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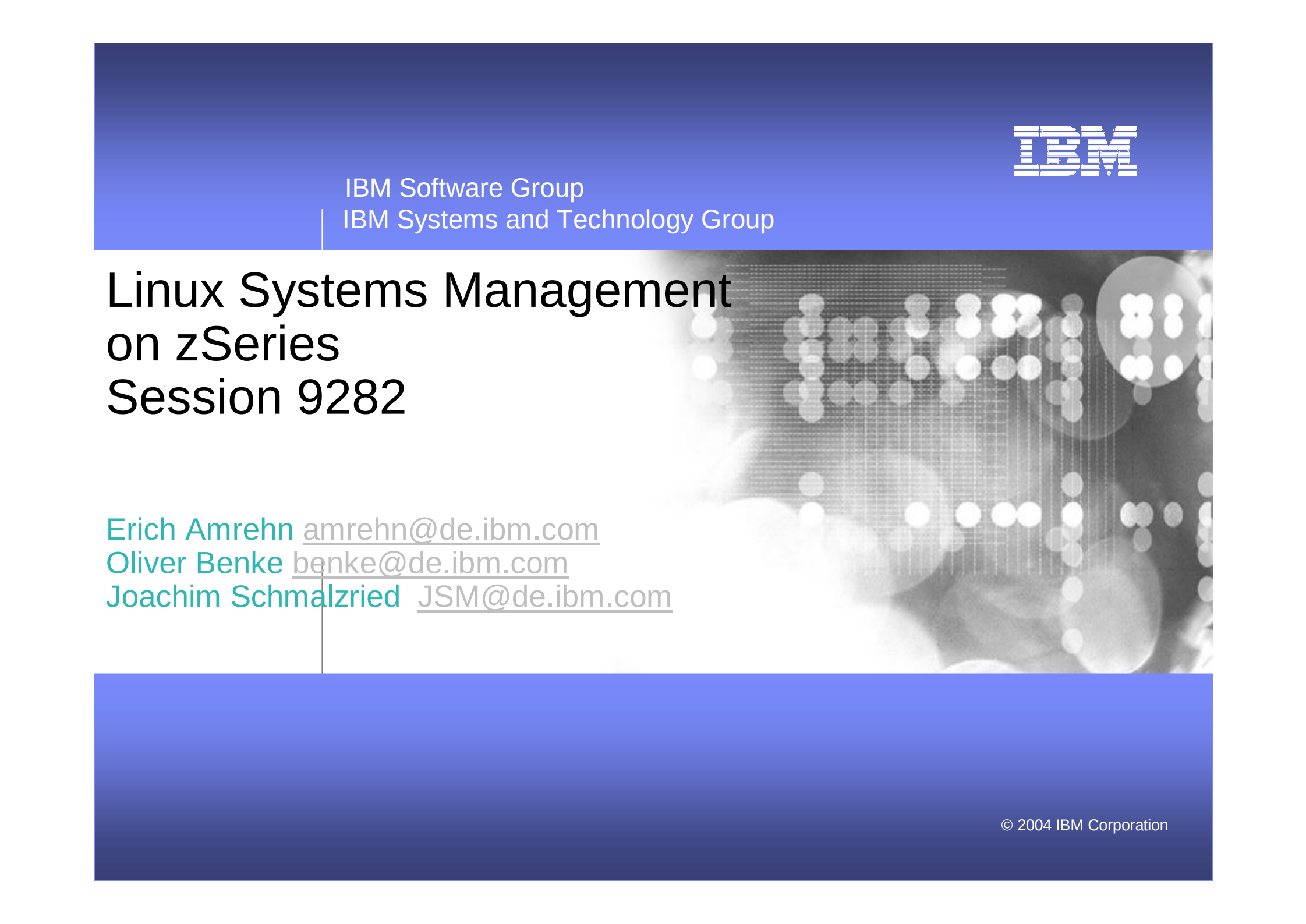

