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zEnterprise Platform Performance Management: Overview

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Session: 8686

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Notes:

Performance is in Internal Throughput Rate (ITR) ratio based on measurements and projections using standard IBM benchmarks in a controlled environment. The actual throughput that any user will experience will vary depending upon considerations such as the amount of multiprogramming in the user's job stream, the I/O configuration, the storage configuration, and the workload processed. Therefore, no assurance can be given that an individual user will achieve throughput improvements equivalent to the performance ratios stated here.

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Agenda

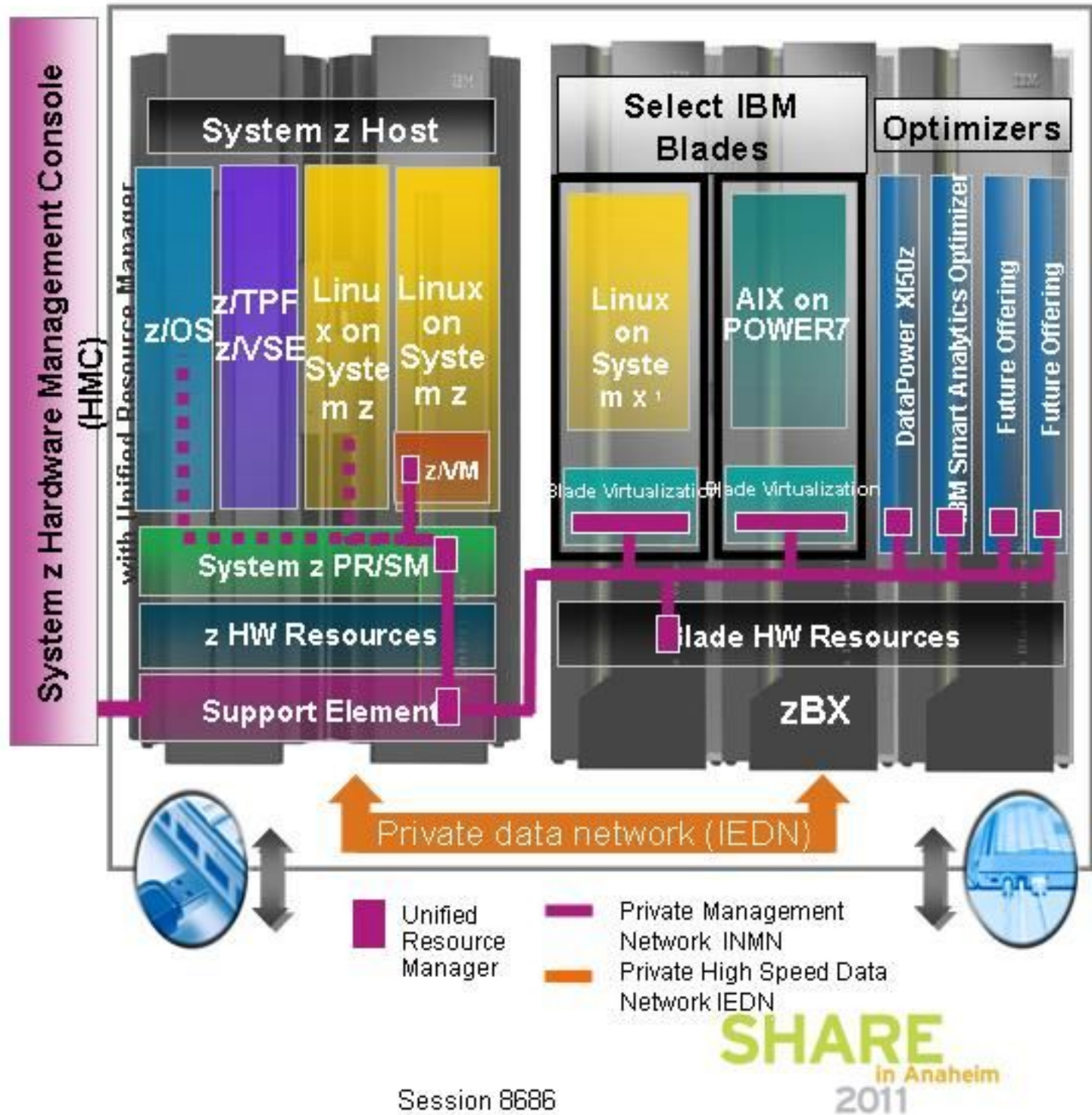
- Platform Management Objectives
- Workload based monitoring
- Management functions

Platform Performance Management Objectives

zEnterprise Unified Resource Manager

- Ensemble:
  - A zEnterprise Ensemble is a collection of zEnterprise Nodes managed as a single virtualized pool of server resources
    - Native LPAR and z/VM Virtual Images
    - Power VM Virtual images
    - IBM Smart Analytics Optimizer for DB2
    - IBM DataPower Appliance
  - A zEnterprise Node can be a member of at most one Ensemble

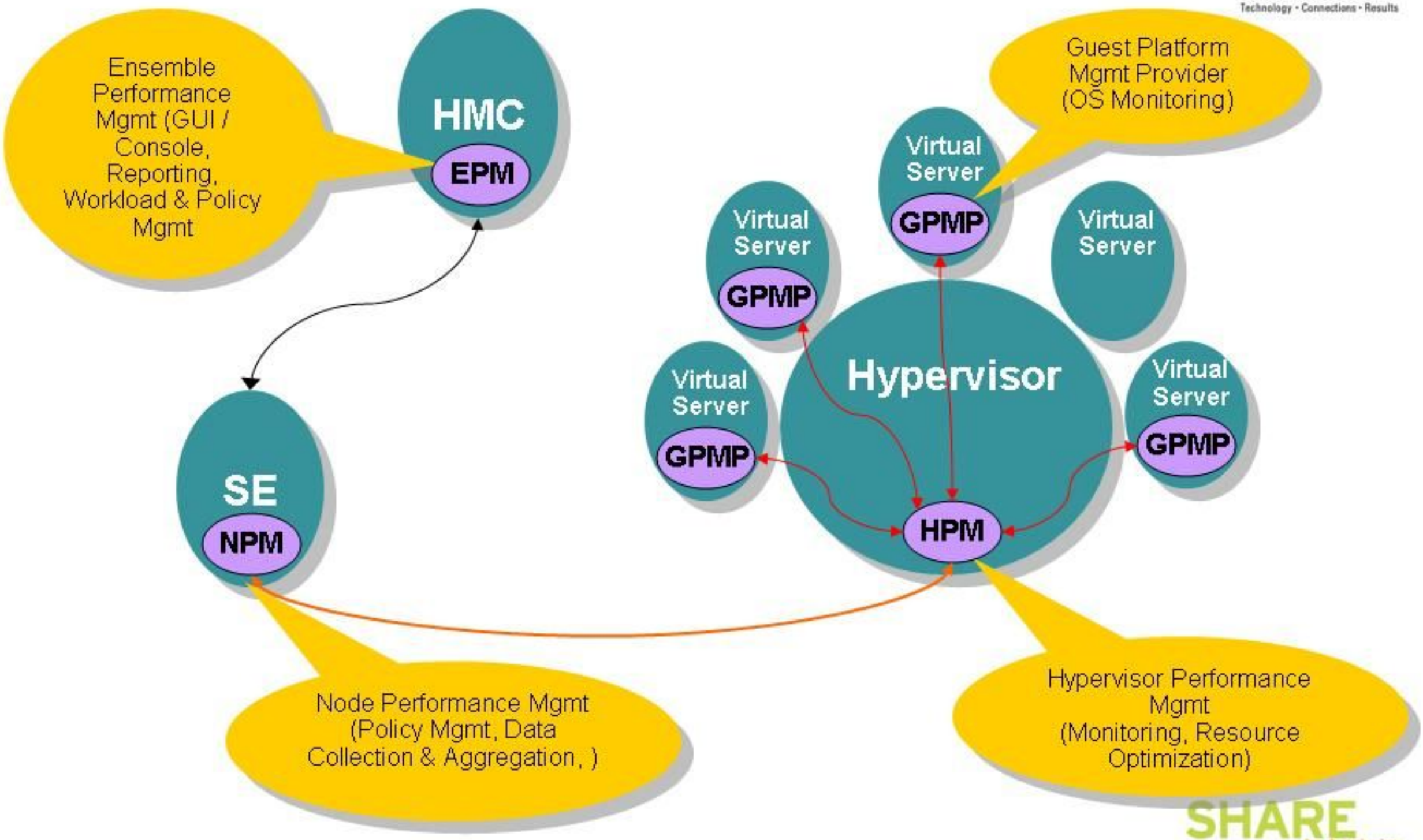
- zEnterprise Unified Resource Manager (zManager)
  - HMC is management console
  - Ensemble-Wide scope of responsibility
  - Hardware configuration and operational control
  - Virtual server life cycle management
  - Virtual network and storage provisioning
  - Energy Management
  - Goal-oriented performance management



