CA Mainframe Application Tuner panels provide information about a variety of delay types. The best place to start looking for delays is with DelayView. With DelayView, you can see which types of operations were executed and how much elapsed time was spent in each operation type.

This section contains the following topics:
- Overview of Delay Categories (see page 283)
- Program Active Delays (see page 285)
- Voluntary Wait Delays (see page 286)
- Abend Procedure Delays (see page 286)
- Data Delays (see page 287)
- Resource Conflict Delays (see page 288)
- System Active Delays (see page 289)
- File Management Delays (see page 289)
- Program Load Delays (see page 290)
- DASD Management Delays (see page 291)
- Other Delays (see page 291)

Overview of Delay Categories

In CA Mainframe Application Tuner, autonavigation enables you to go directly from a delay category to a more detailed panel that provides relevant information about the delay. An overview of delay types is provided in the following table, along with recommendations about how to use CA Mainframe Application Tuner to find out more about why your job is experiencing a delay.

<table>
<thead>
<tr>
<th>Category</th>
<th>Explanation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Program Active</td>
<td>The program or one of its subroutines is in control of a CPU. Place your cursor anywhere on the line and press Enter, or select Option 3 to see which modules have the highest CPU usage.</td>
</tr>
<tr>
<td>Voluntary Wait</td>
<td>The program has voluntarily relinquished control of a CPU. Use the Address line command (A) to determine the delay locations within your application.</td>
</tr>
</tbody>
</table>
### Overview of Delay Categories

<table>
<thead>
<tr>
<th>Delay Category</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Abend Procedure Delay</td>
<td>A component of the application is terminating abnormally or gathering diagnostic information for a problem. Use the Address line command (A) to determine where the program invoked the abend procedures.</td>
</tr>
<tr>
<td>Data Delay</td>
<td>The program is waiting for data to be returned. Place your cursor anywhere on the line and press Enter, or select Option 5 to see which files caused the greatest delay.</td>
</tr>
<tr>
<td>Resource Conflict</td>
<td>The program is delayed because another program has exclusive use of a required resource, such as a file or program. Use the Address line command (A) to determine which modules spent time waiting for resources.</td>
</tr>
<tr>
<td>System Active</td>
<td>The program is using operating system functions, such as storage administration or system security. Place your cursor anywhere on the line and press Enter, or select Option 3 to see which modules have the highest CPU usage.</td>
</tr>
<tr>
<td>File Management Delay</td>
<td>The program is delayed by a file management operation such as locating or opening a file. Use the Address line command (A) to determine which modules spent time waiting for file management activities.</td>
</tr>
<tr>
<td>Program Load Delay</td>
<td>The program is delayed by the operating system while it performs program management functions. Program management includes locating a program on DASD, obtaining storage, reading the program, or converting the relative addressing information into absolute addresses. Use the Address line command (A) to determine which modules spent time waiting for program load activity.</td>
</tr>
<tr>
<td>DASD Management Delay</td>
<td>The program is delayed because of a DASD file management function that is not part of normal file management. Use the Address line command (A) to determine which modules spent time waiting for DASD management functions.</td>
</tr>
</tbody>
</table>
CICS Delays

The CICS subsystem delays are divided into the following categories:
- CICS System Delay
- CICS TransData
- CICS StorCtl Delay
- CICS TaskCtl Delay
- CICS FileCtl Delay
- CICS JourCtl Delay
- CICS TempStor Delay
- CICS ProgCtl Delay
- CICS TermCtl Delay
- CICS DL/I Delay

Other Delays

The program is delayed for a reason not listed in this table. These delays can be related to paging, swapping, nondispatching, or other reasons.

Program Active Delays

The following table describes the various types of program active delays, and the possible reasons for them.

<table>
<thead>
<tr>
<th>Delay type</th>
<th>Reason</th>
</tr>
</thead>
<tbody>
<tr>
<td>Algorithms</td>
<td>An algorithm in the program or one of its subroutines is using CPU time.</td>
</tr>
<tr>
<td>High Level Language options</td>
<td>High overhead compiler options, such as DEBUG or TRACE were specified.</td>
</tr>
<tr>
<td>Data definitions and conversion</td>
<td>High-level languages can use significant CPU time to convert numeric data intended for display to a format that can be used in computation, such as a subscript, that accesses table entries defined in the program or one of its subroutines.</td>
</tr>
</tbody>
</table>
Voluntary Wait Delays

The following table describes the various types of voluntary wait delays, and the possible reasons for them.

<table>
<thead>
<tr>
<th>Delay Type</th>
<th>Reason</th>
</tr>
</thead>
<tbody>
<tr>
<td>Wait for intertask function</td>
<td>The program or one of its subroutines is waiting for another task or address space to present information or is waiting to receive a work request</td>
</tr>
<tr>
<td>Calls to database system other than IMS, DB2, Adabas, NATURAL or CA Datacom</td>
<td>The program or one of its subroutines is requesting data from a database of which CA Mainframe Application Tuner has no internal knowledge. The delay is reported but not attributed to a specific database system.</td>
</tr>
<tr>
<td>Wait/Waitr SVC</td>
<td>Performance of the active task cannot continue until one or more specific events have occurred</td>
</tr>
</tbody>
</table>

Abend Procedure Delays

The following table describes the various types of abend procedure delays, and the possible reasons for them.

<table>
<thead>
<tr>
<th>Delay Type</th>
<th>Reason</th>
</tr>
</thead>
<tbody>
<tr>
<td>Too many SNAP dumps</td>
<td>The process of taking SNAP dumps is taking a significant amount of processing time. Reduce the number of SNAP dumps to decrease overall processing time.</td>
</tr>
<tr>
<td>Program using abend processing</td>
<td>A program or one of its subroutines is using z/OS abend services to process invalid data. You should use means other than z/OS abend services to eliminate or reduce abend processing time.</td>
</tr>
</tbody>
</table>
Data Delays

The following table describes the various types of data delays, and the possible reasons for them.

<table>
<thead>
<tr>
<th>Delay Type</th>
<th>Reason</th>
</tr>
</thead>
<tbody>
<tr>
<td>Placement of data sets</td>
<td>Queueing delays are occurring because data sets used by the program or one of its subroutines reside on busy DASD volumes.</td>
</tr>
<tr>
<td>Insufficient buffers for sequential access methods</td>
<td>Too few buffers are defined for a file to provide timely sequential data set access processing.</td>
</tr>
<tr>
<td>Block size too small for sequential access methods</td>
<td>The block size is too small and causing too many I/O operations. Delays are reported for both the processing time to start and to complete the I/O operation and for the wait for data to be returned.</td>
</tr>
<tr>
<td>File is fragmented into many extents</td>
<td>The file used by the program or one of its subroutines is in many extents. This fragmentation causes additional seeking to take place on the device, which delays the program.</td>
</tr>
<tr>
<td>VSAM files poorly buffered</td>
<td>An insufficient number of index and data buffers are defined for VSAM files, or the buffers are too small.</td>
</tr>
<tr>
<td>VSAM files use share options (4,4)</td>
<td>When VSAM data sets must be open in more than one address space for updating, each application must use share options that preserve the integrity of the data. When these share options are used, each read requires an I/O operation to refresh the data because another address space might have updated the data.</td>
</tr>
<tr>
<td>Insufficient buffers for VSAM files that use local or global shared resources</td>
<td>If a program uses VSAM shared resources for multiple files to better utilize virtual memory, not having enough buffers of a required size causes delays waiting for buffers to become available. This situation is especially important for read operations because the intent is to find the data in the memory buffer as often as possible. Reduce data delays by tuning the buffers to the workload that uses the buffer pool.</td>
</tr>
</tbody>
</table>
An application might spend an inordinate amount of time waiting for data to be returned for an SQL statement. This problem can be caused by excessive page scans if an INDEX is not available to speed the data retrieval. For more information about SQL delays, see the chapter "Using the Product in a DB2 Environment."

An application might spend inordinate amounts of time waiting for data from an IMS database to be returned. For more information about IMS delays, see the chapter "Using the Product in an IMS Environment."

<table>
<thead>
<tr>
<th>Delay Type</th>
<th>Reason</th>
</tr>
</thead>
<tbody>
<tr>
<td>Data set in use by another application</td>
<td>When jobs are executed concurrently, z/OS provides data integrity by using system-wide enqueues. If a job allocates a data set by using DISP=SHR, it has concurrent access, but each program must ensure data integrity. If a job allocates a data set by using DISP=OLD, the z/OS operating system provides data integrity and requires all other programs to wait until the data set is free. Reduce resource conflicts by ensuring that jobs use the same resources in a serial manner.</td>
</tr>
<tr>
<td>Logical resources in use by another application</td>
<td>z/OS provides the ENQUEUE/DEQUEUE facility to ensure that logical resources are protected when multiple jobs or tasks require serialization. For example, when the program uses the ENQUEUE facility to provide a queueing function for a server task, the requesting tasks waiting in ENQUEUE are delayed. Reduce resource conflicts, caused when queueing is emulated with the ENQ/DEQ services, by using another queueing algorithm.</td>
</tr>
</tbody>
</table>
## System Active Delays

The following table describes the various types of system active delays, and the possible reasons for them.

<table>
<thead>
<tr>
<th>Delay Type</th>
<th>Reason</th>
</tr>
</thead>
</table>
| Repeated calling of DATE/TIME services           | A program or one of its subroutines repeatedly calls the date/time operating system services.  
|                                                  | Reduce this type of delay by obtaining the date once and use it for the entire program execution. |
| Excessive storage management activity            | A program or one of its subroutines is allocating and freeing areas of virtual memory excessively.  
|                                                  | Storage management is an expensive function that causes application delays if not properly utilized.  
|                                                  | You can reduce delays resulting from excessive storage management by designing the program to allocate and free storage less frequently. |
| Excessive use of timer services                  | A program or one of its subroutines uses the timers provided by z/OS or an application enabler such as CICS, to control a time-dependent feature of the application.  
|                                                  | Timer services should be used sparingly since their use can cause system delays. |
| Extensive security calls                         | A security system protects all physical and logical system resources, and calls to the protection routines are causing excessive CPU use.  
|                                                  | Excessive security implementation in an online environment can account for up to 10 percent of processor usage. |

## File Management Delays

The following table describes the various types of file management delays, and the possible reasons for them.

<table>
<thead>
<tr>
<th>Delay Type</th>
<th>Reason</th>
</tr>
</thead>
</table>
| Wait for tape mount| A program or one of its subroutines is waiting for a tape mount.  
|                    | Tape mount delays are experienced in the OPEN and End of Volume system services. End of volume processing is the function that requests subsequent volumes of a multivolume data set, which usually resides on tape. |
### Program Load Delays

The following table describes the various types of program load delays, and the possible reasons for them.

<table>
<thead>
<tr>
<th>Delay Type</th>
<th>Reason</th>
</tr>
</thead>
<tbody>
<tr>
<td>Excessive OPEN and CLOSE requests for a file</td>
<td>A program or one of its subroutines might OPEN a file, perform a single I/O operation, and then immediately CLOSE the file. OPEN/CLOSE requests are very expensive operating system functions that contribute heavily to overall delay.</td>
</tr>
<tr>
<td>Small data set extent allocation</td>
<td>Additional time is spent allocating additional data set extents as the data set expands. Reduce this type of delay by allocating a large enough data set to eliminate additional extent allocation.</td>
</tr>
<tr>
<td>High VSAM catalog activity</td>
<td>When a VSAM data set is OPENed or CLOSEd, a number of accesses are made to the CATALOG service routines to fetch control blocks or to write statistics. It is not possible to control the time spent in CATALOG services, but files might be OPENed too often or unnecessarily.</td>
</tr>
</tbody>
</table>

**Request to bring modules into memory**

Delays occur when a module is brought repeatedly into memory or when the search for the module on DASD takes a long time. Factors that influence search times include concatenated libraries, large directories, or poor placement of the libraries.

**Large concatenation used for program library**

A program or one of its subroutines uses a large concatenation of data sets that reside on different volumes and require a significant amount of I/O to process the program management activity.
**DASD Management Delays**

The following table describes the various types of DASD management delays, and the possible reasons for them.

<table>
<thead>
<tr>
<th>Delay Type</th>
<th>Reason</th>
</tr>
</thead>
<tbody>
<tr>
<td>Insufficient space allocated initially for the data set</td>
<td>If the job JCL allocates too little space for a data set, z/OS allocates secondary extents as necessary to hold all the data. The data set allocated should be large enough to hold all of the data initially, preventing unnecessary allocations from taking place.</td>
</tr>
</tbody>
</table>

**Other Delays**

The following table describes the various other types of delays, and the possible reasons for them.

<table>
<thead>
<tr>
<th>Delay Type</th>
<th>Reason</th>
</tr>
</thead>
<tbody>
<tr>
<td>Demand paging</td>
<td>One or more of the following situations might be present in the program or in one of the subroutines it calls:</td>
</tr>
<tr>
<td></td>
<td>■ a program is link-edited inefficiently</td>
</tr>
<tr>
<td></td>
<td>■ data arrays are used incorrectly</td>
</tr>
<tr>
<td></td>
<td>■ too many data buffers are specified</td>
</tr>
<tr>
<td>VIO paging</td>
<td>VIO data sets are simulated files that can significantly reduce I/O delays. They are essentially paging files that are managed by z/OS. The only drawback is that, if the application requests a record that is not in the VIO panel, a page fault will occur that will not be processed concurrently with the application program and the application will experience delay.</td>
</tr>
<tr>
<td>Swapping</td>
<td>This delay is caused when</td>
</tr>
<tr>
<td></td>
<td>■ the program or one of its subroutines is requesting system resources that are unavailable</td>
</tr>
<tr>
<td></td>
<td>■ the site’s tuning parameters are improperly set</td>
</tr>
</tbody>
</table>
Chapter 10: Using the Product in a DB2 Environment

CA Mainframe Application Tuner is compatible with DB2® versions 8.1 or later. If executing DB2 release 8.1, the DB2 New Function Mode is required for the Explain function.

After you have monitored your application, you can begin analysis.

You must specify DB2 system information prior to monitoring. It is recommended that you follow the automatic customization procedure that is documented in the Installation Guide.

This section contains the following topics:

- Analyze DB2 Data (see page 293)
- Explain Function (see page 315)
- DB2 Data Collection (see page 322)
- Background DB2 Catalog Extraction (see page 324)

Analyze DB2 Data

Delays in processing SQL statements are usually caused by improperly designed applications and databases, inadequate indexing, and programming errors. CA Mainframe Application Tuner can help identify application problems that occur when performing the following activities:

- Designing the application program
- Determining when an application should be rebound
- Determining the access path chosen for a query
- Designing the database

CA Mainframe Application Tuner enables you to analyze DB2 data to the SQL statement level.
Display the DB2 Statements Panel from the DataView Panel

Displaying the DB2 Statements panel from the DataView panel shows the monitored activity of DB2 and which SQL statements were consuming CPU during the monitoring period. The display shows measurements collected from only sampled SQL. To view DB2 Intercept data on the DB2 Statements panel, you can use the $ (Select SQL) line command.

Use the following steps to see the SQL statements for a DB2 job:

1. Select Option 5 from the Interactive Analysis menu to display the DataView panel.

2. Type $ next to .DB2 in the DD name field.
3. Press Enter.

The DB2 Statements panel displays:

<table>
<thead>
<tr>
<th>LC Package</th>
<th>S From Stmt Num Type</th>
<th>Declare Total</th>
<th>Stmt</th>
<th>Samps</th>
<th>Actv%</th>
<th>Wait%</th>
<th>Totl%</th>
<th>Count</th>
</tr>
</thead>
<tbody>
<tr>
<td>D91@PROG S B</td>
<td>632 FETCH</td>
<td></td>
<td>100900</td>
<td>3857</td>
<td>27.98</td>
<td>1.57</td>
<td>29.54</td>
<td>1000001</td>
</tr>
<tr>
<td>D91@PROG S B</td>
<td>460 OPEN</td>
<td></td>
<td>100826</td>
<td>591</td>
<td>4.49</td>
<td>1.22</td>
<td>5.71</td>
<td>1</td>
</tr>
<tr>
<td>D91@PROG S B</td>
<td>469 FETCH</td>
<td></td>
<td>100826</td>
<td>243</td>
<td>2.27</td>
<td>0.08</td>
<td>2.35</td>
<td>76924</td>
</tr>
<tr>
<td>D91@PROG S B</td>
<td>580 OPEN</td>
<td></td>
<td>100881</td>
<td>220</td>
<td>1.57</td>
<td>0.56</td>
<td>2.13</td>
<td>1</td>
</tr>
<tr>
<td>D91@PROG S B</td>
<td>201 SELECT</td>
<td></td>
<td>NA</td>
<td>101</td>
<td>0.83</td>
<td>0.14</td>
<td>0.98</td>
<td>1</td>
</tr>
<tr>
<td>D91@PROG S B</td>
<td>232 SELECT</td>
<td></td>
<td>NA</td>
<td>100</td>
<td>0.81</td>
<td>0.15</td>
<td>0.97</td>
<td>1</td>
</tr>
<tr>
<td>D91@PROG S B</td>
<td>263 SELECT</td>
<td></td>
<td>NA</td>
<td>89</td>
<td>0.71</td>
<td>0.15</td>
<td>0.86</td>
<td>1</td>
</tr>
<tr>
<td>D91@PROG S B</td>
<td>538 OPEN</td>
<td></td>
<td>100862</td>
<td>87</td>
<td>0.75</td>
<td>0.09</td>
<td>0.84</td>
<td>1</td>
</tr>
<tr>
<td>D91@PROG S B</td>
<td>589 FETCH</td>
<td></td>
<td>100881</td>
<td>22</td>
<td>0.00</td>
<td>0.21</td>
<td>0.21</td>
<td>1</td>
</tr>
<tr>
<td>D91@PROG S B</td>
<td>388 SELECT</td>
<td></td>
<td>NA</td>
<td>3</td>
<td>0.01</td>
<td>0.02</td>
<td>0.03</td>
<td>1</td>
</tr>
<tr>
<td>D91@PROG S B</td>
<td>623 OPEN</td>
<td></td>
<td>100900</td>
<td>1</td>
<td>0.00</td>
<td>0.01</td>
<td>0.01</td>
<td>1</td>
</tr>
</tbody>
</table>

The DB2 Statements panel is sorted by the Totl% field. Statements with the highest overall delay appear at the top.

4. Scroll to the right to see additional data, as shown in the following figures:
After you identify the statement that caused an excessive delay, use the Explain function to perform further analysis of how DB2 might process the SQL statement. For information, see Using the Explain Function.

Field Descriptions for the DB2 Statements Panel

The fields that are displayed on the DB2 Statements panel are described next.

Command Descriptions for the DB2 Statements Panel

The line commands available on the DB2 Statements panel are described next.

ADDHelp

Invokes the content-sensitive Help application to update or create a help entry for the selected content.

SQL all/sampled

Switches between sample-based statements (which CA Mainframe Application Tuner measured) or intercept-based data (all statements which executed) and the display is indicated by the SQL: field.

SEQUence

Switches between how the data is sorted (by measured activity or sequence of execution) as indicated by the Sort: field.
Select (S)
Is the SQL Statements pane, which shows the full text of the selected SQL statement.

Show Declare (SD)
Displays the DECLARE Statement panel, which shows the DECLARE statement coded by the application programmer for this DB2 verb.
This line command is valid for OPEN, FETCH, and CLOSE statements and UPDATE/DELETE statements that contain the clause WHERE CURRENT OF <cursor_name>. This command is not valid when DB2NOCAT=YES is specified. Customization for the Explain function must be completed.

Explain (E)
Interacts with the Explain panel for the SQL statement.
Customization for the Explain function must be completed.

Code Details (C)
Displays the CodeView Detail panel.
The CodeView Detail panel reports the activity of each Module and CSECT that is associated with the selected DB2 plan/package name and statement number (as active and wait percentages of all samples in the monitor data set).
From the Code Detail panel, you can create a Histogram showing the locations within a CSECT where delays occurred, or you can list the types of delay found within a CSECT.

Explain Information (I)
Displays the messages that are generated based on the results of the DB2 EXPLAIN command. For more information, see Displaying Messages.
If the statement has an associated DECLARE CURSOR indicated by a number in the Declare Stmt column, the Explain data will be from the DECLARE CURSOR and not from the statement itself.

Statement Detail (D)
Displays the contents of the row in tabular format in the DB2 Statement Detail panel.
Each field name and its value are shown. Zero, blank, and N/A entries are skipped.
If a long name value exists, you can then use line command N from the DB2 Statement Detail panel to display the complete long name.
Display the SQL Statements from the DB2 Statements Panel

You can display the SQL statement belonging to a DBRM/Package name that is listed on the DB2 Statements panel.

1. From the DB2 Statements panel, type S next to the desired DBRM/Package name in the LC (line command) column, and press Enter.

   The SQL Statements panel displays.

   ![SQL Statement Panel Example](image_url)

   This panel displays the SQL text for the statement. Extra spaces have been removed from the statement text. CA Mainframe Application Tuner obtains this SQL statement from DB2 space block (SPA).
CodeView Detail Panel for DB2

From the DB2View panel, you can display the program activity that is associated with an SQL statement from a specific DBRM/Package.

1. From the DB2View panel, type C next to the desired DBRM/Package in the LC (line command) column, and press Enter.

   The CodeView Detail panel displays.

<table>
<thead>
<tr>
<th>CA MAT</th>
<th>CodeView Detail</th>
<th>Row 1 to 13 of 20</th>
</tr>
</thead>
<tbody>
<tr>
<td>Package/DBRM: D91PROG</td>
<td>Statement Number: 587</td>
<td></td>
</tr>
<tr>
<td>Options: NORMAL</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mode: CSECT</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Primary commands: MOde Pseudo/Module/Csect/4GL, PSEudo, REGister, ADDHelp</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Line commands: A - Associate C - Callerid D - Delays N - Long Name I - Info L - Listing S – Distribution H - Histogram NH - Normalized Histogram</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Extended Callerid: CC - Current CA - Application CV – Via</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>LC Module</th>
<th>Csect</th>
<th>Description</th>
<th>L C X Actv% Wait% Totl% Visual</th>
</tr>
</thead>
<tbody>
<tr>
<td>.DISPWT</td>
<td>DIA3DBM1 Waiting for the CPU</td>
<td>12.68 0.00 12.68</td>
<td></td>
</tr>
<tr>
<td>.XMS0041</td>
<td>DIA3DBM1 Cross Memory Routine</td>
<td>2.12 0.49 2.61</td>
<td></td>
</tr>
<tr>
<td>.NUCLEUS</td>
<td>IMAGETM Workload manager</td>
<td>B 0.58 0.07 0.65</td>
<td></td>
</tr>
<tr>
<td>.NUCLEUS</td>
<td>IEAVECT External flih</td>
<td>B 0.47 0.14 0.61</td>
<td></td>
</tr>
<tr>
<td>DSNXGRDS</td>
<td>DSNXROHB DB2 routine</td>
<td>A 0.11 0.41 0.52</td>
<td></td>
</tr>
<tr>
<td>DSNXGRDS</td>
<td>DSNXERT DM-FETCH NEXT ROW</td>
<td>A 0.02 0.47 0.49</td>
<td></td>
</tr>
<tr>
<td>DSNXGRDS</td>
<td>DSNXERT RDS-APPL CALL RTN</td>
<td>A 0.00 0.36 0.36</td>
<td></td>
</tr>
<tr>
<td>DSNXGRDS</td>
<td>DSNXERT RDS-TOPMOST RDS CSECT</td>
<td>A 0.05 0.31 0.36</td>
<td></td>
</tr>
<tr>
<td>.NUCLEUS</td>
<td>IEAVTSFR SETFRR Service</td>
<td>B 0.25 0.05 0.31</td>
<td></td>
</tr>
<tr>
<td>DSNXEEZ</td>
<td>DSNXEEZ RDS-DATABASE PGM REQUEST</td>
<td>A 0.00 0.20 0.20</td>
<td></td>
</tr>
<tr>
<td>.NUCLEUS</td>
<td>IRAMFIP System Resources Manage</td>
<td>B 0.16 0.04 0.20</td>
<td></td>
</tr>
<tr>
<td>DSN3EPX</td>
<td>DSNAPRHX SSS-PGM REQUEST NONDELE</td>
<td>A 0.05 0.07 0.13</td>
<td></td>
</tr>
</tbody>
</table>

This panel identifies modules and CSECTs that delayed the SQL statement in the SQL: field for the specified DBRM/Package in the DBRM/Package: field. The commands you can issue and field headings are identical to the CodeView panel (see page 158 and page 159). All subsequent associated panels report information for the specified SQL statement from the specified DBRM/Package named.

The CodeView Detail panel reports both Active and Wait activity percentages for Analyze Normal mode, which accounts for all activity reported in DB2View.
Display the DB2View Panel from the Interactive Analysis Panel

You can also display the DB2View panel directly from the Interactive Analysis panel by selecting Option 10.

1. Select Option 10 from the Interactive Analysis menu to display the DB2 View panel.

```
CA MAT--------------------- Interactive Analysis ---------------------------
OPTION ===>
Enter option to analyze the monitored job:                   Profile: PROFT9
   Options: NORMAL
CA MAT Monitor Information                   Subsystem Details
-------------------------------------------   ------------------------------
0  OverView   - Monitor session information   10  DB2 - View all SQL
1  TaskView   - Activity by task              11  IMS - IMS Transactions
2  DelayView  - Program delays                12  JVM - Java Virtual Machine
3  CodeView   - Program activity              13  WAS - WebSphere Trans.
4  TimeView   - Samples by time               14  CIC - CICS Summary Stats
5  DataView   - Dataset information           15  IDMS - CA IDMS Activity
6  TranView   - Activity by transaction       16  DCM - CA-Datacom Activity
7  ModView    - Module layout                 17  WAS - WebSphere Activity
8  PoolView   - Buffer pools                  18  ADA - Adabas Activity
9  USSView    - Unix System Services          19  NAT - Natural Activity
ACTIVE - switch mode to ACTIVE      WAIT - switch mode to WAIT
NORMAL - switch mode to NORMAL      ALL  - switch mode to ALL
Press END to exit analysis
```

The DB2View panel displays.

```
CA MAT -------------------- DB2View --------------------------- Row 25 of 50
COMMAND ===>                                                  SCROLL ===> CSR
Primary Commands: ADDHelp, SQL all/sampled, SEQ (sort)       Profile: DB2STPRO
Options: NORMAL
Line commands:  S - Select SQL    E - Explain SQL               SQL: All
SD - Show Declare  I - Explain Information      Sort: Sequence
   C - Code Details  D - Statement Detail     DB2 SSID: DB9G
DB2 Rel: 9.1.0
DBRM or  D Data                   Call                            Total
LC Package  S From Stmt Num Type     Count     Total CPU  CPU-P-Call Resp Time
________ _ B___ ________ ________ _________ __________ __________ __________
>------------------------------------------------------------------------------
__ D91@PROG S B         201 SELECT           1   1.582823   1.582823   2.285674
__ D91@PROG S B         232 SELECT           1   1.363766   1.363766   2.285488
__ D91@PROG S B         263 SELECT           1   1.302925   1.302925   2.143666
__ D91@PROG S B         388 SELECT           1   0.006287   0.006287   0.076504
__ D91@PROG S B         460 OPEN             1   9.063884   9.063884  13.145094
__ D91@PROG S B         469 FETCH        76924   2.575384   0.000033   2.934821
__ D91@PROG S B         538 OPEN             1   1.403580   1.403580   2.040191
__ D91@PROG S B         589 FETCH      1000001  30.286899   0.000030  37.179097
```
Scroll to the right to see additional data, as shown in the following figures:

<table>
<thead>
<tr>
<th>DBRM or D Data</th>
<th>Average Resp Time</th>
<th>Declare Total_STMT</th>
<th>Samps</th>
<th>Actv%</th>
<th>Wait%</th>
</tr>
</thead>
<tbody>
<tr>
<td>LC Package</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>S From Stmt</td>
<td>Num Type</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>___________ _</td>
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</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>DBRM or D Data</th>
<th>Average Resp Time</th>
<th>Declare Total_STMT</th>
<th>Samps</th>
<th>Actv%</th>
<th>Wait%</th>
</tr>
</thead>
<tbody>
<tr>
<td>LC Package</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>S From Stmt</td>
<td>Num Type</td>
<td></td>
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</tr>
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<td>___________ _</td>
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</tr>
</tbody>
</table>
Describe Differences between the DB2 Statements and DB2View Panels

You can access DB2 Statements panels from three different options:

■ From Option 2, DelayView, by looking for Major Category Data Delay with Minor Category DB2 Statement, then putting the cursor in the LC (line command) column and simply pressing Enter.

■ From Option 5, DataView, by looking for .DB2 in the DD Name column and DB2 Statement delay in the Dataset Name column, then entering S on the LC column.

■ From Option 6, TranView, for getting to DB2 statements for CICS monitors by determining which transaction you are interested in and then, using line command D - Delay Details simply putting the cursor at the line command and pressing Enter. This action takes you to DelayView for that transaction and from there you follow the same path described above.

Also from TranView you can select N - Data Details, which brings you to DataView for that transaction and then you can follow the same path for DataView described above.

The displays from TranView are different than those from DelayView and DataView because they are intended to be specific to the transaction and they are based on sample data only.

When you access Option 10, DB2View, the DB2 statements in this view are intercepted by the DB2 Harvester and are displayed in order of occurrence.

The DB2 Statements displays from DataView and DelayView emphasize sampled data and the initial columns are presented accordingly. Sample-based percentages are shown first and the display is sorted based on Total%. DB2View data emphasizes data intercepted by the DB2 Harvester and the initial columns are presented accordingly with the intercepted data shown first.

The DB2 Statement displays from Options 2, 5 and 10 can all alternate between showing sampled data only or all data (both sampled and intercepted by the Harvester) by using the SQL command previously described.

These displays are designed to provide a basic subset of data on initial entry then allow you to drill down through the detailed data offered by available command options. If you prefer to see different or more data on the initial screen, use the CUST command to include or exclude, order, or sort the fields available for the display. The panel presented for CUST has a HELP option; simply put H in the Line Command column next to the field you want to review and a description of the field is shown.
Field Descriptions for the DB2View Panel

The fields that are displayed on the DB2View panel are described next.

**DBRM or Package**

Is the name of a package (DBRM) that describes the SQL statement

This field is limited to eight characters. If this value exceeds eight characters, use the `D` (Statement Detail) line command to view the entire field value.

**D S**

Is the type of SQL being executed; either D for Dynamic or S for Static SQL.

**Data From**

Represents the method used to collect the SQL data being presented.

CA Mainframe Application Tuner collects data about SQL using two different methods. One is through the sampling process and the other is by the Harvester intercepting the SQL as it processes.

H indicates that this SQL data was collected by the DB2 Harvester and was not sampled as part of the sampling process. In this situation, fields that normally contain sample-based data contain zeros. Examples of those fields are `%Active` and `%Wait`.

S indicates that this SQL data was collected by the DB2 sampling SRB and was not intercepted by the DB2 Harvester. In this situation, fields that normally contain Harvester-collected data contain zeros. Examples of those fields are Call Count or any of the CPU fields, such as Total CPU.

B indicates that this SQL data was collected by both the Harvester and sampler. SQL statements that contain data from both the Harvester and the sampler provide the most complete view of that SQL statement’s performance.

*Note:* There are a number of reasons why data might not be collected by either the DB2 Harvester or the sampling process, based on the DB2 options selected during customization or by the administrator of the environment after customization.

**Stmt Num**

Is the number of the unique SQL statement that is contained in a Package or Pla.

**Type**

Indicates the type of operation that is being performed with the statement.

CA Mainframe Application Tuner displays ???????? when the DB2 control block is not yet valid. Some values for the operation type are as follows:

- OPEN
- FETCH
- CLOSE
Analyze DB2 Data

- PREPARE
- SELECT
- INSERT
- DELETE
- UPDATE

Call Count
Is the number of times during the monitoring session that CA Mainframe Application Tuner detected that this SQL statement was called from the target address space. A zero in this field indicates that this statement was not harvested by the Synchronous Data Gatherer and the data being presented was obtained by the sampling process.

The Synchronous Data Gatherer must be fully initialized before the first call to DB2 is issued. If the first call is in progress, then the Harvester will not see it. In addition, when the first call is not captured, several data fields will contain information accumulated from the start of the unit-of-work. This data is also bypassed and can result in a zero call count.

It is not uncommon for one or two rows to show zero call counts, while multi-thread environments, such as CICS, might show even more. This situation is not an error. It is an effort to provide the most accurate data possible for each call.

Total CPU
Is the amount of CPU time in seconds needed by DB2 to process all DB2 calls for this SQL statement by using sampling data collected during the measurement.

CPU-P-Call
Is the amount of CPU time in seconds needed by DB2 to process each DB2 call for this SQL statement by using sampling data collected during the measurement.

Total Resp Time
Is the total time (in seconds) for the SQL statement to be completed.

Average Resp Time
Is the average response time for the SQL statement to be completed.

Enclave CPU
Is the amount of CPU time, in seconds, for this SQL statement while it was running under an Enclave.

zIIP CPU
Is the amount of zIIP processor CPU time, in seconds, for this SQL statement.

zIIP Qualified
Is the amount of CPU that was qualified to run on a zIIP processor.
zIIP On standard

Is the amount of CPU that was qualified to run on a zIIP processor, but ran on a standard processor instead.

Section

Is the section number within the package for this statement.

Get Pages

Is the number of sequential and nonsequential GETPAGE requests issued for this SQL statement.

This field addresses selectivity of the SQL statement and might indicate clustering problems.

When a GETPAGE request is made, the Buffer Manager checks if the page is already available in the pool. A high value can indicate a low selectivity of the SQL statement (database design) or a clustering problem.

Having a lot of GETPAGEs per SQL statement indicates that indexing of additional columns might improve performance. Every time a GETPAGE results in a hit (page being located in the pool), the application can begin processing the data immediately. Reducing this number improves performance.

In some cases, using compressed data results in an increase in the number of GETPAGEs, lock requests, and synchronous read I/Os. Sometimes, updated compressed rows cannot fit in the home page, and they must be stored in the overflow page. This condition can cause additional GETPAGE and lock requests.

If a page contains compressed fixed-length rows with no free space, an updated row probably has to be stored in the overflow page. To avoid the potential problem of more GETPAGE and lock requests, add more free space within the page. To start with 10% additional free space and adjust further, as needed. If, for example, 10% free space was used without compression, start with 20% free space with compression for most cases. This recommendation is especially important for data that is heavily updated.

Pages Read From DASD

Is a calculated value that you might find useful. It is calculated as follows:

\[ \text{Sync Pages Read} + \text{Async Pages Read} \]

From DASD%

Is a calculated value that you might find useful. It is calculated as follows:

\[ \left( \left( \text{Pages Read From DASD} - \text{Additional Pages Read} \right) \times 100 \right) / \text{Get Pages} \]

Pages Read From Pools

Is a calculated value that you might find useful. It is calculated as follows:

\[ \text{Get Pages} - \left( \text{Pages Read From DASD} - \text{Additional Pages Read} \right) \]
From Pools%
Is a calculated value that you might find useful. It is calculated as follows:
\[(\text{Pages Read From Pools} \times 100) / \text{Get Pages}\]

Additional Pages Read
Is a calculated value that you might find useful. It is calculated as follows:
\[\text{Pages Read From DASD} - \text{Get Pages}\]

Index Get Pages
Is the number of Index GETPAGE requests issued for this SQL statement.

