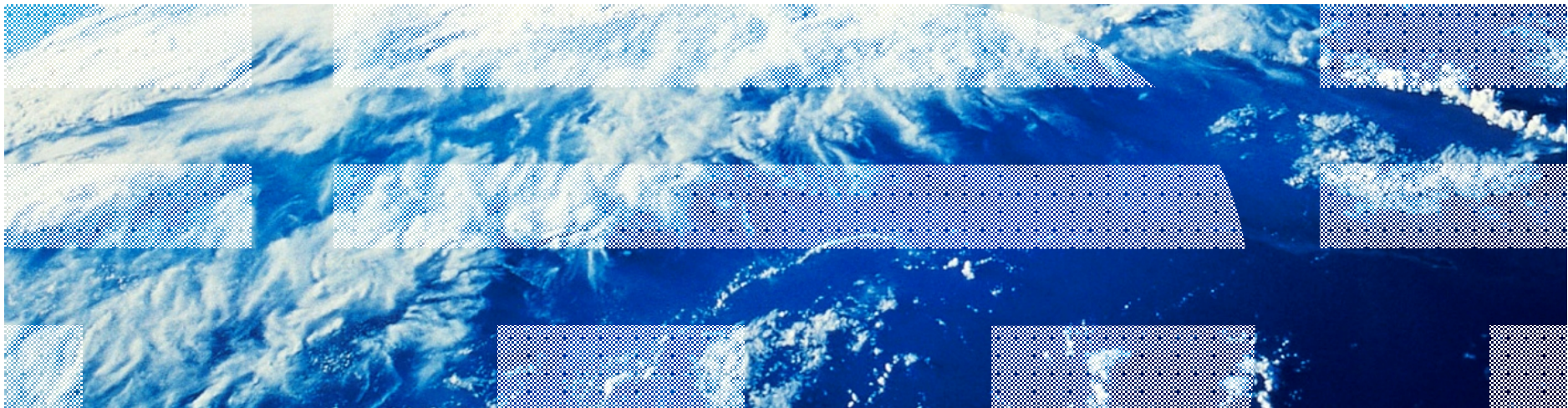# VS01   Monitoring Optionen und wie kann man z/VSE einbinden

Ingo Franzki, IBM
Wilhelm Mild, IBM

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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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What is and why use monitoring

§ **Monitoring definition**

- Monitoring is a continuous process to keep eye on systems or scheduled activities.
- Its aim is to obtain real-time information to ease the overview or action in certain cases.
- Monitoring varies from to time, project to project and activity to activity.
- Can be Real-time or Event driven

§ **Why use monitoring**

- to be aware of the state of a system
- to observe a situation for any changes which may occur over time
- to react on unpredicted or predicted situations

Monitoring types

Business Monitoring vs. Technical Monitoring

§ Business Monitoring (Near-time Monitoring)

- – displaying **measurements** or **KPIs** (Key Performance Indicators) to a business process **controller/management**
  - applying a range or Service Level Agreements (SLA)
  - measurements with a Target Near-time Monitoring

§ Technical Monitoring - **Real-Time Monitoring**

- – **displaying** technical information
  - to IT Support/Maintenance/Administration experts
- – **acting on specific events** or situation changes
  - Event driven monitoring

Anticipating Virtualization Challenges
When a virtual environment has a problem, where did it originate?

There are no "virtual performance problems", only very real performance problems manifested in a very complex consolidated, virtual environment.
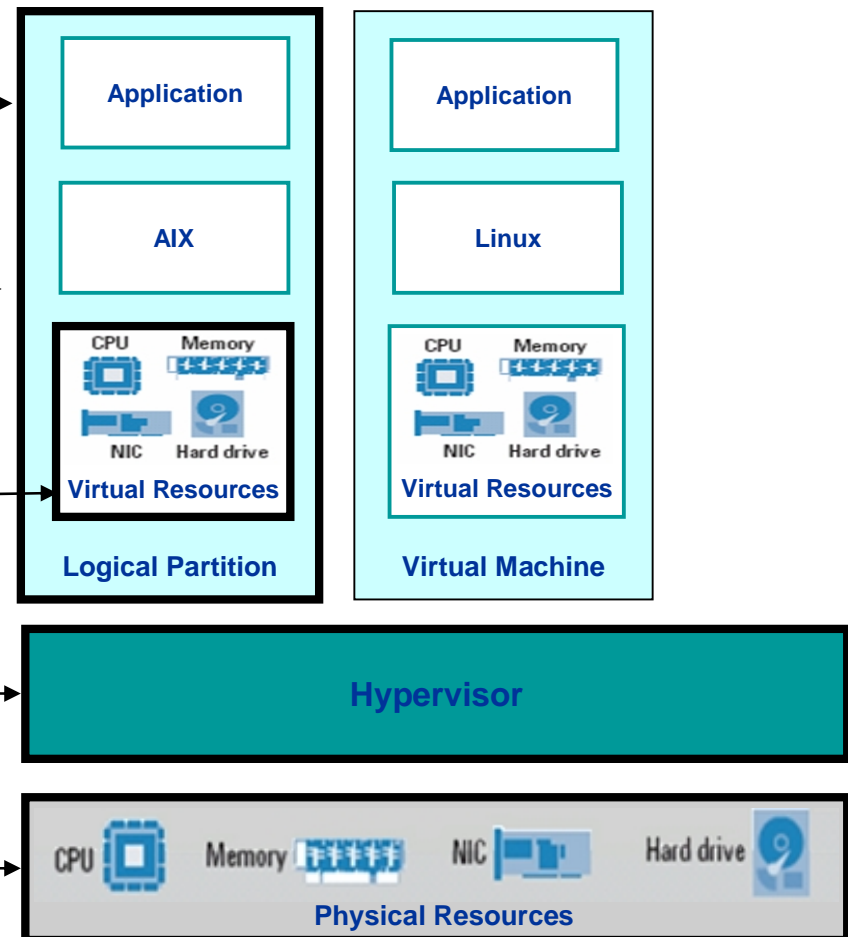
In the Application (bad process) running on the virtual resource?

Application	Application

In the Logical Partition/Machine sharing the same physical resource?

AIX	Linux

| CPU   Memory | CPU   Memory |
NIC Hard drive	NIC Hard drive
Virtual Resources	**Virtual Resources**

In the VIRTUAL RESOURCE?

Logical Partition	**Virtual Machine**

In the HYPERVISOR overhead?

Hypervisor

Or in the PHYSICAL RESOURCE?

CPU   Memory   NIC   Hard drive

Physical Resources

Tivoli Monitoring and Service Automation Component Architecture

§ Tivoli Workload Automation is a component based on the Tivoli Process Automation Engine (TPAe), implementing a <u>data model</u>, <u>workflows</u> and <u>applications</u> for automating the management of IT services
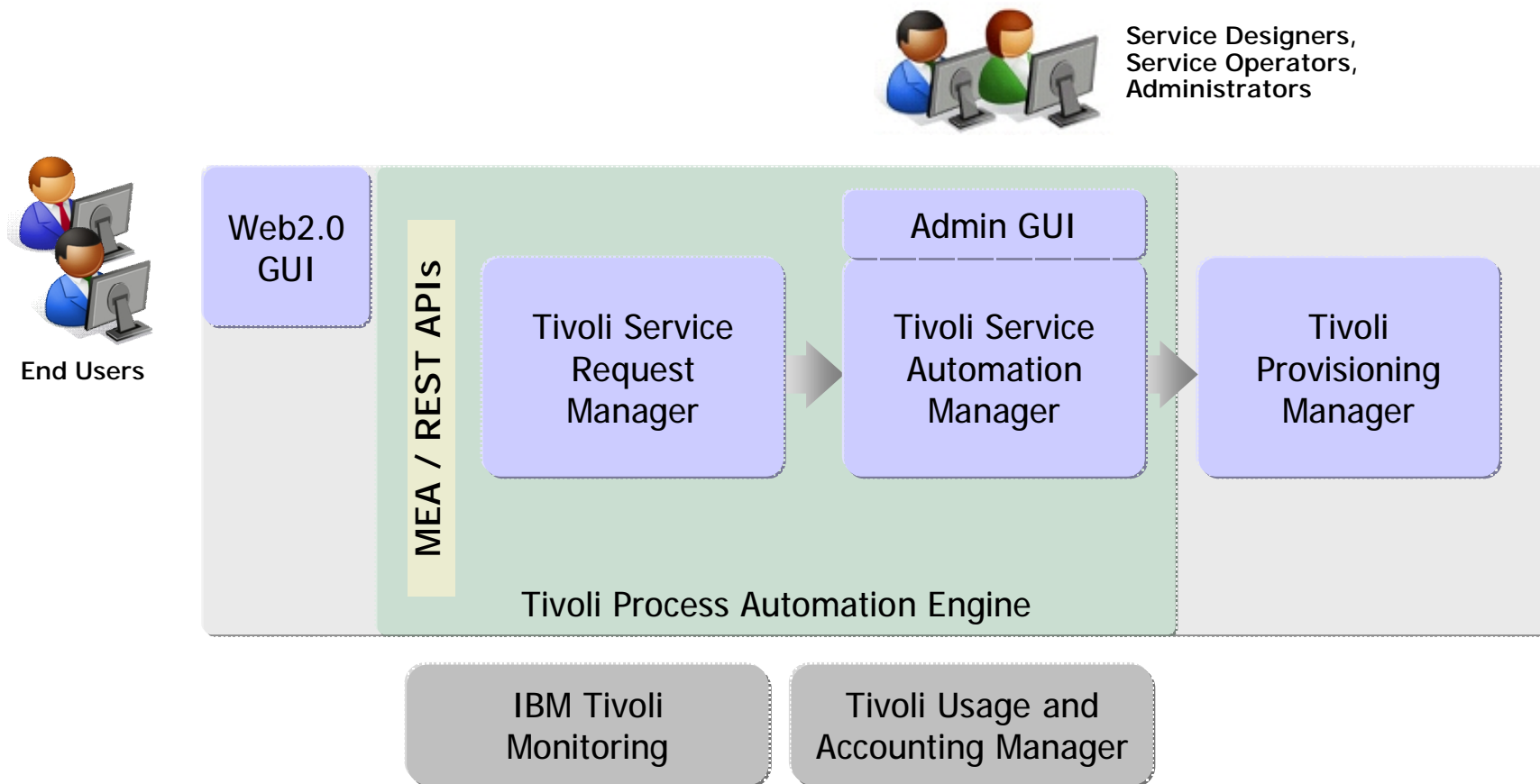
Tivoli Workload Automation Integration Points

