Overload Detection with WLM

User's Guide

AIX

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Software

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About this Guide

This guide describes the "Overload Detection with WLM" application that helps the system administrator to detect overloaded applications. This guide is organized as follows:

- Chapter 1, "**Introduction to Overload Detection with WLM**", describes the application.

- Chapter 2, "**Graphic User Interface (GUI)**", explains how to operate the "Overload Detection with WLM" application.

- Appendix A, "**Reference Information**", provides advanced users with supplemental information about the filesets, configuration files and TCP/IP configuration.

Who Should Use This Book

This guide provides system administrators with information for performing the tasks of overload detection with WLM.

It is assumed that you are familiar with the information and concepts presented in the following publications:

- *System Management Guide: Operating System and Devices*, 86 A2 26EF

- *System Management Concepts: Operating System and Devices*, 86 A2 28EF

You should especially have a very good knowledge of the AIX Workload Management (WLM) functions. Pay a particular attention to the chapters that describe the WLM feature in the two manuals above.

The "Overload Detection with WLM" application is mainly used for Rolling Applications in cluster configurations. For information about Rolling Applications, refer to:

- *EPC & HA Solutions Setup Guide, 86 A2 79HX*

Note: You can also find the present guide on the "Hypertext Library for AIX 5L" CD–ROM. This online documentation is designed for use with an HTML version 3.2 compatible web browser.

Table of Contents

Chapter 1. Introduction to Overload Detection with WLM

Overview

Workload Manager (WLM) provides the system administrator increased control over how the scheduler and the virtual memory manager (VMM) allocate resources to processes. You can use WLM to prevent different classes of jobs from interfering with each other and to allocate resources based on the requirements of different groups of users.

The objective of the "Overload Detection with WLM" application is to detect the overloaded WLM classes. The application uses the statistics generated by WLM to evaluate if some classes are overloaded. A Java–based graphical user interface (GUI), managed through WebSM, displays the overloaded classes. The detection itself is performed wether the GUI is opened or not. However WLM must be configured and started, either in passive mode or in active mode.

"Overload Detection with WLM" is a tool that the system administrator can use in complement of WLM to check that the classes are well balanced, and, if the case arises, to decide if some applications must be transferred on another system (Rolling Applications).

"Overload Detection with WLM" runs with **AIX 5L for POWER Version 5.1** and later.

Some WLM Concepts

The "Overload Detection with WLM" application relies on the WLM configuration. Complete information about WLM is provided in:

• *System Management Concepts: Operating System and Devices*, 86 A2 28EF

• *System Management Guide: Operating System and Devices*, 86 A2 26EF

Some WLM concepts are reminded in this section.

WLM Classes

The central concept of Workload Manager (WLM) is the concept of class. A class is a collection of processes (jobs) which has a single set of resource limits applied to it. WLM assigns processes to the various classes and controls the allocation of system resources among the different classes using class assignment rules. WLM controls the allocation of system resources among the different classes using per class resource shares and limits set by the system administrator.

Resources Managed by WLM

WLM manages three types of resources:

• The CPU utilization of the threads in a class. This is the sum of all the CPU cycles consumed by every thread in the class.

• The physical memory utilization of the processes in a class. This is the sum of all the memory pages which belong to the processes in the class.

• The disk I/O bandwidth of the class. This is the bandwidth (in 512 byte blocks per second) of all the I/Os started by threads in the class on each disk device accessed by the class.

WLM Active and Passive Modes

WLM can start in active mode, where WLM does monitoring and regulation of CPU and memory (the normal operating mode), or in passive mode, where WLM only classifies processes and monitors resource utilization without interfering with the standard AIX resource allocation algorithms.

Detection Principle

A configuration file contains the parameters allowing the system to detect when a class is overloaded.

A class is detected as "overloaded" if one of the two following conditions happens:

- one of the WLM resources used by the class approaches the absolute maximum limit configured in WLM,

- or one of the WLM resources is nearly fully used by all the classes, and the class (the one detected as overloaded) uses this resource excessively according to the target shares configured for this resource.

