Using IBM Tivoli OMEGAMON XE on z/OS
Using IBM Tivoli OMEGAMON XE on z/OS
Before using this information and the product it supports, read the information in “Notices” on page 113.
# Contents

<table>
<thead>
<tr>
<th>Figures</th>
<th>Tables</th>
<th>What's New</th>
<th>Preface</th>
</tr>
</thead>
<tbody>
<tr>
<td>..........................</td>
<td>..........................</td>
<td>..........................</td>
<td>..........................</td>
</tr>
<tr>
<td>7</td>
<td>9</td>
<td>11</td>
<td>15</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>About This Guide ..........................</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Documentation Conventions ..........................</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>20</td>
</tr>
<tr>
<td>Chapter 1.</td>
<td>Introducing IBM Tivoli OMEGAMON XE on z/OS ..........................</td>
<td>Introducing IBM Tivoli OMEGAMON XE on z/OS ..........................</td>
<td></td>
</tr>
<tr>
<td></td>
<td>..........................</td>
<td>..........................</td>
<td></td>
</tr>
<tr>
<td></td>
<td>23</td>
<td>24</td>
<td></td>
</tr>
<tr>
<td>Chapter 2.</td>
<td>Using and Customizing Tivoli OMEGAMON XE on z/OS ..........................</td>
<td>Using the Predefined Workspaces ..........................</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Using the Predefined Situations ..........................</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Using Historical Data Collection and Reporting ..........................</td>
<td></td>
</tr>
<tr>
<td></td>
<td>..........................</td>
<td>..........................</td>
<td>..........................</td>
</tr>
<tr>
<td></td>
<td>33</td>
<td>35</td>
<td>41</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>45</td>
</tr>
<tr>
<td>Chapter 3.</td>
<td>Managing a Sysplex for Availability and Performance ..........................</td>
<td>Configuring and Monitoring for High Availability ..........................</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Monitoring Performance ..........................</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Managing Workloads ..........................</td>
<td></td>
</tr>
<tr>
<td></td>
<td>..........................</td>
<td>..........................</td>
<td>..........................</td>
</tr>
<tr>
<td></td>
<td>49</td>
<td>50</td>
<td>53</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>55</td>
</tr>
</tbody>
</table>

## Scenarios

<p>| Chapter 4. | Monitoring Shared DASD .......................... |
| | Identifying the Cause of I/O Delays .......................... |
| | DASD Device Collection Filtering .......................... |
| | .......................... | .......................... | .......................... |
| | 59 | 60 | 63 |
| Chapter 5. | Using the Inspect Function .......................... |
| | About the Inspect Function .......................... |
| | The Inspect CPU Usage workspace .......................... |
| | Using the Inspect Data to Understand a Problem .......................... |
| | .......................... | .......................... | .......................... |
| | 69 | 70 | 73 |
| | | | 75 |
| Chapter 6. | Monitoring Virtual Storage and Missing Jobs .......................... |
| | Monitoring Paging And Virtual Storage .......................... |
| | Monitoring Critical Started Tasks .......................... |
| | .......................... | .......................... | .......................... |
| | 79 | 80 | 82 |
| Chapter 7. | Monitoring Service Class Goals .......................... |
| | About the Scenario .......................... |
| | Creating the zOS_Critical_SvcClass_Missed_Goal Situation .......................... |
| | Setting Thresholds in the WLM Service Class Resources Workspace .......................... |
| | Analyzing the Problem .......................... |
| | .......................... | .......................... | .......................... |
| | 87 | 88 | 89 |
| | | | 92 |
| | | | 94 |</p>
<table>
<thead>
<tr>
<th>Chapter 8.</th>
<th>Monitoring Cryptographic Services................................. 97</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Validating Your Cryptography Configuration.......................... 98</td>
</tr>
<tr>
<td></td>
<td>Monitoring and Improving Cryptography Performance.................... 100</td>
</tr>
<tr>
<td></td>
<td>Monitoring and Improving Cross-System ICSF Performance.............. 103</td>
</tr>
<tr>
<td>Appendixes</td>
<td>Appendix A. Support Information...................................... 107</td>
</tr>
<tr>
<td></td>
<td>Appendix B. Notices.................................................... 113</td>
</tr>
<tr>
<td></td>
<td>Glossary................................................................. 117</td>
</tr>
<tr>
<td></td>
<td>Index.................................................................. 123</td>
</tr>
<tr>
<td>Figure</td>
<td>Description</td>
</tr>
<tr>
<td>----------</td>
<td>----------------------------------------------------------</td>
</tr>
<tr>
<td>Figure 1</td>
<td>An Tivoli OMEGAMON XE on z/OS Workspace</td>
</tr>
<tr>
<td>Figure 2</td>
<td>Event Indicator in the Physical Navigator</td>
</tr>
<tr>
<td>Figure 3</td>
<td>Event Workspace Example</td>
</tr>
<tr>
<td>Figure 4</td>
<td>Navigator Tree for a Multiplex Environment</td>
</tr>
<tr>
<td>Figure 5</td>
<td>Specifying the INTERVAL Parameter</td>
</tr>
</tbody>
</table>
Tables

Table 1. Symbols in Command Syntax .............................................. 20
Table 2. Preconditions for Data Display ....................................... 39
Table 3. Autostarted Situations ..................................................... 41
IBM® Tivoli® OMEGAMON® XE on z/OS® version 3.1.0 is a member of the latest generation of the OMEGAMON family of mainframe monitoring products.

Tivoli OMEGAMON XE on z/OS merges the functionality of three OMEGAMON XE products for support of zSeries and z/OS operating systems:

- OMEGAMON XE for OS/390®
- OMEGAMON XE for Sysplex
- OMEGAMON XE for IBM Cryptographic Coprocessors

In addition, this release

- Continues migration of functionality from OMEGAMON classic and OMEGAMON II® for MVS®
- Offers enhancements of existing functionality
- Introduces new features

The new and migrated features allow existing 3270-based users to migrate to the XE architecture without losing significant function. In addition, however, Tivoli OMEGAMON XE on z/OS offers you access to the OMEGAMON for MVS classic and CUA® 3270 version 550.

**Note:** With version 550, history collection for sysplexes using the EPILOG® collector is no longer supported.

New workspaces have been introduced to support new and migrated features. At the same time, the number of workspace items in Navigation tree has been reduced. Some workspaces previously accessed from the Navigator are now accessed via links from related workspaces.

### Inspect function

The Inspect function, available in the OMEGAMON for MVS classic and CUA 3270 implementations, has been migrated to the OMEGAMON XE environment. This function samples the location of the instruction address register in the target address space on a rapid basis for a relatively short period of time. This allows it to build up a profile of which instructions, which programs, and which tasks are consuming CPU resources in the
address space. This information can help you identify inefficient code, or where in an address space code may be looping.

**Common storage area usage by address space**

Detailed common storage area usage by address space, available in OMEGAMON II for MVS, is now available in Tivoli OMEGAMON XE on z/OS, v3.1.0.

Common storage area reporting at the address space level includes common storage area elements in use by active address spaces and orphaned elements and usage history (Trend Details) by address space for Common Service Area (CSA), Extended Common Service Area (ECSA), System Queue Area (SQA), and Extended System Queue Area (ESQA).

**Four-hour rolling average CPU usage**

Four-hour rolling average CPU usage is a system-wide calculation that shows consumed processor time in millions of service units (MSUs). It is used to determine license charged based on the amount of CPU being absorbed by the system.

A new attribute, 4 Hour MSUs, has been added to the System CPU Utilization attribute group. This attribute allows you to monitor four-hour rolling average CPU usage so you can adjust your usage or caps and understand variable license charges.

*Note:* When a z/OS system runs as a guest on z/VM, MSUs cannot be computed because the technology required for determining LPAR utilization capacity is not available to z/VM.

**Cumulative CPU by address space**

The On/Off Capacity on Demand feature allows z/OS users to temporarily add processors to their configuration. To ensure that CPU resource is getting to the correct workloads in a timely manner, it important to understand what workloads are using CPU resource.

To assist in this determination, Tivoli OMEGAMON XE on z/OS now provides cumulative CPU seconds and percentages for address spaces (job-level CPU). The Address Space CPU Utilization attribute group has been enhanced to provide CPU, task control block (TCB), service request block (SRB), and pre-emptive SRB CPU times and percentages for the job as a whole, as well as job start date and time and elapsed time. These values are displayed by default in the Address Space CPU Utilization workspace.

**Support for zAAP processors**

The zSeries Application Assist Processors (zAAPs) are a special class of assist processors designed to run Java™ workloads. Tivoli OMEGAMON XE on z/OS v3.1.0 provides information about how much work is eligible for a zAAP processor, which processors are zAAP processors, how utilized the zAAP processors are, and what if any zAAP eligible work is running on normal processors.

For reporting purposes, a zAAP is usually referred to as an integrated facility for applications (IFA). Several workspaces now contain IFA data that can help you determine how well the zAAPs configured to your environment, and the workloads running on
them, are performing and also help you make decisions on how much zAAP resource you may need based on the performance of Java workloads on your regular central processors.

**Note:** This support has been implemented in the OMEGAMON for MVS component. The revised panels and commands are documented in the IBM Tivoli OMEGAMON XE on z/OS Release Notes.

**System CPU at RMF interval**

The value of the Average CPU Percent attribute in the System CPU Utilization attribute group is derived from the current Resource Measurement Facility (RMF) interval in progress. This value is based on an unpredictable time interval, since there is no mechanism to synchronize the sample interval with the RMF interval.

For version 3.1.0, two new attributes have been added to the System CPU Utilization group that measure system CPU at RMF intervals:

- **RMF_MVS_CPU_Percent** provides the average system CPU percent as seen by z/OS.
- **RMF_LPAR_CPU_Percent** provides the average system CPU percent as seen by the LPAR hosting the z/OS system.

These new attributes may be a better choice for situations and historical data since they are based on a fixed interval of collection.

**Reorganization of workspaces**

To simplify the Navigation tree, address space workspaces have been organized under an Address Space Overview workspace.
IBM Tivoli OMEGAMON XE for z/OS is a tool for monitoring, analyzing, and managing operating systems, workloads, and shared resources in a sysplex environment.

This guide describes the features and functionality specific to Tivoli OMEGAMON XE on z/OS. It is not intended as an introduction to the OMEGAMON Platform.
About This Guide

Who should read this guide

This guide is intended primarily for those responsible for planning and configuring monitoring of sysplexes and the z/OS systems that participate in them. It also contains information of interest to those who are responsible for

- monitoring the health of these systems and resolving or forwarding problems
- troubleshooting and providing solutions for the problems
- fine-tuning the performance of systems (by measuring system capabilities and tweaking configuration settings)

Readers should be familiar with the following topics:

- z/OS operating system
- Microsoft Windows® or UNIX® desktop environment
- OMEGAMON Platform
- CandleNet Portal®

Document set information

This section lists publications in the Tivoli OMEGAMON XE on z/OS library and related documents. It also describes how to access Tivoli publications online and how to order Tivoli publications.

Tivoli OMEGAMON XE on z/OS library

The following documents are available in the Tivoli OMEGAMON XE on z/OS library:

- **Getting Started with IBM Tivoli OMEGAMON XE on z/OS**, SC32-9491
  Provides an overview of the IBM Tivoli OMEGAMON XE environment and the planning information needed to install the Tivoli OMEGAMON XE on z/OS product.

- **Configuring IBM Tivoli OMEGAMON XE on z/OS**, SC32-9364
  Provides information on configuring Tivoli OMEGAMON XE on z/OS.

- **Using IBM Tivoli OMEGAMON XE on z/OS**, GC32-9209
  Provides information about the product-specific features and usage of the Tivoli OMEGAMON XE on z/OS product.

- **IBM Tivoli OMEGAMON XE on z/OS Release Notes**, GI11-4038
  Contains information about what is new in this release, including new or revised OMEGAMON II panels. Also contains information about problems discovered late in the testing cycle that were not incorporated into the other publications and work-around procedures for those problems.
OMEGAMON II for MVS Library

- **OMEGAMON II for MVS Configuration and Customization Guide**, GC32-9277
  Describes how to configure and customize the OMEGAMON II for MVS product. It provides background on the product components, addresses maintenance and migration considerations, gives an overview of the configuration and customization process, and documents step-by-step procedures.

- **OMEGAMON II for MVS User's Guide**, GC32-9280
  Contains an overview of OMEGAMON II features, the types of panels displayed, and how to navigate from one panel to another; instructions for adjusting an OMEGAMON II environment; usage scenarios describing how to use OMEGAMON II to monitor realtime and historical performance; instructions for using some of the commands for creating OMEGAMON screen spaces described in the OMEGAMON for MVS Command Language Reference Manual and commands for generating EPILOG reports described in the EPILOG for MVS Command Language Reference Manual.

  Provides the syntax and available keywords for OMEGAMON II for MVS commands

  Documents the syntax and available keywords for EPILOG for MVS commands.

  Provides a description of the ETE® Response Time feature and explains how to start ETE after installation and customization have been completed. Also includes a description of each ETE command argument and descriptions of the ETE error messages, return codes, and sense codes.

IBM Tivoli OMEGAMON Platform Messages

The following books document the messages issued by the OMEGAMON Platform components and products that run on it:

- **IBM Tivoli Candle Products Messages Volume 1 (AOP–ETX)**, SC32-9416
- **IBM Tivoli Candle Products Messages Volume 2 (EU–KLVGM)**, SC32-9417
- **IBM Tivoli Candle Products Messages Volume 3 (KLVHS–KONCT)**, SC32-9418
- **IBM Tivoli Candle Products Messages Volume 4 (KONCV–OC)**, SC32-9419
- **IBM Tivoli Candle Products Messages Volume 5 (ODC–VEB and Appendixes)**, SC32-9420

Related publications

To use the information in this guide effectively, you must have some prerequisite knowledge, which you can obtain from the following guides:

- **Installing and Setting up OMEGAMON Platform and CandleNet Portal on Windows and UNIX**, SC32-1768-00
About This Guide

Provides information on installing and setting up the component products of the OMEGAMON Platform: Candle Management Server®, CandleNet Portal, Candle Management Workstation®, Warehouse Proxy, Alert Adapter for AF/REMOTE®, Alert Adapter for Tivoli Enterprise Console, and Alert Emitter for Tivoli Enterprise Console on Windows and UNIX.

- Administering OMEGAMON Products: CandleNet Portal, GC32-9180
  This document describes the support tasks and functions required for the OMEGAMON platform, including CandleNet Portal user administration.

- Using OMEGAMON Products: CandleNet Portal, GC32-9182
  This guide describes the features of CandleNet Portal and how best to use them with your OMEGAMON products.

- Historical Data Collection Guide for IBM Tivoli OMEGAMON XE Products, GC32-9429
  Describes the process of collecting historical data and either warehousing it or converting it to delimited flat files for reporting purposes. Also describes how to configure historical data collection and warehousing intervals using the CandleNet Portal. Describes how to maintain the Persistent Data Store used to collect and store historical data on z/OS.

- Configuring IBM Tivoli Candle Management Server on z/OS, GC32-9414
  Provides instructions for configuring and customizing the Candle Management Server on z/OS.

The online glossary for the CandleNet Portal includes definitions for many of the technical terms related to OMEGAMON XE software.

Accessing publications online

The documentation CD contains the publications that are in the product library. The format of the publications is PDF. Refer to the readme file on the CD for instructions on how to access the documentation.

IBM posts publications for this and all other Tivoli products, as they become available and whenever they are updated, to the Tivoli software information center Web site. Access the Tivoli software information center by first going to the Tivoli software library at the following Web address:


Scroll down and click the Product manuals link. In the Tivoli Technical Product Documents Alphabetical Listing window, click the IBM Tivoli OMEGAMON XE for z/OS link to access the product library at the Tivoli software information center.

If you print PDF documents on other than letter-sized paper, set the option in the File -> Print window that allows Adobe Reader to print letter-sized pages on your local paper.

Ordering publications

You can order many Tivoli publications online at the following Web site:

You can also order by telephone by calling one of these numbers:

- In the United States: 800-879-2755
- In Canada: 800-426-4968

In other countries, contact your software account representative to order Tivoli publications.

**Tivoli technical training**

For Tivoli technical training information, refer to the following IBM Tivoli Education Web site:

http://www.ibm.com/software/tivoli/education

**Support information**

If you have a problem with your IBM software, you want to resolve it quickly. IBM provides the following ways for you to obtain the support you need:

- Searching knowledge bases: You can search across a large collection of known problems and workarounds, Technotes, and other information.
- Obtaining fixes: You can locate the latest fixes that are already available for your product.
- Contacting IBM Software Support: If you still cannot solve your problem, and you need to work with someone from IBM, you can use a variety of ways to contact IBM Software Support.

For more information about these three ways of resolving problems, see “Support Information” on page 107.

**Participating in newsgroups**

User groups provide software professionals with a forum for communicating ideas, technical expertise, and experiences related to the product. They are located on the Internet and are available using standard news reader programs. These groups are primarily intended for user-to-user communication and are not a replacement for formal support.

To access a newsgroup, use the instructions appropriate for your browser.
Documentation Conventions

Overview
This guide uses several conventions for special terms and actions, and operating system-dependent commands and paths.

Panels and figures
The panels and figures in this document are representations. Actual product panels may differ.

Required blanks
The slashed-b ( bard) character in examples represents a required blank. The following example illustrates the location of two required blanks.

beBA*ServiceMonitor0990221161551000

Revision bars
Revision bars ( | | ) may appear in the left margin to identify new or updated material.

Variables and literals
In examples of z/OS® command syntax, uppercase letters are actual values (literals) that the user should type; lowercase letters are used for variables that represent data supplied by the user. Default values are underscored.

LOGON APPLID (ccccccccc)
In the above example, you type LOGON APPLID followed by an application identifier (represented by cccccccc) within parentheses.

Symbols
The following symbols may appear in command syntax:

Table 1. Symbols in Command Syntax

<table>
<thead>
<tr>
<th>Symbol</th>
<th>Usage</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>The “or” symbol is used to denote a choice. Either the argument on the left or the argument on the right may be used. Example: YES</td>
</tr>
<tr>
<td>[ ]</td>
<td>Denotes optional arguments. Those arguments not enclosed in square brackets are required. Example: APLLDEST DEST [ALTDEST] In this example, DEST is a required argument and ALTDEST is optional.</td>
</tr>
</tbody>
</table>
Some documents use braces to denote required arguments, or to group arguments for clarity. Example:

```plaintext
COMPARE {workload} -
    REPORT={SUMMARY | HISTOGRAM}
```

The `workload` variable is required. The `REPORT` keyword must be specified with a value of `SUMMARY` or `HISTOGRAM`.

Default values are underscored. Example:

```plaintext
COPY infile outfile - [COMPRESS={YES | NO}]
```

In this example, the `COMPRESS` keyword is optional. If specified, the only valid values are `YES` or `NO`. If omitted, the default is `YES`.

<table>
<thead>
<tr>
<th>Symbol</th>
<th>Usage</th>
</tr>
</thead>
</table>
| `{ }`  | Some documents use braces to denote required arguments, or to group arguments for clarity. Example: `COMPARE {workload} -
    REPORT={SUMMARY | HISTOGRAM}` The `workload` variable is required. The `REPORT` keyword must be specified with a value of `SUMMARY` or `HISTOGRAM`. |
| `_ `   | Default values are underscored. Example: `COPY infile outfile - [COMPRESS={YES | NO}]` In this example, the `COMPRESS` keyword is optional. If specified, the only valid values are `YES` or `NO`. If omitted, the default is `YES`. |
Overview

This chapter introduces IBM Tivoli OMEGAMON XE on z/OS and describes the resources it provides for monitoring, analyzing, and managing operating systems, workloads, and shared resources in a sysplex environment.

