BMC Intelligent Capping for zEnterprise User Guide

Supporting

Version 1.1 of BMC Intelligent Capping for zEnterprise

November 2014
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<tr>
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Before contacting BMC
Have the following information available so that Customer Support can begin working on your issue immediately:

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  - Product name
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  - License number and password (trial or permanent)
- Operating system and environment information
  - Machine type
  - Operating system type, version, and service pack or other maintenance level such as PUT or PTF
  - System hardware configuration
  - Serial numbers
  - Related software (database, application, and communication) including type, version, and service pack or maintenance level
- Sequence of events leading to the problem
- Commands and options that you used
- Messages received (and the time and date that you received them)
  - Product error messages
  - Messages from the operating system
  - Messages from related software
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About this book

This book contains detailed product information and is intended for system administrators and performance specialists.

Like most BMC documentation, this book is available in printed and online formats. To request printed books or to view online books and notices (such as release notes and technical bulletins), see the support website at http://www.bmc.com/support.

Note
Online books are formatted as PDF or HTML files. To view, print, or copy PDF books, use the free Adobe Reader from Adobe Systems. If your product installation does not install the reader, you can obtain the reader at http://www.adobe.com.

The software also offers online Help. To access Help, press F1 within any product or click the Help button in graphical user interfaces (GUIs).

Related publications

From the BMC Support Central website, you can use the following methods to access related publications that support your product or solution:

- Link to the BMC Documentation Center (https://webapps.bmc.com/infocenter/index.jsp) to browse documentation sets.

- View Quick Course videos (short overviews of selected product concepts, tasks, or features), which are available from the following locations:
  - Documentation Center
  - Support Central (at http://www.bmc.com/support/mainframe-demonstrations)
  - BMC Mainframe YouTube channel (https://www.youtube.com/user/BMCSoftwareMainframe)
You can order hardcopy documentation from your BMC sales representative or from the support site. You can also subscribe to proactive alerts to receive e-mail messages when notices are issued.

Tip
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Conventions

This document uses the following special conventions:

- All syntax, operating system terms, and literal examples are presented in this typeface.

- Variable text in path names, system messages, or syntax is displayed in italic text: testsys/instance/fileName

- Menu sequences use a symbol to convey the sequence. For example, Actions => Create Test instructs you to choose the Create Test command from the Actions menu.

Syntax statements

This topic explains conventions for showing syntax statements.

A sample statement follows:

COMMAND KEYWORD1 [KEYWORD2 | KEYWORD3] KEYWORD4={YES | NO} fileName...

The following table explains conventions for syntax statements and provides examples:
<table>
<thead>
<tr>
<th>Convention</th>
<th>Example</th>
</tr>
</thead>
<tbody>
<tr>
<td>Items in italic type represent variables that you</td>
<td>alias</td>
</tr>
<tr>
<td>must replace with a name or value. If a variable</td>
<td>databaseDirectory</td>
</tr>
<tr>
<td>is represented by two or more words, initial</td>
<td>serverHostName</td>
</tr>
<tr>
<td>capitals distinguish the second and subsequent words.</td>
<td></td>
</tr>
<tr>
<td>Brackets indicate optional items. Do not type</td>
<td>[tableName, columnName, field]</td>
</tr>
<tr>
<td>the brackets when you enter the option. A</td>
<td>[-full, -incremental, -level]</td>
</tr>
<tr>
<td>comma means that you can choose one or more of the listed options. You</td>
<td></td>
</tr>
<tr>
<td>must use a comma to separate the options if you choose more than one</td>
<td></td>
</tr>
<tr>
<td>option.</td>
<td></td>
</tr>
<tr>
<td>Braces indicate that at least one of the enclosed items is required. Do</td>
<td>{DBDName</td>
</tr>
<tr>
<td>not type the braces when you enter the item.</td>
<td>UNLOAD device={disk</td>
</tr>
<tr>
<td>A vertical bar means that you can choose only one of the listed items.</td>
<td>{-a</td>
</tr>
<tr>
<td>In the example, you would choose either commit or cancel.</td>
<td>{commit</td>
</tr>
<tr>
<td>An ellipsis indicates that you can repeat the previous item or items</td>
<td>columnName...</td>
</tr>
<tr>
<td>as many times as necessary.</td>
<td></td>
</tr>
</tbody>
</table>
Overview of BMC Intelligent Capping for zEnterprise

The BMC Intelligent Capping for zEnterprise (iCap) product helps you optimize capacity on IBM z/OS LPARs to reduce the cost of running workloads. iCap can dynamically reallocate CPU capacity as needed, based on optimization policies that you define.

An iCap policy is a set of rules that establishes your objectives for adjusting:

- Defined capacities (DCs) of LPARs
- Group capacity limits (GCLs)

Based on your policy rules, iCap performs two main actions:

- Manages and prioritizes workloads by selectively distributing Millions of Service Units (MSUs) across the LPARs and capacity groups that your policy defines. For example, iCap can increase service units on LPARs that are running high-priority workloads.
- Ensures that the sum of DCs and GCLs in a managed LPAR set never exceeds the MSU limit that you set.

**Note**

iCap is a component of the BMC Cost & Performance Optimization for System z suite, which also includes the BMC Cost Analyzer for zEnterprise product and the BMC Subsystem Optimizer for zEnterprise product. Cost Analyzer identifies where you can realize cost savings through managing and optimizing LPAR capacities and workloads.

To collect system information for building iCap policies, you can either access the Cost Analyzer reports for iCap or run iCap in observe mode. For more information about Cost Analyzer reports, see “Collecting system information from Cost Analyzer” on page 43.
How iCap works

As a cost-management product, iCap helps you optimize IBM product license costs that are based on a sub-capacity Monthly License Charge (MLC). This topic explains sub-capacity pricing and how iCap affects it.

For more information, view the Quick Course "Intelligent Capping for zEnterprise - Getting Started."

Overview of sub-capacity pricing

IBM bases sub-capacity pricing on the four-hour rolling average (4HRA) utilization of z/OS LPARs recorded during the period of a month. A monthly period runs from 00:00 on the second day of the month through midnight (24:00) on the first day of the next month.

The unit of measurement for LPAR use is Millions of Service Units (MSUs) used per hour.

Note

MSUs are also called Software MSUs (as opposed to Hardware MSUs).

MSUs are calculated as follows:

\[
\text{MSUs} = \text{CPU seconds per hour} \times \text{Software Service Units coefficient}
\]

In this equation, \textit{CPU seconds} refers to those used by general-purpose CPs in a z/OS LPAR. The Software Service Units coefficient is reported in field SMF70CPA of the SMF type 70 record.

The Software Service Units coefficient determines the MSU rating of an IBM mainframe processor. However, IBM uses MSUs only to gauge software pricing; consequently, you cannot use MSU ratings as a capacity metric. You can use this information for cost analysis and planning, but not for capacity planning or performance reporting.

For more information about IBM sub-capacity pricing, see http://www-03.ibm.com/systems/z/resources/swprice/subcap/zos.html.
How the product optimizes capacity to lower costs

As a component of the BMC Cost & Performance Optimization for System z suite, iCap:

- Monitors the 4HRA
- Actively manages the MSU capacity limits for all z/OS LPARs and capacity groups on the central processor complex (CPC), or for only the z/OS LPARs and capacity groups specified in the active policy
- Optimizes the defined capacity (DC) and group capacity limit (GCL) of managed LPARs and capacity groups on a CPC
- Dynamically aligns MSU allocations based your policy. iCap considers the current CPU utilization of an LPAR and distributes MSUs according to priority, or a combination of priority and low importance workload. For more information, see “Overview of workload prioritization” on page 16.
- Transfers MSUs between:
  — Individual LPARs
  — Capacity groups

Data collection

iCap collects data once every minute across all of the LPARs and capacity groups included in a policy.

The collected data includes:

- The 4HRA for individual LPARs and capacity groups, and the combined 4HRA for all LPARs and capacity groups
- The actual MSUs consumed per interval
- The DCs of LPARs, and the GCLs of capacity groups
- The percentage of MSU limit that each LPAR and capacity group is using, and the total usage for the entire policy
- The percentage of low importance work running on an LPAR or capacity group
Overview of workload prioritization

When the combined 4HRA for managed LPARs and capacity groups exceeds the specified MSU limit, at least one LPAR or capacity group is subject to capping. iCap allows LPARs and capacity groups running high importance workloads to gain additional MSUs at the expense of those running low importance workloads.

The order in which managed LPARs and capacity groups receive MSUs can be determined in the following ways:

- A combination of priority and low importance workload
  iCap considers the priority of an LPAR or capacity group and the amount of low importance workload running on the LPAR or capacity group. iCap uses Workload Manager (WLM) Tuning to collect information about low importance work.

- Priority only
  iCap considers only the priority of an LPAR or capacity group, without using WLM Tuning.

For more information about using the WLM Tuning parameter, see “Scenarios” on page 81.

iCap modes

iCap can run in the following modes:

- Observe
  Observe mode does not require policies. In this mode, iCap collects data, monitors MSU usage, and displays data in views. If you are new to creating policies, this information can help you build a policy.

- Message
  Message mode is similar to observe mode but does require a policy. In this mode, iCap messages display the DC or GCL values that the product would set if it were running in manage mode. You can use message mode to preview the effects of a policy without actually changing anything.

- Manage
  In manage mode, iCap applies the selected policy. That is, the product actively manages DCs and GCLs for LPARs and capacity groups defined in the policy, and ensures that their sum does not exceed the MSU limit.
iCap interface options

iCap gives you the flexibility to select the user interface that you prefer:

- The MainView Explorer graphical user interface (GUI)
- A windows-mode interface based on ISPF

This topic provides an overview of MainView Explorer and the windows-mode interface. For more information, see the *MainView User Guide*.

**MainView Explorer**

With MainView Explorer, you can build views from comprehensive menus with the ease of a mouse click. You can display data in enhanced chart types, such as topology diagrams, histograms, and three-dimensional bar charts.

**Figure 1: MainView Explorer sample view**
Also, you can format and arrange your data in ways that are unmatched in a standard ISPF session. For example, you can detach a view into a separate window, move columns and fields by clicking and dragging them, and sort columns with the click of a mouse.

**Related Information**

- “Overview of iCap navigation in MainView Explorer” on page 34
- “MainView Explorer charts” on page 35
- “View containers” on page 36

**Windows-mode ISPF interface**

Users who prefer an ISPF interface can use windows mode, in which the data is organized into a tabular view. You can split the screen both vertically and horizontally. Windows mode offers experienced ISPF users a familiar ISPF environment and powerful features for building and formatting views.

**Figure 2: Windows-mode ISPF interface sample view**

![Windows-mode ISPF interface sample view](image)

**Product architecture**

iCap is based on the MainView Infrastructure (MVI) architecture.

iCap uses MVI to:

- Manage the overall address space
Conduct cross LPAR communications
Provide the user interface
Maintain history data
Define alarms

MainView architecture

You can run iCap on one of the following MainView interfaces:

- Windows mode ISPF interface
  In windows mode, the product runs in the following address spaces:
  - Coordinating address space (CAS)
  - Product address space (PAS)
  - User address space (UAS)
  The Runtime Component System (RTCS) runs alongside these address spaces. It provides programming services to all CASs, PASs, and UASs.

- MainView Explorer GUI interface
  MainView Explorer is a desktop GUI that lets you access MainView products through your web browser, or by installing the interface as an application in a local directory. MainView Explorer consists of the following components:
  - Client
    The client runs as a signed Java applet under a web browser.
  - Host server
    The host server runs as an address space on an IBM z/OS system.

Note
Alarms are available to all products that use the MainView Infrastructure. You can create alarms that trigger an automatic alert or action, and to provide IBM MVS console messages. For more information about iCap alarms, see “Setting alarms” on page 38.
iCap architecture

As illustrated in the following figure, iCap architecture consists of the following components:

- A master PAS and agent PASs
  The iCap master PAS runs on one of the managed LPARs. All other managed LPARs run agent PASs. (For more information about choosing a system to run the iCap master PAS, see “Master PAS guidelines” on page 26.)

- Data collectors
  A data collector on each LPAR collects information about MSU usage, including the 4HRA and Workload Manager (WLM) importance data.
  WLM importance data refers to the number of MSUs consumed by low importance work. By default, service class periods with importance values of 5 and below are considered low importance work.
  The data collector sends this information to the master PAS.

- An assessor
  The assessor dynamically reallocates CPU capacity based on policy rules.

In addition, iCap uses the IBM Base Control Program internal interface (BCPii) function. iCap uses BCPii to allow z/OS system applications to access the LPAR management facilities on the IBM Hardware Management Console (HMC) system. Specifically, iCap modifies defined capacity (DC) and group capacity limit (GCL) only.
Figure 3: iCap architecture

Requirements

This topic lists system requirements. It also specifies requirements for authorizing iCap to work with the IBM BCPii function and the IBM RACF product.

System requirements

iCap requires the following system resources:

- The iCap master PAS requires Version 1.13 or later of the IBM z/OS system.
- The iCap agent PASs require z/OS 1.12 or later.
- The IBM z/OS BCPii component—Version 1.13 (HWIBCPIISTC) or later—must be running on the system where the master PAS runs.
Note
If you want to run iCap in manage mode, the BCPii address space must be up and running before you begin to use iCap.

By default, the master and agent PASs assign themselves to the SYSSTC WLM service class. BMC recommends that you also assign the CASs to which the PASs are connected to the SYSSTC service class.

Note
With Version 2.1 z/OS, you should not allow the IBM Capacity Provisioning (CPM) component to manage and modify the defined capacity of an LPAR or the group capacity limit of a capacity group. This will affect the functionality of iCap. Also, iCap does not support IBM z/VM guests.

BCPii and RACF security requirements

This topic lists requirements for authorizing iCap to work with the following resources in the IBM z/OS environment:

- IBM Base Control Program internal interface (BCPii) function
- IBM Resource Access Control Facility (RACF) product

BCPii security requirements

To use the BCPii function, you must first set up the necessary authorization for iCap. A BCPii application requires:

- RACLIST specification for the Facility class
- Read authority to the HWI.APPLNAME.HWISERV profile in the Facility resource class
  This profile defines the applications that can use the BCPii services.
- Access authority to the following profiles in the Facility resource class:
  - HWI.TARGET.netID.nau (for setting values related to the CPC or the activation profile)
Granting BCPii access to these resources enables the iCap BCPii Routine to adjust an LPAR’s DC or a capacity group’s GCL in your Hardware Management Console (HMC) Facility.

**Note**
For more information about BCPii installation and setup, see the IBM manual *MVS Programming*.

## RACF security requirements

iCap has the following requirements related to RACF security:

- A RACF security definition is required for each LPAR or capacity group that the iCap master PAS monitors.

- The ID (user ID) element must be defined in the RACF security definition.

  The assigned user ID authorizes the master PAS to adjust the DC of an LPAR, or the GCL of a capacity group in your HMC.

### Examples of RACF security definitions

As the following examples show, you can create RACF security definitions to provide either specific access or general access.