Use the GUI to display the overloaded classes, and to display or modify the configuration parameters. The GUI is described on page 2-1.

Once the system administrator has detected overloaded classes, it may be necessary to transfer some applications (Rolling Applications) from one node of a cluster to another. This task is described in:

- *EPC & HA Solutions Setup Guide, 86 A2 79HX*

Chapter 2. Graphic User Interface (GUI)

Entering the Overload Detection Menus

We assume in this chapter that WLM is configured and started (either in active or passive mode).

The Overload Detection application is started from the WebSM "**Workload Manager**" application. Select "**Overload Detection**" to display Figure 1:
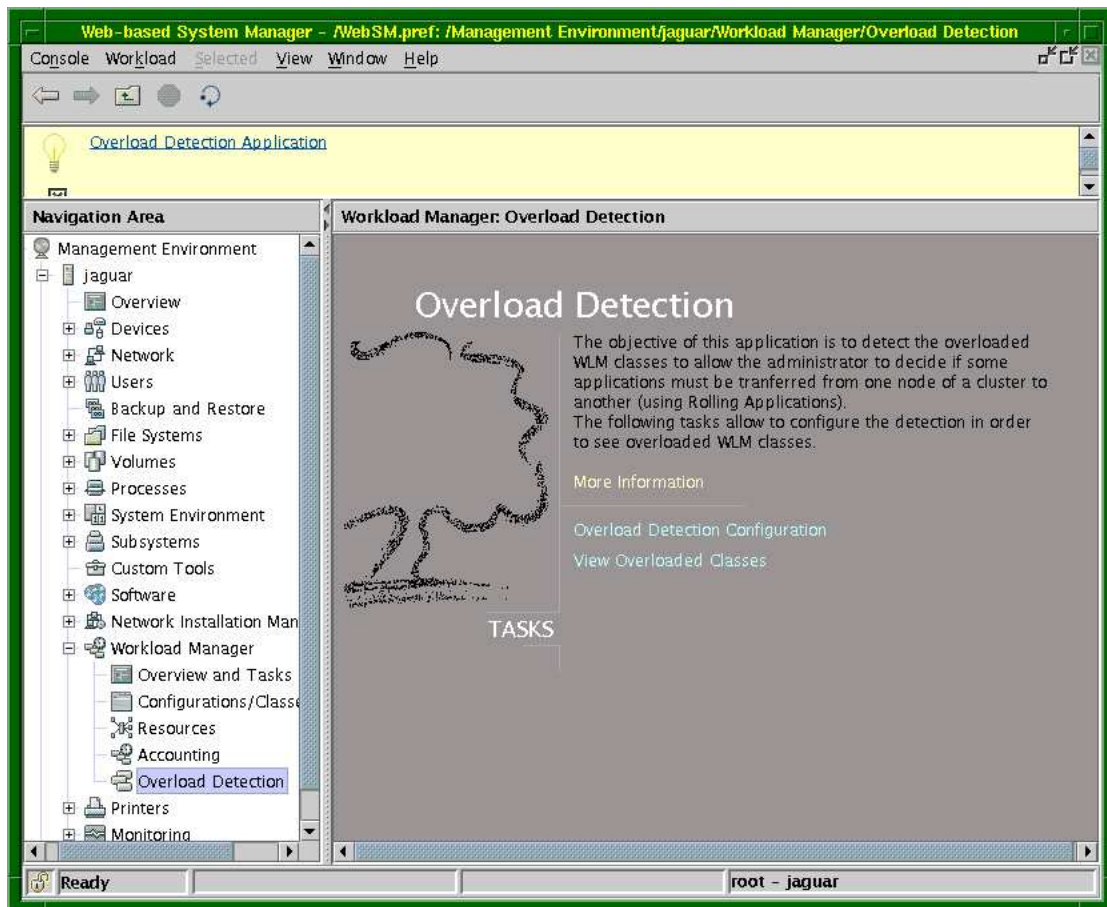

Figure 1.   Starting "Overload Detection" from WebSM

The Overload Detection menu offers the choice between two actions:

- "**Overload Detection Configuration**", described on page 2-2, to display the detection parameters,

- "**View Overloaded Classes**", described on page 2-4, to display the WLM classes and check if an overload is detected.