IBM® Tivoli® Monitoring
The Industries' Most Extensive Resource Monitoring

Operating Systems	Infrastructure	Application and Collaboration	Business Integration	Web Environment	Database	Agent Builder
AIX	AIX (LPAR DLPAR WPAR)	SAP	CICS	WebSphere	DB2	Agentless or Agent Adapter (Universal Agent)
i5/OS		Siebel	Web Services	WebLogic	SQL	
z/OS	VMware	PeopleSoft	IMS	IIS	Oracle	
Windows	Windows Hyper-V	Tuxedo	MQ	Oracle	Sybase	OPAL solutions (100+ packages)
Linux	Solaris Zones	Domino	Message Broker	NetWeaver	Informix	
Unix		Exchange .Net		JBoss		Microsoft Message Queue and more....
z/VSE	Citrix	Biztalk Sharepoint		Apache		Blackberry
	Clustering			Sun Java System		Micromuse

Tivoli Enterprise Portal
Everything at your Fingertips

Event monitoring with Netcool/Omnibus

Workload Automation on zEnterprise

Fit for purpose workload deployment
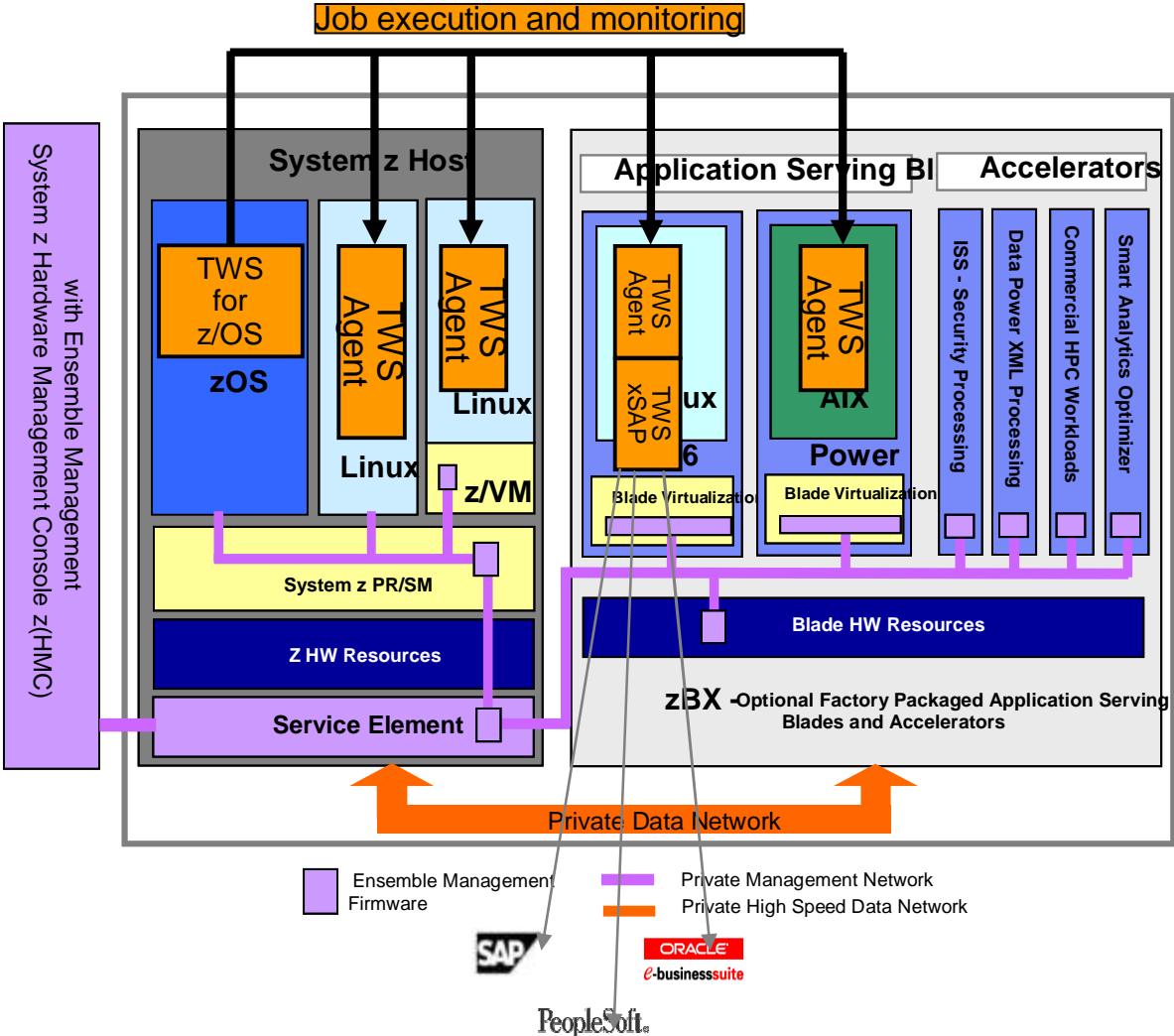
§ zCentric end-to-end solution ideal to manage heterogeneous workloads across System z and Blade extensions, under a single point of control and management

§ Future option to exploit Unified Resource Management interfaces would provide unprecedented workload moving and optimization capabilities

Business benefits

« *Reduce costs with fit-for-purpose platform, and implement a virtualized and green data center*

« *Realize data-proximity processing with high bandwidth for distributed applications*

11

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Application Extensions allow business users to take advantage of processes in a managed approach

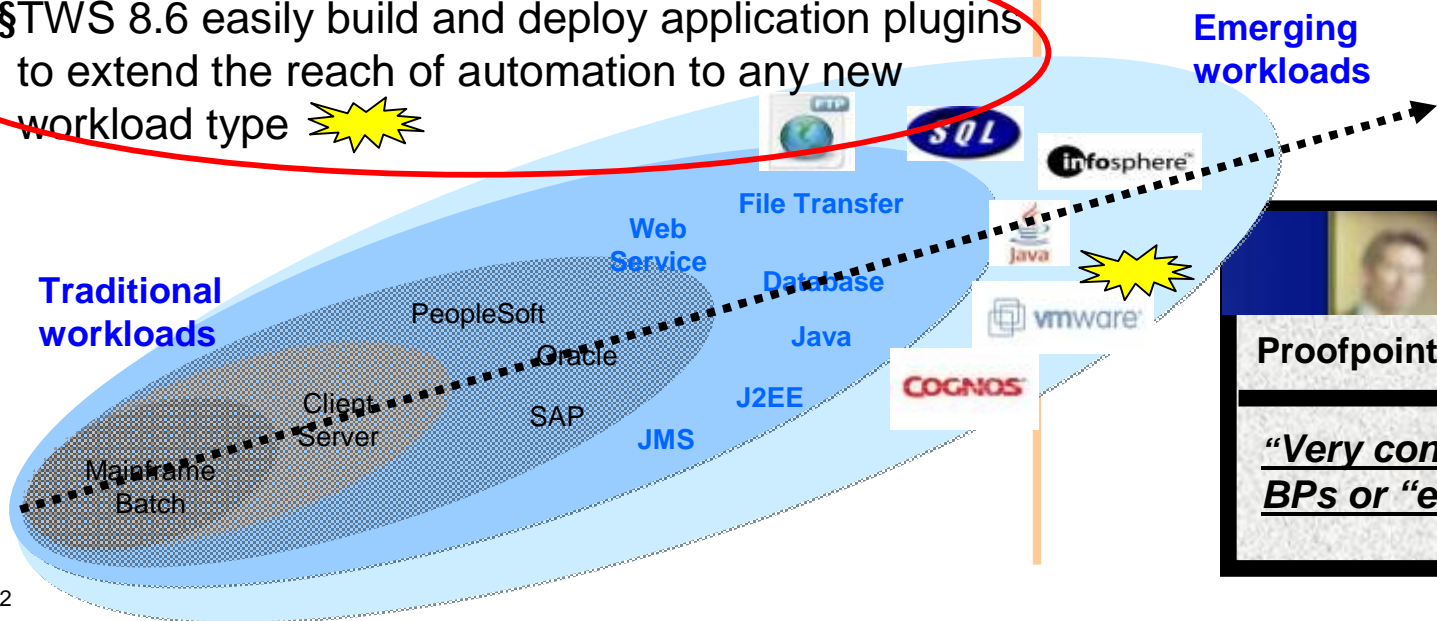New Tivoli Workload Automation application extensible framework