Chapter contents

Introducing IBM Tivoli OMEGAMON XE on z/OS ........................................... 24
  Overview ......................................................................................... 24
  How Tivoli OMEGAMON XE on z/OS works ................................. 24
  Resources provided by Tivoli OMEGAMON XE on z/OS ............ 27
  Using Tivoli OMEGAMON XE on z/OS .......................................... 29
Introducing IBM Tivoli OMEGAMON XE on z/OS

Overview

Tivoli OMEGAMON XE on z/OS is a member of the latest generation of the OMEGAMON family of mainframe monitoring products. It combines the monitoring capabilities of OMEGAMON II for MVS, OMEGAMON XE for Sysplex, OMEGAMON XE for OS/390, and OMEGAMON XE for IBM Cryptographic Coprocessors to enable you to monitor and manage workload performance and resource utilization of Parallel Sysplexes® and the individual z/OS systems that participate in them.

Tivoli OMEGAMON XE on z/OS provides comprehensive information about sysplex-level resources such as coupling facilities, global enqueue, global serialization resources (GRS) ring systems, shared DASD groups, and cross-system coupling facilities (XCFs) and the service classes, report classes, and resource groups that use them. It also provides extensive system-level information about the z/OS images in the sysplexes and monitors the status and configuration of IBM cryptographic coprocessors installed in zSeries servers.

Tivoli OMEGAMON XE on z/OS also acts as a powerful analytic interface to classic OMEGAMON and OMEGAMON II for MVS monitoring products. Used in conjunction with other OMEGAMON XE monitoring products, the data, analyses, and alerts presented by Tivoli OMEGAMON XE on z/OS help you develop a holistic view of your entire computing enterprise from a single console.

How Tivoli OMEGAMON XE on z/OS works

Tivoli OMEGAMON XE on z/OS uses the CandleNet Portal interface. In the CandleNet Portal, real time and historical data collected by Tivoli OMEGAMON XE on z/OS monitoring agents is displayed in tabular and graphic views in a set of predefined workspaces (see Figure 1 on page 25).

When you open a workspace, CandleNet Portal retrieves monitored data from the agents (or the historical datastore or or data warehouse) via the hub Candle Management Server and sends the results to the workspace. Chart and table views use queries to specify what data the CandleNet Portal requests.

The characteristics or properties of the logical and physical objects monitored by Tivoli OMEGAMON XE on z/OS (for example, the amount of virtual storage allocated to a task) are known as attributes. These attributes are used to define the queries that specify the data to be displayed in the workspaces.

With the proper user authority, you can tailor these views to display critical or warning indicators when monitored values reach specified thresholds, and filter incoming data so you see only the information you are interested in at any given time. You can add additional views to existing workspaces or create your own workspaces and define your own queries using Tivoli OMEGAMON XE on z/OS attributes.
Attributes are also used to describe situations, or conditions, that can trigger events. Event indicators are displayed in the CandleNet Portal Navigator view (see Figure 2 on page 26).
You can link from an event indicator in the Navigator to an Event workspace that provides information about conditions prevailing at the time the event occurred and current conditions, as well as expert advice on how to handle the situation (see Figure 3 on page 27).
Introducing IBM Tivoli OMEGAMON XE on z/OS

Situations can also trigger automated actions.

Tivoli OMEGAMON XE on z/OS provides a set of predefined situations that you can run to monitor a wide range of conditions. You can also create your own situations using the Tivoli OMEGAMON XE on z/OS attributes.

Resources provided by Tivoli OMEGAMON XE on z/OS

Tivoli OMEGAMON XE on z/OS attributes

Attributes are characteristics or properties of the logical and physical objects monitored by Tivoli OMEGAMON XE on z/OS, such as the amount of allocated virtual storage or the percentage of CPU consumed by an address space in a sampling interval. Attributes are used to define the queries used to collect the information presented in workspaces and to define the situations that trigger alerts and automated actions.

Tivoli OMEGAMON XE on z/OS monitors over 50 groups of attributes, providing a wealth of sysplex- and system-level data. You can use these attributes to tailor the information presented in workspaces, or to define situations that target specific thresholds, events, or performance problems you want to monitor.

For descriptions of the attribute groups and the individual attributes monitored by Tivoli OMEGAMON XE on z/OS, see the Tivoli OMEGAMON XE on z/OS section of the CandleNet Portal online help.
Predefined workspaces

Tivoli OMEGAMON XE on z/OS provides two sets of predefined workspaces: sysplex-level and system-level. Each workspace or set of workspaces displays a specific set of data.

The sysplex-level workspaces provide information on sysplex-level resources, such as coupling facilities, cross-system coupling facilities (XCFs), global and enterprise enqueues, global resource serialization (GRS) ring systems, and shared DASD groups. Sysplex-level workspaces also enable you to monitor workload performance and resource utilization by service classes, report classes, and resource groups.

The system-level workspaces provide information about resource usage on individual systems, including:

- address space CPU utilization
- service definitions and policies
- storage usage and bottlenecks
- channel activity
- common storage usage
- single image DASD device usage
- Workload Manager (WLM) service class resource usage
- LPAR cluster activity

You can use the information provided by these workspaces to manage the performance and availability of systems and their resources, to identify potential problems, to trace the causes of alerts or exceptions, to make tuning and resource distribution decisions, and to identify particular conditions you want to monitor.

For information on locating and navigating Tivoli OMEGAMON XE on z/OS workspaces, see “Using the Predefined Workspaces” on page 35. For a complete list and descriptions of the predefined workspaces, see the Tivoli OMEGAMON XE on z/OS section of the CandleNet Portal online help. For information about creating and customizing views and workspaces, see the CandleNet Portal online help.

Predefined monitoring situations

Situations are descriptions of conditions you want to monitor, such as rapid growth in usage of CSA. Situations periodically verify the values of attributes used in the description. When they are distributed to systems monitored by Tivoli OMEGAMON XE on z/OS agents, situations can, for example, alert you to a coupling facility structure that has failed, or to a service class that is failing to meet its goal. Situations can also trigger simple (reflex) actions, or complex automation policies.

If situations are associated with Navigator items, they can generate auditory or visual event indicators, which provide access to special event workspaces containing more information about the event and guidance for how it should be handled.
Tivoli OMEGAMON XE for z/OS provides an extensive set of predefined situations. These situations check for conditions that are typically considered to be problematic or noteworthy. They can also serve as templates for creating customized situations of your own. All these situations include expert advice.

More than 100 of these situations match the thresholds available in OMEGAMON II for MVS. Tivoli OMEGAMON XE on z/OS provides a tool that lets you migrate an OMEGAMON II profile containing customized thresholds values.

For information on activating and customizing the predefined situations, see “Using the Predefined Situations” on page 41. For descriptions of the predefined situations, see the Tivoli OMEGAMON XE on z/OS section of the CandleNet Portal online help. For more information on creating, editing, and distributing situations, see the CandleNet Portal online help and documentation. For information on migrating an OMEGAMON II profile, see Configuring Tivoli OMEGAMON XE on z/OS.

**Historical data collection and reporting**

In addition to providing real time data, Tivoli OMEGAMON XE on z/OS also lets you collect data over extended periods of time. By studying the information gathered from a historical perspective, you can, for example, identify trends and determine whether current performance is typical or exceptional, or evaluate the effect of tuning decisions.

You can view the historical data collected by Tivoli OMEGAMON XE on z/OS in CandleNet Portal workspaces or in reports generated by third-party reporting tools.

The OMEGAMON II for MVS component also provides historical data collection and reporting through the EPILOG collector.

*Note:* The OMEGAMON II for MVS (V550) component of Tivoli OMEGAMON XE on z/OS supports only system-level EPILOG data.

For more information about historical data collection for Tivoli OMEGAMON XE on z/OS, see “Using Historical Data Collection and Reporting” on page 45, Configuring IBM Tivoli OMEGAMON XE on z/OS, and Historical Data Collection Guide for OMEGAMON XE Products.

For information about historical data collection and reporting for OMEGAMON II for MVS, see OMEGAMON II for MVS User’s Guide.

**Using Tivoli OMEGAMON XE on z/OS**

The data and resources provided by Tivoli OMEGAMON XE on z/OS enable you to monitor and manage workload performance and resource usage in a variety of ways. The following are only some of them. See “Scenarios” on page 57 for scenarios that illustrate how you can use the workspaces, situations, and data provided by Tivoli OMEGAMON XE on z/OS to monitor the systems in your sysplexes.

**Monitor CPU usage at the system and address space level**

System CPU utilization is the percentage of time that all processors available to a system were busy dispatching work. The System CPU Utilization workspace provides information about CPU usage for each monitored z/OS system. In an LPAR environment, it also provides partition management statistics.
The System CPU Utilization workspace shows the number of physical processors reported on, number of processors online, the average percentage of time that all processors collectively available in this z/OS system were busy dispatching work, and other information specific to CPU workload and partition workload.

If you use defined capacity as a basis for pricing, this workspace also shows the long-term average CPU service used by this system or LPAR in millions of service units (MSUs) per hour.

For each address space in a z/OS image or LPAR, the Address Space CPU Utilization workspace provides basic identifying information such as job name and ASID, basic Workload Manager information such as service class and service class period, as well as various CPU statistics. It also provides enclave data, such as the total number of dependent and independent enclaves owned by the address space that are currently active or inactive.

**Manage resources and workloads across LPAR clusters**

Tivoli OMEGAMON XE on z/OS provides an overview of the LPAR clusters in your central processor complex/cluster processor complexes (CPCs) and allows you to look at the LPAR details for individual clusters.

**Identify service classes that are missing their goals**

Tivoli OMEGAMON XE on z/OS allows you to determine whether a workload is meeting its goal, determine which resources a service class is using, and which resources are affecting service class performance.

**Monitor enqueues across systems and sysplexes**

Tivoli OMEGAMON XE on z/OS provides information on enqueues shared across systems in a sysplex (global enqueues) in several related workspace. In environments in which enqueue management spans two or more sysplexes using Unicenter® CA-MIM™ Resource Sharing, it can also provide information on resources in conflict between users in multiple sysplexes, using the concept of an enqplex. (For information on assigning sysplexes to an enqplex, see Configuring Tivoli OMEGAMON XE on z/OS.)

**Identify and ease bottlenecks**

Bottleneck analysis is a performance monitoring technique that identifies execution states of a workload and the frequency of each state. When the results of this analysis are averaged over time, it is possible to find what states (such as waiting for CPU) prevent a workload from achieving its service goal. Identification and easing of bottlenecks is a key part of performance management.

Tivoli OMEGAMON XE on z/OS provides summary bottleneck data for all monitored address spaces or for a selected service class period, displaying over 20 execution states. It also provides information for over 50 execution states for selected address spaces.

Impact analysis helps you determine how various workloads are interfering with each other, by showing which workloads are using the resources that an impacted workload needs. This helps you to reduce degradation of the monitored workloads.
The Address Space Bottlenecks and Impact Analysis workspace displays resource contention statistics for a selected address space. Bar charts let you quickly determine which address spaces are impacting the favored address space, how they are impacting it, and to what extent they are impacting it.

**Monitor common storage areas usage by address space**

Common storage comprises:
- Common Service Area (CSA)
- Extended Common Service Area (ECSA)
- System Queue Area (SQA)
- Extended System Queue Area (ESQA)

Common storage area reporting at the address space level includes common storage area elements in use by active address spaces and orphaned elements, and usage history (trend details) by address space.

**Determine processor capacity requirements**

Tivoli OMEGAMON XE on z/OS provides cumulative CPU seconds and percentages for address spaces (job-level CPU). The Address Space CPU Utilization attribute group provides CPU, task control block (TCB), service request block (SRB), and pre-emptive SRB CPU times and percentages for the job as a whole, as well as job start date and time and elapsed time.

These values are displayed by default in the Address Space CPU Utilization workspace. The On/Off Capacity on Demand feature allows z/OS users to temporarily add processors to their configuration. The job-level CPU times and percentages provided by Tivoli OMEGAMON XE on z/OS help you understand what workloads are using the CPU and ensure the resource is getting to the correct workloads in a timely manner.

**Monitor and plan z/Series Application Assist Processors resources**

z/Series Application Assist Processors (zAAPs) are a special class of assist processors designed to run Java workloads. For reporting purposes zAAPs are usually referred to as IFAs (Integrated Facility for Applications processors). Tivoli OMEGAMON XE on z/OS provides IFA data in various workspaces that can help you determine how well the zAAPs configured to your environment, and the workloads running on them, are performing.

Tivoli OMEGAMON XE on z/OS can also provide information to help you make decisions on how much zAAP resource you may need based on the performance of Java workloads on your regular CPs. By starting Java applications using a switch (-Xifa:force), you can accumulate data at the address space and service class period level on how much IFA would be consumed if IFAs were configured.

**Identify inefficient or looping code**

The Inspect function allows you to observe where in the executable code a z/OS address space is spending its time. Inspect provides CPU usage data for a selected address space drilled down to the agent-selected level of granularity within each CSECT, for the most active TCBs. This information helps identify inefficient code, or where in an address
space code may be looping. The workspace also contains sampling statistics and messages sent by the Inspect agent, which enables you to evaluate the statistical accuracy of the resultant data.
Overview

This chapter is intended to familiarize you with the monitoring resources provided by Tivoli OMEGAMON XE on z/OS and to help you use them to meet your specific requirements.

This chapter describes how to

- use and customize predefined workspaces that report sysplex- and system-level data
- activate and customize predefined situations to enable alerts and reflex actions
- configure historical data reporting
- find more detailed information on workspaces, attributes, and situations.

The information on the organization and use of workspaces should be of interest to all Tivoli OMEGAMON XE on z/OS users. The information on activating and modifying situations and configuring historical data collection should be of interested to users with administrative authorities who are responsible for setting up and customizing monitoring and alerts.

Chapter contents

Using the Predefined Workspaces .......................................................... 35
  About the workspaces ................................................................. 35
  Sysplex and system managed system names ................................... 35
  The Sysplex Enterprise Overview workspace .............................. 37
  Sysplex level workspaces ......................................................... 37
  System level workspaces ......................................................... 38
  Prerequisites for data reporting ............................................... 39
  Customizing workspaces ......................................................... 39
  Finding more information about workspaces ............................... 40
Using the Predefined Situations ......................................................... 41
  About the situations ................................................................. 41
  Autostarted situations ............................................................ 41
  Activating predefined situations .............................................. 41
  Modifying predefined situations ............................................. 43
<table>
<thead>
<tr>
<th>Section</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>Importing OMEGAMON II for MVS thresholds</td>
<td>44</td>
</tr>
<tr>
<td>Finding more information about situations</td>
<td>44</td>
</tr>
<tr>
<td>Using Historical Data Collection and Reporting</td>
<td>45</td>
</tr>
<tr>
<td>About historical data collection and reporting</td>
<td>45</td>
</tr>
<tr>
<td>Configuring historical data collection</td>
<td>45</td>
</tr>
<tr>
<td>Finding more information about historical data collection</td>
<td>46</td>
</tr>
</tbody>
</table>
Using the Predefined Workspaces

About the workspaces

Tivoli OMEGAMON XE for z/OS ships with two sets of predefined workspaces: sysplex level workspaces and system (or LPAR) level workspaces.

The sysplex level workspaces display information about sysplex components such as coupling facilities, global enqueues, global resource serialization (GRS) systems, shared DASD groups, and cross-system coupling facilities (XCFs), and about the report classes, service classes, and resource groups that use those resources.

The system level workspaces report data on address space CPU utilization, storage usage and bottlenecks, channel activity, common storage usage, single image DASD device usage, WLM service class resource usage, and LPAR cluster activity for individual z/OS systems or images. They also report the status, configuration, and performance of any installed IBM cryptographic coprocessors.

Tivoli OMEGAMON XE on z/OS also provides a Sysplex Enterprise Overview workspace that summarizes data from all your monitored sysplexes, and a Cross-System Cryptographic Coprocessor Overview workspace that summarizes data about Integrated Cryptographic Service Facility (ICSF) subsystems on all monitored z/OS images.

Workspaces are accessed either directly from the physical Navigator or through links from other workspaces. In the Navigator, the sysplex workspaces are listed under each managed sysplex name, and the system workspaces are listed under each z/OS managed system name. (Figure 4 on page 36 illustrates the organization of the workspaces in the CandleNet Portal Navigator in a multiplex enterprise.)

Most of the predefined workspaces are capable of reporting historical data. However, you must configure and start historical data collection in order for historical data to be available for reporting.

Sysplex and system managed system names

From the standpoint of Tivoli OMEGAMON XE on z/OS, sysplexes and systems are managed systems. In the CandleNet Portal Navigator, managed systems are identified by managed system names.

Sysplex managed system names take the form

\[ \text{plexname:MVS:SYSPLEX} \]

where plexname is normally the true name of the sysplex, but could be configured to be an alias for the sysplex.

System managed system names take the form

\[ \text{plexname:smfid:MVSSYS} \]

where plexname is normally the true name of the sysplex, but could be configured to be an alias for the sysplex. (This part of the system managed system name typically matches the plexname component of its parent sysplex in the navigation tree.) The smfid
Using the Predefined Workspaces

component is the true System Management Facility (SMF) ID for the system or LPAR being monitored.

Figure 4. Navigator Tree for a Multiplex Environment

![Navigator Tree for a Multiplex Environment](image)

Organization of the workspaces

The physical Navigator view of the CandleNet Portal shows an enterprise as a mapping of platforms, systems, agents, and monitored resources. In a sysplex environment, monitored sysplexes appear between the platform and system levels of the Navigator tree, listed by their managed system names. Below each sysplex name are items for the sysplex-level resources and components followed by an item for every system (or LPAR) in the sysplex being monitored by a Tivoli OMEGAMON XE agent:
Using the Predefined Workspaces

```
ENTERPRISE
  z/OS Systems
    SYSPLEX1:MVS:SYSPLEX
      Coupling Facility Policy Data for Sysplex
      Coupling Facility Structures Data for Sysplex
    . . .
    SYSTEM1
    SYSTEM2
```

Each navigator item can be associated with one or more workspaces that provide information relevant to that level of the navigator.

**The Sysplex Enterprise Overview workspace**

When Tivoli OMEGAMON XE on z/OS is installed, the Sysplex Enterprise Overview is the default workspace for the z/OS Systems item in the Navigator. As its name indicates, this workspace provides an overview of all the sysplexes in your enterprise. From the table views in this workspace you can link to sysplex-level workspaces for a selected sysplex.

```
ENTEPRINE
  z/OS Systems
    Enterprise Status Workspace
    Sysplex Enterprise Overview Workspace
```

**The Cross-System Cryptographic Coprocessor Overview workspace**

From the z/OS Systems Navigator item, you can also access the Cross-System Cryptographic Coprocessor Overview workspace. To access the workspace, with z/OS Systems selected, right-click the item, then select Workspace from the pop-up menu.

