Monitoring the Power System Family with IBM Tivoli Monitoring

Common Romandie

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Agenda

IT Service Management
Key Metrics & ITSM processes

- **IT delivers services**
  - A key objective: Service Quality
- **Tools are required to support IT Service Management processes such as:**
  - Monitoring & Event Management
  - Capacity Management
  - Availability Management
  - Incident Management
  - Problem Management
- **How ?**
  - Identifying and being able to collect and process a large amount of Key Metrics:
    - Capacity
    - Availability
    - Performance
    - ...
- **In the world of the Power Systems, IBM Tivoli Monitoring has useful features to collect and process key metrics.**
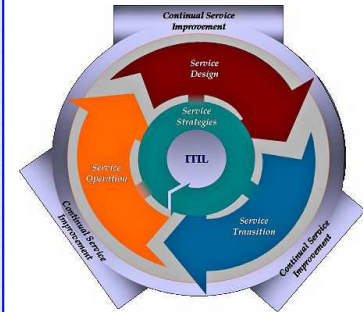
Agenda

1   **IT Service Management**

2   **IBM Tivoli Monitoring Overview**

3   **ITM Agents for Power Systems**

4   **Usage Examples**

5   **Interconnection**

6   **Additional Information – Q&A**

IBM Tivoli Monitoring
## At a glance

- **What is IBM Tivoli Monitoring ?**
  - A scalable metric collector (attributes) running on multiple platforms
  - Collected attributes are used for:
    - Monitoring purpose (Situations)
    - Reporting (real-time, historical)
  - An ITM agent provides a collection of attributes
    - Attributes (metrics) are agent specific
  - Provides a powerful portal
    - Administration
    - Reporting
  - Centralized data warehouse
  - Embedded trend analyzer
  - Scalable solution to support from few agents to 10'000 agents
  - ITM servers run on AIX, Windows, Linux, Solaris …
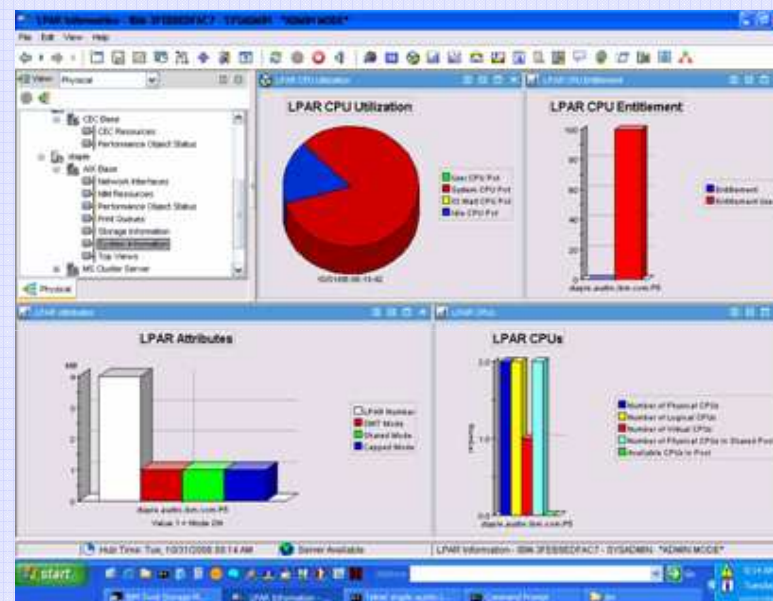
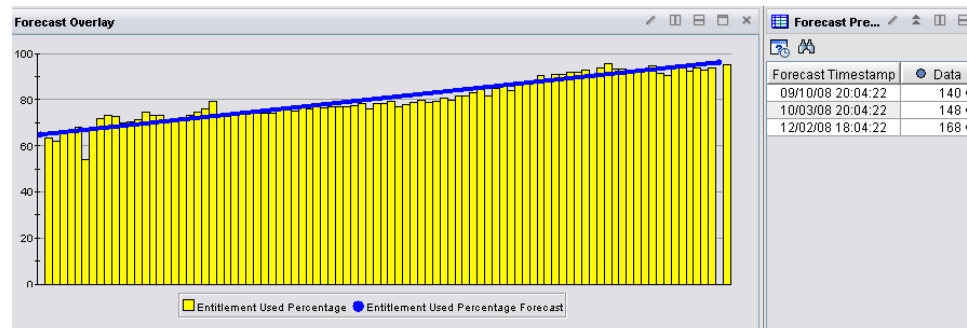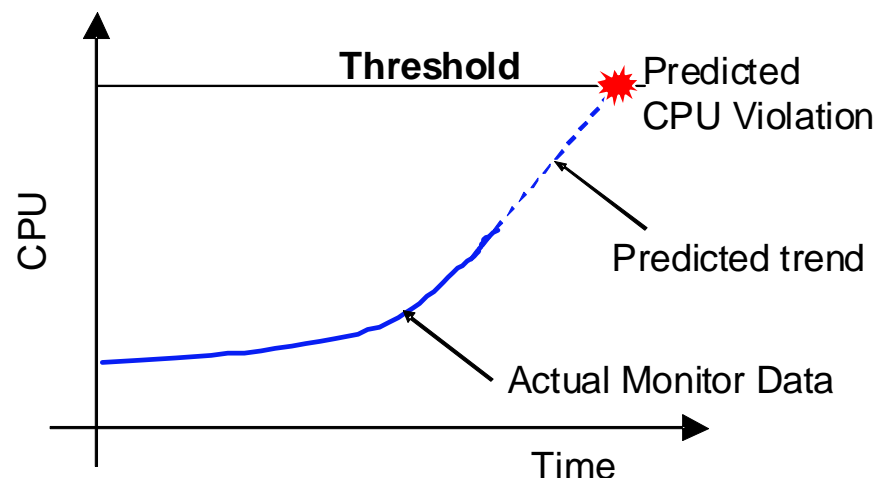# IBM Tivoli Monitoring
IBM Tivoli Data Warehouse (TDW)