§Customers shifting from traditional backend transaction focused systems to modern systems running web applications and heterogeneous applications

§Workload Automation role is maintaining a single point of control over workloads

§TWS 8.6 easily build and deploy application plugins to extend the reach of automation to any new workload type

Business benefits

« *Share infrastructure among applications*

« *Reduces labor costs, enabling to automate new workloads with the same staff of people*

« *No request for new skill: re-using of workload automation processes and procedures already in place*

Emerging workloads

File Transfer

Web Service

Database

Java

J2EE

JMS

Traditional workloads

PeopleSoft

Oracle

Client Server

SAP

Mainframe Batch

FTP

SQL

infosphere

Java

vmware

COGNOS

Proofpoints – Customer quotes

"Very concrete needs" from BPs or "early adopters"

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Tivoli Monitoring for Green Energy
Data Center Optimization and Reporting

Metric Collection, Analytics, Thresholding and Eventing

§ Monitor power usage and thermal data from IT resources through embedded sensors or via remote sensors

§ Operations dashboard integrates traditional IT measurements and emerging environmental measurements onto common dashboard

§ Aggregation of IT and environmental metrics with ability to take manual or automated actions when needed

§ Intelligent thresh-holding and event generation
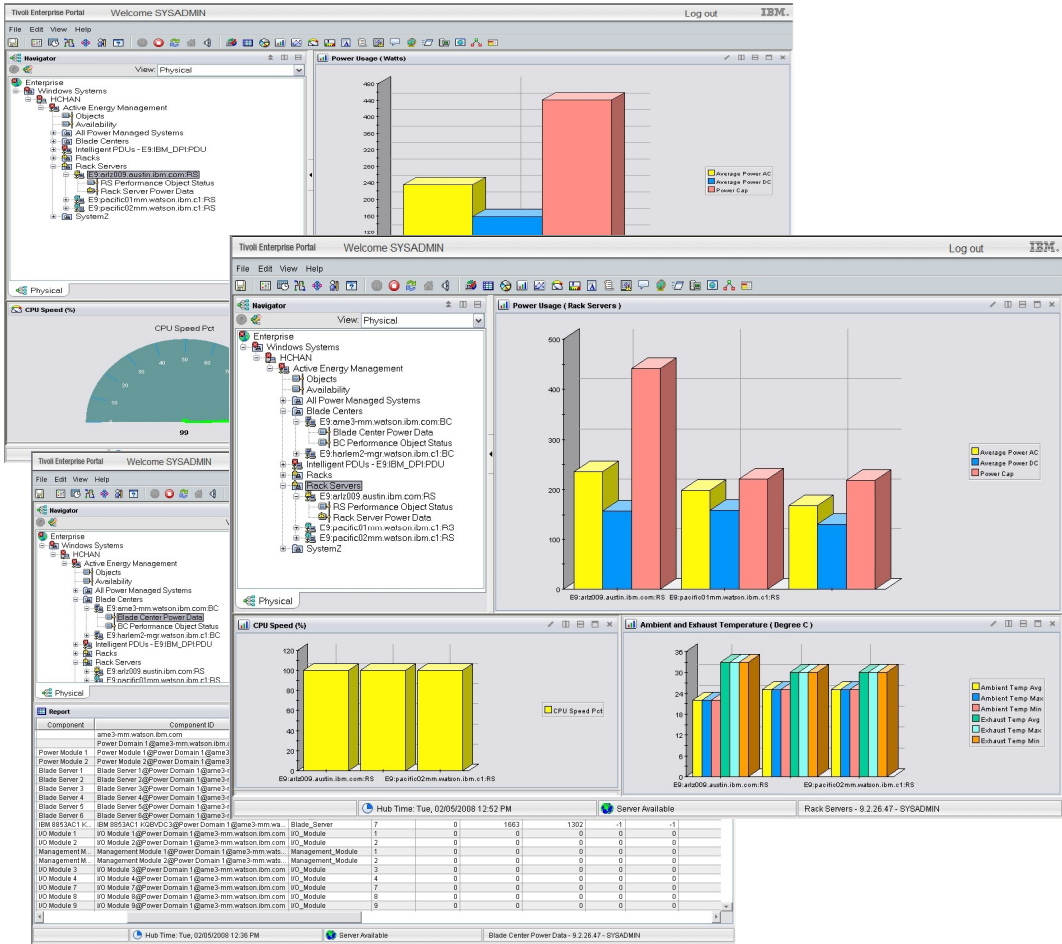
Monitoring Power and Thermal

IBM Systems Director

1. Multiple Workloads
Linux, AIX, Windows, VMware, KVM, Hyper-V, PowerVM, z/VM

2. Higher Utilization via Efficient Resource Sharing

3. Provisioning of New Workloads
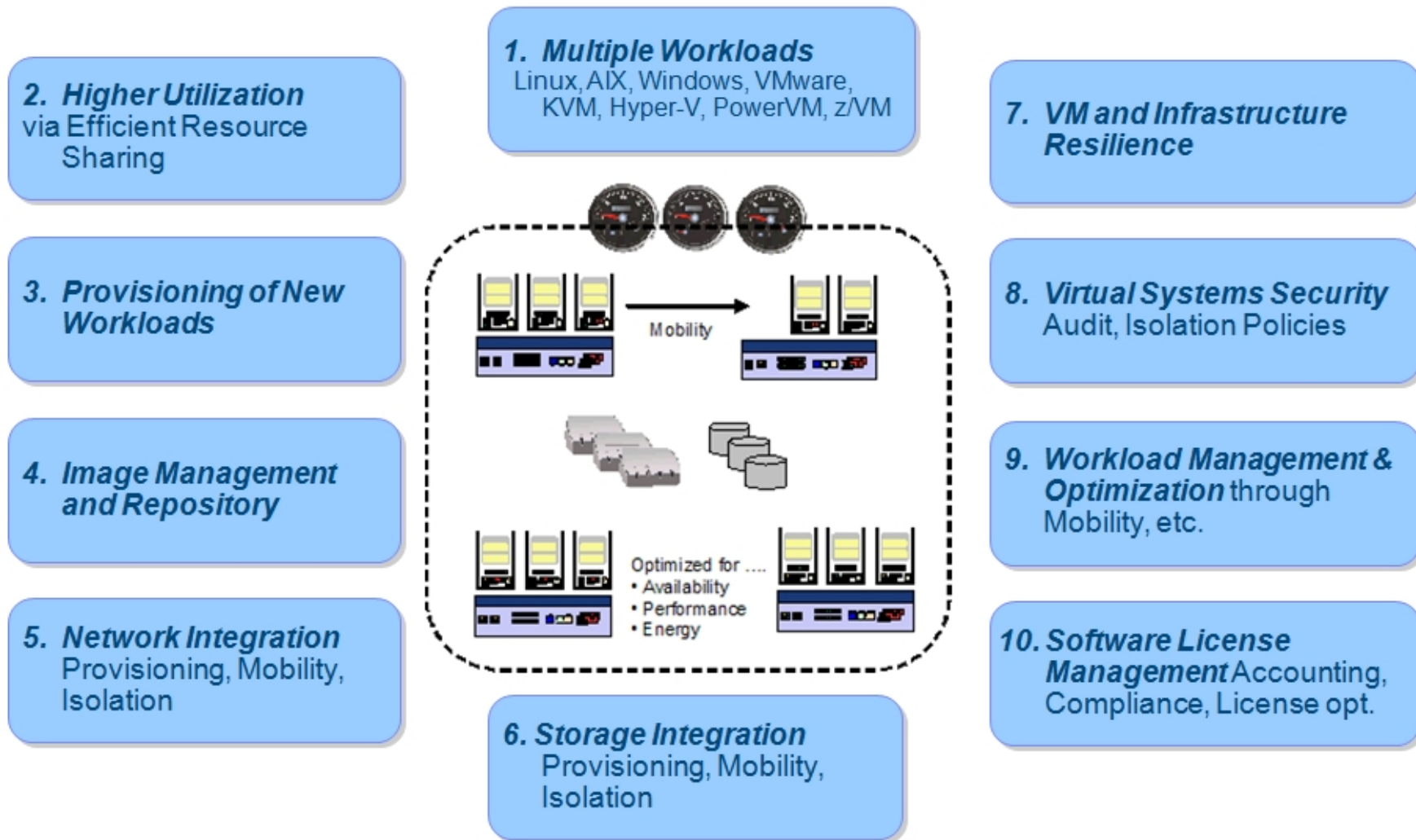
4. Image Management and Repository

5. Network Integration Provisioning, Mobility, Isolation

6. Storage Integration Provisioning, Mobility, Isolation

7. VM and Infrastructure Resilience

8. Virtual Systems Security Audit, Isolation Policies

9. Workload Management & Optimization through Mobility, etc.

10. Software License Management Accounting, Compliance, License opt.

Mobility

Optimized for ....
• Availability
• Performance
• Energy

What makes this virtual machine management and environment *different* from other virtual machine management environments is that it has been designed to allow a single manager or administrator to assign and manage virtualized workloads across several different platforms simultaneously, including Linux, AIX (IBM"s Unix), Windows, VMware, KVM, Hyper-V, PowerVM and z/VM (mainframe) environments.

IBM Systems Director 6.3: An Overview

§ In a nutshell, Systems Director 6.3 offers systems managers and administrators with a single point of control for managing physical and virtualized systems environments and associated peripherals such as storage.