**Sysplex level workspaces**

Each entry below a sysplex in the Navigator tree is associated with one or more workspaces that report information on resources shared by the sysplex or sysplex workloads. Each entry has a default workspace, which opens when you select the item, and which may have other associated workspaces you can access through links in table views in the default workspace.

For example, the default workspace for each sysplex managed system entry is a Sysplex Level Overview workspace, which provides summary data for the selected sysplex. From this workspace, you can link to a variety of related workspaces. The default workspace for the Shared DASD Groups Data for Sysplex entry is the Shared DASD for Groups workspace, which displays information for all the groups in the sysplex. From this workspace you can link to a workspace that displays details for a selected group of DASD devices.
Using the Predefined Workspaces

Beneath each system item in the Navigator tree is an item for each type of resource being monitored by a Tivoli OMEGAMON XE agent. For example, if you have installed both Tivoli OMEGAMON XE for z/OS and Tivoli OMEGAMON XE for Storage, you will see entries for MVS Operating System and Storage Subsystem.

When you expand MVS Operating System, you will see the managed system name of the system or LPAR monitored by Tivoli OMEGAMON XE on z/OS:

When you expand managed system entry, the workspaces that provide information about that system are listed:

As with the sysplex-level entries, every entry under the system name is associated with one or more workspaces. Each entry has a default workspace, which opens when you select the entry, and which may have other related workspaces you can access through links in table views in the workspace.
Prerequisites for data reporting

Some workspaces or attributes display data only if specific conditions are met. See Table 2 for a list of these workspaces and conditions.

<table>
<thead>
<tr>
<th>Data is available in</th>
<th>Only if</th>
</tr>
</thead>
<tbody>
<tr>
<td>Common storage workspaces</td>
<td>The Common Storage Area Analyzer (CSA Analyzer) is started.</td>
</tr>
<tr>
<td></td>
<td><strong>Note:</strong> The CSA Analyzer is shipped and installed with Tivoli OMEGAMON XE on z/OS. It is configured as part of the configuration of the OMEGAMON II for MVS component and is started as a separate started task.</td>
</tr>
<tr>
<td>Channel Path Activity workspace</td>
<td>The Resource Measurement Facility (RMF) has been started.</td>
</tr>
<tr>
<td>GRS Ring Systems Data for Sysplex workspace</td>
<td>The global resource serialization (GRS) complex is in ring mode. (If the complex is in star mode, the workspace shows only the name, status, and ring acceleration of each system.)</td>
</tr>
<tr>
<td>Cryptographic workspaces</td>
<td>At least one IBM cryptographic coprocessor is installed and configured.</td>
</tr>
<tr>
<td>DASD MVS Workspace and DASD MVS Devices Workspace</td>
<td>The Resource Measurement Facility (RMF) has been started.</td>
</tr>
<tr>
<td>4 Hour MSUs attribute in the System CPU Utilization workspace</td>
<td>A defined capacity is used as a basis for pricing and the z/OS system is not running as a guest on z/VM.</td>
</tr>
<tr>
<td>User Response Time workspace</td>
<td>The End to End (ETE) Response Time collector is started.</td>
</tr>
<tr>
<td></td>
<td><strong>Note:</strong> The ETE response time collector is shipped and installed with Tivoli OMEGAMON XE on z/OS. It is configured as part of the configuration of the OMEGAMON II for MVS component and is started as a separate started task.</td>
</tr>
<tr>
<td>Integrated Facility for Applications (IFA) on CP resource times at the address space and service class period level</td>
<td>z/Series Application Assist Processors are configured on the systems, or Java applications are started using a switch (-Xifa:force)</td>
</tr>
<tr>
<td>LPAR cluster workspaces</td>
<td>The z/OS system is not running as a guest on z/VM.</td>
</tr>
</tbody>
</table>

Customizing workspaces

You can modify the predefined workspaces in a number of ways. You can:
Using the Predefined Workspaces

- add, delete, or modify views
- modify queries
- apply thresholds or filters
- change the appearance of tables and charts
- add links to other workspace, or make a workspace accessible using a URL

To change a workspace, create a copy of the original and save it with a new name, then modify the copy.

**Note:** If you want to modify a predefined workspace, you should either use Save As to save it with a new name, or create a copy of the workspace and save it with a different name. If you retain the original name, your customized workspace will be overwritten the next time you apply updates to the product.

Only someone with Modify Situation authority can modify predefined situations.

You can also choose a particular workspace as your home workspace, just as you might set a home page for your web browser. For example, you might want to set the Sysplex Enterprise Overview workspace as your home workspace, the one you see first when you log on to CandleNet Portal.

If you have OMEGAMON DE on z/OS, you can create workspaces that include both mainframe and distributed sites, applications, and business processes.

**Finding more information about workspaces**

For descriptions of the predefined workspaces, the views they contain, and the attribute groups on which they are based, see Workspaces in the Tivoli OMEGAMON XE on z/OS section of the CandleNet Portal online Help.

For more information about customizing workspaces, see Using OMEGAMON Products: CandleNet Portal and the CandleNet Portal online Help.
Using and Customizing Tivoli OMEGAMON XE on z/OS

Using the Predefined Situations

About the situations

To help you begin monitoring quickly, Tivoli OMEGAMON XE for z/OS provides a number of predefined situations. These situations monitor for conditions that are typically considered to be problematic or noteworthy and trigger a Critical or Warning event indicators in the Navigator when those conditions occur.

Some of these situations are set to start running the first time you start a Candle Management Server after installing Tivoli OMEGAMON XE on z/OS. The other situations you must activate yourself.

Autostarted situations

Several of the sysplex-level predefined situations, and all of the cryptographic coprocessor (system-level) situations, shipped with Tivoli OMEGAMON XE on z/OS are autostarted (see Table 3).

These situations are set to start when the Candle Management Server on which they are running starts, and they are automatically distributed to the appropriate managed system list. (The *MVS_SYSPLEX managed system list is populated with each online sysplex proxy node automatically and the situations assigned to this list begin monitoring when the Candle Management Server on that node starts. The *MVS_SYSTEM managed system list is populated with the name of each Tivoli OMEGAMON XE on z/OS Candle Management Server as it comes online.)

Table 3. Autostarted Situations

<table>
<thead>
<tr>
<th>Autostarted Situations</th>
</tr>
</thead>
<tbody>
<tr>
<td>Crypto_CKDS_80PCT_Full</td>
</tr>
<tr>
<td>Crypto_CKDS_Access_Disabled</td>
</tr>
<tr>
<td>Crypto_Internal_Error</td>
</tr>
<tr>
<td>Crypto_Invalid_Master_Key</td>
</tr>
<tr>
<td>Crypto_Invalid_PKA_Master_Keys</td>
</tr>
<tr>
<td>Crypto_No_Coprocessors</td>
</tr>
<tr>
<td>Crypto_No_PCI_Coprocessors</td>
</tr>
<tr>
<td>Crypto_PCI_Unavailable</td>
</tr>
<tr>
<td>Crypto_PKDS_Read_Disabled</td>
</tr>
<tr>
<td>Crypto_PKDS_Write_Disabled</td>
</tr>
<tr>
<td>Crypto_Service_Unavailable</td>
</tr>
<tr>
<td>MVS_CFStruct_Status_Crit</td>
</tr>
<tr>
<td>MVS_CFStructUsers_Connect_Crit</td>
</tr>
<tr>
<td>MVS_CFSystems_Performance_Crit</td>
</tr>
<tr>
<td>MVS_XCFGroupMembers_Status_Crit</td>
</tr>
<tr>
<td>Sysplex_DASD_Dev_ContIndx_Warn</td>
</tr>
<tr>
<td>Sysplex_Workloads_Perfldx_Crit</td>
</tr>
<tr>
<td>Sysplex_XCFSystems_Status_Crit</td>
</tr>
</tbody>
</table>

Activating predefined situations

The majority of the predefined situations shipped with Tivoli OMEGAMON XE on z/OS are not set to autostart. You must activate these situations before they can begin monitoring.
Using the Predefined Situations

To activate a situation you use the Situation editor of the CandleNet Portal to

1. Distribute (assign) the situation to one or more managed systems or managed system lists.
2. Start the situation.

Each situation is already associated with an appropriate Navigator item. When you distribute a situation, you will see its name listed under the name of its associated item in the Situation editor:

Some system-level situations are shipped with very high or very low values, which essentially disable them. Others have values that may be inconsistent with your site’s policies, goals, or monitoring requirements. You should examine the predefined situations and customize them with values that are meaningful for your installation before you activate them.

Distributing situations

You distribute situations using the CandleNet Portal Situation editor. You can access the Situation editor from the toolbar or by right-clicking an item in the Navigator and selecting Situations from the pop-up menu.

Distribute only the situations that you are going to autostart or plan to manually enable. If you distribute all the situations, they will be propagated to the agents when the Candle Management Server starts. This may simplify any subsequent activation procedures, but it extends startup time. Review the situations to determine which ones you plan to use and add distribution lists for only those situations. Once the situations are distributed, their alerts will appear on the Navigator items they are associated with.

To distribute a situation:

1. Open the Situation Editor.
2. If necessary, use the Situation Filter to view the situations available for distribution.
   
   Check Eligible for Association to see a list of all the situations which are written for this type of managed system (z/OS Sysplex or z/OS System, depending on where you access the Situation editor from; if you access the editor from the toolbar, you will see situations for all types of managed systems).

   Any undistributed situations will show their icon partially dimmed.

3. Select (click) the situation you want to distribute.
   
   The Situation editor displays the Condition tab for the situation.

4. Select the Distribution tab.
   
   The available managed systems and managed systems lists are displayed.
Select the systems and lists to which you want to distribute the situation, then click the left arrow to assign the situations to the systems or system lists.

Click Apply to save and implement the change and continue editing; click OK to apply and save the change and close the Situation editor.

Starting situations
Some situations you might want to run for a limited time or only under specific conditions. These situations you should start and stop manually. Other situations you may want to run continuously. These situations you should set to run at Candle Management Server startup, so they will run across Candle Management Server restarts.

Initially, you might want to start situations manually to evaluate the impact of the monitoring and monitoring interval on system performance, adjust them accordingly, then decide if you want the situation to run indefinitely, across Candle Management Server restarts.

To start a situation, right-click on the situation name in the Situation editor tree and select Start from the pop-up menu.

To set a situation to start automatically when the Candle Management Server starts:
1. Select (click) the name of the situation in the Situation editor tree.
2. The settings for the situation are displayed in the righthand frame of the editor.
3. On the Conditions tab, check Run at startup.
4. Click Apply to save and implement the change and continue editing; click OK to apply and save the change and close the Situation editor.

Modifying predefined situations
Before activating any predefined situations you should examine the conditions and values they monitor and, if necessary, adjust them to ones better suited to your environment.

If you decide to make changes to a predefined situation, create a copy of the situation (Create Another) and rename and modify the copy. Otherwise, the changes you make will be overwritten the next time the product is updated.

To modify a situation:
1. Open the Situation editor from the toolbar, or right-click a Navigator entry and select Situations from the pop-up menu.

   **Note:** If you open the Situation editor by right-clicking a Navigator item, the situation you create is automatically associated with that item. If you open the editor from the toolbar, you must manually associate the new situation with a Navigator item in order to see an alert indicator when the situation evaluates as true.

2. Use the Situation Filter to view the situations.

   If necessary, check Associated with Monitored Application to see all situations that were written for this type of agent, regardless of where they are distributed.
3. To create a copy, right-click the situation and select Create Another . . . from the popup menu.

4. Type a name for the new situation and click OK.

5. Modify the situation properties as required and click OK to save the new situation and close the Situation editor.

**Importing OMEGAMON II for MVS thresholds**

More than 100 of the predefined situations match the thresholds available in OMEGAMON II for MVS. If you have an existing OMEGAMON II profile, you can import those values to these predefined situations using the KXEMIGR tool. For more information, see Configuring IBM Tivoli OMEGAMON XE on z/OS.

If you import a profile, be aware that you will have to migrate profile again if maintenance is updating any of the situations you have changed.

**Finding more information about situations**

You can find descriptions of all the predefined situations shipped with Tivoli OMEGAMON XE on z/OS, including definitions and advice, by selecting Situations in the Tivoli OMEGAMON XE on z/OS section of the CandleNet Portal online Help.

You can find more information on creating and modifying situations in Using OMEGAMON Products: CandleNet Portal and in the CandleNet Portal online Help.
Using Historical Data Collection and Reporting

About historical data collection and reporting

In addition to monitoring real-time data, Tivoli OMEGAMON XE on z/OS can log data to binary datasets so you can examine data for longer periods of time.

You can view the logged historical data in Tivoli OMEGAMON XE on z/OS workspaces. Table and chart views for which historical data collection has been enabled have a tool for setting a time span, which allows you to see previously collected data samples for up to 24 hours. If you have configured data warehousing, you can view samples for longer periods of time.

In order for historical data to be available in workspaces, you must configure and start historical data collection for the appropriate attribute groups (see “Configuring historical data collection” on page 45).

You can also export the logged historical data to delimited flat files for use with third-party reporting tools to produce trend analysis reports and graphics. Data warehoused to the Candle Data Warehouse, a relational database, can be used to produce customized history reports.

**Note:** Datasets for storing historical data should have been allocated in the persistent data store (PDS) and maintenance of the PDS should have been configured as part of the configuration of the Candle Management Server in each address space. To warehouse data, you must have installed Microsoft SQL Server and configured your environment to include the Warehouse Proxy agent and Candle Data Warehouse.

Configuring historical data collection

You configure historical data collection using the CandleNet Portal History Collection Configuration dialog. (You can also use the History Configuration program in the Candle Management Workstation.)

Configuration is done on an attribute group by attribute group basis. You can configure collection for different attribute groups at different intervals so important volatile data may be collected faster while less dynamic data can be collected less frequently.

Not all attribute groups can collect historical data. This is because collecting history data for these attribute groups is not appropriate or would have a detrimental effect on performance. For example, collection might generate unmanageable amounts of data. Only those attribute groups for which data can be collected are listed in the Configuration dialog. (See “Disk Space Requirements for Historical Data Tables” on page 107 for information about the Tivoli OMEGAMON XE on z/OS attribute groups for which historical data can be reported.)

Note that for a given attribute group, the same history collection options are applied to all Candle Management Servers for which collection for that attribute group is currently enabled. You cannot specify different intervals for the same attribute group for different Candle Management Servers.
Regardless of what location you specify for data collection (agent or Candle Management Server), all data for a sysplex is collected at the sysplex proxy. Because the identity of the sysplex proxy can change (for example when one system is taken off line and the backup becomes the proxy), and the CandleNet Portal does not know which address space is currently serving as the proxy, you must configure historical data collection on all Candle Management Servers eligible as backups for the sysplex proxy and start collection on those servers.

**Starting and stopping data collection**

You start and stop historical data collection for individual attribute groups from the status tab of the History Collection Configuration dialog.

On the Status tab, select the target Candle Management Server and Tivoli OMEGAMON XE on z/OS, then the attribute group or groups for which you want to change collection status.

**Requests for historical data from large tables**

Requests for historical data from tables that collect a large amount of data will have a negative impact on the performance of the product components involved. To reduce the performance impact on your system, set a longer collection interval for attribute groups that collect a large amount of data, in particular the Address Space groups, the DASD MVS Devices group, and the Enqueue group. (for sites that are active with WebSphere). You specify this setting from the Configuration tab of the History Collection Configuration dialog.

When you are viewing a report or a workspace for which you would like historical data, you can set the Time Span interval to obtain data for previous samplings. Selecting a long time span interval for the report time span increases the amount of data being processed, and may have a negative impact on performance. The program must dedicate more memory and CPU cycles to process a large volume of report data. To reduce the impact, use the shortest time span setting sufficient to provide the information you need, especially for tables that collect a large amount of data.

If the amount of information requested is too large, the report request may drop the task and return to the CandleNet Portal or Candle Management Workstation with no data because the agent took too long to process the request. However, the agent continues to process the report data to completion, and remains blocked, even though the report data is not viewable.

There could also be cases where the historical report data from the PDS may not be available. This could occur because the PDS may not be available while its maintenance job is running.

**Finding more information about historical data collection**

For more information on configuring historical data collection and reporting in CandleNet Portal, see the CandleNet Portal online Help and *Using OMEGAMON Products: CandleNet Portal.*
For more information on allocating datasets and configuring CT/PDS, see *Configuring IBM Tivoli OMEGAMON XE for z/OS*.

For information on maintaining the CT/PDS, exporting historical data to flat files, and warehousing historical data, see the *Historical Data Collection Guide for IBM Tivoli OMEGAMON XE Products*.

For information on configuring the Candle Data Warehouse and the Warehouse proxy, see *Installing and Setting up OMEGAMON Platform and CandleNet Portal on Windows and UNIX*.
Using Historical Data Collection and Reporting
Overview

The primary reason for running a sysplex is to increase availability or total throughput. In many cases, you also want to improve performance of individual units of work. Managed correctly, a sysplex can provide high availability, fault tolerance, and performance. When not managed correctly, it can actually decrease availability. Even when you design a sysplex well, you still need to proactively monitor and manage it. This chapter reviews some best practices and guidelines for doing both.

Chapter contents

- Configuring and Monitoring for High Availability ............................................. 50
- Monitoring Performance .................................................................................. 53
- Managing Workloads ...................................................................................... 55
Optimal hardware configuration

The first step to achieving high availability is optimal hardware configuration. The considerations for achieving optimal hardware configuration are described in the IBM Redbook, *Achieving the Highest Levels of Parallel Sysplex Availability*, SG24-6061.

Dataset placement and performance

*Achieving the Highest Levels of Parallel Sysplex Availability* also discusses considerations for the placement and performance characteristics for sysplex datasets, such as couple datasets, that can impact communication and cross-image function availability. The XCFAS started task (XCFAS STC) allocates all the couple datasets (XCF, Logger, CFRM, Workload Manager WLM, ARM, and OMVS) and can be monitored as an application by IBM Tivoli OMEGAMON XE for Storage on z/OS. It can verify performance (dataset MSR and Cache) and availability (free space on volumes allocated to XCFAS STC).

Using automation

One of the biggest threats to availability is a plex-wide outage that occurs when a single image that owns some shared database resources fails and is not recovered quickly. These resources need to be resolved quickly or all members of the plex may wait on in-doubt resources. The simplest thing to do is to have Automatic Restart Manager (ARM) inform automation and restart the resource on any available system.

For DB2®, using "Restart Light" when starting on a different LPAR quickly resolves retained locks to minimize disruption to other systems. After all work in doubt has been resolved, DB2 self-terminates. This approach is quite different from the traditional one of diagnosing the failed system, restarting it, and then restarting the workload. Traditional automation rules no longer apply; you need plex-wide policies to manage workload recovery. The earlier the failure warning, the faster you can recover. It is the job of the performance and availability monitor to detect impending failures so they can be prevented or reduce their duration.

Monitoring messages

There are numerous console messages that indicate some problem is about to occur or is being avoided automatically. In either case, you should be aware of these events. The availability redbook describes these messages and the automated actions required. System Automation for OS/390® (SA/390) includes a component called msys that automates critical sysplex availability events. Its capabilities are also described in the redbook in a section on msys.