- Tivoli Data Warehouse is the backbone repository and central data store for all historical management data and the basis for Tivoli reporting
- The data is stored, pruned and summarized for ease use and cost savings.
- Provide data to multiple reporting tools
  - ITM portal
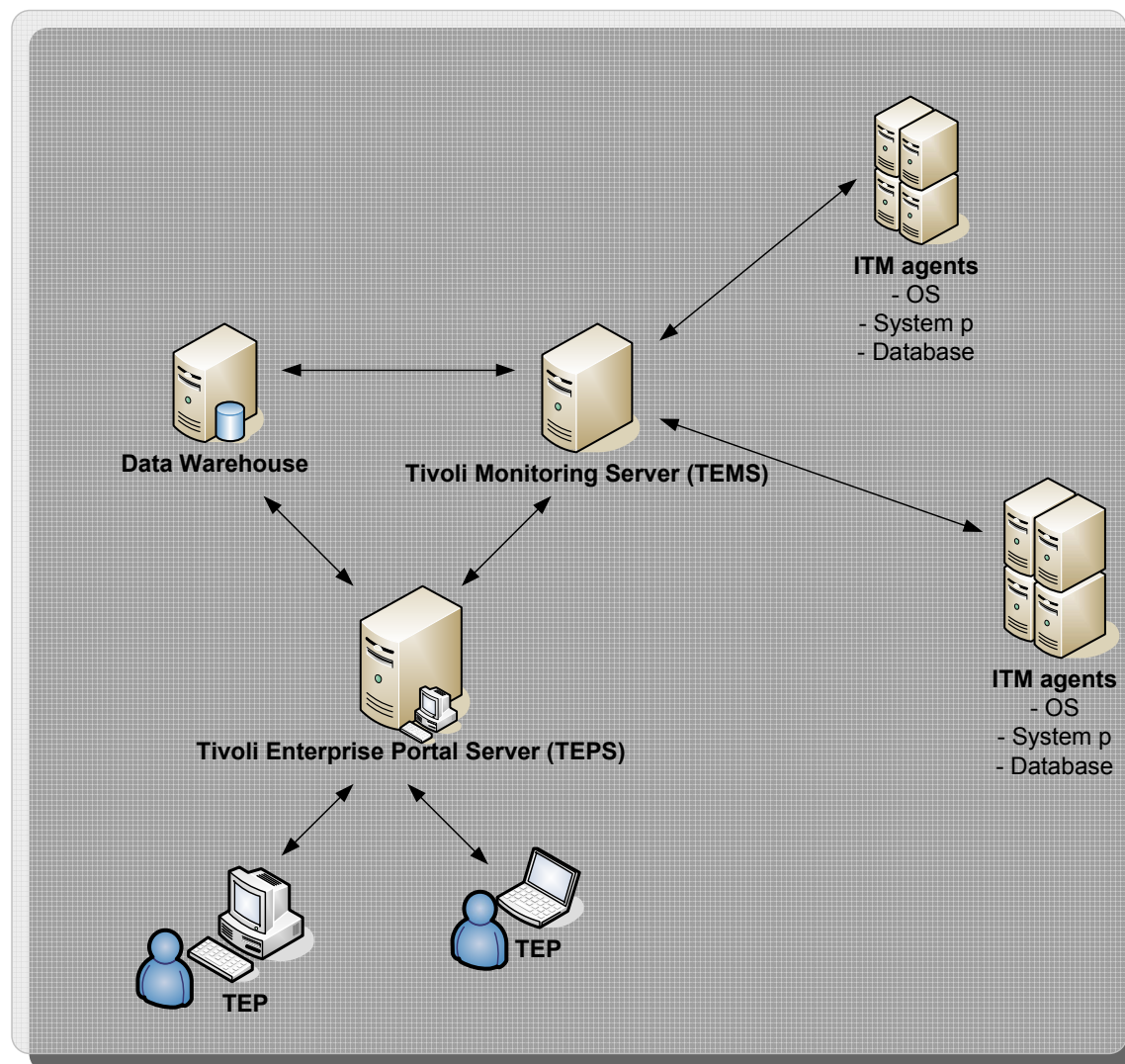 - Tivoli Common Reporting
  - Third party products

Real-time and Historical Data
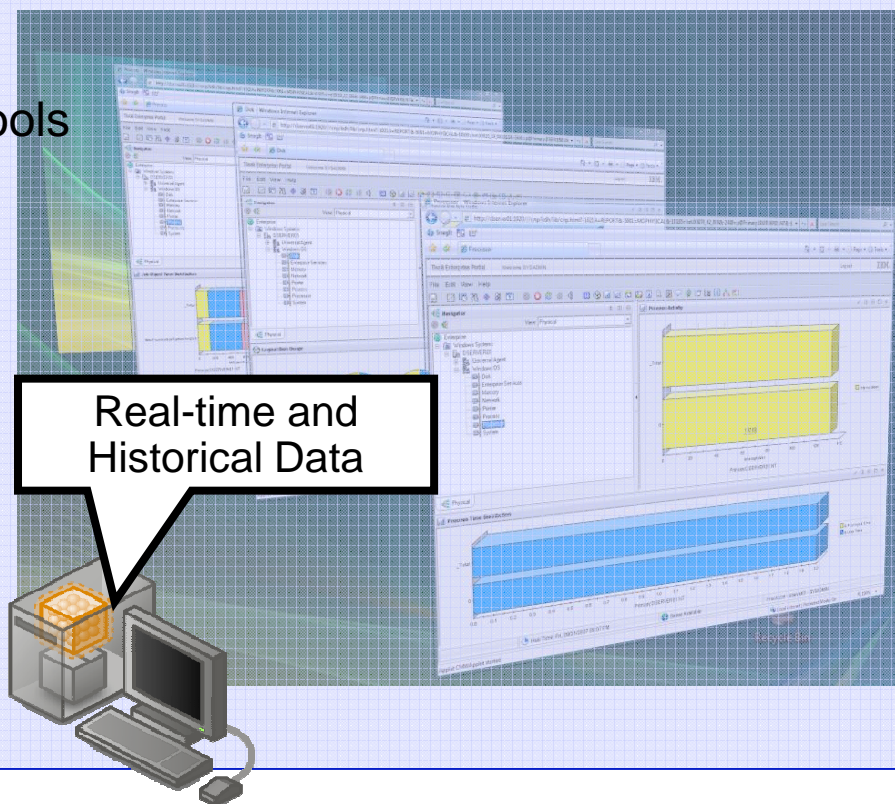
IBM Tivoli Monitoring
Predict resource constraints with Tivoli Performance Analyzer

- Future predictions based off historical warehoused data.

- Predict when CPU, Memory, Storage and Network will meet limitations.

- Proactively respond to near-term & long term performance problems

- Warehouse future trends for capacity analysis reports

IBM Tivoli Monitoring
Main components – Simple View

- **ITM agent**
  - Collects the metrics (attributes).
- **TEMS**
  - Execute the monitoring policies (Situations) and more !
- **TEPS**
  - Stores the reports and enables the management of ITM from the GUI.
- **TEP**
  - End user portal
- **Data Warehouse**
  - Stores the metrics collected by the ITM agents.

ITM agents
- OS
- System p
- Database

Data Warehouse

Tivoli Monitoring Server (TEMS)

ITM agents
- OS
- System p
- Database

Tivoli Enterprise Portal Server (TEPS)

TEP

TEP

Agenda

Tivoli Monitoring for Power Systems - Overview

- **System p agents**
  - CEC agent
  - HMC agent
  - VIOS agent
  - AIX Premium agent

Allow the visibility within virtualized Power System environments

- **Operating System agents**
  - Unix agent (AIX)
  - Unix agent (Linux)
  - Unix Log Alert agent
  - i5/OS agent

Allow the visibility within the Operating System layer

IBM
Power System
Family
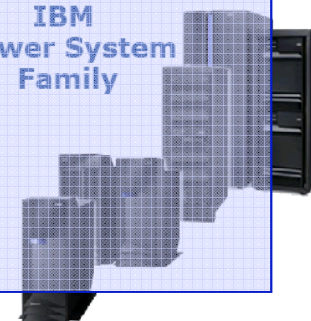
Tivoli Monitoring for Power Systems – System p agents

Current version: v 6.2.2

- **System p agents**

  - CEC agent
    - installed on an LPAR (AIX) or preinstalled on VIOS
    - collects metrics through the HMC or IVM
    - collects metrics about the Central Electronics Complex (CEC) resources