**Example**

Provides general RACF security authority access to the Facility of HWISERV:

```
RDEFINE FACILITY HWI.APPLNAME.HWISERV UACC(NONE)
PERMIT HWI.APPLNAME.HWISERV CLASS(FACILITY) ID(userID) ACCESS(READ)
SETROPTS RACLIST(FACILITY) REFRESH
```

**Example**

Provides specific RACF security access to a particular resource, in this case an LPAR image:

```
RDEFINE FACILITY HWI.APPLNAME.HWISERV UACC(NONE)
PERMIT HWI.TARGET.IBM390PS.BRYALS.SJSB CLASS(FACILITY) ID(DYCSTC) ACCESS(UPDATE)
SETROPTS RACLIST(FACILITY) REFRESH
```

The element `IBM390PS.BRYALS.SJSB` refers to the `netID.nau.imageName` of the LPAR that is being monitored by the iCap master PAS. You can find the `netID.nau.imageName` element in your HMC by accessing the Support Element (SE).
Example
Defines user IDs BCPII and HWISTART to the security product (which is useful for sites that do not have specific definitions for every user):

```
ADDUSER BCPII DFLTGRP(SYS1)
RDEFINE STARTED BCPII.** STDATA(USER(BCPII) GROUP(SYS1))
ADDUSER HWISTART DFLTGRP(SYS1)
RDEFINE STARTED HWISTART.** STDATA(USER(BCPII) GROUP(SYS1))
SETROPTS RACLIST(STARTED) REFRESH
```

Where to go from here

After you finish installing and customizing the product (as instructed in the Installation System documentation), you can proceed as follows:

1. Perform administrative setup tasks to prepare iCap for use (“Setting up iCap” on page 25).


3. Create and manage policies for controlling capacity at your site (“Creating and managing policies” on page 41).
Setting up iCap

You install the iCap product and customize it as instructed in the Installation System documentation. This chapter explains how to prepare the product for use by setting up data collection, starting the iCap master and agent PASs, and installing alarms. This chapter also explains how to access iCap using a windows-mode interface based on ISPF and with the MainView Explorer GUI.

Defining the recording interval for historical data collection

Use the following procedure to specify the recording interval for historical data collection.

1 In BBIPARM member DYCTIR00, define the recording interval and synchronization by using the following syntax:

   INTERVAL INTVAL="{SMF | n}" SYNCVAL="n" SHORT="{YES | NO}"

   **WARNING**
   Values must be enclosed in quotation marks.

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Description</th>
</tr>
</thead>
</table>
| INTVAL="{SMF | n}" | Defines the length of the recording interval
| | Valid values are:
| | ■ SMF — SMF recording interval
| | ■ n — a number of minutes between 1 and 60
| | This number must be 1 or an integer factor of 60 (1, 2, 3, 4, 5, 6, 10, 12, 15, 20, 30 or 60).
| | The default is 5 minutes. |
### Parameter Description

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>SYNCVAL=&quot;n&quot;</td>
<td>Defines when to start the first interval, in number of minutes after the hour. Valid values are 0 through the value of INTVAL. If INTVAL=&quot;SMF&quot;, iCap uses SYNCVAL=&quot;0&quot; (the default).</td>
</tr>
<tr>
<td>SHORT=&quot;{YES</td>
<td>NO}&quot;</td>
</tr>
</tbody>
</table>

**Example**

To set the interval to 10 minutes, starting at 5 minutes after the hour:

```plaintext
INTERVAL INTVAL="10" SYNCVAL="5" SHORT="YES"
```

iCap has six 10-minute intervals every hour, at 5, 15, 25, 35, 45, and 55 minutes after the hour.

---

### Starting the iCap master and agent PASs

This topic explains how to start and stop the iCap master and agent product address spaces (PASs).

The iCap master PAS collects data from the entire CPC and manages the LPARs and capacity groups that are running on the CPC. In most cases, each CPC has only one master PAS. For more information, see “Policy guidelines” on page 41.

An iCap agent PAS is a simplified version of the master PAS. Agent PASs collect data and return it to the master PAS. Multiple agent PASs can run on a CPC. For more information about how the PASs run in the iCap environment, see “MainView architecture” on page 19.

**Note**

BMC recommends that you automate starting and stopping the PASs. For more information, see the automated operations documentation for your product.

---

### Master PAS guidelines

When choosing a system to run the iCap master PAS, choose one that meets the following guidelines:

- Runs IBM z/OS Version 1.13 or later
Starting the iCap master PAS

Use the following procedure to start the master PAS.

Before you begin

Verify that you created the JCL for starting the iCap master PAS. You should have created this JCL during customization, as instructed in the MainView Customization Reference. For an example of the JCL, see “Example of master PAS JCL” on page 91.

To start the master PAS

1. From the operator console, enter the START command:
   - To start in observe mode (the required mode if you have not yet created a policy), enter:
     ```plaintext
     START procName,SSID=ssid,PASMODE=OBSERVE
     ```
     *procName* is the name of the master PAS startup procedure. *ssid* is the subsystem ID of the CAS to which the PAS should connect (default BBCS).
   - To start in message or manage mode (these require a policy), enter:
     ```plaintext
     START procName,SSID=ssid,POLICY=policyName,PASMODE={MSG | MANAGE}
     ```

   **Note**
   For manage mode, an active agent must be running on every LPAR and capacity group defined in the policy. If an agent is not active on a managed LPAR or a managed group member during the first four hours of the master PAS, the master PAS will switch to observe mode.

2. To verify that the PAS started successfully, look for this console message:

   ```plaintext
   DYCMN110I Intelligent Capping for zEnterprise vv.rr.mm - PUT level nnnnnnnn initialized
   ```
Starting the iCap master and agent PASs

Related Information

- “iCap PAS started task parameters” on page 28
- “iCap modes” on page 16
- “Changing the iCap mode” on page 71

Starting the iCap agent PAS

Use the following procedure to start the agent PAS.

Before you begin

Verify that you created the JCL for starting the iCap agent PAS. You should have created this JCL during customization, as instructed in the MainView Customization Reference. For an example of the JCL, see “Example of agent PAS JCL” on page 92.

To start the agent PAS

1. From the operator console, enter the START command:

   ```
   START procName,SSID=ssid
   ```

   `procName` is the name of the agent PAS startup procedure. `ssid` is the subsystem ID of the CAS to which the PAS should connect (default BBCS).

2. To verify that the PAS started successfully, look for this console message:

   ```
   DYCMN110I Intelligent Capping for zEnterprise vv.rr.mm - PUT level nnnnnnnnn initialized
   ```

iCap PAS started task parameters

The following table describes the started task parameters for the iCap master and agent PASs.
Specifying an invalid parameter or parameter value will cause the PAS to terminate with an error message. In some cases, specifying an invalid combination of parameters will cause the PAS to issue a warning but continue running as an agent.

**Note**
You must specify values for all of the parameters that have no default value.

### Table 1: Started task parameters for iCap

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Default value</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>PASMODE=</td>
<td>OBSERVE</td>
<td>The mode in which you want to run iCap</td>
</tr>
<tr>
<td>{OBSERVE</td>
<td>MSG</td>
<td>MANAGE}</td>
</tr>
<tr>
<td>POLICY=policyName</td>
<td>No default</td>
<td>The name of the policy (up to eight characters long)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>If running the product in message or manage mode, you must specify a policy name; otherwise, the PAS will terminate. For observe mode, a policy is not required.</td>
</tr>
<tr>
<td>SSID=ssid</td>
<td>BBCS</td>
<td>The subsystem ID of the coordinating address space (CAS) to which the iCap PAS should connect</td>
</tr>
<tr>
<td></td>
<td></td>
<td>The maximum length is four characters.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>The CAS is started as a separate address space from the iCap PAS and must be initialized before the iCap PAS is initialized. For a PAS to connect to a CAS, the SSID values in the CAS and PAS startup procedures must be the same.</td>
</tr>
<tr>
<td>SRVCLASS=</td>
<td>SYSSTC</td>
<td>Whether the service class is set by the WLM policy or SYSSTC</td>
</tr>
<tr>
<td>{SYSSTC</td>
<td>WLM-RULE}</td>
<td><strong>Note</strong>: BMC recommends that the iCap master PAS use the default value, SYSSTC.</td>
</tr>
<tr>
<td>TYPE={MASTER</td>
<td>AGENT}</td>
<td>AGENT</td>
</tr>
<tr>
<td></td>
<td></td>
<td><strong>Note</strong>: You should have only one master PAS in an iCap environment. For more information, see “Policy guidelines” on page 41.</td>
</tr>
</tbody>
</table>
### Stopping an iCap PAS

If you need to stop an iCap PAS for any reason, use the following procedure.

1. Verify the procedure name for the PAS that you want to stop.
2. From the system operator console, enter the STOP (or P) command:

   \[ P \text{ procName} \]

**Note**

BMC recommends using the STOP command rather than the CANCEL command to stop the PAS.

### Accessing iCap

This topic explains how to access iCap with either a windows-mode interface based on ISPF or the MainView Explorer GUI.

**Note**

If you are new to MainView interfaces, see the *MainView User Guide* for full descriptions of both interfaces.

### Accessing iCap (windows-mode interface)

The procedure for accessing iCap in windows mode varies slightly based on whether you are using MainView. Use one of the following procedures.
To access iCap in windows mode (if using MainView)

1. On the MainView Selection Menu, select O (Cost Optimization).

2. On the BMC Cost Optimization Selection Menu, select 1 (BMC Intelligent Capping for zEnterprise).

   The EZICAP menu is displayed (“Overview of the EZICAP menu” on page 31).

To access iCap in windows mode (if not using MainView)

1. Run the MCO CLIST.

2. On the BMC Cost Optimization Selection Menu, select 1 (BMC Intelligent Capping for zEnterprise).

3. If you are not connected to the CAS, select the CAS SSID for iCap from the displayed list of CAS regions.

   The EZICAP menu is displayed (“Overview of the EZICAP menu” on page 31).

4. If not already connected to the system that is running the iCap master PAS, you can switch to that system in one of the following ways:

   - Type PLEX on the COMMAND line and press Enter. Then select the iCap master PAS from the displayed list.

   - Type CONTEXT PASName on the COMMAND line and press Enter.

     Example

     CONTEXT DYCJ connects to the PAS running in the context DYCJ.

Overview of the EZICAP menu

Products that use the windows-mode interface provide easy menus to make it easier to access the information that you need. All easy menu names begin with EZ.

The options on the easy menus are prefixed with either a period (.) or a greater-than sign (>). A period indicates that the option hyperlinks directly to a view. A greater-than sign indicates that the option hyperlinks to another menu.

The EZICAP menu (Figure 4 on page 32) is displayed when you start iCap. From EZICAP, you can access:

- LPAR and capacity group information
- Current and historical information about policies
The Policy Administration user interface (UI)

iCap logs

Figure 4: EZICAP menu

Accessing iCap (MainView Explorer)

Use the following procedure to access iCap with MainView Explorer.

You can run MainView Explorer sessions either in a web browser or from a directory on your computer. For more information about starting MainView Explorer and setting a context, see the MainView User Guide.

To access iCap through MainView Explorer

1. At the Windows security prompt for BMC, click OK (or Yes).
2. In the Logon dialog box, type your TSO user ID and the corresponding password in the User ID and Password boxes.
3. If the Allocate user datasets for personal use check box is available, indicate whether to allocate user data sets to contain your customized views and configurations (instead of saving them to the site-wide data sets):

   Note
   If you do not see this box, your site administrator disabled allocation of user data sets; you can skip to Step 5 on page 33.

   - If you do not want to allocate user data sets, clear the Allocate user datasets for personal use box and all boxes below it.
   - If you want to allocate user data sets, select the Allocate user datasets for personal use check box.
4 If you selected Allocate user datasets for personal use in Step 3 on page 32, provide the following information:

a In the Template for user datasets box, specify the template for your data set names.

The template can consist of your TSO prefix (%UPREFIX), your user ID (%USERID), and the data set name (%BBDEF). You can arrange them in any order. Only %BBDEF is required, and it resolves to BBVDEF or BBCDEF (BBVDEF for customized views, and BBCDEF for customized configurations). If you do not specify %BBDEF in your template, BBVDEF or BBCDEF is added to the data set name as the low-level qualifier.

**Note**
If your site administrator specified a template in the MainView Explorer host server startup procedure, the Template for user datasets box and the Insert token boxes are grayed out. If you choose to allocate user data sets, they will be named according to the site-defined template.

**Example**
The following examples show valid templates and the user data sets that are allocated if the user ID is MYID01:

- %USERID.TEST.%BBDEF (or %USERID.TEST) allocates MYID01.TEST.BBVDEF (and BBCDEF).

- PROD.U%BBDEF.%USERID allocates PROD.UBBVDEF.MYID01 (and UBBCDEF).

- %USERID.&SYSNAME..%BBDEF allocates MYID01.SYSC.BBVDEF (on SYSC).

Including the system variable &SYSNAME., as shown in the last example, enables you to use the same data set template on different system images.

b To insert the %USERID token in the template, select the Insert token for User ID box.

c To insert the %UPREFIX token in the template, select the Insert token for User prefix box.

d If the Insert token for User prefix box is checked (either by you or because of the site-wide template), type your TSO user prefix in the User prefix field.

5 Click OK.

MainView Explorer opens in a separate window. The window that contains the splash screen must remain open during the MainView Explorer session.
Overview of iCap navigation in MainView Explorer

The MainView Explorer console consists of the following frames. Each frame provides specific functions related to viewing or locating data.

- **Navigation**
  
  This frame consists of the Context tree and the Product tree. Icons or nodes on the tree represent subsystems, system images, MainView products, and views.

- **View**
  
  This frame displays open views as tabbed pages. Each tab contains the name of the view and an icon that indicates the type of view.

- **Messages**
  
  This frame displays a log of product messages, including requests to the host server.

When you access iCap in MainView Explorer, you can select the iCap master PAS from a product tab on the Context tree in the Navigation frame. Then, you can access the EZICAP view by expanding the MENU folder in the Product tab, and selecting EZICAP-iCap Primary Menu.

Figure 5: MainView Explorer console
MainView Explorer charts

From MainView Explorer, you can display view data in various chart types. Charts depict the hierarchical relationships between objects and present their current data.

For example, the following iCap charts were generated from the POLOVER view, using the Current MSU/hr (the X value) and the 4HRA (the Y value).

Figure 6: 2D line chart

![2D line chart]

Figure 7: 2D bar chart

![2D bar chart]
**View containers**

In MainView Explorer, you can use *view containers* to display multiple views and charts in one tab.

A view container is similar to a screen in windows mode. You can open multiple view containers in separate tabs and add them to the stack of panes or detach them (just like regular views). For more information about view containers, see the *MainView User Guide*.

iCap provides the following out-of-the-box view containers:

<table>
<thead>
<tr>
<th>Name</th>
<th>Type</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>4HRA and Current MSU/hr vs MSULIMIT</td>
<td>2D line</td>
<td>The policy’s combined 4HRA vs. MSU limit Three lines show the trend over time of:</td>
</tr>
<tr>
<td></td>
<td></td>
<td>■ The combined 4HRA of all policy LPARs and groups</td>
</tr>
<tr>
<td></td>
<td></td>
<td>■ The current MSU per hour</td>
</tr>
<tr>
<td></td>
<td></td>
<td>■ The MSU limit</td>
</tr>
<tr>
<td></td>
<td></td>
<td>This chart is based on the POLOVER view's *Policy row (policy totals row).</td>
</tr>
<tr>
<td>4HRA by LPARs/Groups</td>
<td>Stacked, 2D column</td>
<td>4HRA by all LPARs and groups included in the policy This chart is based on the POLOVER view's LPAR or Group column.</td>
</tr>
<tr>
<td>Service Units by Importance–Policy</td>
<td>Stacked, 2D area</td>
<td>Distribution of MSUs by importance This chart is based on the POLIMP view's *Policy row (policy totals row).</td>
</tr>
</tbody>
</table>
Figure 8: Example of charts based on the POLOVER view

Figure 9: Example of Service Units by Importance–Policy chart
Setting alarms

iCap ships with product-specific alarms that can alert you when system resources are overused. You use MainView Alarm Manager to set these alarms, or to create your own alarms.