zEnterprise Platform Performance Manager

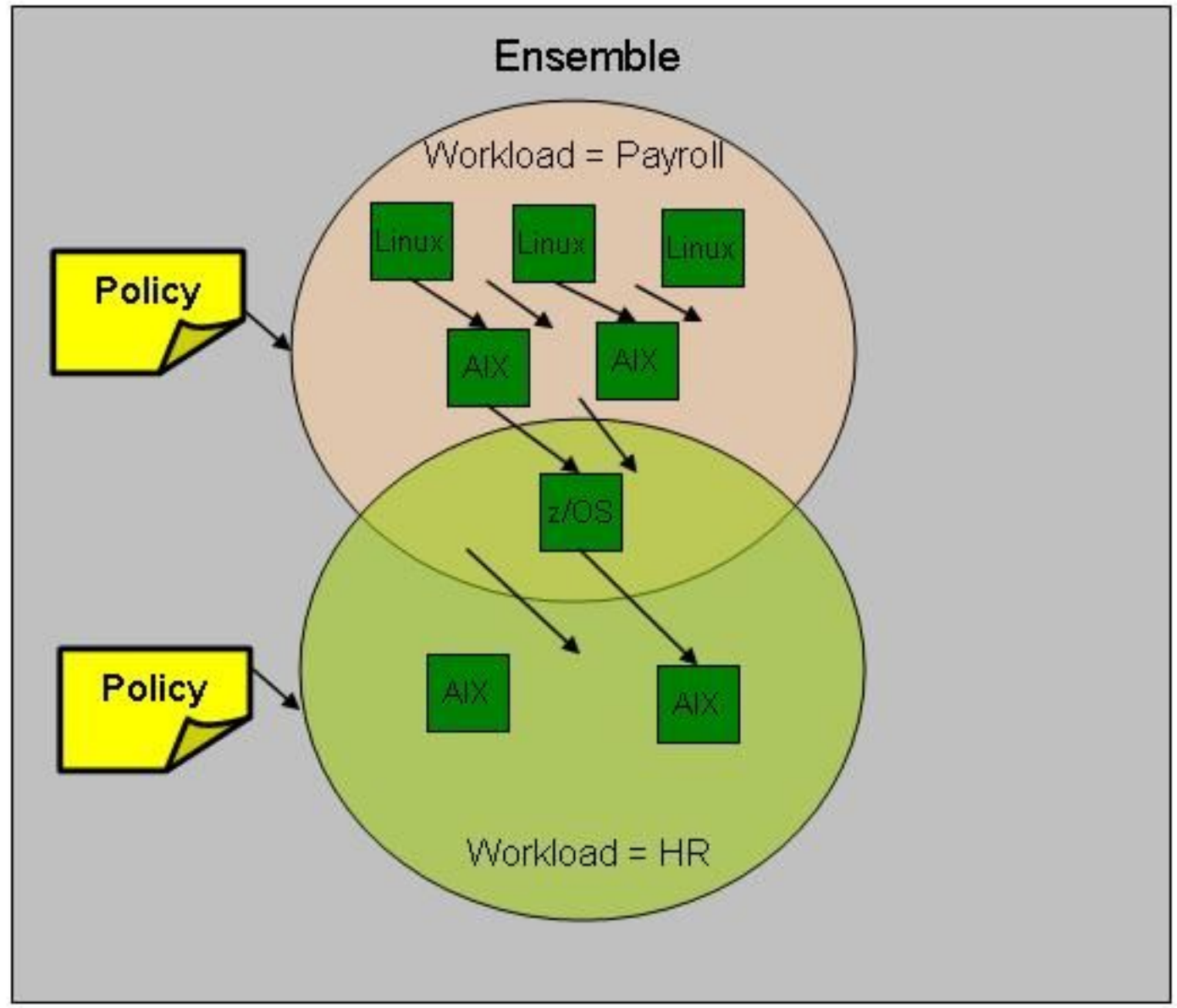
- Platform management component responsible for goal-oriented resource monitoring, management, and reporting across the zEnterprise Ensemble
  - Core component responsible for definition and implementation of goal-oriented management policy
  - Extend goal oriented approach of z/OS WLM to platform managed resources
  - Common approach to monitoring / management of platform resources across zEnterprise
  - Orchestration of autonomic management of resources across virtual servers
    - Provide Intelligent Resource Director like function across the zEnterprise
    - Pushes management directives to the SE, Hypervisors, and OS agents as required across the zEnterprise
- Integration of HMC console support
  - Integrated UI for monitoring, display of workload topology relationships, status alerts, etc
  - Definition of Performance Management Goals and Policy Administration
- Functionality integrated into the Unified Resource Manager
  - Code structured and packaged as System Z firmware
  - Inter-Component communication over trusted internal platform management network

Platform Performance Manager Structure



Platform Workload

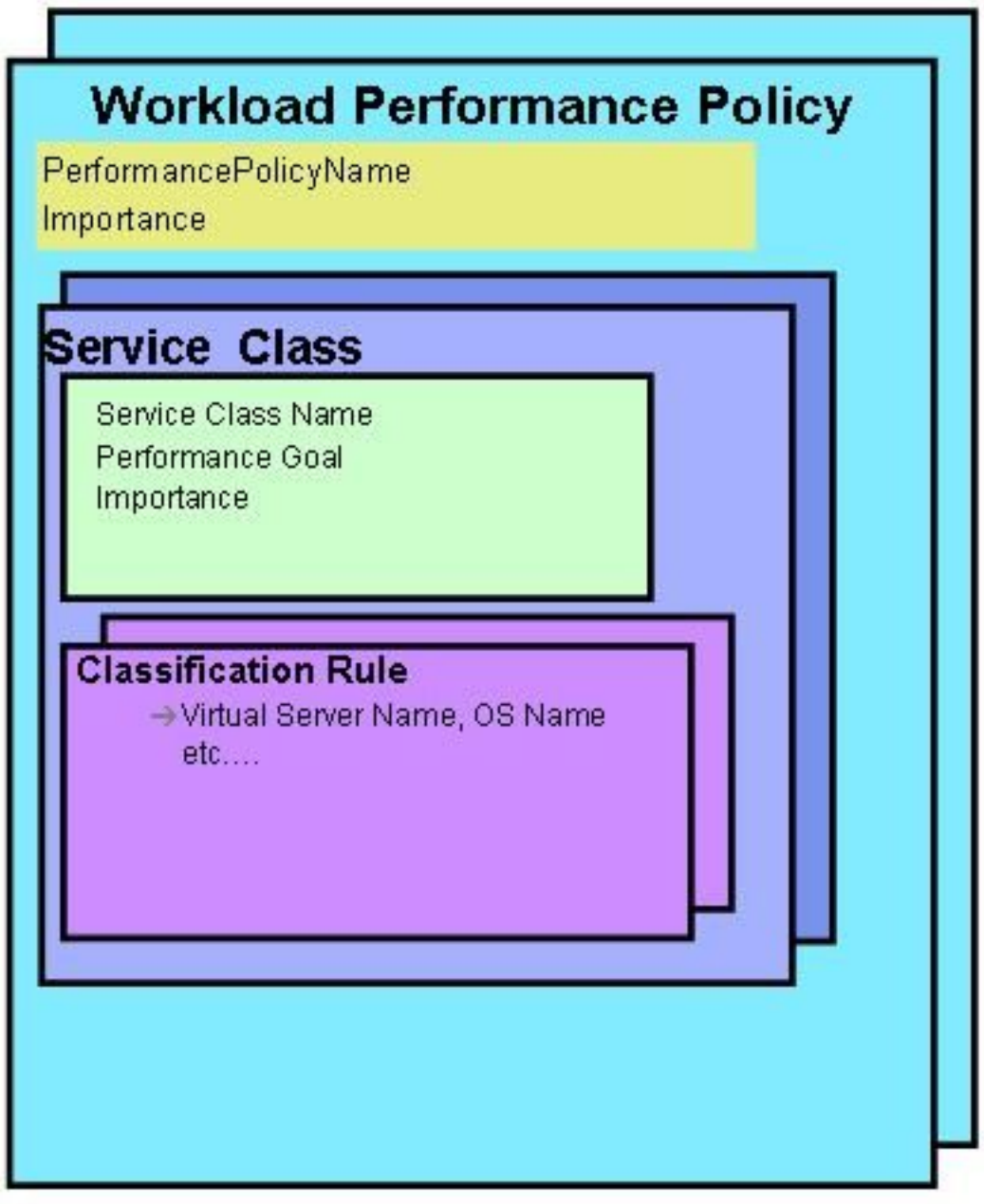
- **A Platform Workload is a grouping mechanism and "management view" of virtual servers supporting a business function**
- **Provides the context within which associated platform resources are presented, monitored, reported, and managed**
- **Management policies are associated to Platform Workload**
  - Performance Policy
- **Workload can be defined by an administrator**
  - Requires 'Automate' level enabled
  - Requires appropriate role