Overload Detection Configuration

Selecting "**Overload Detection Configuration**" displays the configuration parameters, similar to Figure 2:
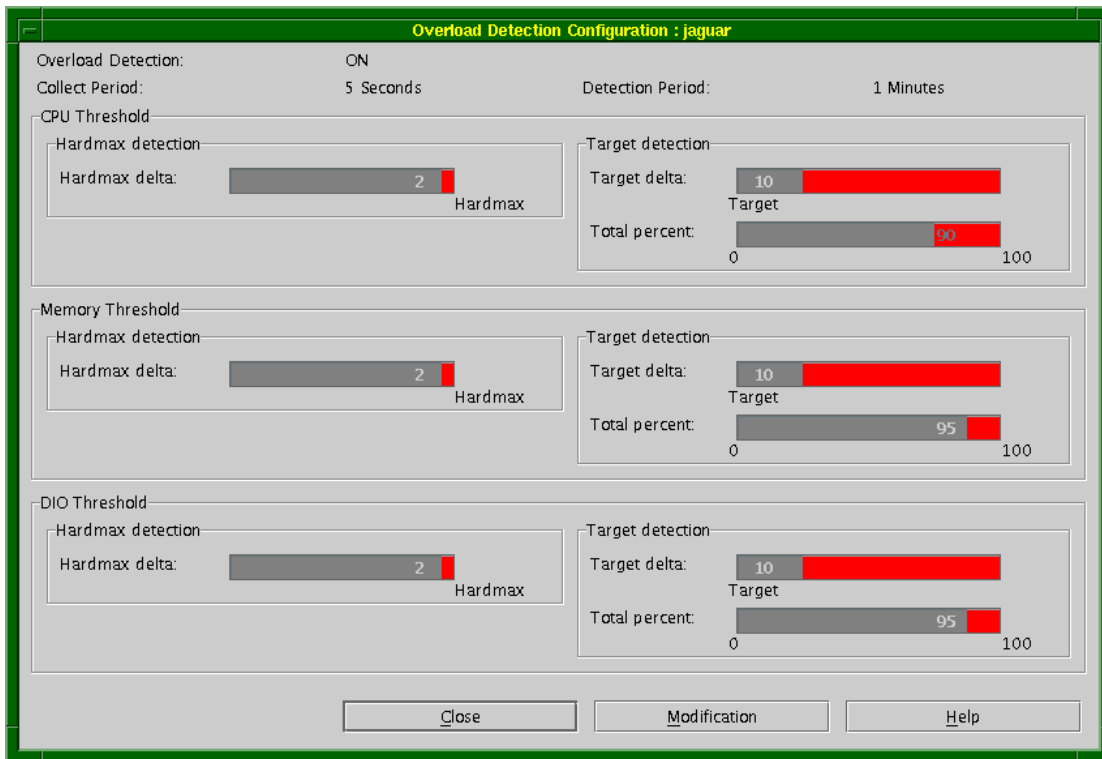

Figure 2.   Displaying the Configuration Parameters

Configuration Parameters

- The **Overload Detection** parameter indicates wether the detection is operational (**ON**) or not (**OFF**). The Overload Detection is ON if the following conditions are satisfied:

  – WLM is started, in passive or active mode,

  – the detection daemon (**wlmrad**) is started,

  – the detection parameter of the daemon configuration file is active (**Rolling : yes**).

- The **Collect Period** can take the values: **5**, **10** or **20** seconds. The Collect Period value acts on the precision of the resource targets calculation. The default period (5 seconds) is the optimum value for the calculation precision. A longer period may decrease the use of CPU by the **wlmrad** detection daemon.