Using Intelligent Resource Director

Another challenge to achieving high availability, fault tolerance, and performance is effective workload balancing. Before you can balance workloads, you need to clone CICS® regions and DB2 subsystems, which means you also clone operating systems.
This in turn creates more LPARs. Many users overcommit physical processors to logical processors. This situation is compounded by the presence of many additional LPARs. One of the side effects of having many of logical central processors (CPs) assigned where the weight does not match the percentage of physical processors available is short engine syndrome. This is caused by the LPAR hypervisor time-slicing the CP to its weight in the complex.

This issue is automatically managed by Intelligent Resource Director (IRD). IRD attempts to determine the optimal number of logical CPs and the appropriate weight to eliminate short engines. However, this can actually unlock latent demand and cause the higher weighted LPARs to deliver more CPU cycles to their applications at the expense of lower priority LPARs. You can create situations to monitor the percentage of the physical box used by specific LPARs to detect increases or decreases in total utilization.

Often the routing algorithm is a round robin that does not take into account the ability of the system to deliver adequate service. If the routing is assisted by Workload Manager (WLM), a reasonably good routing decision may be made. But once a workload is routed, system affinities often keep the rest of the work running on that system, even after it becomes saturated. The best circumvention to avoid overloaded LPARs from degrading service is to use IRD. IRD can shift resources between LPARs according to WLM goal achievement requirements.

Even if you are using IRD, you still need to monitor and manage workload distribution. It is important to monitor for workload imbalances in the sysplex. Without IRD, these imbalances are more likely to negatively impact service level agreements (SLAs). Another mechanism that should be exploited to balance workloads is WLM-managed initiators. But even with all of these, you still may need monitors to detect imbalances and automation to correct them.

**Monitoring the hardware controls**

Use Tivoli OMEGAMON XE on z/OS to see how IRD is dynamically managing the LPARs. If imbalances are being adjusted repeatedly for the same LPAR, investigate your routing mechanisms. Tivoli OMEGAMON XE on z/OS can also detect imbalances in Multiple Image Facility (MIF) channels, which are shared across LPARs. If the channel utilization is high on one LPAR, note how that compares to the plex-wide utilization: is this balanced or unbalanced? Ensure that you also enable Dynamic Channel-path Management (DCM).

If you anticipate a high volume of Hierarchical Storage Management (HSM) recalls, consider distributing these recalls across the sysplex. This is especially true if your workload is dynamically balanced across the sysplex. Create a Common Recall Queue (CRQ) coupling facility list structure, which supports balancing workloads across the HSMplex. This is actually a pull, not a push mechanism and therefore does not need to be balanced once established. This allows any available HSM to process the recalls issued from any member of the sysplex.

In a sysplex, HSM serializes access to the Control Data Sets (CDS). This can be done with global resource serialization (GRS) enqueues or reserves or with the coupling facility (via VSAM RLS). The latter provides more granular lock levels and better performance. IBM
Tivoli OMEGAMON XE for Storage on z/OS has mechanisms to monitor and control HSM recall activity.
Monitoring Performance

Monitoring coupling facilities

In the past it was important to ensure that you had the fastest coupling facility (CF), as this was usually still slower than the central processing complexes (CPCs) that z/OS was running on. This is no longer the case; now channel speeds are more of an impediment than the CPU speed. Issues with speed can be detected by monitoring structure synchronous service times and number of requests converted. In addition to negatively impacting the response time, the CP that made the request goes into a spin loop until the request is either satisfied or eventually converted. The CP is unable to dispatch any other ready work on the machine while in a spin loop. This wasted capacity is charged to the requesting address space.

Each subsystem uses the CF differently and has its own issues that need to be observed. But from a system level, here are a few things to monitor with Tivoli OMEGAMON XE on z/OS:

- CF storage less than 45%
- CF CPU less than 30%
- Number of structure connections (GRS all systems, DB2 all members of DSGROUP)
- Synchronous service times on high request volume structures
- Number of requests converted from synchronous to asynchronous
- Subchannel utilization less than 30%
- Path Busy less than 10%

Monitoring CF structures for growth

If you allocate structures with auto alter, make sure you monitor the structures for growth. If there is a problem you want to be aware of it. If it was just undersized, you should increase the INITSIZE so it does not expand when the structure is deleted and reallocated. Dynamic increases in size cause a performance hit. When a structure dynamically expands, the console message IXC588I is issued. Monitor for this message so permanent changes can be made.

Monitoring XCF performance metrics

Cross-system coupling facility (XCF) is used by many applications. CICS multiregion operation (MRO) uses it to route transactions between terminal-owning region (TORs) and application-owning regions (AORs) on different z/OS systems. WLM uses it to implement workload balancing and passes performance management data between systems. The console started task relies on it for multi-system message passing. It can use the CF or channel-to-channel controls (CTCs) or both and will dynamically pick that with the best performance.
These days the CF almost always outperforms the CTCs. But this dynamic reconfiguration makes failures somewhat transparent. Processes will continue to function but performance will be degraded, which may not be noticed until peak loads, the worst time to become aware of failures. For this reason, it is important to monitor XCF performance metrics, such as retries due to errors on the path and message delays from the unavailable receiver's buffer or because of path busy.
Managing Workloads

Assigning appropriate goals and importance

Ensure that all work sysplex-wide has the appropriate classification. This ensures that the work is properly managed if systems enter or leave the sysplex.

Many shops define too many workloads with goal importance set to highest. This may work if you have excess capacity and all workloads are not cloned to every LPAR. But when an LPAR is unavailable and workloads are manually or automatically redirected to another LPAR, problems usually arise. This occurs when goals are set in isolation by LPAR, not plex-wide as they should be. WLM cannot decide what is most important if all the heavy work is classified as highest. When classifying workloads, you need to plan for contingencies so that when workloads run on different LPARs, they have to correct relative priorities.

Critical workloads can also be affected if

- Unattainable goals are set
- Service classes containing critical work are not given enough importance
- Workloads are assigned to wrong service classes

Monitoring the Performance Index

WLM has plex-wide policies that determine the relative priority of work. The image-specific and plex-wide performance of each service class is tracked and calculated. This calculation generates something known as a Performance Index (PI). When this PI is greater than one, the goal specified is not being met. It is very possible for the plex-wide goal to be met while a specific LPAR is performing miserably. Tivoli OMEGAMON XE on z/OS reports show plex-wide PI as well as the LPAR with the worst PI. If these two numbers are not close, then a workload imbalance exists. This is because other members of the plex have PIs significantly below the worst LPAR and often below one, meaning they are making their goals.
The chapters in this sections contain scenarios that illustrate how you can use the workspaces, situations, and data provided by Tivoli OMEGAMON XE on z/OS to monitor the systems in your sysplexes and to alert you to potential or actual problems.
Introduction

This chapter illustrates how you can use CandleNet Portal and Tivoli OMEGAMON XE on z/OS to monitor and manage the performance of shared DASD in your sysplex. It includes instructions for creating situations for filtering the collection of data for DASD devices.

The section on identifying causes of I/O delays should be of interest to all users. The section on DASD device collection filtering should be of interest to those with administrative authority who are responsible for configuring data collection.

Chapter contents

Identifying the Cause of I/O Delays.................................................. 60
  Background .............................................................................. 60
  Displaying the system Event view ............................................. 60
  Analyzing I/O distribution ......................................................... 60
  Isolating the problem .............................................................. 61
  Taking action to resolve a shared DASD problem ....................... 61
DASD Device Collection Filtering .................................................. 63
  Overview .................................................................................. 63
  When you should use DASD device collection filtering ............... 63
  How DASD device collection filtering works ............................ 63
  Requirements and restrictions for situations for DASD device collection filtering .................. 64
  Creating a DASD collection filtering situation ......................... 64
  Distributing the situation ......................................................... 65
  Starting and stopping the situation ......................................... 66
  Examples situations for DASD device collection filtering .......... 66
  Displaying messages for the situations you create .................... 67
Identifying the Cause of I/O Delays

Background

Tivoli OMEGAMON XE on z/OS provides three sysplex-level DASD-related workspaces:

- The Shared DASD Groups Data for Sysplex workspace displays information on device contention and usage for all the groups in a sysplex. This information can help determine how equitably a device is serving all systems in the sysplex.

- The Shared DASD Devices workspace displays statistics for the individual devices in a selected group. The Shared DASD Devices workspace displays information about the activity of the shared devices for a group, averaged over all systems in the sysplex. This information can help determine how equitably a device is serving all systems in the sysplex.

- The Shared DASD Systems workspace displays information about the systems that share a device. This information helps you measure the performance and exceptions from the perspective of each system.

This scenario illustrates how you can use these workspaces, in conjunction with a monitoring situation designed to alert you to device contention, to identify the devices and datasets responsible for significant I/O time or delays for important workloads in your sysplexes.

Displaying the system Event view

You are looking at the CandleNet Portal and see that the z/OS Systems Navigator icon is overlaid by a warning event indicator.

You move your cursor over the icon to see a flyover list of situations that are true for your mainframe systems. The Sysplex_DASD_Dev_ContIdx_Warn situation, which you activated to monitor DASD device contention in your sysplexes, is listed in the flyover.

Glancing down the expanded z/OS Systems tree, you notice warning indicators for the Service Classes Data for Sysplex and the Shared DASD Group Data for Sysplex items in the SYSPLEX1 tree, which leads you to suspect the problem is in the distribution of I/O activity among your DASD volumes.

Analyzing I/O distribution

The Sysplex_DASD_Dev_ContIdx_Warn situation has alerted you to the fact that DASD device contention index has reached a level that warrants attention. Now you want to find information about the device or devices causing the contention.

In the Navigator, you select Shared DASD Groups Data for Sysplex and the default workspace is displayed. To determine if I/O activity is unevenly distributed among the devices, you examine:
The average true busy percentage of the group. If, for example, the value ranges between 1.1 at the lower end and 60.2 at its highest, that means that on average, devices in the group spend 1.1% of their time doing work for all systems; at its busiest, one device is spending 60.2% of its time doing work for all systems.

The average device contention for the group. For example, the value of the average contention index might be 0.75, and the highest device contention index of the group 1.5. A high number (more than 1.0) means that I/O requests for a device are substantially delayed because of contention for the device or path generated by other systems. You would like to lower the contention index for a device in contention.

Examining this information allows you to determine which group or groups of devices is experiencing uneven I/O distribution, but you need information about the specific devices involved.

Isolating the problem

To get information about the devices in a group you have identified, you click the icon beside its name in the Shared DASD Groups table view to link to the Shared DASD Devices workspace for that group.

The Shared DASD Devices workspace displays statistics for each device in the group. With the information in this workspace, you can determine if a device is not serving all systems in the sysplex equitably. You determine this by examining:

- True percent busy. If this value is too high for one device, while other devices have a lower value, the workload should be balanced between the devices.
- Contention index. If this value is too high, this is an indication that I/Os for the device are substantially delayed due to contention for the device or path generated by other systems.
- System response time. A high value in this column indicates an inordinate amount of time is required for this device to process I/O activity.
- Cumulated I/O rate. This indicates the device is not processing I/Os at an acceptable rate.

To view additional information for a specific device to help you determine if it is causing I/O delays, you click the icon beside the volume serial number in the Shared DASD Devices table. The link takes you to the Shared DASD Systems workspace, which shows:

- the systems that share the device and indicates which systems have a high response time and high I/O rate
- performance measures and exceptions presented for each system and indicates how the device is performing for each system

Based on this information, you can identify which devices are causing excessive I/O delays.

Taking action to resolve a shared DASD problem

From the information you have gathered, you decide to implement one of the following solutions.
Identifying the Cause of I/O Delays

- Redistribute the work among devices to eliminate the contention for resources.
- Reschedule the work for a single device to a time when device contention is usually low.
DASD Device Collection Filtering

Overview

With Tivoli OMEGAMON XE on z/OS, the best way to reduce processing overhead is to control the amount of DASD information being sent to the sysplex proxy for sort merge processing. Six thousand unit addresses on each of nine LPARs in a sysplex, for example, requires the proxy to sort merge this data before it can be evaluated. However, if you create a DASD filter situation to reduce the number of rows sent to the proxy, overhead will be reduced dramatically.

You can use the attributes in the DASD_Device_Collection_Filtering attribute group to create situations that limit the amount of DASD device data sent to the Candle Management Workstation.

By limiting the amount of data, you can

- reduce the amount of CPU the program uses to collect DASD device data
- limit the data that the program collects to the DASD devices that are performing poorly or that have contention

Once you have enabled the situation, verify that the number of devices exceeding the situation thresholds is no more than 100 or some reasonable number.

When you should use DASD device collection filtering

You should create situations for DASD device collection filtering when you are monitoring

- more than one image
- more than 500 DASD devices

How DASD device collection filtering works

In most cases, you create a situation to alert you to problems in the monitored system. When you create a situation for DASD device collection filtering, you are

- filtering the devices that are being monitored
- identifying the DASD devices that need further monitoring

For example, when you create a situation for DASD device collection filtering, the program builds a list of DASD devices based on the situation. This list is rebuilt on the DASD filter situation interval. The lower the interval, the more overhead as it collects Resource Measurement Facility (RMF) data on all the devices to determine if they qualify. The higher the interval, the more likely that spikes in activity on previously inactive volumes will go unnoticed, as they were not in the monitored volume list.

If a DASD device meets the requirements in the situation, all data for the device is forwarded to the proxy for sort merge. If the device does not meet the requirements in the situation, the device data is not forwarded to the proxy.
Requirements and restrictions for situations for DASD device collection filtering

Situations for DASD collection filtering have the following requirements and restrictions.

- You must create the situation using the attributes in the DASD_Device_Collection_Filtering group.
- For each sysplex, you can have only one situation for DASD collection filtering. (For this reason, the one situation must contain all the conditions for monitoring the devices.)
- You can create one situation for DASD collection filtering and distribute the same situation to more than one sysplex.
- The collection interval should be a minimum of 5 minutes.
  This causes the RMF data to be collected less frequently to rebuild the filter list. If you have a small DASD farm (less than 2000 unit addresses), you might not want to use the filter function, or you might want to use a collection interval of 10 minutes.

Creating a DASD collection filtering situation

You use the Situation editor to perform the following tasks.

- create the situations for DASD device collection filtering
- distribute the situations to the systems you want to monitor
- start and stop the situations

Accessing the Situations editor

To access the Situation editor:

1. In the Navigator, click z/OS Systems.
   CandleNet Portal displays a list of the sysplexes being monitored.
2. Select the name of the sysplex and right click.
   CandleNet Portal displays a pop-up menu.
3. On the pop-up menu, click Situations... .
   CandleNet Portal displays the Situations editor.

Creating the situation

To create the situation:

1. Click the Create new situation button.
   The Enter New Situation Name dialog appears.
2. On the Enter New Situation Name dialog, specify a name for the situation and click OK .
   The Select attribute dialog appears.
3. In the Group box, click DASD_Device_Collection_Filtering.
   The attributes available for DASD device filtering are displayed in the Item group box.
4. In the Item group box, select the attribute or attributes you want to include in the situation.
   Use Ctrl+click to select several attributes; use Shift+click to select a contiguous set of attributes.

5. Click OK. The Condition tab of the Situation editor is displayed.

**Specifying the conditions for the situation**

The following table shows the options available on the Condition tab. The left column lists the controls on the panel and the right column provides a description for the control. For examples of the types of filter criteria you might want to specify, see “Examples situations for DASD device collection filtering” on page 66.

<table>
<thead>
<tr>
<th>Control on the Condition Tab</th>
<th>Purpose</th>
</tr>
</thead>
<tbody>
<tr>
<td>Add attributes button</td>
<td>Displays the Select Attribute dialog so that you can add additional attributes to the situation.</td>
</tr>
<tr>
<td>Condition group box</td>
<td>Location where you specify the operation for the attribute (such as equal, not equal, or greater than).</td>
</tr>
<tr>
<td></td>
<td>- To specify that you want all the conditions to be met (AND), specify the conditions in a row.</td>
</tr>
<tr>
<td></td>
<td>- To specify that you want any of the conditions to be met (OR), specify the values in a column.</td>
</tr>
<tr>
<td>Description</td>
<td>Optional field that you can use to provide a description for the situation.</td>
</tr>
<tr>
<td>Run at startup check box</td>
<td>Specifies that the situation will automatically start when the Candle Management Server is started.</td>
</tr>
<tr>
<td>Sampling Interval counter</td>
<td>Specifies the length of time between samples.</td>
</tr>
<tr>
<td>State drop-down list</td>
<td>Determines the severity level if the situation is true. When creating situations for DASD device collection filtering, you select Informational in the drop-down list.</td>
</tr>
</tbody>
</table>

**Distributing the situation**

After you have created the situation for DASD device collection filtering, you must distribute the situation to the systems.

To distribute the situation:

1. On the Situations Dialog, click the Distribution tab.
2. In the Assigned group box, click the name of the sysplex.
3. Click the right arrow button.
   CandleNet Portal moves the name of the sysplex to the Available Managed Systems group box.
4. In the Available Managed Systems List box, select *MVS_SYSPLEX.
5. Click the left arrow button.
   CandleNet Portal moves *MVS_SYSPLEX to the Assigned group box.
6. Click OK to distribute the situation.

Starting and stopping the situation

You can start and stop the situation using the Situations dialog:
1. In the left hand frame of the Situation Editor, right-click the name of the situation.
2. Select the appropriate option from the pop-up menu:
   - To start the situation, click Start.
   - To stop the situation, click Stop.
   If you would like the situation to run continuously across Candle Management Server restarts, check Run at startup on the Condition tab.

Examples situations for DASD device collection filtering

Filtering for devices that are busy
The following situation limits data collection to devices that have
- some activity
- long average response times

Average response time GT 70.0 AND
I/O Rate GT 2.0

Filtering for devices with a specific volume serial name
The following situation limits data collection to devices that have a volume serial name that begins with SYS.

Volume Serial Number EQ SYS

Filtering for performance problems on critical volumes
The following situation limits the data collection to critical database devices that have
- a volume serial name that begins with DB2 or IMS
- some activity
- slow response times

(Average response time GT 70.0 AND I/O Rate GT 2.0 AND Volume Serial Number EQ DB2*) OR
(Average response time GT 70.0 AND I/O Rate GT 2.0 AND Volume Serial Number EQ *IMS*)
Displaying messages for the situations you create

Tivoli OMEGAMON XE on z/OS provides messages for DASD device collection filtering. You can display these messages in the RKLVLOG on the Candle Management Server on the host. The messages for sysplex situations have the prefix KOS.
DASD Device Collection Filtering
Using the Inspect Function

Overview

This chapter discusses the Inspect function. It explains what Inspect does, how to invoke it, and how to specify the number of samples and the sampling interval that it uses to collect data.

This chapter also describes the Inspect Address Space CPU Use workspace and how you can use it to identify inefficient code, or to determine where, within the code, a program might be looping.

Chapter contents

About the Inspect Function ................................................................. 70
  What is the Inspect function? ......................................................... 70
  Invoking the Inspect function .................................................... 70
  Modifying the template Inspect link ........................................... 70
The Inspect CPU Usage workspace ................................................. 73
  About the workspace ................................................................. 73
  The Sampling Statistics view ...................................................... 73
  The Agent Messages view .......................................................... 73
  The Inspect Data view ............................................................... 73
Using the Inspect Data to Understand a Problem ............................. 75
  Evaluating the validity of the data .............................................. 75
  Understanding the data ............................................................. 75
About the Inspect Function

What is the Inspect function?
The Inspect function is a diagnostic tool whose primary purpose is to help you understand where, within an address space, code is spending its time. That information can then be used to either optimize the code, or to identify where, within the code, a program might be looping.