Linux Systems Management on zSeries Session 9282

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Abstracts

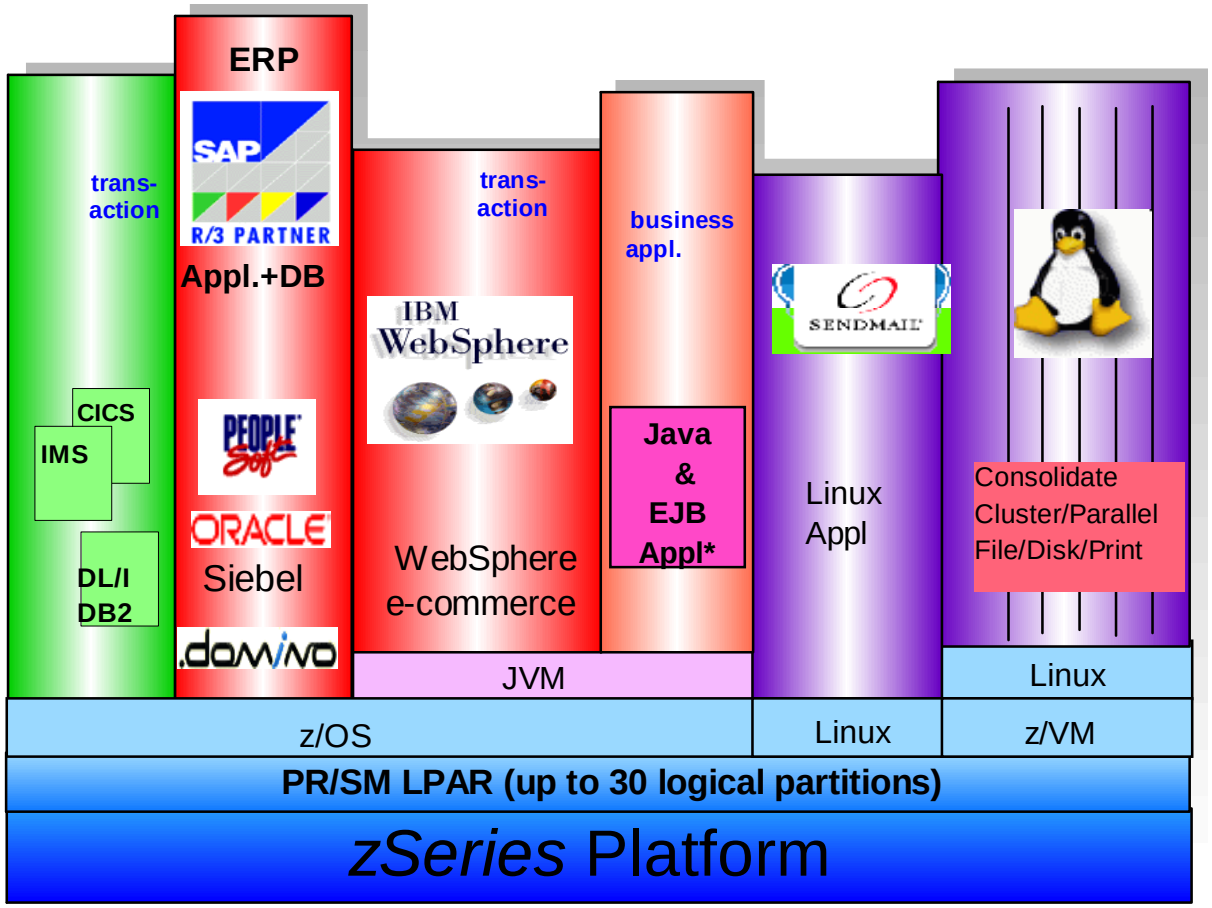
- **Linux Systems Management on zSeries**
  zSeries has unique Linux management capabilities that are integrated into z/VM and z/OS products and tools.
  This session covers:
  - z/VM toolkit and z/OS RMF for Linux performance monitoring with 3270, Java, and browser user interfaces
  - Console automation and Linux boot with Tivoli System Automation for z/OS or z/VM PROP
  - Application High Availability with Tivoli System Automation for Multiplatforms (Scenarios: Apache and mySAP)
  - How to notify TEC about cluster and application state changes and automation and operator actions
  - How to use Tivoli Intelligent Orchestrator and Provisioning Manager to dynamically provision Linux systems running mySAP