- The **Detection Period** (in minutes) is the period on which the system calculates the average resources consumption. An overload detection is reported if the consumption for the Detection Period exceeds the configured thresholds.

Two thresholds are configured for each resource (CPU, Memory, Disk I/O).

- **Hardmax detection**: the absolute maximum limit indicates the maximum amount of the resource that can be made available for a class, even if there is no contention of the resource. An overload detection occurs for a class when its average consumption of the resource, during the detection period, is above or equal to the hard maximum minus a delta. This delta (**Hardmax delta** parameter) is configured for each resource.

  In Figure 2, the **Hardmax delta** is equal to 2. An overload is detected when the resource consumption reaches the value `hardmax-2`.

- **Target detection**: the target defines the resource percentage that a class should trend to use, considering the current WLM configuration. An overload detection occurs for a class when:

  – the total consumption of the resource by all the classes is above or equal to the value defined for the resource (**Total percent** parameter approaches 100).

  – <u>and</u> the average consumption of the resource for the class, during the detection period, is above or equal to the target increased by a delta (**Target delta** parameter). The delta is configured for each resource.

  In Figure 2, the **Target delta** is equal to `10` and the **Total Percent** is equal to `95`. An overload is detected when the total resource consumption reaches `95%`, and the resource consumption for the class exceeds `Target+10`.

Modifying the Configuration Parameters

The Modification button displays a menu which allows the administrator to modify the configuration parameters values.
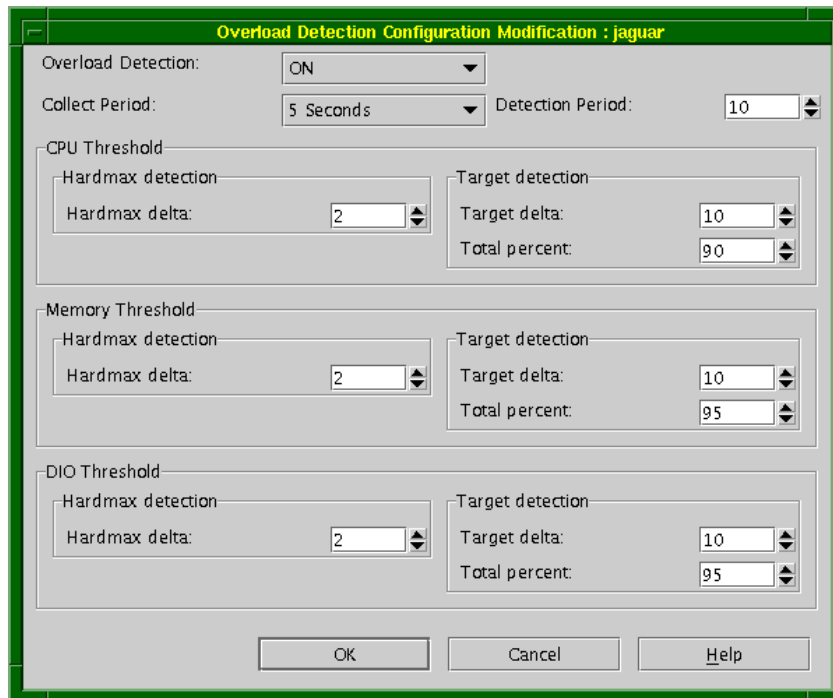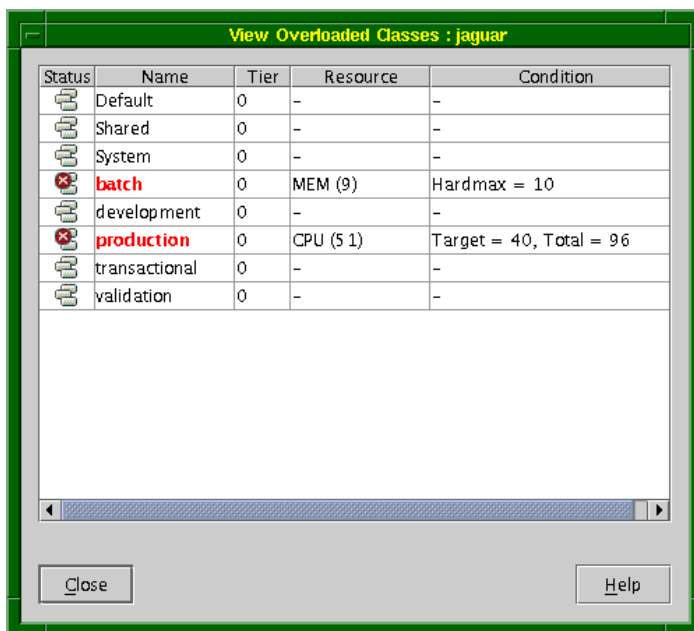