You might use the Inspect function, for example, when a workspace or event shows an address space with high CPU usage.

You can use the default sample number and sample intervals or specify your own.

Invoking the Inspect function
The Inspect function is invoked when you select a link to the Inspect Address Space CPU Use workspace. When you select the link for a particular address space, the workspace is populated with Inspect data, gathered using default or user-specified parameters, as specified in the link definition.

Tivoli OMEGAMON XE on z/OS provides two default Inspect links, invoked from the Address Space CPU Utilization table of the Address Space CPU Utilization workspace:

- Inspect Address Space CPU Use
  Uses the default parameters of 1000 samples at 5 millisecond intervals.
- Inspect with 5000 samples at 2ms interval
  Uses the specified parameters, but is intended as a template you can use to set your own sample count and sampling interval.

Modifying the template Inspect link
Use the template Inspect link (Inspect with 5000 samples at 2ms interval) to collect Inspect data using the sample count and sampling interval you specify.

The Inspect Address Space CPU Use workspace is not populated with data until the Inspect agent completes on the target system. The time it takes to complete is a function of the number of samples and the sampling interval specified in the link definition. For example, taking 1000 samples at a 5-millisecond interval (the default settings) will take 5 seconds for the data collection process to complete. When you are selecting the values for number of samples and the sampling intervals, bear in mind that if the total time taken to execute the agent exceeds the client timeout value, the CandleNet Portal will return no data, even if the agent subsequently completes normally.

To modify the template Inspect link:

1. Navigate to the Address Space CPU Utilization workspace by linking from the Address Space Counts table of the Address Space Overview workspace for the target system.
2. Right-click the ✉ link icon beside a row in the Address Space CPU Utilization table and select Link Wizard from the pop-up menu. The Link Wizard editor appears.

3. In the Selection area, select Inspect with 5000 samples at 2ms interval, then click Next >.

<table>
<thead>
<tr>
<th>Selection</th>
</tr>
</thead>
<tbody>
<tr>
<td>Define New Link</td>
</tr>
<tr>
<td>Owned Enclaves</td>
</tr>
<tr>
<td>Service Class Period Information</td>
</tr>
<tr>
<td>Address Space CPU Usage Details</td>
</tr>
<tr>
<td>Address Space CPU Usage Enclaves</td>
</tr>
<tr>
<td>Inspect Address Space CPU Use</td>
</tr>
<tr>
<td>Inspect with 5000 samples at 2ms interval</td>
</tr>
</tbody>
</table>

4. In the Link Identity field, type a new name for the link and description, if desired, then click Next >.

<table>
<thead>
<tr>
<th>Link Identity</th>
</tr>
</thead>
<tbody>
<tr>
<td>Name</td>
</tr>
<tr>
<td>Description:</td>
</tr>
</tbody>
</table>

5. In the Properties tree of the Expression editor, select the ⌥ INTERVAL symbol under Query - Inspect Address Space CPU Use. The Expression editor appears instead of the help in the right frame (see Figure 5 on page 72).

6. In the Expression field, type the interval, in milliseconds, at which you want Inspect to collect samples.

7. In the Properties tree, select the ⌥ SAMPLES symbol under Query - Inspect Address Space CPU Use.

8. In the Expression field, type the number of samples you want Inspect to use in deriving the data.

9. Click Finish to save your changes and close the editor.

You should see the name you assigned in the pop-up menu when you right-click a ✉ link icon in the Address Space CPU Utilization table.

The new name and parameters will persist until you close the workspace.
Figure 5. Specifying the INTERVAL Parameter
The Inspect CPU Usage workspace

About the workspace

The Inspect Address Space CPU Usage workspace contains three views (in addition to the physical Navigator view):

- Sampling Statistics view
- Agent Messages view
- Inspect Data view

The Sampling Statistics view

The four columns of this table view show the number of samples requested, the sampling interval in milliseconds, the number of samples collected, and the number of samples used.

Normally the number of samples collected will be same as the number requested. However, if the job being inspected ends before the Inspect agent has finished collecting data, the number of samples collected will be the number collected up to the point where Inspect detected that the target job had ended.

The number of samples used is the number of times that the Inspect agent saw CPU activity in the target address space and gives you some indication as to the statistical accuracy of the resultant inspect data. The number of samples used value does NOT represent the number of rows of Inspect data.

The Agent Messages view

This view displays any error or informational messages that might be returned by the Inspect agent. These messages help to explain the resultant data (or lack thereof) that you see in the other views. For example, if no CPU activity was seen by Inspect in the address space being inspected, the agent would return a message indicating that; the number of samples used column in the Sampling Statistics view would be zero; and no data would be displayed in the Inspect Data view.

The Inspect Data view

The Inspect Data view contains the output from the inspection process. The Inspect agent returns data only for elements for which it saw CPU activity. The data is ordered in descending CPU activity order with the following hierarchy:
For each task control block (TCB) for which Inspect sees CPU activity, it attempts to determine the executing load modules consuming the CPU time. For each load module, Inspect then attempts to map the CSECT structure of the load module and assign the load module’s CPU time to the appropriate CSECTs. This allows you to determine which load modules and CSECTs within the load module are consuming CPU time.

Inspect maps the CSECT structure for each load module (with CPU activity) by scanning the target address space for load libraries and attempting to read in the load module from each library in turn. It also scans SYS1.LINKLIB, SYS1.NUCLEUS and SYS1.LPALIB for load modules.

If Inspect cannot locate the load module, the CSECT name is unknown and the entire load module is considered to be one large CSECT.

Inspect then further breaks down the CPU time attributed to each CSECT into blocks of code, the size of which is calculated by inspect once the data collection process has completed. In order to prevent Inspect from flooding the client workspace with rows of data, the Inspect agent attempts to calculate a granularity (block) size that will limit the number of rows of data returned to about 100, but where possible the Inspect agent will use a granularity size of 16 bytes (0X00000010). The granularity size used is displayed in the Agent Messages view of the Inspect CPU Use workspace. The granular data is shown in the rightmost two columns of the Inspect Data view. Again, these are displayed in descending CPU use order with the most active blocks of code within each CSECT being at the top of the display rows for each CSECT.

For descriptions of the information in the columns of this table, see the Address Space Inspect Data Attributes in the online help.
Using the Inspect Data to Understand a Problem

Evaluating the validity of the data

Before examining the data, review the Samples Used field in the Sampling Statistics view. This field indicates the statistical validity of the sampled data. A low number of samples indicates that the inspect data may not give a truly representative view of where the code in the target address space is spending its time.

Also review any messages in the Agent Messages view that may indicate that the data might be incomplete, or explain why there is no data.

Understanding the data

In the Inspect Data view, the data is organized in descending CPU by task control block (TCB), so the most active items are at the top of the display. In the example shown below, Inspect saw one TCB active. The program that was attached to create this TCB was called KLV. Since Inspect only saw one TCB active, 100% of the CPU time that Inspect saw being used is attributed to this TCB. The TCB Ended column is blank, indicating that this TCB did not end while Inspect was running.

Inspect saw two load modules in use during its sampling activities, KM5AGENT and IEAVXPCA. Since KM5AGENT is at the top, this was the most active load module. However, you can also see that the second load module spent some of its time executing within the PCAUTH address space, as shown by the Load Module ASID Hex and Load Module Jobname columns.

<table>
<thead>
<tr>
<th>TCB Address</th>
<th>Initial Program</th>
<th>TCB CPU % of job</th>
<th>TCB Ended</th>
<th>Load Module Name</th>
<th>Load Module ASID Hex</th>
<th>Load Module ASID Jobname</th>
</tr>
</thead>
<tbody>
<tr>
<td>0X007F83D0</td>
<td>KLV</td>
<td>100.0</td>
<td></td>
<td>KM5AGENT</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>IEAVXPCA</td>
<td>0X0002</td>
<td>PCAUTH</td>
</tr>
</tbody>
</table>
The Load Module Address column shows where in storage in the target address space the load module is loaded. Following that are two columns which show how the CPU time used by this load module breaks down as a percentage of all the CPU time used by the address space (Load Module CPU % Job) and of this TCB (Load Module CPU % TCB). Since there is only once TCB in this instance, these numbers are the same for each load module. (If there were more TCBs active you would see the CPU time used by each load module as a percentage of both the overall job and its owning TCB.)

<table>
<thead>
<tr>
<th>Load Module Address</th>
<th>Load Module CPU % of TCB</th>
<th>Load Module CPU % of Job</th>
</tr>
</thead>
<tbody>
<tr>
<td>0x12E8F670</td>
<td>73.3</td>
<td>73.3</td>
</tr>
<tr>
<td>0x123020A0</td>
<td>26.6</td>
<td>26.6</td>
</tr>
</tbody>
</table>

To the right, the CSECT Name column shows that in this instance all the CPU time seen by Inspect was being consumed by one CSECT, in this case KM3PBM1.

The CSECT Offset in Load Module shows amount of offset within the load module of this CSECT, and the CSECT Address column shows the address of the CSECT within the target address space storage. You could use this information to locate the CSECT within a dump of the address space, for example to confirm an eye catcher that might contain a compile date or time or some other version information.

In the next columns, the CPU time attributed to the CSECT is displayed as a percentage of the total CPU time for the job, the load module, and the TCB. This can help you understand how much the CSECT is being used overall, by each load module, and by each task within the address space. This can help you to identify the CSECTs that are most heavily used.

<table>
<thead>
<tr>
<th>CSECT Name</th>
<th>CSECT Offset in load module</th>
<th>CSECT Address</th>
<th>CSECT CPU % of Load Module</th>
<th>CSECT CPU % of TCB</th>
<th>CSECT CPU % of Job</th>
</tr>
</thead>
<tbody>
<tr>
<td>KM3PBM1</td>
<td>0X000A9580</td>
<td>0X12F38BF0</td>
<td>100.0</td>
<td>73.3</td>
<td>73.3</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>IEAVXRFIE</td>
<td>0X0005AB50</td>
<td>0X12307B50</td>
<td>100.0</td>
<td>26.6</td>
<td>26.6</td>
</tr>
</tbody>
</table>

In the final columns, the granular level data is shown. This breaks each CSECT down into blocks of code, based on the granularity size calculated by Inspect. The granularity size used is shown in the Agent Messages view. This allows you to further refine where within each CSECT the code is spending its time and identify areas that may be looping or that might benefit from optimization.
To understand how the granular level data relates to the program source (section of code) you can then refer to a link editor and compile listings.

<table>
<thead>
<tr>
<th>Offset in CSECT</th>
<th>CPU% of CSECT</th>
</tr>
</thead>
<tbody>
<tr>
<td>0X00000AE0</td>
<td>36.3</td>
</tr>
<tr>
<td>0X00000BD0</td>
<td>33.0</td>
</tr>
<tr>
<td>0X00000CD0</td>
<td>30.6</td>
</tr>
<tr>
<td>0X00000AA0</td>
<td>100.0</td>
</tr>
</tbody>
</table>
Overview

This chapter documents how you can use Tivoli OMEGAMON XE on z/OS to monitor storage usage and to alert you when critical tasks fail.

Chapter contents

Monitoring Paging And Virtual Storage ........................................ 80
Monitoring Critical Started Tasks ............................................. 82
Monitoring Paging And Virtual Storage

Overview

System virtual storage maximum is bounded by the amount of real storage plus paging space limits, so paging space performance and availability become a vital factor in the effective execution of applications. With the introduction of 64-bit or large storage objects, the memory requirements of paging became higher and storage can become exhausted more readily. When usage approaches 30%, paging efficiency begins to decline, and blocked paging disappears at about 35% occupancy. Severe problems can occur if page space used is greater than 85%. Because the percentage of paging space increases as well as paging rate, it is a good indicator that a problem may be ensuing.

The following scenario suggests how you can use the resources provided by Tivoli OMEGAMON XE on z/OS to detect and analyze paging and storage problems.

Activating the OS390_Local_PageDS_PctFull_Crit situation

To alert you to impending problems and to simplify analysis when problems occur, you can activate the predefined situation OS390_Local_PageDS_PctFull_Crit. This situation monitors to determine whether the percentage of slots in use on a local page dataset is greater than or equal to 35% and issues a Critical alert if this condition is found to be true. (See "Activating predefined situations" on page 41 for instructions for activating the situation.)

You can also modify this situation to include page rate as an additional indicator that the paging system performance is becoming impacted.

Using the Page Dataset Activity workspace to gather information

When you see an event indicator alerting you that the OS390_Local_PageDS_PctFull_Crit condition is true, you might start investigating the problem using the Page Dataset Activity workspace for the affected system.

This workspace provides information about availability and response time for a specific page dataset. Page datasets are auxiliary storage datasets that back up all frames of virtual storage. They must be large enough to contain all common and private virtual storage. Page datasets are used when an address space references data that is not in either real or expanded storage. The process of bringing in data is called a page-in and is coordinated by the auxiliary storage manager (ASM). If swap datasets are not defined, page datasets also contain the swapped out part of an address space.

Because the process of paging is very slow when compared to referencing data from real or expanded storage, it is important that page dataset devices be isolated from contention with other kinds of work. This is especially true if there is contention for real and expanded storage, and the page fault rate is high. The Percent Full and Response Time bar charts in this workspace provide visual representations of the availability of space in the various types of page datasets and the response times for those datasets.
Even if page rates are low, datasets over 35% percent full could indicate a performance issue is developing and some action may be required.

Your next step is to decide what action to take to resolve any problems. Rather than simply adding another dataset, you can use the Address Space Storage workspace to evaluate if there are any jobs which can be trimmed or moved to a different system or time slot to balance out system resources.

Examining storage usage

You can link to the Address Space Storage workspace from the Address Space Counts table of the Address Space Overview workspace.

In the workspace, the Fixed Storage bar graph shows who the heavy users of fixed storage are. The Virtual Memory table at the bottom of the workspace provides data on fixed and virtual low, extended, and large storage use. This information can be used as an application tuning tool as well as system performance tuning tool.

Check for applications using large percentages of the storage memory limits. This information can be used in deciding how to manage those applications later.

Evaluating your options

Consider the following options to address any paging problems you have detected:

- Increase paging to align with potential virtual storage demand
  
  This would mean increasing the size of paging space by adding more local page datasets or increasing the size of existing ones.

- Redistribute larger applications to other LPARs
  
  You could redistribute large applications or applications using a lot of storage to other systems where the workload is lighter or paging demand lower. Alternately or in addition, you could rebalance large jobs at different times so that they do not run concurrently and compete for virtual storage or paging space.

- Decrease the applications’ memlimit to reduce storage demand on system
  
  The viability of this option depends on your application service requirements, as such a change could directly impact performance in the application. This could also depend on the behavioral effects on the application, as some applications may not be able to effectively function with lowered memory limits.
Monitoring Critical Started Tasks

Background
In most environments, there is a set of started tasks, such as CICS® tasks or WebSphere® tasks, that should always be running. This scenario shows you how to define a situation that will alert you if one or more of these task fails. The situation is based on the Job Name attribute of the Address Space CPU Utilization attribute group and uses the Check for Missing Items function.

Creating the MissingTaskAlert situation

**Note:** This scenario assumes that you are already familiar with the basic steps for creating a situation. If you are not sure of the steps, see “Monitoring Service Class Goals” on page 87.

For this scenario, you are creating a situation to monitor two tasks, CICS1 and WEB5, running on SYSA in SYSPLEX1.

1. Navigate to the Address Space Overview workspace for SYSA.

2. With the workspace displayed, access the Situation editor by right-clicking the Address Space Overview Navigator item and selecting Situations from the pop-up menu.

3. In the Situation editor, create a new situation.

4. In the Create Situation window, type a name and description for the situation, for example, MissingTaskAlert.
5. In the Select Attribute dialog, select the Address Space CPU Utilization Attribute Group and the Job Name attribute.
6. In the expression editor, select the Check for Missing Items function:

- **Condition**
  - **Description**:
    - Critical task is not running
  - **Condition**
    - **Job Name**
      - The name of the job, started task, TSO user, APPC address space, and so on, consuming CPU cycles. Valid value is a string, with a maximum of eight characters.

- **Sampling interval**
  - 0:0:15:0

- **Sound**
  - **Enable** critical.wav

- **State**
  - **Critical**
  - Run at startup

7. In the Missing Item popup, enter your list of critical tasks, then click OK.

8. If you want to make the situation trigger independently for each job name:
A. Click the Advanced . . . button. The Advanced Situation Options dialog appears.

B. Select the Display Item tab, then select Job Name as the display item. This is especially helpful if you want to attach an action to the situation, such as a start command.

C. Click OK to close the Advanced Situation Options dialog.

9. Complete the situation, for example by selecting a different sampling interval, adding any advice or instructions you want to provide, adding a Start command to restart the task, or distributing it to other systems you want it to run on.

Remember to stop the situation if you migrate the task it is monitoring.
Overview

This scenario illustrates how you can use Tivoli OMEGAMON XE for z/OS resources to monitor service class goals. This scenario also provides step-by-step instructions for creating a situation, defining a reflex action using a TSO command, and setting a threshold in a table view.

Chapter contents

About the Scenario ............................................................... 88
Setting the scene ............................................................... 88
Creating the zOS_Critical_SvcClass_Missed_Goal Situation .......... 89
  Overview ................................................................. 89
  Creating the situation ................................................... 89
  Defining the Take Action command .................................. 90
Setting Thresholds in the WLM Service Class Resources Workspace .... 92
  Overview ................................................................. 92
  Setting the thresholds .................................................. 92
Analyzing the Problem .......................................................... 94
  Monitoring the situation ................................................. 94
  Using the WLM Service Class Resources workspace .................... 94
  Using the Address Spaces Workspace for Service Class workspace .... 94
  Using the Service Class Workflow Analysis workspace ................. 94
  Using the LPAR Clusters workspace .................................. 95
About the Scenario

Setting the scene

Your DB2® and IMS™ transaction servers service applications that are important to your business operation. You run these address spaces on your SYSA z/OS system under the STCONLN Service Class.

You want to use Tivoli OMEGAMON XE on z/OS to monitor this service class and notify the appropriate parties when the service class is missing its goals. You also want to use Tivoli OMEGAMON XE on z/OS to determine why the service class is missing its goals.

To set up monitoring, alerting and analysis, you perform the following tasks using the Candle Net Portal:

- Create a situation that will raise a critical alert when a service class is not meeting its goals.
- Define an action for the situation that will cause a system command to be executed at the z/OS system associated with the raised situation.
- Modify the Tivoli OMEGAMON XE on z/OS workspace to provide a report column threshold that matches the situation parameters. This will help pinpoint the problem service classes when doing problem analysis.
Creating the **zOS_Critical_SvcClass_Missed_Goal** Situation

**Overview**

Your first step is to create a situation that will raise an event and notify the appropriate personnel when a service class misses its goal.

Using the Situation editor, you create a new situation named **zOS_Critical_SvcClass_Missed_Goal**. This situation raises a critical (red) event indicator on the physical Navigator and sends a TSO message to a designated system administrator when the Performance Index a service class period is above 1.5. You set the situation to start whenever the Candle Management Server starts.

Because you access the Situation editor from the WLM Service Class Resources Navigator item for SYSA, this situation will be associated with that item and a critical event indicator will appear on the item when the situation is true.