§ Simplified graphical user interface to help reduce complexity and cost of IT management.

§ Creates a launch point for plug-in applications that manage virtualized resources and that can provide integrated service management.

§ Works across IBM's three server architectures: the IBM System x, Power Systems, and System z.

§ IBM's System Director is a master management program that provides several monitor and control functions to systems managers and administrators:

  – Discovery and inventory;

  – Visualization of server/storage/network infrastructure;

  – Dashboard views with health and status information;

  – Monitoring functions (including the ability to automate these functions);

  – Physical and virtual systems management;

  – Security monitoring and administration;

  – Support for integrated service management

   (support for integrated service functions, automated support response, and update management)

  – Common cross-platform navigation and look and feel

IBM Systems Director 6.3: An Overview

The opening screen is organized around four functions:

1. Update IBM Systems Director
2. System Discovery
3. Request Access
   (to systems and resources)
4. Collect Inventory.
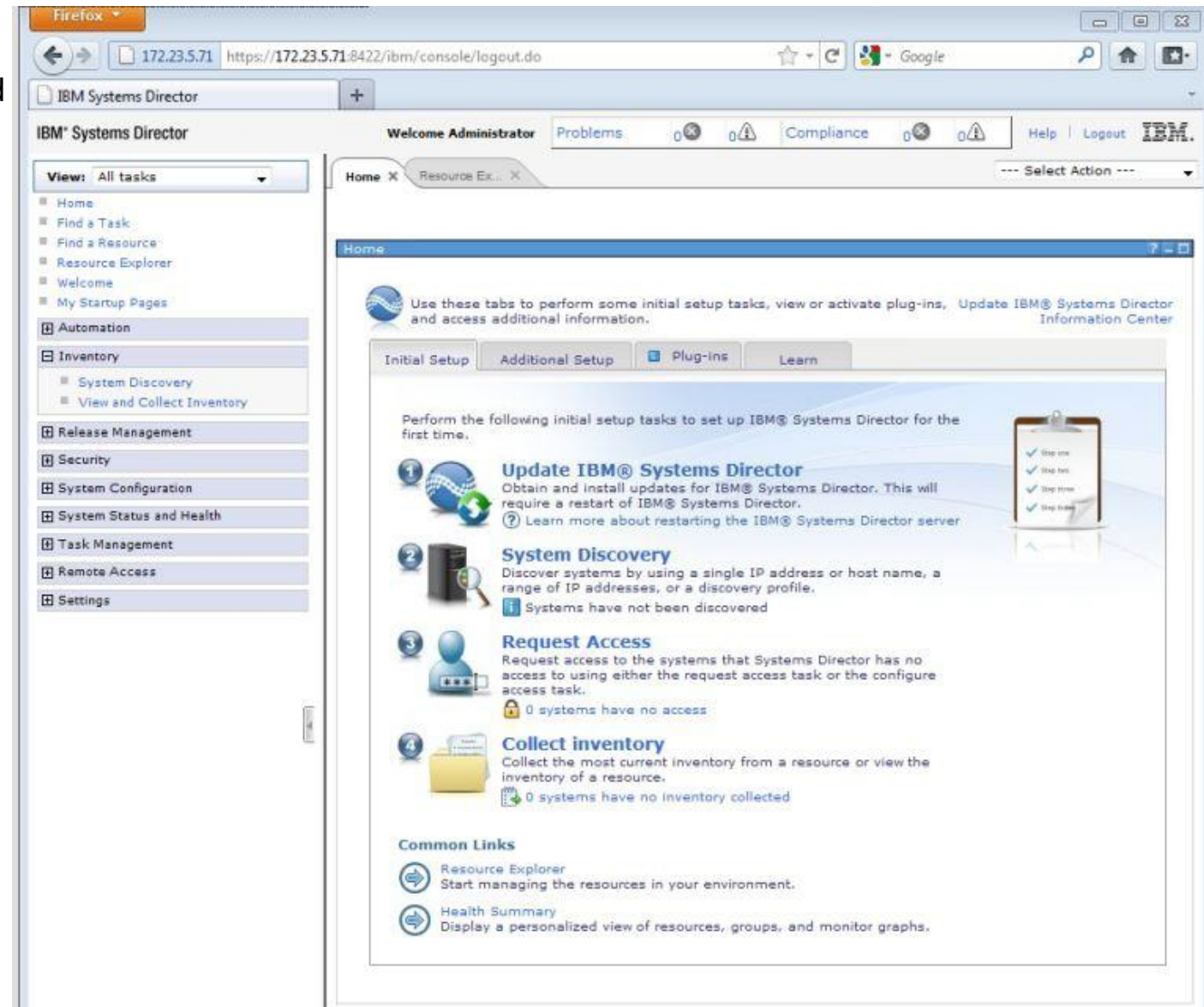
IBM Systems Director VMControl

Software that delivers consistent management of single virtual systems or pools of cooperating systems across all IBM enterprise platforms

IBM® Systems Director

IBM System x

Power Systems

System z

VMControl features:

- Discover virtual resources
- Display inventory and topology
- Monitor virtual resource health
- Relocate virtual resources
- Create and manage virtual servers
- Deploy and manage workloads
- Provision and manage virtual images
- Manage virtual resource pools

VMControl encompasses virtual workload lifecycle management, image management and system pool management as an extension to IBM Systems Director.

IBM VMControl Provides a Common Interface Across Diverse Hypervisors
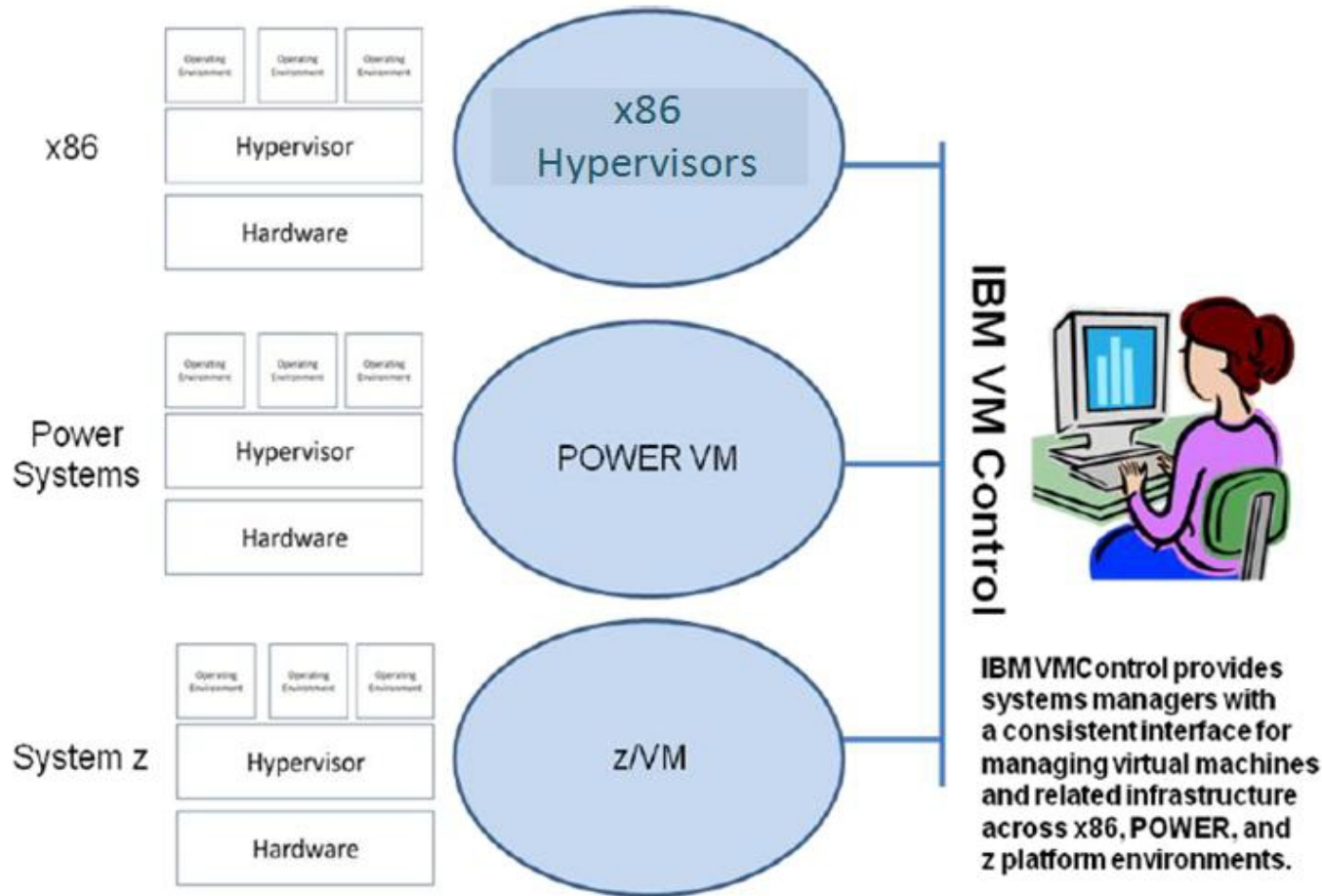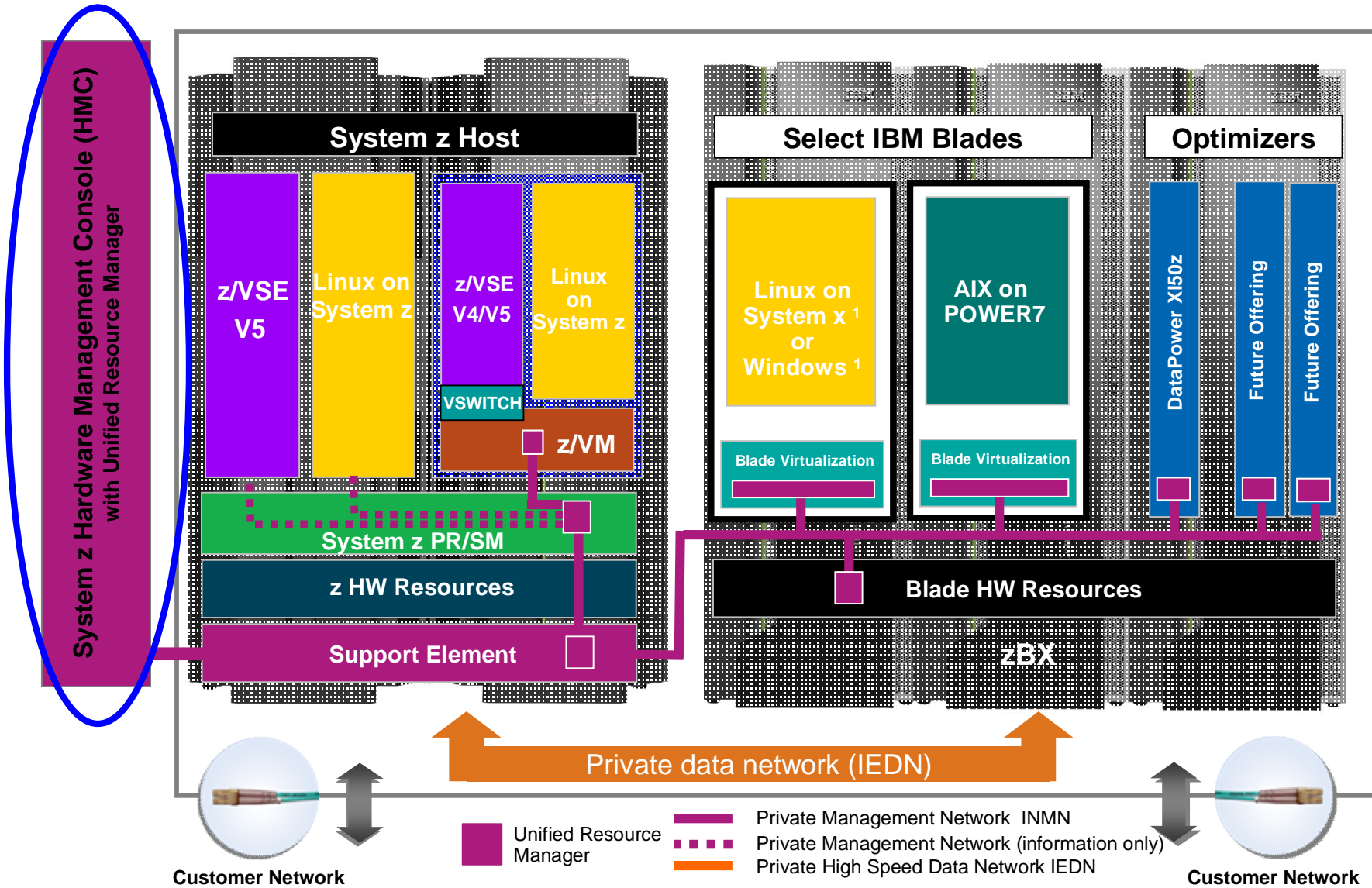