Workload Performance Policy

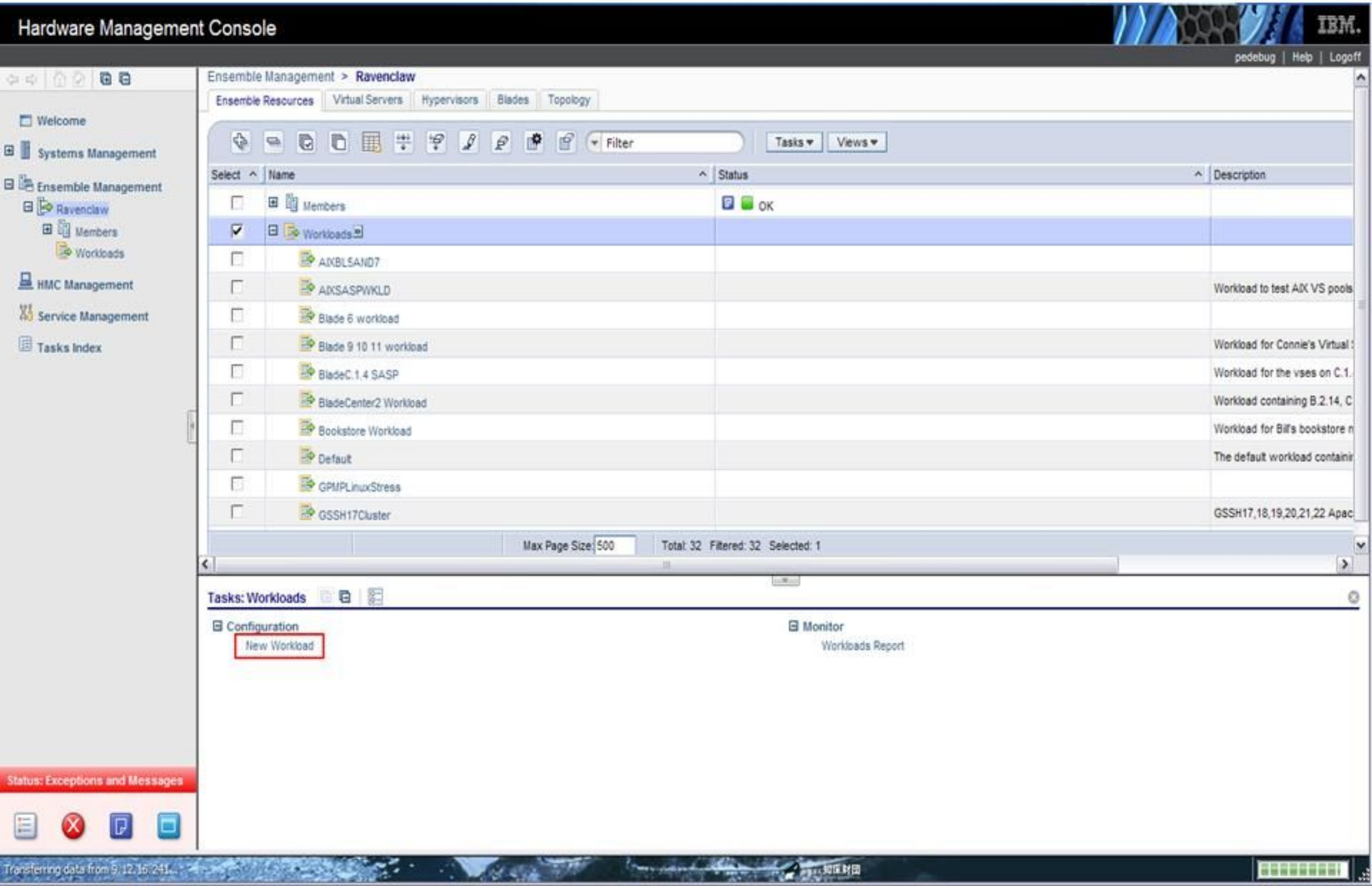
- Defines performance goals for virtual servers in a workload
  - Conceptually similar to simplified z/OS WLM Policy
- Provides basis for monitoring and management of platform resources used by virtual servers in a Workload
- Workload to performance policy relationship:
  - A Workload can have multiple performance policies associated with it
  - Single policy is active at a given time
  - Can dynamically change the policy that is active
    - Through the UI
    - Through a timed based schedule
      - *Example: Day shift policy / night shift policy*

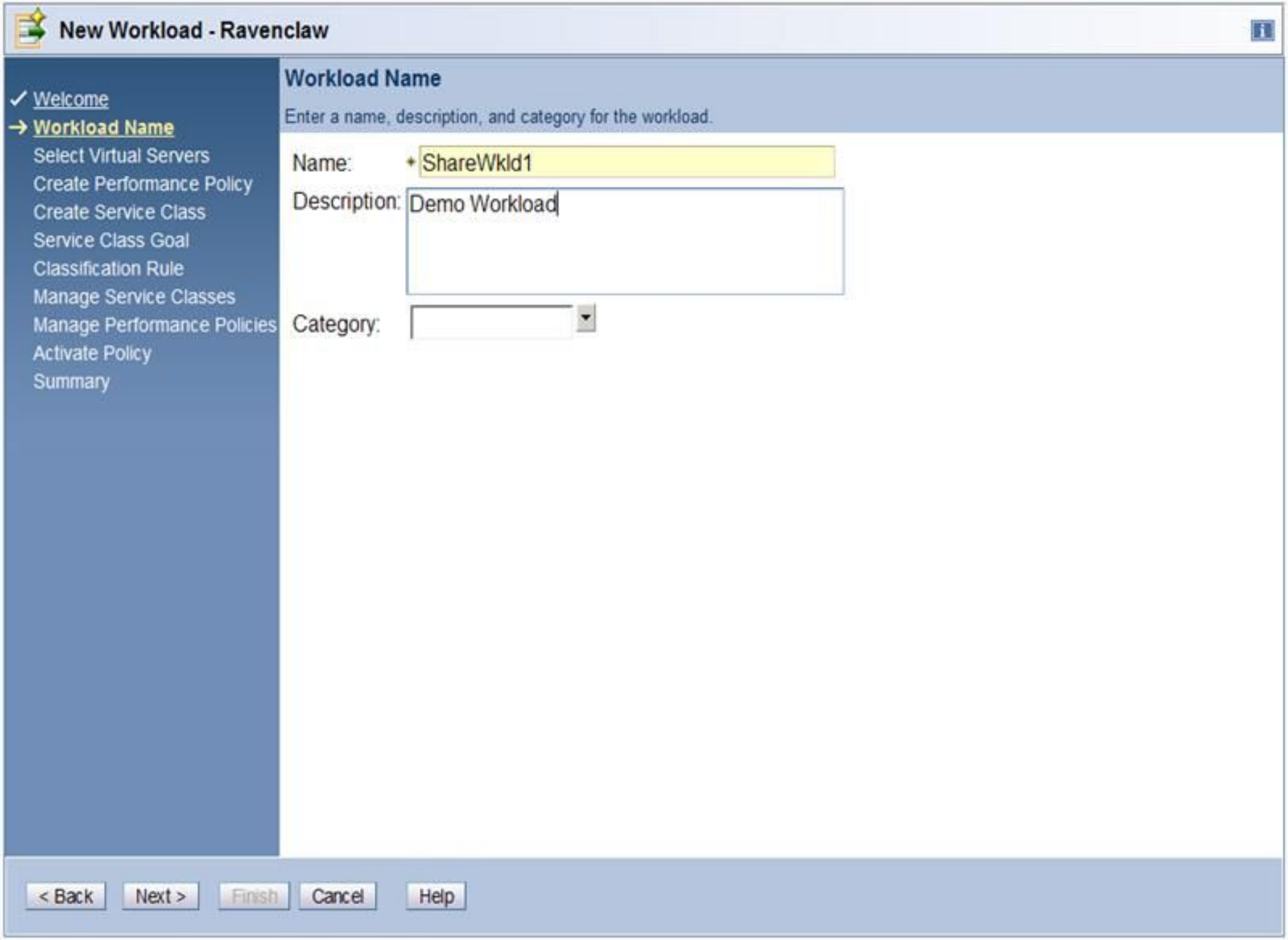
Workload Performance Policy…



- Policy structure:
  - Policy contains a set of service classes
  - Classification rules map each virtual server within the workload to a service class
  - A service class assigns a performance goal and importance
- HMC as console for policy creation and editing
  - Wizard for policy creation
  - Repository for policies under development and saved policies
  - Links to Workload based performance reporting

Define a new Workload




New Workload - Ravenclaw
Welcome
Workload Name
Select Virtual Servers
Create Performance Policy
Create Service Class
Service Class Goal
Classification Rule
Manage Service Classes
Manage Performance Policies
Activate Policy
Summary
Workload Name
Enter a name, description, and category for the workload.
Name:
ShareWkld1
Description:
Demo Workload
Category:
< Back
Next >
Finish
Cancel
Help

New Workload - Ravenclaw

- ✓ Welcome
- ✓ Workload Name
- → **Select Virtual Servers**
- Create Performance Policy
- Create Service Class
- Service Class Goal
- Classification Rule
- Manage Service Classes
- Manage Performance Policies
- Activate Policy
- Summary

Select Virtual Servers

Select virtual servers and custom groups to add into the workload. Adding a custom group into the workload adds all virtual servers in the group.

Show: All virtual servers

Available Virtual Servers:

--- Select Action --- | Filter

Select	Name	Hypervisor	Workloads
☐	r90f1b207v6	B.2.07	WkldForFastHigh
☐	r90f1b207v7	B.2.07	WkldForModerateMe
☐	r90f1b207v8	B.2.07	AIXSASPWKLD
☐	r90f1c1b09v1	B.2.09	Blade 9 10 11 worklo
☐	r90f1c1b09v2	B.2.09	Blade 9 10 11 worklo
☐	r90f1c1b09v3	B.2.09	WAS ND Workload
☐	r90f1c1b09v4	B.2.09	
☐	r90f1c1b09v5	B.2.09	
☐	r90f1c1b09v6	B.2.09	
☐	r90f1c1b09v7	B.2.09	

Total: 289 Filtered: 289 Selected: 0

Add >

< Remove

Selected:

r90f1c1b09v5 (B.2.09)
r90f1c1b09v6 (B.2.09)

< Back | Next > | Finish | Cancel | Help

New Workload - Ravenclaw

- ✓ Welcome
- ✓ Workload Name
- ✓ Select Virtual Servers
- → Create Performance Policy
- Create Service Class
- Service Class Goal
- Classification Rule
- Manage Service Classes
- Manage Performance Policies
- Activate Policy
- Summary

Create Performance Policy

You may create a performance policy for the workload now or use the default performance policy and create a performance policy later.

*Create Option
- ○ Default
- ◉ New
- ○ New based on:

Policy Details

Workload: ShareWkld1

Name: • SharePolicy1

Description: Policy for Share wkld

Business importance: • Medium

- Highest
- High
- **Medium**
- Low
- Lowest

What is the relative Importance of this Business function To other?

< Back | Next > | Finish | Cancel | Help

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What is the relative Importance of this Specific task to other Tasks of business function?