Synch Pages Read
Is the number of synchronous read pages issued for this SQL statement.
Synchronous read I/Os are one type of physical DB2 I/O. They address the effectiveness of the DB2 buffer pools.

This value is the number of synchronous I/O operations. When a logical read operation results in a buffer pool miss, a synchronous read occurs.

**Tuning Tip:** Unnecessary read I/Os are one of the principal culprits in poorly tuned applications. While random I/O cannot be avoided, critical re-referenced indexes and tables can be kept in memory. At other times, the strategy is to get the data into memory before the application needs it, typically when processing the data pages sequentially. This procedure is done with prefetch and possibly with parallel processing.

This field only appears if at least one row has a non-zero value.

Asynch Pages Read
Is the number of asynchronous pages read by prefetch operations that were issued for this SQL statement.

**Tuning Tip:** Generally, unless the application is totally random, the higher the prefetch number, the more likely it is that the data will be in memory when needed. The more successful that read-ahead buffering is, the faster the application should perform.

This field only appears if at least one row has a non-zero value.

Sequential Pre Fetch
Is the number of sequential prefetch requests that were issued for this SQL statement.
Sequential prefetch is performed concurrently with other operations of the originating application program. It brings pages into the buffer pool before they are required and reads several pages with a single I/O operation. Sequential prefetch can be used to read data pages, by table space scans or index scans with clustered data reference. It can also be used to read index pages in an index scan. Sequential prefetch allows CP and I/O operations to be overlapped.
**Tuning Tip:** A buffer pool must be at least 1000 pages to get the full benefit of sequential prefetch. In addition, a sufficient number of sequential pages must be allowed in the buffer pool assigned to the accessed table (VPSEQT parameter). Otherwise, the prefetch quantity might be reduced, or prefetch disabled.

This field only appears if at least one row has a non-zero value.

**List Pre Fetch**

Is the number of list prefetch requests that were issued for this SQL statement.

List prefetch reads a set of data pages determined by a list of RIDs (ROW IDs) taken from an index. The data pages need not be contiguous. The maximum number of pages that can be retrieved in a single list prefetch is 32 (64 for utilities). List prefetch can be used in conjunction with either single or multiple index access. List prefetch is used in the following circumstances:

- usually with a single index that has a cluster ratio lower than 80%
- sometimes on indexes with a high cluster ratio, if the estimated amount of data to be accessed is too small to make sequential prefetch efficient, but large enough to require more than one regular read
- always to access data by multiple index access
- always to access data from the inner table during a hybrid join
- usually for updatable cursors when the index contains columns that might be updated

This field only appears if at least one row has a non-zero value.

**Dynamic Pre Fetch**

Is the number of dynamic prefetch requests issued for this SQL statement.

Dynamic prefetch can reduce paging and improve performance over sequential prefetch for some data access that involves data that is not on consecutive pages.

At runtime, dynamic prefetch might or might not actually be used. Dynamic prefetch is used in prefetch situations when the pages that DB2 will access are distributed in a nonconsecutive manner. If the pages are distributed in a sufficiently consecutive manner, sequential prefetch will be used instead.

**Tuning Tip:** Normally dynamic prefetch assists programs by providing read-ahead buffering for processing; GETPAGEs that would have to wait for synchronous I/O now find the page in the buffer pool. This number should be monitored because the more dynamic prefetch requests activated, the more buffer pool resources can be strained. It might be necessary to alter the buffer pool size or sequential steal threshold to manage increased demands of dynamic prefetch.

This field only appears if at least one row has a non-zero value.
LOB Get Pages
Is the number of GETPAGE requests issued to satisfy a Large OBject column SQL request.
This field only appears if at least one row has a non-zero value.

Rows Returned or Changed
Is the number of rows that are returned by a FETCH, updated by an UPDATE, inserted by an INSERT, or returned from cache for a PREPARE.
This field only appears if at least one row has a non-zero value.

Declare Stmt
Is the statement number of the DECLARE that is associated with the statement or NA if no DECLARE is associated with the statement.

Length
Is the length of the SQL statement. The statement has had all extra spaces removed.

Parallel Subtasks
Number of parallel subtasks created on behalf of this statement. This field only appears if at least one row has a non-zero value.

Parallel Groups
Number of parallel groups executed for this SQL statement. This field only appears if at least one row has a non-zero value.

Statement Triggers
Number of times a statement trigger was activated by this SQL statement. This field only appears if at least one row has a non-zero value.

Row Triggers
Number of times a row trigger was activated by this SQL statement. This field only appears if at least one row has a non-zero value.

Re-Optimized
Number of times re-optimization occurred for this SQL statement. This field only appears if at least one row has a non-zero value.

In cache KEPDYN(Y)
Number of times that a prepare for this SQL statement was avoided because KEPDYNAMIC(YES) was used along with prepared statement caching and DB2 still had a copy of the executable version of the statement. This field only appears if at least one row has a non-zero value.
Found in cache

Number of times that a PREPARE request for this statement was satisfied by making a copy from the prepared statement cache.

Not found in cache

Number of times that a PREPARE request for this statement was received, but a matching statement was not found in the prepared statement cache.

Incremental Binds

Is the number of times DB2 executed an incremental bind to account for changes in the DBRM. This field only appears if at least one row has a non-zero value.

Requesting Location

Is the name of the location which originated this statement. This field is limited to eight characters. If this value exceeds eight characters, use the D (Statement Detail) line command to view the entire field value.

Correlation

Is the correlation ID of the DB2 thread, for example:

- for IMS, the correlation ID is the PSB name
- for CICS, the correlation ID is the transaction name
- for Batch type threads, the correlation ID is the Job Name
- for Remote and RRSAF threads, the value in this field is dependent on the requesting application

OPER ID

Is the original primary auth ID of the requesting user. This field is limited to eight characters. If this value exceeds eight characters, use the D (Statement Detail) line command to view the entire field value.

Plan

Is the plan name that describes the SQL statement. This field is limited to eight characters. If this value exceeds eight characters, use the D (Statement Detail) line command to view the entire field value.

Collection

Is the name of the group of packages that have the same qualifier. This field is limited to eight characters. If this value exceeds eight characters, use the D (Statement Detail) line command to view the entire field value.

Thread

Is the address of the Agent Control Element for this DB2 thread.
Thread Count

Is a counter, controlled by DB2, which is incremented each time the agent calls DB2. The size of this counter is two bytes and will wrap to zero and begin again when the two byte size limit is exceeded.

Requesting Job Name

Is the name of the requesting address space Job Name.

Executing Job Name

Is the name of the executing address space Job Name. For example, this name is the name of Stored Procedures address space when a CALL is executed or a FUNCTION is used.

WLM

Is the z/OS Workload Manager Service Class name for a DDF thread.

APPLENV

Is the name of the Application Environment defined for this Stored Procedure or Function. This field is limited to eight characters. If this value exceeds eight characters, use the D (Statement Detail) line command to view the entire field value.

Cursor Name

Is the name of the cursor for this SQL statement. This field is limited to eight characters. If this value exceeds eight characters, use the D (Statement Detail) line command to view the entire field value.

Routine Name

Is the qualified DB2 stored procedure name or qualified function name invoked by the application program.

The name is derived from the qualifier followed by the name as defined by the creator of stored procedure or function.

This field is limited to 17 characters. If this value exceeds 17 characters, use the D (Statement Detail) line command to view the entire field value.

Type - extended

Displays the complete 24-character call type issued with this statement as an argument. Some values for extended call type are:

- FETCH RELATIVE
- FETCH ABSOLUTE
- FETCH BEFORE
- FETCH AFTER
- FETCH ROWSET NEXT
- FETCH ROWSET RELATIVE
- FETCH ROWSET ABSOLUTE
- SET CURRENT PACKAGESET
- SET HOST VAR

Note: some fields might not be displayed automatically when data for those fields has not been collected.

Command Descriptions for the DB2View Panel

The commands available on the DB2View panel are described next.

ADDHelp
Invokes the content-sensitive Help application to update or create a help entry for the selected content.

SQL all/sampled
Switches between sample-based statements (which CA Mainframe Application Tuner measured), or intercept-based data (all statements that executed). The current display mode is indicated by SQL: field

SEQUence
Switches between how the data is sorted (by measured activity or sequence of EXECUTION) and is shown in the Sort: field.

Select (S)
Is the SQL Statements panel, which shows the full text of the selected SQL statement.

Show Declare (SD)
Is the DECLARE Statement panel, which show the DECLARE statement coded by the application programmer for this DB2 verb.

This line command is valid for OPEN, FETCH, and CLOSE statements and UPDATE/DELETE statements that contain the clause WHERE CURRENT OF <cursor_name>. This command is not valid when DB2NOCAT=YES is specified. Customization for the Explain function must be completed.

Explain (E)
Interacts with the Explain panel for the SQL statement. Customization for the Explain function must have been completed.
Code Details (C)
Displays the CodeView Detail panel. The CodeView Detail panel reports the activity of each Module and CSECT that is associated with the selected DB2 plan/package name and statement number (as active and wait percentages of all samples in the monitor data set).

From the Code Detail panel, you can create a Histogram showing the locations within a CSECT where delays occurred, or you can list the types of delay found within a CSECT.

Explain Information (I)
Displays the messages that are generated based on the results of the DB2 EXPLAIN command. For more information, see Displaying Messages.

If the statement has an associated DECLARE CURSOR indicated by a number in the Declare Stmt column, the Explain data will be from the DECLARE CURSOR and not from the statement itself.

Statement Detail (D)
Displays the contents of the row in tabular format in the DB2 Statement Detail panel. Each field name and its value are shown. Zero, blank, and N/A entries are skipped.

If a long name value exists, you can then use line command N from the DB2 Statement Detail panel to display the complete long name.
Display Statement Details and Long Names

1. Type D in the LC field on either the DB2 Statements panel or the DB2View panel and press Enter.

   The DB2 Statement Detail panel displays.

```
CA MAT ---------------- DB2 Statement Detail ----------- Row 3 to 24 of 38
COMMAND === SCROLL === PAGE
Primary Commands: SQL - Display SQL Text            Profile: PROFT9
             Options: NORMAL
Line Commands: N - Display Long Name               DB2 SSID: DIA3
             DB2 Rel: 9.1.0
LC Field Name       Field Value
________________ ___________________________________________________________
-------------------------------------------------------------------------------
Location         DIA                                     
Plan             D91PRG                                  
Collection       D91PROGZ_BIG_PACKAGE_LITTLE_PACKAGE_PACKAGE_LONGER_AND_LONG 
Package          D91PROG                                 
Section Number   2                                       
Stmnt Number     425                                     
Statement        OPEN                                    
SQL Type         Static                                  
Total Count      1                                       
Total CPU        15.123193                               
CPU per Call     15.123193                               
Total Resp Time  34.591737                               
Avg Resp Time    34.591737                               
Enclave CPU      15.124186                               
Get Pages        69340                                  
Pages from DASD  47598                                  
From DASD%       68.64                                  
Pages from Pools 21742                                
From Pools%      31.36                                  
Index Get Pages  2                                       
Sync Read I/O    1217                                   
Async Pages Read 46381                                
SEQ Pre Fetch    2448                                   
Declare Stmnt    769                                    
Length           46                                      
Correlation      USRDB2T9                               
OPER ID          USRMMMI                                 
Thread           1CEF5088                                
Thread Count     7086                                   
Req Job Name     USRDB2T9                               
Exec Job Name    USRDB2T9                               
Cursor Name      BT_D91PROG_CURSOR_FOR_TESTING_LONG_NAMES 
Unique Samps     1                                       
Total Samps      358                                    
Max Conc Samps   1                                       
Active%          4.51                                    
Wait%            1.92                                    
Total%           6.44                                    
*********************************************************************** End of Table ***********************************************************************
```
This panel displays the contents of the row in tabular format. It shows each field name and its value. Zero, blank, and N/A entries are skipped.

You can use the SQL command to view the full text of the selected SQL statement in the SQL Statements panel.

If a long name value exists, you can use line command N to view the DB2 Long Name panel.

<table>
<thead>
<tr>
<th>Field Name: Collection</th>
<th>Profile: DB2STRP</th>
</tr>
</thead>
<tbody>
<tr>
<td>D81PROGZ_BIG_PACKAGE_LITTLE_PACKAGE_PACKAGE_LONGER_AND_LONGER_AND_LONGER_AND_LONGER_AND_LONGER_AND_LONGER_AND_STILL_LONGER</td>
<td></td>
</tr>
</tbody>
</table>

This panel shows the complete long name and the field name for the selected field.

**Display a DECLARE Statement**

1. Type SD in the LC field on the DB2 Statements panel and press Enter.

   The DECLARE Statement panel displays.

   The SD line command is valid for OPEN, FETCH, and CLOSE statements and UPDATE/DELETE statements that contain the clause WHERE CURRENT OF <cursor_name>.
Customization for the Explain function must be completed.

```
CA MAT ------------------- DECLARE Statement -------------- Row 1 to 9 of 9
COMMAND ===> SCROLL ===> PAGE

DBRM name: D91PROG                                   Profile: PROFT9
Statement: 769                                      DB2 SSID: DIA3
Timestamp: 09.035 12:46:13                           DB2 SSID: 9.1.0

SQL Text

```

This panel shows the DECLARE statement that is coded by the application programmer for this DB2 verb.

**Explain Function**

As a complement to workload analysis, CA Mainframe Application Tuner provides an integrated DB2 Explain function.

CA Mainframe Application Tuner calls DB2 and issues the EXPLAIN command for both dynamic and static SQL.

CA Mainframe Application Tuner issues an SQL EXPLAIN command for the statements found during the Monitor process. The command is executed on a thread created by CA Mainframe Application Tuner to the DB2 subsystem that the target address space is attached to. This thread is independent of the target job being monitored.

Consequently, if objects such as tables are DROPped, ALTERed, or CREATEd while the job is being monitored, the DB2 EXPLAIN command might receive a return code of -204 (Undefined Name) or possibly, after an ALTER, a -206 (name is not valid in the context where it is used).

You can display additional key information about the SQL statement by using the Explain line command (E) on either the DB2 Statements panel or the SQL Statements panel. You can see useful information in the following areas:

- Statistical and textual information about the access path
- Suggestions about how to improve SQL statement performance
See Viewing an Explained SQL Statement to see an example of the output from the Explain line command.

The source of the SQL statements that are explained is dependant on several TUNSSP00 settings. If the installation recommendations were followed, static SQL is extracted from the DB2 catalog and explained. Dynamic SQL is extracted from internal DB2 objects and then passed to the EXPLAIN command.

The two TUNSSP00 settings that control whether or not the EXPLAIN command is issued are shown next.

**DB2EXPL**

Requests that information regarding DB2 access path selection be obtained from DB2 SQL statements by issuing the EXPLAIN command and externalizing the data.

The call for Explain data is made while the address space is being measured. Specifying DB2EXPL=YES indicates that Explain data will be collected for each dynamic SQL statement and all SQL statements in a DBRM or package. DB2EXPL=NO indicates no DB2 Explain data is to be gathered. BATCH indicates DB2 Explain data is collected only for batch jobs and not for online systems, such as CICS.

Explain will be performed for all static SQL found in the DBRM or package, as bound into the DB2 catalog. When DB2CTSQL=NO (do not access the DB2 catalog for SQL) is specified, the statement that is explained is derived from internal DB2 objects.

Dynamic SQL is always explained from SQL derived from internal DB2 objects.

The default is DB2EXPL=NO.

**DB2HEXPL**

Requests that information regarding DB2 access path selection be obtained from DB2 SQL statements that were extracted using the Synchronous Data Gatherer.

DB2HEXPL=YES must be specified in conjunction with this option.

Specifying DB2HEXPL=YES indicates that Explain data will be collected for each dynamic SQL statement and all SQL statements in a DBRM or package that are seen by the Synchronous Data Gatherer. DB2HEXPL=NO indicates that no DB2 Explain of the harvested SQL is performed.

This statement is only valid when DB2HVSQL=YES (harvest all SQL) or DB2HVSQL=NO and DB2HVDYN=YES (harvest only dynamic SQL) are specified.

The default is DB2HEXPL=NO.

CA Mainframe Application Tuner uses the DB2 EXPLAIN command to acquire access path data. The DB2 EXPLAIN command uses three tables to store this information. The table names used by the EXPLAIN command are:

- PLAN_TABLE
- DSN_STATEMNT_TABLE
- DSN_FUNCTION_TABLE
The qualifier, as required by CA Mainframe Application Tuner, is CAMAT.

CAMAT.PLAN_TABLE, CAMAT.DSN_STATEMNT_TABLE, and CAMAT.FUNCTION_TABLE are created in the installation process during Step 10.

The sample BIND statements following show the package name that is required to be bound in the DB2 plan. The BIND for the DB2 plan is distributed in CEESJCL member TNCEBND.

```
DSN SYSTEM(DIA3)
   BIND PACKAGE(MAT85) MEMBER(TNMESSQLM) +
       QUALIFIER(MAT85DB2) +
       ACTION(REP) ISOLATION(CS) +
       RELEASE(COMMIT) +
       ENCODING(EBCDIC) +
       DEGREE(ANY) ENABLE(*)
   *
   ************************************************
   * BIND PERFORMANCE PRODUCTS MAIN PLAN            *
   ************************************************
   *
   BIND PLAN(MAT85DB2) +
       OWNER(DB2USR) +
       QUALIFIER(MAT85DB2) +
       RETAIN +
       ISOLATION(CS) +
       VALIDATE(BIND) +
       ACTION(REPLACE) +
       ENCODING(EBCDIC) +
       PKLIST(*.MAT85.*)
```
View an Explained SQL Statement

Type E in the LC field on the DB2 Statements panel and press Enter. The Explain panel displays.

```
<table>
<thead>
<tr>
<th>Plan Table</th>
<th>QMF</th>
<th>PLAN TABLE Selected Row: 001 OF 002</th>
</tr>
</thead>
<tbody>
<tr>
<td>CA MAT</td>
<td>EXPDBRM</td>
<td>D91PROG</td>
</tr>
<tr>
<td>CA MAT</td>
<td>EXPSTM#</td>
<td>769</td>
</tr>
<tr>
<td>QUERYNO</td>
<td>QUERY_NO</td>
<td>1296126539</td>
</tr>
<tr>
<td>QBLOCKNO</td>
<td>GRY BLK</td>
<td>3</td>
</tr>
<tr>
<td>QBLOCK_TYPE</td>
<td>EXPQTYPE</td>
<td>NCO0B</td>
</tr>
<tr>
<td>GROUP_MEMBER</td>
<td>EXPGPMEM</td>
<td>DIA3</td>
</tr>
<tr>
<td>APPLNAME</td>
<td>PLANNAME</td>
<td>D91PRG</td>
</tr>
<tr>
<td>VERSION</td>
<td>VERSION</td>
<td><strong>N/A</strong></td>
</tr>
<tr>
<td>PROGRAM</td>
<td>PROGRAM</td>
<td>D91PROG: (CA MAT Monitoring)</td>
</tr>
<tr>
<td>COLLID</td>
<td>COL_LID</td>
<td>D91PROGZ_BIG_PACKAGE_LITTLE_PACKAGE_PACKAGE_LONGE</td>
</tr>
<tr>
<td>WHEN_OPTIMIZE</td>
<td>EXPWOPT</td>
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<td>LAST_BIND_TIME</td>
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<td>2009-02-04-07.46.20.199913</td>
</tr>
<tr>
<td>PLANNO</td>
<td>QBLKSTEP</td>
<td>1</td>
</tr>
<tr>
<td>METHOD</td>
<td>METH ...</td>
<td>0: (First Table Accessed)</td>
</tr>
<tr>
<td>TNAME</td>
<td>TABLNAME</td>
<td>DB2DATA</td>
</tr>
<tr>
<td>TABNO</td>
<td>........</td>
<td>3</td>
</tr>
<tr>
<td>CREATOR</td>
<td>CREATOR</td>
<td>RDWM91</td>
</tr>
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</table>
```
<table>
<thead>
<tr>
<th>Explain Function</th>
<th>Chapter 10: Using the Product in a DB2 Environment 319</th>
</tr>
</thead>
<tbody>
<tr>
<td>ACCESS_TYPE ...... TYPE ...</td>
<td>R: (TableSpace Scan)</td>
</tr>
<tr>
<td>ACCESS_CREATOR .........</td>
<td><strong>N/A</strong></td>
</tr>
<tr>
<td>ACCESS_NAME ...... INDEX ...</td>
<td><strong>N/A</strong></td>
</tr>
<tr>
<td>MATCH_COLS ...... MCOL ...</td>
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</tr>
<tr>
<td>INDEXONLY ...... I ......</td>
<td>NO</td>
</tr>
<tr>
<td>MIXOPSEQ ...... MULT_IDX</td>
<td>0</td>
</tr>
<tr>
<td>SORTN UNIQ ...... S N U ...</td>
<td>NO</td>
</tr>
<tr>
<td>SORTN JOIN ...... S N J ...</td>
<td>NO</td>
</tr>
<tr>
<td>SORTN ORDERBY ...... S N O ...</td>
<td>NO</td>
</tr>
<tr>
<td>SORTN GROUPBY ...... S N G ...</td>
<td>NO</td>
</tr>
<tr>
<td>SORTC UNIQ ...... S C U ...</td>
<td>NO</td>
</tr>
<tr>
<td>SORTC JOIN ...... S C J ...</td>
<td>NO</td>
</tr>
<tr>
<td>SORTC ORDERBY ...... S C O ...</td>
<td>NO</td>
</tr>
<tr>
<td>SORTC GROUPBY ...... S C G ...</td>
<td>NO</td>
</tr>
<tr>
<td>TSLOCK_MODE ...... LCK_MOD</td>
<td>IS: (Intent Share LOCK)</td>
</tr>
<tr>
<td>PREFETCH ...... P F ....</td>
<td>S: (Sequential PREFETCH can be used)</td>
</tr>
<tr>
<td>COLUMN_FN_EVAL ...... COLFNEVL</td>
<td><strong>N/A</strong>: (Evaluation Time Unknown)</td>
</tr>
<tr>
<td>ACCESS DEGREE ...... EXPACDGR</td>
<td>NULL value</td>
</tr>
<tr>
<td>ACCESS_PGROUP_ID ...... EXPACPPGP</td>
<td>NULL value</td>
</tr>
<tr>
<td>JOIN DEGREE ...... EXPJODGR</td>
<td>NULL value</td>
</tr>
<tr>
<td>JOIN_PGROUP_ID ...... EXPJOPGP</td>
<td>NULL value</td>
</tr>
<tr>
<td>SORTC_PGROUP_ID ...... EXPSTCPG</td>
<td>NULL value</td>
</tr>
<tr>
<td>SORTN_PGROUP_ID ...... EXPSTNPG</td>
<td>NULL value</td>
</tr>
<tr>
<td>PARALLELISM_MODE ...... EXPPOEMODE</td>
<td>NULL value</td>
</tr>
<tr>
<td>JOIN_TYPE ...... EXPJTYPE</td>
<td><strong>N/A</strong>: (Inner JOIN or No JOIN)</td>
</tr>
<tr>
<td>MERGE_JOIN_COLS ...... EXPMERGC</td>
<td>NULL value</td>
</tr>
<tr>
<td>CORRELATION_NAME ...... EXPCORMM</td>
<td>A</td>
</tr>
<tr>
<td>PAGE_RANGE ...... EXPPRNGE</td>
<td><strong>N/A</strong></td>
</tr>
<tr>
<td>OPTHINT ...... EXPOPTHN</td>
<td><strong>N/A</strong></td>
</tr>
<tr>
<td>HINT_USED ...... EXPHINTU</td>
<td><strong>N/A</strong></td>
</tr>
<tr>
<td>PRIMARY_ACCESS ...... EXPPMAC</td>
<td><strong>N/A</strong></td>
</tr>
<tr>
<td>TIMESTAMP ...... TIMSTAMP</td>
<td>200902041125462</td>
</tr>
<tr>
<td>REMARKS ..........</td>
<td><strong>N/A</strong></td>
</tr>
</tbody>
</table>
| ******************************************* End of Table *******************************************
Information on the Explain Panel

You can find out additional information about Explain and how its output can help you make performance evaluations of a particular SQL statement in the IBM® manual, *DB2 Application Programming and SQL Guide*. A partial list of the key issues you should attempt to resolve for long-running or often-used SQL is shown next.

**Index matching did not work**

An index was available for the table that was accessed, but no matching columns were found.

This situation is often a result of a difference in the length of the data item in the program and the length of the column in the DB2 table.

**Not using Sequential Prefetch**

Sequential Prefetch reads multiple pages of a table into the buffer pool with a single I/O operation.

This situation significantly reduces delays for SQL access when large amounts of data are accessed.

**Not using List Prefetch**

List Prefetch is a way of accessing data pages efficiently.

List Prefetch can be used in conjunction with either single or multiple index access.

**Not specifying parallel operations**

Parallel operations specify that pages of a partitioned table might be prefetched by using multiple I/O streams.

This solution improves access significantly.
**Display Messages**

Type I in the LC field on the DB2 Statements panel and press Enter.

The Explain Information panel displays.

<table>
<thead>
<tr>
<th>CA MAT</th>
<th>Explain Information</th>
<th>COMMAND</th>
<th>SCROLL</th>
<th>Row 1 to 20</th>
</tr>
</thead>
<tbody>
<tr>
<td>DBRM name: D91PROG</td>
<td>Profile: PROFT9</td>
<td>Statement: 769</td>
<td>DB2 SSID: DIA3</td>
<td></td>
</tr>
<tr>
<td>Stmt type: DECLARE</td>
<td>DB2 Rel: 9.1.0</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Line commands: H - Display Help Text

LC Rule Text

- **TE0000** Step No. 1 is accessing RDWM91.DB2DATA.
- **TE0002** This table is not being accessed with an index.
- **TE0003** This is the first table in the query.
- **TE0011** The table will be accessed using a tablespace scan. Every page in the tablespace will be scanned by DB2 to provide an answer.
- **TE0012** Note: Unless this statement is retrieving most of the rows in this table, consider adding an index on the most restrictive columns in the predicate. Examine the columns in the indexes on this table and add them to the predicate if possible.
- **TE0026** The table data pages will be accessed to satisfy this portion of the query. This requires additional overhead.
- **TE0043** The data will be retrieved using Sequential Prefetch.
- **TE0046** Column function evaluation is not used or column function evaluation will be determined at execution time.

The Explain Information panel displays messages that are generated based on the results of the DB2 EXPLAIN command.

The statement has an associated DECLARE CURSOR indicated by a number in the Declare Stmt column, the Explain data will be from the DECLARE CURSOR and not from the statement itself.
DB2 Data Collection

CA Mainframe Application Tuner can gather and display data from SQL statements. The gathered data provides valuable information about performance and resource use of DB2 applications. With CA Mainframe Application Tuner, you do not require expensive DB2 SQL traces to gather data. CA Mainframe Application Tuner collects all relevant performance measurements in real time for every SQL statement that is executed in a DB2 subsystem.

The collected data is then summarized and stored for analysis. This method of collecting data provides detailed information about the performance and resource usage of DB2 applications, while avoiding the costly overhead and large volumes of data that is associated with other DB2 performance aids.

CA Mainframe Application Tuner collects data from DB2 internal objects and the DB2 catalog. Beginning with version 8.1, DB2 maintains some character information in UNICODE. This data is stored using a code page of 1208, which is similar to ASCII for characters with a numeric representation below 128.

In order to convert this information to a more readable EBCDIC format, CA Mainframe Application Tuner provides the ability to convert code page 1208 to one of the following code pages:

-1, 37, 273, 274, 277, 278, 280, 281, 284, 285, 297, 500, 871, and 1047

The code page specified should match that of the DB2 subsystems that will be monitored. To specify the code page in the TUNSSP00 member, use the following parameter described next:

**DB2TCSID**

UNICODE translation code page.

Translate data from UNICODE code page 1208 into the code page specified.

Supported code page values are -1, 37, 273, 274, 277, 278, 280, 281, 284, 285, 297, 500, 871, and 1047.

The default is DB2TCSID=-1. (-1 is equivalent to code page 37.)

CA Mainframe Application Tuner uses three methods of data collection to obtain DB2 data:

- Asynchronous sampling
- Background DB2 catalog extraction
- The Synchronous Data Gather
**DB2 Asynchronous Sampling**

Sampling for DB2 is the same as sampling for any other target. At specified intervals, data is collected about the target. The more samples collected from the same location within the target, the better areas that might have tuning opportunities are identified. For DB2, the area within the target is identified by a DB2 SQL statement. The more samples that are taken during the execution of a SQL statement, the higher the probability that a tuning opportunity exists.

The principle drawback for sampling DB2 is that DB2 reuses structures. When a sample is taken there is a chance that the data in the object being sampled is left over from a previous call to DB2. CA Mainframe Application Tuner uses a number of techniques to resolve any discrepancies, but they will occur, especially when collecting the source of the SQL statement. The SQL statement is collected from other sources as well as sampling; therefore, CA Mainframe Application Tuner provides two commands in the TUNSSP00 member to suppress the collection of SQL from the sampling process.

**DB2SPSQL**

Collect the SQL statement during the sample process.

A data record is written with the SQL found in internal DB2 control blocks for the address space being monitored.

The following are valid responses:

- **YES** will collect the SQL statement during the sample process.
- **NO** will not collect the SQL statement during sampling.

The default is **DB2SPSQL=YES**.

**DB2SPDYN**

Collect dynamic SQL statement during sampling if DB2SPSQL=NO.

A data record is written with the dynamic SQL statement found in internal DB2 control blocks for the address space being monitored. **YES** will produce the dynamic SQL statement each time a call to DB2 is sampled and the SQL statement is determined to be dynamic.

**Note:** When **DB2SPSQL=**YES is specified, **DB2SPDYN=** is ignored.

The following are valid responses:

- **YES** will collect the dynamic SQL statement during the sample process.
- **NO** will not collect the dynamic SQL statement during the sample process.

The default is **DB2SPDYN=NO**.

Sampling is not the only source of the SQL statement.
Background DB2 Catalog Extraction

DB2 maintains information about applications requesting DB2 services in its catalog. The SQL statements contained in a package or DBRM, for example, are stored by the BIND process. This information, along with table statistics and other data, is used to determine an optimum access path to execute the SQL statement.

CA Mainframe Application Tuner can access the DB2 catalog to obtain static SQL statements and collect access path information through the DB2 EXPLAIN process. This process runs as a background function and can run longer than the actual monitor, especially if a great deal of dynamic SQL is present or a DBRM or package contains many SQL statements.

For static statements, obtaining the SQL statement from the DB2 catalog is more reliable than the sample process. The statement that is stored in the DB2 catalog is the same statement coded in the application with extraneous spaces and HOST variables removed. For performance reasons, CA Mainframe Application Tuner extracts the SQL statements from the DB2 catalog for each package or DBRM encounter during sampling. This can become an issue if the package or DBRM is used for many functions and contains SQL that is not always used by every program. The result is an extended monitor while CA Mainframe Application Tuner extracts the SQL and obtains access path information for each statement.

In order to access DB2, the server needs to know the plan and package that was used during the installation process. The plan and package values are specified in the TUNSSP00 member and must match the plan and package values specified in the DB2 BIND control statements.

**DB2PACK**

DB2 package name. Specify the name of the DB2 package assigned during the DB2 BIND job during customization.

The default is MATnn, where nn is the value specified for the DB2LIBS keyword (normally the release number of CA Mainframe Application Tuner).

**DB2PLAN**

DB2 plan name. Specify the name of the DB2 plan assigned during the DB2 BIND job during customization.

The default is MATnnDB2, where nn is the value specified for the DB2LIBS keyword (normally the release number of CA Mainframe Application Tuner).

If obtaining the SQL statements from the DB2 catalog is an issue, CA Mainframe Application Tuner provides a command in the TUNSSP00 member to suppress the collection of SQL from the DB2 catalog.
DB2CTSQL

SQL from DB2 catalog.

DB2CTSQL is used to determine whether or not CA Mainframe Application Tuner should extract the plan or package statements from the DB2 catalog or extract them directly from DB2 control blocks when monitoring a DB2 application.

DB2HVSQL=YES and DB2HRVST=YES should be used in conjunction with DB2CTSQL=NO since the Data Harvester collects information in a synchronous manner.

Specify whether or not to collect the SQL statement from the DB2 catalog. The following are valid responses:

YES will collect the SQL data for each plan or package sampled or harvested from the DB2 catalog.

NO will not collect the SQL statement from the DB2 catalog.

It is recommend that DB2CTSQL=YES be used.

The default is DB2CTSQL=YES.

Suppressing the collection of the SQL statements from the DB2 catalog can result in the incorrect statement being identified during the sample process.

Another function of the DB2 background processing is obtaining current access path information through the DB2 EXPLAIN process. This function is discussed in more detail in Use the Explain Function.

Synchronous Data Gatherer

The third method of data collection that CA Mainframe Application Tuner uses is the Synchronous Data Gatherer.

Data is collected (harvested) on each call to DB2 at a point when processing of the statement is near completion.

The harvested information is more reliable than sampling because data collection occurs at the same point for each call and after all DB2 objects have been fully populated.

The Synchronous Data Gatherer is activated by an entry in the TUNSSP00 member.

DB2HRVST

Synchronous Data Gatherer activation.

During initialization of the Server, this parameter prepares the environment for the Harvester to accept START and STOP exit commands.
When the DB2 Harvesters are in place, absolute DB2 counts, CPU time, and elapsed times are gathered.

The following are valid responses:

**YES** activates the DB2 Harvester facility and allows CA Mainframe Application Tuner to gather data.

**NO** prevents the activation of the DB2 Harvester facility and CA Mainframe Application Tuner will not gather data.

The default is **DB2HRVST=NO** (for no DB2 support).

Recommendation: When customizing for DB2 support, set this value to **YES**.

**Limit Harvested SQL**

As in sampling and catalog extraction, the Harvester can also obtain SQL statements. The harvested statements are from internal DB2 objects and are a more reliable source than sampling, due to the synchronous nature of the process.

There might be circumstances, however, where the harvested SQL is redundant or too voluminous to be processed efficiently. For those instances, CA Mainframe Application Tuner provides commands in the TUNSSP00 member to suppress or modify the harvesting of SQL statements.

**DB2HVSQ**

Collect harvested SQL data.

A data record is written with the SQL found in internal DB2 control blocks for the address space being monitored. **YES** will produce the SQL data record each time a call to DB2 is harvested.

The following are valid responses:

**YES** will harvest the SQL statement.

**NO** will not harvest the SQL statement.

It is recommend that **DB2HVSQ=YES** be used.

The default is **DB2HVSQ=YES**.

**DB2HVDYN**

Collect dynamic SQL data if **DB2HVSQ=NO**.

A data record is written with the dynamic SQL found in the internal DB2 control blocks for the address space being monitored.

The following are valid responses:

**YES** will collect the dynamic SQL data records.

**NO** will not collect the dynamic SQL data records.

The default is **DB2HVDYN=NO**.
Data Collection Granularity Qualifiers

During the monitor process, data is collected in an effort to pinpoint opportunities to improve performance.