For example, the alarms that iCap distributes can notify you when conditions exist that could negatively impact cost management, such as the combined 4HRA reaching 95% of the MSU limit, or an LPAR or group being soft capped.

Overview of MainView Alarm Manager

MainView Alarm Manager is part of the MainView Infrastructure and runs within the coordinating address space (CAS). MainView Alarm Manager can monitor multiple systems simultaneously: if installed on one system, it keeps track of your entire sysplex.

With MainView Alarm Manager, you can manage your environment by exception. You can create an alarm for a view and specify thresholds for any data element within that view. Subsequently, if the data in the view matches the alarm, an alarm report is generated. You can view alarm definitions and reports from the EZALARMS view.

For more information about MainView Alarm Manager, see the MainView Alarm Management Guide. For more information about alarm customization and reporting, see the MainView Customization Reference manual.

Setting the iCap distributed alarms

iCap ships distributed alarms in HLQ.BBACTDEF. In order to use them, you must add them to the alarm definition file system. Use the following procedure.

1. In iCap, type ALRMDIST on the COMMAND line and press Enter.
The ALRMDIST view lists the iCap distributed alarms (Figure 10 on page 39).

Figure 10: Example of ALARMDIST view

![Image of ALARMDIST view]

The following table describes each alarm.

Table 2: Distributed alarms in iCap

<table>
<thead>
<tr>
<th>Alarm name</th>
<th>Description</th>
</tr>
</thead>
</table>
| DYC4HR00    | The 4HRA for an LPAR or group has exceeded the assigned DC or GCL.  
This alarm is built using the 4HRA %DCGCL column for the *Policy row of the POLOVER view. |
| DYCMSL00    | The combined 4HRA equals or exceeds 98% of MSU limit.  
This alarm is built using the %MSULIMIT column for the *Policy row of the POLOVER view. |
| DYCMSL01    | The combined 4HRA equals or exceeds 95% of MSU limit.  
This alarm is built using the %MSULIMIT column for the *Policy row of the POLOVER view. |
| DYCMSL02    | The combined 4HRA equals or exceeds 85% of MSU limit.  
This alarm is built using the %MSULIMIT column for the *Policy row of the POLOVER view. |

2 Type A or ADD in the CMD column beside each alarm that you want to add, and press Enter.

If needed, you can use MainView Alarm Manager to customize the iCap distributed alarm definitions to meet your specific monitoring needs; you can also create your own alarms by using the MAKEAlarm line command. For more information, see the MainView Alarm Management Guide.

**Note**

Provisions must be made to use the distributed alarms if the iCap master PAS is moved to new system.
Creating and managing policies

This chapter explains how to collect system information by using iCap reports in Cost Analyzer, and how to create and activate a policy via the Policy Administration user interface (UI). This chapter also explains how to display policy details, modify policy definitions, and view the iCap logs.

Overview of policies

An iCap policy is a set of rules that you specify to manage group capacity limits (GCLs) and the defined capacities (DCs) of LPARs.

You can collect system information for building iCap policies in one of the following ways:

- If you have the Cost Analyzer product installed, access the Cost Analyzer reports for iCap to get the system information that you need.
- If you do not have Cost Analyzer installed, run iCap in observe mode.

Related Information

- "Collecting system information from Cost Analyzer " on page 43
- "Creating a policy" on page 49
- " iCap modes" on page 16

Policy guidelines

Consider the following guidelines when working with policies:
■ Each CPC requires its own iCap master PAS. Typically, you should have one master PAS per CPC.

■ BMC does not recommend running multiple iCap environments on the same CPC. This type of configuration would severely limit the product's ability to share MSUs across the LPARs and groups, as MSUs cannot be moved across environments.

    Note
    For testing purposes, if you want to run multiple iCap environments on a CPC, note that a particular LPAR or capacity group can be managed by only a single active policy.
    Also, if multiple master PASs exist on one CPC, each master PAS must have a unique SSID.

■ A single policy can apply to multiple LPARs and capacity groups.
   You can define multiple policies for the same set of managed LPARs and capacity groups, but only one of those policies can be active at a time.

■ On any LPAR, only one iCap PAS (master or agent) can be active at any time.

■ You can include the members of a capacity group in a policy as individually managed LPARs, but the following restrictions apply:

   — You can add group members to a policy, but you must include all of the group members in the policy.

    Note
    If you add group members to the policy (instead of adding the group itself), the iCap manages the LPARs as if they are individual LPARs and not part of the group.
    This configuration might be useful if the CPC has only a few LPARs, and they are contained in a group. (A policy definition requires a minimum of two LPARs and/or groups.) In that case, you could add individual LPAR members to a policy rather than removing the LPARs from the group.

   — If you add group members to a policy, you cannot add the group itself.

   — If iCap is managing the members of a group and you want to add new LPARs to that group, BMC recommends that you add the LPARs to the policy before you add the members to the group on the hardware management console.
    For more information, see “Adding an LPAR to a group in the active policy” on page 70.

■ iCap does not support IBM z/VM guests; iCap supports only LPARs that run on a native IBM z/OS system. Starting an iCap PAS on a z/OS system running as a z/VM guest causes the PAS to terminate immediately.
Collecting system information from Cost Analyzer

Before creating a policy, you need to collect system information that can help you build the most effective policy. Using the BMC Cost Analyzer for zEnterprise product you can generate reports that provide input values for iCap policies.

This topic explains how to access, generate, and print iCap reports in Cost Analyzer. It also explains how to use the information from these reports to build a policy.

**Note**
Alternatively, you can obtain system information by running iCap in observe mode, as discussed in “iCap modes” on page 16.

Accessing the iCap Configuration dialog in Cost Analyzer

Access the iCap Configuration dialog in the Cost Analyzer product to generate an iCap report.

**Note**
Before you can access the iCap Configuration dialog, the administrator for the Cost Analyzer product must assign you as a member of the iCap user group for Cost Analyzer. For more information, see the section about user groups in the Cost Analyzer for zEnterprise User Guide.

1. On the toolbar, click the **iCap Configuration** button.

   The iCap Configuration dialog is displayed.

   To generate a report, see “Generating iCap reports in Cost Analyzer” on page 43.

Generating iCap reports in Cost Analyzer

This topic explains how to generate an iCap report in Cost Analyzer. iCap reports provide metrics about a particular CPC during a specific month. You can set report parameters to determine the effects of adjusting the DC and delaying workloads of low importance.
You can generate these reports for individual LPARs, a group of LPARs, or any subset of LPARs. Cost Analyzer then uses the MSU utilizations from the cost models of the specified month to generate a report similar to the following sample.

**Figure 11: Sample iCap report**

![iCap Configuration Tool](image)

For a list of parameters and their descriptions, see “iCap report parameter descriptions” on page 46. For more examples, see “Examples of iCap reports from Cost Analyzer” on page 75.

You can change the report parameters to determine the combined effect of reducing the DC for any set of LPARs and/or delaying low-importance workloads. The resulting report shows the contribution of low-importance workloads to the 4HRA—for the entire set of LPARs and for each individual LPAR. Using this data, you can set input parameters for iCap policies. It is expected that you will generate numerous reports before you achieve the desired results.

**Note**

In some cases, only partial monthly data is available (for example, for a report based on the current month). Partial data might compromise the report’s accuracy, or fail to generate the expected results.
To generate a report

1 In the **Description** field, enter a description to be displayed at the top of the report.

Use a description that will sufficiently distinguish this report from others.

2 In the **Select Usage Month** field, use the calendar to select the month and year that you want to use as the source of the report data.

3 In the **Select CPC** field, select the CPC for which you want to generate the report.

You can select only one CPC at a time.

4 In the **Select Managed Objects** field, select the managed objects for which the report should collect data.

The dialog lists the managed objects that correspond to the selected CPC. You can select LPARs, groups, and group members from the list of managed objects. Hover the mouse over any group in the list to display the LPARs that are contained in that group.

If you select a capacity group from the list, all LPARs that are members of that group are automatically selected. You can also select the group members to be managed as individual LPARs by selecting the **Members** check box instead of the **groupName** checkbox.

For more information about using individual group members in a policy, see “Policy guidelines” on page 41.

5 In the **Low-Importance Level to Delay** field, select the workload importance level at which to begin delays if the jobs of that workload surpass the maximum allowed MSUs.

For example, if you select level 3, any jobs with a workload importance of 3, 4, 5, and Discretionary importance will be delayed if they surpass the maximum allowed MSUs.

In the generated report, this value determines the Low-Importance Contribution %. If you specify 4, the Low-Importance Contribution % will probably be higher than if you specify 5. If you want to increase the amount of low importance work on your managed objects, specify a higher value for this field.

---

**Note**

If an LPAR or group has no low importance work, or does not provide type 72 records (based on Workloads by Importance), the low importance percentage is set to zero.
On the POLIMP view, you can see the amount of importance work (in MSUs) per importance level for each LPAR and group on the CPC. This view shows the amount that was consumed in the last 5 minutes.

6 In the % to Reduce from Peak MSUs field, enter the percentage by which you want to decrease the peak MSU utilizations of the usage month.

For example, if your peak was 210 MSUs and you want to decrease it by 5 percent for the specified usage month, enter 5. If you set % to Reduce from Peak MSUs to 0, the report displays the total peak 4HRA for the managed LPARs and groups.

The value that you set for % to Reduce from Peak MSUs should not be higher than the Low-Importance Contribution %. For example, if you want to decrease the maximum allowed MSUs by 5 percent, adjustment can take place only if the Low-Importance Contribution % is 5 or higher.

If the Low-Importance Contribution % is too low (less than the value specified for % to Reduce from Peak MSUs), you can increase the percentage of low-importance work on the CPC by specifying a higher value for Low-Importance Level to Delay. For more information about the Low-Importance Contribution %, see Step 5 on page 45.

7 Select Click to generate report.

Cost Analyzer displays the generated report.

8 (optional) To convert the report to a PDF, complete this step:

a Click Generate PDF Report.

b Click Open if you want to view the PDF now, or Save As to save it to your local computer.

Note BMC plans to include the Save As XML Document feature in a future release of BMC Cost Analyzer for zEnterprise.

iCap report parameter descriptions

You can use the values generated in iCap reports from Cost Analyzer to set input parameters for iCap policies.

Table 3 on page 47 describes the parameters of the iCap report:
Table 3: iCap report parameters

<table>
<thead>
<tr>
<th>Report parameters</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>CPC Name</td>
<td>Name of the CPC</td>
</tr>
<tr>
<td>ID</td>
<td>The last four digits of the serial number of the CPC</td>
</tr>
<tr>
<td>Billing Year/Month</td>
<td>Usage month you selected for the report</td>
</tr>
<tr>
<td>Peak Interval</td>
<td>The date and time the Peak Interval occurred during the usage month for the managed objects you selected in the report</td>
</tr>
<tr>
<td>Low-Importance Level to Delay</td>
<td>Specified low-importance level to delay Workloads with the specified importance level will be delayed if the 4HRA MSU usage surpasses the Maximum MSUs Allowed. That is, if 4 is specified, workloads with an importance value of 4 and below are considered to be low importance. These workloads will be delayed if the MSU usage exceeds the Maximum MSUs Allowed. This parameter corresponds to the Low Importance parameter in iCap policies. For more information, see “Creating a policy” on page 49.</td>
</tr>
<tr>
<td>% to Reduce from Peak MSUs</td>
<td>Specified percentage by which you want to decrease the peak MSU utilizations of the usage month.</td>
</tr>
<tr>
<td>Recommended % to Reduce from Peak MSUs</td>
<td>Actual percentage by which the MSU limit was reduced If there is a discrepancy between the % to Reduce from Peak MSUs and the Recommended % to Reduce from Peak MSUs values, this means that there was not enough low-importance work to decrease the peak MSU utilizations of the usage month for the selected percentage amount. For example, if you selected an adjustment of 10% and there was not enough low-importance work to reduce the Peak Interval by 10%, Cost Analyzer calculates the actual percentage that was adjusted. The percentage of low-importance work is shown under Low-Importance Contribution %. The percentage value that you set for % to Reduce from Peak MSUs should not be higher than the value for Low-Importance Contribution %.</td>
</tr>
<tr>
<td>Low-Importance Contribution %</td>
<td>Percentage of low importance work that contributed to the Peak Interval</td>
</tr>
<tr>
<td>Maximum MSUs Allowed</td>
<td>Maximum allowed 4HRA of combined activity for the managed objects</td>
</tr>
</tbody>
</table>

The table at the bottom of the report contains a row of data for each managed object selected for the report. Table 4 on page 48 describes the table columns in the iCap report.
The column name includes the corresponding iCap policy parameter in parenthesis. For example Current DC | GCL (Max DC or GCL), corresponds to the Max DC/GCL parameter.

Table 4: iCap report table columns

<table>
<thead>
<tr>
<th>Table column</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Name (Name)</td>
<td>Name of the managed object</td>
</tr>
<tr>
<td>Type (Type)</td>
<td>Whether the managed object is an individual LPAR or a group</td>
</tr>
<tr>
<td>Proportion of Peak MSUs, in .1% (Proportion)</td>
<td>Percentage that the managed object contributed to the Peak 4HRA This parameter corresponds to the Proportion parameter in iCap policies. For more information, see “Creating a policy” on page 49.</td>
</tr>
<tr>
<td>Actual Maximum 4HRA (None)</td>
<td>On the managed object, percentage of low-importance work that contributed to the peak 4HRA</td>
</tr>
<tr>
<td>Low-Importance Contribution% (None)</td>
<td>Percentage of low importance work on the managed object that contributed to the Peak 4HRA</td>
</tr>
</tbody>
</table>
| Current DC | GCL (Max DC or GCL) | Maximum DC or GCL of the managed object A value of 0 means the managed object did not have a limit. A value greater than 0 indicates:  
  ■ The DC for an individual LPAR  
  ■ The GCL for a group, or the highest DC for an LPAR member within a group |

“Using iCap reports from Cost Analyzer to build a policy” on page 48 describes how you can use these values to build an iCap policy.

Using iCap reports from Cost Analyzer to build a policy

After producing an iCap report, you can use the generated values to build a policy.

The following table lists the iCap report fields and the corresponding iCap policy parameters. You can input the values from the report straight into the policy.
Table 5: iCap report fields and corresponding policy parameters

<table>
<thead>
<tr>
<th>Parameter level</th>
<th>iCap report fields</th>
<th>iCap policy parameter</th>
</tr>
</thead>
<tbody>
<tr>
<td>Policy</td>
<td>ID</td>
<td>CPCID</td>
</tr>
<tr>
<td></td>
<td>Low-Importance Level to Delay</td>
<td>Low Importance</td>
</tr>
<tr>
<td></td>
<td>Maximum MSUs Allowed</td>
<td>MSU Limit</td>
</tr>
<tr>
<td>LPAR/group</td>
<td>Name (LPAR or Group Name)</td>
<td>LPAR/Group Name</td>
</tr>
<tr>
<td></td>
<td>Type (Type)</td>
<td>Type</td>
</tr>
<tr>
<td></td>
<td>Proportion of Peak MSUs, in .1%</td>
<td>Proportion</td>
</tr>
<tr>
<td></td>
<td>(Proportion)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Current DC</td>
<td>GCL (Max DC or GCL)</td>
</tr>
</tbody>
</table>

For more information about building an iCap policy and a list of policy parameters, see “Creating a policy” on page 49.