Agenda

- Linux Systems Management on zSeries Overview
- Console automation and Linux boot
- Mainframe-like High Availability for Linux
- Linux Disaster Recovery
- Event management
- Performance monitoring
- Orchestration and Provisioning
- z/VM Automation
- Summary
- Client Success Stories
- Information

zSeries : Complexity, Flexibility, Options

New Workloads



*s390.**ibm.com**/products/s390da/applications/guide.html

System Management Considerations

- Skill level of Operators
- Maintaining High Availability
- Integration
- End to End Solutions
  - Same solutions on all platforms
  - z/OS integration

Automation: Linux Support

BSM

- Tivoli Business Systems Manager
- WebSphere Business Integration Family
- Tivoli Service Level Advisor

Security

- IBM Enterprise Identity Mapping
- Tivoli Identity Management Family
- Tivoli Storage Manager Family
- IBM Tivoli Directory Server
- IBM Tivoli Directory Integrator
- Risk Manager
- Privacy Manager
- IBM Tivoli Compliance Manager

Provisioning

- Tivoli Provisioning Manager
- Tivoli Configuration Manger
- Tivoli Identity Manager
- Remote Control
- Workload Schedular

Availability

- Tivoli Monitoring Family
- *Tivoli Enterprise Console*
- *Tivoli Storage Area Network Manager*
- *Tivoli Monitoring for Transaction Performance*
- *Analyzer for Lotus Domino*
- *OMEGAMON for Linux*
- *NetView*
- *Switch Analyzer*

Optimization

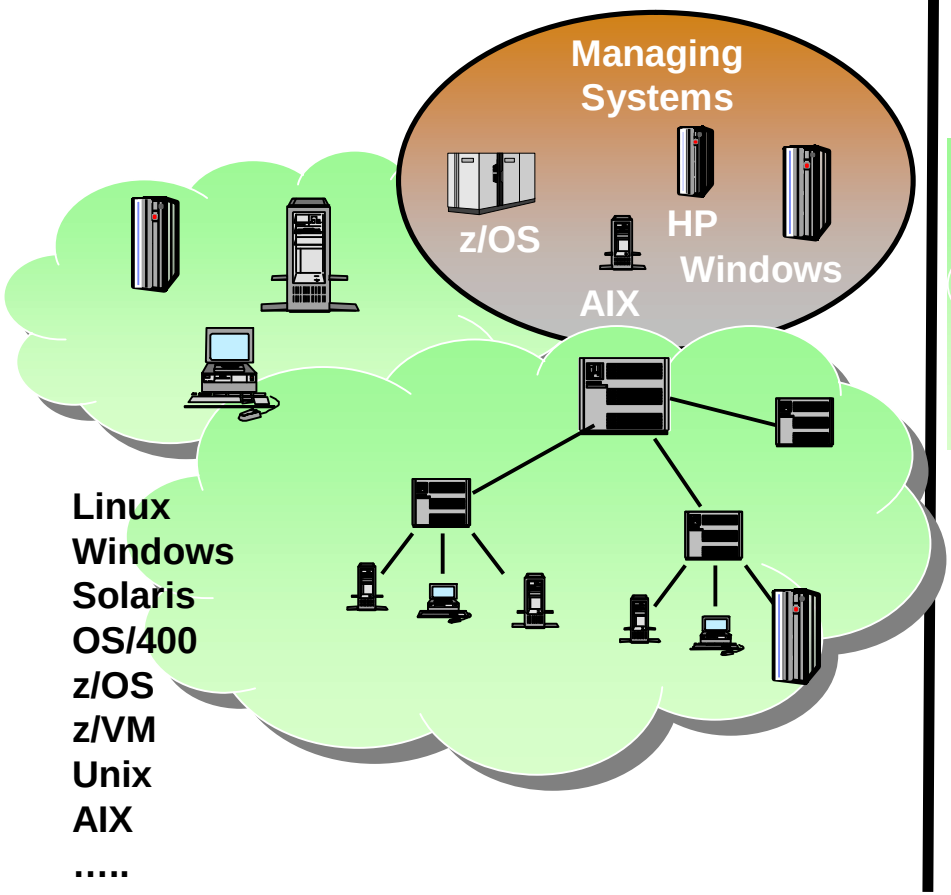
- Tivoli Storage Resource Manager
- Tivoli Decision Support for OS/390
- WEB site Analyzer
- WebSphere Application Server for z/OS
- SANergy
- San Manager
- Storage Manager
- Storage Resource Manager
- System Automation for Multiplatforms