In DB2, the object of interest is the SQL statement and the name of the package that it belongs to. Sometimes knowing what package the SQL statement belongs to is sufficient information in a standard batch type job, but it is not enough information in online or distributed environments. For example, in CICS, either the transaction name or the DB2 user ID might be useful.

The Synchronous Data Gatherer provides four additional data qualifies to assist in analyzing monitored SQL statements. Some of these qualifiers are automatically turned on, depending on the type of DB2 connection.

CA Mainframe Application Tuner provides these commands in the TUNSSP00 member.

DB2HVLOC

Harvest the requesting location.

The requesting location name is generally of importance for distributed DB2 threads. It can help to identify where the SQL originated from.

Most other threads will originate from the local location.

The following are valid responses:

YES - Use LOCATION as part of the key to gather information.

NO - Do not add LOCATION to the key.

The default is DB2HVLOC=YES.

DB2HVCOR

Use correlation ID as part of the key.

Collect the DB2 correlation ID for the DB2 data in both the Harvester and the sampling process.

This option adds a higher level of granularity to the DB2 data being collected.

For IMS, the correlation ID is the PSB name.

For CICS, the correlation ID is the transaction name.
For Batch type threads, the correlation ID is the job name.
For remote and RRSAF threads, the value in this field is dependent on the requesting application.
The following are valid responses:

**YES** - Use the DB2 correlation ID in building the key.
**NO** - Do not add correlation ID to the key.
The default is DB2HVCOR=YES.

**DB2HVIID**
Use operator ID as part of the key.
Collect the DB2 primary operator ID for the DB2 data in both the Harvester and the sampling process.
This option adds a higher level of granularity to the DB2 data being collected.
The following are valid responses:

**YES** - Use the DB2 operator ID in building the key.
**NO** - Do not add operator ID to the key.
The default is DB2HVIID=YES.

**DB2HVTHD**
Use thread address as part of the key.
Add the DB2 Thread Agent Control Element address to the data being collected by the Harvester and the sampling process.
The following are valid responses:

**YES** - Use the DB2 thread address in building the key.
**NO** - Do not add the DB2 thread address to the key.
The default is DB2HVTHD=YES.

**Use Summarization for Harvested Data**

The Synchronous Data Gatherer harvests SQL statements as they pass through the DB2 system. When a statement appears to be the same statement as the previous call, the information is summarized until a new, un-matching, statement is encountered. This process works efficiently as long as like statements appear one after another, such as repeated FETCHs. When an application produces calls that repeat in a larger cycle, such as FETCH followed by UPDATE, the amount of data collected can be extensive.

To assist in reducing the impact of repetitive SQL statements, the Synchronous Data Gatherer provides a table summarization function for the harvested data. The size of table is determined by the value supplied by the DB2HVSUM command in the TUNSSP00 member.
DB2HVSUM

Allow for the construction of an internal table that will be used to summarize repetitive harvested DB2 data.

The numeric value specified represents the number of data rows that will be stored internally. Each time the Harvester is activated, this table will be searched sequentially to determine if there is a like row present. If the key values of the row are equal, then the data is added to the existing row. If no matching row is found, then a new row is added to the table. When the table is full, the row at the bottom of the table is sent to the monitor file and the new row is placed into the table at that location.

The number of slots is an arbitrary value that should be derived by an estimation of the looping process within a DB2 application and the number of times that application will execute during the monitor cycle. If the largest program executes 25 calls to DB2 before looping back to execute the 25 calls again and is executed many times in a row, then a value of DB2HVSUM=25 would insure that the calls for the application that were made during the monitor session would be summarized before being written.

Part of the summarization key is the SQL statement itself, so that uniquely dynamic calls will not benefit from summarization.

When SQL records are requested along with summarization, the SQL is only written once to reduce the amount of data written.

The value range that can be entered for DB2HVSUM is 0 through 9999.

The default is DB2HVSUM=0.

Harvester Error Processing Control

In the remote possibility that the Synchronous Data Gatherer encounters an unrecoverable problem when harvesting data, diagnostic information will be written to the operating system logrec and a message will be displayed on the server JES log.

Since some problems are repetitive in nature, the Harvester data collector has the ability to limit the number of messages displayed, as well as shutting itself down after a designated number of errors. As with other parameters, these commands are located in the TUNSSP00 member

DB2HVMXM

Abend messages.

Designate the number of abend messages that will be displayed in the server JES log if the Harvester encounters an error.

To limit the number of messages displayed in the JES log and LOGREC, use DB2HVMXM to stop the display of Harvester abend messages.
When the message count exceeds the value specified for DB2HVMXM, the following message displays:

TN3441W Max Harvester ABEND message count exceeded for pppppppp jijijiji

where

- pppppppp is the profile name.
- jijijiji is the job name being monitored.

The default is DB2HVMXM=100.

**DB2HVMXA**

Harvester abends.

Designate the number of Harvester abends that will be allowed before shutting down the collection of data.

When an error occurs, the Harvester writes diagnostic information to LOGREC and displays the following message on the server JES log:

TN3438W Harvester Abend cccccc aaaaaaaa dddddd tttttttt sssssss pppppppp jijijiji

TN3439I Harvester processing continues. pppppppp jijijiji

where

- cccccc is the abend code.
- aaaaaaaa is the next instruction address.
- dddddd is displacement of instruction.
- tttttttt is the count of abends.
- sssssss is the intercept sequence number.
- pppppppp is the profile name.
- jijijiji is the job name being monitored.

Harvesting processing continues until the maximum abend count specified by DB2HVMXA is exceeded. At this time, the following message displays:

TN3440W Max Harvester ABEND count has been exceeded. Harvester processing ended for pppppppp jijijiji

where

- pppppppp is the profile name.
- jijijiji is the job name being monitored.

When the value specified for ABEND count is reached, the Harvester will stop collecting data. If DB2HVMXA is zero, no limit is recognized.

The default is DB2HVMXA=1000.
Harvester Exits

The Synchronous Data Gatherer uses Harvester exits to collect data from DB2. Each exit has an arbitrary name that bears no relationship to its purpose. Currently, DB2 has three exits defined. They are DB2E1, DB2E2, and DB2E3.

- DB2E1 harvests data from most SQL calls to DB2 with the major exception being COMMIT.
- DB2E2 harvests data from COMMIT calls only.
- DB2E3 combines the DB2E1 and DB2E2 into a single exit for managing purposes.

Exits are started by calling a command processor specifying the name of the target DB2 subsystem and the name of the exit to start. The command processor can be called when the server starts or when a monitor session discovers processing in a DB2 address space. Once started, an exit is active until a stop command is issued or the server is shut down. If more than one server has active exits, any exit that is shared by multiple servers will remain active until the last server has issued a stop command for that exit.

In order to start the harvesting process when a monitor session discovers processing in DB2, CA Mainframe Application Tuner must know the name of the exit. The exit name is supplied in the TUNSSP00 member with the DB2HVEXT command. Any start command issued by the monitoring session will specify this exit.

Exits can also be started when the server is started. A command in the TUNSSP00 member can be used to list the DB2 subsystems to which the start command should be issued. There is a command for each exit currently defined for DB2.

**DB2HVEXT**

Exit name.

Specify the name of the exit to be used when a Harvester is started during a monitor session.

The following are valid values:

- DB2E1 — harvest non-COMMIT SQL calls to DB2 (see also DB2HVSE1 below)
- DB2E2 — harvest only COMMIT calls to DB2 (see also DB2HVSE2 below)
- DB2E3 — harvest both COMMIT and other SQL calls to DB2 (see also DB2HVSE3 below)
Recommendation:

- Use the default parameter, DB2E3, to collect the most complete data.
- When using the default, you should also review DB2HVSE3 to define the DB2 subsystems where you would like CA Mainframe Application Tuner to implant the DB2 Harvester during startup processing.

The default is DB2HVEXT=DB2E3.

DB2HVSE1

Plant DB2 Harvester exit DB2E1 at server start.

Use this parameter to avoid losing some data related to the first call to DB2. This parameter allows the Server initialization process to implement the Harvester exit during startup.

Specify a list up to 12 DB2 subsystems that a Harvester START command can issue for the DB2E1 exit.

The format is DB2HVSE1=ssid,ssid,ssid,...

This parameter should only be used when DB2HVEXT=DB2E1 is specified.

There is no default.

DB2HVSE2

Plant DB2 Harvester exit DB2E2 at server start.

Use this parameter to avoid losing some data related to the first call to DB2. This parameter allows the Server initialization process to implement the Harvester exit during startup.

Specify a list up to 12 DB2 subsystems that a Harvester START command can issue for the DB2E2 exit.

The format is DB2HVSE2=ssid,ssid,ssid,...

This parameter should only be used when DB2HVEXT=DB2E2 is specified.

There is no default.

DB2HVSE3

Plant DB2 Harvester exit DB2E3 at server start.

Use this parameter to avoid losing some data related to the first call to DB2. This parameter allows the Server initialization process to implement the Harvester exit during startup.

Specify a list up to 12 DB2 subsystems that a Harvester START command can issue for the DB2E3 exit.
The format is DB2HVSE3=ssid,ssid,ssid,...

This parameter should only be used when DB2HVEXT=DB2E3 is specified.
Note: DB2HVEXT=DB2E3 is the default.

There is no default.

Using DB2E1 and DB2E2 together as opposed to DB2E3, allows the flexibility of stopping one exit without affecting the other. For example, in a transaction environment such as CICS, COMMITS are generated by the DB2 subsystem when a transaction reaches a synchronization point. This situation can generate more information than is useful. To fix this problem, the COMMIT exit can be stopped or not started without affecting the harvesting of other SQL calls.

Manually Starting and Stopping Harvester Exits

The Synchronous Data Gatherer harvesting exits can be started or stopped by using a server MODIFY command.

To start a Harvester exit on a given processor

Enter the following command on a z/OS console:

F server,HARVESTER,START,ssid,exit

where

- server is the server name.
- ssid is the DB2 subsystem ID.
- exit is the Harvester exit name (DB2E1, DB2E2, or DB2E3).

HARVESTER can be abbreviated as HAR.

Example:

F MATUNER,HARVESTER,START,DIA3,DB2E1

The following messages will be displayed on the z/OS console:

TS0020I CA MAT Synchronous Data Gatherer Harvesting has been activated. MATUNER START
TS0003I CA MAT Token = 1200C3B4CD11A96C7594282CB500000001040003
TS0019I CA MAT Synchronous Data Gatherer command processing completed. MATUNER START

If the exit is already active for any server, the following messages will be displayed:

TS0019I CA MAT Synchronous Data Gatherer command processing completed. MATUNER START
TN3431I Harvester command processed for: START,DIA3,DB2E1
To stop a Harvester exit on a given processor

Enter the following command on a z/OS console:

```
F server,HARVESTER,STOP,ssid,exit
```

where

- `server` is the server name.
- `ssid` is the DB2 subsystem ID.
- `exit` is the Harvester exit name (DB2E1, DB2E2, or DB2E3).

Example:

```
F MATUNER,HARVESTER,STOP,DIA3,DB2E1
```

The following messages will be displayed on the z/OS console:

```
TS0021I CA MAT Synchronous Data Gatherer Harvesting has been deactivated. MATUNER STOP
TS0003I CA MAT Token = 1200C3B4CD11A96C7594282CB500000001040003
TS0019I CA MAT Synchronous Data Gatherer command processing completed. MATUNER STOP
TN3431I Harvester command processed for: STOP,DIA3,DB2E1
```

If the exit is active for another server, the following messages will be displayed:

```
TS0019I CA MAT Synchronous Data Gatherer command processing completed. MATUNER STOP
TN3431I Harvester command processed for: STOP,DIA3,DB2E1
```

If the exit has not been started, the following messages will be displayed:

```
TS0023I CA MAT Synchronous Data Gatherer Harvesting has not been started. MATUNER STOP
TS0019I CA MAT Synchronous Data Gatherer command processing completed. MATUNER STOP
TN3431I Harvester command processed for: STOP,DIA3,DB2E1
```

To list active and inactive Harvester exits on a given processor

Enter the following command on a z/OS console:

```
F server,HARVESTER,LIST
```

where `server` is the server name.
A display similar to the following will be sent to the z/OS console:

TS0031I CA MAT Synchronous Data Gatherer System DIA3 is active.
TS0031I CA MAT Synchronous Data Gatherer Target DIA3DBM1 is active.
TS0031I CA MAT Synchronous Data Gatherer HVCode DB2E3 is inactive.
TS0031I CA MAT Synchronous Data Gatherer Server TRI85MM is inactive.
TS0031I CA MAT Synchronous Data Gatherer HVCode DB2E1 is active.
TS0031I CA MAT Synchronous Data Gatherer Server TRI85KM is active.

**Display DB2 Server Settings**

Z/OS MODIFY commands can be used to display or change most of the DB2 Harvester and data collection commands in the server.

**To change a setting**

Issue the following command:

```
F server,HARVESTER,SETFLAG,command,value
```

where

- `server` is the server name.
- `command` is one of the commands listed in the section Synchronous Data Gatherer.
- `value` is the new value.

DB2HVSUM, DB2HVSE1, DB2HVSE2, and DB2HVSE3 cannot be modified.

Example:

```
F MATUNER,HARVESTER,SETFLAG,DB2HVLOC,NO
```

The following messages will be displayed in the server JES log:

TN3443I The old setting for DB2HVLOC was YES
TN3444I The new setting for DB2HVLOC is NO
TN3431I Harvester command processed for: SETFLAG,DB2HVLOC,NO

**To display a setting**

Issue the following command:

```
F server,HARVESTER,SHOWFLAG,command
```

where

- `server` is the server name.
- `command` is one of the commands listed in the section Synchronous Data Gatherer.
Example:

F MATUNER,HARVESTER,SHOWFLAG,DB2HVLOC

The following messages will be displayed in the server JES log:

TN3445I The setting for DB2HVLOC is NO
TN3431I Harvester command processed for: SHOWFLAG,DB2HVLOC

To display all the DB2 Harvester and data collection commands in the server

Issue the following command:

F server,HARVESTER,SHOWFLAG,DB2

where server is the server name.

Example:

F MATUNER,HARVESTER,SHOWFLAG,DB2

The following messages will be displayed in the server JES log:

TN3445I The setting for DB2TCSID is -1
TN3445I The setting for DB2SPSQL is YES
TN3445I The setting for DB2SPDYN is NO
TN3445I The setting for DB2PLAN is MAT85DB2
TN3445I The setting for DB2PACK is MAT85
TN3445I The setting for DB2CTSQL is YES
TN3445I The setting for DB2EXPL is YES
TN3445I The setting for DB2HEXPL is YES
TN3445I The setting for DB2HRVST is YES
TN3445I The setting for DB2HVLOC is NO
TN3445I The setting for DB2HVCOR is YES
TN3445I The setting for DB2HVIID is YES
TN3445I The setting for DB2HVTHD is YES
TN3445I The setting for DB2HVSQI is YES
TN3445I The setting for DB2HVDYN is NO
TN3445I The setting for DB2HVSUM is 0
TN3445I The setting for DB2HMXA is 1000
TN3445I The setting for DB2HVXMM is 100
TN3445I The setting for DB2HVEXT is DB2E3
TN3445I The setting for DB2HVSE1 is NONE
TN3445I The setting for DB2HVSE2 is NONE
TN3445I The setting for DB2HVSE3 is DB86,DB9G,DIA1,DIA2,DIA3,IA4,IA5
TN3431I Harvester command processed for: SHOWFLAG,DB2
Summary of DB2 Customization Parameters

The DB2 parameters in TUNSSP00 are designed to be hierarchical in nature. The concept is that the administrator of CA Mainframe Application Tuner can determine the site’s preference for how the data should be collected.

Either of the following methods can be chosen:

- Sampling by using the standard sampling architecture
- Interception of data from DB2 by using the Harvester

The data collected with the Sampler is based only on active or waiting samples as the samples are taken during the monitor session. Therefore, you will see active and waiting sample percentages on the DB2 displays.

The data collected with the Harvester is based on statistics that are maintained and managed by the DB2 subsystem itself. This data includes (but is not limited to) such things as CPU time, counts of the times an SQL statement is executed, buffer counts, and so on.

Data can also be collected by both the Sampler and the Harvester at the same time.

The administrator can then decide if there is a need to see all static and dynamic SQL or if there is only interest in dynamic SQL and set the appropriate options listed in the section Synchronous Data Gatherer.

Next, the administrator can determine how granular the data needs to be. Is there a need for thread, or operator or location information? If so, set the appropriate options listed in the section Synchronous Data Gatherer.

Finally, if there is a need to have Explain information for either the sampled SQL, the harvested SQL, or both, set the appropriate Explain options listed in the section Synchronous Data Gatherer.

<table>
<thead>
<tr>
<th>Harvester Parameters</th>
<th>Sampling Parameters</th>
<th>Granularity Parameters</th>
<th>Other Parameters</th>
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<tbody>
<tr>
<td>DB2HRVST</td>
<td>DB2SPSQL</td>
<td>DB2HVLOC</td>
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<tr>
<td>DB2HVSQL</td>
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<td></td>
</tr>
<tr>
<td>DB2HVDYN</td>
<td>DB2CTSQL</td>
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<tr>
<td>DB2HVMXA</td>
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<td>DB2HVMXM</td>
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<td></td>
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<tr>
<td>DB2HVSUM</td>
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<tr>
<td>DB2HEXPL</td>
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<td></td>
<td></td>
</tr>
</tbody>
</table>
DB2 Harvester and Data Collection Settings

Following lists the DB2 Harvester and data collection settings in TUNSSP00 that are used by CA Mainframe Application Tuner.

**DB2HRVST**

Synchronous Data Gatherer activation.

During initialization of the Server, this parameter prepares the environment for the Harvester to accept START and STOP exit commands.

When the DB2 Harvesters are in place, absolute DB2 counts, CPU time, and elapsed times are gathered.

The following are valid responses:

- **YES** activates the DB2 Harvester facility and allows CA Mainframe Application Tuner to gather data.
- **NO** prevents the activation of the DB2 Harvester facility and CA Mainframe Application Tuner will not gather data.

The default is **DB2HRVST=NO** (for no DB2 support).

**Recommendation**: When customizing for DB2 support, set this value to **YES**.

**DB2EXPL**

Explain data collection.

Request that information regarding DB2 access path selection be obtained from DB2 SQL statements by issuing the EXPLAIN command and externalizing the data.

The call for Explain data is made while the address space is being measured.

Explain will be performed for all static SQL found in the DBRM or package, as bound into the DB2 catalog. When **DB2CTSQL=NO** (do not access the DB2 catalog for SQL) is specified, the statement that is explained is derived from internal DB2 objects.

Dynamic SQL is always explained from SQL derived from internal DB2 objects.

---

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>DB2HVEXT</td>
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<tr>
<td>DB2HVSE1</td>
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<td>DB2HVSE2</td>
<td></td>
</tr>
<tr>
<td>DB2HVSE3</td>
<td></td>
</tr>
</tbody>
</table>

See the section Synchronous Data Gatherer for detailed information about each of these parameters.
The following are valid responses:

- **YES** indicates that Explain data will be collected for each dynamic SQL statement and all SQL statements in a DBRM or package.
- **NO** indicates no DB2 Explain data is to be gathered.
- **BATCH** indicates DB2 Explain data is collected only for batch jobs and not for online systems, such as CICS.

The default is **DB2EXPL=NO** (for no DB2 support).

**Recommendation**: When customizing for DB2 support, set this value to **YES**.

**DB2HEXPL**

Explain data from harvested SQL.

Request that information regarding DB2 access path selection be obtained from DB2 SQL statements that were extracted using the Synchronous Data Gatherer.

This statement is only valid when **DB2HVSQL=YES** (harvest all SQL) or **DB2HVSQL=NO** and **DB2HVDYN=YES** (harvest only dynamic SQL) are specified.

The following are valid responses:

- **YES** indicates that Explain data will be collected for each dynamic SQL statement and all SQL statements in a DBRM or package that are seen by the Synchronous Data Gatherer.
  - **DB2EXPL=YES** must be specified in conjunction with this option.
  - **DB2HVSQL=YES** or **DB2HVDYN=YES** is required with this option.
- **NO** indicates that no DB2 Explain of the harvested SQL is to be performed.

The default is **DB2HEXPL=NO** (for no DB2 support).

**Recommendation**: When customizing for DB2 support, set this value to **YES**.

**DB2CTSQL**

SQL from DB2 catalog.

**DB2CTSQL** is used to determine whether or not CA Mainframe Application Tuner should extract the plan or package statements from the DB2 catalog or extract them directly from DB2 control blocks when monitoring a DB2 application.

**DB2HVSQL=YES** and **DB2HRVST=YES** should be used in conjunction with **DB2CTSQL=NO** since the Data Harvester collects information in a synchronous manner.
Specify whether or not to collect the SQL statement from the DB2 catalog. The following are valid responses:

- **YES** will collect the SQL data for each plan or package sampled or harvested from the DB2 catalog.
- **NO** will not collect the SQL statement from the DB2 catalog.

It is recommend that DB2CTSQL=YES be used.

The default is DB2CTSQL=YES.

**DB2SPSQL**

Collect the SQL statement during the sample process.

A data record is written with the SQL found in internal DB2 control blocks for the address space being monitored.

The following are valid responses:

- **YES** will collect the SQL statement during the sample process.
- **NO** will not collect the SQL statement during sampling.

The default is DB2SPSQL=YES.

**DB2SPDYN**

Collect dynamic SQL statement during sampling if DB2SPSQL=NO

A data record is written with the dynamic SQL statement found in internal DB2 control blocks for the address space being monitored. **YES** will produce the dynamic SQL statement each time a call to DB2 is sampled and the SQL statement is determined to be dynamic.

**Note**: When DB2SPSQL=YES is specified, DB2SPDYN= is ignored.

The following are valid responses:

- **YES** will collect the dynamic SQL statement during the sample process.
- **NO** will not collect the dynamic SQL statement during the sample process.

The default is DB2SPDYN=NO.

**DB2HVSQL**

Collect harvested SQL data.

A data record is written with the SQL found in internal DB2 control blocks for the address space being monitored. **YES** will produce the SQL data record each time a call to DB2 is harvested.
The following are valid responses:

- **YES** will harvest the SQL statement.
- **NO** will not harvest the SQL statement.

It is recommend that DB2HVSQL=YES be used.

The default is DB2HVSQL=YES.

**DB2HVDYN**

Collect dynamic SQL data if DB2HVSQL=NO.

A data record is written with the dynamic SQL found in the internal DB2 control blocks for the address space being monitored.

The following are valid responses:

- **YES** will collect the dynamic SQL data records.
- **NO** will not collect the dynamic SQL data records.

The default is DB2HVDYN=YES.

**DB2HVEXT**

Exit name.

Specify the name of the exit to be used when a Harvester is started during a monitor session.

The following are valid values:

- **DB2E1** — harvest non-COMMIT SQL calls to DB2 (see also DB2HVSE1 below)
- **DB2E2** — harvest only COMMIT calls to DB2 (see also DB2HVSE2 below)
- **DB2E3** — harvest both COMMIT and other SQL calls to DB2 (see also DB2HVSE3 below)

**Recommendation:**

Use the default parameter, DB2E3, to collect the most complete data.

When using the default, you should also review DB2HVSE3 to define the DB2 subsystems where you would like CA Mainframe Application Tuner to implant the DB2 Harvester during startup processing.

The default is DB2HVEXT=DB2E3.
**DB2HVSE1**

Plant DB2 Harvester exit DB2E1 at server start.

Use this parameter to avoid losing some data related to the first call to DB2. This parameter allows the Server initialization process to implement the Harvester exit during startup.

Specify a list up to 12 DB2 subsystems that a Harvester START command can issue for the DB2E1 exit.

The format is `DB2HVSE1=ssid,ssid,ssid,...`

This parameter should only be used when `DB2HVEXT=DB2E1` is specified.

There is no default.

**DB2HVSE2**

Plant DB2 Harvester exit DB2E2 at server start.

Use this parameter to avoid losing some data related to the first call to DB2. This parameter allows the Server initialization process to implement the Harvester exit during startup.

Specify a list up to 12 DB2 subsystems that a Harvester START command can issue for the DB2E2 exit.

The format is `DB2HVSE2=ssid,ssid,ssid,...`

This parameter should only be used when `DB2HVEXT=DB2E2` is specified.

There is no default.

**DB2HVSE3**

Plant DB2 Harvester exit DB2E3 at server start.

Use this parameter to avoid losing some data related to the first call to DB2. This parameter allows the Server initialization process to implement the Harvester exit during startup.

Specify a list up to 12 DB2 subsystems that a Harvester START command can issue for the DB2E3 exit.

The format is `DB2HVSE3=ssid,ssid,ssid,...`

This parameter should only be used when `DB2HVEXT=DB2E3` is specified.

Note: `DB2HVEXT=DB2E3` is the default.

There is no default.

**DB2HVLOC**

Harvest the requesting location.

The requesting location name is generally of importance for distributed DB2 threads. It can help to identify where the SQL originated from.

Most other threads will originate from the local location.
The following are valid responses:
- YES - Use LOCATION as part of the key to gather information.
- NO - Do not add LOCATION to the key.

The default is DB2HVLOC=YES.

**DB2HVCOR**

Use correlation ID as part of the key.

Collect the DB2 correlation ID for the DB2 data in both the Harvester and the sampling process.

This option adds a higher level of granularity to the DB2 data being collected.

- For IMS, the correlation ID is the PSB name.
- For CICS, the correlation ID is the transaction name.
- For Batch type threads, the correlation ID is the job name.
- For remote and RRSAF threads, the value in this field is dependent on the requesting application.

The following are valid responses:
- YES - Use the DB2 correlation ID in building the key.
- NO - Do not add correlation ID to the key.

The default is DB2HVCOR=YES.

**DB2HVIID**

Use operator ID as part of the key.

Collect the DB2 primary operator ID for the DB2 data in both the Harvester and the sampling process.

This option adds a higher level of granularity to the DB2 data being collected.

The following are valid responses:
- YES - Use the DB2 operator ID in building the key.
- NO - Do not add operator ID to the key.

The default is DB2HVIID=YES.

**DB2HVTHD**

Use thread address as part of the key.

Add the DB2 Thread Agent Control Element address to the data being collected by the Harvester and the sampling process.
The following are valid responses:

- YES - Use the DB2 thread address in building the key.
- NO - Do not add the DB2 thread address to the key.

The default is DB2HVTHD=YES.

DB2HVSUM

Allow for the construction of an internal table that will be used to summarize repetitive harvested DB2 data.

The numeric value specified represents the number of data rows that will be stored internally. Each time the Harvester is activated, this table will be searched sequentially to determine if there is a like row present. If the key values of the row are equal, then the data is added to the existing row. If no matching row is found, then a new row is added to the table. When the table is full, the row at the bottom of the table is sent to the monitor file and the new row is placed into the table at that location.

The number of slots is an arbitrary value that should be derived by an estimation of the looping process within a DB2 application and the number of times that application will execute during the monitor cycle. If the largest program executes 25 calls to DB2 before looping back to execute the 25 calls again and is executed many times in a row, then a value of DB2HVSUM=25 would insure that the calls for the application that were made during the monitor session would be summarized before being written.

Part of the summarization key is the SQL statement itself, so that uniquely dynamic calls will not benefit from summarization.

When SQL records are requested along with summarization, the SQL is only written once to reduce the amount of data written.

The value range that can be entered for DB2HVSUM is 0 through 9999.

The default is DB2HVSUM=0.

DB2HVMXA

Harvester abends.

Designate the number of Harvester abends that will be allowed before shutting down the collection of data.

When an error occurs, the Harvester writes diagnostic information to LOGREC and displays the following message on the server JES log:

TN3438W Harvester Abend cccccc aaaaaaaa ddddddd tttttttt sssssss pppppppp jiiiiiiii

TN3439I Harvester processing continues. pppppppp jiiiiiiii
where

- cccccccc is the abend code.
- aaaaaaaa is the next instruction address.
- dddddddd is displacement of instruction.
- tttttttt is the count of abends.
- ssssssss is the intercept sequence number.
- pppppppp is the profile name.
- jjjjjjjj is the job name being monitored.

Harvesting processing continues until the maximum abend count specified by DB2HVMXA is exceeded. At this time, the following message displays:

TN3440W Max Harvester ABEND count has been exceeded. Harvester processing ended for pppppppp jjjjjjjj

where

- pppppppp is the profile name.
- jjjjjjjj is the job name being monitored.

When the value specified for ABEND count is reached, the Harvester will stop collecting data. If DB2HVMXA is zero, no limit is recognized.

The default is DB2HVMXA=1000.

**DB2HVMXM**

Abend messages.

Designate the number of abend messages that will be displayed in the server JES log if the Harvester encounters an error.

To limit the number of messages displayed in the JES log and LOGREC, use DB2HVMXM to stop the display of Harvester abend messages.

When the message count exceeds the value specified for DB2HVMXM, the following message displays:

TN3441W Max Harvester ABEND message count exceeded for pppppppp jjjjjjjj

where

- pppppppp is the profile name.
- jjjjjjjj is the job name being monitored.

The default is DB2HVMXM=100.
**DB2TCSID**

UNICODE translation code page.

Translate data from UNICODE code page 1208 into the code page specified.

Supported code page values are -1, 37, 273, 274, 277, 278, 280, 281, 284, 285, 297, 500, 871, and 1047.

The default is DB2TCSID=-1. (-1 is equivalent to code page 37.)

**CAFSTALL**

DB2 CAF interface timeout value.

Specify a timeout value in seconds.

When CA Mainframe Application Tuner issues calls to DB2 to obtain Explain data, CA Mainframe Application Tuner will set a timer. If the timer expires before the Explain data is returned, CA Mainframe Application Tuner assumes the DB2 region is stalled. For large DB2 systems, the default of 90 seconds might not be sufficient to return DB2 Explain data. For these cases, CAFSTALL allows the site to specify the timer amount in seconds.

Default is 90.

**DB2LIBS**

DB2 parameter member suffix.

Specify a TUNDB2xx member with this keyword.

The CAF Interface loads DB2 interface modules to obtain the SQL statement text from the DB2 catalog. For each version of DB2 you have installed at your site, you need to specify a load library where DSNHLI is located. These load libraries are in the parameter library member of TUNDB2xx, where xx is a 2-character suffix or &SYSCLONE.

Default is xx, where xx is the release number of CA MAT.

**DB2PACK**

DB2 package name.

Specify the name of the DB2 package assigned during the DB2 BIND job during customization.

This job must be run against every DB2 subsystem against which monitors will be run.

The default is MATnn, where nn is the value specified for the DB2LIBS keyword (normally the release number of CA MAT).
DB2PLAN

DB2 plan name.

Specify the name of the DB2 plan assigned during the DB2 BIND job during customization.

This job must be run against every DB2 subsystem against which monitors will be run.

The default is MATnnDB2, where nn is the value specified for the DB2LIBS keyword (normally the release number of CA MAT).
Chapter 11: Using the Product in a CICS Environment

This chapter describes the types of delays that are specific to CICS. Use this chapter along with the tables in the chapter "Tuning Your Applications" to analyze the types of delays that are specific to a CICS environment. CA Mainframe Application Tuner is compatible with CICS TS 3.1 and later releases.

CA Mainframe Application Tuner detects the delays incurred by transactions and CICS tasks in this environment. The terms *transactions* and *tasks* define units of work within CICS. A transaction might comprise a single task or several tasks.

CICS is a transaction processing system that shares the resources of the region among many concurrently executing tasks. CICS management routines control the transaction’s access to all external and internal resources, such as files, databases, storage, programs, and special CICS facilities.

This section contains the following topics:

- **Support for CICS** (see page 349)
- **Transaction Response Times** (see page 350)
- **CICS Transaction Types** (see page 350)
- **Analyze CICS Data** (see page 351)
- **CICS Summary Statistics** (see page 364)
- **Summary Statistics Panels** (see page 366)
- **CICS Transaction Statistics** (see page 382)
- **Transaction Statistics Panels** (see page 383)
- **CICS Idle Time** (see page 396)

**Support for CICS**

This chapter includes several CICS features that are supported only for CICS TS 3.1 and later releases:

- CICS summary statistics
- CICS transaction statistics
- CICS Idle Time
Transaction Response Times

If you attempt to use these features in a pre-CICS TS 3.1 environment, you will receive an Invalid Release message.

If you use an earlier release of CICS, refer to the previous release of this User Guide.

For configuration of these features, see the Installation Guide.

Messages for CICS TS 3.1 and later environments and pre-CICS TS 3.1 environments are documented separately in Chapter 5 of the Message Reference Guide.

Transaction Response Times

CICS transaction response times are affected by these major factors:

- **System response time** - depends on the implementation of the code and the speed of the processor
- **DASD response time** - generally responsible for most of the internal processing of a transaction
- **Network response time** - can be in seconds or the internal time can be a fraction of a second
  
  If the network is overloaded, you will never get good response time
  
  CA Mainframe Application Tuner helps you monitor the internal processing time of a transaction but cannot identify problems with your network
- **Existing workload** - might affect the performance because of contention for hardware resources or logical resources
- **Application design** - might affect performance because a task might use excessive resources

CICS Transaction Types

CICS has the following types of transactions:

- **Non-conversational** - a single transaction/task pair that has one input from a terminal user and returns a single output
- **Conversational** - a single transaction and corresponding task that can interact with the terminal user by using several input and output operations

  This type of work can use excessive CICS resources and risk causing enqueue delays because the task retains resources between terminal interactions.
• **Pseudo conversational** - a single transaction that might span several tasks

  This type of work benefits a system when your response time is relatively slow because CICS resources are returned to the system during think times.

• **Non-terminal** - no terminal or principal facility is associated with this task, such as tasks initiated with DPL

## Analyze CICS Data

To analyze CICS data to the SQL statement level, use the following steps to display the SQL statements for a CICS job:

1. Set up your monitoring criteria so that the Observations Requested field contains a number in the range of 3000 to 10000. See the chapter "Setting up a monitor definition" for more information about specifying monitoring criteria.

2. Invoke the monitor using the Invoke line command (I).

3. Analyze the data by using one of the analysis line commands (A, AL, AA, or AW).

4. From the Interactive Analysis menu, select Option 6.

   The TranView panel displays.

   ```
   CA MAT --------------------------- TranView ----------------- Row 2 to 7 of 7
   COMMAND ===>                                                  SCROLL ===> CSR
   Primary commands: SElect, RECall, ADDHelp                    Profile: CICSTS32
   STC - CICS Summary Stats  IDL - CICS Idle Time  Options: NORMAL
   Line commands: T - Tag   U - Untag   D - Delay Details (Auto-Navigation)
   C - Code Details      N - Data Details
   P - CallerID Details  S - Additional Tran Statistics
   LC TRAN     T D #Trans Avg RESP Avg CPU  Actv%  Data%  Other% Total% Visual
   __________ _ _ ______ ________ ________ ______ ______ ______ ______ __________
   >------------------------------------------------------------------------------
   __ MVB2       Y      1 30.25732  0.02672  12.50   3.75   0.00  16.25 =====>
   __ MVB3       Y      1 31.57696  0.04382  11.25   1.25   3.75  16.25 =====>
   __ MVB4              1 30.19894  0.01891   5.00   0.00  10.00  15.00 =====>
   __ MVB5       Y      3 30.29251  0.01075   7.50   0.00   5.00  12.50 ====>
   __ MVB1       Y      0  0.00000  0.00000   6.25   0.00   5.00  11.25 ====>
   __ CATR              1  0.01592  0.00512   0.00   0.00   1.25   1.25
   ********************************* End of Table ********************************
   ```
TranView for CICS

TranView displays activity in terms of the individual transactions detected. It divides the activity of these transactions into six major groups and displays the percentage of time each transaction spends in one of these groups. A description for each field in TranView follows.