Creating and activating policies

This topic explains how to create a new policy and activate it for use by iCap.

Creating a policy

To create a policy, you can build one from scratch or clone an existing policy. Use one of the following procedures:

- “To create a policy from scratch” on page 50
- “To clone an existing policy” on page 56

Before you begin

Collect the system information that you will use to build the policy. You can collect the information in either of the following ways:

- Access the BMC Cost Analyzer for zEnterprise reports for iCap.
  For more information, see “Collecting system information from Cost Analyzer” on page 43.

- Run iCap in observe mode.
  For more information, see “Starting the iCap master PAS” on page 27.
To create a policy from scratch

1 Enter the Policy Administration UI (also known as the POLICIES view) by using one of the following methods:

- On EZICAP, hyperlink on Policy Admin UI.
- Type POLICIES on the COMMAND line.

2 On the Policy Administration UI, type NEW on the COMMAND line.

3 In the Create a Policy for iCap dialog box, enter values for the parameters shown in Table 6 on page 50.

**Note**
You must specify values for all of the parameters that have no default value.

**Note**
If you are using iCap reports from Cost Analyzer, you can input values directly from the report into the policy. For more information, see “Using iCap reports from Cost Analyzer to build a policy” on page 48.

Table 6: Policy parameters

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Default value</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Policy Name</td>
<td>No Default</td>
<td>Name of the policy&lt;br&gt;Note: The policy name must be unique.</td>
</tr>
<tr>
<td>Description</td>
<td>No Default</td>
<td>Description of the policy (up to 32 characters)</td>
</tr>
<tr>
<td>MSU Limit</td>
<td>No Default</td>
<td>The maximum allowable MSUs to be consumed collectively by all LPARs and capacity groups that the policy manages&lt;br&gt;The sum of DCs and GCLs cannot exceed this value. When the combined 4HRA of all LPARs and capacity groups exceeds this value, at least one LPAR or group is subject to capping. Possible values are 1 through 99999.&lt;br&gt;After activating the policy, you can change the MSU limit by using a modify command. For more information, see “Temporarily changing the MSU limit for an active policy” on page 70.&lt;br&gt;This parameter corresponds to the Maximum MSUs Allowed parameter in the iCap reports.</td>
</tr>
<tr>
<td>Parameter</td>
<td>Default value</td>
<td>Description</td>
</tr>
<tr>
<td>--------------</td>
<td>---------------</td>
<td>-----------------------------------------------------------------------------</td>
</tr>
<tr>
<td>WLM Tuning</td>
<td>YES</td>
<td>Whether to use Workload Manager (WLM) tuning to determine the order that</td>
</tr>
<tr>
<td></td>
<td></td>
<td>LPARs and groups will receive MSUs when they compete for MSUs when the MSU</td>
</tr>
<tr>
<td></td>
<td></td>
<td>limit is approaching. The order of LPARs and groups is set by the values</td>
</tr>
<tr>
<td></td>
<td></td>
<td>defined for LPARs and capacity groups in the Low Importance parameter. For</td>
</tr>
<tr>
<td></td>
<td></td>
<td>more information, see the description of the Low Importance parameter in</td>
</tr>
<tr>
<td></td>
<td></td>
<td>this table. Possible values are:</td>
</tr>
<tr>
<td></td>
<td></td>
<td>■ YES</td>
</tr>
<tr>
<td></td>
<td></td>
<td>MSUs are distributed according to low-importance values and priority.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Consider this option when the WLM policies that are managing the</td>
</tr>
<tr>
<td></td>
<td></td>
<td>workloads are sufficiently different. That is, an importance value of n</td>
</tr>
<tr>
<td></td>
<td></td>
<td>on one sysplex is not comparable to an importance value of n on another</td>
</tr>
<tr>
<td></td>
<td></td>
<td>sysplex. For more information, see “Using WLMTUNING=YES” on page 87.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>■ COMBINED</td>
</tr>
<tr>
<td></td>
<td></td>
<td>MSUs are distributed according to low importance values. Consider this</td>
</tr>
<tr>
<td></td>
<td></td>
<td>option when the WLM policies that are managing the workloads are</td>
</tr>
<tr>
<td></td>
<td></td>
<td>sufficiently similar. That is, an importance value of n must be</td>
</tr>
<tr>
<td></td>
<td></td>
<td>comparable on each sysplex. iCap includes low importance values from</td>
</tr>
<tr>
<td></td>
<td></td>
<td>different sysplexes, as though all systems in the policy belong to a</td>
</tr>
<tr>
<td></td>
<td></td>
<td>single sysplex. For more information, see “Using WLMTUNING=COMBINED” on</td>
</tr>
<tr>
<td></td>
<td></td>
<td>page 84.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>■ NO</td>
</tr>
<tr>
<td></td>
<td></td>
<td>This option distributes MSUs according to the priority values assigned</td>
</tr>
<tr>
<td></td>
<td></td>
<td>to LPARs and capacity groups (defined in the Priority parameter),</td>
</tr>
<tr>
<td></td>
<td></td>
<td>ignoring the low importance values. For more information, see “Using</td>
</tr>
<tr>
<td></td>
<td></td>
<td>WLMTUNING=No” on page 82.</td>
</tr>
<tr>
<td>CPCID</td>
<td>No Default</td>
<td>The last four digits of the serial number of the CPC on which this policy</td>
</tr>
<tr>
<td></td>
<td></td>
<td>will be executed. This parameter corresponds to the ID parameter in the</td>
</tr>
<tr>
<td></td>
<td></td>
<td>iCap reports.</td>
</tr>
<tr>
<td>Parameter</td>
<td>Default value</td>
<td>Description</td>
</tr>
<tr>
<td>--------------------------</td>
<td>---------------------------------------------------------</td>
<td>---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------</td>
</tr>
<tr>
<td>AdjFac Priority 1</td>
<td>0.6, 0.8, 1, 1.2, 1.4 (priority 1, 2, 3, 4, and 5 respectively)</td>
<td>Adjustment factors that iCap uses to determine the Adjusted Low Importance Workload Percentage for an LPAR or capacity group. That percentage determines the order in which LPARs or capacity groups receive MSUs when the MSU limit is approaching (if WLMTUNING=YES or COMBINED). iCap uses the values specified for Adjustment Factors for Priority to calculate the Adjusted Low Importance Workload Percentage as follows: $\text{lowImportanceWorkloadPercentage} \times \text{adjustmentFactors}$ adjustmentFactors refers to the adjustment values that you set with this parameter. lowImportanceWorkloadPercentage refers to a value that iCap calculates as follows: $\left[\frac{% \text{OfStandardCPCConsumption} \times \text{adjustmentFactor}}{\text{consumptionOfAllWorkloads}}\right]$. The values must increase from priority 1 through 5. Note: You must specify all of these parameters, or none. For LPARs running very high-priority workloads, you can specify an adjustment factor of zero for priority 1. In this case, LPARs or groups with priority 1 have an Adjusted Low Importance Workload Percentage of zero and are favored over all other LPARs and groups.</td>
</tr>
<tr>
<td>AdjFac Priority 2</td>
<td></td>
<td></td>
</tr>
<tr>
<td>AdjFac Priority 3</td>
<td></td>
<td></td>
</tr>
<tr>
<td>AdjFac Priority 4</td>
<td></td>
<td></td>
</tr>
<tr>
<td>AdjFac Priority 5</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Low Importance</td>
<td>5</td>
<td>The workload importance level at which to begin delays if the jobs of that workload surpass the maximum allowed MSUs. Service class periods that are running in a workload (on an LPAR) have predefined importance values. For example, if you specify 4 for the Low Importance value, all service class periods with an importance value of 4 and below are considered to be low importance. Therefore, if the workload surpasses its maximum allowed MSUs, any jobs with a workload importance of 4, 5, and Discretionary importance will be delayed. Possible values are 2, 3, 4, 5, and D (discretionary workloads). The default value is 5. Tip: On the POLIMP view, you can see the amount of importance work (in MSUs) per importance level that was consumed in the last 5 minutes for each LPAR and group on the CPC. This parameter corresponds to the Low-Importance Level to Delay parameter in the iCap reports.</td>
</tr>
</tbody>
</table>

4 Save your changes and move to the next stage:
In windows mode, type **END** on the **COMMAND** line or press **F3**.

In MainView Explorer, press **OK**.

The NLPARGRP view lists all of the LPARs and capacity groups on the local system.

**WARNING**
If you exit the NLPARGRP view before adding LPARs or groups to the policy, all previously defined policy details will be lost.

5 Add LPARs and/or groups to the policy by using one of the following methods:

- If the LPAR or group appears in the list:
  
  — In windows mode, type **ADD** in the **CMD** column next to the LPAR or group name and press **Enter**.
  
  — In MainView Explorer, right-click the LPAR or group and select **Line action => Add an LPAR/Group to a policy**

- If the LPAR or group does not yet exist, or it exists on another CPC, type **ADD** on the **COMMAND** line and press **Enter**.

**Note**
A policy should contain LPARs and/or groups from a single CPC.
If you are adding LPARs or groups from another CPC (and you intend to run the policy on that CPC), all of the LPARs and groups in the policy must belong to that CPC.

**Note**
You must specify at least two LPARs and/or groups. You can save the policy with only one LPAR or group, but it will be invalid and you will not be able to use it.

6 In the Add an LPAR or Group to the Policy dialog box, enter values for the parameters listed in Table 7 on page 54.
**WARNING**

If you are adding LPARs that are group members:

- You must add all of the group members to the policy
- The group members are managed as individual LPARs
- You cannot add the group itself
  That is, if the group already exists in the policy, you cannot add the group members.

For more information, see “Policy guidelines” on page 41.

### Table 7: LPAR/group parameters

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Default value</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>LPAR/Group Name</td>
<td>No Default</td>
<td>Name of the LPAR or capacity group on which this policy will be executed. This value must match the LPAR or capacity group name as defined to PR/SM. <strong>Note:</strong> If you are using values from iCap reports to build the policy, ensure that you include the same managed objects (LPARs, groups, or group members) that you selected in the report.</td>
</tr>
<tr>
<td>Type</td>
<td>No Default</td>
<td>Whether the name specified in the LPAR/Group Name parameter refers to an LPAR or capacity group. Possible values are L (LPAR) and G (group). This parameter corresponds to the Type (Type) column in the iCap reports.</td>
</tr>
<tr>
<td>Priority</td>
<td>5</td>
<td>Relative priority of an LPAR or capacity group. Possible values are 1 through 5. iCap uses this parameter to determine recipient and donor LPARs when LPARs and capacity groups compete for MSUs.</td>
</tr>
<tr>
<td>Parameter</td>
<td>Default value</td>
<td>Description</td>
</tr>
<tr>
<td>---------------</td>
<td>---------------</td>
<td>---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------</td>
</tr>
</tbody>
</table>
| Proportion    | No Default    | Proportion that iCap uses to calculate the number of MSUs to which an LPAR or capacity group is entitled. iCap calculates the entitled MSU value for an LPAR or group as follows: $\left[ \frac{\text{proportion}}{\sum(\text{all proportions})} \right] \times \text{MSULimit}$ This parameter applies only when the combined 4HRA of all LPARs and groups exceeds the MSU limit, and at least one LPAR or group is soft capped. If the 4HRA for an LPAR or group is at or below entitlement, the following guidelines apply:  
- The LPAR or group is assigned the MSUs to which it is entitled, and its DC or GCL is set slightly above the 4HRA. These additional MSUs ensure that an LPAR or group is not accidentally capped if its 4HRA increases in the time between samples.  
- iCap will not take MSUs that are required by the LPAR or group; however, iCap will donate unused MSUs (also called gray-space MSUs) to other LPARs or groups. If the 4HRA for an LPAR or group exceeds entitlement, the DC or GCL can be forcefully reduced (causing the LPAR or group to be soft capped). However, the DC or GCL is not reduced below the LPAR's or group's entitlement. This parameter corresponds to the Proportion of Peak MSUs, in .1% (Proportion) column in the iCap reports. For more information about how iCap distributes MSUs according to proportion and entitlement, see “Scenarios” on page 81.  |
| Max DC/GCL    | No Default    | Maximum value that iCap can use when setting the DC or GCL. You can use this parameter to specify:  
- The maximum DC or GCL that an LPAR or group is allowed at any time  
- An excess threshold for an LPAR or group, which prevents the LPAR or group from using excessive MSUs  
This parameter corresponds to the Current DC|GCL (Max DC or GCL) column in the iCap reports.  |
7 Save your changes and return to NLPARGRP:

- In windows mode, type **END** on the **COMMAND** line or press **F3**.
- In MainView Explorer, press **OK**.

The LPAR/group name is highlighted in green to indicate that it is included in the policy. The **Priority**, **Proportion**, and **MaxDCGCL** fields are also populated with the defined values for the LPAR or group.

---

**Note**
You can include additional LPARs and groups in the policy at a later time. For more information, see “Updating a policy definition” on page 68.

---

8 After you have finished adding LPARs and groups to the policy, confirm that the policy is valid by typing **VALIDATE** on the **COMMAND** line.

---

**Note**
The **VALIDATE** command also confirms that you have the correct security access to manage the LPARs and groups specified in the policy.

---

If there are errors in the policy, take one of the following actions:

- If the errors relate to the policy definition, correct the errors and save the policy.
  For more information, see “Fixing policy errors” on page 59.

- If the errors relate to RACF security authorization, save the policy and contact your product administrator to gain the necessary security access.
  Then, confirm security authorization for the policy, as instructed in “Confirming security authorization” on page 60.

9 Save the policy and return to the Policy Administration UI:

- In windows mode type **SAVE** on the **COMMAND** line.
- In MainView Explorer, click the save icon.

Now that you have finished creating a policy, and you have checked that the policy is valid, active it as instructed in “Activating a policy” on page 60.

**To clone an existing policy**

1 Enter the Policy Administration UI by using one of the following methods:

- On EZICAP, hyperlink on **Policy Admin UI**.
- Type **POLICIES** on the **COMMAND** line.

2 On the Policy Administration UI, perform one of the following actions:

- In windows mode, type **CLO** in the **CMD** column next to the policy that you want to clone.

- In MainView Explorer, right-click the policy that you want to clone and select **Line action => Clone a policy**.

3 In the Clone a Policy for iCap dialog box, type a new policy name that is unique.

4 *(optional)* Edit the policy parameters as needed.

For a list of policy parameters and their descriptions, see **Table 6 on page 50**.

5 Save your changes and move to the next stage:

- In windows mode, type **END** on the **COMMAND** line or press **F3**.

- In MainView Explorer, press **OK**.

The **NLPARGRP** view lists all of the LPARs and capacity groups on the local system. LPAR and group names that are highlighted in green are already included in the policy.

6 *(optional)* Edit the LPARs and groups as needed.