Orchestration

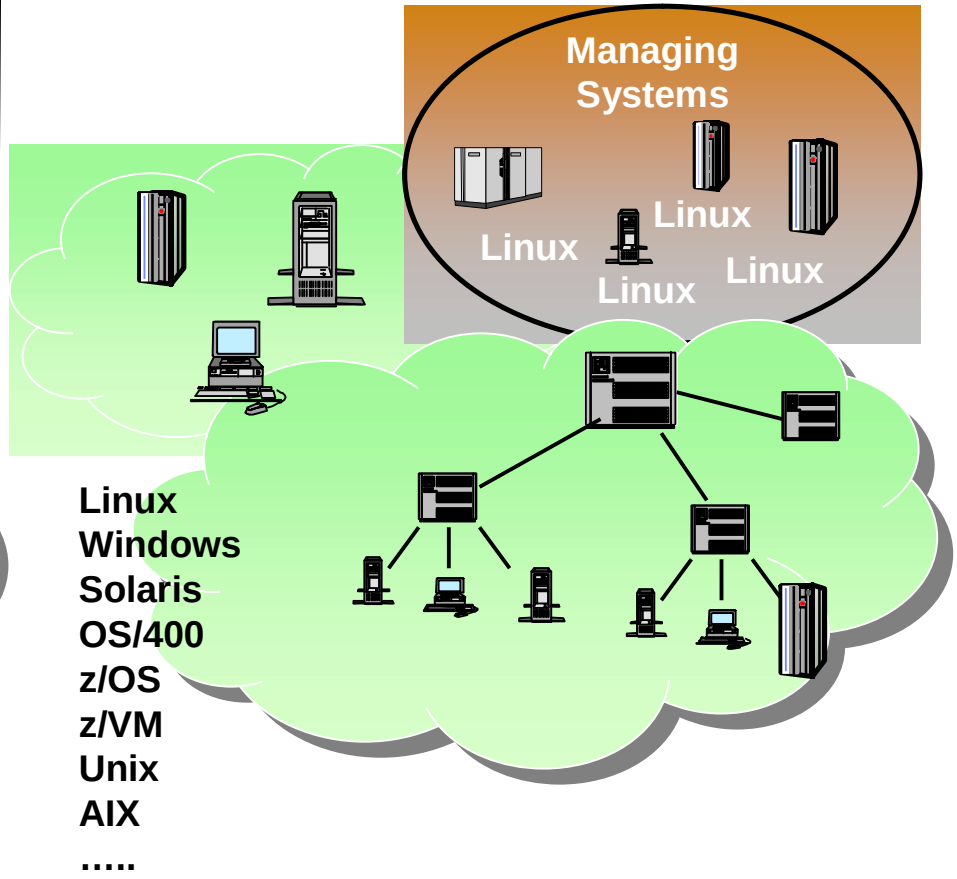
- Tivoli Intelligent ThinkDynamic Orchestrator
- Intelligent Infrastructure Management Offerings
- *IBM Web Infrastructure Orchestration*

Two Sides to Linux Management

Managing Linux as an Endpoint
(Tivoli calls this a client)