New Workload - Ravenclaw

- ✓ Welcome
- ✓ Workload Name
- ✓ Select Virtual Servers
- ✓ Create Performance Policy
- ✓ Create Service Class
- → Service Class Goal
- Classification Rule
- Manage Service Classes
- Manage Performance Policies
- Activate Policy
- Summary

Service Class Goal - SharePolicy1:Gold1

Select the performance goal and business importance fo

Performance Goal

◉ Velocity: • Moderate

○ Discretiona

Business impor

- Fastest
- Fast
- **Moderate**
- Slow
- Slowest

New Workload - Ravenclaw

- ✓ Welcome
- ✓ Workload Name
- ✓ Select Virtual Servers
- ✓ Create Performance Policy
- ✓ Create Service Class
- → Service Class Goal
- Classification Rule
- Manage Service Classes
- Manage Performance Policies
- Activate Policy
- Summary

Service Class Goal - SharePolicy1:Gold1

Select the performance goal and business importance for this service class.

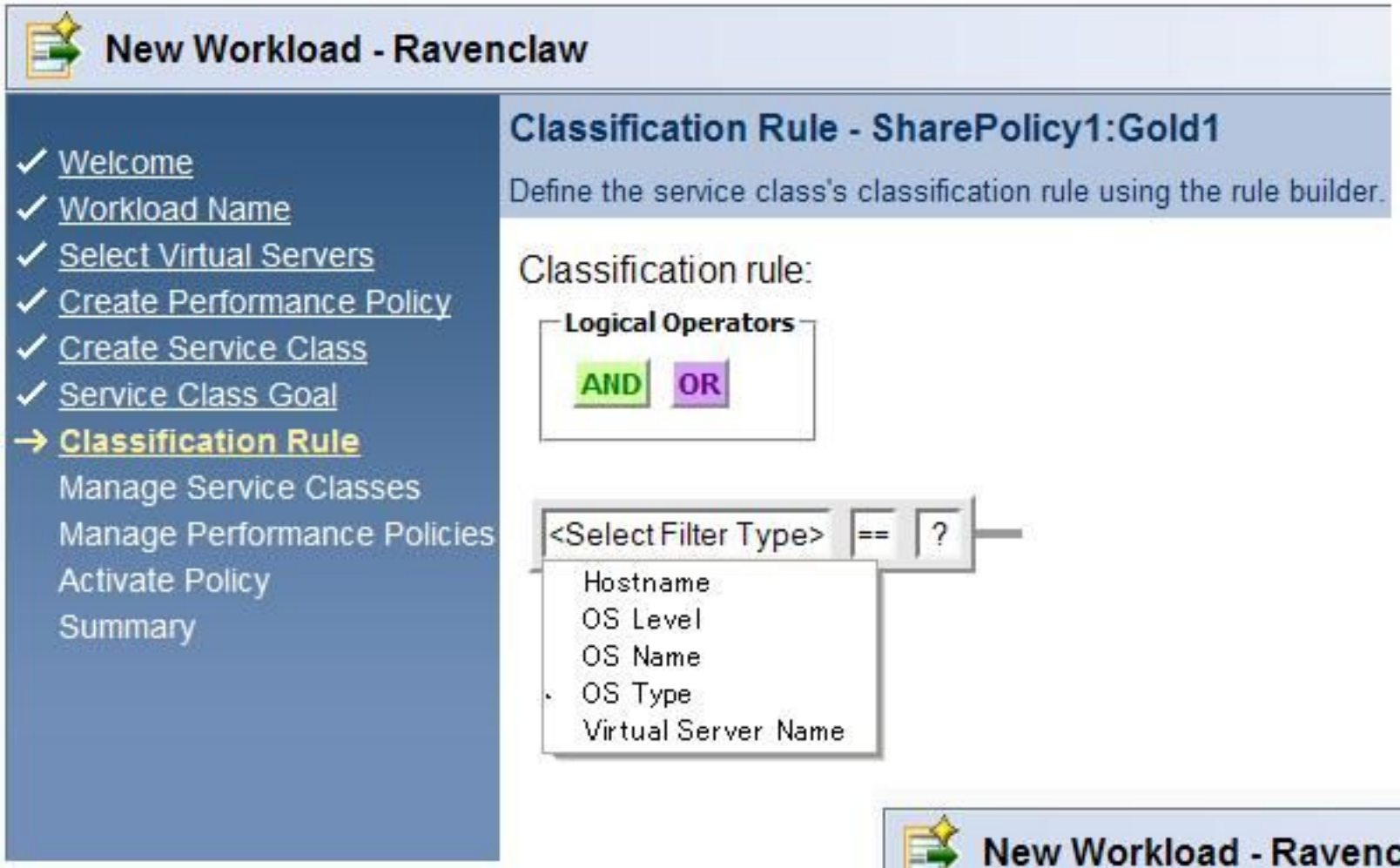
Performance Goal

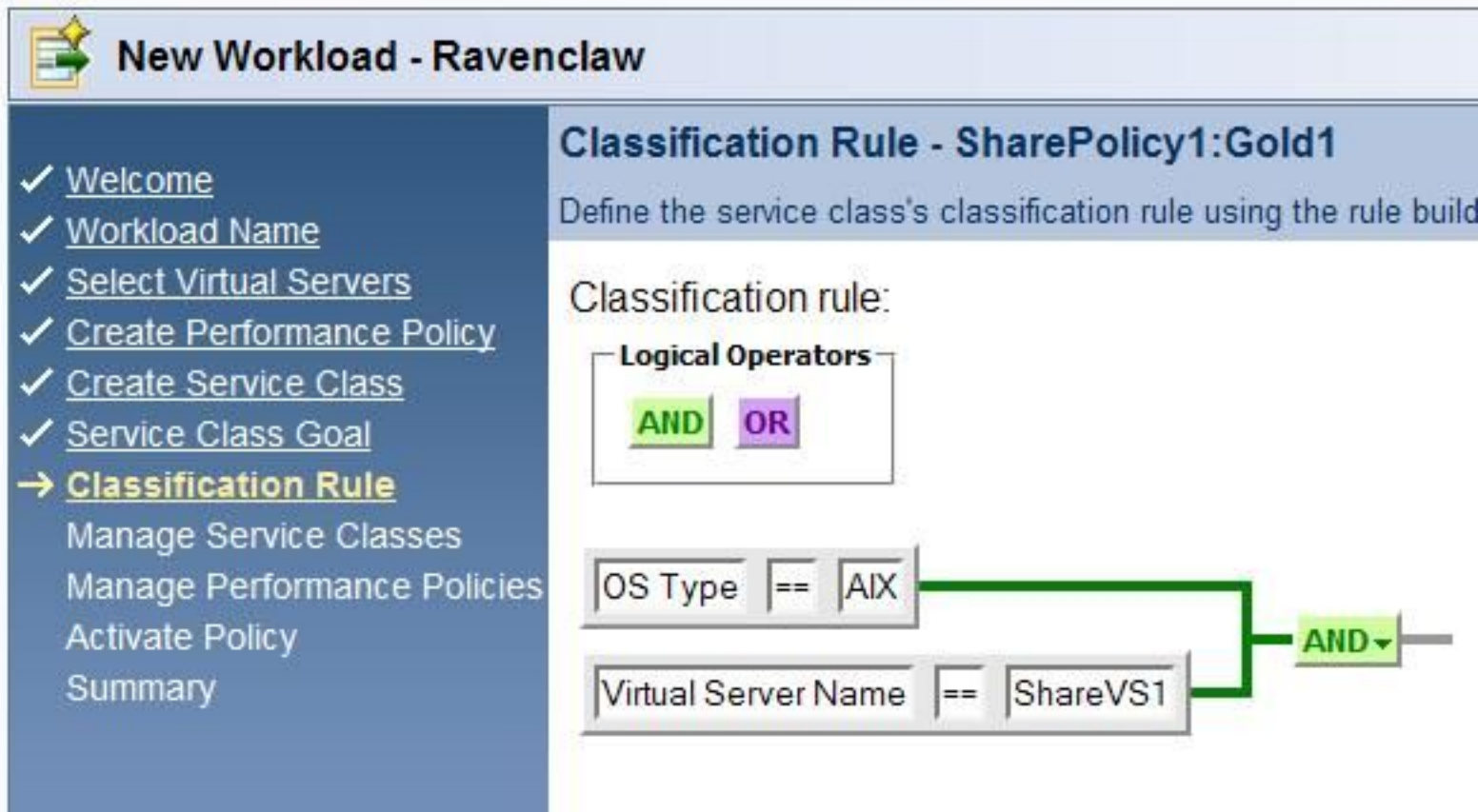
◉ Velocity: • Moderate

○ Discretionary

Business importance: • Medium

- Highest
- High
- **Medium**
- Low
- Lowest


New Workload - Ravenclaw
Welcome
Workload Name
Select Virtual Servers
Create Performance Policy
Create Service Class
Service Class Goal
Classification Rule
Manage Service Classes
Manage Performance Policies
Activate Policy
Summary
Classification Rule - SharePolicy1:Gold1
Define the service class's classification rule using the rule builder.
Classification rule:
Logical Operators
AND
OR
<Select Filter Type>
==
?
Hostname
OS Level
OS Name
OS Type
Virtual Server Name


New Workload - Ravenclaw
Welcome
Workload Name
Select Virtual Servers
Create Performance Policy
Create Service Class
Service Class Goal
Classification Rule
Manage Service Classes
Manage Performance Policies
Activate Policy
Summary
Classification Rule - SharePolicy1:Gold1
Define the service class's classification rule using the rule build
Classification rule:
Logical Operators
AND
OR
OS Type
==
AIX
Virtual Server Name
==
ShareVS1
AND

New Workload - Ravenclaw

- ✓ Welcome
- ✓ Workload Name
- ✓ Select Virtual Servers
- ✓ Create Performance Policy
- ✓ Create Service Class
- ✓ Service Class Goal
- ✓ Classification Rule
- ✓ Manage Service Classes
- ✓ Manage Performance Policies
- → **Activate Policy**
- Summary

Activate Policy

Select the performance policy to activate when the workload is created.

--- Select Action ---

Select	Performance Policy	Business Importance	Description
◉	SharePolicy1	Medium	Policy for Share wkld
○	Default	Medium	The default workload performance policy

Total: 2

☑ Launch Customize Scheduled Operations to schedule future performance policy activations.
The task will be launched after the workload has been created.