**Creating the situation**

To create the **zOS_Critical_SvcClass_Missed_Goal** situation:

1. Navigate to system SYSA in the Navigator and expand the plus \( \oplus \), if necessary.
2. Right-click the WLM Service Class Resources item and select Situations from the pop-up menu.
   
The Situation editor opens. The WLM Service Class Resources node and any associated situations are displayed in the left-hand frame.
3. Select the \( \square \) Create New Situation icon.
   
The Create Situation dialog appears.
4. Fill out the Create Situation dialog, then click OK:

   ![Create Situation Dialog](image)

   - **Name:** `zOS_SvcClass_Missed_Goal`
   - **Description:** `A critical service class period is missing its goal`
   - **Monitored Application:** `MVS_SYSTEM_M5`
Creating the zOS_Critical_SvcClass_Missed_Goal Situation

The Select attribute dialog appears, with the WLM_Service_Class_Resources group selected.

5. Scroll down the item list and select the Performance Index attribute, then click OK. The Condition tab for your new situation is displayed with the Performance Index attribute added to the expression editor.

6. Create the situation expression:

<table>
<thead>
<tr>
<th>Performance Index</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.5</td>
</tr>
</tbody>
</table>

A. Click in the first row of the Performance Index column.
B. Click the \( \geq \) relational operator button and select Greater Than (GT) from the pop-up menu.
C. Type enter a value of 1.5.

7. Accept the default sampling interval of every 15 minutes, or set the sampling interval that suits your monitoring requirements.

8. By default, Run at startup is selected. This means that after the situation has been distributed, it will start whenever the Candle Management Server is started. If you want to start and stop the situation manually, for example if you want to test the effects of the selected sampling interval, deselect Run at startup.

9. Click Apply to save the situation properties you have defined so far.

10. To generate a separate action message for each service class name, make Service Class a display item, using the Advanced... button:

A. In the Condition tab, click the Advanced... button. The Advanced Situation Options dialog appears.
B. Select the Display Item tab, then use the drop-down menu for the Item field and select Service_Class.
C. Click OK to close the Advanced Situation Options dialog.

Defining the Take Action command

You want to use a TSO command to send a message to the system administrator whenever a service class misses its goal. You want to include in the message the name of the service class and the value of the Performance Index attribute at the time the situation became true.

To define the Take Action command:

1. With the zOS_Critical_SvcClass_Missed_Goal Properties dialog open, select the Action tab.
2. In the System Command text field, type the following command, using attribute substitution for service_class_name and performance_index value.
**SEND 'service class service_class_name is missing goal. Performance Index is performance_index', USER=(userid)**

3. If you want separate notification for every monitored item for which the situation is true, click Take action on each item.

4. Set the command to run at the Candle Management Server.

5. Click Apply to save the command.
Setting Thresholds in the WLM Service Class Resources Workspace

Overview

Now you want to set thresholds in the WLM Service Class Resources workspace that will mirror the condition you defined in the situation. This will allow you to analyze problems more easily. You decide that you also want to create a threshold that will produce a warning indicator when a service class is nearing the critical threshold.

You use the Properties editor for the WLM Service Class Resources table to add these thresholds to the Performance Index column.

Setting the thresholds

To set the thresholds:

1. Select the WLM Service Class Resources item for SYSA in the physical Navigator. The default workspace is displayed.

2. In the workspace, right-click in the WLM Service Class Resources table view and select Properties from the pop-up menu.

3. In the Properties editor, select the Thresholds tab.

4. To create the critical threshold:
   - Scroll in the Thresholds editor until you see the Performance Index attribute.
   - Click in the first row beneath the column heading. The critical (red) indicator is already selected.
   - Select a relational operator of Greater Than (GT) and type a value of 1.5.

5. To create a warning threshold:
   - In the second row click the alert indicator selector next to the row number and select the warning (yellow) indicator.
B. Click in the second row below the Performance Index attribute and select the Greater Than (GT) relational operator and type a value of 1.0.

C. Click OK to save the thresholds and close the editor.
Analyzing the Problem

Monitoring the situation

When the situation evaluates to true, you receive notification that a service class is not meeting its goal. In CandleNet Portal, you move your mouse pointer over the event indicator on the Enterprise icon in the Navigator to see the Event flyover. In the flyover, you right-click the zOS_Critical_SvcClass_Missed_Goal situation and select Acknowledge from the pop-up menu to create an acknowledgment to let the operators monitoring the situation in the data center know you are working on the situation.

In the flyover, you click the link icon next to the service class situation to open its event workspace. You compare the initial situation values and the current situation values to see if the high performance index value is persisting. Since it has taken you several minutes to respond to the situation notification, and the value is staying high, you decide to analyze the problem further to see if you can prevent this problem from arising.

Using the WLM Service Class Resources workspace

You navigate to the WLM Service Class Resources workspace for the affected system to examine the performance information. The thresholds you previously set in the Performance Index column help you pinpoint the problem service class periods, in this scenario the STCONLN service class. You note the goal importance for the service class in case an adjustment is required to address the problem. In addition, you examine the overall performance of service classes with less important goals to determine if they can be adjusted to allow more resources to be available to the more important service classes.

Using the Address Spaces Workspace for Service Class workspace

To get more information about the problem, you link to the Address Spaces Workspace for Service Class from the sysplex level Service Classes Data for Sysplex workspace. In this workspace you can examine data for all the address spaces in the STCONLN service class. For service classes like STCONLN with a goal type of Velocio, CPU will be the primary resource required for meeting this goal. You note the address spaces with the highest CPU utilization, as these may require further investigation. Sorting the table by the CPU Percent column helps you identify the address spaces with highest CPU usage. You also examine the address space list to verify that there are no unexpected address spaces.

Using the Service Class Workflow Analysis workspace

Stepping back to the Service Classes Data for Sysplex workspace, you link to the Workflow Analysis Workspace for Service Class to determine the greatest resource impactor for the STCONLN service class. In this case, you determine the major bottleneck for the service class or its associated address spaces is Waiting on CPU, so you want to examine the performance information for the LPAR and central processing complex where the workload is running.
Using the LPAR Clusters workspace

You use the LPAR Clusters workspace to examine the performance information for the LPAR and CPC where the workload is running. You examine the performance parameters listed below to determine a path for problem resolution:

- **CPU % Index**: A value of 1 or greater indicates that the actual LPAR physical processor utilization meets or exceeds the configured targets. A value less than 1 indicates that the LPAR is not able to obtain the resources it is targeted to obtain (based on its defined weight).

- **Effective Weight Index**: A value of 1 or greater indicates that the ability of the LPAR to obtain logical processor resource meets or exceeds the defined targets. A value less than 1 indicates that the LPAR is not able to obtain the resources it is targeted to demand (based on its defined weight).

- Current, Initial, Minimum and Maximum Weights for the LPAR: In a shared physical processor configuration, the LPAR WEIGHT determines the relative importance of the LPAR for the allocation of processor resources. In an IRD configuration, the weights will be adjusted within the maximum and minimum bounds.

- **CPU % Ready**: Indicates the percent of time that the LPAR had “ready” work and was not dispatched (for example, because no processors are available).

- **LPAR Capping Status**: Indicates if “capping” is defined for the LPAR. LPAR will prevent an LPAR from obtaining processor resource even when other LPARs are not using available resources.

In a sysplex configuration, the performance of a given service class should be examined in all the LPARs where the service class workload is running. This will help balance any performance adjustments that may be implemented to resolve the problem.
Analyzing the Problem
Overview

The scenarios in this chapter illustrate how the data collected and presented by Tivoli OMEGAMON XE for z/OS can be used to monitor and improve your cryptographic services.

Contents

Validating Your Cryptography Configuration ........................................... 98
Cryptography configuration problems ......................................................... 98
Checking and correcting the configuration .................................................... 98
Monitoring and Improving Cryptography Performance ................................. 100
Cryptography performance ........................................................................ 100
Checking service call performance ............................................................... 100
Checking top user performance .................................................................. 101
Improving performance .............................................................................. 102
Monitoring and Improving Cross-System ICSF Performance ......................... 103
Cross-system cryptography performance ...................................................... 103
Checking and improving cross-system cryptography performance ............... 103
Validating Your Cryptography Configuration

Cryptography configuration problems

Many cryptography problems are the result of configuration errors such as

- failure to assign coprocessors to the z/OS system
- offline or unavailable coprocessors
- disabled public keys
- invalid master keys

This scenario illustrates how you can use the features of Tivoli OMEGAMON XE on z/OS to check your cryptography configuration and correct any errors you discover.

Checking and correcting the configuration

To check the configuration of your coprocessors:

1. In theNavigator, expand the item for a system in a sysplex and scan the tree for the Cryptographic Coprocessor entry.

   ![Enterprise](image1)
   ![System1](image2)
   ![MVS Operating System](image3)
   ![Sysplex1:System1:Mvssys](image4)
   ![Address Space Overview](image5)
   ![Channel Path Activity](image6)
   ![Common Storage](image7)
   ![Cryptographic Coprocessors](image8)
   ![Dasd Mvs](image9)
   ![Dads Mvs Devices](image10)

2. Select (click) Cryptographic Coprocessors to display the default Cryptographic Services workspace.

3. Check the attributes in the ICSF Subsystem Status view to make sure that

   - the ICSF subsystem is configured correctly
   - master keys are loaded and set correctly
   - coprocessors are online and active
   - cryptography services are operational

4. If several ICSF subsystems are installed on images that share coprocessors, and a monitoring agent is installed on each subsystem, inspect the values for each subsystem. Also, be sure to check cross-system ICSF performance. (See “Monitoring and Improving Cross-System ICSF Performance” on page 103).
Recheck the Cryptographic Coprocessor workspaces after any changes or adjustments to the cryptography configuration.
Monitoring and Improving Cryptography Performance

Cryptography performance

The cryptographic coprocessor data collected by Tivoli OMEGAMON XE for z/OS helps you make load-balancing decisions to improve cryptography performance.

Cryptography performance monitoring on each Integrated Cryptographic Service Facility (ICSF) subsystem has two main components.

- Service call performance monitoring, which involves gathering data such as
  - arrival rate of service requests
  - time to complete each service call
  - queue lengths
- Top user performance monitoring, which involves determining which job names are the heaviest users of cryptography services.

Checking service call performance

Use the Service Call Performance workspace to evaluate how well service requests are being handled. You can link to this workspace from Service Call Performance table of the Cryptographic Services workspace for a particular system (see steps 1 and 2 of “Checking and correcting the configuration” on page 98), or from the Service Call Performance by System table of the Cross-System Cryptographic Coprocessors Overview workspace.

Starting from the Cross-System workspace allows you to gain an overview of performance and to quickly check performance details for several systems in succession.

1. Select (click) the z/OS Systems item in the Navigator.
   The Sysplex Enterprise Overview workspace is displayed.

2. Right-click the Navigator item and select Workspace > Cross-System Cryptographic Coprocessors Overview from the pop-up menu.
   The Cross-System Cryptographic Coprocessors Overview workspace is displayed.

3. In the Service Call Performance by System table view of the workspace, click the link icon.

4. In the Select Target dialog, select theCryptographic Coprocessors node for the system for which you want want data.
   The Service Call Performance workspace is displayed.

5. In the Service Call Performance workspace:
   - Check the Average Arrivals per Minute bar chart to see which services are being called most frequently.
   - Check the Average Service Time per Call bar chart to see which services are taking the longest time to complete.

   Service calls are taking the longest time to complete, but are not arriving frequently, probably do not pose a performance problem. Performance problems tend to occur...
when a particular service call both arrives frequently and takes a long time to complete.

- Check the Average Pending per Call bar chart for queue length.
  A high number of pending requests for a particular service call would indicate a performance problem.
- Use the Average Bytes per Service Call bar chart to see whether the service calls with the largest number of bytes also have the highest service times.

Relatively high services are to be expected for calls that have the largest number of bytes.

**Note:** Byte counts are available for some but not all service calls. Therefore, the data shown in the Average Bytes per Service Call bar chart are correct but incomplete. For a list of the service calls for which byte counts are available, see the online help.

6. If any of the statistics displayed in the bar charts do not seem to make sense or if you need more information about a service call’s performance, examine detailed data in the Service Call Performance table. For explanations of all the attributes in this table, see the online help.

7. To check service call performance on another system, use the Backward button (on the CandleNet Portal toolbar in desktop mode) or the Back button (in browser mode) to return to the Cross-System Cryptographic Coprocessors Overview workspace, then repeat steps 3–6.

**Checking top user performance**

Use the Top User Performance workspace to learn which jobs are the heaviest users of cryptography services. You can link to this workspace from the Cryptographic Services workspace for a particular system (see steps 1 and 2 of “Checking and correcting the configuration” on page 98) or from the Top Users by System table in the Cross-System Cryptographic Coprocessors Overview workspace (see steps 1 and 2 of “Checking service call performance” on page 100).

Check the bar charts in the Top User workspace to see which jobs
- are requesting cryptography services most frequently
- have the highest average service time
- are waiting longest for their requests to move to the top of the queue
- are requesting services with the highest byte counts.

**Note:** Byte counts are not available for all service calls. Therefore, the data shown in the Top 10 Average Bytes per Call bar chart are correct but incomplete. For a list of the service calls for which byte counts are available, see the online help.

If you need more information about top user performance, you can find detailed data in the Performance by Top Users table. One particularly useful piece of information in this table is the LastSvcDesc column, which shows the service requested most recently by each of the top users. Click the Refresh button several times and see whether the same
service call keeps showing up. If so, that service call is being used heavily by the top users and may be implicated in any performance problems that arise.

For explanations of all the columns, see the online help.

**Improving performance**

The following are suggestions for improving performance.

- If service times are unacceptably high, you might consider decreasing the strength of cryptography by reducing the length of the key. Conversely, if you need to increase the strength of cryptography, you can observe and weigh the performance risk.

- If any of the top job names are relatively unimportant, you might want to reduce their priority on the system.

- For the most frequently called services and the services with the highest normal service times, you might want to create your own situations. In each situation, specify combinations of arrival rate and service time that you consider worrisome (warning) or truly unacceptable (critical). Whenever a service call reaches a specified threshold, an event alert will be posted on CandleNet Portal. You can then take immediate action to correct the problem.

For instructions on creating situations, see the CandleNet Portal online help.
Monitoring and Improving Cross-System ICSF Performance

Cross-system cryptography performance

If several ICSF subsystems are installed on z/OS images that share coprocessors in a sysplex or Processor Resource/System Manager (PR/SM) complex, the workloads on each subsystem can affect the performance of the other subsystems. Use the Cross-System Cryptographic Coprocessor Overview workspace to compare the subsystems’ cryptography performance and to troubleshoot performance problems.

Checking and improving cross-system cryptography performance

Access the Cross-System Cryptographic Coprocessor Overview workspace as described in steps 1 and 2 of “Checking service call performance” on page 100.

To check cross-system performance:

- Check the ICSF Subsystems by System table to make sure the coprocessors are online and cryptography services are active on all systems.

  The predefined situation Crypto_No_PCI_Coprocessors defines the lack of an online PCI coprocessor as a warning condition. A matching threshold has been set for the 1 PC1 column. So when this condition occurs, warning event indicators appear in the table and in the Navigator.

  If you find configuration or availability problems, correct them immediately.

- Check the Service Call Performance by System table to determine the average request arrival rate, service time in milliseconds, queue length, and byte count per service call for each system.

  If all service calls have been processed on a single system, but service time is well under a millisecond, and the Pending column shows no request queue, there is no performance problem. However, if the same system continues to be used exclusively and the arrival rate increases, service time and queue length would also increase, and a serious performance problem might develop. In such a case, you might consider rebalancing workloads among systems to correct the problem.

- Check the Top Users by System table to see whether one or two job names seem to be monopolizing cryptographic services.

  If any of the top job names are relatively unimportant, you might want to reduce their priority on the system.

  Look at the LastSvcDesc column, which shows the service requested most recently by each of the top users. Refresh the workspace several times over various intervals and see whether the same service call keeps showing up. If so, that service call is being used heavily by the top users and may be implicated in performance problems. See “Improving performance” on page 102 for suggestions for improving service call performance.
If you have a problem with your IBM software, you want to resolve it quickly. This section describes the following options for obtaining support for IBM software products:

- “Searching knowledge bases” on page 107
- “Obtaining fixes” on page 108
- “Receiving weekly support updates” on page 108
- “Contacting IBM Software Support” on page 109

Searching knowledge bases

You can search the available knowledge bases to determine whether your problem was already encountered and is already documented.

Searching the information center

IBM provides extensive documentation that can be installed on your local computer or on an intranet server. You can use the search function of this information center to query conceptual information, instructions for completing tasks, and reference information.

Searching the Internet

If you cannot find an answer to your question in the information center, search the Internet for the latest, most complete information that might help you resolve your problem.

To search multiple Internet resources for your product, use the **Web search** topic in your information center. In the navigation frame, click **Troubleshooting and support > Searching knowledge bases** and select **Web search**. From this topic, you can search a variety of resources, including the following:

- IBM technotes
- IBM downloads
- IBM Redbooks®
- IBM developerWorks®
- Forums and newsgroups
- Google
Obtaining fixes

A product fix might be available to resolve your problem. To determine what fixes are available for your IBM software product, follow these steps:

2. Click Downloads and drivers in the Support topics section.
3. Select the Software category.
4. Select a product in the Sub-category list.
5. In the Find downloads and drivers by product section, select one software category from the Category list.
6. Select one product from the Sub-category list.
7. Type more search terms in the Search within results if you want to refine your search.
8. Click Search.
9. From the list of downloads returned by your search, click the name of a fix to read the description of the fix and to optionally download the fix.

For more information about the types of fixes that are available, refer to IBM Software Support Handbook at http://techsupport.services.ibm.com/guides/handbook.html.

Receiving weekly support updates

To receive weekly e-mail notifications about fixes and other software support news, follow these steps:

2. Click My Support in the upper right corner of the page.
3. If you have already registered for My Support, sign in and skip to the next step. If you have not registered, click register now. Complete the registration form using your e-mail address as your IBM ID and click Submit.
4. Click Edit Profile.
5. In the Products list, select Software. A second list is displayed.
6. In the second list, select a product segment, for example, Application servers. A third list is displayed.
7. In the third list, select a product sub-segment, for example, Distributed Application & Web Servers. A list of applicable products is displayed.
8. Select the products for which you want to receive updates, for example, IBM HTTP Server and WebSphere Application Server.
9. Click Add products.
10. After selecting all products that are of interest to you, click Subscribe to email on the Edit profile tab.
11. Select Please send these documents by weekly email.
12. Update your e-mail address as needed.

13. In the **Documents** list, select **Software**.

14. Select the types of documents that you want to receive information about.

15. Click **Update**.

   If you experience problems with the **My support** feature, you can obtain help in one of the following ways:

   **Online**: Send an e-mail message to erchelp@ca.ibm.com, describing your problem.

   **By phone**: Call 1-800-IBM-4You (1-800-426-4968).

**Contacting IBM Software Support**

IBM Software Support provides assistance with product defects.

Before contacting IBM Software Support, your company must have an active IBM software maintenance contract, and you must be authorized to submit problems to IBM. The type of software maintenance contract that you need depends on the type of product you have:

- For IBM distributed software products (including, but not limited to, Tivoli, Lotus®, and Rational® products, as well as DB2® and WebSphere® products that run on Windows or UNIX operating systems), enroll in Passport Advantage® in one of the following ways:
  - **Online**: Go to the Passport Advantage Web page (http://www.lotus.com/services/passport.nsf/WebDocs/Passport_Advantage_Home) and click **How to Enroll**
  - **By phone**: For the phone number to call in your country, go to the IBM Software Support Web site at http://techsupport.services.ibm.com/guides/contacts.html and click the name of your geographic region.