    AIX 5.3 TL5, 6.1
    VIOS V2.1.3, Fix Pack 23
    HMC V6, V7

  - HMC agent
    - installed on LPAR (AIX partition)
    - remotely monitors HMC
    - collects metrics about the Hardware Management Console resources

    AIX 5.3 TL5, 6.1
    HMC V6, V7

  - VIOS Premium agent
    - preinstalled on VIOS
    - collects metrics about the VIOS resources

    VIOS V2.1.3, Fix Pack 23

  - AIX Premium agent
    - installed on LPAR
    - Collects metrics about the LPAR & AIX resources

    AIX 5.3 TL5, 6.1

Tivoli Monitoring for Power Systems – System p agents Attributes Groups & Attributes

- **An attribute group is a group of metrics (attributes) collected by the ITM agent**
- **System p agents**
  - CEC agent: 9 attribute groups
    - AMS, CPU Pool, LPAR, CEC …
    - Example: **Global CEC** attribute group
      - The number of partitions on the CEC.
      - Total number of CPUs in the CEC.
      - The number of CPUs allocated to logical partitions.
      - The number of CPUs unallocated in the CEC.
      - The percentage of allocated CPUs.
      - The number of CPUs in shared pool.
      - The total amount of memory in the CEC.
      - The amount of memory allocated to logical partitions
      - ….

      > Useful attributes (metrics) for capacity management of the CEC

  - HMC agent:10 attribute groups
    - CPU, File Systems, Managed CEC, Physical Memory …
  - VIOS Premium agent: 40 attributes groups
    - CPU, Disk, MPIO, Memory, Processes, Network …
  - AIX Premium agent: 41 attribute groups
    - CPU, MPIO, Network adapter, Memory, Volume, WPAR …

Tivoli Monitoring for Power Systems – OS agents

Current version: v 6.2.2

- **Operating System agents**
  - Unix agent (AIX)

    AIX 5.2, 5.3, 6.1

    - installed on LPAR
    - collects metrics about the AIX resources

  - Unix agent (Linux)

    RedHat Enterprise Linux AS 4 & 5
    SUSE Linux Enterprise Server 9 & 10

    - installed on LPAR
    - collects metrics about the Linux resources

  - Unix Log Alert agent

    RedHat Enterprise Linux AS 4 & 5
    SUSE Linux Enterprise Server 9 & 10
    AIX 5.2, 5.3, 6.1

    - installed on LPAR (AIX)
    - collect the content of log files, errorlog …

  - i5/OS agent

    i5/OS V5R3
    i5/OS V5R4
    i5/OS V6R1 – IBM i

    - installed on LPAR
    - collects metrics about the i5/OS resources

Tivoli Monitoring for Power Systems – OS agents

- **An attribute group is a group of metrics (attributes) collected by the ITM agent**

- **Operating System agents**
  - Unix agent (AIX): 24 attribute groups
    - CPU, Memory, Processes, File Systems, Users, Network …
  - Unix agent (Linux): 31 attribute groups
    - CPU, Files, Network, Processes, Memory, Users, NFS, RPC …
  - Unix Log Alert agent: 2 attribute groups
    - Log entries, Monitored logs
  - i5/OS agent: 71 attribute groups
    - ASP, Jobs, Sub-systems, Users, Network, Message Queues …

ITM System p & AIX agents: Internals
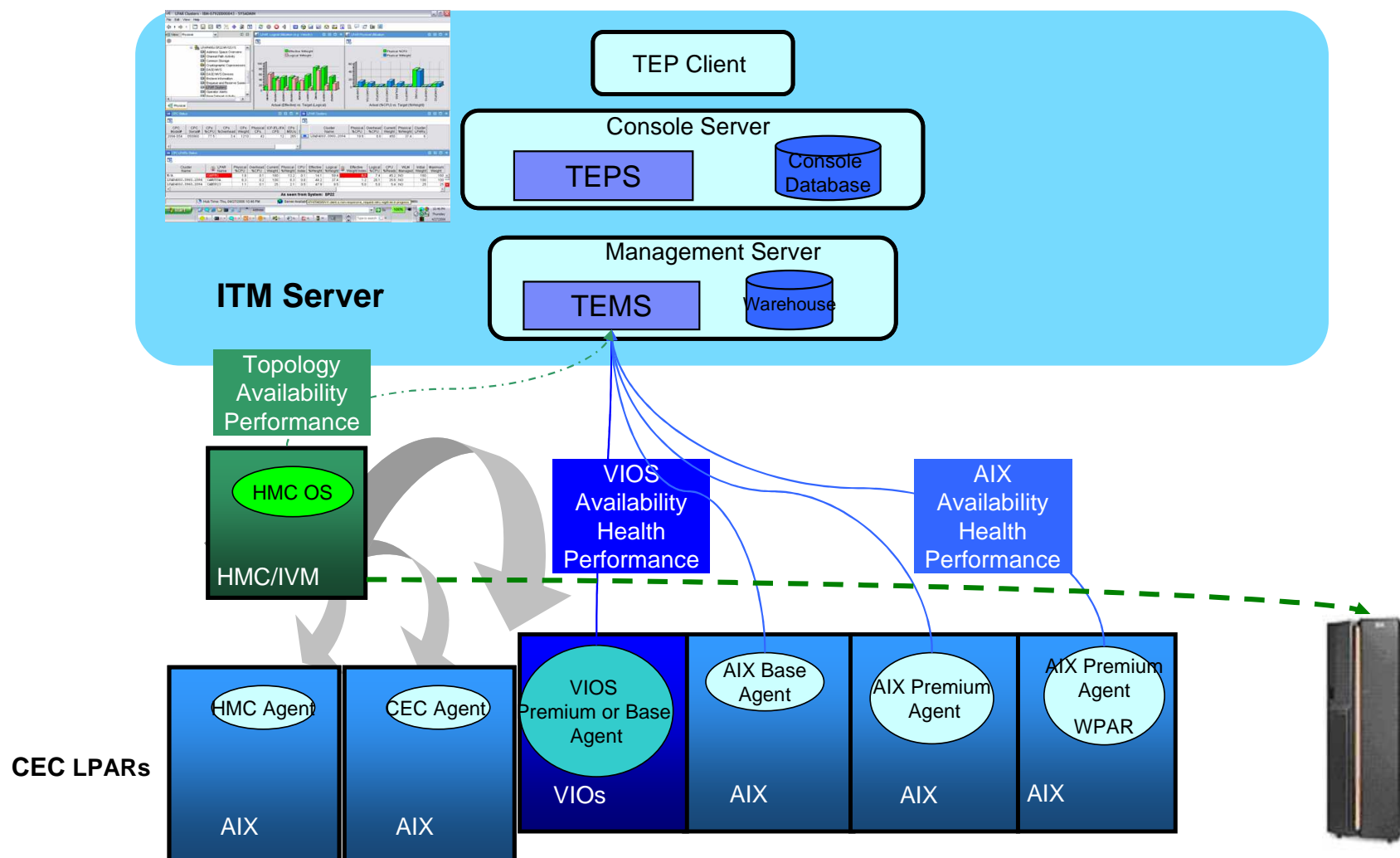
TEP Client

Console Server

TEPS

Console Database

Management Server

ITM Server

TEMS

Warehouse

Topology Availability Performance

HMC OS

HMC/IVM

VIOS Availability Health Performance

AIX Availability Health Performance

CEC LPARs

HMC Agent

AIX

CEC Agent

AIX

VIOS Premium or Base Agent

VIOs

AIX Base Agent

AIX

AIX Premium Agent

AIX

AIX Premium Agent

WPAR

AIX

Agenda

1 IT Service Management

2 IBM Tivoli Monitoring Overview

3 ITM Agents for Power Systems

4 **Usage Examples**

5 Integration

6 Additional Information – Q&A

ITM CEC Agent – Usage Example

- **Benefit**
  - Helps determine how efficiently the resources of a frame are being utilized
  - Helps determine if LPAR resources are over/under utilized against their entitlement
  - Helps determine effectiveness of Active Memory Expansion

- **Overview of the entire frame**
  - Inventory of resources such as CPU, memory
  - Resource allocation to individual LPARS, Pools
  - Information regarding number of LPARS, processor, CEC modes
  - Active memory expansion metrics

- **Integration with System Director**
  - Contextually launch to make configuration changes, etc.