**Table 8 on page 57** lists the actions that are available from the **NLPARGRP** view.

### Table 8: Actions from NLPARGRP

<table>
<thead>
<tr>
<th>Action</th>
<th>Action to take in windows mode</th>
<th>Action to take in MainView Explorer</th>
</tr>
</thead>
<tbody>
<tr>
<td>Update the attributes for an LPAR or group</td>
<td>Type <strong>UPD</strong> in the <strong>CMD</strong> column next to the LPAR or group name.</td>
<td>Right-click the LPAR or group name and select <strong>Line action =&gt; Update an LPAR/Group in a policy</strong>.</td>
</tr>
<tr>
<td>Action</td>
<td>Action to take in windows mode</td>
<td>Action to take in MainView Explorer</td>
</tr>
<tr>
<td>-------------------------------------------------</td>
<td>-----------------------------------------------------------------------------------------------</td>
<td>--------------------------------------------------------------------------------------------------</td>
</tr>
<tr>
<td>Add an LPAR or group to the policy</td>
<td>■ If the LPAR or group appears in the list, type ADD in the CMD column next to the LPAR or group name.</td>
<td>■ If the LPAR or group appears in the list, right-click the LPAR or group name and select Line action =&gt; Add an LPAR/Group to a policy.</td>
</tr>
<tr>
<td></td>
<td>■ If the LPAR or group does not yet exist, or it exists on another CPC, type ADD on the COMMAND line and press Enter.</td>
<td>■ If the LPAR or group does not yet exist, or it exists on another CPC, type ADD on the COMMAND line and press Enter.</td>
</tr>
<tr>
<td>Delete an LPAR or group from the policy</td>
<td>Type DEL in the CMD column next to the LPAR or group name.</td>
<td>Right-click the LPAR or group name and select Line action =&gt; Delete an LPAR/Group from a policy.</td>
</tr>
</tbody>
</table>

7 After you have finished adding LPARs and groups to the policy, confirm that the policy is valid by typing VALIDATE on the COMMAND line.

**Note**
The VALIDATE command also confirms that you have the correct security access to manage the LPARs and groups specified in the policy.

If there are errors in the policy, take one of the following actions:

- If the errors relate to the policy definition, correct the errors and save the policy.
  
  For more information, see “Fixing policy errors” on page 59.

- If the errors relate to RACF security authorization, save the policy and contact your product administrator to gain the necessary security access.
  
  Then, confirm security authorization for the policy, as instructed in “Confirming security authorization” on page 60.

8 Save the policy and return to the Policy Administration UI:

- In windows mode type SAVE on the COMMAND line.

- In MainView Explorer, click the save icon.

Now that you have finished creating a policy, and you have checked that the policy is valid, active it as instructed in “Activating a policy” on page 60.
Fixing policy errors

Before you can activate a policy, you must check that the policy’s definition is valid. Use the following procedure.

To fix policy errors

1. On the Policy Administration UI, check the value in the Policy Valid? column. Possible values are:

<table>
<thead>
<tr>
<th>Policy status</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Yes</td>
<td>The policy is valid.</td>
</tr>
<tr>
<td>Warning</td>
<td>The policy has some errors, but they will not prevent you from activating the policy. For example, the policy definition might include an LPAR or group that does not exist on the CPC, or the MSU limit might exceed the CPC maximum. Because the related conditions on the CPC might change in the future (making the policy valid then), the policy can be activated.</td>
</tr>
<tr>
<td>Error</td>
<td>The policy has errors and cannot be activated, but you can fix the errors via the Policy Administration UI.</td>
</tr>
<tr>
<td>No</td>
<td>The policy is not valid, cannot be activated, and cannot be fixed via the Policy Administration UI. Because you created the policy by using XML in ISPF, you must fix the errors in XML. For an sample of a policy built by using XML tags, see “Sample policy” on page 95.</td>
</tr>
</tbody>
</table>

2. If the Policy Valid? value is Yes, skip to “Confirming security authorization” on page 60. Otherwise, hyperlink on the Warning, Error, or No value to see error messages in the POLDEF view that explain why the definition is invalid.

3. Return to the Policy Administration UI and update the policy:

   - In windows mode, type UPD in the CMD column next to the invalid policy’s name.
   - In MainView Explorer, right-click the policy and select Line action => Update a policy.

4. Make changes to the policy definition to solve the issues that were highlighted in the error messages in the POLDEF view.

   For more information about updating a policy definition, see “Updating a policy definition” on page 68.
5 Confirm that you have corrected the policy errors. On NLPARGRP, type `VALIDATE` on the COMMAND line.

*Note*

The VALIDATE command also confirms that you have the correct security access to manage the LPARs and groups specified in the policy.

If there are errors in the security authorization, save the policy and contact your product administrator to gain the necessary security access. Then, confirm security authorization for the policy, as instructed in “Confirming security authorization” on page 60.

6 Save the policy and return to the Policy Administration UI:

- In windows mode type `SAVE` on the COMMAND line.
- In MainView Explorer, click the save icon.

Now that the policy is valid, activate it as instructed in “Activating a policy” on page 60.

**Confirming security authorization**

Before you can activate a policy, you must check that you have the correct security access to manage the LPARs and groups specified in the policy.

**To confirm a policy’s security authorization**

1 On the Policy Administration UI, type `SEC` in the CMD column next to the policy name.

If the policy does not pass security authorization, contact your product administrator to gain the necessary security access.

**Activating a policy**

In general, starting the iCap master PAS activates the specified policy. Use the following procedure to activate a policy by starting (or restarting) the PAS; alternatively, you can issue a MODIFY command or use the Policy Administration UI if the PAS is already running.

**Before you begin**

Ensure that the value in the Policy Valid? column is Yes, and that the policy passes security validation as instructed in “Confirming security authorization” on page 60.
To activate a policy by starting or restarting the master PAS

1. Issue the following command:

   \texttt{START masterPAS,POLICY=\textit{policyName}}

To activate a policy if the master PAS is running and you want to activate an alternate policy

1. Use one of the following methods:
   
   - Issue the following MODIFY command:
     
     \texttt{MODIFY masterPAS,POLICY=\textit{policyName}}
   
   - In windows mode, on the Policy Administration UI, type \texttt{ACT} in the CMD column next to the policy that you want to activate.

   - In MainView Explorer, on the Policy Administration UI, right-click the policy that you want to activate and select \texttt{Line action => Activate a Policy}.

Displaying policy details

This topic explains how to access views that display:

- A list of all defined policies (“Displaying all defined policies” on page 61)
- An overview of the active policy (“Displaying an overview of the active policy” on page 65)
- A policy definition (“Displaying policy definitions” on page 63)
- The individual LPAR members in a capacity group (“Displaying LPAR members of a capacity group” on page 66)
- The four-hour MSU usage for an LPAR or group (“Displaying four-hour MSU usage for an LPAR or capacity group” on page 66)

Displaying all defined policies

Use the following procedure to see all defined policies on the Policy Administration UI. You can also view details about each policy, including:

- The MSU limit
Whether the policy is valid

The ID of the CPC on which the policy is running

Whether the policy uses Workload Manager (WLM) tuning

The defined low-importance value

The number of LPARs and groups defined in the policy

To display all defined policies

1. Use one of the following methods:
   - On EZICAP, hyperlink on Policy Admin UI.
   - Type POLICIES on the COMMAND line.

   **Note**
   The policy name for the active policy is highlighted in green.

---

**Figure 12: The Policy Administration UI**

<table>
<thead>
<tr>
<th>NAME</th>
<th>Description</th>
<th>Validated CPCID</th>
<th>WLM Tuning</th>
<th>MSU Limit</th>
</tr>
</thead>
<tbody>
<tr>
<td>NEWDEVUS</td>
<td>iCap LPARs and GROUPs Define Cap Warning</td>
<td>F037</td>
<td>YES</td>
<td>95</td>
</tr>
<tr>
<td>NEWSPE1</td>
<td>Only LPARs of Groups</td>
<td>F037</td>
<td>YES</td>
<td>95</td>
</tr>
<tr>
<td>NEWSPE2</td>
<td>iCap LPARs and GROUPs BMCPLEX</td>
<td>F037</td>
<td>COMBINED</td>
<td>95</td>
</tr>
<tr>
<td>NEWSPE3</td>
<td>iCap LPARs and GROUPs Define Cap Warning</td>
<td>F037</td>
<td>YES</td>
<td>95</td>
</tr>
<tr>
<td>NEWSPE4</td>
<td>SYS with No HWI Security</td>
<td>F037</td>
<td>NO</td>
<td>95</td>
</tr>
<tr>
<td>NEWSPE5</td>
<td>All LPARs w-MAXDCGCL wo-MAXDCGCL</td>
<td>F037</td>
<td>NO</td>
<td>95</td>
</tr>
<tr>
<td>NEWSPE6</td>
<td>iCap LPAR GROUP with MAXDCGCL 0</td>
<td>F037</td>
<td>NO</td>
<td>95</td>
</tr>
<tr>
<td>NEWSPE7</td>
<td>MSULIMIT 690 Extracted from SCRT</td>
<td>F037</td>
<td>YES</td>
<td>69</td>
</tr>
<tr>
<td>NEWSPEB</td>
<td>Only LPARs of Groups</td>
<td>F037</td>
<td>COMBINED</td>
<td>95</td>
</tr>
<tr>
<td>R4BOOT</td>
<td>Policy for R4 Bootcamp</td>
<td>F037</td>
<td>YES</td>
<td>40</td>
</tr>
<tr>
<td>SPEWLMID</td>
<td>CAZI iCap Configuration Tool</td>
<td>F037</td>
<td>COMBINED</td>
<td>50</td>
</tr>
</tbody>
</table>

   **Note**
   You can view the full policy definition for a specific policy in the POLDEF view. For more information, see “Displaying policy definitions” on page 63.

From the Policy Administration UI, you can also:

- Create a new policy, either from scratch or by cloning an existing policy
- Update a policy definition
- Delete a policy
- Activate a policy
- Confirm the security validation for a policy
Displaying policy definitions

Use the following procedure to display the policy definition for a specific policy. For the active policy you can also display further details, such as the mode that the policy is running in and the policy activation time and date.

To display a policy definition

1 Perform one of the following actions:

   ■ From any view:
     — Type POLDEF policyName on the COMMAND line.

   ■ From the Policy Administration UI:
     — Hyperlink on the Policy Valid? column for the policy.
     — In windows mode, enter BRO or S in the CMD column next to the policy’s name.
     — In MainView Explorer, right-click the policy name and select Line action => Browse Policy Definition.
The POLDEF view displays information about the policy definition.

**Figure 13: POLDEF view**

<table>
<thead>
<tr>
<th>02SEP2014 08:31:45</th>
<th>MAINVIEW WINDOW INTERFACE (V6.1.00)</th>
</tr>
</thead>
<tbody>
<tr>
<td>COMMAND</td>
<td>SCROLL ===&gt; PAGE</td>
</tr>
<tr>
<td>CURR WIN</td>
<td>1</td>
</tr>
<tr>
<td>ALT WIN</td>
<td></td>
</tr>
<tr>
<td>W1 =POLDEF</td>
<td></td>
</tr>
<tr>
<td></td>
<td>POLDEF</td>
</tr>
<tr>
<td></td>
<td>DYCJ</td>
</tr>
<tr>
<td></td>
<td>*</td>
</tr>
<tr>
<td></td>
<td>02SEP2014=08:31:45=ICAP=D00</td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td>Policy Name</td>
<td>DYCGRPLN</td>
</tr>
<tr>
<td>Description</td>
<td>Low Imp and New MSULIMIT 600</td>
</tr>
<tr>
<td>MSU Limit..</td>
<td>600</td>
</tr>
<tr>
<td>CPC Id...</td>
<td>F037</td>
</tr>
<tr>
<td>Validated..</td>
<td>OK</td>
</tr>
<tr>
<td>Low Imp...</td>
<td>5</td>
</tr>
<tr>
<td>Security...</td>
<td>OK</td>
</tr>
<tr>
<td>Adjust 1...</td>
<td>0.60</td>
</tr>
<tr>
<td>Adjust 2...</td>
<td>0.80</td>
</tr>
<tr>
<td>Adjust 3...</td>
<td>1.00</td>
</tr>
<tr>
<td>Adjust 4...</td>
<td>1.20</td>
</tr>
<tr>
<td>Adjust 5...</td>
<td>1.40</td>
</tr>
<tr>
<td>LPAR or Type</td>
<td>Priority Proportion Max DC</td>
</tr>
<tr>
<td>Group</td>
<td>GCL</td>
</tr>
<tr>
<td>DB2GROUP</td>
<td>2 Group</td>
</tr>
<tr>
<td></td>
<td>750</td>
</tr>
<tr>
<td></td>
<td>300</td>
</tr>
<tr>
<td>DEFAULT</td>
<td>3 Group</td>
</tr>
<tr>
<td></td>
<td>750</td>
</tr>
<tr>
<td>IMSA</td>
<td>5 LPAR</td>
</tr>
<tr>
<td></td>
<td>128</td>
</tr>
<tr>
<td></td>
<td>150</td>
</tr>
<tr>
<td>SJTEST</td>
<td>2 Group</td>
</tr>
<tr>
<td></td>
<td>800</td>
</tr>
<tr>
<td></td>
<td>300</td>
</tr>
<tr>
<td>SJTEST2</td>
<td>1 Group</td>
</tr>
<tr>
<td></td>
<td>900</td>
</tr>
<tr>
<td></td>
<td>400</td>
</tr>
<tr>
<td>TEST1</td>
<td>4 Group</td>
</tr>
<tr>
<td></td>
<td>600</td>
</tr>
<tr>
<td></td>
<td>250</td>
</tr>
</tbody>
</table>

To display a detailed definition of the active policy

1. Use one of the following methods:
   - On EZICAP, hyperlink on **Active Policy**.
   - Type **POLACTV** on the COMMAND line.

**Figure 14: POLACTV view**

<table>
<thead>
<tr>
<th>30MAR2014 08:54:52</th>
<th>MAINVIEW WINDOW INTERFACE (V6.1.00)</th>
</tr>
</thead>
<tbody>
<tr>
<td>COMMAND</td>
<td>SCROLL ===&gt; PAGE</td>
</tr>
<tr>
<td>CURR WIN</td>
<td>1</td>
</tr>
<tr>
<td>ALT WIN</td>
<td></td>
</tr>
<tr>
<td>W1 =POLACTV</td>
<td></td>
</tr>
<tr>
<td></td>
<td>POLACTV</td>
</tr>
<tr>
<td></td>
<td>DYCJ</td>
</tr>
<tr>
<td></td>
<td>*</td>
</tr>
<tr>
<td></td>
<td>30MAR2014=08:54:52=ICAP=D00</td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td>Policy Name</td>
<td>DYCWLMPE</td>
</tr>
<tr>
<td>Description</td>
<td>EXCEL Calculated Proportions</td>
</tr>
<tr>
<td>WLM Tuning.</td>
<td>Combined CPC Id... F037</td>
</tr>
<tr>
<td>MSU Limit..</td>
<td>400</td>
</tr>
<tr>
<td>Activated..</td>
<td>29MAR2014 14:57:57</td>
</tr>
<tr>
<td>Mode...</td>
<td>Msg</td>
</tr>
<tr>
<td>Adjust 1...</td>
<td>0.60</td>
</tr>
<tr>
<td>Adjust 2...</td>
<td>0.80</td>
</tr>
<tr>
<td>Adjust 3...</td>
<td>1.00</td>
</tr>
<tr>
<td>Adjust 4...</td>
<td>1.20</td>
</tr>
<tr>
<td>Adjust 5...</td>
<td>1.40</td>
</tr>
<tr>
<td>Low Imp...</td>
<td>3</td>
</tr>
<tr>
<td>C LPAR or Type</td>
<td>Priority Proportion Max DC</td>
</tr>
<tr>
<td>Group</td>
<td>Entitlement GCL</td>
</tr>
<tr>
<td>DEFAULT</td>
<td>3 Group</td>
</tr>
<tr>
<td></td>
<td>157</td>
</tr>
<tr>
<td></td>
<td>77</td>
</tr>
<tr>
<td>IMSA</td>
<td>4 LPAR</td>
</tr>
<tr>
<td></td>
<td>53</td>
</tr>
<tr>
<td></td>
<td>26</td>
</tr>
<tr>
<td>SJSC</td>
<td>2 LPAR</td>
</tr>
<tr>
<td></td>
<td>62</td>
</tr>
<tr>
<td></td>
<td>25</td>
</tr>
<tr>
<td>SJTEST2</td>
<td>1 Group</td>
</tr>
<tr>
<td></td>
<td>555</td>
</tr>
<tr>
<td></td>
<td>272</td>
</tr>
</tbody>
</table>

**Note**

The tabular section of the view has one row for each LPAR and capacity group specified in the policy. If you changed the definition of the policy after activating the policy (as described in “Updating a policy definition” on page 68), the definition shown here differs from the policy's stored definition.