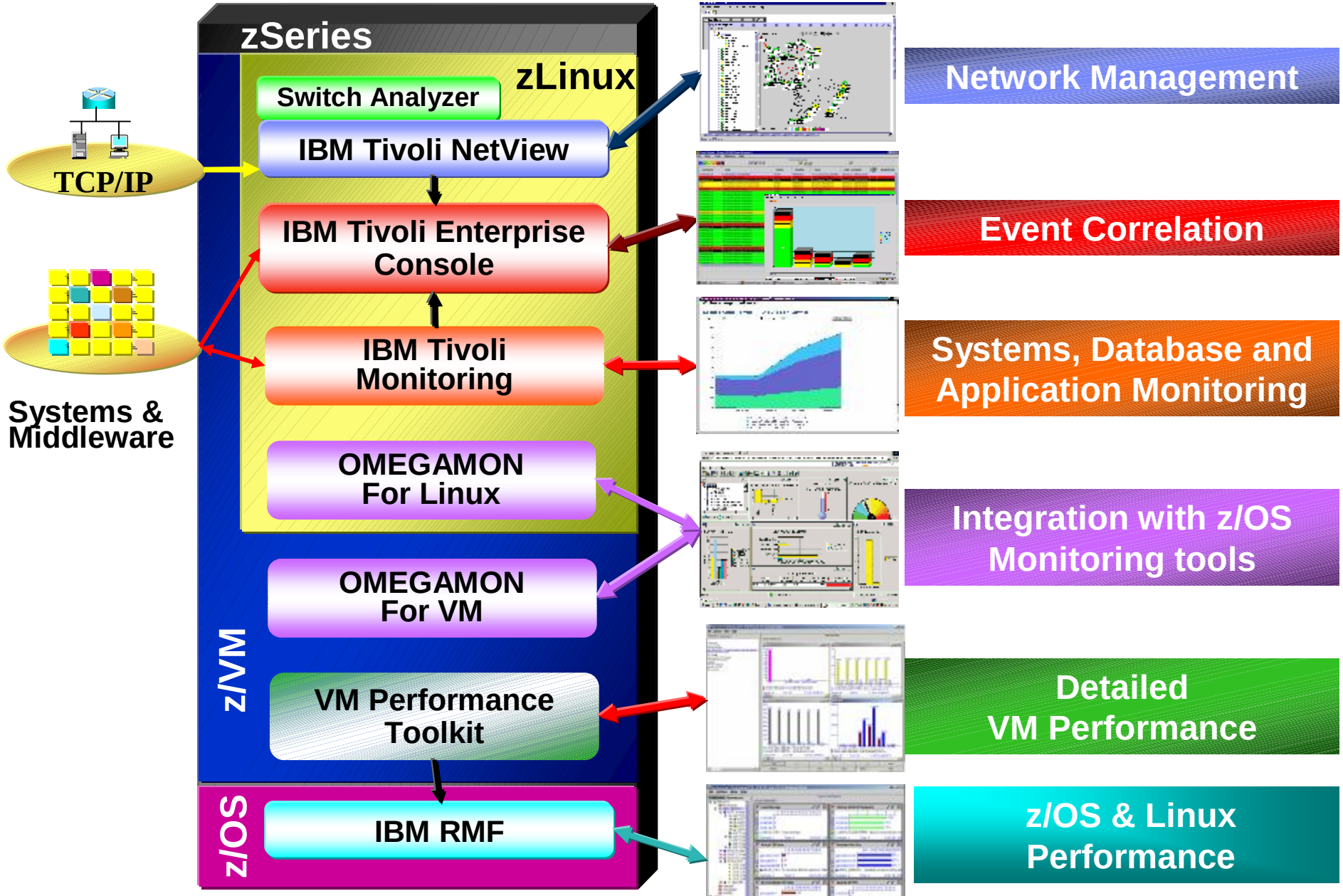


Linux as a Management Platform
(Tivoli calls this a server)