ITM CEC Agent: Overall Frame Utilization

ITM CEC Agent - Active Memory Expansion

LPAR's Actual Logical Memory

20 GB
Uncompressed Pool 2 GB
Compressed Pool 18 GB

1.4X Compression Ratio

LPAR's Expanded Memory

30 GB
Uncompressed Mem 2 GB
Compressed Mem 25.2 GB
Memory Deficit 2.8 GB
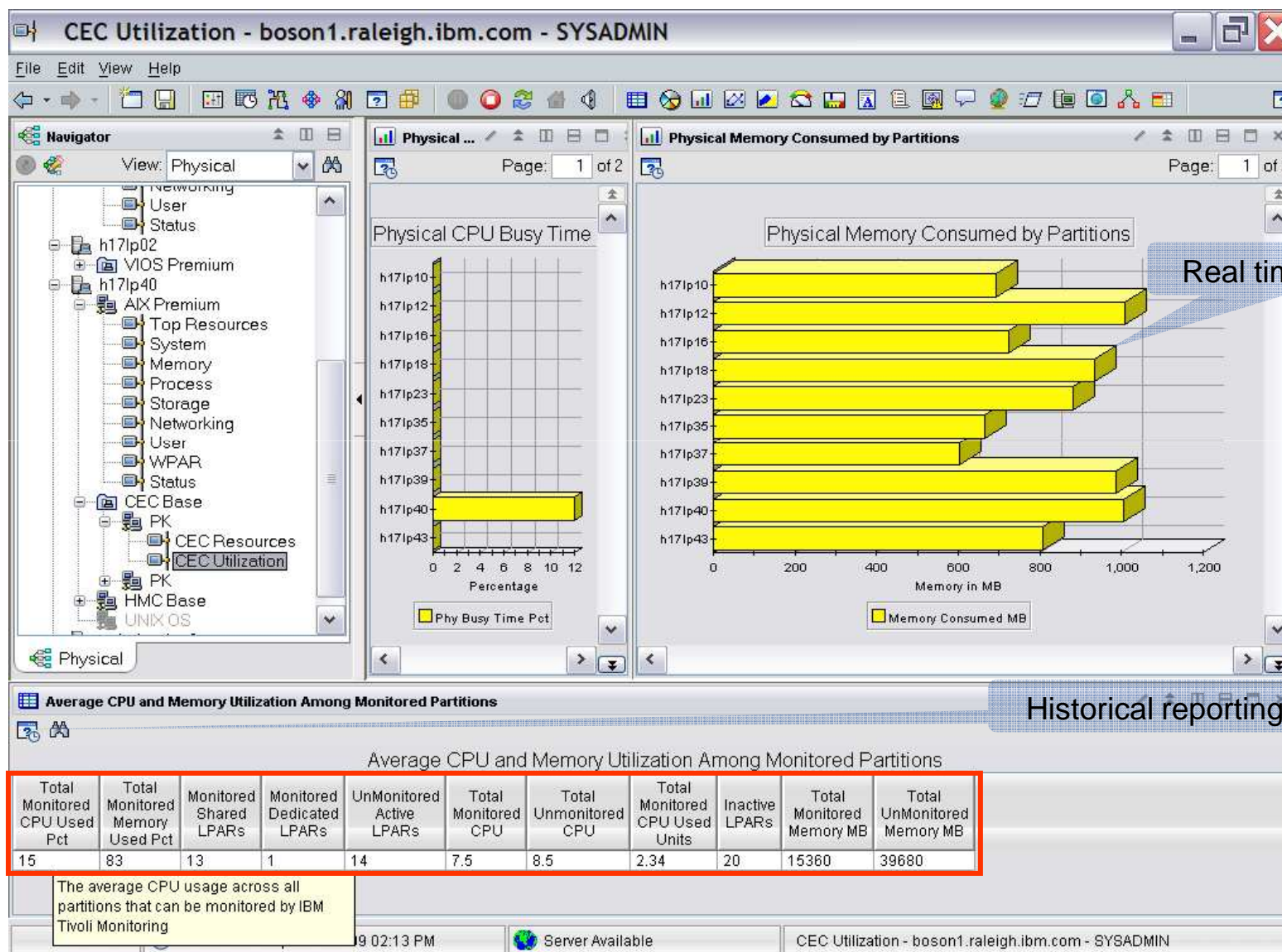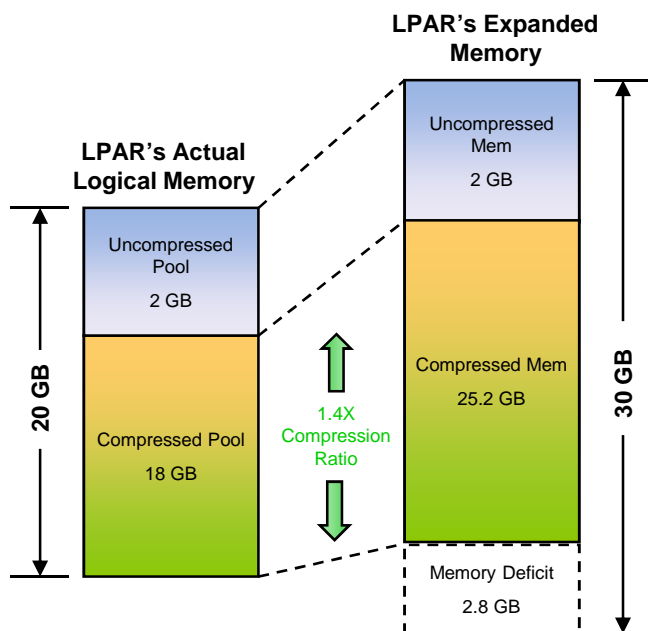
Memory Expansion Factor = 1.5X = 30GB / 20GB

- **Memory Deficit**
  - Workload's data does not compress small enough to achieve desired expanded memory size
  - Results in a "hole" in expanded memory

- **Identifying a Memory Deficit**

- **Resolving a memory deficit**
  - The memory expansion factor can be reduced (thus reducing the expanded memory size of the LPAR)
  - To keep the expanded memory size the same, reduce the memory expansion factor and increase the amount of memory configured to the LPAR