Source: Clabby Analytics, October, 2011

Availability monitoring - Xymon Monitor (formerly Hobbit)

§ **Xymon is a tool for monitoring servers, applications and networks**

§ **Xymon is an application that performs 'tests' of network services on predetermined hosts**

– TCP based connections

– ftp ssh telnet smtp pop3 imap nntp rsync clamd oratns qmtp qmqp dns dig ntp rpc http ldap apache and more...

– Also z/VM and z/VSE agents are available
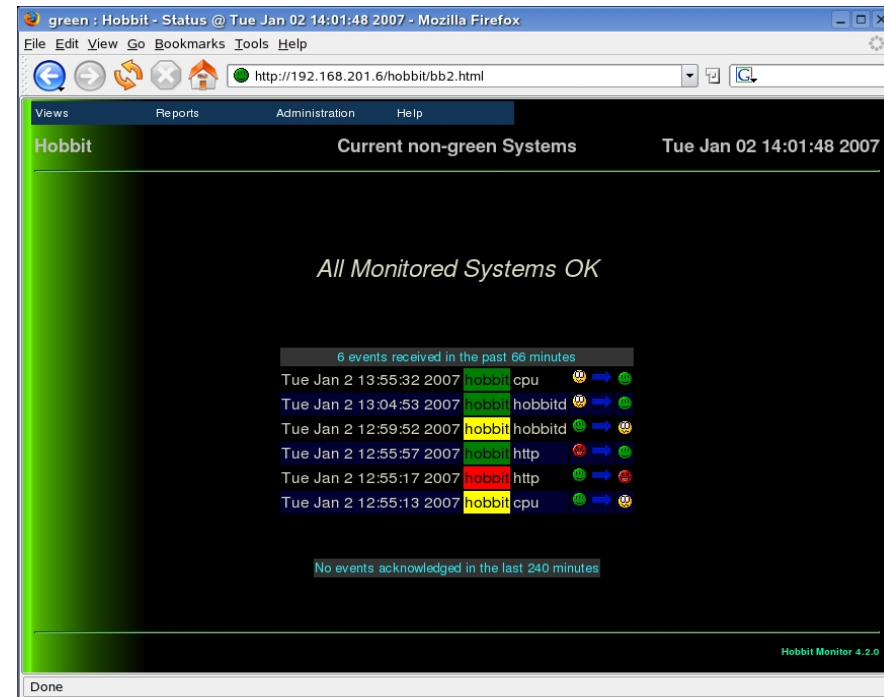
§ **Provides a web based status display, updated every minute**

§ **Presentation from Rich Smrcina:**

– http://www.wavv.org/wavv2008/presentations/hobbitmon.pdf

§ **z/VSE, z/VM and z/OS Agents:**

– http://sites.google.com/site/rsmrcina/samples

zManager for IBM zEnterprise and z/VSE Support

System z Hardware Management Console (HMC) with Unified Resource Manager

System z Host

| z/VSE V5 | Linux on System z | z/VSE V4/V5 | Linux on System z |

VSWITCH

z/VM

System z PR/SM

z HW Resources

Support Element

Select IBM Blades

Linux on System x [1] or Windows [1]

AIX on POWER7

Blade Virtualization

Blade Virtualization

Blade HW Resources

zBX

Optimizers

DataPower XI50z

Future Offering

Future Offering

Private data network (IEDN)

Customer Network

Customer Network

■ Unified Resource Manager

— Private Management Network INMN
···· Private Management Network (information only)
— Private High Speed Data Network IEDN

[1] All statements regarding IBM future direction and intent are subject to change or withdrawal without notice, and represents goals and objectives only.

z/VSE Monitoring support

z/VSE V4.3 – SNMP Monitoring Agent support (1)

§ **z/VSE V4.3 Announcement letter (210-313)**

System management enhancements:

SNMP (Simple Network Management Protocol) is a widely used standard network protocol that allows systems to monitor elements of a network. z/VSE V4.3 will provide a monitoring agent that allows SNMP version 1 clients to retrieve z/VSE specific system and performance data. This will help performance monitors to collect data that can be used for planning purposes.

§ **What is SNMP (Simple Network Management Protocol) ?**

– **From Wikipedia:**

Simple Network Management Protocol (SNMP) is an Internet-standard protocol for managing devices on IP networks. Devices that typically support SNMP include routers, switches, servers, workstations, printers, modem racks, and more.

[...]

SNMP is a component of the Internet Protocol Suite as defined by the Internet Engineering Task Force (IETF). It consists of a set of standards for network management, including an application layer protocol, a database schema, and a set of data objects.

– SNMP uses an extensible design, where the available information is defined by management information bases (MIBs). MIBs describe the structure of the management data of a device subsystem; they use a hierarchical namespace containing object identifiers (OID). Each OID identifies a variable that can be read or set via SNMP. MIBs use the notation defined by ASN.1.