**Tran**
Name of a transaction detected by CA Mainframe Application Tuner during the monitoring of an IMS or CICS region.

**T**
"X" indicates the transaction has been tagged for analysis.

**#Trans**
Number of times the transaction completed processing during the monitored period.

**Avg RESP**
Average time (in seconds) for this transaction during the monitored period.

**Tot CPU**
Cumulative CPU seconds for this transaction during the monitored period.

**AVG CPU**
Average CPU time required for this transaction during the monitored period.

**Actv%**
Percentage of time during the monitored period that the CPU was actively processing the monitored transaction.

**Data%**
Percentage of time during the monitored period that the transaction was delayed because of an I/O request.

**Other%**
Percentage of time during the monitored period that was not attributable to any of the categories known to CA Mainframe Application Tuner.

**Totl%**
Summation of the categories of delay.

**Visual**
Graphical representation of the total delay associated with the transaction.
Total SUs

Total amount of CPU time in service units used by this transaction.

CA Mainframe Application Tuner calculates this amount by using the following formula:

\[(\text{Tot CPU} \times 16000000) / \text{CPU Adjustment Rate}\]

The CPU Adjustment Rate can be seen on the OverView report.

Average SUs

Average number of CPU Service Units required to process a transaction.

CA Mainframe Application Tuner calculates this amount by using the following formula:

\[(\text{Avg CPU} \times 16000000) / \text{CPU Adjustment Rate}\]

The CPU Adjustment Rate can be seen on the OverView report.

CA Mainframe Application Tuner gives you flexibility when monitoring a job; you can specify user IDs, terminal IDs, and transaction codes, or use generic transaction codes on the CICS Monitoring Criteria panel to focus the monitoring on specific units of work. The data displayed in TranView represents the selected transaction only. Refer to "Additional monitoring criteria" on page 80 to see how to specify transaction code information.

Select Transactions for Analysis

TranView helps you identify the transactions on which you want to focus. If you select a transaction from TranView, CA Mainframe Application Tuner recalculates the values to reflect only the selected transactions. When you display DelayView, CodeView, and TimeView, you can see the recalculated values.

1. Type T next to the transactions that you want to select for analysis. You can select up to five transactions.
2. Press Enter.
   
   An X will be displayed in the T column indicating which transactions are selected.
3. To clear a transaction, type U next to it and press Enter.
4. Type the SELECT primary command and press Enter.
   
   The TranView panel will only show the selected transactions, with all percentages calculated for the selected transactions only.
5. To redisplay all transactions, type RECall and press Enter.
   
   The transaction **N/A** is calculated from samples representing activity not associated with any particular transaction.
CICS file (or database) accesses are usually the cause of most of the internal processing delays. CICS transactions can access any type of file but usually retrieve their data from VSAM files or a database management system such as IMS/DB or DB2®.

The VSAM response time is especially sensitive to several key definitions, including:

- Number of index buffers
- Number of data buffers
- Number of strings
- CI size
- CI and CA splits

CA Mainframe Application Tuner provides statistics on these critical parameters that can help improve the performance of a transaction.

See also "File and Database Statistics". These statistics can be used to measure the effectiveness of tuning measures (such as file I/O times).

You can access CICS VSAM files by using a facility called Local Shared Resources (LSR). This feature creates a buffer pool in the monitored program’s region that can be shared by a number of VSAM files. The number of buffers and strings that you define for the pools can critically affect a transaction’s performance. CA Mainframe Application Tuner allows you to look into your LSR pool with PoolView, which lists each group of buffers and their usage statistics.

1. From the Interactive Analysis menu, select Option 8.

   The PoolView panel displays:

   ![PoolView Panel]

2. Type S.
3. Press Enter.

The Shared Pools panel displays.

<table>
<thead>
<tr>
<th>Pool type: LOCAL</th>
<th>Profile: CICSMIX</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total pool size: 81408</td>
<td>Options: NORMAL</td>
</tr>
<tr>
<td>Hit ratio for all subpools: 67.0%</td>
<td></td>
</tr>
</tbody>
</table>

Hit ratios indicate that a significant portion of the read requests are satisfied from buffers rather than from DASD. You can relate VSAM files to a buffer pool by using the data and index Cl sizes from the DataView detail panels. If a file indicates large delays, you can alter the number of buffers that are allocated for the Cl size that the file uses.

4. To look at more detailed information about a VSAM pool, type S and press Enter.

The VSAM Pool Details panel displays. VSAM Pool Details displays the same information as shown in Shared Pools, but in a detail format.
5. To view a list of VSAM data sets that are opened by using the specified pool, type `D` and press Enter.

The Pooled Data Sets panel displays. Each of the data sets uses the buffers provided by this pool for its I/O.

<table>
<thead>
<tr>
<th>Subpool</th>
<th>Buffer Size</th>
<th>Profile</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>512</td>
<td>CICSMIX</td>
</tr>
</tbody>
</table>

The fields on the Pooled Data Sets panel are described next.

**Subpool**
- Identification number of the VSAM subpool.

**Buffer size**
- Size in bytes of each buffer in the subpool.

**DDname**
- DDNAME used to allocate the data set.

**Data Set Name**
- Full name of the data set.

**Type**
- One of the following VSAM data set types:
  - `KSDS` - a key sequenced data set that always accompanied by an INDEX component; the index component does not have to use the same subpool.
  - `ESDS` - an entry sequenced data set.

**Comp**
- One of the following types:
  - `DATA` - ntains indexing information
CISize

Control Interval Size

This field shows the unit of transfer for VSAM data to and from storage. It is always a multiple of 512 bytes.

6. Type $ next to one of the DD statements and press Enter to display an enhanced version of the Data Set Details panel.

DelayView

The best place to start looking for delays is with Option 2 on the Interactive Analysis menu. With DelayView, you can see which types of operations were executed and how much elapsed time was spent in each operation type.

For more information, see Interactive analysis option 2 – DelayView.

Overview of CICS Delay Types

This section describes the types of delays that are specific to CICS. CICS statistics, which can give insight into these delays, are discussed in CICS Summary Statistics and CICS Transaction Statistics. Warning signs and possible tuning measures are also discussed.

With autonavigation, you can go directly from a delay category to a more detailed screen that provides relevant information about the delay. For more information, see "Using Autonavigation".

An overview of the delay types that you see in a CICS environment follows along with recommendations about how to use CA Mainframe Application Tuner to find out more about why your transactions are experiencing delays.

CA Mainframe Application Tuner groups delays into major and minor categories. An overview of CICS delay categories follows.

CICS System Delays

Either CICS locks were held by the application causing delays or a function was shipped to another CICS region running in an MRO configuration.

CICS Transient Data

Transient data delays include all functions that read, write, or delete records to the transient data in VSAM data sets. Delays associated with actually performing I/O to the VSAM cluster also are included in this category.
CICS Storage Control

Storage allocated for the application includes CICS system-acquired storage for the application, such as areas for the program, data records, terminal areas, and messages. It also includes dynamically acquired user storage needed by the application.

CICS File Control/Database

This category includes the delays associated with performing I/O to CICS files or database operations. The I/O is directly requested by the application or is performed on behalf of the application by CICS.

CICS Journal Control

Journal control delays are those delays associated with performing any actions to the CICS journals. Journaling is performed on behalf of the applications.

CICS Temporary Storage

Temporary storage delays are those delays that are incurred because of read/write activity to the Temporary Storage facility of CICS.

CICS Program Control

This category includes delays incurred by the application when programs are loaded by CICS.

CICS Terminal Control

This category includes all delays incurred when reading or writing data to a terminal, all VTAM related delays, and delays caused when an application is waiting for input from the terminal user.

CICS DL/I Resources

This category includes delays related to application requests to local DL/I resources and to DBCTL regions.

The various types of CICS system delays, and the possible reasons for them are described next.

Lock delays

CICS obtains locks on behalf of the application for a variety of reasons. These locks normally exist for a short period of time. A significant delay can indicate a system definition problem.

MRO Inter-region delays

If your application uses the multiregion option of CICS, it might be delayed because you are unable to establish a session with the remote system. This delay indicates that too few sessions are available on the remote system, or, if the connection has been made, the other system is responding slowly and your request is delayed. CA Mainframe Application Tuner attempts to identify the name of the other CICS in its detail data.
The following text describes the various types of CICS transient data delays, and the possible reasons for them.

**Extrapartition Queue locked**
Application can wait when making a request to an extrapartition transient data queue because some other task is using that destination.

**TD Queue locked**
Transient data queues defined in the DCT as logically recoverable can cause delays because a subsequent task that is making a request to the same queue is forced to wait until the first application terminates or issues a synchpoint command.

**Buffer wait**
This delay occurs when all of the buffers for the transient data are in use. The application waits until a buffer becomes available.

**VSAM string wait**
This delay occurs when all of the VSAM strings for the transient data queue are in use. The application waits until a VSAM string becomes available.

**VSAM I/O wait**
This delay occurs when the transient data request is waiting for the VSAM I/O to the Transient Data VSAM file to complete processing.

**VSAM I/O buffer wait**
Brief delay that occurs when there is contention for a VSAM control interval.

The various types of CICS storage control delays, and the possible reasons for them are described next.

<table>
<thead>
<tr>
<th>Delay type</th>
<th>Reason</th>
</tr>
</thead>
<tbody>
<tr>
<td>CICS DSA</td>
<td>Any of these delays can occur when a CICS region is stressed on storage. The two most important reasons for extended storage waits occur when the program or one of its subroutines issues an unconditional GETMAIN for storage and the request is for either</td>
</tr>
<tr>
<td>USER DSA</td>
<td>a very large amount of storage</td>
</tr>
<tr>
<td>CICS EDSA</td>
<td>a reasonable amount of storage, but the system does not have the storage available because storage is fragmented or the CICS region has reached a short-on-storage condition</td>
</tr>
<tr>
<td>USER EDSA</td>
<td></td>
</tr>
<tr>
<td>CUSHION</td>
<td></td>
</tr>
</tbody>
</table>
The following table describes the various types of CICS file control delays, and the possible reasons for them.

<table>
<thead>
<tr>
<th>Delay type</th>
<th>Reason</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>VSAM buffer</strong></td>
<td>The application is waiting for a VSAM buffer that is controlled with CICS file control table definition parameters. Resolve this type of delay by increasing the number of buffers defined in the file control table.</td>
</tr>
<tr>
<td><strong>VSAM Upgrade set</strong></td>
<td>The application is attempting to read a record by using a VSAM path while another application is updating the record.</td>
</tr>
<tr>
<td><strong>File control state change</strong></td>
<td>The application is attempting to change the state of a file resource, but another task is still using the file.</td>
</tr>
<tr>
<td><strong>VSAM I/O</strong></td>
<td>The application is waiting for VSAM I/O to finish. Another job or task in the system can be updating the same file and preventing the CICS I/O from completing its processing.</td>
</tr>
<tr>
<td><strong>VSAM String wait</strong></td>
<td>The application is waiting for a VSAM string that the program or one of its subroutines is allocating to request data from a VSAM file.</td>
</tr>
<tr>
<td><strong>VSAM file recovery failed</strong></td>
<td>The file recovery failed. Because file recovery is handled by IBM routines, resolve file recovery wait problems with your systems programmer.</td>
</tr>
<tr>
<td><strong>Shared resource</strong></td>
<td>The application has requested a MASSINSERT operation and is waiting for a VSAM transaction ID to become available.</td>
</tr>
<tr>
<td><strong>VSAM exclusive control</strong></td>
<td>The application has attempted to update a VSAM file and requires exclusive control of a VSAM control interval to complete the update. This type of delay indicates a high level of concurrency of transactions that require access to the same records in the CICS system.</td>
</tr>
</tbody>
</table>

The following table describes the various types of CICS journal control delays, and the possible reasons for them.

<table>
<thead>
<tr>
<th>Delay type</th>
<th>Reason</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Subtask</strong></td>
<td>The application is waiting for journal control to submit the archiving jobs to archive the journals.</td>
</tr>
<tr>
<td><strong>Available ECB</strong></td>
<td>The application is waiting for a logical ECB. Only a specified number of ECBs is available to journal control, and the wait is due to extensive journaling activity. Allocate more ECBs by increasing the number of journals allocated to CICS.</td>
</tr>
<tr>
<td>Reason</td>
<td>Description</td>
</tr>
<tr>
<td>-------------------------</td>
<td>----------------------------------------------------------------------------------------------------------------------------------------------</td>
</tr>
<tr>
<td>Buffer unavailable</td>
<td>The application has issued a journal request and the buffer is nearly full, or the journal is unavailable because of a volume switch.</td>
</tr>
<tr>
<td>Flushing buffer</td>
<td>The application is requesting a journal close and is flushing the buffers.</td>
</tr>
<tr>
<td>I/O block</td>
<td>The application has issued a journaling request with the WAIT option and is suspended until the I/O completes processing.</td>
</tr>
<tr>
<td>I/O complete</td>
<td>The application has issued a CLOSE request for a journal and is waiting for all active I/O operations to finish before completing the CLOSE request.</td>
</tr>
<tr>
<td>JACD Get</td>
<td>The application has issued an inquiry request for a journal and the state of the journal is changing, due to switching from one journal to another. An extended delay might indicate that a journal I/O problem exists.</td>
</tr>
<tr>
<td>JACD Put</td>
<td>The application has issued a journal request and the state of the journal is changing, due to switching from one journal to another. An extended delay might indicate system I/O problems.</td>
</tr>
<tr>
<td>Switch wait reason</td>
<td>The application has issued a journal switch and is waiting for data to be written to the journal before the request can be honored. It is essentially an I/O wait.</td>
</tr>
<tr>
<td>Close done reason</td>
<td>The application is waiting for the OPEN/CLOSE subtask to complete a close request. The application cannot influence this type of delay.</td>
</tr>
<tr>
<td>Detach</td>
<td>A task has requested shutdown and is waiting for the detaching of the journal subtask from the operating system. The application cannot influence this type of delay.</td>
</tr>
<tr>
<td>Ready</td>
<td>An outstanding write to operator with reply (WTOR) is causing the application to wait. This application cannot influence this type of delay.</td>
</tr>
<tr>
<td>Request done</td>
<td>The application is waiting for an OPEN or CLOSE request that another CICS task issued.</td>
</tr>
<tr>
<td>Switch</td>
<td>A system-related delay that the application cannot influence has occurred.</td>
</tr>
<tr>
<td>Tape2</td>
<td>A system-related delay that the application cannot influence. This delay indicates that a journal tape has been opened with an open ahead request and is not ready for I/O.</td>
</tr>
</tbody>
</table>
The following table describes the types of CICS temporary storage delays, and the possible reasons for them.

<table>
<thead>
<tr>
<th>Delay type</th>
<th>Reason</th>
</tr>
</thead>
<tbody>
<tr>
<td>Auxiliary storage</td>
<td>An application has attempted an unconditional write to temporary storage but sufficient auxiliary storage is unavailable. Determine if the application is attempting to place a piece of temporary storage, which is too large, to the facility.</td>
</tr>
<tr>
<td>Buffer</td>
<td>The application has attempted to write to temporary storage and all buffers are in use. Increase the number of temporary storage buffers by altering the buffer specification in the TS initialization parameter of the CICS system.</td>
</tr>
<tr>
<td>Extend</td>
<td>An application has made a request to extend temporary storage but some other task made the same request. A long delay might indicate a device or VSAM problem.</td>
</tr>
<tr>
<td>I/O</td>
<td>The application has made a request to temporary storage and is waiting for I/O completion.</td>
</tr>
<tr>
<td>Queue</td>
<td>The application has made a request to the temporary storage queue, but the queue is already in use by another task that has a lock on the queue. Many transactions might be using the same temporary storage queue, or the same transaction has many instances running in parallel.</td>
</tr>
<tr>
<td>VSAM string</td>
<td>The application has made a temporary storage request and is waiting for a VSAM string.</td>
</tr>
<tr>
<td>Activity keypoint</td>
<td>The application is waiting for activity keypointing to complete processing. The delay can be significant when there are many temporary storage queues.</td>
</tr>
</tbody>
</table>

The following table describes the various types of CICS program control delays, and the possible reasons for them.

<table>
<thead>
<tr>
<th>Delay type</th>
<th>Reason</th>
</tr>
</thead>
<tbody>
<tr>
<td>Loader</td>
<td>The application has made a request to load another program into storage and the task has been suspended. If the application is loading the program for the first time, the delay is related to the I/O required to move the program into storage.</td>
</tr>
</tbody>
</table>
The following table describes the various types of CICS terminal control delays, and the possible reasons for them.

<table>
<thead>
<tr>
<th>Delay type</th>
<th>Reason</th>
</tr>
</thead>
<tbody>
<tr>
<td>Terminal I/O</td>
<td>The application has issued a request to read or write data to a terminal and the task is waiting until the operation completes processing.</td>
</tr>
<tr>
<td>DFHZGET failure</td>
<td>The application has requested terminal control and is waiting for completion of an internal storage control operation. Increase the amount of storage available for the CICS region.</td>
</tr>
<tr>
<td>LU62</td>
<td>The application has requested terminal control to perform an operation and an error occurred during the VTAM operation. The application cannot influence this system-related delay.</td>
</tr>
</tbody>
</table>

The following table describes the various types of CICS DL/I resources delays, and the possible reasons for them.

<table>
<thead>
<tr>
<th>Category</th>
<th>Reason</th>
</tr>
</thead>
<tbody>
<tr>
<td>PSB schedule lock</td>
<td>The application is waiting for the PSB because another task has a lock on the PSB. Too many tasks are attempting to access the same PSB.</td>
</tr>
<tr>
<td>No DL/I thread</td>
<td>The application has made a request for DL/I data and no DL/I threads are available. A DL/I thread is required to access data within IMS databases. Increase the number of DL/I threads by modifying the CICS initialization parameters.</td>
</tr>
<tr>
<td>Termination request</td>
<td>The application is in termination but another task has requested the scheduling of a PSB. The application waits until the other task completes scheduling.</td>
</tr>
<tr>
<td>No PSB space</td>
<td>The application has made a DL/I request and there is no PSB pool space available. The task has obtained a DL/I thread but the attempt to load the PSB into the pool failed because other tasks performing DL/I are using the space.</td>
</tr>
<tr>
<td>No DMB space</td>
<td>The application has made a DL/I request and no DMB pool space is available. The task has obtained a DL/I thread and the PSB has been loaded. The attempt to load the DMBs, referenced in the PSB, into the pool failed because other tasks performing DL/I are using the space.</td>
</tr>
</tbody>
</table>
CICS Summary Statistics

CICS summary statistics are normally automatically collected at regular intervals (default 1 minute) by the COLLECT_TRANSACTION (collect CICS requested statistics) - see the Installation Guide. If you want to obtain summary statistics that contain data for a given monitoring run, you need to wait until that run has completed; wait until at least 1 COLLECT_TRANSACTION has completed (message TN0846I), and then analyse summary statistics for a subsequent monitoring run.

If it has not been excluded from analysis, you can assess the impact of the COLLECT_TRANSACTION (default name is TUNC) on your system using TranView. However, the COLLECT_TRANSACTION will not appear in TranView if it has not completed during a monitor run.

Use one of the following methods to obtain the CICS summary statistics:

- Enter STC from the TranView panel.
- Select option 14 from the Interactive Analysis panel.

You will then see the CICS Summary (requested) Statistics panel shown following.

<table>
<thead>
<tr>
<th>DL/I PSB/DMB load</th>
<th>A hardware error occurred when the application attempted to load a PSB or DMB.</th>
</tr>
</thead>
<tbody>
<tr>
<td>DBCTL user wait</td>
<td>The application has made a DL/I request and is waiting for the DBCTL address space to service the request.</td>
</tr>
</tbody>
</table>

CICS Summary Statistics

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- Enter STC from the TranView panel.
- Select option 14 from the Interactive Analysis panel.

You will then see the CICS Summary (requested) Statistics panel shown following.

<table>
<thead>
<tr>
<th>CA MAT -------- CICS Summary (requested) Statistics ---</th>
<th>SCROLL --- CSR</th>
</tr>
</thead>
<tbody>
<tr>
<td>COMMAND ===&gt;</td>
<td>Place cursor on topic and press ENTER : Profile: CICSA</td>
</tr>
<tr>
<td>DISP</td>
<td>Dispatcher</td>
</tr>
<tr>
<td>JAVA</td>
<td>JAVA</td>
</tr>
<tr>
<td>PAUT</td>
<td>Program autoinstall</td>
</tr>
<tr>
<td>SDMP</td>
<td>System dumps</td>
</tr>
<tr>
<td>STOR</td>
<td>Storage (DSA)</td>
</tr>
<tr>
<td>TDQ</td>
<td>Transient Data (TDQ)</td>
</tr>
<tr>
<td>TSQ</td>
<td>Temporary Storage (TSQ)</td>
</tr>
<tr>
<td>VTM</td>
<td>VTAM</td>
</tr>
<tr>
<td>ENQ</td>
<td>Enqueues</td>
</tr>
<tr>
<td>LSRP</td>
<td>LSRP001 (by file)</td>
</tr>
<tr>
<td>LSRP001 (by pool)</td>
<td>LSRP001 (by pool)</td>
</tr>
</tbody>
</table>
The CICS Summary statistics allow you to check if problems in the CICS environment in which a given transaction runs might be affecting that transaction’s performance. These statistics can give you insight into the causes of poor transaction performance. Some examples of such problems are:

- Excessive transaction or system dumps pre-empting CICS resources
- Excessive DB2 aborts
- Storage waits
- Transaction Class queueing
- Temporary Storage waits due to insufficient strings or buffers

You can request summary statistics in the categories listed following.

<table>
<thead>
<tr>
<th>Category</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>DB2</td>
<td>DB2 statistics</td>
</tr>
<tr>
<td>DISP</td>
<td>Dispatcher statistics</td>
</tr>
<tr>
<td>JAVA</td>
<td>JAVA statistics (pool)</td>
</tr>
<tr>
<td>LOGS</td>
<td>Logstream statistics</td>
</tr>
<tr>
<td>PAUT</td>
<td>Program autoinstall statistics</td>
</tr>
<tr>
<td>RECV</td>
<td>Recovery Manager statistics</td>
</tr>
<tr>
<td>SDMP</td>
<td>System dump statistics</td>
</tr>
<tr>
<td>TDMP</td>
<td>Transaction dump statistics</td>
</tr>
<tr>
<td>STOR</td>
<td>Storage Manager statistics (DSA)</td>
</tr>
<tr>
<td>TCPI</td>
<td>TCP/IP statistics</td>
</tr>
<tr>
<td>TDQ</td>
<td>Transient data statistics</td>
</tr>
<tr>
<td>TRNM</td>
<td>Transaction Manager statistics</td>
</tr>
<tr>
<td>TSQ</td>
<td>Temporary storage statistics</td>
</tr>
<tr>
<td>URIM</td>
<td>URIMAP statistics</td>
</tr>
<tr>
<td>VTAM</td>
<td>VTAM statistics</td>
</tr>
<tr>
<td>FILE</td>
<td>FILE statistics</td>
</tr>
<tr>
<td>TCLS</td>
<td>TCLASS statistics</td>
</tr>
<tr>
<td>ENQ</td>
<td>Enqueue statistics</td>
</tr>
<tr>
<td>LSRF</td>
<td>LSRpool (by file) statistics</td>
</tr>
<tr>
<td>LRSP</td>
<td>LSRpool (by pool) statistics</td>
</tr>
</tbody>
</table>
Summary Statistics Panels

The following panels are examples of CICS summary statistics panels.

All the summary statistics panels show the following information:

- when the statistics were requested
- the last time the statistics counters were reset

Reset of requested statistics occurs when

- CICS starts
- A COLLECT STATISTICS or PERFORM STATISTICS was issued with a RESET parameter
- The expiry of a statistics interval occurs, such as at CICS midnight

*You should always check the reset time to establish the validity of the summary statistics for the desired analysis period.* Note that not all statistics are reset to zero when a reset occurs. Refer to the *CICS Performance Guide* for the reset characteristics of individual statistics fields.

Transactions do not reset any statistics counters.

The Help panels provide a description of each statistic. Refer to the *CICS Performance Guide* for more detailed information.

If the COLLECT_TRANSACTION has not been run, or if this feature has been turned off (see the *Installation Guide*), all Summary Statistics displays will show NO DATA.

DB2 Statistics

Warning signs and possible tuning criteria follow.

**Warning Signs:**

- Excessive aborts (abending transactions?)
- Excessive thread waits (insufficient pool threads?)
Possible Tuning Criteria:

Ideally, rejects and failures should be zero.

Possible Tuning Criteria:

- Reduced string waits
- Improved lookaside ratios

Use PF11/PF10 to scan right and left in the panel shown next.
Possible Tuning Criteria:

- Reduction in aborts
- Reduction in waits

Panel 1:

CA MAT ------------ CICS Statistics - DB2 -------------- Row 1 to 16 of 25
COMMAND ====>                                                   SCROLL ====> CSR
Collection Time: 2007/07/16 20:06:07   Reset Time: 00:00:00   Profile: CICSA

Panel 2:

CA MAT ------------ CICS Statistics - DB2 -------------- Row 17 to 25 of 25
COMMAND ====>                                                   SCROLL ====> CSR
Collection Time: 2007/07/16 20:06:07   Reset Time: 00:00:00   Profile: CICSA

Dispatcher Statistics

Warning signs and possible tuning criteria follow.
Warning Signs:

- Excessive CPU time (tasks using too much CPU?)
- Excessive thread waits (insufficient pool threads?)

Possible Tuning Criteria:

Reduction in CPU usage

JAVA Statistics

Warning signs and possible tuning criteria follow.

Warning Signs:

Excessive requests (system over-loaded? - check response times)

Possible Tuning Criteria:

Reduction in requests
Logstream Statistics

<table>
<thead>
<tr>
<th>CA MAT</th>
<th>CICS Statistics</th>
<th>Logstream</th>
<th>Row 1 to 4</th>
</tr>
</thead>
<tbody>
<tr>
<td>COMMAND</td>
<td>SCROLL</td>
<td>CSR</td>
<td></td>
</tr>
<tr>
<td>Collection Time: 2007/07/16 20:06:07</td>
<td>Reset Time: 00:00:00</td>
<td>Profile: CICSA</td>
<td></td>
</tr>
<tr>
<td>LOGS</td>
<td>******************</td>
<td>***************</td>
<td>******************</td>
</tr>
<tr>
<td>LOGS</td>
<td>Keypt frequency</td>
<td>00004000</td>
<td>Logdefer interval</td>
</tr>
<tr>
<td>LOGS</td>
<td>Keypoints taken</td>
<td>00000001</td>
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</tr>
<tr>
<td>LOGS</td>
<td>******************</td>
<td>***************</td>
<td>******************</td>
</tr>
</tbody>
</table>

Program Autinstall Statistics

Warning signs and possible tuning criteria follow.

Warning Signs:
- Rejects/failures, which can be due to
- Application errors?
- LINKs to invalid program?
- Program autinstall program bugs?
- Program not present in DFHRPL library?

Recovery Manager Statistics

Warning signs and possible tuning criteria follow.

Warning Signs:
- Excessive shunt time (problems with other systems participating in UOWs?)
- Excessive forced actions (operational errors, failed partner systems?)
Possible Tuning Criteria:

Review operational procedures if these problems recur.

System Dump Statistics

Warning signs and possible tuning criteria follow.

**Warning Signs:**

- Excessive system dumps (system problems, application problems ?)

  Check CICS log and transaction abend statistics.

**Possible Tuning Criteria:**

- Investigate causes

  Ideally, no system dumps should occur for production CICS systems. Suppress *routine* or known system dumps as these can cause major slowdowns.

Transaction Dump Statistics

Warning signs and possible tuning criteria follow.
Summary Statistics Panels

Warning Signs:

- Excessive transaction dumps (system problems, application problems, CSD definition errors?)
  
  Check CICS log and transaction abend statistics.

Possible Tuning Criteria:

- Investigate causes
  
  Ideally, no transaction dumps should occur for production CICS systems. Suppress routine or known transaction dumps as these can cause slowdowns.

Storage Manager Statistics

Warning signs and possible tuning criteria follow.

Warning Signs:

- Requests causing wait
  
  Check CICS log (SOS messages?) and transaction abend statistics. The system might be overloaded.

Possible Tuning Criteria:

- Investigate causes
  
  Ideally, no storage waits should occur in production systems.
TCP/IP Statistics

Warning signs and possible tuning criteria follow.

Warning Signs:

- Excessive delays, timeouts (system TCP/IP problems, network problems, insufficient maxsocket limit?)

Possible Tuning Criteria:

- Reduced delays and timeouts

| CA MAT -------------- CICS Statistics - TCP/IP ----------------- Row 1 to 11 |
| COMMAND ===>                                                  SCROLL ===> CSR |
| Collection Time: 2007/07/16 20:06:07   Reset Time: 00:00:00   Profile: CICSA |

```
TCPI  Maxsockets limit   00065535    Curr i/b sockets   00000002
TCPI  Peak i/b sockets   00000002    Curr o/b sockets   00000000
TCPI  Peak o/b sockets   00000000    Curr persist o/b   00000000
TCPI  Peak persist o/b   00000000    i/b sockets creatd 00000002
TCPI  o/b sockets creatd 00000000    i/b sockets closed 00000000
TCPI  Times maxsockets   00000000    Total delayed      00000000
TCPI  Delay time        00:00:00.0000  Timeouts           00000000
TCPI  Curr delayed      00000000    Peak delayed       00000000
TCPI  Curr delay time   00:00:00.0000
```

Transient Data (TDQ) Statistics

Warning signs and possible tuning criteria follow.

Warning Signs:

- Excessive buffer waits (insufficient buffers?)
- String waits (insufficient strings?)
- NOSPACE (DFHINTRA big enough?)
- I/O errors (data set problems?)
- Peak Cis used approaching max Cis (DFHINTRA big enough?)
Possible Tuning Criteria:

- Reduced buffer waits
- Reduced string waits
- No I/O errors
- Peak CI usage comfortably below max CIs

Transaction Manager Statistics

Warning signs follow.

Warning Signs:

- Maxtask (maxtask limit too low? system overloaded? rogue transactions? system at SOS?)
- Delays and queueing (as per Maxtask)
- Possible Tuning Criteria:
Summary Statistics Panels

Chapter 11: Using the Product in a CICS Environment

- Zero time at Maxtask
- Reduced delays and queuing

```
CA MAT ------- CICS Statistics - Transaction Manager ---------- Row 1 to 8

COMMAND ===>                                                  SCROLL ===> CSR
Collection Time: 2007/07/16 20:06:07   Reset Time: 00:00:00   Profile: CICSA

TRNM  ****************** *************** ****************** **************
TRNM  User + sys trans  00000037        Curr MAXTSK limit 00000025
TRNM  Curr user trans  00000002        Curr qd user tran  00000000
TRNM  Times at MAXTASK  00000000      Active user trans 00000005
TRNM  Pk qd user trans  00000000      Tot act user tran 000000014
TRNM  Total delayed   00000000      Tot trn last reset 00000000
TRNM  Q time spent 00:00:00.0000        Curr q time 00:00:00.0000
TRNM  ****************** *************** ****************** **************
```

Temporary Storage (TSQ) Statistics

Warning signs and possible tuning criteria follow.

Warning Signs:
- Excessive buffer waits (insufficient buffers?)
- Unnecessary use of auxiliary storage (not needed if the queue is not recoverable)
- String waits (insufficient strings?)
- Auxiliary storage exhausted (DFHTEMP big enough?)
- I/O errors (data set problems?)
- Peak Cis used approaching max Cis (DFHTEMP big enough?)
- Excessive writes GT CISZ (performance hit)

Possible Tuning Criteria:
- Reduced buffer waits
- Reduced string waits
- Reduced use of auxiliary storage
- Peak CI usage comfortably below max Cis
- No I/O errors
- Reduced writes GT CISZ (adjust CISZ?)
URIMAP Statistics

Warning signs and possible tuning criteria follow.

Warning Signs:

- Excessive requests (application problem?)
- Host disabled (definition or operational problem?)
Possible Tuning Criteria:

- Reduced requests
- Zero host disabled

VTAM Statistics

Warning signs and possible tuning criteria follow.

Warning Signs:

- Excessive times at RPL max (correct VTAM definitions?)
  This might not be a performance problem, but should be checked.
- Excessive times at SOS (VTAM storage problem - check VTAM definitions, buffer usage)

Possible Tuning Criteria:

- Reduced times at RPL max
- Reduced times at SOS
Summary Statistics Panels

FILE Statistics

Warning signs and possible tuning criteria follow.

Warning Signs:
- Excessive string waits.
- Excessive times exclusive control conflicts
- Excessive ratio of VSAM EXCPs to VSAM I/O requests
- For CMDTs, a high ratio of source data set reads to data table reads

Possible Tuning Criteria:
- Reduced string waits
- Reduced exclusive control conflicts
- Lower EXCP ratio
- For CMDTs, a low ratio of source data set reads to data set reads

Use PF11/PF10 to scan right and left in the panel shown next.

<table>
<thead>
<tr>
<th>Acctix</th>
<th>Rem</th>
<th>DataTable</th>
<th>RLS</th>
<th>Dataset</th>
<th>Close</th>
</tr>
</thead>
<tbody>
<tr>
<td>DFHCMA</td>
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<td>N</td>
<td>N</td>
<td></td>
<td></td>
</tr>
<tr>
<td>DFHCSD</td>
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<td>N</td>
<td>N</td>
<td>K</td>
<td></td>
</tr>
<tr>
<td>DFHDBF</td>
<td>N</td>
<td>N</td>
<td>N</td>
<td></td>
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</tr>
<tr>
<td>DFHLRQ</td>
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<td>N</td>
<td>N</td>
<td>K</td>
<td></td>
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<tr>
<td>EZACACHE</td>
<td>N</td>
<td>T</td>
<td>N</td>
<td>K</td>
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</tr>
<tr>
<td>EZACONFG</td>
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<td>N</td>
<td>K</td>
<td></td>
</tr>
<tr>
<td>FILEA</td>
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<td>N</td>
<td>N</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

************** End of Table **************

TCLASS Statistics

Warning signs and possible tuning criteria follow.

Warning Signs:
- Excessive queueing, queueing time
- Excessive purges
If the transaction queues are excessively long, scan times for the waiting for dispatch queue can affect system performance as a whole (see waiting for 1st dispatch Dispatcher statistics). You can use the PurgeThreshold and DTIMOUT parameters to control TCLASS queue size. But be aware that excessive transaction purges can also affect system performance.

If you are never at the limit of your transaction class setting, you might consider resetting its value or review whether there is any need to continue specifying any transaction types with that class.

Possible Tuning Criteria:

- Reduced queuing
- Reduced purges

Use PF11/PF10 to scan right and left in the panel shown next.