The displayed MSULIMIT value might also differ from the value in the stored definition if you have used a MODIFY command to change it.
Displaying an overview of the active policy

Use the following procedure to display an overview of the active policy in the POLOVER view. You can access the POLOVER view to assess how the active policy is managing the specified LPARs and capacity groups.

On this view, you can also see:

- The 4HRA
- The DCs of LPARs and GCLs
- The percentage of MSU limit that each LPAR and capacity group is using, and the total usage for the entire policy

To display an overview of the active policy

1. Use one of the following methods:
   - On EZICAP, hyperlink on Policy Overview.
   - Type POLOVER on the COMMAND line.

**Figure 15: POLOVER view**

```
31MAR2014  03:13:08 ------ MAINVIEW WINDOW INTERFACE (V6.1.00) ---------------
COMMAND ===>                                                 SCROLL ===> PAGE
CURR WIN ===> 1        ALT WIN ===> >W1 =POLOVER===========DYCJ=====*========
Policy Name DYCWLMPB Activated 30MAR2014 11:01
MSU Limit..      600
Mode....... Msg
Peak 4HRA..      440 Peak Time 30MAR2014 11:32

| LPAR or Group | T Propor | Entitle Prio | Low-Im | Adj Low 4HRA | DefCap | Min(4HRA, % MSU | E |
|---------------|----------|--------------|--------|--------------|--------|------------------|
| DB2GROUP      | G        | 183          | 110    | 2            | 41     | 959      41 | 6.8   |
| DEFAULT       | G        | 157          | 94     | 3            | 54     | 63      899 | 63   | 10.5 |
| IMSA          | L        | 53           | 32     | 4            | 56     | 67      7 | 7    | 1.2  |
| SJSC          | L        | 52           | 31     | 2            | 94     | 75      27 | 300  | 27   | 4.5  |
| SJTEST2       | G        | 555          | 333    | 1            | 86     | 51      78 | 899  | 78   | 13.0 |
| *Policy T     |          |              |        |              |        | 216     216 | 36.0 |
```

**Note**

The T column shows whether the LPAR or group is an individual LPAR (L), a group (G), or a group member (I). If the LPAR is a group member, the Group Name column shows the group to which the LPAR belongs.
Displaying LPAR members of a capacity group

Use the following procedures to display the LPAR members of a capacity group in the GRPMEM view. On the GRPMEM view, you can see details of the LPARs in a group, including:

- The current 4HRA
- The Low Importance Workload percentage
- The sysplex on which an LPAR is running

To view the LPAR members of capacity groups for the active policy

1. Use one of the following methods:
   - On EZICAP, select LPAR Members of Groups.
   - Type GRPMEM on the COMMAND line.

To view the LPAR members of a specific capacity group

1. On the POLOVER view, hyperlink on the #Members column for a capacity group.

The LPAR members of the capacity group are displayed.

<table>
<thead>
<tr>
<th>C Group</th>
<th>LPAR</th>
<th>4HRA</th>
<th>Low-Imp</th>
<th>Excluded</th>
<th>Status</th>
<th>Sysplex</th>
<th>System</th>
</tr>
</thead>
<tbody>
<tr>
<td>DB2GROUP</td>
<td>DB2A</td>
<td>63</td>
<td>67</td>
<td>OK</td>
<td>BMCPLEX1</td>
<td>DB2A</td>
<td></td>
</tr>
<tr>
<td>DB2GROUP</td>
<td>DB2B</td>
<td>40</td>
<td>32</td>
<td>OK</td>
<td>BMCPLEX1</td>
<td>DB2B</td>
<td></td>
</tr>
<tr>
<td>DB2GROUP</td>
<td>SYSN</td>
<td>8</td>
<td>10</td>
<td>OK</td>
<td>BMCPLEX1</td>
<td>SYSN</td>
<td></td>
</tr>
</tbody>
</table>

Note
The GRPMEM view lists only LPARs that are members of a capacity group. For a list of all of the LPARs, capacity groups, and group members in a policy, access the GRPLPAR view by typing the view name on the COMMAND line.

Displaying four-hour MSU usage for an LPAR or capacity group

Use the following procedure to display the four-hour MSU usage for an LPAR or capacity group.
1 Use one of the following methods:

- On the POLOVER view, hyperlink on the 4HRA column for an LPAR or capacity group.

- Type LPAR48BK lparName or GRP48BK groupName on the COMMAND line.

The resulting view (LPAR48BK or GRP48BK) displays the 48 5-minute buckets of MSU usage over the last four hours, for either a specific LPAR (LPAR48BK) or a specific capacity group (GRP48BK). The buckets appear in reverse chronological order, with the most recent bucket at the top.

**Figure 16: LPAR48BK view**

```
30MAR2014 08:56:40 ------ MAINVIEW WINDOW INTERFACE (V6.1.00) ----------------
COMMAND ===>                                                 SCROLL ===> PAGE
CURR WIN ===> 1        ALT WIN ===>
>W1 =LPAR48BK==========DYCJ=====*========30MAR2014==08:56:40====ICAP=====D====1
LPAR SYSM                           4HRA     42
## End Time  Duration      MSU/hr
-- --------  --------      -----
01 08:56:16  00:03:30        48.3
02 08:52:45  00:05:00        37.5
03 08:47:44  00:05:00        43.3
04 08:42:44  00:05:00        48.2
05 08:37:43  00:05:00        40.1
06 08:32:42  00:05:00        43.6
07 08:27:41  00:05:00        38.5
```

**Figure 17: GRP48BK view**

```
30MAR2014 08:58:31 ------ MAINVIEW WINDOW INTERFACE (V6.1.00) ----------------
COMMAND ===>                                                 SCROLL ===> PAGE
CURR WIN ===> 1        ALT WIN ===>
>W1 =GRP48BK===========DYCJ=====*========30MAR2014==08:58:31====ICAP=====D====1
Group SJTEST2                        4HRA    148
## End Time  Duration      MSU/hr
-- --------  --------      -----
01 08:58:16  00:03:20       175.7
02 08:54:55  00:05:00       146.1
03 08:49:55  00:05:00       137.3
04 08:44:54  00:05:00       143.1
05 08:39:54  00:05:00       154.3
06 08:34:53  00:05:00       138.3
07 08:29:53  00:05:00       147.3
```

**Note**

For LPARs within a capacity group, WLM does not attempt to synchronize; as a result, the 48 buckets on different LPAR members do not cover the same 5-minute time frame.
Modifying a policy

Use the following procedures either to change the policy temporarily (without changing the saved policy definition), or to make lasting changes to the policy definition itself:

- “Updating a policy definition” on page 68
- “Temporarily changing the MSU limit for an active policy” on page 70
- “Adding an LPAR to a group in the active policy” on page 70

Updating a policy definition

Use the following procedure to update a policy definition.

1. On the Policy Administration UI, complete one of the following actions:
   - In windows mode, enter UPD in the CMD column next to the policy that you want to update.
   - In MainView Explorer, right-click the policy that you want to update and select Line action => Update a policy.

2. (optional) In the Update a Policy in iCap dialog box, edit the policy parameters.
   For a list of policy parameters and their descriptions, see “Creating a policy” on page 49.

3. Save your changes and move to the next stage:
   - In windows mode, type END on the COMMAND line or press F3.
   - In MainView Explorer, press OK.

   The NLPARGRP view lists all of the LPARs and capacity groups on the local system. LPAR and group names that are highlighted in green are already included in the policy.

4. (optional) Edit the LPARs and groups as needed.
   Table 8 on page 57 lists the actions that are available from the NLPARGRP view.
Table 9: Actions from NLPARGRP

<table>
<thead>
<tr>
<th>Action</th>
<th>Action to take in windows mode</th>
<th>Action to take in MainView Explorer</th>
</tr>
</thead>
<tbody>
<tr>
<td>Update the attributes for an LPAR or group</td>
<td>Type <strong>UPD</strong> in the CMD column next to the LPAR or group name.</td>
<td>Right-click the LPAR or group name and select <strong>Line action =&gt; Update an LPAR/Group in a policy.</strong></td>
</tr>
</tbody>
</table>
| Add an LPAR or group to the policy               | ■ If the LPAR or group appears in the list, type **ADD** in the CMD column next to the LPAR or group name.  
■ If the LPAR or group does not yet exist, or it exists on another CPC, type **ADD** on the COMMAND line and press Enter. | ■ If the LPAR or group appears in the list, right-click the LPAR or group name and select **Line action => Add an LPAR/Group to a policy.**  
■ If the LPAR or group does not yet exist, or it exists on another CPC, type **ADD** on the COMMAND line and press Enter. |
| Delete an LPAR or group from the policy          | Type **DEL** in the CMD column next to the LPAR or group name. | Right-click the LPAR or group name and select **Line action => Delete an LPAR/Group from a policy.** |

5 Confirm that the policy is valid by typing **VALIDATE** on the COMMAND line.

*Note*

The VALIDATE command also confirms that you have the correct security access to manage the LPARs and groups specified in the policy.

If there are errors in the policy, take one of the following actions:

■ If the errors relate to the policy definition, correct the errors and save the policy.
  For more information, see “Fixing policy errors” on page 59.

■ If the errors relate to RACF security authorization, save the policy and contact your product administrator to gain the necessary security access.
  Then, confirm security authorization for the policy, as instructed in “Confirming security authorization” on page 60.

6 Save the policy and return to the Policy Administration UI:

■ In windows mode type **SAVE** on the COMMAND line.
In MainView Explorer, click the save icon.

**Note**
If you update the policy definition for the currently active policy, the changes will not take effect until you activate the policy. For more information about activating iCap policies, see “Activating a policy” on page 60.

---

**Temporarily changing the MSU limit for an active policy**

Use the following procedure to change the MSU limit for the active policy without modifying the saved policy definition.

1. On the START command in the ISPF interface, issue the following command:

   ```plaintext
   MODIFY masterPas,MSULIMIT=nnn
   ```

   Possible values for *nnn* are 1 through 99999.

   **Example**
   If the iCap master PAS is running as address space ICAPMAST, you can change the MSU limit to 850 by issuing the following command from the master console:

   ```plaintext
   F ICAPMAST,MSULIMIT=850
   ```

   **Note**
   iCap ignores the MODIFY command if you issue it to a PAS other than the master PAS.

---

**Adding an LPAR to a group in the active policy**

If iCap is managing the members of a group (rather than the group itself), use the following procedure to add an LPAR to the group.

To avoid disrupting the execution of the policy, you should include the LPAR in the policy definition before making changes to the group in the Hardware Management Console (HMC).

1. **To add an LPAR to a group in the active policy**

   Add the LPAR to the policy definition:
If iCap is already managing the LPAR (individually, or as a member of a different group), review the LPAR's current attributes relative to policy and skip to Step 3.

If the LPAR exists on the CPC, add it to the policy and review the LPAR's current attributes.

If the LPAR does not yet exist on the CPC, add it to the policy by typing ADD on the COMMAND line on the NLPARGRP view.

For more information about adding LPARs to a policy, see “Updating a policy definition” on page 68.

2 Activate the updated policy.

Note
If the LPAR does not yet exist on the CPC, iCap ignores the LPAR until you make changes to the HMC. iCap sends out the following message:
Specified LPAR xxxxxxxx does not exist.

3 Access the HMC and add the LPAR to the group.

iCap starts managing the new LPAR immediately.

## Changing the iCap mode

Use the following procedure to change the mode in which iCap is running without restarting the master PAS.

1 In the ISPF interface, issue the following command:

   MODIFY masterPas,MODE=mode

Possible values for mode are:

- OBSERVE
- MESSAGE | MSG
- MANAGE

Related Information

- “iCap modes” on page 16
Deleting a policy

Use the following procedure to delete a policy.

1. On the Policy Administration UI view, complete one of the following actions:
   - In windows mode, enter `DEL` in the CMD column next to the policy.
   - In MainView Explorer, right-click the policy and select **Line action => Delete a Policy**.

2. In the Policy Delete Confirmation dialog, type `Y` to confirm the deletion.

   **Note**
   If you delete the active policy, the following warning message will appear:
   
   **You are about to DELETE the active policy!**
   
   If you continue with the deletion, iCap will continue to use the deleted policy until you activate an alternate policy or you stop the iCap master PAS. If you stop the master PAS, you must specify an alternate policy the next time you start the PAS; otherwise iCap will default to policy= NO-POLICY and run in observe mode.

Viewing the iCap logs

You can use the iCap log function to see how LPARs and groups are being managed, and to better understand any changes that are made to the iCap master PAS.

The iCap log function records changes in the iCap environment. iCap creates an interval record each time an important event occurs (such as initializing a PAS, changing a policy, changing defined capacities, or changing the MSU limit).

**To view the iCap logs**

1. From EZICAP, select one of the following options:
   - **All Log Records** (LOGRALL) displays all events (except the events where no action was taken).
   - **PAS System Log Records** (LOGRMAST) displays events that affect the master PAS, such as an MSU limit change, policy change, or mode change.
- **LPAR/Group Log Records** (LOGRLPAR) displays events for a specific LPAR or capacity group (Figure 18 on page 73).

**Figure 18: LPAR/Group Log Records (LOGRLPAR)**

The most recent event is listed at the top. You can view further details for an LPAR or group by clicking an entry in the **LPARGrou Name** column.

**Figure 19: LOGRLPAR—scrolled**

**Figure 20: LOGRLPAR—further details**
Viewing the iCap logs
Examples of iCap reports from Cost Analyzer

This topic provides specific examples of iCap reports from the BMC Cost Analyzer for zEnterprise product.

For more information about the iCap report parameters, see “iCap report parameter descriptions” on page 46.

Example iCap report (where adjustment is possible)

The following example shows a report where adjustment is possible and the maximum allowed MSUs is reduced by 5%:

- The user requested an adjustment percentage of 5% (shown in the % to Reduce from Peak MSUs field).
- The amount of low-importance work running on the LPARs is 14.31% (shown in the Low-Importance Contribution % field).
  
  The Low-Importance Contribution % field shows the maximum adjustment percentage possible. The adjustment percentage must be an integer, so the maximum adjustment percentage possible is 14%.