ITM CEC Agent - Active Memory Expansion

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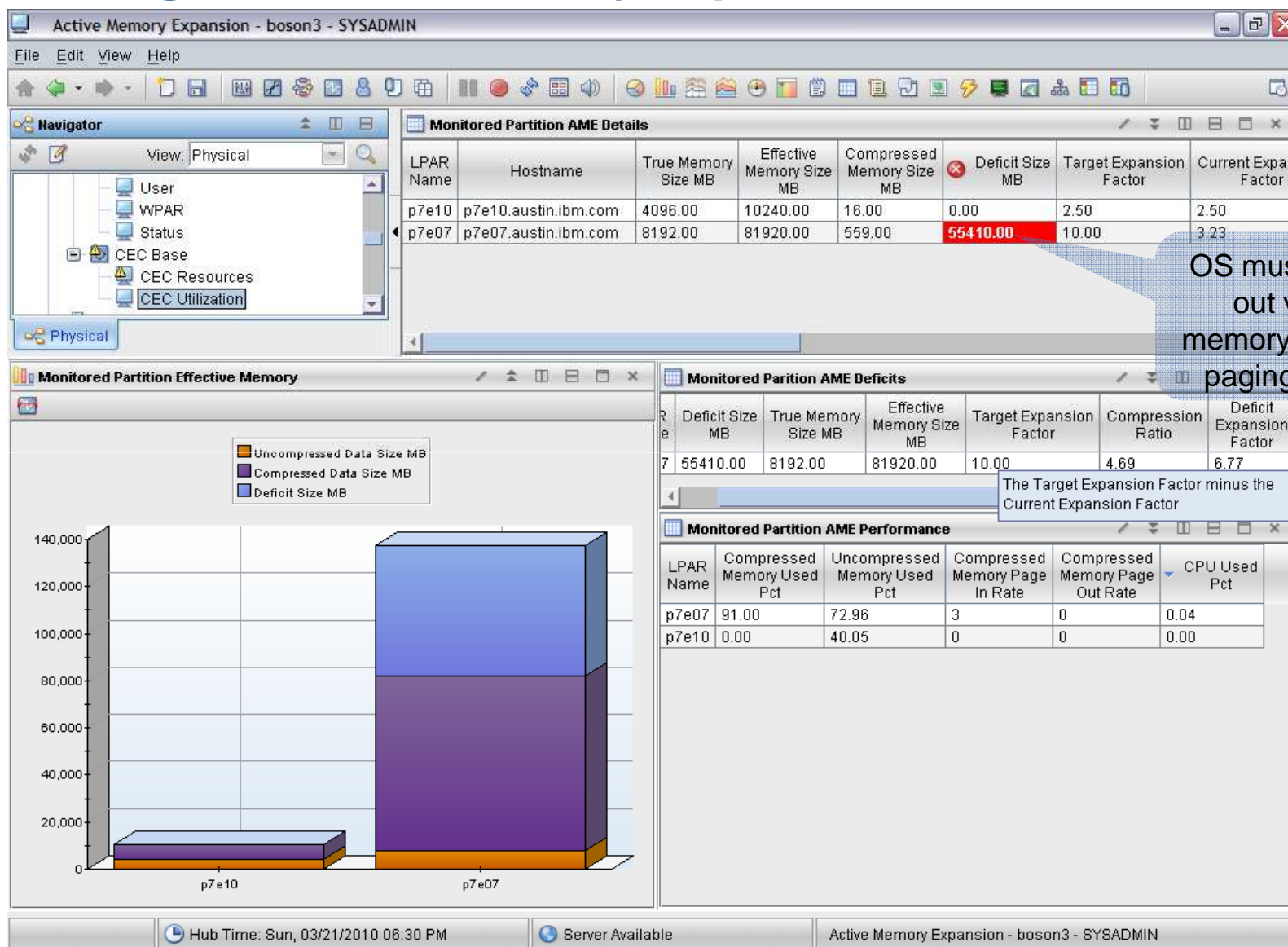
ITM AIX Premium & Unix Logs - Usage Example

- **Benefits**
  - Insight into resource utilization on LPARs and WPARs
  - Which processes are using the most resource?
  - Alerts based on errors in logs

- **AIX Premium Agent**
  - CPU / memory usage & load
  - Processes & their cpu usage
  - Resource consumption by individual WPARs
  - Storage & Network usage
  - Active Memory Expansion information
  - Network bandwidth

- **Tivoli Monitoring for Unix Logs**
  - Monitor system and user logs
  - Customizable alerts based on messages in the logs
  - Hardware alerts