---

### CA MAT ------------ CICS Statistics - TCLASS ---------------- Row 1 to 14 of

| COMMAND ==| SCROLL ==== CSR |
| Collection Time: 2007/07/09 23:02:07 | Reset Time: 00:00:00 | Profile: CICSA |

<table>
<thead>
<tr>
<th>TCLASS</th>
<th>Maximum</th>
<th>Attaches</th>
<th>Purged</th>
<th>Queued</th>
<th>Accepted</th>
<th>Accepted after Allowed</th>
<th>Immediate</th>
<th>Immediately</th>
<th>Queueing</th>
</tr>
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<td>0</td>
<td>0</td>
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<td>0</td>
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<td>0</td>
<td>0</td>
<td>0</td>
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<td>DFHEDFTC</td>
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<tr>
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<tr>
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<td>0</td>
<td>0</td>
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<tr>
<td>DFHTSDEL</td>
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<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
</tbody>
</table>

---

### ENQ Statistic

Warning signs and possible tuning criteria follows.

Warning Signs:

- Excessive waits, waiting time
- Excessive rejects or purges
The enqueue pool names are listed in the *CICS TS Users Guide*. See also "Investigating Enqueue Waits" in the IBM CICS TS InfoCentre. Excessive enqueue waits can be a symptom of a number of different problems, including

- System slowdown
- Application design issues
- Bottlenecks
- Resource unavailability

**Possible Tuning Criteria:**

- Reduced waits
- Reduced purges

Use **PF11/PF10** to scan right and left in the panel shown following.

![Enqueue Statistics Panel](image)

**LSR Pool (by File) Statistics**

Warning signs and possible tuning criteria are discussed next.

**Warning Signs:**

- Buffer waits

There might be insufficient buffers or one file in the pool is monopolizing the buffers. Consider allocating this file to its own pool if this is the case.
Possible Tuning Criteria:

- Reduced buffer waits

Use **PF11/PF10** to scan right and left in the panel shown next.

```
CA MAT  ------------  CICS Statistics - LSR (by file)  ------------------ Row 1
COMMAND ===>                                                  SCROLL ===> CSR

Collection Time: 2007/07/16 20:06:07   Reset Time: 00:00:00   Profile: CICSA
File   Pool  Data  Index  Buffer  Highest
Name   ID    Bufsz Bufsz Waits  Buffer Waits
________ _____ _____ _____ ________ ____________
-------------------------------------------------------------------------------
ACCTFIL      1     0     0        0        0
ACCTIX       1     0     0        0        0
DFHOMACD     1     0     0        0        0
DFHCSD       1 20480  1024        0        0
DFHLRQ       1     0     0        0        0
EZACACHE     1     0     0        0        0
EZACONFG     1 20480   512        0        0
FILEA        1     0     0        0        0

*******************************************************************************
End of Table *******************************************************************************
```

LSR Pool (by Pool) Statistics

Warning signs follow.

**Warning Signs:**

- String waits
- Low lookaside ratios (data and index)

Consider increasing available pool strings if string waits are excessive. Consider allocating heavily-used files to their own pool (see File statistics).

See the *CICS Performance Guide* for further tuning guidelines.

Connection Statistics

Warning signs and possible tuning criteria follow.

**Warning Signs:**

- Excessive outstanding allocates, queued allocates
- Failed allocates

Outstanding and queued allocates can be a sign of problems in the target CICS region.
You might be seeking an answer to some of the following questions when looking at these statistics:

- Are there enough sessions defined?
- Is the balance of contention winners to contention losers correct?
- Is there conflicting usage of APPC mode groups?
- What can be done if there are unusually high numbers, compared with normal or expected numbers, in the statistics report?

See the *CICS Performance Guide* for further tuning guidelines.

**Possible Tuning Criteria:**

- Reduced outstanding and queued allocates
- Zero failed allocates

Use **PF11/PF10** to scan right and left in the panel shown next.

```
CA MAT---------- CICS Statistics - Connections ---------- Row 1 to 1
COMMAND ===> SCROLL ===> CSR
Collection Time: 2007/07/16 20:06:07   Reset Time: 00:00:00   Profile: CICSA
Conn Access Protocol Netname  AIDs in Generic AIDs Current Max o/stdng
Method                   Chain   in Chain     Bids    Allocates
-------------------------- --------------- --------------- ------- -----------
GRIG IRC    EXCI     CITGR1GI     0       0            0       0
```

**End of Table**

---

**CICS Transaction Statistics**

To obtain additional CICS transaction statistics for a given transaction that displays on the TranView panel, enter the line command S next to the desired transaction. These statistics are derived from CICS Transaction Monitoring data (control block DFHMNTDS) as described in the IBM manual, *CICS Transaction Server for z/OS Data Areas*.

You can request additional transaction statistics in the categories listed following. See the *CICS Performance Guide* for further information about these statistics.

In order to correctly interpret these statistics, you will need to understand the relationships between response times, dispatch times, and wait and exception times. These relationships are described in the *CICS Performance Guide*. 
The statistics listed in the following table are presented as averages per transaction, except where an average would not be meaningful (such as high water marks). These exceptions are marked with **.

<table>
<thead>
<tr>
<th>Category</th>
<th>Description</th>
<th>Relevant Performance Class Categories</th>
</tr>
</thead>
<tbody>
<tr>
<td>ALL</td>
<td>All of the categories listed below</td>
<td></td>
</tr>
<tr>
<td>DB</td>
<td>File and database statistics</td>
<td>DFHDATA, DFHFILE, DFHRMI, DFHSYNC, DFHTASK</td>
</tr>
<tr>
<td>DISP</td>
<td>Dispatcher statistics</td>
<td>DFHCICS, DFHTASK</td>
</tr>
<tr>
<td>STG</td>
<td>Storage statistics</td>
<td>DFHSTOR</td>
</tr>
<tr>
<td>TSQ</td>
<td>Temporary storage statistics</td>
<td>DFHTEMP</td>
</tr>
<tr>
<td>TDQ</td>
<td>Transient data statistics</td>
<td>DFHDEST</td>
</tr>
<tr>
<td>JNL</td>
<td>Journal/logger statistics</td>
<td>DFHJOUR</td>
</tr>
<tr>
<td>IC</td>
<td>Interval control statistics</td>
<td>DFHTASK</td>
</tr>
<tr>
<td>PC</td>
<td>Program control statistics</td>
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<td>TERM</td>
<td>Terminal control statistics</td>
<td>DFHTERM</td>
</tr>
<tr>
<td>WAIT</td>
<td>Wait/Exception statistics</td>
<td>DFHCICS, DFHTASK - see also &quot;Exception Class Data&quot;</td>
</tr>
<tr>
<td>WEB</td>
<td>WEB/EJB/DOC statistics</td>
<td>DFHDOCH, DFHEJBS, DFHWEBB</td>
</tr>
<tr>
<td>FEPI</td>
<td>FEPI statistics</td>
<td>DFHFPEI</td>
</tr>
<tr>
<td>BTS</td>
<td>Business Transaction Services</td>
<td>DFHCBTS</td>
</tr>
<tr>
<td>SOCK</td>
<td>Socket statistics</td>
<td>DFHSOCK</td>
</tr>
</tbody>
</table>

**Transaction Statistics Panels**

Transaction statistics panels are shown in the following panels.

**File and Database Transaction Statistics**

Warning signs and possible tuning criteria follow.
Warning Signs:

- Excessive requests (application design?)
- Excessive wait times (buffering, DB2 tuning?)

Possible Tuning Criteria:

- Reduction in wait times

| CA MAT -------------- CICS Transaction Statistics -------------- Row 1 to 13 |
| COMMAND ===>       | SCROLL ===>      |
| Press to select: ALL DISP DB STG TSQ TDQ JNL | Profile: CICSA  |
| TRANS=TUNY          | Average/transaction |
| Type                | (unless marked **) |

| DB     | FC gets 00004300 | FC puts 00004300 |
| DB     | FC reads 00008700 | FC adds 00000000 |
| DB     | FC deletes 00000000 | FC total requests 00026100 |
| DB     | CFDT wait time 00:00:00.00000 | FC I/O wait time 00:00:09.20380 |
| DB     | IMS requests 00000000 | IMS wait time 00:00:00.00000 |
| DB     | DB2 requests 00000000 | DB2 wait time 00:00:00.00000 |
| DB     | DB2 READYQ wait 00:00:00.00000 | DB2 connect wait 00:00:00.00000 |
| DB     | RMI elapsed 00:00:00.00000 | RMI suspend time 00:00:00.00000 |
| DB     | Syncpoint requests 00:00:00.00000 | Syncpoint elapsed 00:00:00.00000 |
| DB     | Syncpoint delay 00:00:00.00000 | RLS wait time 00:00:00.00000 |
| DB     | RLS SRB CPU time 00:00:00.00000 |

Dispatcher Transaction Statistics

For a detailed discussion of the various TCB and Key modes (X8, L9 and so on), refer to the CICS Performance Guide.

Warning Signs:

- Maxtask delay
- Dispatch delays (contention, enqueuing?)
- Excessive CPU time
- Change Mode delays (THREADSAFE tuning)

Possible Tuning Criteria:

- Reduction in delays
- Reduction in CPU
- Reduction in Change Mode delays (THREADSAFE tuning)
### Panel 1:

<table>
<thead>
<tr>
<th>Command</th>
<th>Scroll</th>
<th>CSR</th>
</tr>
</thead>
<tbody>
<tr>
<td>Press to select: <strong>ALL</strong></td>
<td>DISP DB</td>
<td>STG</td>
</tr>
<tr>
<td>Stats TRAN=TUNY</td>
<td>Average/transaction</td>
<td>Type</td>
</tr>
<tr>
<td>(unless marked **)</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

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<table>
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<tr>
<th>DISP</th>
<th>Average/transaction</th>
</tr>
</thead>
<tbody>
<tr>
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</tr>
<tr>
<td>Abend count**</td>
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</tr>
<tr>
<td>PGM TCBs**</td>
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</tr>
<tr>
<td>Waiting for disp</td>
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<tr>
<td>Suspend time</td>
<td>00:00:22.08072</td>
</tr>
<tr>
<td>Max XPLINK delay</td>
<td>00:00:00.00000</td>
</tr>
<tr>
<td>1st disp delay</td>
<td>00:00:00.00000</td>
</tr>
<tr>
<td>TCB mismatch wait</td>
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</tr>
<tr>
<td>Max XPLINK delay</td>
<td>00:00:00.00000</td>
</tr>
<tr>
<td>1st disp delay</td>
<td>00:00:00.00000</td>
</tr>
<tr>
<td>Giveup cntl wait</td>
<td>00:00:00.00000</td>
</tr>
<tr>
<td>Key 8 dispatch time</td>
<td>00:00:00.00000</td>
</tr>
<tr>
<td>Key 9 dispatch time</td>
<td>00:00:00.00000</td>
</tr>
<tr>
<td>L8 CPU time</td>
<td>00:00:00.00000</td>
</tr>
<tr>
<td>L9 CPU time</td>
<td>00:00:00.00000</td>
</tr>
<tr>
<td>J8 CPU time</td>
<td>00:00:00.00000</td>
</tr>
<tr>
<td>S8 CPU time</td>
<td>00:00:00.00000</td>
</tr>
<tr>
<td>J9 CPU time</td>
<td>00:00:00.00000</td>
</tr>
<tr>
<td>X8 CPU time</td>
<td>00:00:00.00000</td>
</tr>
<tr>
<td>DISP</td>
<td>Average/transaction</td>
</tr>
</tbody>
</table>

### Panel 2:

---

<table>
<thead>
<tr>
<th>DISP</th>
<th>Average/transaction</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tran count**</td>
<td>00000003</td>
</tr>
<tr>
<td>Abend count**</td>
<td>00000000</td>
</tr>
<tr>
<td>PGM TCBs**</td>
<td>00000000</td>
</tr>
<tr>
<td>Waiting for disp</td>
<td>00:00:06.66086</td>
</tr>
<tr>
<td>Suspend time</td>
<td>00:00:22.08072</td>
</tr>
<tr>
<td>Max XPLINK delay</td>
<td>00:00:00.00000</td>
</tr>
<tr>
<td>1st disp delay</td>
<td>00:00:00.00000</td>
</tr>
<tr>
<td>TCB mismatch wait</td>
<td>00:00:00.00000</td>
</tr>
<tr>
<td>Max XPLINK delay</td>
<td>00:00:00.00000</td>
</tr>
<tr>
<td>1st disp delay</td>
<td>00:00:00.00000</td>
</tr>
<tr>
<td>Giveup cntl wait</td>
<td>00:00:00.00000</td>
</tr>
<tr>
<td>Key 8 dispatch time</td>
<td>00:00:00.00000</td>
</tr>
<tr>
<td>Key 9 dispatch time</td>
<td>00:00:00.00000</td>
</tr>
<tr>
<td>L8 CPU time</td>
<td>00:00:00.00000</td>
</tr>
<tr>
<td>L9 CPU time</td>
<td>00:00:00.00000</td>
</tr>
<tr>
<td>J8 CPU time</td>
<td>00:00:00.00000</td>
</tr>
<tr>
<td>S8 CPU time</td>
<td>00:00:00.00000</td>
</tr>
<tr>
<td>J9 CPU time</td>
<td>00:00:00.00000</td>
</tr>
<tr>
<td>X8 CPU time</td>
<td>00:00:00.00000</td>
</tr>
</tbody>
</table>

---

### Storage Transaction Statistics

Warning signs and possible tuning criteria follow.

**Warning Signs:**

- Excessive getmains (design problem?)
- Excessive storage usage (design problem?)
**Possible Tuning Criteria:**

- Reduction in getmains
- Reduction in storage usage

![Temporary Storage (TS) Transaction Statistics](image)

**Warning Signs:**

- Excessive TS requests (design problem?)
- Unnecessary use of auxiliary storage, TS I/O waits (design problem, buffering?)

**Possible Tuning Criteria:**

- Reduction in TS requests
- Reduction in TS wait time
Transient Data (TD) Transaction Statistics

Warning signs and possible tuning criteria follow.

Warning Signs:

- Excessive TD requests (design problem?)
- I/O waits (design problem, buffering?)

Possible Tuning Criteria:

- Reduction in TD requests
- Reduction in TD I/O wait time

Journal/Logger Transaction Statistics

Warning signs and possible tuning criteria follow.

Warning Signs:

- Excessive requests (design problem, resources unnecessarily defined as recoverable?)
- I/O waits (design problem, logstream problems?)
Possible Tuning Criteria:

- Reduction in requests
- Reduction in I/O wait time

### Interval Control Transaction Statistics

Warning signs and possible tuning criteria follow.

**Warning Signs:**

- Excessive requests (design problem?)
- Excessive delay time (system problems? - see Dispatcher Statistics)

**Possible Tuning Criteria:**

- Reduction in requests
- Reduction in delay time

### Program Control Transaction Statistics

Warning signs and possible tuning criteria follow.
Warning Signs:

- Excessive requests (design problem?)
- Excessive load time (system problems?)

Possible Tuning Criteria:

- Reduction in requests
- Reduction in load time

Terminal Control Transaction Statistics

Warning signs and possible tuning criteria follow.

Warning Signs:

- Excessive messages/characters (design problem?)
- Excessive allocates (system problems?)
- Excessive waits (system problems, problem with remote regions/systems?)
Possible Tuning Criteria:

- Reduction in unnecessary messages/characters
- Reduction in wait time

| CA MAT ------- CICS Additional Transaction Statistics -------------- Row 1 to 4 |
|--------------|-------------------------|-------------------------|
| COMMAND ===| SCROLL ===> CSR          |                          |
| Press to select: ALL DISP DB STG TSQ TDQ JNL                     | Profile: CICSA          |
| IC PC TERM WAIT WED FEPI BTS SOCKET | Stats TRAN=TUNY          |
| Type   | Average/transaction     | (unless marked **)      |
| TERM Primary msgs in 00000000 | Primary chars in 00000000 |
| TERM Primary msgs out 00000000 | Primary chars out 00000000 |
| TERM TCTTE allocates 00000000 | I/O wait time 00:00:00.00000 |
| TERM LU61 I/O wait 00:00:00.00000 | LU62 I/O wait 00:00:00.00000 |
| TERM IR I/O wait 00:00:00.00000 |                          |
| TERM *************** *************** | *************** *************** |

Warning Signs and possible tuning criteria follow.

Wait/Exception Transaction Statistics

Warning signs and possible tuning criteria follow.

Warning Signs:

- Excessive waits and delays (design problem, system problems, insufficient buffers or strings?)
- Excessive enqueues (system problems, design problems?)

---

Transaction Statistics Panels
Possible Tuning Criteria:

- Reduction in waits and delays
- Reduction in enqueues

### CA MAT ------- CICS Additional Transaction Statistics ----------- Row 1 to 10

**COMMAND** => **SCROLL** => **CSR**

Press to select: ALL DISP DB STG TSQ TDQ JNL TCICSA

Profile: CICSA

Stats TRAN=TUNY Average/transaction Type (unless marked **)

<table>
<thead>
<tr>
<th>Type</th>
<th>Average/transaction</th>
</tr>
</thead>
<tbody>
<tr>
<td>WAIT</td>
<td></td>
</tr>
</tbody>
</table>

### WEB/EJB/DOC Transaction Statistics

Warning signs and possible tuning criteria follow.

**Warning Signs:**

- Excessive requests (design problem?)
- Excessive characters sent or received (design problem?)
- Excessive delays (system problems, design problems?)
### Possible Tuning Criteria:
- Reduction in requests
- Reduction in characters sent/received
- Reduction in delays

### FEPI Transaction Statistics

Warning signs and possible tuning criteria follow.
Warning Signs:

- Excessive FEPI requests (design problem?)
- Excessive characters sent or received (design problem?)
- Excessive suspend time (system problems, design problems?)

Possible Tuning Criteria:

- Reduction in FEPI requests
- Reduction in characters sent/received
- Reduction in suspend time

Business Transaction Services (BTS) Transaction Statistics

Warning signs and possible tuning criteria follow.

Warning Signs:

- Excessive BTS requests (design problem?)
- Excessive length sent or received (check response time/CPU time - design problem?)
Possible Tuning Criteria:

- Reduction in BTS requests
- Reduction in length sent/received

Socket Transaction Statistics

Warning signs and possible tuning criteria follow.

Warning Signs:

- Excessive socket requests (design problem?)
- Excessive characters sent or received (check response time/CPU time - design problem?)
- Excessive delays or I/O waits (system problems?)
### Possible Tuning Criteria:

- Reduction in socket requests
- Reduction in characters sent/received
- Reduction in delays and/or I/O waits

```plaintext
<table>
<thead>
<tr>
<th>Category</th>
<th>Value</th>
<th>Category</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bytes encrypted</td>
<td>00000000</td>
<td>Bytes decrypted</td>
<td>00000000</td>
</tr>
<tr>
<td>Exacts</td>
<td>00000000</td>
<td>Create non-persist</td>
<td>00000000</td>
</tr>
<tr>
<td>Create persistent</td>
<td>00000000</td>
<td>Receives</td>
<td>00000000</td>
</tr>
<tr>
<td>Chars received</td>
<td>00000000</td>
<td>Sends</td>
<td>00000000</td>
</tr>
<tr>
<td>Chars sent</td>
<td>00000000</td>
<td>Total requests</td>
<td>00000000</td>
</tr>
<tr>
<td>Inbound receives</td>
<td>00000000</td>
<td>Inbound chars recv</td>
<td>00000000</td>
</tr>
<tr>
<td>Inbound sends</td>
<td>00000000</td>
<td>Inbound chars sent</td>
<td>00000000</td>
</tr>
<tr>
<td>HWM non-persist**</td>
<td>00000000</td>
<td>HWM persist**</td>
<td>00000000</td>
</tr>
<tr>
<td>I/O wait</td>
<td>00:00:00:00.0000</td>
<td>Outbound I/O wait</td>
<td>00:00:00:00.0000</td>
</tr>
<tr>
<td>Max SSL TCB delay</td>
<td>00:00:00:00.0000</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
```
CICS Idle Time

Idle Time is defined as follows:

Idle Time = Monitor Interval - Sum of (Dispatch Time for user tasks in this Interval)

This could be expressed as the time spent by CICS in the given Monitor Interval not performing user work.

User tasks are defined as all tasks not flagged by CICS as system tasks.

To obtain CICS Idle Time on the TranView panel, enter the primary command IDL.

| CA MAT -------- CICS Idle Time ------------- Row 1 to 4 of 4 |
| COMMAND ===> | SCROLL ===> CSR |
| Profile: CICSA |
| User tasks : 12 |
| Average dispatch time : 00:00:01.6 |
| Average CPU time : 00:00:01.3 |
| Average suspend time : 00:00:33.3 |
| Average response time : 00:00:34.9 |
| Monitor started : 2007/06/19 20:40:54 |

<table>
<thead>
<tr>
<th>Totals</th>
<th>hh:mm:ss Pct of Interval</th>
</tr>
</thead>
<tbody>
<tr>
<td>User Task CPU Time</td>
<td>00:00:15 22.0</td>
</tr>
<tr>
<td>User Task Dispatch Time</td>
<td>00:00:18 27.0</td>
</tr>
<tr>
<td>Idle (Not Dispatched)</td>
<td>00:00:48 73.0</td>
</tr>
<tr>
<td>Monitor Interval</td>
<td>00:01:06 100.0</td>
</tr>
</tbody>
</table>

************************************************************************************ End of Table *******************************************************
Chapter 12: Using the Product in an IMS Environment

Delays processing IMS calls are usually caused by improperly designed applications and databases, inadequate database indexing, and programming errors. CA Mainframe Application Tuner can help identify the programs and IMS databases, segments, and calls that require attention. CA Mainframe Application Tuner is compatible with IMS versions 7.1 and later.

This section contains the following topics:
- Analyze IMS Transactions (see page 397)
- Analyze IMS Data (see page 401)
- Analyze IMS Batch Performance Information (see page 408)
- IMS Region Types (see page 413)

Analyze IMS Transactions

CA Mainframe Application Tuner enables you to analyze IMS data to the IMS transaction level. Use the following steps to see the IMS statements for an IMS job:

1. From the Interactive Analysis menu, select Option 11.

   CA MAT --------------------- Interactive Analysis ---------------------------
   OPTION ===>
   Enter option to analyze the monitored job:                   Profile: BIGBATCH
   options: NORMAL

   CA MAT Monitor Information                   Subsystem Details
   -------------------------------------------   ------------------------------
   0  OverView   - Monitor session information   10  DB2 - View all SQL
   1  TaskView   - Activity by task              11  IMS - IMS Transactions
   2  DelayView  - Program delays                12  JVM - Java Virtual Machine
   3  CodeView   - Program activity              13  WAS - WebSphere Trans.
   4  TimeView   - Samples by time               14  CIC - CICS Summary Stats
   5  DataView   - Dataset information           15  IDMS - CA IDMS Activity
   6  TranView   - Activity by transaction       16  DCM - CA-Datacom Activity
   7  ModView    - Module layout                 17  IDL - CA-Ideal Activity
   8  PoolView   - Buffer pools                  18  ADA - Adabas Activity
   9  USSView    - Unix System Services          19  NAT - Natural Activity
   ACTIVE - switch context to ACTIVE   WAIT - switch context to WAIT
   NORMAL - switch context to NORMAL   ALL - switch context to ALL

   Press END to exit analysis

   The IMS TranNameView panel displays.
If you have specified one or more transaction codes in the IMS Monitoring Criteria panel (see "Monitoring criteria for IMS" on page 83), the IMS TranNameView panel will display one line with the transaction code other. This transaction code represents all other transactions that are intercepted but DO NOT appear in the list of specified IMS Monitoring Criteria transactions.

You can see additional fields by scrolling to the right.

The fields in this panel are described next.

**CTL Region**

Name of the MVS main storage region that contains the IMS control program.

**IFP/BMP/MPP Region**

Name of the MVS main storage region that contains the IMS message processing program.

**IMS ID**

Name of the IMS system.

**Region Active**

Percentage of time that the IMS Region was active during the monitor session.

**Region Idle**

Percentage of time that the IMS Region was idle during the monitor session.

**Region Total**

Total time that the IMS Region was operating during the monitor session.
Average Elapsed

Average elapsed time (in seconds) for all transactions detected.

Tran Code

IMS Transaction name; the panel is sorted on this field.

PSB Name

Name of the PSB to which the transaction is defined.

A PSB can be associated with multiple transactions. In a Message Processing Region (MPR) the PSB name must be the same as the Program name.

Tran Count

Number of times this transaction was executed during the monitor session.

Total Elapsed Time

Total time (HH:MM:SS.NNNNNN) that the transaction was executing.

Avg Elapsed Time

Average time (HH:MM:SS.NNNNNN) that the transaction was executing.

DL/I Call Interface

IMS data manipulation language, which is a common high-level interface between a user application and IMS.

Visual

Depicts the elapsed time of the transaction compared to all transactions.

CPU Time (CPU sec)

Total amount of CPU time required to process all occurrences of the transaction (in CPU seconds). You need to scroll to the right to see this field.

CPU Avg. (CPU sec)

Average amount of CPU time required to process a single occurrence of the transaction (in CPU seconds). You need to scroll to the right to see this field.

Region Idle and Region Total ONLY include the period of time between the first and last DL/I call intercepted in the IMS message region being monitored. Therefore Region Total can be equal or less than the total monitor session elapsed time.
2. Enter the PSBname primary command on the COMMAND line and press Enter to see the activity and delays for all the detected IMS calls by PSBNAME, PCB #, call type, and segment.

The IMS Statements panel displays.

| CA MAT ---------------------- IMS Statements --------------- Row 1 to 4 of 4 |
|-----------------------------|-------------------------|-----------------------------|
| COMMAND ===>                | SCROLL ===> HALF        |
| Primary commands: DBDname, PSBname, IMSview | Profile: IMS4        |
| Mode: PSBNAME               |                         |
| Line commands: S - SSA      |                         |

| LC PSB Name PCB# DBD Name Segment Call P-Opts Actv% Wait% Totl% Visual |
|-------------------------------|------------------------|--------------|-----------------|
| >------------------------------|------------------------|--------------|-----------------|
| DFSSAM04 2 DI21PART PARTROOT GU A | 0.02 27.95 27.97 =>    |
| DFSSAM04 2 DI21PART PARTROOT ISRT A | 0.02 25.51 25.53 =>    |
| DFSSAM07 2 DI21PART PARTROOT ISRT A | 0.00 11.60 11.60 >     |
| DFSSAM03 2 DI21PART PARTROOT ISRT A | 0.00 5.88 5.88         |

********************************* End of Table *******************************

3. Summarize the activity and delays for all the detected IMS calls from the transactions by database by entering the DBDname primary command on the COMMAND line of the IMS TranNameView panel and pressing Enter.

4. Display the IMS Statements panel for a specific transaction by entering the Statements line command (S) next to a transaction from the IMS TranNameView panel. The IMS Statements panel displays for that transaction.

| CA MAT ---------------------- IMS Statements --------------- Row 1 to 1 of 1 |
|-----------------------------|-------------------------|-----------------------------|
| COMMAND ===>                | SCROLL ===> CSR         |
| Primary commands: DBDname, PSBname, IMSview | Profile: IMS        |
| Mode: PSBNAME               |                         |
| Line commands: S - SSA      |                         |

Transaction: ADDPART

| LC PSB Name PCB# DBD Name Segment Call P-Opts Actv% Wait% Totl% Visual |
|-------------------------------|------------------------|--------------|-----------------|
| >------------------------------|------------------------|--------------|-----------------|
| DFSSAM04 2 DI21PART PARTROOT ISRT A | 0.02 25.51 25.53 =>    |

********************************* End of Table *******************************

Use the CodeView Detail (C) line command from the IMS TranNameView panel to display the program activity that is associated with a specific transaction; see the next panel.
Analyze IMS Data

CA Mainframe Application Tuner enables you to analyze IMS data to the IMS statement level. Use the following steps to see the IMS statements for an IMS job:

1. Set up your monitoring criteria so that the Observations Requested field contains a number in the range of 3000 to 10000.
2. Invoke the monitor by using the Invoke line command (I).
3. Analyze the data by using one of the analysis line commands, A, AL, AA, or AW.
4. Select Option 5 from the Interactive Analysis menu.

The DataView panel displays.

```
CA MAT -------------------------- DataView ------------------ ROW 1 to 4 of 4
COMMAND ===>                                                  SCROLL ===> CSR
Primary commands: LINKlist on/off                            Profile: IMS
Line commands: S - Select                                     Options: NORMAL
Linklist: ON

LC DD name  Dataset name                                 Delay% Visual
------------------------------------------------------------------------------
  .IMS     IMS Statement Delay                           23.88 =========>
S_ INVDATA  CAMAT.TEST.INVDATA                             1.45
_ INVINDEX  CAMAT.TEST.INVINDEX                            1.11
_ INVTRAN   CAMAT.TEST.INVTRAN                             0.55
_ DFSRESLB  IMS.V7100.RESLIB                              0.00
_ IEFRDER   IMSLOG                                        0.00
_ IMS      IMS.V7100.PSBLIB                               0.00
_ IMS      IMS.V7100.DBDLIB                               0.00
_ LINKLST   SYS1.LINKLIB                                  0.00
_ LINKLST   SYS1.MIGLIB                                   0.00
```
5. Type S next to one of the DD statements and press Enter.

An enhanced version of the Data Set Details panel displays. In this example, the INVDATA DD statement was selected.

```
CA MAT--------------------- Data Set Details ------------ Row 1 to 26 of 32
COMMAND ===>                                                  SCROLL ===> HALF
DDNAME: INVDATA                                             Profile: IMS

Access Method: VSAM        Cluster: CAMAT.TEST.INVDATA
Opened for: DIRECT        Data: CAMAT.TEST.INVDATA.DATA
Share Options: 3 3           Index: CAMAT.TEST.INVDATA.INDX
Organization: KSDS          Alt Index: N/A

Data Component Information for: CAMAT.TEST.INVDATA.DATA

------ SMS ------- ------ Allocation ------- ----------- Format -----------
DATACLAS:          Unit:                     Rec Len:        200 CI Size:    20
STORCLAS:          Primary:                0 # CIs per CA: 315 Strings:     0
MGMTCLAS:          Secondary:              0 CA Freespace:    25
Volume Count:         n/a CI Freespace:    25
Total Extent Count:     0 Stripes:          0

---- VSAM Statistics ---------------------------------------------------------
Records Read: 0          Records Updated: 0          CA Splits:     19
Records Added: 0          Records Deleted: 0          CI Splits:    559

Index Component Information for: CAMAT.TEST.INVDATA.INDX

------ SMS ------- ------ Allocation ------- ----------- Format -----------
DATACLAS:          Unit:                     Rec Len:       3065 CI Size:    30
STORCLAS:          Primary:                0 # CIs per CA: 15 Strings:     0
MGMTCLAS:          Secondary:              0 CA Freespace:     0
Volume Count:         n/a CI Freespace:     0
Total Extent Count:     0 Stripes:          0
```

The fields in this panel are described next.

**DD Name**

DDNAME used to allocate the data set.

**Organization**

Physical organization of the data stored in this data set,

Possible values are KSDS, ESDS, or RRDS

**Dataset name**

Full name of the data set.

If the data set organization is KSDS, CA Mainframe Application Tuner displays the names of the DATA and INDEX components.
Volser
First volume serial of the data set.

Unit
First device address of the data set.

Opened for
Intention of the program when performing I/Os for this data set.
Possible values are READ, WRITE, and DIRECT.

Logical record length
Specified length of the records that reside in this data set.

Share Options
Displays how an alternate index’s data or index component is shared among users.
You can select one of the following numbers:
- The data set can be shared by any number of users for read processing, or the data set can be accessed by only one user for read and write.
- The data set can be accessed by any number of users for read processing and it can also be accessed by one user for write processing.
- The data set can be fully shared by any number of users.
- The data set can be fully shared by any number of users, and buffers used for direct processing are refreshed for each request.

Data CI size
Size of the Control Interval for the data in this data set.

Number of CIs per CA
Count of CIs allocated within a control area for the data in this data set

Index levels.
Number of index levels

VSAM KSDS data sets are indexed using a multilevel structure. The number of levels can have an impact on the performance of the data set if there are insufficient index buffers.

RPL strings
Number of strings for the data set.
This field indicates the number of concurrent operations that might be started for the data set.
Index buffers
Number of buffers used to perform I/O for the index component.

Data buffers
Number of buffers used to perform I/O for the data component.

Index EXCPs
Number of EXCPs for the INDEX component during the monitored period.

Data EXCPs
Number of EXCPs for the DATA component during the monitored period.

Records retrieved
Total number of records retrieved during the monitored period.

Records written
Number of records written to the data set during the monitored period.

CI splits
Number of times that the control interval was split due to lack of space.

CA splits
Number of times that the control area was split due to lack of space.

CI freespace
Percentage of free space in the control interval. Defined when the data set was created.

CA freespace
Percentage of free space in the control area. Defined when the data set was created.

File uses Shared Resources
The file uses VSAM local and global shared resources (LSR/GSR) and some values are invalid in the main display.

When the message File uses Shared Resources appears, values described below replace those marked n/a.

Pool ID
Pool identifier used to satisfy requests for this file (LSR/GSR).

Buffer Size
Size of the buffer used from the pool identified by Pool ID (LSR/GSR).
**Num Buffers**

Number of buffers available in the shared pool (LSR/GSR).

**Hit Ratio**

Percentage of READ requests that were satisfied from the buffer pool without an EXCP (LSR/GSR).

**Steal Writes**

Number of nonuser-initiated WRITES that were initiated for this buffer pool. A value of greater than 0 in this field can indicate a serious performance problem (LSR/GSR).

6. Press End to return to the DataView panel.

7. To select the .IMS DD statement, type S in the LC column and press Enter.

The IMS Statements panel displays:

```
CA MAT ----------------------- IMS Statements --------------- ROW 1 to 7 of 7
COMMAND ====>                      SCROLL: CSR
Primary commands: DBDname, PSBname, IMSview           Profile: IMS
                Mode: PSBNAME
Line commands: S - SSA
LC PSB Name PCB# DBD Name Segment  Call P-opts Actv% Wait% Totl% Visual
________________________________________________________________________
 INV2200     2 INVDBD   INVENSEG ISRT A       1.78 17.07 18.86 ======>
 INV2200     2 INVDBD   INVENSEG GHU A       2.79  0.11  2.90 >
 INV2200     2 INVDBD   INVENSEG REPL A       0.78  0.00  0.78
 INV2200     2 INVDBD   INVENSEG DLET A       0.55  0.00  0.55
 INV2200     2 INVDBD   INLOCSEG GHU A       0.44  0.00  0.44
 INV2200     2 INVDBD   INLOCSEG REPL A       0.22  0.00  0.22
 INV2200     2 INVDBD   INLOCSEG DLET A       0.11  0.00  0.11
*******************************************************************************
```

**IMS Statements Panel**

The IMS Statements panel has two modes. The information that displays depends on the mode you select. Select a mode by issuing either the PSBNAME or the DBDNAME primary commands.
PSBNAME

The default mode is PSBNAME. In this mode, IMS calls are sorted by PSB name. CA Mainframe Application Tuner displays all calls during the monitored period sorted by the activity level associated by that call. In PSBNAME mode, you can display more detailed information by using the S (SSA) line command to display the Segment Search Arguments panel.

In some circumstances you may see additional information in this report. If the Segment Search Argument is a qualified SSA and if the server parameter IMSSSA has been set to YES, you will see a Value field showing SSA value data.