  **Note**
  
  For adjustment to occur, the Low-Importance Contribution % must be higher than the % to Reduce from Peak MSUs.

- The actual adjustment percentage is 5% (shown in the Recommended % to Reduce from Peak MSUs field).

Adjustment is possible because the Low-Importance Contribution % (14.31%) is higher than the requested % to Reduce from Peak MSUs (5%). So, the maximum allowed MSUs is reduced by 5%.
Tip
If you want to see the total peak 4HRA for the managed LPARs and groups before adjustment, set the % to Reduce from Peak MSUs value to 0.

Figure 21: Example iCap report (where adjustment is possible)

The following example shows a report where the requested adjustment percentage cannot be applied due to insufficient low-importance activity, so the adjustment percentage is decreased:
The user requested an adjustment percentage of 5% (shown in the % to Reduce from Peak MSUs field).

The amount of low-importance work running on the LPARs is 4.05% (shown in the Low-Importance Contribution % field).

The Low-Importance Contribution % shows the maximum adjustment percentage possible. The adjustment percentage must be an integer, so the maximum adjustment percentage possible is 4%.

**Note**

For adjustment to occur, the Low-Importance Contribution % must be higher than the % to Reduce from Peak MSUs.

The actual adjustment percentage is 4% (shown in the Recommended % to Reduce from Peak MSUs field).

The adjustment percentage is decreased because the Low-Importance Contribution % (4.05%) is lower than the requested % to Reduce from Peak MSUs (5%). So, the maximum allowed MSUs is reduced by 4%.
**Tip**

If you want to increase the **Low-Importance Contribution %**, try changing the value for **Low-Importance Level to Delay**. For example, changing that value from 5 to 4 would probably make the **Low-Importance Contribution %** value higher.

Figure 22: Example iCap report (where the requested adjustment percentage cannot be applied)

The following example shows a report where the requested adjustment percentage cannot be applied due to insufficient low importance activity:

- The user requested an adjustment percentage of 5% (shown in the % to Reduce from Peak MSUs field).
The amount of low-importance work running on the LPARs is 0.06% (shown in the **Low-Importance Contribution %** field).

The **Low-Importance Contribution %** field shows the maximum adjustment percentage possible. The adjustment percentage must be an integer, so the maximum adjustment percentage possible is 0%. Because the **Low-Importance Contribution %** is less than 1, adjustment is not possible.

The actual adjustment percentage is 0% (shown in the **Recommended % to Reduce from Peak MSUs** field).

---

**Tip**

If you want to increase the **Low-Importance Contribution %**, try changing the value for **Low-Importance Level to Delay**. For example, changing that value from 5 to 4 would probably make the **Low-Importance Contribution %** value higher.

---

Figure 23: Example iCap report (where adjustment is not possible)
Example iCap report (where adjustment is not possible)
Scenarios

The scenarios in this appendix illustrate the entitlement-based rules that determine how gray-space MSUs are distributed when you use the WLMTUNING policy parameter.

Overview of how entitlement works

When the combined 4HRA of all LPARs and groups exceeds MSU limit, typically:

- Some LPARs and groups have 4HRAs below the entitlement level
- Other LPARs and groups have 4HRAs above entitlement

LPARs and groups with a 4HRA below entitlement are assigned the MSUs to which they are entitled, and their DCs or GCLs are set slightly above the 4HRA. These additional MSUs ensure that LPARs or groups are not accidentally capped if their 4HRA increases in the time between samples.

Then, the leftover (unused) MSUs are distributed to other LPARs or groups in need of MSUs. The unused MSUs are called gray-space MSUs.

To avoid being soft capped (temporarily capped), LPARs and groups with a 4HRA above entitlement require additional MSUs. These LPARs and groups can compete for gray-space MSUs and are ranked according to one of the following items:

- Priority
- Adjusted Low Importance Workload Percentage
- Ratio 4HRA/entitlement
Calculating the entitlement of an LPAR or group

Using the Proportion parameter (explained in “Creating a policy” on page 49), iCap calculates the entitlement of an LPAR or group as follows:

\[
\text{PROPORTION} \div \sum(\text{ALL PROPORTIONS}) \times \text{MSULIMIT}
\]

**Example**

In this example, the value of MSU limit is 500.

<table>
<thead>
<tr>
<th>LPAR/group</th>
<th>Proportion</th>
<th>Entitlement</th>
</tr>
</thead>
<tbody>
<tr>
<td>GROUPGGG</td>
<td>350</td>
<td>175</td>
</tr>
<tr>
<td>LPARAAA</td>
<td>200</td>
<td>100</td>
</tr>
<tr>
<td>LPARBBB</td>
<td>150</td>
<td>75</td>
</tr>
<tr>
<td>GROUPHHH</td>
<td>250</td>
<td>125</td>
</tr>
<tr>
<td>LPARCCC</td>
<td>50</td>
<td>25</td>
</tr>
</tbody>
</table>

iCap calculates the entitlements as follows:

- **GROUPGGG**— \((350 \div 1000) \times 500 = 175\)
- **LPARAAA**— \((200 \div 1000) \times 500 = 100\)
- **LPARBBB**— \((150 \div 1000) \times 500 = 75\)
- **GROUPHHH**— \((250 \div 1000) \times 500 = 125\)
- **LPARCCC**— \((50 \div 1000) \times 500 = 25\)

Using WLMTUNING=No

For this scenario, assume that the following conditions exist in your environment:

- You have mission-critical LPARs and groups that must be favored over other LPARs and groups.

Also, assume that you want to set the order in which LPARs and groups receive MSUs based on:

1. Priority
2. Ratio \((4\text{HRA} \div \text{entitlement})\)

**Rules**

If WLMTUNING=NO, the following rules apply when LPARs or groups have 4HRAs above entitlement:
- The LPAR or group with the highest priority is favored.
- If LPARs or groups have equal priority, the LPAR or group with the lowest ratio 4HRA/entitlement is favored.

**Scenario**

As the following view shows, both GROUPGGG and LPARCCC have 4HRAs that are below their entitlement values. Therefore, GROUPGGG and LPARCCC receive the MSUs to which they are entitled, and their DC or GCL is set slightly above the 4HRA.

**Figure 24: POLOVER view (WLMTUNING=NO)**

<table>
<thead>
<tr>
<th>LPAR/group</th>
<th>Entitlement</th>
<th>Priority</th>
<th>4HRA</th>
<th>DC</th>
<th>GCL</th>
</tr>
</thead>
<tbody>
<tr>
<td>GROUPGGG</td>
<td>175</td>
<td>1</td>
<td>150</td>
<td>152</td>
<td></td>
</tr>
<tr>
<td>LPARAAA</td>
<td>100</td>
<td>2</td>
<td>119</td>
<td>119</td>
<td></td>
</tr>
<tr>
<td>LPARBBB</td>
<td>75</td>
<td>3</td>
<td>100</td>
<td>79</td>
<td></td>
</tr>
<tr>
<td>GROUPHHH</td>
<td>125</td>
<td>3</td>
<td>129</td>
<td>129</td>
<td></td>
</tr>
<tr>
<td>LPARCCC</td>
<td>25</td>
<td>4</td>
<td>20</td>
<td>21</td>
<td></td>
</tr>
</tbody>
</table>

iCap can distribute the gray-space (unused) MSUs from GROUPGGG and LPARCCC to other LPARs and groups in need of additional MSUs. iCap calculates gray-space MSUs as follows:

\[
\text{entitlement} - \text{(DC|GCL)}
\]

**Table 10: Sample calculation of gray-space MSUs**

<table>
<thead>
<tr>
<th>LPAR or group</th>
<th>Entitlement</th>
<th>DC or GCL</th>
<th>Gray-space MSUs</th>
</tr>
</thead>
<tbody>
<tr>
<td>GROUPGGG</td>
<td>175</td>
<td>152</td>
<td>23</td>
</tr>
<tr>
<td>LPARCCC</td>
<td>25</td>
<td>21</td>
<td>4</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>27</strong></td>
<td><strong>27</strong></td>
<td><strong>27</strong></td>
</tr>
</tbody>
</table>

Because the remaining LPARs and groups (LPARAAA, LPARBBB, and GROUPHHH) have 4HRAs above their entitlements, they must compete for the remaining 27 gray-space MSUs. iCap distributes the gray-space MSUs as follows:

- Of the three competitors, LPARAAA has the higher priority value (2). iCap determines that LPARAAA requires 19 of the gray-space MSUs:
  \[
  119 \text{ (4HRA)} - 100 \text{ (entitlement)} = 19
  \]

This distribution leaves 8 remaining gray-space MSUs:

\[
27 \text{ (available gray-space MSUs)} - 19 \text{ (MSUs required by LPARAAA)} = 8
\]
- LPARBBB and GROUPHHH have an equal priority value of 3, so iCap will distribute the remaining gray-space MSUs based on entitlement (or proportion). Because GROUPHHH has the lowest ratio of 4HRA/entitlement (as shown in the following table), GROUPHHH will receive the next distribution:

<table>
<thead>
<tr>
<th>LPAR or group</th>
<th>4HRA</th>
<th>Entitlement</th>
<th>Ratio 4HRA/entitlement</th>
</tr>
</thead>
<tbody>
<tr>
<td>LPARBBB</td>
<td>100</td>
<td>75</td>
<td>1.33</td>
</tr>
<tr>
<td>GROUPHHH</td>
<td>129</td>
<td>125</td>
<td>1.03</td>
</tr>
</tbody>
</table>

Based on the following formula, iCap calculates that GROUPHHH is allowed to take 5 of the remaining 8 gray-space MSUs:

**Formula:**

$$\frac{\text{remainingGraySpaceMSUs} \times \text{entitlement}}{\text{totalEntitlementForCompetingLPARsOrGroups}}$$

**Calculation:**

$$\frac{(8 \times 125)}{(125 + 75)} = 5$$

However, GROUPHHH needs only 4 MSUs (GCL (129) - entitlement (125)), which leaves 4 gray-space MSUs still available.

- iCap distributes the 4 remaining gray-space MSUs to LPARBBB, but that is not enough to meet its 4HRA (100). Consequently, LPARBBB is soft capped.

**Recommendation**

BMC recommends assigning a generous proportion value and a priority value of 1 to mission-critical LPARs and capacity groups:

- Awarding generous proportions to mission-critical LPARs and groups increases the possibility of the 4HRA remaining below entitlement. That is, the mission-critical LPARs and groups receive the MSUs that they require.

- In the event that the 4HRA exceeds the entitlement, having a priority value of 1 increases the probability that the mission-critical LPARs or groups will receive first choice of gray-space MSUs.

**Using WLMTUNING=COMBINED**

For this scenario, assume that the following conditions exist in your environment:

- The workloads are governed by different WLM policies.

- The WLM policies managing the workloads are sufficiently similar. That is, an importance value of \( n \) must be comparable on each sysplex.
Also, assume that you want to set the order in which LPARs and groups receive MSUs based on:

1. Adjusted Low-Importance Workload Percentage
2. Ratio \((4\text{HRA} \div \text{entitlement})\)

**Rules**

If WLMTUNING=COMBINED, the following rules apply when LPARs or groups have a 4HRA above entitlement:

- The LPAR or group with the lowest Adjusted Low-Importance Workload Percentage is favored.
- If LPARs or groups have equal Adjusted Low-Importance Workload Percentage, the LPAR or group with the lowest ratio of 4HRA/entitlement is favored.

**Calculating the Adjusted Low-Importance Workload Percentage**

iCap calculates the Adjusted-Low Importance Workload Percentage as follows:

\[
\text{lowImportanceWorkloadPercentage} \times \text{adjustmentFactor}
\]

\(\text{adjustmentFactor}\) refers to the values that you set for the Adjustment Factors for Priority parameter. The \(\text{adjustmentFactor}\) value corresponds to priority. The higher the priority is, the lower the adjustment factor is. That is, for two LPARs with an equal Low-Importance Workload Percentage, the LPAR with the highest priority (and lower adjustment factor) will have lower Adjusted Low-Importance Workload Percentage. \(\text{lowImportanceWorkloadPercentage}\) refers to a value that iCap calculates as follows:

\[
\left(\%\text{OfStandardCPCConsumption} \times \text{adjustmentFactor}\right) \div \text{consumptionOfAllWorkloads}
\]

**Note**

You can specify the level of importance values that are considered to be of low importance with the Low Importance parameter. The default value is 5.

For more information about the Low Importance parameter, see “Creating a policy” on page 49.

**Scenario**

As the following view shows, both GROUPGGG and LPARCCC have 4HRAs that are below their entitlement values. Therefore, GROUPGGG and LPARCCC receive the MSUs to which they are entitled, and their DC or GCL is set slightly above the
4HRA. In contrast, LPARAAA, LPARBBB, and GROUPHHH have 4HRAs above their entitlements and must compete for the remaining 27 gray-space MSUs from GROUPGGG and LPARCCC. For an explanation of how to calculate gray-space MSUs, see “Using WLMTUNING=No” on page 82.

Figure 25: POLOVER view (WLMTUNING=COMBINED)

---

iCap distributes the gray-space MSUs as follows:

- LPARAAA has an Adjusted Low Importance Workload Percentage of 9 (the lowest of the remaining LPARs and groups).

  **Note**
  
  The Low-Importance Workload Percentage for LPARAAA is 11, the highest among the remaining LPARs and groups. Due to LPARAAA’s priority value of 2 (and lower Adjustment Factor for its priority), its Adjusted Low-Importance Workload Percentage is the lowest, as shown in the **Adj Low-Imp Wkld%** column in Figure 25 on page 86.

iCap determines that LPARAAA requires 19 of the gray-space MSUs:

\[
119 \text{ (4HRA)} - 100 \text{ (entitlement)} = 19
\]

This distribution leaves 8 remaining gray-space MSUs:

\[
27 \text{ (available gray-space MSUs)} - 19 \text{ (MSUs required by LPARAAA)} = 8
\]

- LPARBBB and GROUPHHH have an equal Adjusted Low-Importance Workload Percentage of 10, so iCap will distribute the remaining gray-space MSUs based on entitlement (or proportion). Because GROUPHHH has the lowest ratio of 4HRA/entitlement (as shown in the following table), GROUPHHH will receive the next distribution:

<table>
<thead>
<tr>
<th>LPAR or group</th>
<th>4HRA</th>
<th>Entitlement</th>
<th>Ratio 4HRA/entitlement</th>
</tr>
</thead>
<tbody>
<tr>
<td>LPARBBB:</td>
<td>83</td>
<td>75</td>
<td>1.11</td>
</tr>
<tr>
<td>GROUPHHH:</td>
<td>135</td>
<td>125</td>
<td>1.08</td>
</tr>
</tbody>
</table>

—iCap calculates that GROUPHHH is allowed to take the remaining 8 gray-space MSUs. However, GROUPHHH does not receive enough MSUs to meet the 4HRA (135). Consequently GROUPHHH is soft-capped.
— As there are no remaining gray-space MSUs, iCap sets the DC of LPARBBB to 75 (equal to entitlement). Consequently, LPARBBB is also soft-capped.

Using **WLMTUNING=**YES

For this scenario, assume that the following conditions exist in your environment:

- The workloads are governed by different WLM policies.
- The WLM policies managing the workloads are sufficiently *different*. That is, an importance value of *n* on one sysplex is not comparable to an importance value of *n* on another sysplex.