- For customers with Subscription and Support (S & S) contracts, go to the Software Service Request Web site at https://techsupport.services.ibm.com/ssr/login.


- For IBM eServer™ software products (including, but not limited to, DB2 and WebSphere products that run in zSeries, pSeries, and iSeries environments), you can purchase a software maintenance agreement by working directly with an IBM sales representative or an IBM Business Partner. For more information about support for eServer software products, go to the IBM Technical Support Advantage Web site at http://www.ibm.com/servers/eserver/eserver/techsupport.html.

If you are not sure what type of software maintenance contract you need, call 1-800-IBMSERV (1-800-426-7378) in the United States. From other countries, go to the contacts page of the *IBM Software Support Handbook* on the Web at
http://techsupport.services.ibm.com/guides/contacts.html and click the name of your geographic region for phone numbers of people who provide support for your location.

To contact IBM Software Support, follow these steps:
1. “Determining the business impact” on page 110
2. “Describing problems and gathering information” on page 110
3. “Submitting problems” on page 111

Determining the business impact
When you report a problem to IBM, you are asked to supply a severity level. Therefore, you need to understand and assess the business impact of the problem that you are reporting. Use the following criteria:

<table>
<thead>
<tr>
<th>Severity 1</th>
<th>The problem has a critical business impact. You are unable to use the program, resulting in a critical impact on operations. This condition requires an immediate solution.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Severity 2</td>
<td>The problem has a significant business impact. The program is usable, but it is severely limited.</td>
</tr>
<tr>
<td>Severity 3</td>
<td>The problem has some business impact. The program is usable, but less significant features (not critical to operations) are unavailable.</td>
</tr>
<tr>
<td>Severity 4</td>
<td>The problem has minimal business impact. The problem causes little impact on operations, or a reasonable circumvention to the problem was implemented.</td>
</tr>
</tbody>
</table>

Describing problems and gathering information
When explaining a problem to IBM, be as specific as possible. Include all relevant background information so that IBM Software Support specialists can help you solve the problem efficiently. To save time, know the answers to these questions:

- What software versions were you running when the problem occurred?
- Do you have logs, traces, and messages that are related to the problem symptoms? IBM Software Support is likely to ask for this information.
- Can you re-create the problem? If so, what steps were performed to re-create the problem?
- Did you make any changes to the system? For example, did you make changes to the hardware, operating system, networking software, and so on.
- Are you currently using a workaround for the problem? If so, be prepared to explain the workaround when you report the problem.
- What software versions were you running when the problem occurred?
Submitting problems

You can submit your problem to IBM Software Support in one of two ways:

- **Online**: Click **Submit and track problems** on the IBM Software Support site at http://www.ibm.com/software/support/probsub.html. Type your information into the appropriate problem submission form.

- **By phone**: For the phone number to call in your country, go to the contacts page of the IBM Software Support Handbook (http://techsupport.services.ibm.com/guides/contacts.html) and click the name of your geographic region.

If the problem you submit is for a software defect or for missing or inaccurate documentation, IBM Software Support creates an Authorized Program Analysis Report (APAR). The APAR describes the problem in detail. Whenever possible, IBM Software Support provides a workaround that you can implement until the APAR is resolved and a fix is delivered. IBM publishes resolved APARs on the Software Support Web site daily, so that other users who experience the same problem can benefit from the same resolution.
Overview

This information was developed for products and services offered in the U.S.A. IBM may not offer the products, services, or features discussed in this document in other countries. Consult your local IBM representative for information on the products and services currently available in your area. Any reference to an IBM product, program, or service is not intended to state or imply that only that IBM product, program, or service may be used. Any functionally equivalent product, program, or service that does not infringe any IBM intellectual property right may be used instead. However, it is the user's responsibility to evaluate and verify the operation of any non-IBM product, program, or service.

IBM may have patents or pending patent applications covering subject matter described in this document. The furnishing of this document does not give you any license to these patents. You can send license inquiries, in writing, to:

IBM Director of Licensing
IBM Corporation
North Castle Drive
Armonk, NY 10504-1785 U.S.A.

For license inquiries regarding double-byte (DBCS) information, contact the IBM Intellectual Property Department in your country or send inquiries, in writing, to:

IBM World Trade Asia Corporation
Licensing
2-31 Roppongi 3-chome, Minato-ku
Tokyo 106, Japan

The following paragraph does not apply to the United Kingdom or any other country where such provisions are inconsistent with local law:

INTERNATIONAL BUSINESS MACHINES CORPORATION PROVIDES THIS PUBLICATION "AS IS" WITHOUT WARRANTY OF ANY KIND, EITHER EXPRESS OR IMPLIED, INCLUDING, BUT NOT LIMITED TO, THE IMPLIED WARRANTIES OF NON-INFRINGEMENT, MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE.

Some states do not allow disclaimer of express or implied warranties in certain transactions, therefore, this statement might not apply to you.

This information could include technical inaccuracies or typographical errors. Changes are periodically made to the information herein; these changes will be incorporated in
new editions of the publication. IBM may make improvements and/or changes in the product(s) and/or the program(s) described in this publication at any time without notice.

Any references in this information to non-IBM Web sites are provided for convenience only and do not in any manner serve as an endorsement of those Web sites. The materials at those Web sites are not part of the materials for this IBM product and use of those Web sites is at your own risk.

IBM may use or distribute any of the information you supply in any way it believes appropriate without incurring any obligation to you.

Licensees of this program who wish to have information about it for the purpose of enabling: (i) the exchange of information between independently created programs and other programs (including this one) and (ii) the mutual use of the information which has been exchanged, should contact:

IBM Corporation
2Z4A/101
11400 Burnet Road
Austin, TX  78758 U.S.A.

Such information may be available, subject to appropriate terms and conditions, including in some cases payment of a fee.

The licensed program described in this document and all licensed material available for it are provided by IBM under terms of the IBM Customer Agreement, IBM International Program License Agreement or any equivalent agreement between us.

Any performance data contained herein was determined in a controlled environment. Therefore, the results obtained in other operating environments may vary significantly. Some measurements may have been made on development-level systems and there is no guarantee that these measurements will be the same on generally available systems. Furthermore, some measurement may have been estimated through extrapolation. Actual results may vary. Users of this document should verify the applicable data for their specific environment.

Information concerning non-IBM products was obtained from the suppliers of those products, their published announcements or other publicly available sources. IBM has not tested those products and cannot confirm the accuracy of performance, compatibility or any other claims related to non-IBM products. Questions on the capabilities of non-IBM products should be addressed to the suppliers of those products.

All statements regarding IBM's future direction or intent are subject to change or withdrawal without notice, and represent goals and objectives only.

All IBM prices shown are IBM's suggested retail prices, are current and are subject to change without notice. Dealer prices may vary.

This information is for planning purposes only. The information herein is subject to change before the products described become available.

This information contains examples of data and reports used in daily business operations. To illustrate them as completely as possible, the examples include the names of individuals, companies, brands, and products. All of these names are fictitious and any
similarity to the names and addresses used by an actual business enterprise is entirely coincidental.

COPYRIGHT LICENSE:

This information contains sample application programs in source language, which illustrate programming techniques on various operating platforms. You may copy, modify, and distribute these sample programs in any form without payment to IBM, for the purposes of developing, using, marketing or distributing application programs conforming to the application programming interface for the operating platform for which the sample programs are written. These examples have not been thoroughly tested under all conditions. IBM, therefore, cannot guarantee or imply reliability, serviceability, or function of these programs. You may copy, modify, and distribute these sample programs in any form without payment to IBM for the purposes of developing, using, marketing, or distributing application programs conforming to IBM's application programming interfaces.

Each copy or any portion of these sample programs or any derivative work, must include a copyright notice as follows:

© (your company name) (year). Portions of this code are derived from IBM Corp. Sample Programs. © Copyright IBM Corp. _enter the year or years_. All rights reserved.

If you are viewing this information in softcopy form, the photographs and color illustrations might not display.

Trademarks

IBM, the IBM logo, AF/Remote, Candle Management Server, Candle Management Workstation, CandleNet Portal, CICS, Common User Access, CUA, DB2, developerWorks, EPILOG, eServer, ETE, IBMLink, IMS, iSeries, Lotus, MVS, OMEGamon, OMEGamon II, OMEGAView, Passport Advantage, pSeries, Redbooks, OS/390, Tivoli, the Tivoli logo, WebSphere, z/OS, and zSeries are trademarks or registered trademarks of International Business Machines Corporation in the United States, other countries, or both.

Java and all Java-based trademarks and logos are trademarks or registered trademarks of Sun Microsystems, Inc. in the United States, other countries, or both.

Linux is a trademark of Linus Torvalds in the United States, other countries, or both.

Microsoft, Windows, Windows NT, and the Windows logo are trademarks of Microsoft Corporation in the United States, other countries, or both.

UNIX is a registered trademark of The Open Group in the United States and other countries.
Other company, product, and service names may be trademarks or service marks of others.
A

agent  Agent software collects information about an operating system, subsystem, or application, and can execute certain commands. Agents are installed on systems you want to monitor.

alert  A warning message that appears at a console to indicate an event has occurred that may require intervention.

alert adapter  An agent that monitors and relays alert information from another product to CandleNet Portal. Sources of alerts include message logs, system consoles, network management products, and system management products.

attribute  A system or application element being monitored by the agent, such as Disk Name and Disk Read/Writes Per Second. An attribute can also be a field in an ODBC-compliant database.

attribute group  A set of related attributes that can be combined in a view or a situation. Each type of IBM Tivoli OMEGAMON XE agent has a set of attribute groups associated with it.

central processor complex (CPC)  A physical collection of hardware (such as an ES/3090) that consists of main storage, one or more central processors, timers, and channels.

C

CandleNet Portal Server  A collection of software services for the CandleNet Portal that enables retrieval, manipulation and, analysis of data from the monitoring agents running on systems in your enterprise.

Candle Management Server  The predecessor to the CandleNet Portal. On the Candle Management Workstation, data is presented in tabular reports and alerts associated with managed objects in graphic views.

Currently, the Candle Management Workstation is used primarily for certain administrative functions that have not yet been migrated to CandleNet Portal. If you want to define and manage work groups and work lists, for example, you must use the Candle Management Workstation.

Candle Data Warehouse  A long-term data store for the performance and analysis data collected by monitoring agents.

The warehoused data is written to Microsoft SQL Server relational database. You can view the data stored in the warehouse in CandleNet Portal workspaces, or use third-party analysis and reporting tools on it.

Candle warehouse proxy agent  A process that periodically moves data from the binary history files maintained at the Candle Management Server or monitoring agent to the warehouse.

cross-system coupling facility (XCF)  A component of z/OS which provides services that allow authorized applications to coordinate and manage communication, resource sharing and recovery among other instances of the application in a sysplex. XCF provides Group Services to define the application structure, Monitoring Services to determine when failures have occurred and Signalling Services to provide communication among the members. A sysplex requires a couple dataset to manage the sysplex. The couple dataset includes information related to the systems in the sysplex, XCF groups and members.
**coupling facility** A special logical partition that provides high-speed caching, list processing, and locking functions in a parallel sysplex.

**E**

**enclave** A collection of the routines that make up an application. The enclave is the equivalent of any of the following:

- A run unit, in COBOL
- A program, consisting of a main C function and its sub-functions, in C and C++
- A main procedure and all of its subroutines, in PL/I
- A program and its subroutines, in Fortran

Enclaves are a key feature of the program management model.

**enqplex** A group of z/OS images in two or more sysplexes under common enqueue management. A resource in one enqplex is distinct from a resource having the same name in another enqplex. Two or more sysplexes having the same enqplex name share qname/rname resources.

**enqueue** A shared memory structure that serializes access to database resources. Enqueues are local to one instance if Real Application Clusters is not enabled. When you enable Real Application Clusters, enqueues can be global to a database. See also global enqueue. An enqueue is a locking mechanism.

**event** A change in the status of a situation you are monitoring.

**event workspace** The workspace that opens when you select a situation from the flyover list of situations that have fired.

**F**

**filter** A criterion or set of criteria used to limit the amount of information returned to the user in response to a query.

**function** A method of evaluating the information that an attribute supplies. Used in situations, the default function is Value of expression. The functions available depend on the type of attribute used in the condition.

**G**

**goal** A performance target for a workload.

**global enqueue** An enqueue that is shared across systems.

**global resource serialization (GRS)** A base z/OS function that provides applications as well as systems level functions with the ability to serialize a resource between multiple units of work. The resource is abstract (whatever one wants it to be) and can be serialized at various levels (scopes). User resource naming conversions and scope specifications ensure proper intersect between different requesters. Scopes/levels range from multiple systems to single address spaces or job steps. GRS is widely used and is critical to the stability/integrity of a z/OS operating system and all its exploiters.

**GRS** See global resource serialization.

**H**

**historical reporting** A viewing option for tables that collects data for a specified period of time, such as over the past hour.

**hub** The Candle Management Server that has been designated to act as the focal point to which all CandleNet Portal servers connect. A non-hub, or remote, Candle Management Server passes its collected data to the hub to be made available to clients, thereby creating an Enterprise-wide view.
Integrated Applications Facility (IFA) A special type of processor. See zAAP z/Series Application Assist Processor.

Intelligent Resource Director (IRD) A key feature of the zSeries architecture, which automatically directs resources to priority workloads. IRD gives users the capability of managing resource and workload across z/OS LPARs that are members of a common group called an LPAR cluster.

LPAR cluster A set of z/OS LPARs that share a central processing complex (CPC) and are members of a common sysplex. An LPAR cluster comprises the scope of the Intelligent Resource Director management control.

Managed system A particular operating system, subsystem, or application in your enterprise that being monitoring with an OMEGAMON or IBM Tivoli OMEGAMON XE agent.

Monitor interval A specified time, scalable for seconds, minutes, hours, or days, for how often the Candle Management Server checks to see if a situation has become true. The minimum monitor interval is 30 seconds; the default is 15 minutes.

Multiregion operation (MRO) Communication between CICS systems in the same processor without the use of SNA network facilities. This allows several CICS systems in different regions to communicate with each other and to share resources such as files, terminals, temporary storage, and so on. The systems must be in the same operating system; or, if the XCF access method is used, in the same sysplex.

Navigator The left pane of the CandleNet Portal application window. The Navigator physical view shows your network enterprise as a physical hierarchy of systems grouped by platform. OMEGAMON DE users can also create other views to create logical hierarchies grouped as you specify, such as by department or function.

OMEGAMON DE on z/OS IBM Tivoli OMEGAMON Dashboard Edition. OMEGAMON DE includes all the features of CandleNet Portal included with OMEGAMON XE, plus application integration components. OMEGAMON XE on z/OS includes OMEGAVIEW, which aggregates, into a single Common User Access® (CUA) view, the status information from the OMEGAMON or OMEGAMON II components of IBM Tivoli OMEGAMON XE products, and OMEGAVIEW II® for the Enterprise, which integrates status information from OMEGAMON and OMEGAMON II components into the Tivoli OMEGAMON XE architecture, allowing the CandleNet Portal to be used to create situations and policies those systems.

Parallel Sysplex A set of z/OS systems that communicate and cooperate with each other through multisystem hardware components and software services to process customer workloads. A Parallel Sysplex combines parallel processing with read/write data sharing across multiple systems with full data integrity.

Performance index (PI) A mean
**policy**  An automated system process that you set up to perform actions and automates manual tasks. It comprises a series of automated steps, called activities, whose order of execution you control.

**predefined situations**  A set of ready-made situations for you to use as-is or to modify without having to create your own.

**predefined workspaces**  A set of workspaces that come with your product for you to use and modify for your environment.

**product code**  The three-letter code used to identify a monitoring product in certain contexts. For example, the product code for Tivoli OMEGAMON XE for z/OS is KM5.

**Properties editor**  A dialog for specifying the properties of the individual views that make up a workspace.

**query**  A query is a request for data from the agent.

**report class**  Work for which reporting information is to be collected separately. A report class can combine work from different service class or a single transaction.

**Resource Measurement Facility (RMF)**  An IBM licensed program or optional element of z/OS that measures selected areas of system activity and presents the data collected in the format of printed reports, System Management Facility (SMF) records, or display reports. RMF is used to evaluate system performance and identify reasons for performance problems.

**service class**  Represents a grouping of work with similar resource and performance requirements. Each service class can have one or more periods. Each service class period has a goal.

**service definition**  An explicit definition of all the workloads and processing capacity in a sysplex. A service definition includes service policies, workloads, service classes, resource groups, and classification rules.

**service policy**  A set of performance goals for all z/OS images using z/OS workload management in a sysplex. There can be only one active service policy for a sysplex, and all subsystems in goal mode within that sysplex process towards that policy. However, you can create several service policies, and switch between them to cater for the different needs of different processing periods. The Workload Manager (WLM) will dynamically balance the system resources according to the active service policy.

**sample**  The data that the product collects for the server instance.

**sample interval**  The time between data samplings.

**severity**  The value or relative importance you assign to a particular state. If two or more states occur at the same time, the Navigator level that contains these states shows the indicator for the highest severity level.

**situation**  A set of conditions that, when met, creates an event. A condition consists of an agent attribute, an operator such as greater than or equal to, and a value. It can be read as, "If - system condition - compared to - value - is true". An example of a situation is: IF - CPU usage - GT - 90% - TRUE. IF and TRUE are part of every situation. The expression "CPU usage GT 90%" is the situation condition.

**SQL**  Structured Query Language. SQL is a programming language for getting information from and updating a database. The CandleNet Portal Queries editor enables you to write SQL queries to ODBC data sources for retrieval and display in table and chart views.

**SRB**  Service request block. A unit of work that is scheduled to execute in another address space.
**state**  An indication associated with an icon, color, and severity level assigned to a situation at any particular point in time. A situation can reflect one of the following states: Critical, Warning, or Informational.

**status**  The true or false condition of a situation.

**sysplex**  A set of systems communicating and cooperating with each other, through certain multisystem hardware components and software services, in order to process workloads. See also Parallel Sysplex.

**sysplex proxy**  A data consolidation point for sysplex monitoring. Historical data for the sysplex is collected at the proxy, and sysplex situations are evaluated there.

**System Management Facility (SMF)**  A z/OS facility that collects and records a variety of system and job-related information.

**System Modification Program/Extended (SMP/E)**  An IBM licensed program used to install software and software changes on z/OS systems. In addition to providing the services of SMP, SMP/E consolidates installation data, allows more flexibility in selecting changes to be installed, provides a dialog interface, and supports dynamic allocation of datasets.

**velocity**  The measure of how fast work should run when ready, without being delayed for processor or storage access. Velocity is expressed as a percentage from 1 to 99. In other words, the velocity goal defines the acceptable amount of delay for work when work is ready to run. Velocity goals should be used for long-running jobs and for address spaces; they are the most appropriate goal for any started tasks that require a goal.

**view**  A windowpane, or frame, in a workspace. It may contain data from an agent in a chart or table, or it may contain a terminal session or notepad, for example. A view can be split into two separate, autonomous views.