The default setting for server parameter IMSSSA, which controls the collection and display of IMS SSA value data, is NO. If you choose to set this parameter to YES, you will see IMS SSA value data displayed in both character and hexadecimal format in this report. IMSSSA=YES must be in effect during both the monitor session of the IMS region and the analysis of the resulting monitor data set. However, we do not recommend that you use this setting since sensitive data may be exposed.

For more information, see the Installation Guide, TUNSSP00 parameters section.

DBDNAME

All activity that is associated with the database is summarized in a single row. The following panel shows the IMS Statements panel in DBDNAME mode.
The fields that are displayed in the IMS Statements panel for PSB Name mode are described next.

**PSB Name**
Name of the PSB generated to support this application. The PSB comprises one or more PCBs.

**PCB#**
Relative offset of this PCB from the start of the PSB.

**DBD Name**
Name of the IMS database that was accessed.

**Segment**
Name of the segment that was accessed by the application program.

**Call**
Type of operation that is being performed within the IMS call.

**P-Opt**
Processing options generated in the PCB during the PSBGEN.

**Actv%**
Percentage of the monitored period that CA Mainframe Application Tuner detected that the processing of the IMS statement was using CPU.

**Wait%**
Percentage of the monitored period that CA Mainframe Application Tuner detected that the program waited for IMS data to be returned.

**Totl%**
Sum of the Actv% and Wait% fields.

**Visual**
Visual representation of the Totl% field.
Analyze IMS Batch Performance Information

CA Mainframe Application Tuner provides additional information for IMS batch programs. IMS batch operates entirely in a single address space. Database operations are controlled by IMS routines using a VSAM local shared resource pool. Use the following steps to access statistics on the use of this pool.

1. From the Interactive Analysis menu, select Option 8.

The PoolView panel displays:

<table>
<thead>
<tr>
<th>CA MAT</th>
<th>PoolView</th>
<th>ROW 1 TO 1 OF 1</th>
</tr>
</thead>
<tbody>
<tr>
<td>COMMAND</td>
<td>SCROLL</td>
<td>CSR</td>
</tr>
</tbody>
</table>

Line Commands: S - Select
Profile: IMS
Options: NORMAL

LC Type Group Category

| __ IMS LSR IMS VSAM local pools |

PoolView lists the shared pools that are used in the batch job.

The fields in PoolView are described next.

**Type**

Type of pool, either IMS or VSAM.

**Group**

 Defines the group as LSR, or GSR.

LSR refers to VSAM Local Shared Resources where the buffer pool is maintained in the user's storage (PRIVATE). GSR refers to VSAM Global Shared Resources where the buffer pool is maintained in common storage (ECSA).

**Category**

Literal name of the pool.
2. Use the Select line command (S) to link to the Shared Pools panel. This panel displays all of the unique buffer pools that are defined to the overall pool.

<table>
<thead>
<tr>
<th>Pool type: LOCAL</th>
<th>Profile: IMS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total pool size: 59392</td>
<td>Options: NORMAL</td>
</tr>
<tr>
<td>Hit ratio for all subpools: 88.1%</td>
<td></td>
</tr>
</tbody>
</table>

Line commands: S - Select, D - Datasets

<table>
<thead>
<tr>
<th>LC Type</th>
<th>Group</th>
<th>SP</th>
<th>Buffers size</th>
<th>fixed</th>
<th>w/read</th>
<th>wo/read</th>
<th>Hit</th>
<th>Non-user</th>
<th>Ratio writes</th>
</tr>
</thead>
<tbody>
<tr>
<td>IMS LSR</td>
<td>0</td>
<td>4</td>
<td>512 NO</td>
<td>0</td>
<td>158</td>
<td>100</td>
<td>0%</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>IMS LSR</td>
<td>0</td>
<td>4</td>
<td>2,048 NO</td>
<td>69</td>
<td>225</td>
<td>76.5%</td>
<td>34</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>IMS LSR</td>
<td>0</td>
<td>4</td>
<td>4,096 NO</td>
<td>0</td>
<td>0</td>
<td>N/A</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>IMS LSR</td>
<td>0</td>
<td>4</td>
<td>8,192 NO</td>
<td>4</td>
<td>158</td>
<td>97.5%</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
</tbody>
</table>

The fields on the Shared Pools panel are described next.

**Pool type**

LOCAL or GLOBAL

Local pools are used exclusively for IMS batch jobs and are located in the batch region. GLOBAL pools are located in CSA.

**Total pool size**

Total size of all the allocated buffers for all the buffer pools for this shared pool.

**Hit ratio for all subpools**

Measure of buffer pool performance.

A high hit ratio means that a high percentage of reads were satisfied from the buffer pools without having to access external media. The hit ratio is calculated as follows:

100 x (Retrieves wo/read / (retrieves w/read + retrieves wo/read))

**Type**

Type of pool, VSAM or IMS.

**Group**

Location of the subpool. LSR is in the user region; GSR is in CSA.

**SP**

Identifier of the subpool.

**No. of Buffers**

Number of virtual buffers for this subpool.
Buffer size
Size in bytes of each buffer residing in this subpool.

Buffer fixed
Indicates whether the buffers are fixed in storage for this buffer pool.

Requests w/read
Number of retrieves that were satisfied with an access to external media.

Requests wo/read
Number of retrieves that were satisfied from within the buffers in the pool. No I/O was necessary.

Hit Ratio
Percentage of the monitored period that READ requests were satisfied without a physical I/O.

Non-user writes
Writes initiated by VSAM to make free space in this pool. These types of writes are very expensive and indicate that the pool might be too small. They are also called VSAM steal writes. Scroll right to display the following fields:

User init. writes
Writes by VSAM initiated by the user for synchronization processing.

Retrieves by RBA
Number of retrieves by relative byte address (RBA).

ESDS inserts
Number of inserts to the Entry Sequenced Data Set (ESDS).

Retrieves by KEY
Number of retrieves by key to a Key Sequenced Data Set (KSDS).

KSDS inserts
Number of inserts to a Key Sequenced Data Set (KSDS).

Buffer alters
Number of times a buffer was altered by VSAM.

VSAM gets
Number of VSAM GET requests.

Buffer searches
Number of VSAM search buffer requests.
No. PLH in chain

Number of Placeholders (PLH) in lock chain.

Error buffs in pool

Current number of error buffers in pool.

Max error buffs

Largest number of error buffers ever in the pool since the pool was created.

From the Shared Pools panel, you can display further detail by using one of the line commands:

■ The Select line command (S) displays the VSAM Pool Details panel.
■ The Data Sets line command (D) displays the Pooled Data Sets panel.

VSAM Pool Details displays the same information as shown in Shared Pools, but in a detail format.

<table>
<thead>
<tr>
<th>Pool type: IMS</th>
<th>Profile: IMS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pool group: LSR</td>
<td></td>
</tr>
<tr>
<td>Pool ID: 0</td>
<td></td>
</tr>
<tr>
<td>Number of buffers: 4</td>
<td></td>
</tr>
<tr>
<td>Buffer size: 512</td>
<td></td>
</tr>
<tr>
<td>Placeholders in chain: 0</td>
<td></td>
</tr>
<tr>
<td>Hit Ratio: 100 %</td>
<td></td>
</tr>
<tr>
<td>Requests requiring a read: 0</td>
<td></td>
</tr>
<tr>
<td>Requests satisfied from pool: 158</td>
<td></td>
</tr>
<tr>
<td>User initiated writes: 0</td>
<td></td>
</tr>
<tr>
<td>Non-user initiated writes: 0</td>
<td></td>
</tr>
<tr>
<td>Retrieves by RBA: 0</td>
<td></td>
</tr>
<tr>
<td>ESDS inserts: 0</td>
<td></td>
</tr>
<tr>
<td>Retrieves by key: 0</td>
<td></td>
</tr>
<tr>
<td>KSDS inserts: 0</td>
<td></td>
</tr>
<tr>
<td>Buffer alters: 0</td>
<td></td>
</tr>
<tr>
<td>VSAM GETS: 0</td>
<td></td>
</tr>
<tr>
<td>Buffer searches: 0</td>
<td></td>
</tr>
<tr>
<td>Error buffers in pool: 0</td>
<td></td>
</tr>
<tr>
<td>Maximum error buffers: 0</td>
<td></td>
</tr>
</tbody>
</table>

3. Press END to return to Shared Pools.
4. Type D to display the Pooled Data Sets panel. Pooled Data Sets displays information about any VSAM data set using the specified pool.

```
  Subpool: 0        BufferSize: 512                             Profile: IMS
                      Line commands: S - Select

  LC DDname   Data Set Name                                Type Comp   CISize
  __ __________ ____________________________________________ ____ ________ ______
  __ INVINDX  CAMAT.TEST.INVINDX.DATA                       KSDS DATA    512
```

The fields on the Pooled Data Sets panel are described next.

**Subpool**
Identification number of the VSAM subpool.

**BufferSize**
Size in bytes of each buffer in the subpool.

**DDname**
DDNAME used to allocate the data set.

**Data Set Name**
Full name of the data set.

**Type**
One of the following VSAM data set types:
- **KSDS** - a key sequenced data set that is always accompanied by an INDEX component. The index component does not have to use the same subpool.
- **ESDS** - an entry sequenced data set

**Comp**
One of the following types:
- **DATA** - contains real customer data
- **INDEX** - contains indexing information

**CISize**
Control Interval Size. The unit of transfer for VSAM data to and from storage. It is always a multiple of 512 bytes.
IMS Region Types

IMS processing can occur in a number of environments. CA Mainframe Application Tuner enables you to resolve performance problems and is capable of monitoring each of the following types of IMS processing.

**IMS batch processing**

IMS processing might occur in a batch region.

During this type of processing, all IMS activity occurs in one region. A batch program can process all full function IMS databases, but cannot access DEDBs or MSDBs. Batch programs are used when a large number of updates must be done, or when large reports must be created. Batch programs do not require a control region and other programs might not have concurrent access to the databases used by the job.

**IMS batch message program**

IMS processing might occur in a batch region that is connected to a control region or DBCTL region.

This type of processing is used also when a large number of records are updated or a report is created. This type of processing requires the control region. When you use a control region, recovery is made easier and other programs are allowed to access the databases concurrently.

**IMS message processing program**

IMS processing might occur in a region called a message processing region or MPR.

The MPR processes transactions that are created in an online environment, which means that a user can be sitting at a terminal entering interactive work and the IMS control region is scheduling work in the MPR. Normally the output message produced by this kind of IMS processing is destined for a terminal user. This type of processing requires a control region to control the terminal I/O and a DBCTL region to control the access to the databases. Other programs can access the databases while messages are being processed.

**IMS fast path program**

IMS processing might occur in a special region called a Fast Path region.

These regions are usually devoted to processing online transactions that require very fast response times. Programs running in this environment normally access Fast Path databases such as Data Entry Databases (DEDBs) or Main Storage Databases (MSDBs), but might also access full function IMS databases. They have similar requirements to MPR processing.
CICS transaction access

IMS processing might occur on behalf of a transaction that is executed in a CICS environment.

In this environment, the IMS data is either attached locally or attached by using a DBCTL region. The CICS transaction processing is similar to IMS. You enter a query or update and the IMS connection reads or alters the database. If the database is accessed by using a DBCTL, other programs might access the data concurrently. If the database is locally attached, only CICS shared database processing can occur concurrently.

CICS shared database processing

IMS processing might occur in a CICS environment that uses a batch job. You can run a shared database program only in a local DL/I environment. The batch job runs in its own region, but the CICS region synchronizes the updates to the IMS databases by using "mirror" transactions to process each request of the batch job. Shared database programs can use full function IMS databases.
Chapter 13: Using the Product in a Java Virtual Machine (JVM) Environment

This section contains the following topics:

- Analyze JVM Data (see page 415)
- Display JVM Detail Reports (see page 421)
- Display JVM Delay Locations (see page 424)

**Analyze JVM Data**

When CA Mainframe Application Tuner detects Java Virtual Machine (JVM) activity, the major category (Java Virtual Machine) and minor delay category (JVMPI Trace Activity) are assigned.

In order to collect detail Java application information, the Java support must be installed for the environment.

See the Installation Guide.

To see the JVM statements for an JVM activity:

1. Set up your monitoring criteria.
2. Invoke the monitor by using the I (Invoke) line command.
3. Analyze the data by using one of the analysis line commands, A, AL, AA, or AW.
4. From the Interactive Analysis menu, select Option 2.

The DelayView panel displays:

```
CA MAT -------------------------- DelayView ----------------- Row 1 to 9 of 9
COMMAND ===> SCROLL ===> HALF

Primary commands: DETail on/off Module: * Profile: JVM1
ADDHelp Csect: * Options: NORMAL
Offset: * Detail: ON

Line commands: A - Address (AutoNav enabled) S - Distribution

LC Major category Minor category Actv% Wait% Totl% Visual
-----------------------------------------------
__ Java Virtual Machine JVMPI Trace Activity 58.27 0.00 58.27 =========>
__ Voluntary Wait Wait/Waitr SVC 1.27 19.38 20.65 ==>
__ Program Active Program Active 12.02 0.00 12.02 =>
__ CICS Program Ctl Del Loader Delay 0.00 8.35 8.35 >
__ ESR SVC 122 (TYPE2) Unknown function 0.14 0.00 0.14
__ Program Load Delay LOAD SVC 122-9 0.14 0.00 0.14
__ Resource Conflict Global Serialization 0.14 0.00 0.14
__ System Active Restore SVC 0.14 0.00 0.14
__ Unix System Services loadhfs (BPX1LOD) 0.14 0.00 0.14
***************************** End of Table *******************************
```

It is important to note that the activity percentage values indicate the activity for all detected JVM activity and do not correspond with sample-based activity percentages that are displayed elsewhere by CA Mainframe Application Tuner.

5. Position the cursor and press Enter to autonavigate from the DelayView panel to display the JVM Applications panel.

If you autonavigate from the TranView Delay Detail panel, only the JVM activity that is associated with the selected transaction is reported.

You can also select Option 12 - JVM - Java Virtual Machine from the Interactive Analysis menu to display the JVM Applications panel.

```
CA MAT -------------------------- JVM Applications ----------------- Row 1 to 3 of 3
COMMAND ===> SCROLL ===> HALF

Primary commands: MOde Process/Application/Via/Current Profile: JVM1
Options: NORMAL

Line commands: A - Application Methods T - Threads Mode: Process
V - Via Methods NI - JVM Info Tran: *
C - Current Methods

JVM JVM
LC Process ID Release Information Pct% Visual
-----------------------------------------------
__ 33555438 1.4.2 J2RE 1.4.2 IBM z/OS Persistent Reusable 50.00 =========>
__ 16778231 1.4.2 J2RE 1.4.2 IBM z/OS Persistent Reusable 42.48 =======>
__ 33555444 1.4.2 J2RE 1.4.2 IBM z/OS Persistent Reusable 7.52 >
************************************************************************ End of Table *************************************************
```
The fields that are displayed on this panel are described next.

**Process ID**
Displays the identification numbers or the processes that are monitored by using a Java Virtual Machine.

**JVM release**
Displays the release level of the Java Virtual Machine (obtained from java.vm.version).

**JVM Info**
Displays the Java Virtual Machine System Properties (obtained from java.vm.info).

**Pct%**
Displays the percentage of all JVM activity measured where CA Mainframe Application Tuner detected program code to be executing.
This value is calculated based on the total of JVM activity, not the total number of samples. First volume serial of the data set.

**Visual**
Displays a visual depiction of the Pct% value.

### Command Descriptions for the JVM Applications Panel

The commands in this panel when it is in Process mode (initial display) are described next.

**MOde [Process/Application/Via/Current]**
Enter the MOde command followed by the mode (Process, Application, Via, or Current) to change display modes.
The Mode field indicates the display mode.

- Process (initial display): The Process IDs used by the monitored application are displayed
- Application: The class methods (which can be identified as not a system class) for an application are displayed
- Via: The class methods called by the application are displayed
- Current: The current active trace entries (last called class methods) are displayed

See also Examples of the JVM Applications panel in other modes.

**A - Application Methods**
Display the application class methods (which can also be identified as not a system class) for an application.
V - Via Methods
Display the via class methods called by the application.

C - Current Methods
Display the current active trace entries (last called class methods).

T - Threads
Display the thread TCBs (addresses) for the selected process.

NI - JVM Info
Display the Java Virtual Machine information string (by release level).

Example of the JVM Applications Panel in Other Modes

The following sections show examples of the JVM Applications panel in various modes:

- Application
- Via
- Current

The Application, Via, and Current modes display the class methods that are used by the measured application. The full Class.Method and Class Source are displayed. If values in these fields are truncated, use the NM and NS line command to display the full value.
**Application Mode**

The following panel shows the JVM Applications panel in Application mode.

<table>
<thead>
<tr>
<th>LC</th>
<th>Class.Method</th>
<th>Class Source</th>
<th>Pct%</th>
<th>Visual</th>
</tr>
</thead>
<tbody>
<tr>
<td>__</td>
<td>WaitTest.main</td>
<td>WaitTest.java</td>
<td>74.51</td>
<td></td>
</tr>
<tr>
<td>__</td>
<td>c/Launcher$AppClassLoader.loadClass</td>
<td>Launcher.java</td>
<td>6.07</td>
<td></td>
</tr>
<tr>
<td>__</td>
<td>java/lang/ClassLoader.loadClass</td>
<td>ClassLoader.java</td>
<td>5.10</td>
<td></td>
</tr>
<tr>
<td>__</td>
<td>com/ibm/cics/server/Wrapper.main</td>
<td>Wrapper.java</td>
<td>4.61</td>
<td></td>
</tr>
<tr>
<td>__</td>
<td>om/ibm/cics/server/Wrapper.&lt;clinit&gt;</td>
<td>Wrapper.java</td>
<td>4.37</td>
<td></td>
</tr>
<tr>
<td>__</td>
<td>/net/URLClassLoader$ClassFinder.run</td>
<td>URLClassLoader.java</td>
<td>2.67</td>
<td></td>
</tr>
<tr>
<td>__</td>
<td>java/lang/ClassLoader.defineClass0</td>
<td>ClassLoader.java</td>
<td>0.97</td>
<td></td>
</tr>
<tr>
<td>__</td>
<td>rity/AccessController.doPrivileged1</td>
<td>AccessController.java</td>
<td>0.73</td>
<td></td>
</tr>
<tr>
<td>__</td>
<td>java/lang/ClassLoader.defineClass</td>
<td>ClassLoader.java</td>
<td>0.49</td>
<td></td>
</tr>
<tr>
<td>__</td>
<td>java/net/URLClassLoader.access$500</td>
<td>URLClassLoader.java</td>
<td>0.49</td>
<td></td>
</tr>
<tr>
<td>__</td>
<td>ibm/cics/server/Wrapper.driveReInit</td>
<td>Wrapper.java</td>
<td>0.49</td>
<td></td>
</tr>
</tbody>
</table>

**Via Mode**

The following panel shows the JVM Applications panel in Via mode.

<table>
<thead>
<tr>
<th>LC</th>
<th>Class.Method</th>
<th>Class Source</th>
<th>Pct%</th>
<th>Visual</th>
</tr>
</thead>
<tbody>
<tr>
<td>__</td>
<td>java/math/BigInteger.divide</td>
<td>BigInteger.java</td>
<td>64.56</td>
<td></td>
</tr>
<tr>
<td>__</td>
<td>** No Calls.**</td>
<td></td>
<td>7.04</td>
<td></td>
</tr>
<tr>
<td>__</td>
<td>java/lang/ClassLoader.loadClass</td>
<td>ClassLoader.java</td>
<td>5.10</td>
<td></td>
</tr>
<tr>
<td>__</td>
<td>c/Launcher$AppClassLoader.loadClass</td>
<td>Launcher.java</td>
<td>5.10</td>
<td></td>
</tr>
<tr>
<td>__</td>
<td>cics/server/Wrapper.collectingTrace</td>
<td>Wrapper.java</td>
<td>4.13</td>
<td></td>
</tr>
<tr>
<td>__</td>
<td>m/cics/server/Wrapper.&lt;clinit&gt;</td>
<td>Wrapper.java</td>
<td>3.88</td>
<td></td>
</tr>
<tr>
<td>__</td>
<td>java/lang/ClassLoader.loadClass</td>
<td>ClassLoader.java</td>
<td>2.67</td>
<td></td>
</tr>
<tr>
<td>__</td>
<td>java/math/BigInteger.multiply</td>
<td>BigInteger.java</td>
<td>2.18</td>
<td></td>
</tr>
<tr>
<td>__</td>
<td>/net/URLClassLoader$ClassFinder.run</td>
<td>URLClassLoader.java</td>
<td>0.73</td>
<td></td>
</tr>
<tr>
<td>__</td>
<td>urity/SecureClassLoader.defineClass</td>
<td>SecureClassLoader.java</td>
<td>0.49</td>
<td></td>
</tr>
<tr>
<td>__</td>
<td>ibm/cics/server/Wrapper.driveReInit</td>
<td>Wrapper.java</td>
<td>0.49</td>
<td></td>
</tr>
</tbody>
</table>
Current Mode

The following panel shows the JVM Applications panel in Current mode.

<table>
<thead>
<tr>
<th>LC</th>
<th>Class.Method</th>
<th>Class Source</th>
<th>Pct%</th>
<th>Visual</th>
</tr>
</thead>
</table>
| __  | ath/MutableBigInteger.divideOneWord | MutableBigInteger.java | 62.38 | -------->
| __  | java/util/zip/ZipFile.open      | ZipFile.java       | 4.37 |        |
| __  | java/util/zip/ZipFile.getEntry  | ZipFile.java       | 4.37 |        |
| __  | WaitTest.main                   | WaitTest.java      | 3.40 |        |
| __  | java/math/BigInteger.divide     | BigInteger.java    | 2.91 |        |
| __  | java/net/URL.openConnection    | URL.java           | 2.67 |        |
| __  | nixFileSystem.getBooleanAttributes() | UnixFileSystem.java | 2.18 |        |
| __  | java/math/BigInteger.multiplyToLen | BigInteger.java    | 2.18 |        |
| __  | java/lang/String.replace        | String.java        | 1.94 |        |
| __  | l/jar/JarFile.hasClassPathAttribute | JarFile.java       | 1.70 |        |
| __  | java/math/MutableBigInteger.divide | MutableBigInteger.java | 1.70 |        |

The various commands that are available on this panel in Application, Via, and Current modes are described next.

MOde [Process/Application/Via/Current]

Enter the MOde command followed by the mode (Process, Application, Via, or Current) to change display modes.

The Mode field indicates the display mode.

- Process (initial display): the Process IDs used by the monitored application are displayed
- Application: the class methods (which can be identified as not a system class) for an application are displayed
- Via: the class methods called by the application are displayed
- Current: the current active trace entries (last called class methods) are displayed

A - Application Methods

Display the application class methods associated with a Class.Method.

V - Via Methods

Display the via class methods associated with a Class.Method.
Display JVM Detail Reports

C - Current Methods
Display the current active trace entries associated with a Class.Method.

D - Method Details
Display the source line numbers within the selected method where activity was detected.

P - Processes
Display the process ID's associated with the selected class.

NM - Method Name
Display the full name of the selected method (which might have been truncated on the panel display).

NS - Source Name
Display the full name of the source file of the selected method (which might have been truncated on the panel display).

Display JVM Detail Reports

The following sections describe the different JVM detail reports that are available. The level of detail that displays depends on from where the detail report was called, and is indicated by the Method, Source, Process, and ThrdTCB fields.
Display the JVM Methods Panel

The JVM Methods panel displays the Class.Methods and Class Source information. From here, you can use the D (Method Details) line command to display the line numbers in the class source where the activity was detected and the P (Processes) line command to see the associated Process IDs.

<table>
<thead>
<tr>
<th>LC</th>
<th>Class.Method</th>
<th>Class Source</th>
<th>Pct%</th>
<th>Visual</th>
</tr>
</thead>
<tbody>
<tr>
<td>__</td>
<td>WaitTest.main</td>
<td>WaitTest.java</td>
<td>41.50</td>
<td>======&gt;</td>
</tr>
<tr>
<td>__</td>
<td>com/ibm/cics/server/Wrapper.main</td>
<td>Wrapper.java</td>
<td>2.67</td>
<td></td>
</tr>
<tr>
<td>__</td>
<td>com/ibm/cics/server/Wrapper.&lt;clinit&gt;</td>
<td>Wrapper.java</td>
<td>1.94</td>
<td></td>
</tr>
<tr>
<td>__</td>
<td>c/Launcher$AppClassLoader.loadClass</td>
<td>Launcher.java</td>
<td>1.94</td>
<td></td>
</tr>
<tr>
<td>__</td>
<td>java/lang/ClassLoader.defineClass0</td>
<td>ClassLoader.java</td>
<td>0.97</td>
<td></td>
</tr>
<tr>
<td>__</td>
<td>rity/AccessController.doPrivileged1</td>
<td>AccessController.java</td>
<td>0.49</td>
<td></td>
</tr>
<tr>
<td>__</td>
<td>/net/URLClassLoader$ClassFinder.run</td>
<td>URLClassLoader.java</td>
<td>0.24</td>
<td></td>
</tr>
<tr>
<td>__</td>
<td>java/lang/ClassLoader.defineClass0</td>
<td>ClassLoader.java</td>
<td>0.24</td>
<td></td>
</tr>
</tbody>
</table>

The commands that are available on the JVM Methods panel are described next.

**D - Method Details**

Display the source line numbers within the selected method where activity was detected.

**P - Processes**

Display the process IDs that are associated with the selected class.

**NM - Method Name**

Display the full name of the selected method (which might have been truncated on the panel display).

**NS - Source Name**

Display the full name of the source file of the selected method (which might have been truncated on the panel display).
Display the JVM Method Detail Panel

Enter the D line command on the JVM Methods panel to display the JVM Method Detail panel. The JVM Method Detail panel displays the line numbers in the class source where activity was detected.

![JVM Method Detail Panel](image)

Display the JVM Thread TCBs Panel

Enter the T line command on the JVM Applications panel to display the JVM Thread TCBs panel. The JVM Thread TCBs panel displays the Thread TCB (hexadecimal address) and UNIX® Thread ID (16-byte hexadecimal value) that is associated with the selected process ID. The Application, Via, or Current methods that is associated with a thread can be displayed.

![JVM Thread TCBs Panel](image)
The various commands that are available on the JVM Thread TCBs panels are described next.

**A - Application Methods**
Display the application class methods associated with a Class.Method.

**V - Via Methods**
Display the via class methods associated with a Class.Method.

**C - Current Methods**
Display the current active trace entries associated with a Class.Method.

**I - JVM Info**
Display the JVM Information panel where you can issue the 
**VI** line command to see the full Java name of the selected method or source.

---

**Display JVM Delay Locations**

The following sections describe how to display JVM Delay locations from various panels within CA Mainframe Application Tuner.

**TranView for CICS Panel**

The following panel shows an example of the TranView for CICS activity panel. From this panel, the D (Delay Details) line command (LC) displays the DelayView Detail panel where you can view JVM activity when a Java application program is running for the transaction.

```
CA MAT --------------------------- TranView ----------------- Row 1 to 8 of 8
COMMAND ===>                                                  SCROLL ===> CSR
Primary commands: SELect, RECall, ADDHelp                    Profile: CICSJAV
STC - CICS Summary Stats   IDL - CICS Idle Time  Options: NORMAL
Line commands: T - Tag   U - Untag   D - Delay Details (Auto-Navigation)
C - Code Details      N - Data Details
P - CallerID Details  S - Additional Tran Statistics
LC TRAN     T D #Trans Avg RESP Avg CPU Actv%  Data%  Other% Total% Visual
________________ ___________________________ ____________________________
| JTU4       Y      4 42.65599 125.4748  60.94   0.40   0.02  61.37 =========>
| JTU3       Y      2 46.97247 124.4241  31.86   0.00   0.01  31.87 =====>
| MQPT              9  2.75560  0.90153   5.71   0.01   0.26   5.98
| MQGT              5  0.16780  0.09408   0.33   0.00   0.03   0.37
```

---


Display JVM Delay Locations

Chapter 13: Using the Product in a Java Virtual Machine (JVM) Environment  425

DelayView Detail Panel

The following panel shows the DelayView Detail panel with an example when Java activity is present. The Java Virtual Machine entry under the Major category column shows JVMPI Trace activity under the Minor category. Use autonavigation by placing the cursor on the line and pressing Enter displays additional JVM application data.

<table>
<thead>
<tr>
<th>Major Category</th>
<th>Minor Category</th>
<th>Actv%</th>
<th>Wait%</th>
<th>Total%</th>
<th>Visual</th>
</tr>
</thead>
</table>
| Java Virtual Machine JVMPI Trace Activity | 36.80 | 0.00 | 36.80 | =========>
| Java Virtual Machine ExecuteJava | 2.01 | 0.00 | 2.01 |        |
| System Active Getmain SVC | 1.96 | 0.00 | 1.96 |        |
| Program Active Program Active | 1.22 | 0.00 | 1.22 |        |
| CICS Program Ctl Del Loader Delay | 0.00 | 0.88 | 0.00 |        |
| System Active Restore SVC | 0.22 | 0.00 | 0.22 |        |
| Voluntary Wait Wait/Waitr SVC | 0.20 | 0.00 | 0.20 |        |
| System Active Purge SVC | 0.14 | 0.00 | 0.14 |        |
| Unix System Services sigsuspend (BPX1SSU) | 0.09 | 0.00 | 0.09 |        |
| System Active Exit SVC | 0.03 | 0.00 | 0.03 |        |

Place the cursor on the line for JVMPI Trace activity and press Enter to view the JVM Applications panel.

<table>
<thead>
<tr>
<th>JVM Process ID</th>
<th>Release Information</th>
<th>Pct%</th>
<th>Visual</th>
</tr>
</thead>
</table>
| 16778261 1.3.1 | J2RE 1.3.1 IBM OS/390 Persistent Reusable | 52.58 | =========>
| 16778264 1.3.1 | J2RE 1.3.1 IBM OS/390 Persistent Reusable | 45.58 | =========>
| ************************************************** | End of Table | **        |
Delay Locations Detail Panel

On the Delay Locations Detail panel the Module column contains the JVM short name of the Java activity. The Csect Description column shows only a part of the long name of the Java activity.

<table>
<thead>
<tr>
<th>LC Module</th>
<th>Csect</th>
<th>Offset</th>
<th>Csect Description</th>
<th>Stmt</th>
<th>D C Pct</th>
<th>Visual</th>
</tr>
</thead>
<tbody>
<tr>
<td>BJITC-01</td>
<td>00000000 w/J1.4/bin/libjitc.so</td>
<td>Y 24.87 =&gt;</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>IBJVM-01</td>
<td>00000000 bin/classic/libjvm.so</td>
<td>Y 5.15 =&gt;</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>.EUSER .EUSER</td>
<td>3FE26A0E In extended user spac</td>
<td>1.24</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>.EUSER .EUSER</td>
<td>3FE26A38 In extended user spac</td>
<td>0.62</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>.EUSER .EUSER</td>
<td>3FE26A08 In extended user spac</td>
<td>0.59</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>.EUSER .EUSER</td>
<td>3FE30DB2 In extended user spac</td>
<td>0.76</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>.EUSER .EUSER</td>
<td>3FE30D9A In extended user spac</td>
<td>0.45</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

To view the entire long name, enter the N (Long Name) line command; a new panel displays with the full long name.

Short Name: BJITC-01

/SJ5E/var/mtw/J1.4/bin/libjitc.so
DelayView Panel

The following panel shows an example of the DelayView panel when Java activity is detected. The Major category column shows Java Virtual Machine and the Minor category column shows ExecuteJava.

<table>
<thead>
<tr>
<th>Major category</th>
<th>Minor category</th>
<th>Actv%</th>
<th>Wait%</th>
<th>Totl%</th>
<th>Visual</th>
</tr>
</thead>
<tbody>
<tr>
<td>Program Active</td>
<td>Program Active</td>
<td>63.83</td>
<td>0.00</td>
<td>63.83</td>
<td>======&gt;</td>
</tr>
<tr>
<td>Java Virtual Machine</td>
<td>ExecuteJava</td>
<td>22.04</td>
<td>0.00</td>
<td>22.04</td>
<td>==&gt;&gt;</td>
</tr>
<tr>
<td>Voluntary Wait</td>
<td>Wait/Waitr SVC</td>
<td>0.55</td>
<td>7.12</td>
<td>7.67</td>
<td>&gt;</td>
</tr>
<tr>
<td>CICS Program Ctl Del</td>
<td>Loader Delay</td>
<td>0.00</td>
<td>2.69</td>
<td>2.69</td>
<td></td>
</tr>
<tr>
<td>Unix System Services</td>
<td>read (BPXIRED)</td>
<td>1.93</td>
<td>0.00</td>
<td>1.93</td>
<td></td>
</tr>
<tr>
<td>Unix System Services</td>
<td>realpath (BPX1RPH)</td>
<td>0.48</td>
<td>0.00</td>
<td>0.48</td>
<td></td>
</tr>
<tr>
<td>Unix System Services</td>
<td>1stat (BPXI1ST)</td>
<td>0.28</td>
<td>0.00</td>
<td>0.28</td>
<td></td>
</tr>
<tr>
<td>Unix System Services</td>
<td>loseek (BPXI1LSK)</td>
<td>0.28</td>
<td>0.00</td>
<td>0.28</td>
<td></td>
</tr>
<tr>
<td>Unix System Services</td>
<td>open (BPX1OPN)</td>
<td>0.17</td>
<td>0.00</td>
<td>0.17</td>
<td></td>
</tr>
<tr>
<td>PC Call</td>
<td>PC Call</td>
<td>0.14</td>
<td>0.00</td>
<td>0.14</td>
<td></td>
</tr>
<tr>
<td>Unix System Services</td>
<td>Unix System Services</td>
<td>0.07</td>
<td>0.00</td>
<td>0.07</td>
<td></td>
</tr>
<tr>
<td>Unix System Services</td>
<td>loadhfs (BPX1LOD)</td>
<td>0.07</td>
<td>0.00</td>
<td>0.07</td>
<td></td>
</tr>
</tbody>
</table>

Enter the A (Address) line command next to Java Virtual Machine to view the Delay Locations panel.
Delay Locations

On the Delay Locations Detail panel the Module column contains the JVM short name of the Java activity. The Csect Description column shows only a part of the long name of the Java activity.

![Delay Locations Detail Panel](image)

To view the entire long name, enter the N (Long Name) line command; the following panel displays with the full long name.

![Long Name Panel](image)

/SJSE/var/mtw/J1.4/bin/libjitc.so
Chapter 14: Using the Product in a WebSphere Application Server Environment

CA Mainframe Application Tuner is compatible with WebSphere Application Server for z/OS V5.1 and V6.1.

In order to collect detail WebSphere application information, the WebSphere Application Server support must be installed.

See the *Installation Guide*.

This section contains the following topics:

- **Introduction** (see page 430)
- **Monitor WebSphere Application Server** (see page 431)
- **Analyze WebSphere Application Server Transactions** (see page 434)
Introduction

The IBM® product, WebSphere, includes two foundation products and several foundation extensions. The two products that represent the heart of the product set are WebSphere MQ and WebSphere Application Server (WAS). WAS is what most people think about today when you say WebSphere. WebSphere Application Server is a Java2 Enterprise Edition (J2EE) compliant application server, which means WAS supports the J2EE specification and builds on the J2EE specification.