< Back | Next > | Finish | Cancel | Help

New Workload - Ravenclaw

- ✓ Welcome
- ✓ Workload Name
- ✓ Select Virtual Servers
- ✓ Create Performance Policy
- ✓ Create Service Class
- ✓ Service Class Goal
- ✓ Classification Rule
- ✓ Manage Service Classes
- ✓ Manage Performance Policies
- ✓ Activate Policy
- → **Summary**

Summary

Click Finish to create the workload, its performance policies and their service classes and activate the selected policy.

Workload

Name: ShareWkld1
Active performance policy: SharePolicy1
Description: Demo Workload
Category:

Virtual servers:
Custom groups:

Review the policy
Before activation

Performance Policies

SharePolicy1

Description: Policy for Share wkld
Business importance: Medium

Service Classes

Gold1

Description: Gold Service class for ShareWkld1
Performance goal: Velocity - Moderate
Business importance: Medium
Classification rule: (OS Type == "AIX"
AND Virtual Server Name == "ShareVS1")

Default

Description: The default workload performance policy service class.
Performance goal: Velocity - Moderate
Business importance: Medium

< Back | Next > | Finish | Cancel | Help

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Workload Monitoring

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Workload Based Monitoring and Reporting

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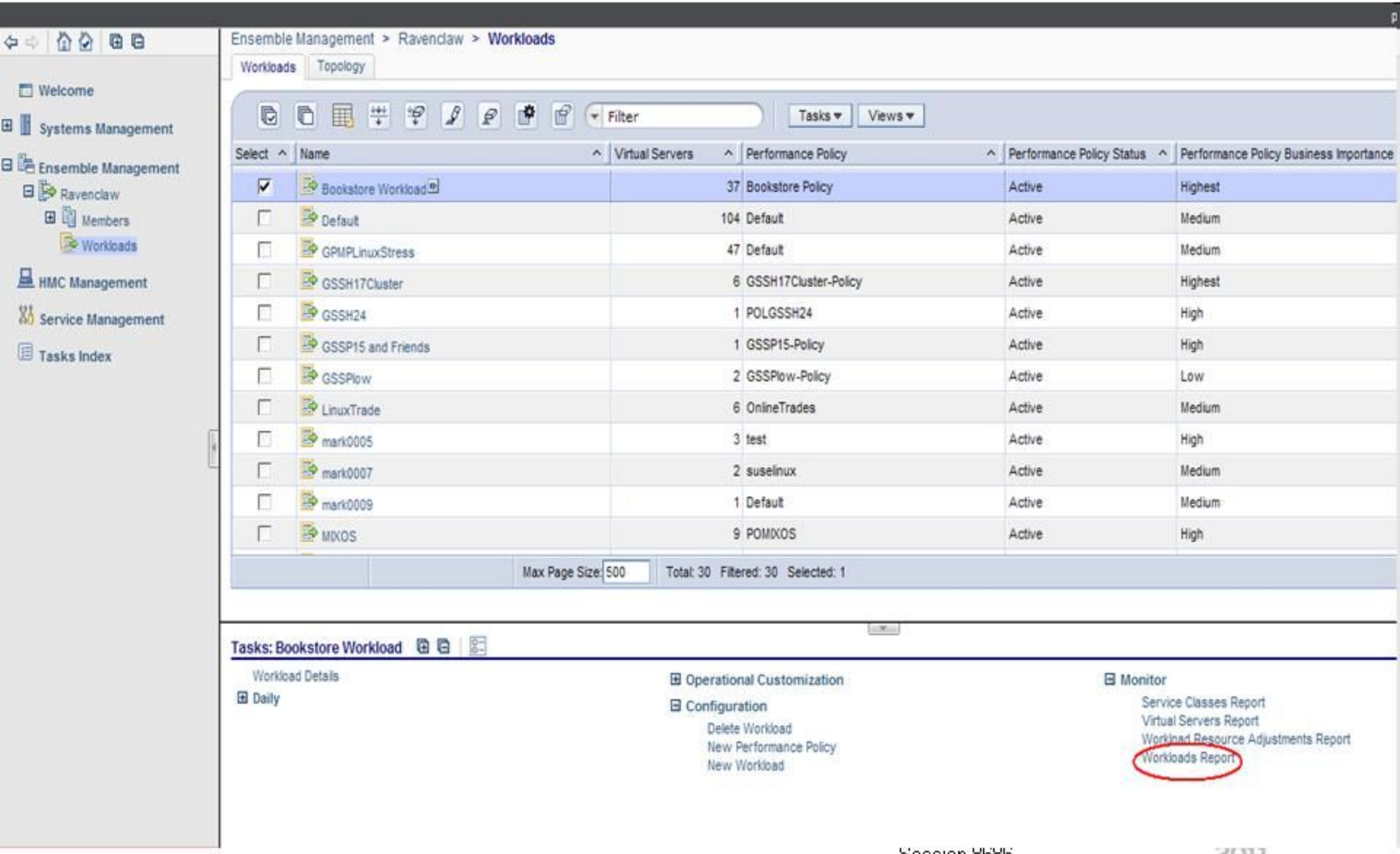
- Provide reporting capability that shows usage of platform resources in a Workload context within a zEnterprise Ensemble scope
  - Across virtual servers / partitions supporting the Workload
- Workload goal vs actual reporting
- Drill down from overall Workload "performance health" view to contributions of individual virtual server
- Graphical views
  - Topology, trending graphs, etc
- Links to system activity displays to show hardware utilization views
- Reporting is limited to platform level resources, not trying to replicate tools that report on intra-OS resources and performance

Workload Monitoring



Workload Monitoring Overview

- Provide monitoring on the HMC based on a Workload context

- Display of current data and fairly recent history
  - Current stake in the ground is 36 hours of history
  - Interval of data displayed is user selectable
  - Granularity of data kept in repository changes over time
    - 1 minute granularity kept for most recent hour
    - 15 minute interval data kept after first hour

- Workload Report
  - Display high level view of "performance health" of each Workload
  - Indication if a Workload contains service class missing goals
  - Worst performing service class / performance index
  - Details of specific Workloads
    - Graph of PI of worst performing service class
      - *Option to graph other service classes*
    - Bar graph of virtual server utilization distribution
      - *Visualize view of workload overall load*
  - Drill down to Workload's service class report

R90HMC1: Workloads Report - Mozilla Firefox: IBM Edition

http://9.12.16.241:8080/hmc/wd/Tc8e5

Workloads Report - Ravenclaw

Report Interval: Starting 3/2/11 11:05:51 PM for 15 minutes (3/2/11 11:20:51 PM) Modify

--- Select Action --- | Filter

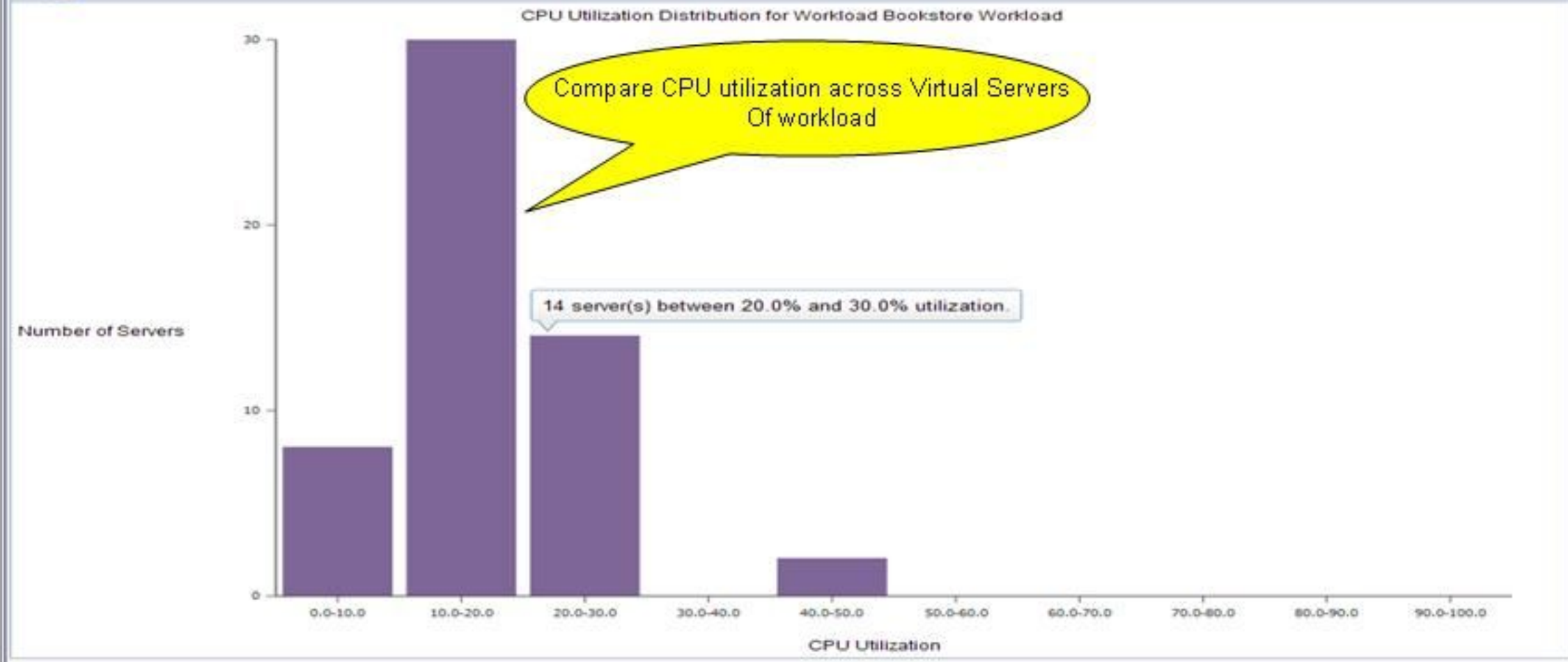
Select	Workload	Service Class With Largest PI (PI)	Performance Policy
○	AIXBL5AND7	SCAIXB5and7 (3.52)	PoAIXB5and7
○	AIXSASPWKLD	AIXSASP_SC (0.70)	AIXSASP_Policy
○	Blade 6 workload	v1_v2 SC (1.25)	Blade 6 policy
○	Blade 9 10 11 workload	High priority SC (1.00)	Cross Blade Center Policy
○	BladeC.1.4 SASP	SASP SC Gold (1.00)	SASP Policy
○	BladeCenter2 Workload	Highest SC (1.55)	BC2 Policy
◉	Bookstore Workload	A-Team (2.04)	Bookstore Policy
○	Default	Default (0.72)	Default

Total: 30 Filtered: 30 Selected: 1

Workload health overview

Workload Charts

Charts: CPU Utilization | Performance Index



Transferring data from 9.12.16.241...