Also, assume that you want to set the order in which LPARs and groups receive MSUs based on:

1. Adjusted Low-Importance Workload Percentage
2. Priority
3. Ratio \( \frac{4\text{HRA}}{\text{entitlement}} \)

**Rules**

If WLMTUNING=\( \text{YES} \), the following rules apply when LPARs or groups have 4HRAs above entitlement:

- If LPARs or groups belong to the *same sysplex*, the LPAR or group with the *lowest* Adjusted Low-Importance Workload Percentage is favored. If the LPARs or groups have equal Adjusted Low-Importance Workload Percentage, the LPAR or group with the *lowest* ratio \( \frac{4\text{HRA}}{\text{entitlement}} \) is favored.

- If LPARs or groups belong to *separate sysplexes*, the LPAR or group with the *highest* priority is favored. If the LPARs or groups have equal priority, the LPAR or group with the *lowest* ratio of \( \frac{4\text{HRA}}{\text{entitlement}} \) is favored.
Scenario

As the following view shows, GROUPGGG has a 4HRA below entitlement value. Therefore, it receives the MSUs to which it is entitled, and the GCL is set slightly above the 4HRA.

Figure 26: POLOVER view (WLMTUNING=YES)

In contrast, LPARAAA, LPARBBB, LPARCCC and GROUPHHH have 4HRAs above their entitlements and must compete for the remaining 23 gray-space MSUs from GROUPGGG. (For an explanation of how to calculate gray-space MSUs, see “Using WLMTUNING=No” on page 82.)

- From each sysplex, a sysplex winner is selected.
- Among the sysplex winners, a winner is selected.

For more information about how sysplexes are favoured, see “Rules” on page 87.

The sysplex-winners are determined as follows:

Table 11: Determining sysplex winners

<table>
<thead>
<tr>
<th>Sysplex</th>
<th>LPAR/group</th>
<th>Adjusted Low-Importance Workload Percentage</th>
<th>Sysplex winner</th>
</tr>
</thead>
<tbody>
<tr>
<td>SYSPLXII</td>
<td>LPARAAA</td>
<td>8</td>
<td>LPARAAA</td>
</tr>
<tr>
<td></td>
<td>LPARBBB</td>
<td>10</td>
<td></td>
</tr>
<tr>
<td>SYSPLXOO</td>
<td>GROUPHHH</td>
<td>10</td>
<td>GROUPHHH</td>
</tr>
<tr>
<td></td>
<td>LPARCCC</td>
<td>12</td>
<td></td>
</tr>
</tbody>
</table>

Among the sysplex-winners, LPARAAA wins over GROUPHHH because it has the higher priority value of 2.

The gray-space MSUs are distributed as follows:
- LPARAAA has the highest priority of the sysplex-winners. iCap determines that LPARAAA requires 10 of the gray-space MSUs:

\[ 110 \text{ (4HRA)} - 100 \text{ (entitlement)} = 10 \]

This distribution leaves 13 remaining gray-space MSUs:

\[ 23 \text{ (gray-space MSUs)} - 10 \text{ (MSUs required by LPARAAA)} = 13 \]

- LPARBBB (the remaining LPAR on SYSPLXII) and GROUPHHH (the sysplex winner on SYSPLXOO) compete for gray-space MSUs.

LPARBBB and GROUPHHH have an equal priority value of 3, and an equal Adjusted Low-importance Workload Percentage of 10, so iCap will distribute the remaining gray-space MSUs based on entitlement (or proportion). Because GROUPHHH has the lowest ratio of 4HRA/entitlement (as shown in the following table), GROUPHHH will receive the next distribution:

<table>
<thead>
<tr>
<th>LPAR or group</th>
<th>4HRA</th>
<th>Entitlement</th>
<th>Ratio 4HRA/entitlement</th>
</tr>
</thead>
<tbody>
<tr>
<td>LPARBBB</td>
<td>100</td>
<td>75</td>
<td>1.33</td>
</tr>
<tr>
<td>GROUPHHH</td>
<td>150</td>
<td>125</td>
<td>1.2</td>
</tr>
</tbody>
</table>

- iCap calculates that GROUPHHH is allowed to take the remaining 13 gray-space MSUs. However, GROUPHHH does not receive enough MSUs to meet the 4HRA (150). Consequently GROUPHHH is soft-capped.

- As there are no remaining gray-space MSUs, iCap sets the DC of LPARBBB to 75 and the DC of LPARCCC to 25 (equal to entitlement). That is, LPARBBB and LPARCCC are soft-capped.
Generated JCL examples

This topic contains examples of JCL for starting the iCap master and agent PASs. This JCL is generated during customization, as instructed in the MainView Customization Reference.

Example of master PAS JCL

The following figure is an example of iCap master PAS JCL that is generated during customization.

Figure 27: Example of master PAS JCL

```
//DYCPASM   PROC   XDM=N,
//             SSID=BBCS,
//             PREFIX=DYCQA.COZE.V2380.PUT1401B,
//             VSPREFIX=DYCQA.COZE.PUT1401B,
//             PRDPREFIX=DYCQA.COZE.PUT1401B,
//             POLICY=,
//             PASMODE=OBSERVE,
//             RGN=0
//*
//*  BMC Intelligent Capping for zEnterprise (iCap) Master PAS STC
//*/
//*  Change logs:  
//*  -------------------------------------------------------------------------
//*  Start PAS
//*  -------------------------------------------------------------------------
//PAS   EXEC   PGM=DYC9XZ00,
//             PARM=('SSID=&SSID,XDM=&XDM,
//             POLICY=&POLICY,MODE=&PASMODE,TYP=MASTER'),
//             REGION=&RGN.M,
//             TIME=1440
//*
//STEPLIB   DD   DISP=SHR,DSN=&PREFIX..BBLINK
//BBIPARM   DD   DISP=SHR,DSN=&PRDPREFIX..S0&SYSCLONE..UBBPARM
//POLICIES   DD   DISP=SHR,DSN=&PRDPREFIX..POLICIES
//BBSECURE   DD   DISP=SHR,DSN=&PRDPREFIX..BBSECURE
//BMCPWD   DD   DISP=SHR,DSN=&PRDPREFIX..BMCPWD
//BBACTDEF   DD   DISP=SHR,DSN=&PRDPREFIX..BBACTDEF
//BBVDEF   DD   DISP=SHR,DSN=&PRDPREFIX..BBVDEF
//*
//*  HISTORY DATA SETS
//*
//HISTDS01   DD   DISP=SHR,DSN=&VSPREFIX..S0SE.HISTDS01
```
Example of agent PAS JCL

The following figure is an example of iCap agent PAS JCL that is generated during customization.

Figure 28: Example of agent PAS JCL

Example of agent PAS JCL
SSID=PAS SSID, this is a four character value that determines what CAS it connects too. The default is BBCS.

XDM = Y,N - Extended diagnostic mode, the default is N.

Policy = The name of your policy, it can be up to 8 characters in length. If it is not specified for a MASTER PAS, then NO-POLICY will be used as a policy and you will be switched to observe mode, if you specified manage or message mode.

Mode = Manage,Observe,Msg (default is observe), this is not required for an AGENT PAS.

Manage, means actively manage the CPC
Observe means just collect data do not do anything
Msg means observe + write WTO's saying what you would have done if you were managing

Type = master, agent (the default is agent)

Srvclass = srvclass, default SYSSTC, WLM-RULE (rule means let WLM tell us what it is). The only two valid options are SYSSTC or WLM-RULE.
Sample policy

The following figure shows the sample *HLQ.DYCSAMP (SAMPOLC)* policy that BMC provides in the distributed library.

Figure 29: iCap sample policy

```xml
<dc_policy>
<!- ***** Policy-level Parameters -->
<description> iCap Sample Policy </description>
<wlmtuning> YES|NO|COMBINED </wlmtuning>
<low_importance> ? </low_importance>
<adjust_factor_prio_1> 0.6 </adjust_factor_prio_1>
<adjust_factor_prio_2> 0.8 </adjust_factor_prio_2>
<adjust_factor_prio_3> 1 </adjust_factor_prio_3>
<adjust_factor_prio_4> 1.2 </adjust_factor_prio_4>
<adjust_factor_prio_5> 1.4 </adjust_factor_prio_5>

<!- ***** CPC-level Parameters -->
<cpcid> ???? </cpcid>
<msulimit> ???? </msulimit>

<!- ***** LPAR- or Group-level Parameters -->
<lparorgroup>
  <name> SAMPGRP1 </name>
</lparorgroup>
```
Policy parameter descriptions

The following table lists the XML tags that the sample policy uses. The table also shows the corresponding parameters.

---

**Note**

The iCap parameter descriptions are available in “Creating and activating policies” on page 49.

---

Table 12: Policy parameters

<table>
<thead>
<tr>
<th>XML tag</th>
<th>Parameter</th>
</tr>
</thead>
<tbody>
<tr>
<td>&lt;description&gt;</td>
<td>Description</td>
</tr>
<tr>
<td>&lt;wlmtuning&gt;</td>
<td>WLM Tuning</td>
</tr>
<tr>
<td>&lt;low_importance&gt;</td>
<td>Low Importance</td>
</tr>
<tr>
<td>&lt;adjust_factor_prio_1&gt;</td>
<td>AdjFac Priority 1</td>
</tr>
<tr>
<td>&lt;adjust_factor_prio_2&gt;</td>
<td>AdjFac Priority 2</td>
</tr>
<tr>
<td>&lt;adjust_factor_prio_3&gt;</td>
<td>AdjFac Priority 3</td>
</tr>
<tr>
<td>&lt;adjust_factor_prio_4&gt;</td>
<td>AdjFac Priority 4</td>
</tr>
<tr>
<td>&lt;adjust_factor_prio_5&gt;</td>
<td>AdjFac Priority 5</td>
</tr>
<tr>
<td>&lt;cpcid&gt;</td>
<td>CPCID</td>
</tr>
<tr>
<td>&lt;msulimit&gt;</td>
<td>MSU Limit</td>
</tr>
<tr>
<td>XML tag</td>
<td>Parameter</td>
</tr>
<tr>
<td>--------------</td>
<td>--------------------------</td>
</tr>
<tr>
<td>LPAR and group information&lt;br&gt;&lt;lparorgroup&gt;</td>
<td></td>
</tr>
<tr>
<td>&lt;name&gt;</td>
<td>LPAR/Group Name</td>
</tr>
<tr>
<td>&lt;type&gt;</td>
<td>Type</td>
</tr>
<tr>
<td>&lt;priority&gt;</td>
<td>Priority</td>
</tr>
<tr>
<td>&lt;proportion&gt;</td>
<td>Proportion</td>
</tr>
<tr>
<td>&lt;maxdcgcl&gt;</td>
<td>Max DC/GCL</td>
</tr>
</tbody>
</table>
Glossary

GCL

Group capacity limit. The maximum value for the average consumption of MSUs by a capacity group. If the 4HRA reaches a value that is greater than or equal to the GCL, the capacity group is capped. This is a control value defined in the Hardware Management Console (HMC).

4HRA

Four–hour rolling average. The CPU consumption, measured in MSUs.

4HRA is calculated by the RMF using the last 48 5-minute buckets and written into the type 70 record of the z/OS image in which the RMF is running.

While the RMF in each z/OS image records the CPU consumption of all LPARs on the same CPC, the 4HRA metric is available only for the host LPAR (the LPAR in which this record is created).

The four–hour rolling average or 4HRA is sometimes called R4HA.

A

AEWLC

Advanced Entry Workload License Charges

AWLC

Advanced Workload License Charges
C

CPC

Central processor complex. This complex is a physical collection of hardware that includes main storage, one or more central processors, timers, and channels.


D

DC

Defined capacity. The maximum value for the average consumption of MSUs by an LPAR. If the 4HRA reaches a value that is greater than or equal to the DC, the LPAR is capped. This is a control value defined in the Hardware Management Console (HMC).

E

entitlement

The amount of MSUs that an LPAR or group is allowed to take. The entitlement can be calculated by:

\[
\frac{\text{PROPORTION}}{\sum(\text{ALL PROPORTIONS})} \times \text{MSULIMIT}
\]

For more information, see “Overview of how entitlement works”.

EWLC

Entry Workload License Charges

F

FWLC

Flat Workload License Charges
gray-space MSUs

When an LPAR or group has 4HRA below entitlement, the remaining (unused) MSUs are called gray-space MSUs. These gray-space MSUs can be given to other LPARs or groups in need of MSUs.

iCap calculates gray-space MSUs as follows:

\[
\text{entitlement} - (DC|GCL)
\]

LPAR

Logical partition. A subset of a single system that contains resources (processors, memory, and input/output devices).

An LPAR operates as an independent system and can contain different operating systems such as:

- z/OS
- Integrated Coupling Facility
- Linux (from Linus Torvalds)
- IBM z/VM

An LPAR can also be inactive.

managed object

An LPAR or capacity group that is managed by an iCap policy.

MLC Product

An IBM System z software product using MLC pricing.
MLCs

Monthly License Charges. One of the methods that IBM is using to charge for software products.

This method is used for the operating system itself and for the most important (and expensive) transaction processing subsystems (for example, CICS, DB2, IMS, and Web Sphere MQ).

For more information see, http://www-03.ibm.com/systems/z/resources/swprice/mlc/index.html

MSU limit

The maximum allowable MSUs to be consumed collectively by all LPARs and capacity groups that the policy manages.

The sum of DCs and GCLs cannot exceed this value. When the combined 4HRA of all LPARs and capacity groups exceeds this value, at least one LPAR or group is subject to capping.

MSUs

Hundreds of Service Units. A measure of CPU time consumption, calculated as number of CPU seconds used per hour, multiplied by the service units per seconds (SU/sec) coefficient.

The SU/sec coefficient depends on the CPC type and model and normally is the same for all LPARs on a CPC.

S

SCRT

Sub-Capacity Reporting Tool. An IBM tool that processes the RMF and SMF records (in particular type 70 and type 89) and produces the Sub-Capacity report.

This report is used by IBM to calculate the monthly license charge. IBM customers using Sub-Capacity licenses must use SCRT to process data from all LPARs on a CPC for the complete billing month (from 00:00 of day 2 of the calendar month to 24:00 of day 1 of the next calendar month) and send it to IBM.

For more information see, http://www-03.ibm.com/systems/z/resources/swprice/.

soft capping
If the 4HRA for a managed LPAR or group exceeds the DC or GCL, the LPAR or group might be temporarily capped.

See also MSU limit on page 102.

sub-capacity

A group of licensing rules, terms, and conditions for software licenses based on actual CPU resource usage.

For more information see, http://www-03.ibm.com/systems/z/resources/swprice/.

U

UIE

Universal Information Exchange. A BMC component that runs on your mainframe system to read and process SMF/RMF and subsystem data collected from target z/OS images.

UIE can produce two types of output:

- XML data files
- Visualizer files

For more information, see the *Universal Information Exchange User Guide*.

V

VWLC

Variable Workload License Charges

W

WLM

Workload Manager. A component that controls access to system resources based on performance goals set by the system administrator.
**workload**

A group of work to be tracked, managed, and reported as a unit.

A workload consumes system resources such as CPU time and I/O operations.

**Z**

**z/OS**

A 64-bit operating system for IBM mainframe computers.

**z/OS image**

An instance of z/OS running in an LPAR or as VM guest.

z/OS images can run in an LPAR or inside an instance of the z/VM operating system as a guest.

**z/VM**

An IBM Virtual Machine operating system for mainframe computers.

**zNALC**

IBM System z New Application License Charges.
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