WAS for z/OS has a Server side and a Client side. A Server comprises a Control Region and one or more corresponding Server Regions. The Control Region is a system address space. No application code runs there. The Control Region manages communications into and out of the server, authenticates all client requests, keeps track of the client transactions, and interfaces with Workload Manager (WLM) to schedule the work.

A Servant Region is an application address space where an application and its objects run. Between the Control and Servant Regions is a work queue that is administered by Workload Manager. WLM prioritizes the requests and dispatches them to a Servant Region to meet performance targets that the user has defined.

When an application is deployed, the user specifies the WAS server in which the application will execute.
Monitor WebSphere Application Server

The primary targets for the WebSphere Application Server feature are the Servant Regions of the WAS Server. This situation is unlike a batch application and can be more easily compared to measuring an IMS Message Processing Region, a DB2® Stored Procedures Address Space, or other Service Address Space where several disparate pieces of work might be processing in the same address space.

When you deploy your application, you must also provide the target WAS Server. A given WAS Server can have 1 to \( n \) Servant Regions that should be measured. CA Mainframe Application Tuner assumes that you are, in all cases, aware of the name of the affected WAS Server.

Scenario 1—General Tuning

This scenario assumes that you are not aware of specific problems areas but suspect or have been made aware of performance degradation.

In this scenario, you run CA Mainframe Application Tuner in non-targeted mode without WAS transaction filters. No detailed reports are produced.

1. Submit a monitor for each occurrence of the associated J2EE Servant Regions (not the Control Region), unless you already know the Servant Region.

   When specifying monitoring criteria for WebSphere, leave the Application URL Filters fields blank, as shown following.

```
CA MAT ------------ WebSphere Application Server Criteria ------------
COMMAND =>

Expert Mode => N  Y - Collect PSW samples
               N - Disable PSW sampling

Specify Application URL Filters:
  =>
  =>
  =>

Specify System Class Filters:
  =>
  =>

Specify values. Press END to return to Monitoring Criteria
```

There can be 1 to \( n \) occurrences of this Servant address space per WAS Server.
2. Analyze the monitor data sets to view the results.

Select the WebSphere Transactions option to view the transactions detected by CA Mainframe Application Tuner, as shown following.

```
CA MAT ------------- WebSphere Transactions -------------- Row 1 to 9 of 9
COMMAND ===>                                                SCROLL ===> HALF
Primary commands: GARbage, WAS (Environment info), SQL       Profile: PLANTS1
Mode: URL
Line commands: N - URL Name

<table>
<thead>
<tr>
<th>LC Transaction URL</th>
<th>Total</th>
<th>Avg</th>
<th>Max</th>
<th>Min</th>
</tr>
</thead>
<tbody>
<tr>
<td>__ /burn/goReflect</td>
<td>5</td>
<td>80658.00</td>
<td>86386.00</td>
<td>76104.00</td>
</tr>
<tr>
<td>__ /burn/goWait</td>
<td>8</td>
<td>14607.25</td>
<td>28045.00</td>
<td>943.00</td>
</tr>
<tr>
<td>__ /burn/go</td>
<td>5</td>
<td>8141.00</td>
<td>11519.00</td>
<td>5632.00</td>
</tr>
<tr>
<td>__ /PlantsByWebSphere/servlet/Shopp</td>
<td>17</td>
<td>2967.65</td>
<td>16547.00</td>
<td>83.00</td>
</tr>
<tr>
<td>__ /burn/goCache</td>
<td>5</td>
<td>1584.60</td>
<td>2825.00</td>
<td>679.00</td>
</tr>
<tr>
<td>__ /burn/goVector</td>
<td>5</td>
<td>512.80</td>
<td>1415.00</td>
<td>3.00</td>
</tr>
<tr>
<td>__ /PlantsByWebSphere/servlet/Image</td>
<td>56</td>
<td>284.36</td>
<td>2157.00</td>
<td>24.00</td>
</tr>
<tr>
<td>__ /burn/gogobble</td>
<td>8</td>
<td>27.63</td>
<td>74.00</td>
<td>5.00</td>
</tr>
<tr>
<td>__ /PlantsByWebSphere/shopping.jsp</td>
<td>1</td>
<td>8.00</td>
<td>8.00</td>
<td>8.00</td>
</tr>
</tbody>
</table>
```

3. Follow up with a subsequent targeted monitor based on the data reported. See scenario 2.

**Scenario 2—User Suspects a Specific Problem**

This scenario assumes that you are aware of suspected problem areas or have already monitored the suspect transactions in nontargeted mode.

In this scenario, you target specific transactions with the use of transaction filters and generate detailed reports.
1. Request additional WAS targeting data by providing specific transaction filters.
   In the following example the filter value *plants* will cause only those transactions containing the value *plants* to be reported.

   CA MAT ------------- WebSphere Application Server Criteria -------------
   COMMAND ===> 
   Expert Mode ==> N    Y - Collect PSW samples
                        N - Disable PSW sampling
   Specify Application URL Filters:
   => *plants*  
   =>  
   Specify System Class Filters:
   =>  
   Specify values. Press END to return to Monitoring Criteria

   You can specify several filter patterns in each input field, separated by a comma (*plants*,*admin*/,/burn*).

2. Submit a monitor for each occurrence of the associated J2EE Servant Regions, unless you already know the Servant Region.
   There can be 1 to \( n \) occurrences of this Servant address space.

3. Analyze the monitor data sets to identify specific causes of application performance issues.
   The WebSphere Transactions report will only contain transactions whose URL names match the filter criteria, as shown next.

   CA MAT ------------ WebSphere Transactions ----------------- Row 1 to 2 of 2
   COMMAND ===>
   SCROLL ===> HALF
   Primary commands: M(ode URL/Application/Via/Current,  Profile: PLANTS2
   GARbage, WAS (Environment info), SQL     Mode: URL
   Line commands: A - Application Classes   S - SQL
                 V - Via Classes           D - Delays
                 C - Current Classes       N - URL Name
   LC Transaction URL      Active% InvWait% VolWait% Total% Visual
   >--------------------------------------------------------------------------
   /PlantsByWebSphere/servlet/Shopp  83.11  0.00  0.00    83.11 =>
   /PlantsByWebSphere/servlet/Image  16.89  0.00  0.00    16.89 =>
   **************************************************End of Table **************************************************
Analyze WebSphere Application Server Transactions

CA Mainframe Application Tuner enables you to analyze WebSphere Application Server data at the WebSphere transaction level.

Use the following steps to analyze WebSphere transactions:

1. From the Interactive Analysis menu, select Option 13.

![Interactive Analysis Menu]

The WebSphere Transactions panel displays.

![WebSphere Transactions Panel]

---

**Analyze WebSphere Application Server Transactions**

CA Mainframe Application Tuner enables you to analyze WebSphere Application Server data at the WebSphere transaction level.

Use the following steps to analyze WebSphere transactions:

1. From the Interactive Analysis menu, select Option 13.

---

**Analyze WebSphere Application Server Transactions**

CA Mainframe Application Tuner enables you to analyze WebSphere Application Server data at the WebSphere transaction level.

Use the following steps to analyze WebSphere transactions:

1. From the Interactive Analysis menu, select Option 13.
The WebSphere Transactions panel presents activity and performance information for the transaction URLs that are monitored by CA Mainframe Application Tuner.

The fields in this panel are described next.

**Transaction URL**
- Name of the sampled transaction URL.

**Active%**
- Percentage of all WebSphere transactions measured where CA Mainframe Application Tuner detected program code to be executing.

**InvWait%**
- Percentage of all WebSphere transactions measured where CA Mainframe Application Tuner detected program code to be in an involuntary wait.

**VolWait%**
- Percentage of all WebSphere transactions measured where CA Mainframe Application Tuner detected program code to be in a voluntary wait.

**Total%**
- Sum of active, voluntary, and involuntary waits.

**Visual**
- Visual representation of the Total% value.

**Total Count**
- Total number of URL instances detected.

**Avg Resp**
- Average response time for the transaction in milliseconds.

**Max Resp**
- Maximum response time for the transaction in milliseconds.

**Min Resp**
- Minimum response time for the transaction in milliseconds.
When no URL filters are specified in the WebSphere monitoring criteria panel (see "Monitoring Criteria for WebSphere Application Server"), CA Mainframe Application Tuner does not collect Class data (Application, Via, or Current) or activity statistics. Only WebSphere transactions, garbage collection, environment, and SQL data is collected. In this case, a list of transactions displays, which you can use to define URL filters for subsequent monitors.

<table>
<thead>
<tr>
<th>CA MAT</th>
<th>WebSphere Transactions</th>
<th>Row 1 to 7 of 7</th>
</tr>
</thead>
<tbody>
<tr>
<td>COMMAND</td>
<td>SCROLL ==&gt; CSR</td>
<td></td>
</tr>
</tbody>
</table>

Primary commands: Garbage, WAS (Environment info), SQL  Profile: WAS4  Mode: URL

Line commands: N - URL Name

<table>
<thead>
<tr>
<th>LC Transaction URL</th>
<th>Total</th>
<th>Avg</th>
<th>Max</th>
<th>Min</th>
</tr>
</thead>
<tbody>
<tr>
<td>/burn/goReflect</td>
<td>1</td>
<td>13293.00</td>
<td>13293.00</td>
<td>13293.00</td>
</tr>
<tr>
<td>/burn/goDB2MF</td>
<td>1</td>
<td>10073.00</td>
<td>10073.00</td>
<td>10073.00</td>
</tr>
<tr>
<td>/burn/go</td>
<td>1</td>
<td>2808.00</td>
<td>2808.00</td>
<td>2808.00</td>
</tr>
<tr>
<td>/burn/gogobble</td>
<td>1</td>
<td>39.00</td>
<td>39.00</td>
<td>39.00</td>
</tr>
<tr>
<td>/burn/goCache</td>
<td>1</td>
<td>24.00</td>
<td>24.00</td>
<td>24.00</td>
</tr>
<tr>
<td>/burn/goVector</td>
<td>1</td>
<td>2.00</td>
<td>2.00</td>
<td>2.00</td>
</tr>
<tr>
<td>/burn/goWait</td>
<td>1</td>
<td>0.00</td>
<td>0.00</td>
<td>0.00</td>
</tr>
</tbody>
</table>

End of Table

Transaction only mode

2. From the WebSphere Transactions panel, enter the MOde primary command on the COMMAND line and press Enter to see all classes of the selected type (Application/Via/Current). For example:

- Type MO A to see all the Application classes.
- Type MO V to see all the Via classes.
- Type MO C to see all the Current classes.
The WebSphere Classes panel displays.

```
CA MAT ----------------- WebSphere Classes ----------------- Row 1 to 4 of 4
COMMAND ====> SCROLL ====> CSR

Primary commands: MMode URL/Application/Via/Current Profile: WAS5
GARbage, WAS (Environment info), SQL Mode: Appl.

Line commands: D - Delays NC - Class Name
S - SQL NM - Method Name

LC Class Name Method Name Line # Active% InvWait%
>------------------------------------------------------------------------
__ common/IoPerform read Compiled 48.03 0.00
__ common/CpuPerform exercise Compiled 47.35 0.00
__ common/GoHeader processRequest 41 4.19 0.00
__ common/GoHeader processRequest 42 0.43 0.00
------------------------------------------------------------------------
```

This panel shows a high-level display of classes for the selected mode.

3. From the WebSphere Transactions panel, use line commands A (Application Classes), V (Via Classes), or C (Current Classes) to see the classes that are associated with the selected transaction, as shown following.

```
CA MAT ----------------- WebSphere Classes ----------------- Row 1 to 2 of 2
COMMAND ====> SCROLL ====> CSR
Primary commands: GARbage, WAS (Environment info) Profile: WAS5
Type: Appl.

Line commands: D - Delays NC - Class Name
S - SQL NM - Method Name
Transaction: /burn/go

LC Class Name Method Name Line # Active% InvWait%
>------------------------------------------------------------------------
__ common/IoPerform read Compiled 48.03 0.00
__ common/CpuPerform exercise Compiled 47.35 0.00
------------------------------------------------------------------------
```

The WebSphere Classes panel provides information about the classes and methods that are called by the WebSphere application.

You can also see the method name and line number for the selected transaction URL. Compiled in the Line # column indicates that the method was compiled dynamically and that there is no line number.
4. From the WebSphere Transactions panel, use line command D (Delays) to see the delay category for the selected transaction, as shown following.

Possible delay categories are

- IO delay
- network delay
- SQL delay
- JMS delay
- other delay

The WebSphere Delays panel reports the delays that are attributed to the selected transaction or class.

5. From the WebSphere Transactions panel, use line command S (SQL) to see the SQL statement information for the selected transaction, as shown following.
The WebSphere SQL Statements panel reports the SQL statement information that is associated with the selected transaction or class.

If a statement has been truncated on this panel, you can use line command S again to see the full text of the selected SQL statement.

Or, you can use the SQL primary command to see all detected SQL statements in the following step.

6. From the WebSphere Transactions panel, enter the SQL primary command on the COMMAND line and press Enter to see all detected SQL statements, as shown following.

<table>
<thead>
<tr>
<th>CA MAT</th>
<th>-------- WebSphere SQL Statements --------</th>
<th>Row 1 to 6 of 102</th>
</tr>
</thead>
<tbody>
<tr>
<td>COMMAND</td>
<td></td>
<td>SCROLL</td>
</tr>
<tr>
<td>Primary commands: GARBage, WAS (Environment info)</td>
<td>Profile: WAS7</td>
<td></td>
</tr>
<tr>
<td>Line commands: S - Display SQL</td>
<td>T - Transactions</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>LC SQL Statement</th>
<th>Total Count</th>
<th>Avg Resp Time (ms)</th>
<th>Max Resp Time (ms)</th>
<th>Min Resp Time (ms)</th>
</tr>
</thead>
<tbody>
<tr>
<td>select count(TEXT8),</td>
<td>50</td>
<td>112.00</td>
<td>219.00</td>
<td>77.00</td>
</tr>
<tr>
<td>insert into btsfr.TR</td>
<td>2</td>
<td>96.00</td>
<td>174.00</td>
<td>18.00</td>
</tr>
<tr>
<td>update btsfr.TRI85TB</td>
<td>1</td>
<td>68.00</td>
<td>68.00</td>
<td>68.00</td>
</tr>
<tr>
<td>update btsfr.TRI85TB</td>
<td>1</td>
<td>62.00</td>
<td>62.00</td>
<td>62.00</td>
</tr>
<tr>
<td>update btsfr.TRI85TB</td>
<td>1</td>
<td>62.00</td>
<td>62.00</td>
<td>62.00</td>
</tr>
<tr>
<td>update btsfr.TRI85TB</td>
<td>1</td>
<td>61.00</td>
<td>61.00</td>
<td>61.00</td>
</tr>
</tbody>
</table>
7. From the WebSphere SQL Statements panel, use line command T (Transactions) to see the transactions that are associated with the selected SQL statement, as shown following.

```
<table>
<thead>
<tr>
<th>Application Classes</th>
<th>Via Classes</th>
<th>Current Classes</th>
<th>URL Name</th>
</tr>
</thead>
<tbody>
<tr>
<td>SQL Stmt: select count(TEXT8), TEXT8 from btsrfr.TRI8STB group by TEXT8 order</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

LC Transaction URL  | Active% | InvWait% | VolWait% | Total% | Visual |
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>/burn/goDB2MF</td>
<td>7.16</td>
<td>0.00</td>
<td>0.00</td>
<td>7.16</td>
<td></td>
</tr>
</tbody>
</table>
```

If the SQL statement text is truncated on this panel, you can use the STMT command to see the full text of the SQL statement.

8. From the WebSphere Transaction Detail panel, you can again use line commands A (Application Classes), V (Via Classes), or C (Current Classes) to see the classes that are associated with the selected transaction, as shown following.

9. From any of the WebSphere panels, enter the WAS (Environment info) primary command on the COMMAND line and press Enter to see information about the WebSphere environment, as shown following.

```
<table>
<thead>
<tr>
<th>Process ID: 50332345</th>
</tr>
</thead>
<tbody>
<tr>
<td>JVM: IBM Corporation</td>
</tr>
<tr>
<td>Application Server: WebSphere - z/OS</td>
</tr>
<tr>
<td>Initial Heap Size: 268.6 (MBytes)</td>
</tr>
<tr>
<td>Maximum Heap Size: 268.4 (MBytes)</td>
</tr>
</tbody>
</table>
```
From any of the WebSphere panels, enter the GARbage primary command on the COMMAND line and press Enter to see information about the WebSphere garbage collection information, as shown following.

<table>
<thead>
<tr>
<th>CA MAT</th>
<th>WebSphere Garbage Collection</th>
<th>X</th>
<th>Row 1 to 17 of 25</th>
<th>SCROLL</th>
<th>CSR</th>
</tr>
</thead>
<tbody>
<tr>
<td>COMMAND</td>
<td>===&gt;</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Garbage Collection</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td># of Events</td>
<td>Initial: 8</td>
<td>Final: 11</td>
<td>Rate: 0.034 (events/sec)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Monitored: 3</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Initial Heap Size: 269.0 (MBytes)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Final Heap Size: 269.1 (MBytes)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Occupancy Rate: 0.02 (% of time GC was running during monitor)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Memory Usage</td>
<td>(percentage of heap during monitor session)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Min = 8.3% (22.3MB)</td>
<td>Max = 72.8% (195.8MB)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>% Heap</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>90</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>80</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

The WebSphere Garbage Collection panel provides information about WebSphere memory usage during the monitoring session.
Chapter 15: Using the Product in a WebSphere for MQ Environment

This chapter describes how you can use CA Mainframe Application Tuner to identify and locate delays in your WebSphere for MQ environment.

CA Mainframe Application Tuner also recognizes delays incurred by Queue Managers in this environment.

This section contains the following topics:

Analyze WebSphere for MQ Data (see page 443)

Analyze WebSphere for MQ Data

To analyze WebSphere for MQ data, no setup is required. If WebSphere for MQ is running, CA Mainframe Application Tuner will discover it and begin collecting statistical data. Begin your monitoring session from the DelayView or DataView panel.

<table>
<thead>
<tr>
<th>LC Major category</th>
<th>Minor category</th>
<th>Actv%</th>
<th>Wait%</th>
<th>Totl%</th>
<th>Visual</th>
</tr>
</thead>
<tbody>
<tr>
<td>MQSeries Delay</td>
<td>MQSeries Delay</td>
<td>0.00</td>
<td>5.50</td>
<td>5.50</td>
<td>&gt;</td>
</tr>
<tr>
<td>Other Delays</td>
<td>Unknown wait type</td>
<td>0.00</td>
<td>2.12</td>
<td>2.12</td>
<td></td>
</tr>
<tr>
<td>Voluntary Wait</td>
<td>Stimer SVC</td>
<td>1.41</td>
<td>0.00</td>
<td>1.41</td>
<td></td>
</tr>
<tr>
<td>Program Load Delay</td>
<td>Load SVC</td>
<td>0.00</td>
<td>1.14</td>
<td>1.14</td>
<td></td>
</tr>
<tr>
<td>System Active</td>
<td>Storage management</td>
<td>0.96</td>
<td>0.00</td>
<td>0.96</td>
<td></td>
</tr>
<tr>
<td>System Active</td>
<td>Regmain SVC</td>
<td>0.73</td>
<td>0.00</td>
<td>0.73</td>
<td></td>
</tr>
<tr>
<td>System Active</td>
<td>Getmain 120 SVC</td>
<td>0.73</td>
<td>0.00</td>
<td>0.73</td>
<td></td>
</tr>
<tr>
<td>System Active</td>
<td>PC-Time service</td>
<td>0.35</td>
<td>0.00</td>
<td>0.35</td>
<td></td>
</tr>
<tr>
<td>Resource Conflict</td>
<td>Enq SVC</td>
<td>0.23</td>
<td>0.00</td>
<td>0.23</td>
<td></td>
</tr>
<tr>
<td>Abend Proc Delays</td>
<td>Sdump SVC</td>
<td>0.08</td>
<td>0.00</td>
<td>0.08</td>
<td></td>
</tr>
<tr>
<td>Resource Conflict</td>
<td>Global Serialization</td>
<td>0.00</td>
<td>0.00</td>
<td>0.00</td>
<td></td>
</tr>
<tr>
<td>System Active</td>
<td>System trace</td>
<td>0.08</td>
<td>0.00</td>
<td>0.08</td>
<td></td>
</tr>
<tr>
<td>System Active</td>
<td>Stae SVC</td>
<td>0.03</td>
<td>0.00</td>
<td>0.03</td>
<td></td>
</tr>
</tbody>
</table>
1. Select MQSeries Delay and press Enter.

The Queue Manager Activity panel displays.

<table>
<thead>
<tr>
<th>Queue Manager Activity</th>
<th>Row 1 to 1 of 1</th>
<th>COMMAND ==►</th>
<th>SCROLL ==► HALF</th>
</tr>
</thead>
<tbody>
<tr>
<td>Line commands: S - Queue Activity  C - Code Detail  I - Queue Manager Information</td>
<td>Profile: ASFDFA  Options: NORMAL</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Queue</td>
<td>Queue Description</td>
<td>Actv%</td>
<td>Wait%</td>
</tr>
<tr>
<td>__________</td>
<td>________________________________</td>
<td>______</td>
<td>______</td>
</tr>
</tbody>
</table>
| >----------------------------------------------------------------------------@
| __ CSQ8    CSQ8, IBM WebSphere MQ for z/OS    0.00   5.50   5.50 =========>
| ********************************* End of Table *******************************

The Queue Manager Activity panel displays information about WebSphere for MQ calls that are detected by CA Mainframe Application Tuner. Each row indicates the active and wait time for a specific Queue Manager. A description for each field in the Queue Manager Activity panel follows.

**Queue Manager**

Four-character subsystem name of the Queue Manager.

**Queue Description**

Text description of the function or purpose of the Queue Manager.

if the description is truncated, scroll the panel to the right to display the full description
2. To display additional information about a specific Queue Manager, enter the `I` line command beside the Queue Manager’s name.

The Queue Manager Information panel displays.

```
CA MAT ------------ Queue Manager Information ------------ Row 1 to 18 of 18
COMMAND ===>                                                  SCROLL ===> HALF
Queue Manager . . . . . . CSQ8                              Profile: ASFDFD
Options: NORMAL
Queue Manager Identifier . CSQ8.B999215A58FB9560
Description . . . . . . . CSQ8, IBM WebSphere MQ for z/OS - V5.3
Command Level . . . . . . 5.3.0           Platform Type . . MQPL_MVS
Expiry Interval . . . . . 999999999       Platform Name . . SJSE
Trigger Interval . . . . . 999999999       User ID . . . . .
Queue Sharing Group . . . QSH3            Syncpoint . . . . MQSP_AVAILABLE
Maximum Handles . . . . 256             Max Priority . . 9
Maximum Message Length . . 104857600       Max Uncommitted . 10000
Queue Names -----------------------------------------------
Command Input . . . . . . SYSTEM.COMMAND.INPUT
Dead Letter . . . . . . . CSQ8.DEAD.QUEUE
Default XMIT . . . . . . CSQ8.DEFXMIT.QUEUE
Repository . . . . . . . .
```

The Queue Manager Information panel provides information about the selected Queue Manager. A description for each field in the Queue Manager Information panel follows.

**Queue Manager**

- Four-character subsystem name of the Queue Manager.

**Queue Manager Identifier**

- Unique internally-generated identifier of the Queue Manager.

**Description**

- Queue Manager description.

**Command Level**

- Level of system control commands supported by the Queue Manager.

**Expiry Interval**

- Interval between scans for expired messages. This value can be either a time interval in seconds (1 to 99,999,999) or OFF

**Trigger Interval**

- Time interval (in milliseconds) that is used to restrict the number of trigger messages.
Queue Sharing Group
Name of the queue-sharing group to which the Queue Manager belongs.

Platform Type
Operating system on which the Queue Manager is running.

Platform Name
Name of the operating system.

User ID
User identification of the intra-group queuing agent.

Syncpoint
Indicates whether the Queue Manager supports units of work and syncpointing with the MQGET, MQPUT, and MQPUT1 calls.

Maximum Handles
Maximum number of open handles that any one task can use concurrently.

Maximum Message Length
Maximum message length in bytes

Maximum Priority
Maximum message priority supported by the Queue Manager.

Maximum Uncommitted Messages
Maximum number of uncommitted messages that can exist within a unit of work.

Command Input
Name of the command input queue defined on the Queue Manager. Users can send commands to this queue.

Dead Letter
Name of a queue defined on the Queue Manager. Messages are sent to this queue if they cannot be routed to their correct destination.

Default XMIT
Name of the transmission queue that transmits messages to remote Queue Managers if no other transmission queue is identified.

Repository
Name of a cluster for which this Queue Manager provides a repository-manager service.

If the Queue Manager provides this service for more than one cluster, Repository Namelist specifies the name of a namelist object that identifies the clusters.
Repository Namelist

Name of a namelist object that contains the names of clusters for which this Queue Manager provides a repository-manager service.

3. On the COMMAND line, type **C**.

The CodeView Detail panel displays.

```
CA MAT ------------------- CodeView Detail ------------------ Row 1 to 1 of 1
COMMAND ===>                                                  SCROLL ===> HALF
Queue Manager: CSQ8           Request Type: N/A           Profile: ASFDFD
Queue Name: N/A                                        Options: NORMAL
Mode: CSECT
Primary commands: MOde Pseudo/Module/Csect/4GL,
                  PSEudo, REGister, ADDHelp
Line commands: A - Associate     C - Callerid     D - Delays   N - Long Name
               I - Info          L - Listing      S - Distribution
               H - Histogram    NH - Normalized Histogram
LC Module   Csect    Description               L C Actv% Wait% Totl% Visual
--------------------------------------------------------------------
  CSQBSRV  CSQAPRH  MQSeries                  A Y  0.00  5.50  5.50 ======>
```

4. Go back to the Queue Manager Activity panel and use the **S** line command to display the Queue Activity panel.

```
CA MAT --------------------- Queue Activity ----------------- Row 1 to 3 of 3
COMMAND ===>                                                  SCROLL ===> HALF
Queue Manager: CSQ8                                         Profile: ASFDFD
Options: NORMAL
Line commands: I - Queue Information  C - Code Detail
Queue
LC Queue Name                       Request Actv% Wait%  Totl% Visual
--------------------------------------------------------------------
  CAMAT.JRF.QUEUE1                 MQGET   0.00  3.13   3.13  ====>
  CAMAT.JRF.QUEUE1                 MQPUT   0.00  2.35   2.35  ===>
```

The Queue Activity panel shows the detected activity of each queue within a Queue Manager. Each row shows wait and CPU activity for each queue that is used by the application within the selected Queue Manager.
A description for each field in the Queue Manager Information panel follows.

Queue Name
Name of the message queue. Message queues are used to store messages sent by programs.
Local queues are owned by the local Queue Manager, and remote queues belong to a different Queue Manager.

Queue Request
Function of the API call that was executed:
- MQCONN: Connect to a Queue Manager.
- MQOPEN: Open a message queue for output.
- MQPUT: Put a message in a queue.
- MQCLOSE: Close a queue.
- MQDISC: Disconnect from a Queue Manager.
- MQPUT1: Equivalent to MQOPEN + MQPUT + MQCLOSE.
- MQINQ: Inquire about the properties of an object.
- MQSET: Set properties of an object.
- MQCONNX: Set standard or fastpath bindings.
- MQBEGIN: Begin a unit of work.
- MQCMIT: Commit a unit of work.
- MQBACK: Back out.
- CMT_PREP: IBM® internal function call. Prepare for two phase commit.
- END_THRD: IBM internal function call.

Queue Description
Text description of the function or purpose of the queue.
If the description is truncated, scroll the panel to the right to display the full description

API Type
Application Program Interface type used by the queue to communicate with the Queue Manager

MQI Message Queue Interface
AMI Application Messaging Interface.

AMI Function
Object interface function performed by the AMI call.
5. Type the I LINE command to display the Queue Information panel.

```
CA MAT ------------------- Queue Information ------------ Row 1 to 21 of 21
COMMAND ===> SCROLL ===> HALF
Queue Name . CAMAT.JRF.QUEUE1 Profile: ASFDFD
Description . CAMAT TESTING Options: NORMAL
Queue Manager . . . . . CSQ8 MQ Release . . . . . 5.3.0
Request Type . . . . . MQGET Buffer Length . . 4096
API Type . . . . . . . . . MQI Max Message Length . 32768
Environment . . . . . . . Max Queue Depth . 9999
Language . . . . . . . . .
Queue Parameters -------------------------------------------------------------
Queue Type . . . . . MQQT_LOCAL
Object Type . . . . . MQOT_Q
Queue Definition Type . MQQDT_PREDEFINED
Message Persistence . . MQPER_NOT_PERSISTENT
Inhibit Gets . . . . . MQQA_GET_INHIBITED
Inhibit Puts . . . . . MQQA_PUT_INHIBITED
Options . . . . . . . . . MQGMO_SYNCPOINT
MQGMO_NO_WAIT
MQGMO_ACCEPT_TRUNCATED_MSG
Trigger Information ----------------------------------------------------------
Trigger Control . . . MQTC_OFF Trigger Depth . . 1
Trigger Type . . . . . MQTT_FIRST
Trigger Data . . . .
```

The Queue Information panel displays information about the selected message queue. Message queues are used to store messages that are sent by programs. Local queues are owned by the local Queue Manager, and remote queues belong to a different Queue Manager. A description for each field in the Queue Information panel follows.

**Queue Name**

Name of local or remote Queue Manager.

**Description**

Description associated with the message queue.

**Queue Manager**

Run-time program that manages queues and messages for applications provides the Message Queuing Interface (MQI) for communication with applications application programs invoke functions of the Queue Manager by issuing API calls.
Request Type

Function of the API call which was executed:

- MQCONN: Connect to a Queue Manager.
- MQOPEN: Open a message queue for output.
- MQPUT: Put a message in a queue.
- MQCLOSE: Close a queue.
- MQDISC: Disconnect from a Queue Manager.
- MQPUT1: Equivalent to MQOPEN + MQPUT + MQCLOSE.
- MQINQ: Inquire properties of an object.
- MQSET: Set properties of an object.
- MQCONNX: Set standard or fastpath bindings.
- MQBEGIN: Begin a unit of work.
- MQCMIT: Commit a unit of work.
- MQBACK: Back out.
- CMT_PREP: IBM internal function call. Prepare for two phase commit.
- END_THRD: IBM internal function call.

API Type

Application Program Interface type that is used by the queue to communicate with the Queue Manager:

- MQI   Message Queue Interface
- AMI   Application Messaging Interface

Environment

Environment in which WebSphere for MQ is running.

Language

Specific language.

MQ Release

Release level of WebSphere for MQ.

Buffer Length

Length of the message buffer in bytes.
Max Message Length
Length of the longest physical message that can be handled by the Queue Manager.

Max Queue Depth
Maximum number of messages allowed in the queue.

Queue Type
Specific purpose of the queue:

- MQQT_LOCAL is a queue owned by the Queue Manager to which the application program is connected. It is used to store messages for programs that use the same Queue Manager.

- MQQT_REMOTE is queue owned by a different Queue Manager (the local definition of a remote queue). A remote queue is not a real queue - it is a structure that contains some of the characteristics of a queue that is hosted by a different Queue Manager.

- MQQT_ALIAS are alias queues that are not real queues but definitions. They are used to assign different names to the same physical queue. These aliases allow multiple programs to work with the same queue, accessing it under different names and attributes.

- MQQT_CLUSTER is a local queue that is known throughout a cluster of Queue Managers. Any Queue Manager that belongs to the cluster can send messages to it without the need of a remote definition, or having to define channels to the Queue Manager that owns it.

- MQQT_MODEL is not a real queue. A model queue is a collection of attributes that are used when a dynamic queue is created.

Object Type
Type of object being named in ObjectName. Possible values are as follows:

- MQOT_Q is Queue.

- MQOT_NAMELIST is Namelist.

- MQOT_STORAGE_CLASS is Storage class.

- MQOT_Q_MGR is Queue Manager.

- MQOT_CHANNEL is Channel.

- MQOT_AUTH_INFO is Namelist containing the names of authentication-information objects.

- MQOT_CF_STRUC is Coupling-facility structure.

- Queue Definition Type
- indicates how the queue was defined:
  - MQQDT_PREDEFINED is a permanent queue created by the system administrator; only the system administrator can delete it.
  - MQQDT_PERMANENT_DYNAMIC is a permanent queue that was created by an application issuing an MQOPEN call.
  - MQQDT_TEMPORARY_DYNAMIC is a temporary queue that was created by an application issuing an MQOPEN call.
  - MQQDT_SHARED_DYNAMIC is a shared queue that was created by an application issuing an MQOPEN call.

**Message Persistence**
Indicates whether the message survives system failures and Queue Manager restarts:
- MQPER_PERSISTENT The message survives system failures and Queue Manager restarts.
- MQPER_NOT_PERSISTENT The message does not normally survive system failures or Queue Manager restarts. This situation applies even if an intact copy of the message is found during restart.
- MQPER_PERSISTENCE_AS_Q_DEF If the queue is a cluster queue, the persistence of the message is taken from the Persistence attribute defined at the destination Queue Manager that owns the particular instance of the queue on which the message is placed. If the queue is not a cluster queue, the persistence of the message is taken from the Persistence attribute defined at the local Queue Manager, even if the destination Queue Manager is remote.

**Inhibit Get**
Controls whether GET operations for this queue are allowed:
- MQQA_GET_INHIBITED GET operations are inhibited.
- MQQA_GET_ALLOWED GET operations are allowed.

**Inhibit Puts**
Controls whether PUT operations for this queue are allowed:
- MQQA_PUT_INHIBITED PUT operations are inhibited.
- MQQA_PUT_ALLOWED PUT operations are allowed.
Trigger Control

Controls whether trigger messages are written to an initiation queue, in order to cause an application to be started to service the queue:

- MQTC_OFF - Trigger messages are not required. No trigger messages are to be written for this queue.
- MQTC_ON - Trigger messages are to be written for this queue when the appropriate trigger events occur.

Trigger Type

Controls the conditions under which trigger messages are written as a result of messages arriving on this queue:

- MQTT_NONE - No trigger messages are written as a result of messages on this queue.
- MQTT_FIRST - A trigger message is written whenever the number of messages of trigger priority or greater on the queue changes from 0 to 1.
- MQTT_EVERY - A trigger message is written for every message.
- MQTT_DEPTH - A trigger message is written whenever the number of messages of trigger priority or greater on the queue equals or exceeds the defined trigger depth.

Trigger Data

Free-format data that the Queue Manager inserts into the trigger message when a message arriving on this queue causes a trigger message to be written to the initiation queue.

Trigger Depth

Number of messages of trigger priority or greater that must be on the queue before a trigger message is written.

AMI Application

Application which initiated the AMI call.

AMI Function

Object interface function performed by the AMI call.

AMI Policy Name

Name of the AMI policy in use. Policy controls how AMI functions operate.