à **http://en.wikipedia.org/wiki/Simple_Network_Management_Protocol**

z/VSE V4.3 – SNMP Monitoring Agent support (2)
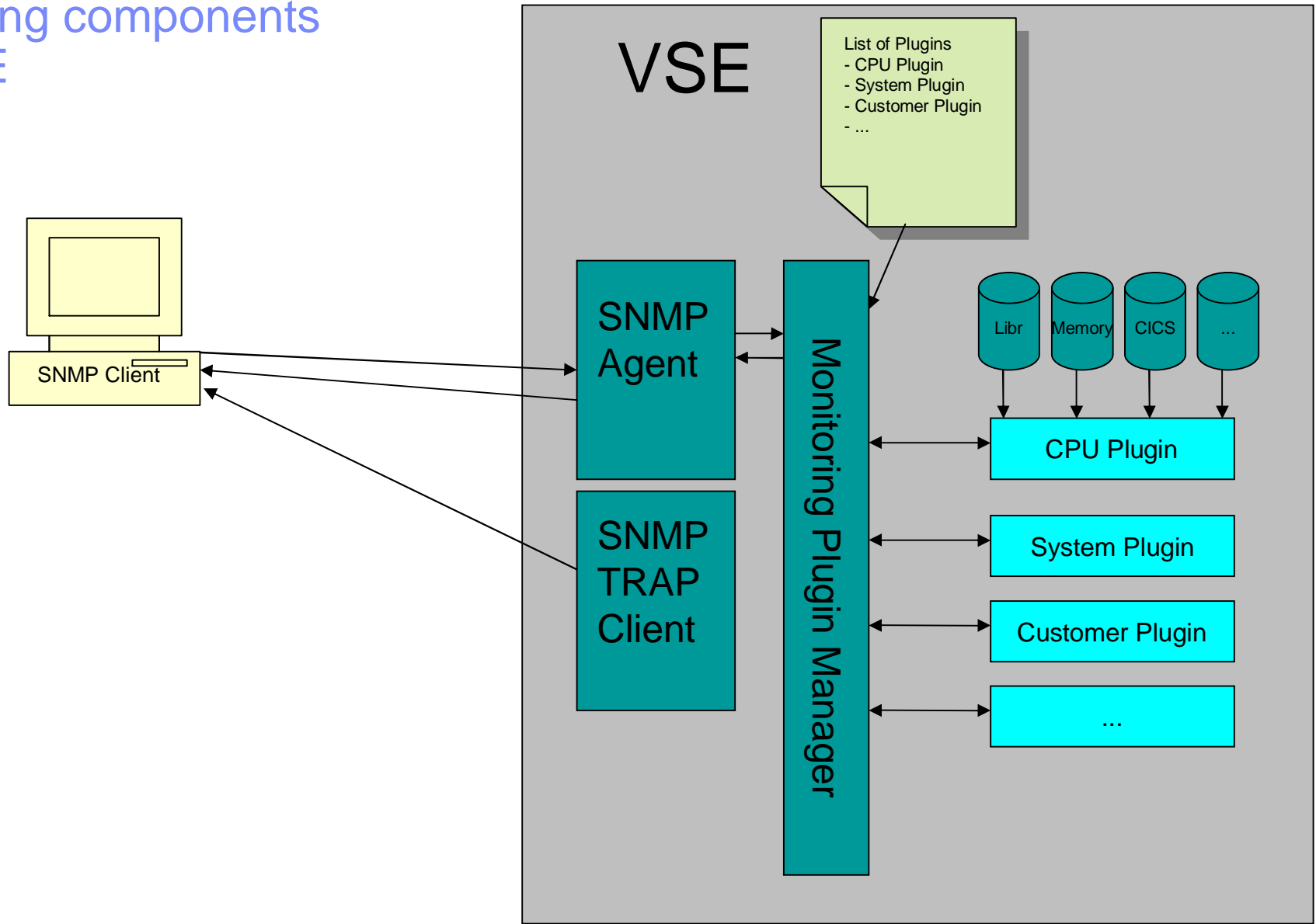
§ **Management Information Base (MIB)**

  – SNMP itself does not define which information (which variables) a managed system should offer

  – Rather, SNMP uses an extensible design, where the available information is defined by management information bases (MIBs).

  – MIBs describe the structure of the management data of a device subsystem

   • They use a hierarchical namespace containing object identifiers (**OID**).

   • Each OID identifies a variable (e.g. a performance counter) that can be read or set via SNMP.

§ **SNMP V1 Protocol**

  – Get   Get the value of an object identified by its OID

  – GetNext   Get the value of the next object identified by an OID

  – Set   Set the value of an object identified by its OID (not used by z/VSE)

  – Trap   Asynchronous notification about something (an event)

à **http://en.wikipedia.org/wiki/Simple_Network_Management_Protocol**

Monitoring components in z/VSE

VSE

List of Plugins
- CPU Plugin
- System Plugin
- Customer Plugin
- ...

SNMP Client

SNMP Agent

SNMP TRAP Client

Monitoring Plugin Manager

Libr   Memory   CICS   ...

CPU Plugin

System Plugin

Customer Plugin

...

z/VSE V4.3 – SNMP Monitoring Agent support

§ **z/VSE Monitoring Agent enables customers to monitor z/VSE systems using** standard monitoring interfaces **(SNMP V1)**

– It also includes an open interface, which enables customers or vendors to use own programs (plugins) to collect additional data

§ **Data collected by the IBM provided plugins contains**

– Information about the environment (e.g. Processor, LPAR and z/VM information)

– Number of partitions (static, dynamic, total, maximum)

– Partition priorities

– Number of CPUs (active, stopped, quiced)

– Paging (page ins, page outs)

– Performance counters overall and per CPU

– CPU address and status

– CPU time, NP time, spin time, allbound time
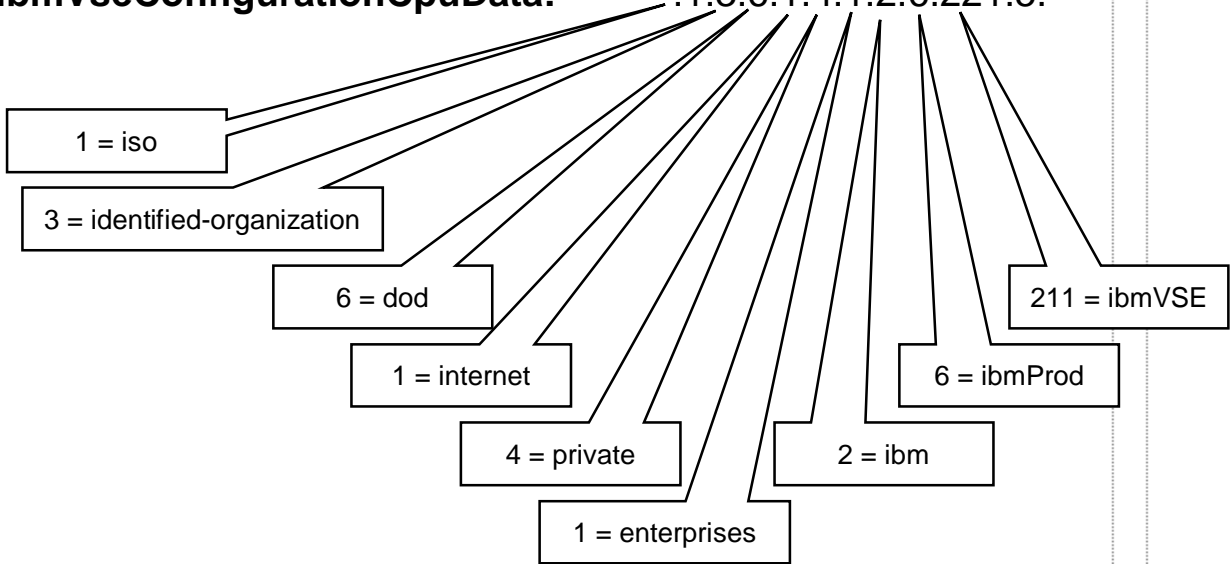
– Number of SVCs and dispatcher cycles
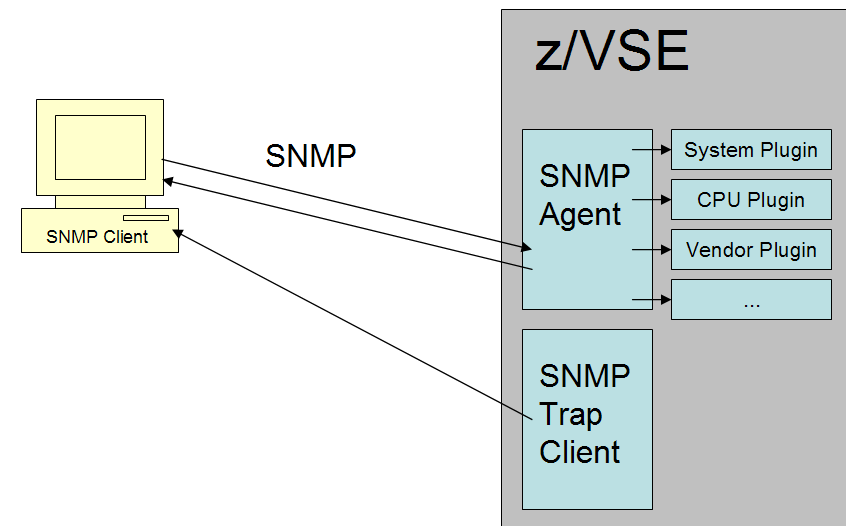
z/VSE V4.3 – SNMP Monitoring Agent support

§ **A MIB (Measurement Information Base) is provided describing the data collected**

à IESMPMIB.Z in PRD1.BASE (plain text member)

ibmVSE:	.1.3.6.1.4.1.2.6.221
ibmVseConformanceGroup:	.1.3.6.1.4.1.2.6.221.1.*
ibmVseConfigurationStatic:	.1.3.6.1.4.1.2.6.221.2.*
ibmVseConfigurationDynamic:	.1.3.6.1.4.1.2.6.221.3.*
ibmVseConfigurationPerformance:	.1.3.6.1.4.1.2.6.221.4.*
ibmVseConfigurationCpuData:	.1.3.6.1.4.1.2.6.221.5.*

1 = iso

3 = identified-organization

6 = dod

1 = internet

4 = private

1 = enterprises

2 = ibm

6 = ibmProd

211 = ibmVSE

z/VSE V4.3 – SNMP Monitoring Agent support

§ **Standard SNMP based monitoring tools can be used to collect, display and analyze z/VSE performance monitoring data**

  – e.g. ITM (IBM Tivoli Monitoring), Velocity monitoring, Nagios (www.nagios.org)

§ **z/VSE SNMP Trap client**

  – Sends SNMP V1 traps to inform one or more monitoring stations or servers about important events

  – For example:

    • The end of a job stream is reached.