Workload Monitoring Overview…

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- Service Class Report
  - High-level view of each service class in Workload's performance policy
    - Goal and importance
    - Actual performance
    - Indication if monitoring event is established for service class and event is triggered
    - Service class details
      - *Graph of service class performance index*
    - Drill down to virtual server report for Workload
- Event Monitoring
  - Leverage HMC event monitoring
    - Send e-mail when selected metrics reach threshold
  - Service Class PI threshold
  - Virtual Server CPU Utilization threshold

R90HMC1: Workloads Report - Mozilla Firefox: IBM Edition

http://9.12.16.241:8080/hmc/wcl/Te81f

Service Classes Report - Bookstore Workload

Interval can be adjusted

Report Interval: Starting 2/26/11 8:02:01 PM for 15 minutes (2/26/11 8:17:01 PM) Modify

--- Select Action --- Filter

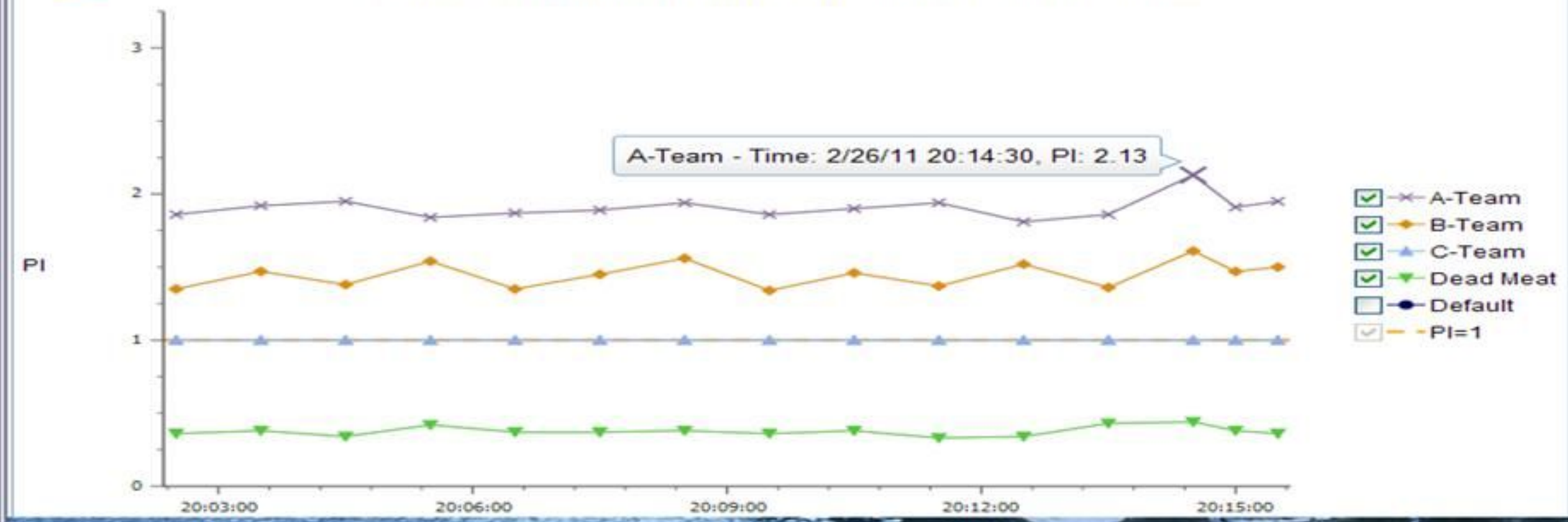
Select	Service Class	Performance Policy	Current Performance	PI	Goal	Business importance
◉	A-Team	Bookstore Policy	Moderate	1.90	Velocity - Fast	High
○	B-Team	Bookstore Policy	Slow	1.46	Velocity - Moderate	Medium
○	BuyNode	Bookstore Policy			Velocity - Fastest	Highest
○	C-Team	Bookstore Policy	Slow	1.00	Velocity - Slow	Low
○	Dead Meat	Bookstore Policy	Slow	0.37	Velocity - Slowest	Lowest
○	Default	Bookstore Policy	Fastest	0.40	Velocity - Moderate	Medium

Total: 6 Filtered: 6 Selected: 1

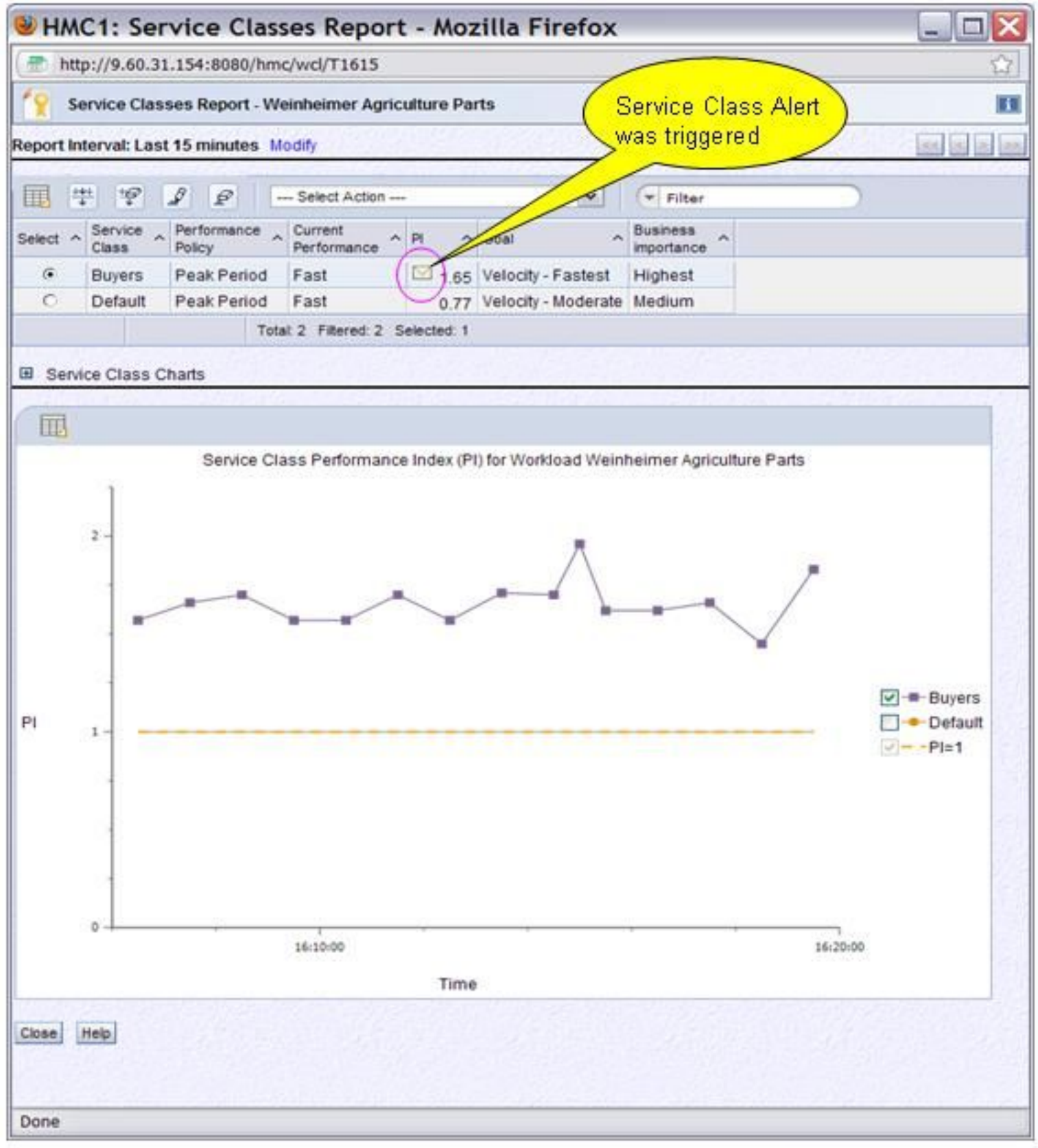
Service Class Charts

Spread sheet of monitoring Data with "Export" support

Service Class Performance Index (PI) for Workload Bookstore Workload



Read 9.12.16.241


HMC1: Service Classes Report - Mozilla Firefox
http://9.60.31.154:8080/hmc/wcl/T1615
Service Classes Report - Weinheimer Agriculture Parts
Service Class Alert was triggered
Report Interval: Last 15 minutes Modify
--- Select Action ---
Filter
Select
Service Class
Performance Policy
Current Performance
PI
Goal
Business importance
Buyers
Peak Period
Fast
1.65
Velocity - Fastest
Highest
Default
Peak Period
Fast
0.77
Velocity - Moderate
Medium
Total: 2 Filtered: 2 Selected: 1
Service Class Charts
Service Class Performance Index (PI) for Workload Weinheimer Agriculture Parts
PI
2
1
0
16:10:00
16:20:00
Time
Buyers
Default
PI=1
Close
Help
Done