**workload**  Work to be tracked, managed and reported as a unit. A group of service classes.

**workspace**  A window comprised of one or more views. Every item listed in the Navigator has its own default workspace and may have multiple workspaces.

**X**

**XCF**  See Cross-system coupling facility

**V**

**Velocio**  VA type of goal set for a service class period. Velocio is a percentage value indicating how fast work should execute when ready, without being delayed for processor or storage access. Velocity goals reflect the ratio of time when a unit of work was ready to use the CPU to the time work was actually using the CPU or I/O. This type of goal is useful for managing long-running nontransaction servers such as JES or HSM. A high percentage indicates that work should process quickly; a low percentage indicates that a greater amount of delay is acceptable.

**Z**

**z/OS**  An IBM operating system for the IBM zSeries family of enterprise servers that includes and integrates functions previously provided by many IBM software products (including the MVS and OS/390 operating systems). z/OS is an open, secure operating system for the IBM zSeries family of enterprise servers, complies with industry standards, is enabled for network computing and e-business, and supports technology advances in networking server capability, parallel processing, and object-oriented programming.
**zAAP**  See zSeries Application Assist Processor.

**zSeries Application Assist Processor**  
(zAAP)  A special class of assist processor designed to run Java(TM) workloads. For reporting purposes, a zAAP is usually referred to as an integrated facility for applications (IFA).
Symbols
*MVS_SYSPLEX managed system list  41,  66
*MVS_SYSTEM managed system list  41

Numerics
4 Hour MSUs attribute  12,  39

A
accessing publications online  18
accessing the Cross-System Cryptographic Coprocessors Overview workspace  100
Action tab  90
activating predefined situations  41
Add attributes button  65
Address Space Counts view  70,  81
Address Space CPU Utilization Attribute group  83
Address Space CPU Utilization attribute group  12
Address Space CPU Utilization view  71
Address Space CPU Utilization workspace  12,  31
Address Space Inspect Data attributes  74
Address Space Overview workspace  70,  81
Address Space Storage workspace  81
Address Spaces Workspace for Service Class  94
Advanced Situation Options dialog  85,  90
Agent Messages view  73
agent, definition of  117
alert, definition of  117
analyzing I/O activity  60
ARM, see Automatic Restart Manager
assist processors  12
Associated with Monitored Application  43
attribute  117
attribute group, definition of  117
attribute groups
  Address Space CPU Utilization  12
  Address Space CPU Utilization Attribute  83
  DASD_Device_Collection_Filtering  64
  System CPU Utilization  13
  WLM_Service_Class_Resources  90
attributes  24
  4 Hour MSUs  12,  39
  Address Space Inspect Data  74
  and workspaces  27
  Average CPU Percent  13
  CPU% of CSECT  77
  CSECT Address  76
  CSECT CPU % of Job  76
  CSECT CPU % of Load Module  76
  CSECT CPU % of TCB  76
  CSECT Offset in Load Module  76
  Current Weight  95
defined  27
  Effective Weight Index  95
  Initial Weight  95
  Job Name  83
  Load Module Address  76
  Load Module ASID Hex  75
  Load Module CPU % Job  76
  Load Module CPU % TCB  76
  Load Module Jobname  75
  LPAR Capping Startus  95
  Maximum Weight  95
  Minimum Weight  95
  Offset in CSECT  77
  Performance Index  90
  Waiting on CPU  94
auto alter  53
Automatic Restart Manager (ARM)  50
avtomation policies  28
auxiliary storage manager (ASM)  80
Average Arrivals per Minute view  100
Average Bytes per Service Call view  101
Average CPU Percent attribute  13
Average Pending per Call view  101
Average Service Time per Call view  100

B
books, see publications  16,  18

C
Candle Data Warehouse
definition of  117
using  45
Candle Management Server, definition of  117
Candle warehouse proxy agent
definition of  117
CandleNet Portal Server
definition of  117
central processor complex (CPC), definition of  117
CF CPU  53
CF storage  53
CF structure connections  53
CF, see coupling facility
CFRM 50
Channel Path Activity workspace 39
channel utilization 51
channel-to-channel controls 53
Check 84
Check for Missing Items function 84
classification of workloads 55
Common Recall Queue (CRQ) coupling facility list structure 51
Common Service Area (CSA) 12
Common Storage Area Analyzer 39
common storage area usage by address space 12
common storage usage history (Trend Details) 12
common storage workspaces 39
Condition group box 65
Condition tab 65
Configuration tab 46
configuring hardware for high availability 50
configuring historical data collection 45
console messages
IXC5881 53
monitoring 50
contacting IBM Software Support 19, 109
contention index 61
Control Data Sets (CDS) 51
couple datasets 50
coupling 53
coupling facility (CF)
definition of 118
monitoring 53
CPU % Index 95
CPU usage data for a selected address space 31
CPU% of CSECT attribute 77
Create Situation dialog 89
creating a DASD collection filtering situation 64
critical tasks, monitoring 82–85
cross-system coupling facility (XCF)
definition of 117
monitoring performance metrics 53
Cross-System Cryptographic Coprocessor Overview workspace 37
Cross-System ICSF workspace 103
Crypto_CKDS_80PCT_Full situation 41
Crypto_CKDS_Access_Disabled situation 41
Crypto_Internal_Error situation 41
Crypto_Invalid_Master_Key situation 41
Crypto_Invalid_PKA_Master_Keys situation 41
Crypto_No_Coprocessors situation 41
Crypto_No_PCI_Coprocessors situation 41, 103
Crypto_PCI_Unavailable situation 41
Crypto_PKA_Services_Disabled situation 41
Crypto_PKDS_Read_Disabled situation 41
Crypto_PKDS_Write_Disabled situation 41
Crypto_Service_Unavailable situation 41
Cryptographic Coprocessor Navigator entry 98
Cryptographic Coprocessors 98
Cryptographic Services workspace 98, 100
cryptographic workspaces 39
cryptography
 correcting configuration 98
 monitoring performance 100
 monitoring performance performance 103
 cryptography configuration
 correcting 98
 problems 98
 validating 98
 cryptography performance, monitoring 100
CSA Analyzer, see Common Storage Area Analyzer
CSECT 31
CSECT Address attribute 76
CSECT CPU % of Job attribute 76
CSECT CPU % of Load Module attribute 76
CSECT CPU % of TCB attribute 76
CSECT Name 76
CSECT Name attribute attributes 76
CSECT Offset in Load Module attribute 76
CSECT structure 74
Cumulated I/O rate 61
cumulative CPU seconds and percentages for address spaces 12
Current Weight attribute 95
customer support, <$EmphasisIBM Software Support 109
customer support, see IBM Software Support 109
customizing situations 29

D
DASD collection filtering, creating 64
DASD device collection filtering
example situations for 66
how it works 63
messages for 67
requirements and restrictions 64
when to use 63
DASD device contention index 60
DASD device contention, monitoring 60
DASD group, isolating problems in 61
DASD problems, resolving 61
DASD_Device_Collection_Filtering attribute group 64
DB2, using ARM with 50
default parameters, Inspect function 70
defined capacity as a basis for pricing 70
Description field 65
determining processor capacity requirements 31
Display Item tab 90
distributing situations 42
documentation conventions 20
Dynamic Channel-path Management (DCM) 51

E
Effective Weight Index attribute 95
Eligible for Association 42
enclave data 30
enclave, definition of 118
End to End (ETE) Response Time collector 39
enqplex
definition of 118
using 30
enqueues
and access to Control Data Sets 51
definition of 118
EPILOG collector 29
event indicator 60
event indicators 25, 28
Event view
displaying 60
Event workspace
example of 27
linking to 26
event workspace
defined 118
event, definition of 118
events 25
Events view 60
examining storage usage 81
Expression editor 71
Expression field 71
Extended Common Service Area (ECSA) 12
Extended System Queue Area (ESQA) 12

F
filter, definition of 118
Fixed Storage view 81
four-hour rolling average CPU usage 12
function, definition of 118

G
global enqueue, definition of 118
global resource serialization (GRS), definition of 118
goal
definition of 118
goals
setting appropriate 55
graphic views 24
GRS Ring Systems Data for Sysplex workspace 39
GRS See global resource serialization 118

H
hardware, configuring for high availability 50
Hierarchical Storage Management (HSM) recalls 51
historical data
collection interval for 46
viewing 45
historical data collection
configuring 45
configuring on sysplex proxy eligible servers 46
starting 46
stopping 46
historical datasets 45
historical reporting
definition of 118
in CandleNet Portal 45
History Configuration program 45
history data collection options 45
hub
definition of 118
retrieving data through 24

I
I/O
analyzing distribution 60
identifying cause of delays 60
I/O activity, analyzing 60
IBM Software Support
contacting 109
IBM Software Support, contacting 109
IBM Tivoli Education Web site 19
IBM Tivoli OMEGAMON XE for Storage on z/OS 50
IBM Tivoli OMEGAMON XE for z/OS
overview 24
ICSF Subsystem Status view 98
ICSF Subsystems by System view 103
identifying causes of I/O delay 60
identifying inefficient code 12, 31
identifying workloads missing goals 30
impact analysis 30
importing an OMEGAMON II for MVS profile 44
importing OMEGAMON II for MVS threshold values 44
inefficient code, identifying 31
information centers, searching to find software
problem resolution 107
Initial Weight attribute 95
Inspect Address Space CPU Use link 70
Inspect Address Space CPU Use query 71
Inspect agent messages 73
Inspect Data view 73, 75
Inspect data, using 75–77
Inspect function 31, 70–77
  default parameters 70
  description of 70
  invoking 70
  migrated from OMEGAMON 11
  ordering of data 73
  samples collected 73
  samples requested 73
  sampling interval 73
  user-specified parameters 70
Inspect link, modifying 70
Inspect with 5000 samples at 2ms interval link 70
integrated facility for applications (IFA)
  definition of 119
Integrated Facility for Applications (IFA) on CP
  resource times 39
Intelligent Resource Director (IRD)
  definition of 119
Intelligent Resource Director (IRD), using 50
  INTERVAL symbol 71
  invoking the Inspect function 70
IRD routing algorithm 51
IRD, see Intelligent Resource Director
IRD, see Intelligent Resource Directory
Item field 90
IXC588I console message 53
Java workloads 31
Job Name attribute 83
job-level CPU 12, 31
knowledge bases, searching to find software problem resolution 107
KXEMIGR tool 44
LastSvcDesc column 101, 103
Link Identity field 71
Link Wizard 71
literals, representation of 20
Load Module Address attribute 76
Load Module ASID Hex attribute 75
Load Module CPU % Job attribute 76
Load Module CPU % TCB attribute 76
Load Module Jobname attribute 75
load modules 74
Logger 50
looping code, identifying 12
looping code, locating 32
LPAR capping 95
LPAR Capping Status attribute 95
LPAR cluster
  definition of 119
LPAR Clusters workspace 95
managed system lists 41
managed system names 35
managed system, definition of 119
managing a sysplex 50–55
managing resources and workloads 30
managing workloads 55
manuals, see publications 16, 18
Maximum Weight attribute 95
message delays 54
messages, from Inspect agent 73
Microsoft SQL Server 45
migrating an OMEGAMON II for MVS profile 29
migrating OMEGAMON II for MVS thresholds 29
millions of service units (MSUs) 12
Minimum Weight attribute 95
Missing Item popup 84
MissingTaskAlert situation, creating 82
monitor interval, definition of 119
monitoring console messages 50
monitoring coupling facilities 53
monitoring critical tasks 82–85
monitoring cross-system coupling facility performance metrics 53
monitoring cryptographic services 97
monitoring cryptography performance 100
monitoring DASD device contention 60
monitoring paging 80–81
monitoring shared DASD 60–67
monitoring system CPU utilization 29
monitoring top user performance 100
monitoring virtual storage 80–81
MSUs, see millions of service units
msys 50
Multiple Image Facility (MIF) channels 51
multiregion operation (MRO)
  definition of 119
  use of XCF 53
multi-system message passing 53
MVS_CFStruct_Status_Crit situation 41
MVS_CFStructUsers_Connect_Crit situation 41
MVS_CFSystems_Performance_Crit situation 41
MVS_XCFGroupMembers_Status_Crit situation 41
Index

N
Navigator view  defined 119  
event indicators in 25  
newsgroups 19  

O
Offset in CSECT attribute 77  
OMEGAMON DE on z/OS  
creating workspaces with 40  
description of 119  
OMEGAMON II for MVS historical data collection 29  
OMEGAMON II for MVS profile  
importing 44  
migrating 29  
OMEGAMON II for MVS thresholds, migrating 29  
OMEGAVIEW 119  
OMVS 50  
On/Off Capacity on Demand 31  
On/Off Capacity on Demand feature 12  
online publications, accessing 18  
ordering of data returned from Inspect function 73  
ordering publications 18  
orGANIZATION of predefined workspaces 36–38  
orphaned elements 12  
OS/390 Systems Navigator icon 60  
OS390_Local_PageDS_PctFull_Crit situation 80

Page Dataset Activity workspace 80  
Page datasets 80  
page rate 80  
paging  
monitoring 80–81  
paging problems, options for correcting 81  
Parallel Sysplex, definition of 119  
Path Busy 53  
performance  
cryptography 100, 103  
of a given service class 95  
service calls 100  
setting appropriate goals for 55  
top users 101  
Performance by Top Users view 101  
performance impact  
requests for historical data from large tables 46  
Performance Index (PI) 55  
Performance Index attribute 90  
persistent data store (PDS) 45  
physical Navigator view 36  
policy, definition of 120  
predefined situations  
about 28  
activating 41  
autostarted 41  
Crypto_No_PCI_Coprocessors 103  
distributing 42  
importing OMEGAMON II for MVS threshold values 44  
modifying 43  
overview 41  
starting 43  
using 41–44  
predefined workspaces  
customizing 39  
derived 28, 120  
organization of 36–38  
overview 35  
prerequisites for data in 39  
setting as home workspace 40  
sysplex-level 28  
overview 35  
using 35–40  
pre-emptive service request block data 31  
processor capacity requirements, determining 31  
Processor Resource/System Manager (PR/SM) 103  
product code  
derived 120  
Properties editor, definition of 120  
publications 16  
accessing online 18  
ordering 18  
queries 24  
query, definition of 120  
queue length 101

R
reflex actions 28  
relative priority of work 55  
report class, definition of 120  
requests converted from synchronous to asynchronous 53  
requirements for DASD device collection filtering situations 64  
reserves 51  
resolving DASD problems 61  
resource contention statistics 31  
Resource Measurement Facility 39, 120  
Resource Measurement Facility (RMF) data 63, 64  
Restart Light 50  
restrictions on DASD device collection filtering attributes 64
128 Using IBM Tivoli OMEGAMON XE for z/OS, v3.1.0

- Retained locks: 50
- Retries due to errors on the path: 54
- Revision bars: 20
- RMF interval: 13
- RMF, see Resource Measurement Facility
- RMF_LPAR_CPU_Percent: 13
- RMF_MVS_CPU_Percent: 13
- Run at startup check box: 65

S

- Sample interval, definition of: 120
- Sample, definition of: 120
- Sampling Interval counter: 65
- Sampling Statistics view: 73
- Select Attribute dialog: 83
- Service Call Performance by System view: 103
- Service Call Performance table: 100
- Service Call Performance view: 101
- Service Call Performance workspace: 100
- Service class: 120
- Service class data: 30
- Service class period: 30
- Service Classes Data for Sysplex workspace: 94
- Service definition, definition of: 120
- Service policy, definition of: 120
- Service request block
  - Definition of: 120
- Service request block data: 31
- Severity, definition of: 120
- Shared DASD monitoring: 60–67
- Shared DASD Devices view: 61
- Shared DASD Devices workspace: 60, 61
- Shared DASD Groups Data for Sysplex Navigator entry: 60
- Shared DASD Groups Data for Sysplex workspace: 60
- Shared DASD Groups view: 61
- Shared DASD Systems workspace: 60, 61
- Short engine syndrome: 51
- Simple actions: 28
- Situation Filter: 42, 43
- Situation notification: 91
- Situations: 25
  - Acknowledging: 94
  - And automation policies: 28
  - And reflex actions: 28
  - Creating your own: 27
- Crypto_CKDS_80PCT_Full: 41
- Crypto_CKDS_Access_Disabled: 41
- Crypto_Internal_Error: 41
- Crypto_Invalid_Master_Key: 41
- Crypto_Invalid_PKDS_Master_Keys: 41
- Crypto_No_Coprocessors: 41
- Crypto_No_PCI_Coprocessors: 41
- Crypto_PCI_Unavailable: 41
- Crypto_PKDS_Read_Disabled: 41
- Crypto_PKDS_Write_Disabled: 41
- Crypto_Service_Unavailable: 41
- Customizing: 29
- DASD Collection Filtering: 64
  - Definition of: 28, 120
  - Distributing: 65
  - MVS_CFStruct_Status_Crit: 41
  - MVS_CFStructUsers_Connect_Crit: 41
  - MVS_CFSysms_Performance_Crit: 41
  - MVS_XCFGroupMembers_Status_Crit: 41
  - OS390_Local_PageDS_PctFull_Crit: 80
  - Predefined: 27
  - Restrictions on DASD device collection filtering: 64
  - Starting: 66
  - Stopping: 66
  - Sysplex_DASD_Dev_CntIndx_Warn: 60
  - Sysplex_DASD_Dev_CntIndx_Warn situation: 60
- Sysplex Enterprise Overview workspace: 37
- Sysplex Level Overview workspace: 37
- Sysplex proxy
  - Configuring historical data collection on: 46
  - Definition of: 121
- Sysplex_DASD_Dev_CntIndx_Warn: 60

SQL, definition of: 120

- Starting situations: 43, 66
- State drop-down list: 65
- Status, definition of: 121
- Stopping situations: 66
- Storage usage, examining: 81
- Subchannel utilization: 53
- Support, contacting: 19
- Symbols in command syntax: 20
- Synchronous service times: 53
- SYS1.LINKLIB load library: 74
- SYS1.LPALIB load library: 74
- SYS1.NUCLEUS load library: 74
- Sysplex
  - Definition of: 121
  - Managing: 50–55
  - Sysplex Enterprise Overview workspace: 37
  - Sysplex Level Overview workspace: 37
  - Sysplex proxy
    - Configuring historical data collection on: 46
    - Definition of: 121
    - Sysplex_DASD_Dev_CntIndx_Warn: 60
Cryptographic Services 98
customizing 39
definition of 121
GRS Ring Systems Data for Sysplex 39
LPAR Clusters 95
overview of 28
Page Dataset Activity 80
predefined, see predefined workspaces 35
Service Classes Data for Sysplex 94
Shared DASD Devices 60, 61
Shared DASD Groups Data for Sysplex 60
Shared DASD Systems 61
Shared DASD systems 60
Sysplex Enterprise Overview 37
System CPU Utilization 30
Top User Performance 101
User Response Time 39
WLM Service Class Resources 92, 94
workspaces, predefined, see predefined workspaces 35

X
XCF, see cross-system coupling facility
XCFAS started task 50
-Xifa:force switch 31, 39

Z
z/OS, definition of 121
z/VM, MSUs not computed on 12
zAAP processor, See zSeries Application Assist Processors
zAAP resource, determining amount required 31
zOS_Critical_SvcClass_Missed_Goal situation
creating 89
monitoring 94
zSeries Application Assist Processors (zAAPs) 12
definition of 122
determining how much resource is needed 12
determining utilization by 12