ITM AIX Premium Agent: LPAR Attributes & Utilization
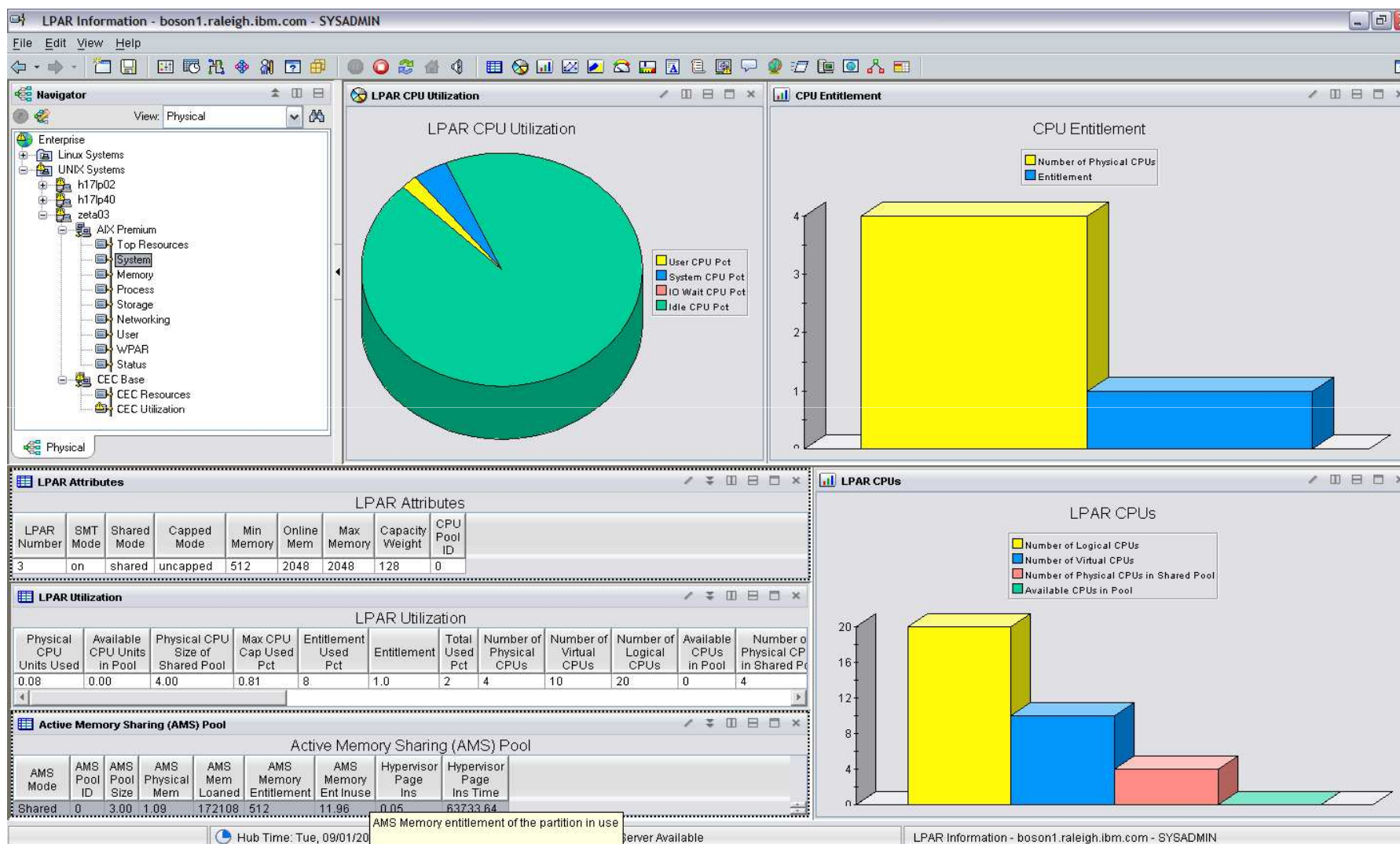
ITM AIX Premium Agent - WPAR Supplementary Workspace links
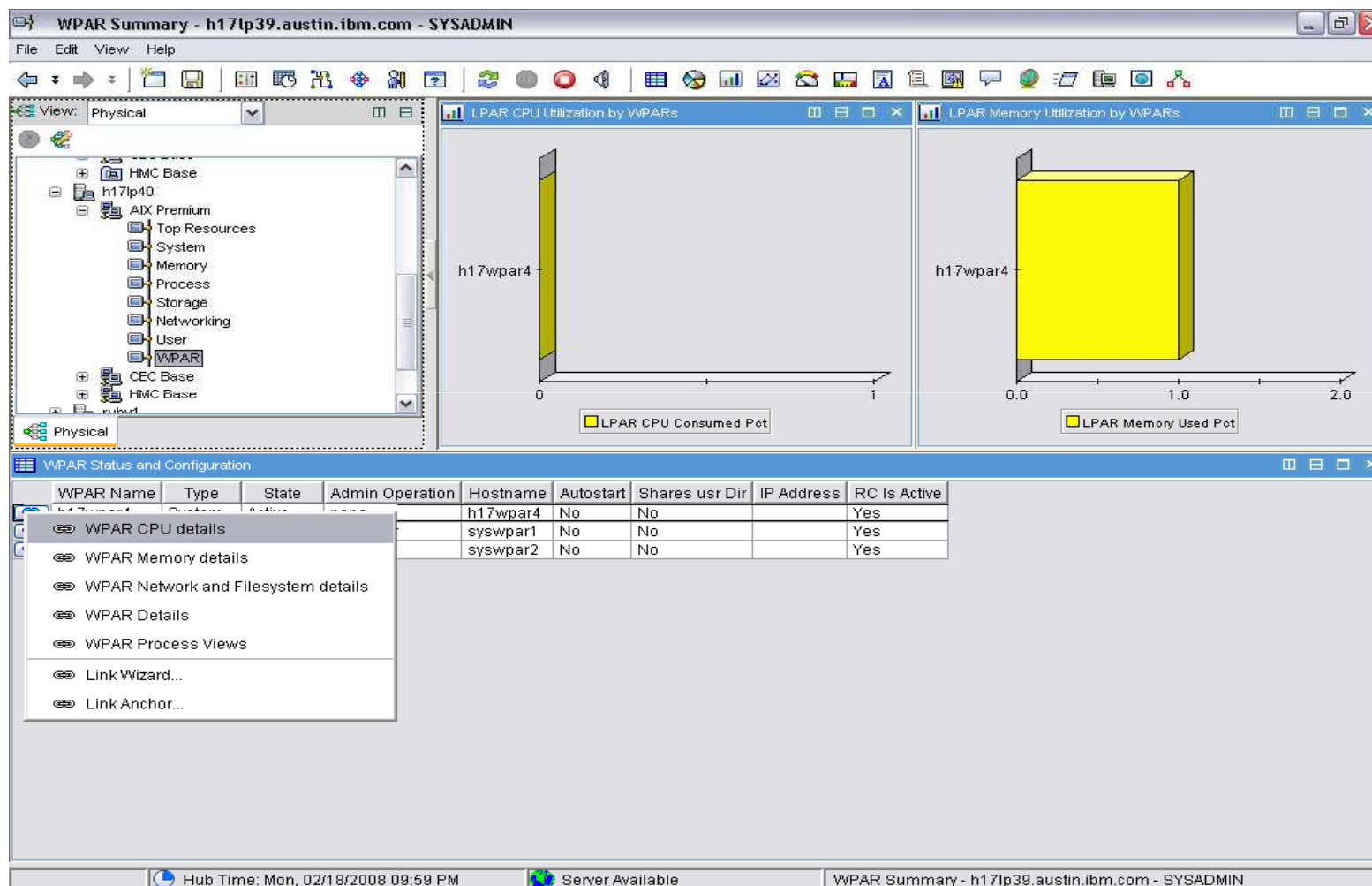
ITM VIOS Agent – Usage Example

- **Benefits**
  - Monitors the availability & health of the VIOS LPAR
  - Monitors the availability and performance of VIOS resources – as they relate to client LPAR

- **Features**
  - Mapping between physical network / storage devices and virtual devices
  - Device Status
  - CPU/Memory usage
  - Storage I/O & disk usage
  - Physical Network Adapter bandwidth utilization; SEA throughput/VLAN throughput