AMI Service Name

Name of the pre-defined Service, which defines numerous default AMI parameters.
6. Type C to display the CodeView Detail panel for the selected queue.

```
CA MAT ------------------- CodeView Detail ------------------ Row 1 to 1 of 1
COMMAND ===>                  SCROLL ===> HALF
Queue Manager: CSQ8          Request Type: MQGET      Profile: ASFDFD
   Queue Name: CAMAT.JRF.QUEUE1     Options: NORMAL
Primary commands: Mode Pseudo/Module/Csect/4GL,
PSEudo, REGister, ADDHelp
   Line commands: A - Associate C - Callerid D - Delays N - Long Name
                   I - Info    L - Listing S - Distribution
                   H - Histogram NH - Normalized Histogram
  LC Module  Csect  Description L C Actv% Wait% Totl% Visual
  ------- ------- ----------------- ------ ------- ------- ------- -------
>-----------------------------------------------------------------------------
  _ CSQBSRV CSQAPRH MQSeries A Y 0.00 3.13 3.13 =========>
```

7. Type C again to display the Callerid Detail panel.

```
CA MAT ------------------- Callerid Detail ------------------ Row 1 to 1 of 1
COMMAND ===>                  SCROLL ===> HALF
Queue Manager: CSQ8          Request Type: MQGET      Profile: ASFDFD
   Queue Name: CAMAT.JRF.QUEUE1     Module: CSQBSRV
Primary commands: REGister, ADDHelp
   Line commands: L - Listing A - Associate
                   I - Module/Csect Information
  LC Module  Csect  Offset Stmt Csect Description Pct Visual
  ------- ------- ------- ------ ------- ----------------- ------ ------- ------- ------- ------- -------
>-----------------------------------------------------------------------------
  _ CSQ4BAP1 CSQ4BAP1 00000810 2245 MQSeries 3.13 =========>
```
Chapter 16: Using the Product in a CA IDMS Environment

This chapter describes how you can use CA Mainframe Application Tuner to identify delays that are specific to CA IDMS.

This section contains the following topics:
- Display CA IDMS Delays (see page 455)
- Display DML Delays (see page 459)

Display CA IDMS Delays

The CA IDMS Delays panel enables you to pinpoint bottlenecks due to CA IDMS requests.

On this panel, you can easily see the percentage of CA IDMS samples taken during the monitored period where CA Mainframe Application Tuner detected tasks in CA IDMS. CA Mainframe Application Tuner is reporting whether or not each task is executing or waiting at the time the samples were taken.
You can use one of the following methods to access this panel:
- option 15 from the Interactive Analysis Menu
- line command S to select a CA IDMS request from the DataView panel

The previous panel shows CA IDMS delays summarized by Module and Offset, sorted by Totl% (default).

See the following panel for an example of these delays summarized by TaskCode.

A description for each field in the CA IDMS Delays panel follows.

Profile
   Name of the profile that you specified when you created the monitor definition.

Options
   Type of analysis in effect: NORMAL, ALL, ACTIVE, or WAIT.

An asterisk (*) following the value indicates that tasks or transactions have been selected for analysis. Place the cursor on the Options field value and press Enter to display a pop-up panel listing the selected tasks/transactions.
Task

Unique name that identifies a task to CA IDMS DC/UCF.

The user types the task code in response to the DC/UCF system prompt. Task codes are defined at system generation or by using a DCMT VARY DYNAMIC TASK command.

Module

Name of the program requesting CA IDMS DB/DC services, when known, or the name of the program invoked by specifying the task code.

Offset

Relative address within the module to which control will be returned upon completion of the CA IDMS DB/DC service request.

Status

Status of the CA IDMS DB/DC service request, whether it is waiting for resources, ready to execute, or executing.

Totl%

Percentage of CA IDMS samples taken during the monitored period where CA Mainframe Application Tuner detected CA IDMS TASKs either executing or waiting for resources.

Visual

Visual depiction of the Totl% value.

Wait

Identifier of the ECB on which the task is waiting.

The ECB can be internal as defined by CA IDMS macro #ECBDS or external as defined by CA IDMS macro #ELEDS.

Note: Scroll right to see this field on the CA IDMS Delays panel.

The available commands for the CA IDMS Delays panel are described next.

MODE TASK

Summarizes the data by task code.

MODE MODULE

Summarizes the data by module and offset (default).

DML

Displays delays caused by DML statements.

D

Line command to display detail information about the selected row.
The following panel shows CA IDMS delays summarized by TaskCode, sorted by Totl%.

To see the CA IDMS Wait reasons, select the CA IDMS Delay panel by choosing option 15 from the Interactive Analysis Menu. You might need to scroll to the right (depending on your screen size and terminal model) to see the Wait field. This field displays the identifier of the ECB on which the task is waiting.
Display DML Delays

The DML Delays panel enables you to pinpoint bottlenecks due to requests from Data Manipulation Language (DML) statements.

On this panel, you can see the current or most recent DML statement in effect when CA Mainframe Application Tuner detected CA IDMS waiting for resources.
You can access this panel by using the DML command from the CA IDMS Delays panel.

```
CA MAT ------------------------- DML Delays -------------- Row 1 to 19 of 39
COMMAND ==>                                                SCROLL ==> HALF
Line commands: D - Detail                                    Profile: IDMS8
CV number: 160      IDMS Release: 16.0                      Options: NORMAL
Options: NORMAL
LC TaskCode Module   Offset   DML SEQ  Totl% Visual
________ ________ ________ ________ _____ __________
>-------------------------------------------------------------------
__ OPER     RHDCOPER 000005A0 00000000 45.56 =========>
__ RHDCNP3S RHDCNP3S 000000000 000000000 16.07 ==>   
__ RHDCNP3S RHDCNP3S 000000000 000000000 15.43 ==>   
__ COBWALK  DCRDISCV 00000C9E 00000012  9.87 =>
__ RHDCNP3S RHDCNP3S 000000000 000000000  6.35 >
__ RHDCNP3S RHDCNP3S 000000000 000000000  1.65 >
__ COBWALK  DCRDISCV 000009DC 00000008  1.09
__ OPER     RHDCOPER 000004FA 00000000  1.03
__ G04AWALK TRIDMSCV 00000C50 00000004  0.91
__ ASMWALK  READDBCR 000006D6 00000004  0.74
__ COBWALK  DCRDISCV 00000BFC 00000011  0.46
__ IDD      IDMSDDDC 00000538 0607030  0.22
__ COBWALK  DCRDISCV 00000E20 00000012  0.14
__ COBWALK  DCRDISCV 00000F20 00000012  0.10
__ COBWALK  DCRDISCV 00000E9E 00000012  0.06
__ ASMWALK  READDBCR 000002BC 00000004  0.04
__ ASMWALK  READDBCR 0000040C 00000009  0.03
__ ASMWALK  READDBCR 00000460 00000010  0.03
__ ASMWALK  READDBCR 0000025A 00000013  0.02
-------------------------------------------------------------------
________________________ Totals ______________________________
100.0
```

A description for each field in the DML Delays panel follows.

**Profile**

Name of the profile that you specified when you created the monitor definition.

**Options**

Type of analysis in effect: NORMAL, ALL, ACTIVE, or WAIT.

An asterisk (*) following the value indicates that tasks or transactions have been selected for analysis. Place the cursor on the Options field value and press Enter to display a pop-up panel listing the selected tasks/transactions.

**TaskCode**

Unique name that identifies a task to CA IDMS DC/UCF.

The user types the task code in response to the DC/UCF system prompt. Task codes are defined at system generation or by using a DCMT VARY DYNAMIC TASK command.

**Module**

Name of the program requesting CA IDMS DB/DC services, when known, or the name of the program invoked by specifying the task code.
Offset
Relative address within the module to which control will be returned upon completion of the CA IDMS DB/DC service request.

DML SEQ
An optional precompiler-generated number identifying the physical sequence in which DML statements appear in a program.

Totl%
Percentage of the monitored period where CA Mainframe Application Tuner detected DML statements waiting for resources.

Visual
Visual depiction of the Totl% value.

Note: Scroll right to see one of the following fields on the DML Delays panel.

DML Verb
Command in a DML statement requesting a data manipulation operation. FINDs are converted to OBTAINs, as appropriate.

DML Target
DML statement object of the requested operation (such as a record or set name).

DML Qualifier
DML statement object qualifying the target (such as an area or set name when the target is a record name).
Scroll to the right in the CA IDMS Delays panel to see the DML Verb/Target/Qualifier field. This field displays either the command in a DML statement requesting a data manipulation operation, the object of the requested operation, or the object qualifying the target.

<table>
<thead>
<tr>
<th>Task Code</th>
<th>Module</th>
<th>Offset</th>
<th>DML Sequence</th>
<th>DML Verb</th>
<th>DML Target</th>
<th>DML Qualifier</th>
<th>Total%</th>
</tr>
</thead>
<tbody>
<tr>
<td>COBWALK</td>
<td>DCRDISCV</td>
<td>00000BFC</td>
<td>000000011</td>
<td>OBTAIN NEXT RECORD IN SET</td>
<td>TELLER</td>
<td>BRANCH-TELLER</td>
<td>0.46</td>
</tr>
</tbody>
</table>

Use line command D to display detail information about the selected row, as shown following.
Chapter 17: Using the Product in an SAP Environment

This chapter describes how you can use CA Mainframe Application Tuner to identify delays that are specific to SAP®.

This section contains the following topics:

Analyze SAP Data (see page 463)

Analyze SAP Data

To analyze SAP data, no setup is required. If SAP is running, CA Mainframe Application Tuner will discover it and begin collecting statistical data. Begin your monitoring session from the DelayView or DataView panel.

<p>| CA MAT -------------------------- DelayView ----------------- Row 1 to 3 of 3 |
| COMMAND ===&gt;                                                  SCROLL ===&gt; HALF |
| Primary commands: DETail on/off ADDHelp                       |
| Module: *             Profile: SAPTEST                        |
| Csect: *              Options: NORMAL                         |
| Offset: *             Detail: ON                              |
| Line commands: A - Address S - Distribution                   |</p>
<table>
<thead>
<tr>
<th>LC Major category    Minor category Actv%  Wait%  Totl% Visual</th>
</tr>
</thead>
<tbody>
<tr>
<td>SAP Delay            SAP Delay 0.00 99.87 99.87 ==========&gt;</td>
</tr>
<tr>
<td>Other Delays         Unknown wait type 0.00 0.09 0.09</td>
</tr>
<tr>
<td>PC call              PC call 0.00 0.04 0.04</td>
</tr>
<tr>
<td>************************************************************************</td>
</tr>
</tbody>
</table>
1. Select SAP Delay and press Enter.

    The SAP Activity panel displays.

    The SAP Information panel provides information about the selected RFC Function. A description of each field in the SAP Information panel follows.

    **RFC Function**
    
    Function of the SAP call

    **Invoking Program**
    
    Name of the program which originated the SAP call

    **RFC Destination**
    
    Intended destination of the SAP call

    **Conversation ID**
    
    Hexadecimal identification number of the SAP call

    **R/3 ID**
    
    Identifier of the SAP R/3 system handling the SAP call

    **R/3 Name**
    
    Name of the SAP R/3 system handling the SAP call

    **Userid**
    
    User ID of the SAP caller

    **Trace**
    
    Whether the SAP trace function is ON or OFF

    **Language**
    
    ISO language used

    **RFC Role**
    
    Client or server
RFC Type
RFC type of the originating request

RFC Release
RFC release level

Total Time
Total time (in millisecond) that it took to process the call

2. To display additional information on a specific RFC function, enter I in the LC column.

The SAP Information panel displays.

<table>
<thead>
<tr>
<th>Function</th>
<th>Function Name</th>
</tr>
</thead>
<tbody>
<tr>
<td>Invoking Program</td>
<td>@ST000001</td>
</tr>
<tr>
<td>RFC Destination</td>
<td>RFC Destination</td>
</tr>
<tr>
<td>Conversation ID</td>
<td>33333333</td>
</tr>
<tr>
<td>R/3 ID</td>
<td>61</td>
</tr>
<tr>
<td>R/3 Name</td>
<td>P61</td>
</tr>
<tr>
<td>Userid</td>
<td>CAMAT</td>
</tr>
<tr>
<td>Trace</td>
<td>OFF</td>
</tr>
<tr>
<td>Language</td>
<td>E</td>
</tr>
<tr>
<td>RFC Role</td>
<td>Client</td>
</tr>
<tr>
<td>RFC Type</td>
<td>R/3</td>
</tr>
<tr>
<td>RFC Release</td>
<td>46C</td>
</tr>
<tr>
<td>Total Time (millisec)</td>
<td>900000</td>
</tr>
</tbody>
</table>

The SAP Information panel provides information about the selected RFC Function. The following table provides a description of each field in the SAP Information panel:

RFC Function
Function of the SAP call.

Invoking Program
Name of the program which originated the SAP call.

RFC Destination
Intended destination of the SAP call.

Conversation ID
Hexadecimal identification number of the SAP call.
R/3 ID
Identifier of the SAP R/3 system handling the SAP call.

R/3 Name
Name of the SAP R/3 system handling the SAP call.

Userid
User ID of the SAP caller.

Trace
Whether the SAP trace function is ON or OFF.

Language
ISO language used.

RFC Role
Client or server.

RFC Type
RFC type of the originating request.

RFC Release
RFC release level

Total Time
total time (in millisecond) that it took to process the call
Chapter 18: Using the Product with Other Databases

This chapter describes how to best use CA Mainframe Application Tuner with the following databases that are distributed from companies other than IBM®:

- Adabas
- Natural
- CA Datacom
- CA Ideal

This section contains the following topics:

- Use the Product with Adabas (see page 468)
- Use the Product with CA Datacom (see page 472)
- Use the Product with CA Ideal (see page 473)
- Use the Product with Natural (see page 476)
Use the Product with Adabas

CA Mainframe Application Tuner provides a list of Adabas statements that are detected during the monitored period. Use this procedure to display these statements after monitoring a job.

To display Adabas statements

1. Analyze the data by using one of the analysis line commands (A, AL, AA, or AW).
2. Select one of the following two ways to locate the Adabas statements:
   - From the Interactive Analysis menu, select Option 18.
   - From the Interactive Analysis menu, select Option 5. Ensure that .Adabas is displayed in the DD Name field. Type S next to .Adabas.

The ADABAS Statements panel displays:

<table>
<thead>
<tr>
<th>Actv%</th>
<th>DB ID</th>
<th>File #</th>
<th>CMD</th>
<th>CMD-IDX</th>
<th>CMD-ID</th>
<th>Wait%</th>
<th>Totl%</th>
<th>Visual</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.26</td>
<td>12345</td>
<td>9</td>
<td>L3</td>
<td>D503C2D7</td>
<td>NLBP</td>
<td>45.66</td>
<td>45.92</td>
<td></td>
</tr>
<tr>
<td>0.00</td>
<td>12345</td>
<td>10</td>
<td>S1</td>
<td>00400201</td>
<td>....</td>
<td>7.65</td>
<td>7.65</td>
<td>&gt;</td>
</tr>
<tr>
<td>0.00</td>
<td>12345</td>
<td>0</td>
<td>RC</td>
<td>01200201</td>
<td>....</td>
<td>4.59</td>
<td>4.59</td>
<td></td>
</tr>
<tr>
<td>0.00</td>
<td>12345</td>
<td>10</td>
<td>L3</td>
<td>01000201</td>
<td>....</td>
<td>2.55</td>
<td>2.55</td>
<td></td>
</tr>
<tr>
<td>0.00</td>
<td>12345</td>
<td>10</td>
<td>L3</td>
<td>01100201</td>
<td>....</td>
<td>2.55</td>
<td>2.55</td>
<td></td>
</tr>
<tr>
<td>0.00</td>
<td>12345</td>
<td>10</td>
<td>S1</td>
<td>00000000</td>
<td>....</td>
<td>2.04</td>
<td>2.04</td>
<td></td>
</tr>
<tr>
<td>0.00</td>
<td>12345</td>
<td>10</td>
<td>L2</td>
<td>01400201</td>
<td>....</td>
<td>0.77</td>
<td>1.02</td>
<td></td>
</tr>
<tr>
<td>0.00</td>
<td>12345</td>
<td>9</td>
<td>L9</td>
<td>51000101</td>
<td>....</td>
<td>0.77</td>
<td>0.77</td>
<td></td>
</tr>
<tr>
<td>0.00</td>
<td>12345</td>
<td>10</td>
<td>L1</td>
<td>00400201</td>
<td>....</td>
<td>0.77</td>
<td>0.77</td>
<td></td>
</tr>
<tr>
<td>0.00</td>
<td>12345</td>
<td>10</td>
<td>L3</td>
<td>01300201</td>
<td>....</td>
<td>0.77</td>
<td>0.77</td>
<td></td>
</tr>
<tr>
<td>0.00</td>
<td>12345</td>
<td>0</td>
<td>ET</td>
<td>00000000</td>
<td>....</td>
<td>0.77</td>
<td>0.77</td>
<td></td>
</tr>
<tr>
<td>0.51</td>
<td>12345</td>
<td>10</td>
<td>L3</td>
<td>01200201</td>
<td>....</td>
<td>0.26</td>
<td>0.77</td>
<td></td>
</tr>
<tr>
<td>0.00</td>
<td>12345</td>
<td>10</td>
<td>L3</td>
<td>01900201</td>
<td>....</td>
<td>0.77</td>
<td>0.77</td>
<td></td>
</tr>
<tr>
<td>0.00</td>
<td>12345</td>
<td>10</td>
<td>L1</td>
<td>00000000</td>
<td>....</td>
<td>0.77</td>
<td>0.77</td>
<td></td>
</tr>
<tr>
<td>0.00</td>
<td>12345</td>
<td>10</td>
<td>L3</td>
<td>00900201</td>
<td>....</td>
<td>0.51</td>
<td>0.51</td>
<td></td>
</tr>
<tr>
<td>0.00</td>
<td>12345</td>
<td>20</td>
<td>S1</td>
<td>01300201</td>
<td>....</td>
<td>0.51</td>
<td>0.51</td>
<td></td>
</tr>
</tbody>
</table>

The following text describes the fields in the ADABAS Statements panel.

**Actv%**

Percentage of the monitored period that the processing of the Adabas statement used CPU.

**DB ID**

Decimal representation of the Adabas database ID containing the file to be accessed. This number can be in the range of 1 to 65535.
File #

Decimal representation of the Adabas file number to be accessed. This number can be in the range of 1 to 5000.

CMD

One of the Adabas commands used to access Adabas databases.

This field displays the database access command. Possible values in this field, and the descriptions of these values, are as follows:

A1
Update records (hold option)

BT
Remove database updates for ET logic users

C1
Write Command ID, PLOG, RABN checkpoint, buffer flush option

C3
Write SYNX-03 checkpoint for exclusive control update users; option to store user data

C5
Write user data on SiBA/PLOG

CL
End/ET session and update database

E1
Delete record (hold option) or Refresh file

ET
End and save current transaction

HI
Prevent record update by other users

L1
Read record of specified ISN

L2
Read records in physical order

L3
Read records in descriptor value order
L4
Read and hold, wait for held record/issue return code option

L5
Read in physical order and hold, wait/issue return code option

L6
Read in descriptor value order with wait/issue return code option

L9
Read ISNs of specified descriptor

LF
Read characteristics of all fields in file

N1
Add new database record with Adabas-assigned ISN

N2
Add new database record with user-assigned ISN

OP
Open user session

RC
Release one or more command IDs or a global format ID for the issuing user

RE
Read ET data for this user, another user, or all users

RI
Release held record and ISN

S1
Return count and ISNs of records meeting the search criteria

S2
Return count of records and ISNs in user-specified order

S4
Return count and ISNs of records meeting the search criteria and hold

S5
Return or save a list of coupled ISNs for the specified file
S8
Combine two ISN lists from the same file with AND, OR, or NOT operation

S9
Sort ISN list in ascending ISN or descriptor-specified sequence

CMD-IDX
Same value as the CMD-ID field in hexadecimal format.

CMD-ID
Identifies users, their transactions, and decoded formats for reuse by subsequent instructions.

The command ID is either user-specified or system-generated. It can be either local or global to specify either internal or globally accessible decoded formats.

Wait%
Percentage of the monitored period that the program waited for Adabas data to be returned.

Totl%
Sum of the Actv% and Wait% fields.

This value represents the total percentage of the Adabas delay time used by this Adabas statement.

Visual
Graphical representation of the sum of the Actv% and Wait% categories for the Adabas statement.

The Visual field provides a graphical representation of the data in the column that immediately precedes it. A graph’s color is determined by its value, as follows:

- Green represents a value between 0 and 20.
- Yellow represents a value between 20 and 50.
- Red represents a value between 50 and 100.

The size of the graph is either relative or absolute, depending on the value (Y/N) selected for AutoScale in the Profile Parameters panel.
Relative scale

Graphs are sized relative to the highest value. The graph for the highest value extends the maximum length of the field, with all other graphs proportional to it.

For example, if the maximum value on a screen is 10, its graph extends the maximum length of the field. If the next highest value is 5, its graph extends half of the maximum length of the field.

Absolute scale

The graph displays an absolute representation of the value. For example, if the maximum value on the screen is 10, the graph extends 1/10 the length of the field.

Use the Product with CA Datacom

CA Mainframe Application Tuner provides a list of CA Datacom statements that are detected during the monitored period.

To display statements after monitoring a job

1. Analyze the data by using one of the analysis line commands (A, AL, AA, or AW).
2. Select one of the following two ways to locate the CA Datacom statements panel:
   - From the Interactive Analysis menu, select Option 16.
   - From the Interactive Analysis menu, select Option 5. Ensure that .DCOM is displayed in the DD Name field. Type S next to .DCOM.

The Datacom Statements panel displays.

```
CA MAT --------------------- DATACOM Statements ------------ ROW 1 to 1 of 1
COMMAND ===>                     Scroll==> CSR
Profile: TUNIVP1

File Key
DBID Table Name   Command Actv% Wait% Totl% Visual
_________________________ ___________
0193 111   KEY00  REDNX    0.00 22.65 22.65 ========>
```

The fields in the CA DATACOM Statements panel are described next.

DBID

Three- or four-digit numeric identifier of the CA Datacom database.

File Table

Three-character name of the CA Datacom table, identifying the logical table being accessed.
Key Name

Five-character alphanumeric name of the search key being used to locate a record in the CA Datacom database.

Command

Five-character CA Datacom command used to access Datacom databases. CA Mainframe Application Tuner detected the commands that are displayed in this field during the monitored period.

Actv%

Percentage of the monitored period that the processing of the CA Datacom statement used CPU.

Wait%

Percentage of the monitored period that the program waited for CA Datacom data to be returned.

Totl%

Summation of the Actv% and Wait% fields.

Visual

Graphical representation of the Totl% field.

Use the Product with CA Ideal

CA Mainframe Application Tuner provides a list of CA Ideal statements that are detected during the monitored period.

To display statements after monitoring a job

1. Analyze the data by using one of the analysis line commands (A, AL, AA, or AW).
2. Select one of the following two ways to locate the CA Ideal programs:
   - From the Interactive Analysis menu, select Option 17
   - From the Interactive Analysis menu, select Option 3 to display the CodeView panel. Issue the MODE 4GL primary command to display the activity that is associated with CA Ideal routines.

The Ideal Programs panel displays. This panel displays the activity of CA Ideal routines that were executing at the time that the monitor was run.
The Language, System, Program Name and Program Version fields are displayed, along with a description of the routine, if available. This information is important when multiple copies of a routine are maintained.

3. Type line command H or NH to select an Ideal routine.

4. Press Enter.

The 4GL Histogram panel shows the activity of each statement in the routine.

The 4GL Histogram panel can also be displayed from the DelayView panel.
The fields in the 4GL Histogram panel for CA Ideal statements are described next.

**System**
Three character identifier of the CA Ideal System from which the program was executed.

**Program**
Name of the CA Ideal program.

**Program Version**
Three digit version number of the program that was executed.

**Stmt**
Statement number of the currently executed statement of the 4GL routine.
This statement is obtained from the 4GL language processor exit.

**Actv%**
Percentage of the monitored period that the processing of the CA Ideal statement used CPU.

**Wait%**
Percentage of the monitored period that the program waited for CA Ideal data to be returned.

**Totl%**
Summation of the Actv% and Wait% fields.

**Visual**
Graphical representation of the Totl% field.

**Source line**
Source of registered program. If the CA Ideal program is registered, the source will appear under this heading.
Use the Product with Natural

CA Mainframe Application Tuner allows you to select how to display the information collected when a Natural program is monitored. You can view either the Natural executor programs (by which Natural supervises the execution of Natural 4GL routines), or the Natural routines themselves.

1. Analyze the data by using one of the analysis line commands (A, AL, AA, or AW).
2. Select one of the following two ways to locate the Natural statements:
   - From the Interactive Analysis menu, select Option 19.
   - From the Interactive Analysis menu, select Option 3 to display the CodeView panel. Issue the MODE 4GL primary command to display the activity that is associated with Natural routines.

The Natural Programs panel displays:

This panel displays the activity of Natural routines that were executing at the time that the monitor was run. These routines exist in ADABAS databases. The Language, Library, and Routine Name fields display, along with a description of the routine, if available. This information is important when multiple copies of a routine are maintained.

3. Type H or NH.
4. Press Enter.

The 4GL Histogram panel shows the activity of each statement in the routine.

```
CA MAT ---------------------- 4GL Histogram ----------------- Row 1 to 4 of 4
COMMAND ====> SCROLL ===> CSR

Language --- NATURAL
Library --- AQMAPP5
Routine --- AQMFETCH

Stmt Actv% Visual
-------------------------------------------------------------
  0  0.00
 60  0.12
150 2.59 =>
170  0.12

************************************************************************ End of Table************************************************************************
```

The 4GL Histogram panel can also be displayed from the DelayView panel.
The fields in the 4GL Histogram panel for Natural statements are now described.

**Library**

1-8 alphanumeric name of the Natural library from which routine was executed.

This library resides in the Adabas database on the Natural System or User file.

**Routine**

Name of the 4GL routine, obtained from the 4GL language processor exit.

**Stmt**

Statement number of the currently executed statement of the 4GL routine.

This statement is obtained from the 4GL language processor exit.

**Actv%**

Percentage of the monitored period that CA Mainframe Application Tuner detected a 4GL statement in control. The statement may or may not have been consuming CPU at the time.

**Visual**

Graphical representation of the Pct field.
address space
An executing batch job, system task, or TSO user. Same as job.

application tuning
The process of analyzing and adjusting the performance of an application with the goal of maximizing efficiency and effectiveness.

broadcast request
A monitor request that is sent to any system in a sysplex.

CEESPLD
The load library.

CodeView
Interactive analysis option 3. This panel displays the execution and wait time of each module that is used by the target program.

connect time
The number of milliseconds during a monitored period that represent the end-to-end time needed for transferring data to and from external media and memory. Connect time displays on the DataView and Data Set Details panels. Connect time might exceed the monitored period because of data overlap caused when multiple blocks of data are moved to and from memory.

contention
A situation that occurs when there are more requests for a service than there are servers available. For single servers such as drives, control units, and paths, contention occurs when two or more requests for service arrive simultaneously.

content-sensitive help
The online Help information for specific CSECTs, pseudo groups, and major and minor delay categories.

CSECT
An individually linkable component of a program, which may be included in one or more load modules.

CSECT Associations
CA Mainframe Application Tuner allows a functional description to be associated with individual CSECTs that will be shown on various analysis panels. The user can build a database of functions of CSECTs, which can substantially simplify the later understanding of the presented results.
data set fragmentation

Under z/OS, data sets are allocated in the form of extents, which represent allocation areas on the physical device. A data set might originally be allocated to occupy from one to five extents and might subsequently grow into up to 16 of these allocation groups. The more scattering that occurs, the more a data set is considered to be fragmented. Because data retrieval time increases with fragmentation, this characteristic is considered undesirable.

DataView

Interactive analysis option 5. This panel displays data sets, databases (IMS, Adabas, Natural, CA IDEAL and CA DATACOM), and DB2® statements that caused activity during the monitored period.

delays

CA Mainframe Application Tuner considers all samples that do not indicate the actual code of the target application program to be processing as some form of delay. This term should not be confused with actual waits and is only a functional indicator from the perspective of the operating system as to what operations are performed at the time of the sample. Delays can cause the task to be in a wait state, executing in RB (application program) or SVRB (operating system) mode.

DelayView

Interactive analysis option 2. This panel displays the target program's performance in terms of the activities that made up the program execution time.

disconnect time

The time in an I/O cycle that a device is not actually transferring or searching for data.

external data set

The monitor data created by another user.

fast path

A predefined link between one screen and another. Executed by placing the cursor on a single value in a field and pressing Enter. The resulting screen displays more detailed information about the selected value.

field

(1) A column of data on a screen. (2) A group of character positions within a screen that are used to enter or display specific information.

field Help

The online information that describes the purpose or contents of a field on a panel. Displayed by placing the cursor anywhere in the field and pressing PF1 (HELP).

filter

The selection criteria established for a column of data. Data that does not meet the selection criteria is not displayed. A filter consists of a character string.
**filtered analysis**
When requesting CA Mainframe Application Tuner to analyze the gathered data, the user may indicate that the output data should be filtered before making it available. This process temporarily discards all data pertaining to involuntary waits, which, in most cases, are not under the control of the monitored program but quite often represent a considerable amount of data that slow down the interactive analysis. This method is preferred to the basic (unfiltered) analysis.

**fixed field**
The fields that are located on the far left side of a screen that you display by scrolling right with PF11 (RIGHT). The presence of fixed fields is indicated by an arrow on the left side of a screen, just below the column headers.

**histogram**
CA Mainframe Application Tuner uses the term histogram to refer to a process where the activity of an individual load module or CSECT is statistically broken up into segments of equal size and their activity comparably demonstrated.

**Installation Verification Procedure (IVP)**
A procedure that is performed after installation that determines if CA Mainframe Application Tuner is functioning properly.

**interactive analysis**
The analysis of data that is processed from a user’s terminal. This form of analysis is preferable because it allows selective presentation of output and reduces the amount of user data. Several report display options are provided.

**invoking a monitor**
The process of starting the observation and subsequent sampling of a target application as defined by the *monitor definition*.

**involuntary wait**
CA Mainframe Application Tuner considers all nondispatch states that are not directly caused by the target address to be involuntary, including such states as the address spaces being swapped out or not being dispatched due to higher priority work already being in the system.

**job**
A batch job, Started Task, or TSO session executing in an z/OS address space. Same as *address space*.

**load module**
Almost all code executed under z/OS is stored and fetched by the operating system in the form of load modules. Load modules comprise individual CSECTs and information about how these CSECTs are to be loaded into memory and resolved.

**local request**
A monitor request that is only sent to the local system of the TSO user.
module load time
The amount of time the operating system spends retrieving and resolving the instruction image of a load module stored on DASD.

ModView
Interactive analysis option 7. This panel displays the activity of each load module for the target application.

monitor administration
The management of monitor information, including monitor definitions, invocations, analysis, history, and status.

monitor data set
The partitioned data set (PDS) that contains the results of a monitoring session.

monitor definition
The specification a user provides to CA Mainframe Application Tuner as to what to monitor and in which manner. A user may maintain any number of monitor definitions at any given point in time.

monitor history
The cumulative collection of data sets for a monitor definition.

monitor request
A monitor definition that has been activated by using the Invoke line command (I) in the Monitor Definition panel.

multitasking
The simultaneous or quasi-simultaneous processing of several units of work (tasks) within the same address space. Each of these tasks operates on independent processes, which might or might not preempt each other.

Observation
The beginning of the sample process. An observation occurs at regular intervals based on monitoring criteria that is defined in the monitor profile. It represents an initial assessment of whether a sample can be taken and if it can, TriTine sampling logic is executed.

Open Application Program Interface (Open API)
The method CA Mainframe Application Tuner uses to define and invoke monitors from outside of the TSO Client (through TSO commands, batch jobs, or from within a program).

Overview
Interactive analysis option 0. This panel displays information about the monitoring process, as well as key global statistics about the monitored application.
pending time
The time between the successful completion of an SSCH and before the execution of the first channel command. Pending time and IOS queue is the total queue time (XA only).

PoolView
Interactive analysis option 8. Displays statistics about VSAM/LSR and VSAM/GSR buffer pool usage.

Primary Option Menu
The panel that displays when CA Mainframe Application Tuner is first invoked. Provides access to all basic features.

product customization
An online facility for customizing the installation of products. Product customization provides an ISPF panel interface that both presents customization steps in sequence and provides current status information about the progress of installation.

profile name
The name that is specified for a monitor definition. Identifies monitor data sets and analysis panels.

profile parameters
A set of parameters that specify default conditions for each user.

pseudo groups
A feature that enables you to assign unique identifiers to related program modules that cause CA Mainframe Application Tuner to treat them as a single group during a monitor session. Modules are associated with pseudo groups by using Option 4, Grouping, on the Primary Option Menu.

registration
The process of providing CA Mainframe Application Tuner with the location of compiled program listings. Used to relate program activity to actual high-level language statements during analysis.

samples
The collective information gathered by all snapshots during one recording interval. This information consists of snapshots for all active and monitored TCBs in the target address space.

screen
A collection of rows and columns of data that displays through the online facility.

screen Help
The online information panels that describe the purpose of a screen. Display screen Help by placing the cursor anywhere on the screen, except on a field, and pressing PF1 (HELP).
**snapshot**  
The capture of the state of one task in the target address space with any related information. This state includes, but is not limited to, the PSW, the wait state bit, the module active at the time, and some of the information pointed to by the current and stored registers.

**status**  
(1) The percentage of completion of a monitor request. (2) The status (Active, Inactive, Waiting) of a monitor request in the Server Space.

**target request**  
A monitor request that is sent to a specified system (or systems) in a sysplex.

**tasklib**  
A DD statement other than STEPLIB or JOBLIB from which a program explicitly initiates the fetch of load modules. The name of the DD statement is at the discretion of the program and varies widely. Examples are DFHRPL for CICS and ISPLLIB for ISPF.

**TaskView**  
Interactive analysis option 1. This panel displays information about the performance of each z/OS task in the monitored address space.

**TimeView**  
Interactive analysis option 4. This panel displays program activity in time sequence. Each row of information represents a single sample taken during the monitored period.

**TNISPF1**  
The REXX EXEC that is used to invoke the ISPF interface.

**TNTUNESS**  
The procedure for starting the Server Space.

**TranView**  
Interactive analysis option 6. This panel shows IMS or CICS activity in terms of individual transactions.

**TRSAMP**  
The data set that contains sample members that are used for the installation and operation of CA Mainframe Application Tuner.

**TSO Client**  
See *CA Mainframe Application Tuner TSO Client*.

**TUNAVSAM**  
The procedure that is used to create the Global Tables data set.

**TUNBATCH**  
The procedure that is used by CA Mainframe Application Tuner for generating batch reports.
TUNCALL

The program that is used to invoke monitors from outside of the TSO Client.

TUNCOB01

The COBOL program provided with CA Mainframe Application Tuner that is used to verify operation and generate sample monitor data.

TUNSDEFS

UTRPARM member that is used to define system default parameters.

TUNSSP00

UTRPARM member that is used to define operational parameters and for password authorization.

TUNUDEFS

UTRPARM member that is used to define user default parameters.

UTRHELP

The data set that contains online Help and content-sensitive help information.

UTRPARM

A data set that is created during product customization into which samples are copied from the CEESSAMP data set. Users can then modify their own copies without corrupting the original models.

VOLSER

The volume serial number.

volume

A named collection of data sets dealt with as an entity by the I/O supervisor. For tape subsystems, it is a cartridge. For DASD, it is a drive, a logical drive (dual-density), or an actuator (3390 class).
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