Workload Monitoring Overview…

- Workload virtual server report
  - List of virtual servers in a service class
    - Virtual server velocity
    - Resource usage
      - *Physical CPU utilization*
      - *OS view of CPU utilization*
      - *Physical memory used*
      - Hypervisor delay percentage
- Resource adjustment report
  - Resource adjustment actions taken over report interval
- Transaction topology and hops report
  - Topology of virtual servers
  - Transactions hops report

Virtual Servers Report - Bookstore Workload

Report Interval: Starting 2/26/11 8:02:01 PM for 15 minutes (2/26/11 8:17:01 PM) Modify

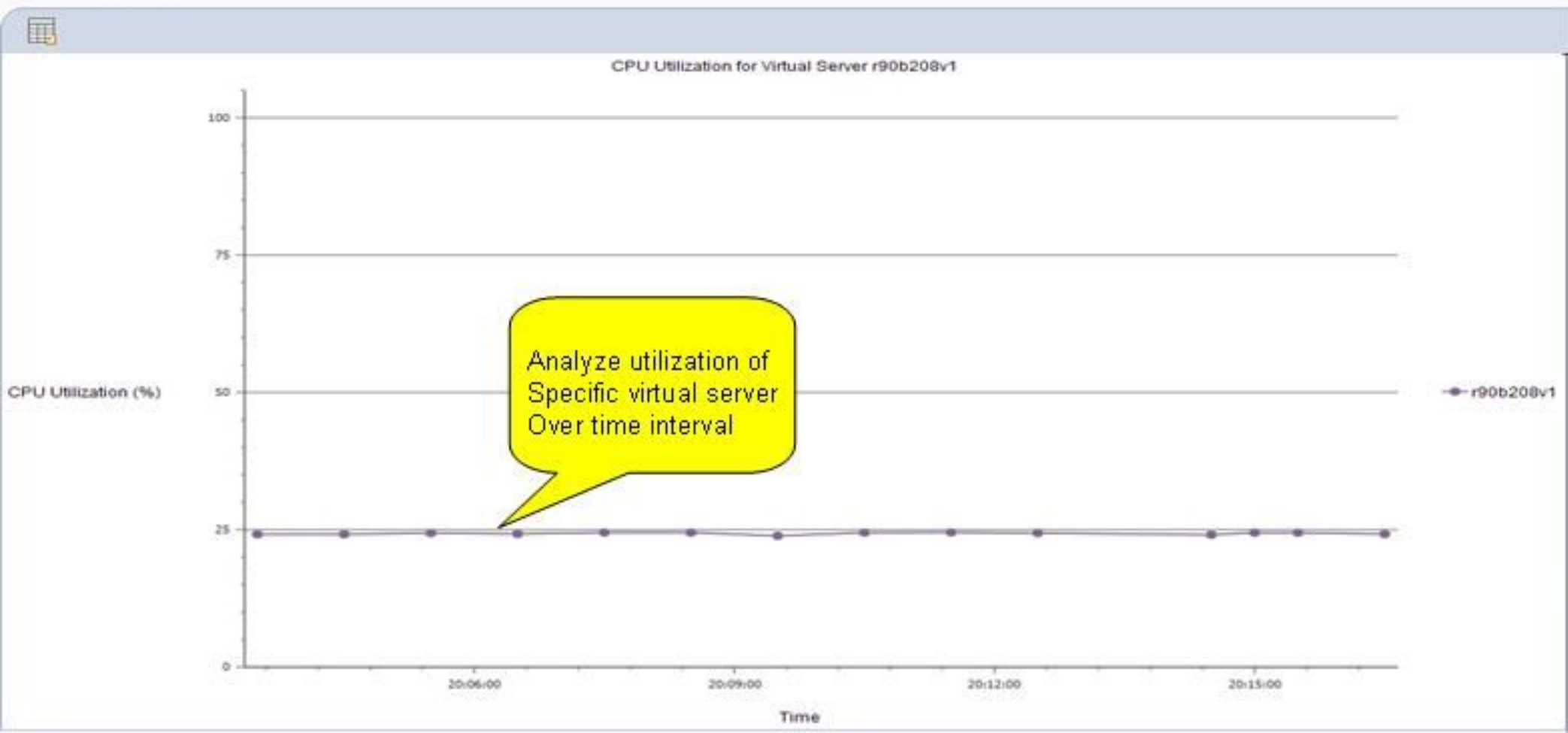
--- Select Action --- | Filter

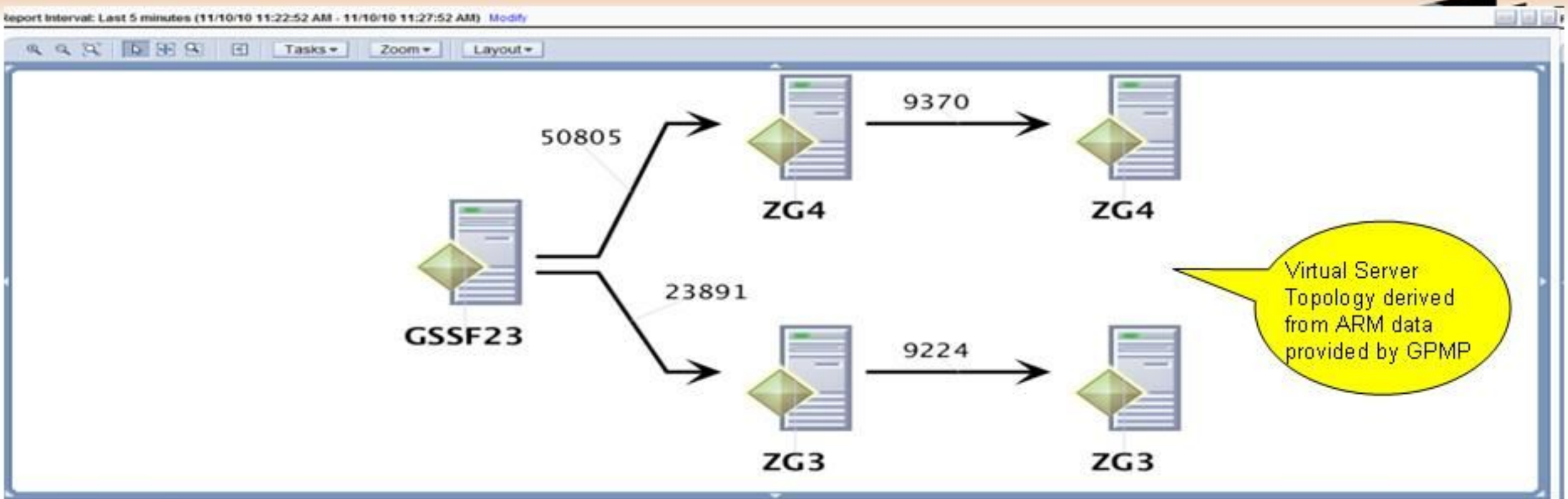
Select	Virtual Server	OS Name	OS Type	OS Level	Virtual Processors	Allocated Memory (MB)	Physical CPU Utilization (%)	Hypervisor CPU Delay (%)	Other Time (%)	Service Class (PI)	OS Processes Total CPU Using Samples (%)	OS Processes Total CPU Delay Samples (%)	OS Processes Total I/O Delay Samples (%)	OS Processes Total Page Delay Samples (%)
◉	r90b208v1	r90f1c1b8v1	AIX	6.1.5.2	8	8,192	24.3	30.8		A-Team (1.90)	28.9	21.7	0.0	49.4
○	r90b208v2	r90f1c1b8v2	AIX	6.1.5.2	8	8,192	11.0	27.8		A-Team (1.90)	15.3	6.0	0.0	78.7
○	r90b208v3	r90f1c1b8v3	AIX	6.1.5.2	8	4,096	10.4	34.9		B-Team (1.46)	14.5	7.2	0.0	78.3
○	r90b208v4	r90f1c1b8v4	AIX	6.1.5.2	8	4,096	22.6	35.3		B-Team (1.46)	28.6	22.9	0.0	48.4
○	r90b208v5	r90f1c1b8v5	AIX	6.1.5.2	8	4,096	10.6	18.0		C-Team (1.00)	14.0	8.1	0.0	77.8
○	r90b208v6	r90f1c1b8v6	AIX	6.1.5.2	8	4,096	10.5	35.3		C-Team (1.00)	14.0	7.7	0.0	78.4
○	r90b208v7	r90f1c1b8v7	AIX	6.1.5.2	8	4,096	3.0	28.1		Dead Meat (0.37)	4.5	7.3	0.0	88.2
○	r90b208v8	r90f1c1b8v8	AIX	6.1.5.2	8	4,096	3.0	28.4		Dead Meat (0.37)	4.6	[illegible]	0.0	88.6

Page 1 of 1 | Total: 37 Filtered: 37 Displayed: 37 Selected: 1

Virtual Server Charts

Monitoring data Provided by GPMP Running on VS





Hops Report - ZG3-ZG4-GSSF23-Class in Workload ZG3-ZG4-GSSF23

Report Interval: Last 5 minutes (11/10/10 11:22:19 AM - 11/10/10 11:27:19 AM) Modify

Detail hop report
With transaction avg
Response time

Details for ZG3-ZG4-GSSF23-Class:

Workload:	ZG3-ZG4-GSSF23	Performance goal:	Velocity - Fast	PI:	
Performance policy:	ZG3-ZG4-GSSF23-Policy	Business importance:	High	Performance:	Slowest