    • An error has occurred during a job stream
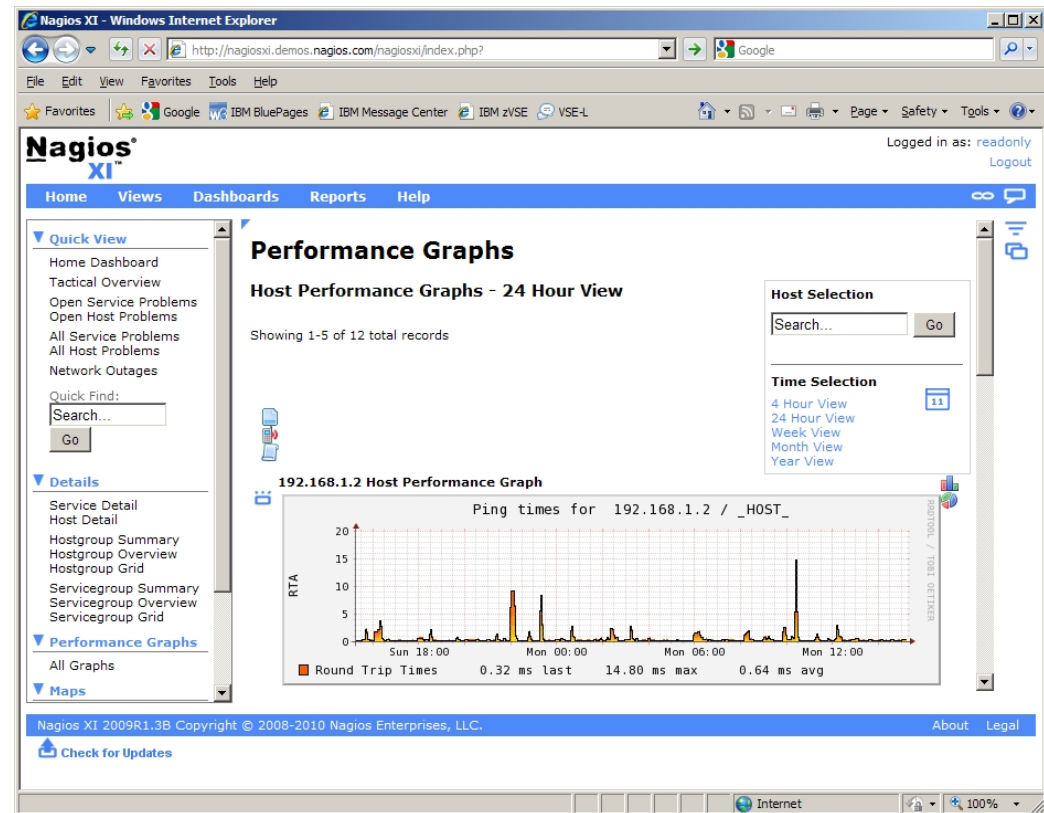
z/VSE V4.3 – SNMP Monitoring Agent support - Setup

To setup the z/VSE Monitoring Agent you have to do the following steps:

1. **Create the configuration files**
   - Use skeletons IESMASCF and SKMASCFG (ICCF library 59) to create the z/VSE Monitoring Agent configuration file
   - If you want to use the System Plugin, use the skeletons IESMPSCF and SKMPSCFG (ICCF library 59) to create the System Plugin configuration file

2. **Create the startup job**
   - Use skeletons SKSTMAS (ICCF library 59) to create a z/VSE Monitoring Agent startup job

3. **Download the MIB** (IESMPMIB.Z in PRD1.BASE) from your z/VSE system to be able to use it with your SNMP client

1. **Start the z/VSE Monitoring Agent** (using the startup job), e.g. R RDR,STARTMAS

z/VSE V4.3 – SNMP Monitoring Agent support – Setup

Monitoring Agent configuration file:

```
* ********************************************* *
* CONFIG FILE FOR z/VSE SNMP MONITORING AGENT    *
* ********************************************* *
* SNMP COMMUNITY NAME:
COMMUNITYNAME = 'public'
* PORT (default SNMP Port 161):
PORT = '161'
* SYSTEM PLUGIN
PLUGIN = 'IESMPSYS'
PARM = 'DD:PRD2.CONFIG(IESMPSCF.Z)'
* CPU PLUGIN
PLUGIN = 'IESMPCPU'
* SAMPLE PLUGIN
* THE SAMPLE PLUGIN IS SHIPED AS SOURCE CODE, YOU
* HAVE TO COMPILE IT, IF YOU WANT TO USE IT
* PLUGIN = 'IESMPSMP'
```

COMMUNITYNAME must match on client and server

Location of the System Plugin config file

„*" is used for comments

z/VSE V4.3 – SNMP Monitoring Agent support – Setup

System Plugin configuration file:

```
* ******************************************** *
* CONFIG FILE FOR MONITORING PLUGIN IESMPSYS   *
* ******************************************** *
* ENTER CONTACT INFORMATION AND LOCATION HERE
CONTACT = 'Joe Tester'
LOCATION = 'Colorado'
* THE SYSTEM NAME AND DESCRIPTION ARE OPTIONAL
*DESC = 'z/VSE TEST SYSTEM'
*SYSNAME = 'VSETestSystem'
```

Enter your information here

z/VSE V4.3 – SNMP Monitoring Agent support – Setup

Startup job for the Monitoring Agent:

```
* $$ JOB JNM=STARTMAS,DISP=L,CLASS=R
// JOB STARTMAS STARTS THE SNMP MONITORING AGENT
* *********************************************** *
* This Job starts the SNMP MONITORING AGENT.           *
* Please change the ID and the SYSPARM card if necessary *
* *********************************************** *
// ID USER=VCSRV,PWD=VCSRV
// LIBDEF *,SEARCH=(PRD2.CONFIG,PRD1.BASE,PRD2.SCEEBASE)
// OPTION SYSPARM='00'
// EXEC IESMASNM,PARM='DD:PRD2.CONFIG(IESMASCF.Z)'
/*
/&
* $$ EOJ
```

Location of the z/VSE Monitoring Agent Config File

z/VSE V4.3 – SNMP Monitoring Agent support – Usage

Operating Monitoring Agent:

To get status information from the z/VSE Monitoring Agent, enter at the z/VSE console
`msg <jobname>,data=status`

Sample output:
```
AR 0015 1I40I READY
R1 0045 IESMA118I AGENT STATUS:
R1 0045 AGENT VERSION:          0004.3000
R1 0045 CONFIG MEMBER:          DD:PRD2.CONFIG(IESMASCF.Z)
R1 0045 PORT:                   161
R1 0045 COMMUNITY STRING:       public
R1 0045 RECEIVED REQUESTS:      5869313
R1 0045 WRONG COMMUNITY STRING: 0
R1 0045 WRONG SNMP VERSION:     0
R1 0045 ANSWERED REQUESTS:      5869313
R1 0045 IESMM002I MONITORING PLUGIN MANAGER STATUS:
R1 0045 MANAGER VERSION:        0004.3000
R1 0045 INSTALLED PLUGINS:      2
R1 0045 HANDLED OIDS:           34
R1 0045 HANDLED OID GROUPS:     1
```
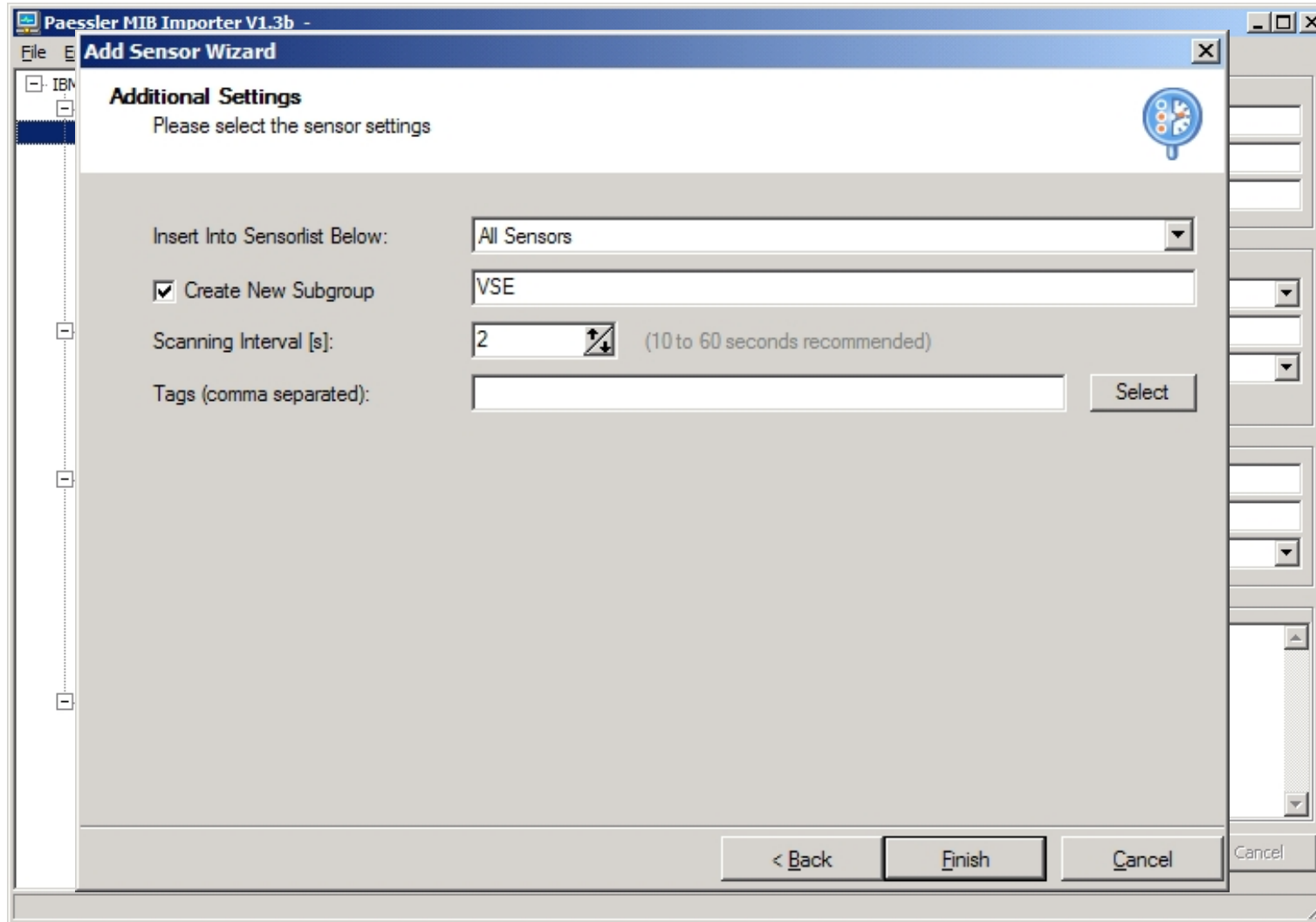
Supported Commands:

HELP	Displays help information
STATUS	Displays the server status
RESETSTAT	Reset statistics
LISTOIDS	List all handled OIDs
LISTOIDSDET	List all handled OIDs (detailed)
LISTPLUGINS	List all active plugins
SHUT	Ends the server
SHUTDOWN	Ends the server

Example: PRTG Traffic Grapher
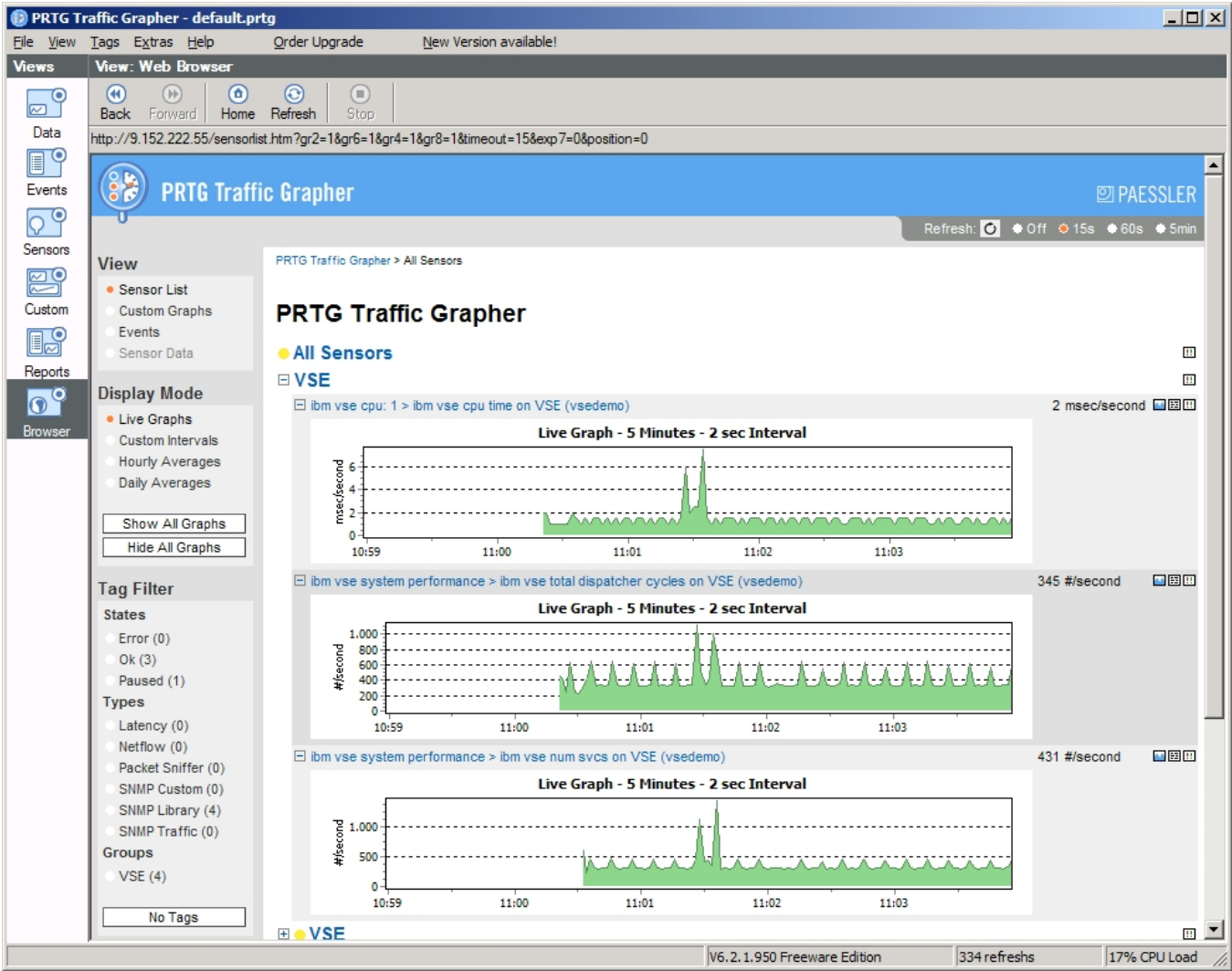
Example: PRTG Traffic Grapher

z/VSE V4.3 – SNMP Monitoring Agent support – Trap Client

Send a Trap (see SKSTTRAP in ICCF library 59):

```
*  **********************************************************
*  SNMP TRAP CLIENT sample
*  You can add one or more destinations.
*  The ADDSYSINF parameter adds system information to
*  trap packet.
*  If you specify the HELP parameter you will find a
*  detailed help and a list of all supported parameters
*  in the job listing.
*  A '*' marks lines as comments
*  **********************************************************
// OPTION SYSPARM='00'
// EXEC IESMTRAP
DEST=192.168.1.55
DEST=myserver1:162
OID=1.2.3.4
MSG=This is a test
ADDSYSINF
/*
```

Trap Details

Trap Type: 6
Specific Type: 0
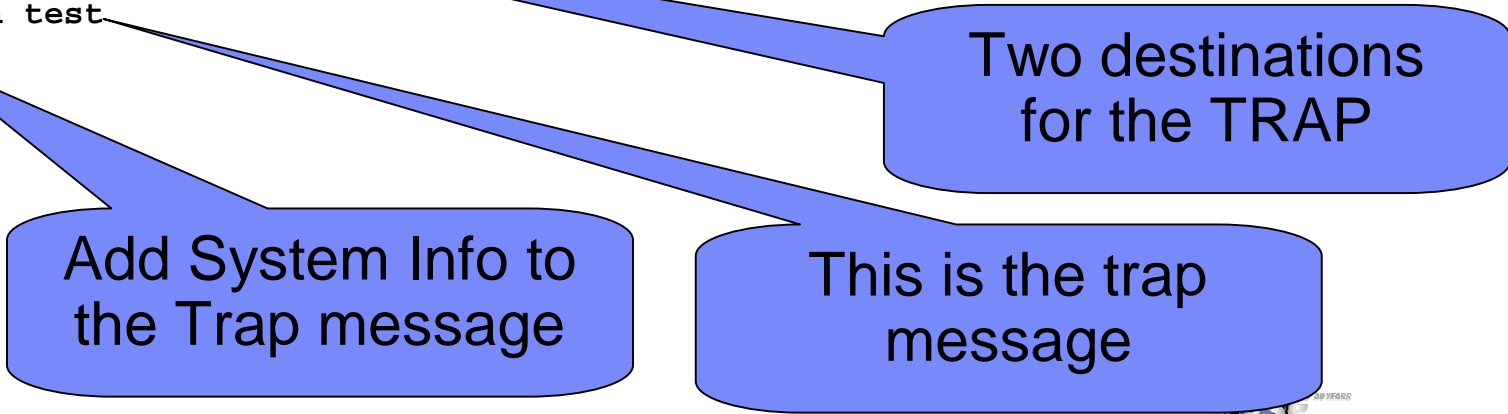Community: public
TimeStamp: 4 days 18h:47m:23.77s
Ip Address: 9.152.84.155
Sender OID: 1.3.6.1.4.1.2.3.116
Trap Type: SNMPv1

Variable Bindings

OID	Type	Value
1.2.3.4	String	This is a test
ibmVseConformanceGroup.16	String	Tue Mar 22 10:02:53 2011
sysDescr	String	z/VSE 4.3.0 ('VSELFP43') running in z/V...

Close   Show Raw   << prev   next >>

Two destinations for the TRAP

Add System Info to the Trap message

This is the trap message

Questions ?