ITM VIOS agent: Network Adapters Bandwidth Utilization
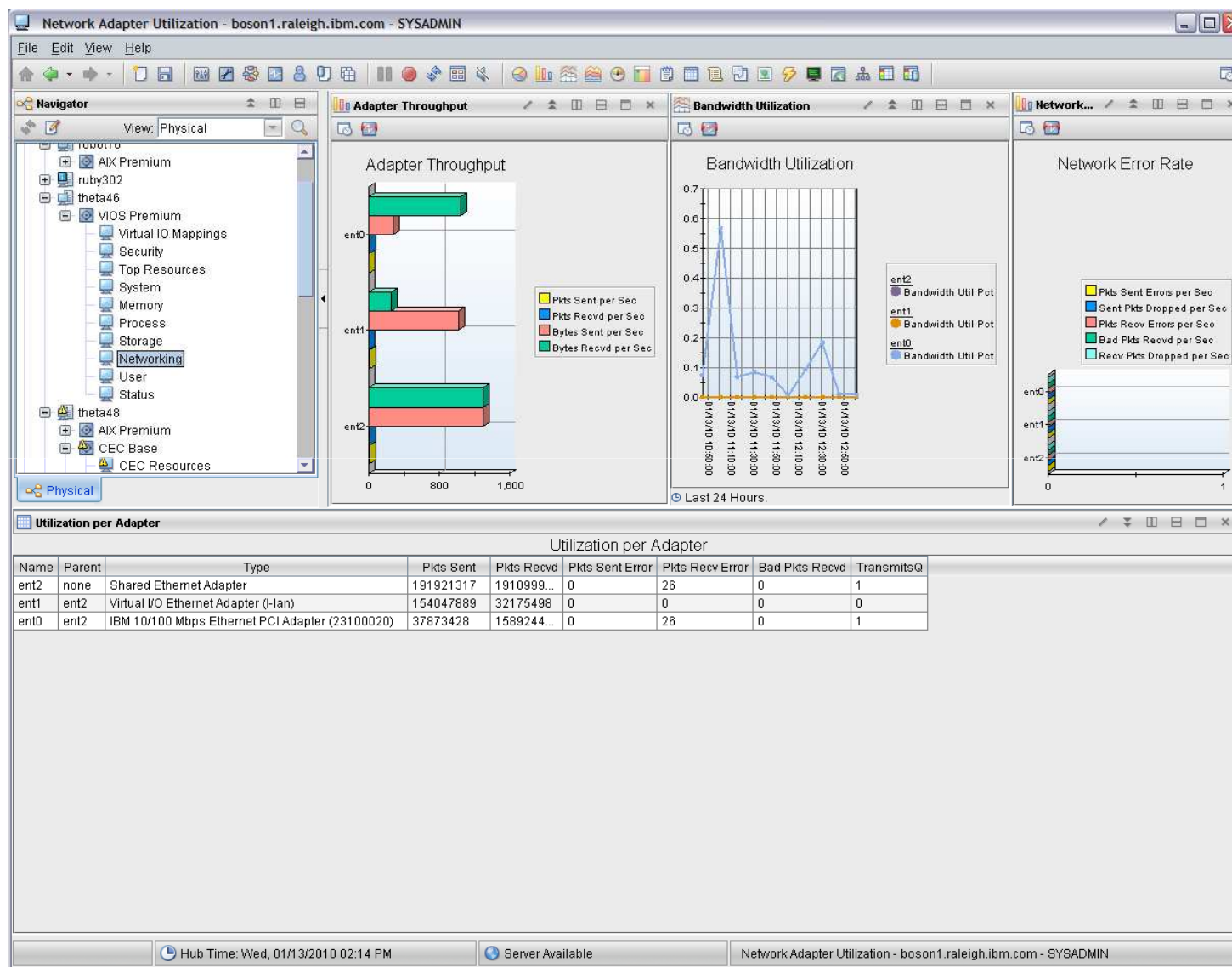
ITM VIOS Agent - Device Status

ITM HMC Agent – Usage Example

- **Benefits**
  - Ensures availability of the hardware management console and reports on the status of systems managed by the HMC.
  - Provides configuration information for CECs and LPARs managed by the HMC
- **Features**
  - Provides configuration information on all the managed systems connected to the HMC
  - Events to notify operators/administrators of LPAR moves, adds or deletes
  - Monitors the resource (CPU, memory, storage, network) usage on the HMC

ITM HMC Agent - Managed CECs & LPAR Events

ITM HMC Agent - Managed LPARs

ITM HMC Agent - HMC System Resources
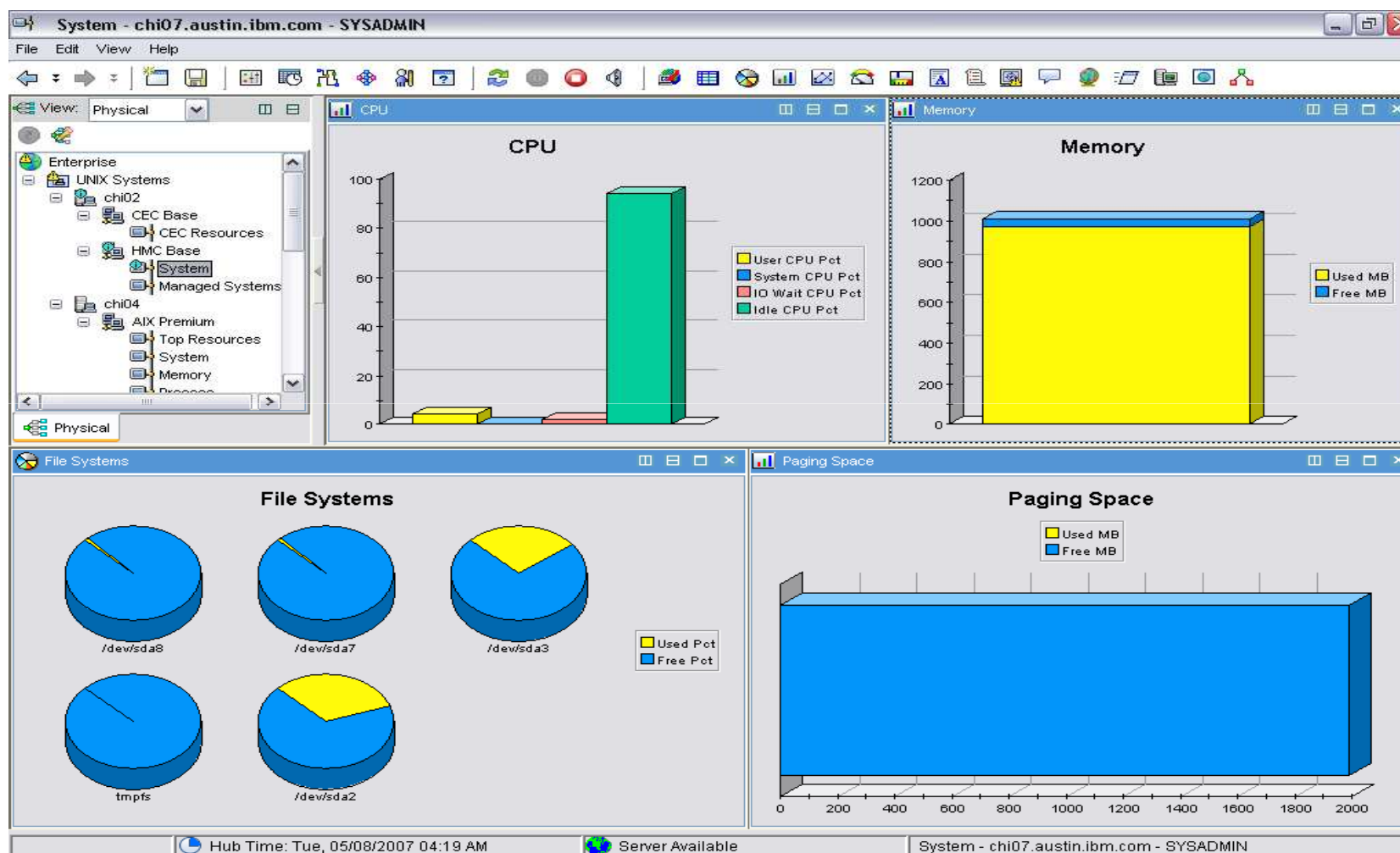
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3   **ITM Agents for Power Systems**

4   **Usage Examples**

5   **Integration**

6   **Additional Information – Q&A**

CEC ITM Agent - Integration with IBM Systems Director

- **Dedicated workspace**
  - ITM workspace dedicated for IBM Systems Director.

- **Easy navigation**
  - Easy navigation to this workspace from several agent and Situation event details workspaces.

- **System Director Web UI**
  - The view of the workspace is initialized with the relevant IBM Systems Director Web UI view (embedded view).