--- Select Action --- | Filter

Name	Hop Number	Group Name	Successful Transactions	Failed Transactions	Stopped Transactions	Inflight Transactions	Queue Time (s)	Execution Time (s)	Successful Average Response Time (s)	Inflight Average Response Time (s)
⊞ Hop 0	0		38,682	0	0	0	0.000000	0.001000	0.001000	0.000000
⊟ Hop 1	1		112,170	0	0	1	0.000000	0.000000	0.005000	0.002000
⊞ DDF	1	DBG2LOC1	75,928	0	0	0	0.000000	0.000000	0.000000	0.000000
⊟ WebSphere:APPLICATION_SERVER	1	g1sr013	17,817	0	0	0	0.000000	0.001000	0.014000	0.000000
ZG3	1		17,817	0	0	0	0.000000	0.001000	0.014000	0.000000
⊟ WebSphere:APPLICATION_SERVER	1	g1sr014	18,425	0	0	1	0.000000	0.001000	0.014000	0.002000
ZG4	1		18,425	0	0	1	0.000000	0.001000	0.014000	0.002000
⊟ Hop 2	2		14,022	0	0	0	0.000000	0.000000	0.000000	0.000000
⊟ DDF	2	DBG2LOC1	14,022	0	0	0	0.000000	0.000000	0.000000	0.000000
ZG3	2		6,884	0	0	0	0.000000	0.000000	0.000000	0.000000
ZG4	2		7,138	0	0	0	0.000000	0.000000	0.000000	0.000000

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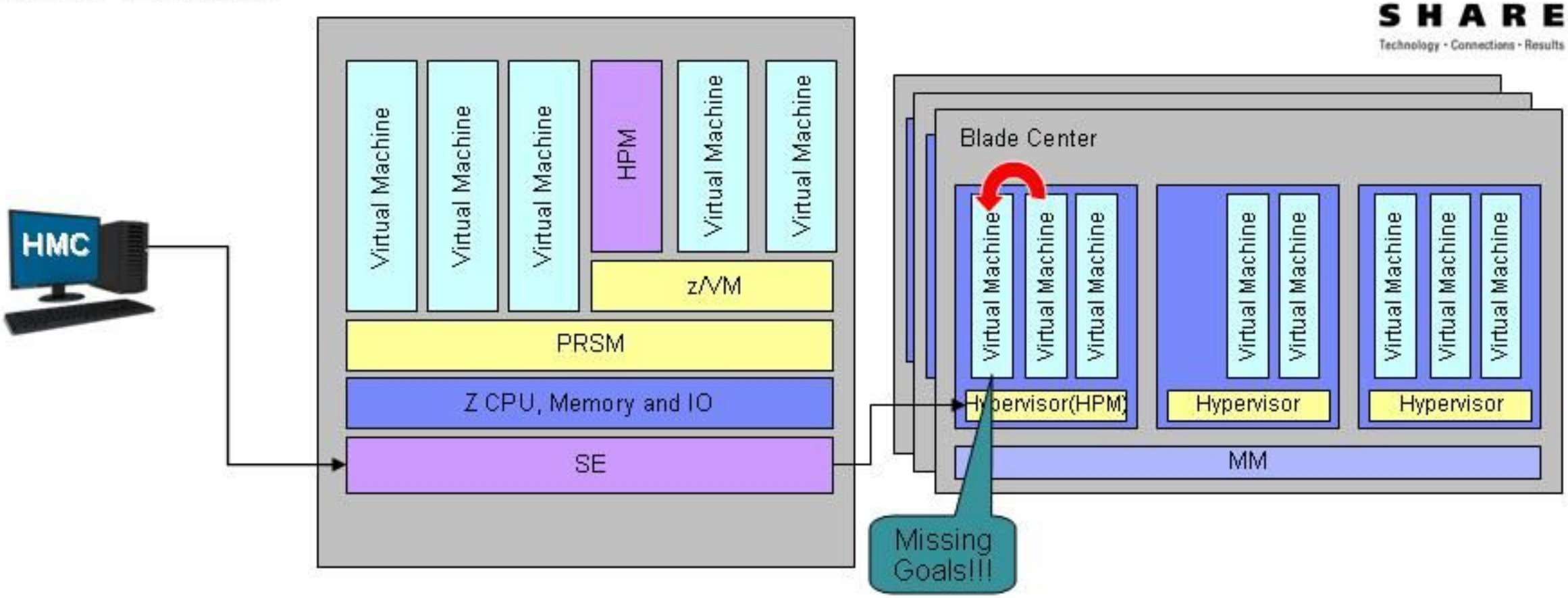
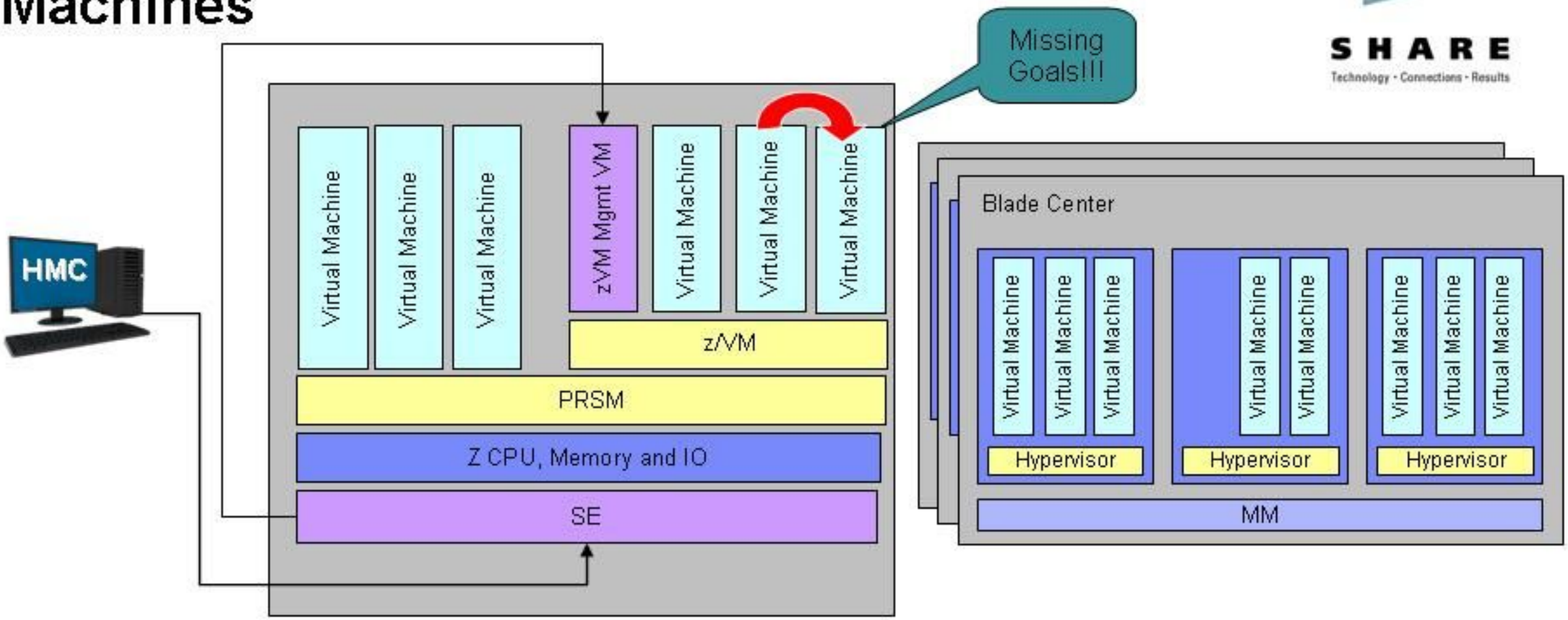
Management Functions

Managing Resources across Virtual Servers on Power Blade



- Manage processor resources across virtual servers to achieve workload goals
  - Detect that a virtual server is part of Workload not achieving goals
  - Determine that the virtual server performance can be improved with additional resources
  - Project impact on all effected Workloads of moving resources to virtual server
  - If good trade-off based on policy, redistribute processor resources

Managing Resources across z/VM Virtual Machines



- Manage processor resources across *z*/VM virtual machines
  - Detect that a virtual machine that is part of Workload is not achieving goals
  - Determine that the virtual machine performance can be improved with additional resources
  - Project impact on all effected Workloads of moving resources to virtual machine
  - If good trade-off based on policy, redistribute processor resources

Resource Adjustment Report

HMC1: Workloads Report - Mozilla Firefox

http://9.60.31.154:8080/hmc/wcl/T14d0

Virtual Server Resource Adjustments Report - Buyer 1

Report Interval: Last 15 minutes Modify

Successful Adjustments

--- Select Action --- | Filter

Receiver Virtual Servers	Receiver Workload	Receiver Service Class	Receiver Processing Units After (Before)	Donor Virtual Servers	Donor Workload	Donor Processing Units After (Before)	Time
Buyer 1	Weinheimer Agriculture Parts	Buyers	0.52 (0.50)	Payroll App	Payroll	0.49 (0.50)	Jul 11, 2010 4:13:18 PM
Buyer 1	Weinheimer Agriculture Parts	Buyers	0.52 (0.50)	Vendor 1	Weinheimer Agriculture Parts	0.49 (0.50)	Jul 11, 2010 4:13:18 PM

Total: 2 Filtered: 2

Failed Adjustments

--- Select Action --- | Filter

Receiver Virtual Servers	Receiver Workload	Receiver Service Class	Failure Reason	Time

Total: 0 Filtered: 0

Close

Done

Examine resource Adjustment action Performed by PPM To help work meet Its performance goal

Explains why resource Adjusment action was Not perfromed

Platform Performance Manager Summary

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- Extend z/OS goal oriented workload management concepts across zEnterprise mixed processors environment
- Integrated function of zEnterprise Unified Resource Manager firmware
- Workload based goal oriented policy definition
- Monitoring and reporting in context of Workload and associated performance policy
- Goal oriented resource management

Thank You

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2011