Figure 3.   Modifying the configuration parameters

When you click on the **OK** button the following actions are performed:

1. The **wlmrad** daemon is stopped.

2. The configuration file is updated.

3. The **wlmrad** damon is re-started with the new configuration file.

View Overloaded Classes

Selecting "View Overloaded Classes" displays the classes of the current WLM configuration in a screen similar to Figure 4:

Figure 4.   Viewing Overloaded Classes

The classes detected as overloaded are displayed in red, with an icon different from the other classes.

The resource for which the class is overloaded is displayed, as well as the condition that has triggered the detection:

- the class approaches the absolute maximum limit (Hardmax)
  (Resource consumption >= Hardmax–hardmax delta).

- or the class exceeds its target (Resource consumption >= Target+Target delta), <u>and </u>the total consumption of all the classes approaches the 100%
  (Total Resource Consumption >= Total percent).

In the Figure 4, two classes are detected as overloaded:

- the `production` class is overloaded because this class consumes `51%` of CPU resource, while its "Target+Target delta" value is equal to `40+10=50,` and the "Total CPU consumption" is equal to `96`.

- the `batch` class is overloaded because it consumes `9%` of memory, while the "Hardmax–hardmax delta" for this resource is equal to `10-2=8`.

Appendix A. Reference Information

This appendix is for administrators who have specific installation or configuration needs.

Installation

The "Overload Detection with WLM" product is made of two LPP:

- **wlmra.server**

- **wlmra.rolling**

These LPP are delivered in the *Bull Enhancement* CD-ROM that comes with AIX delivery. Enter the following command to verify that the filesets are installed:

```
lslpp -L wlmra*
```

If the **wlmra.server** and **wlmra.rolling** filesets are not installed, use the smit install_latest command to install them.

Notes:

1. On new systems, the AIX and Bull Enhancements filesets are factory pre-loaded, and you do not need to perform any installation operation.

2. Refer to the "AIX 5L and Bull Enhancement SRB" (System Release Bulletin) for more information about installation.

3. The **wlmra.accounting** fileset is used by the "WLM Accounting" application.

The **wlmra.*** LPP install the **wlmrad** daemon on the system. The **wlmrad** daemon is a subsystem controlled by the System Resource Controller (SRC).

After installation the **wlmrad** daemon is running and the default values are as follows:

Collect Period	5 seconds
Detection Period	10 minutes
Hardmax delta	2
Target delta	10
Total percent	90 for CPU, 95 for Memory and Disk I/O.

Configuration File

The configuration parameters of **wlmrad** are defined in the /**var**/**wlmra**/**config**/**wlmra.cfg** stanza file.

Note: Only the root user can modify the parameters value.

WebSM Configuration

Web–based System Manager (WebSM) can be configured to run in *standalone* mode or in *remote* mode. Whatever mode WebSM is running (remote or not), the communication between the GUI and the **wlmrad** daemon operates through the port defined in the /**etc**/**services** file (by default **6969**), or through a dynamic port.

If WebSM runs in remote mode, refer to the following publication to configure the communication port:

Web–based System Manager Administration Guide

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