Integrating ITM to your Service Management Tools

- To support your IT Service Management processes, the integration of ITM to your existing Service Management tools might be considered.
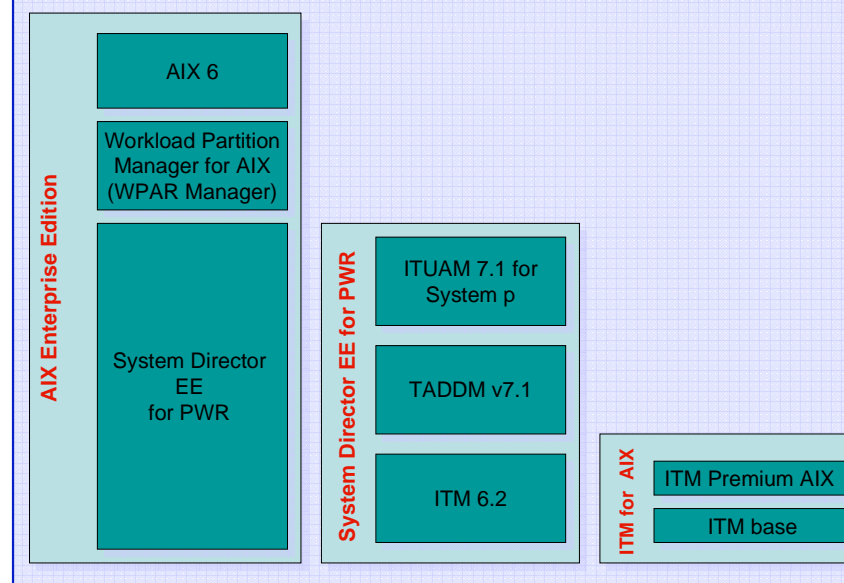

Get events (alerts) from ITM
- IBM Omnibus
- BMC BEM
- other software

Get metrics from the ITM data warehouse – schema of the database is simple to use.

IT Support E-mail SMS IT staff IT staff IT staff IT staff

Service Desk

Reporting Tools

Dashboard

ITM Portal

Tivoli Common Reporting

Paging Tool

Centralized Event Management

ITM Performance Analyzer

ITM Data Warehouse

ITM Management Servers

Operating System agent AIX

Operating System agent Linux

Operating System agent i5/OS

System p agent AIX Premium

System p agent VIOS

System p agent CEC

System p agent HMC

ITM environment to monitor the Power Systems

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Understand the IBM Portfolio

Product	Licensing Mode	Who ?
AIX Enterprise Edition	PROC	STG
System Director Enterprise Edition for Power	PROC	STG
ITM	PVU	SWG
System Director	Free *	STG (Web)

IBM System Director Enterprise Edition for Power

AIX Enterprise Edition
- AIX 6
- Workload Partition Manager for AIX (WPAR Manager)
- System Director EE for PWR

System Director EE for PWR
- ITUAM 7.1 for System p
- TADDM v7.1
- ITM 6.2

ITM for AIX
- ITM Premium AIX
- ITM base

Useful Pointers

- **System p Virtualization Best Practices:**
  - http://www.ibm.com/developerworks/wikis/display/tivolimonitoring/System+p+Virtualization+Best+Practices

- **System p agents user's guide (6.2.2):**
  - http://publib.boulder.ibm.com/infocenter/tivihelp/v15r1/topic/com.ibm.itm.doc_6.2.2/systemP_6.2.2.htm

- **OS agents user's guides (6.2.2):**
  - http://publib.boulder.ibm.com/infocenter/tivihelp/v15r1/topic/com.ibm.itm.doc_6.2.2/using.htm

- **IBM Redbooks:**
  - http://www.redbooks.ibm.com (search key "Tivoli Monitoring")

- **IBM Tivoli Monitoring Forum:**
  - http://www.ibm.com/developerworks/forums/forum.jspa?forumID=796

- **Tivoli Software Group – Suisse Romande:**
  - Pierantonio Marchesini: mpie@ch.ibm.com
  - Laurent Michel: laurent.michel@ch.ibm.com

Questions ?
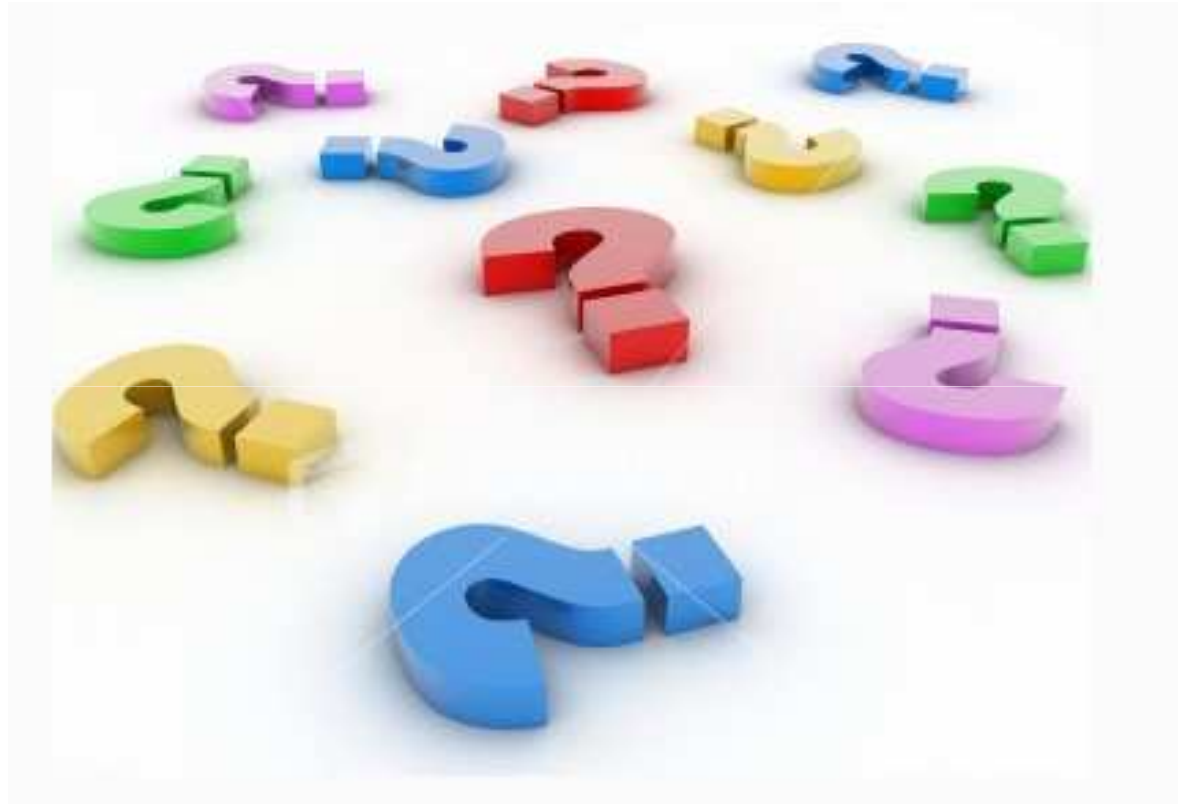
Backup slides

ITM VIOS Agent: N-Port ID Virtualization (NPIV) Mapping

VIOS Agent: Network Adapter Utilization