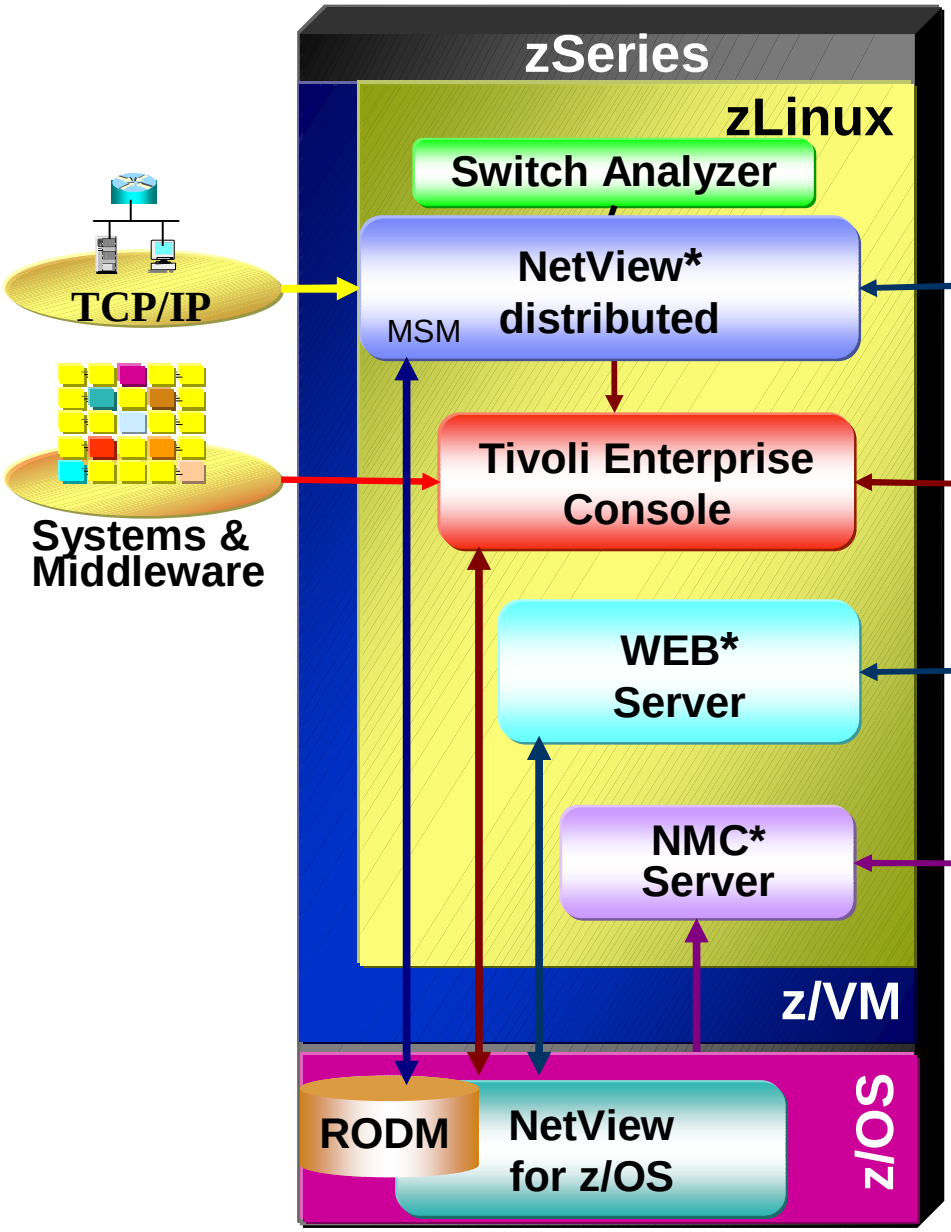


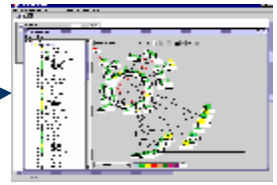
Tivoli Management of Linux on zSeries	Challenges	Value
IBM Tivoli Workload Scheduler[C S]	Multiple job schedulers	One job scheduling for z/OS and Linux Servers
IBM Tivoli Monitoring (ITM) [C S]	Linux system performance problems	Centralized monitoring and control of systems
IBM Tivoli Enterprise Console[C S] **IBM Tivoli NetView**[C S] **Tivoli Infrastructure: Gateway & TMR** [S]	Long problem resolution times and TCP/IP management	Event correlation and TCP/IP management
ITM for Transaction Performance[C S]	Monitoring end user response time	End user web based monitoring
ITM for Business Integration[C S]	Managing WebSphere MQ on Linux	WebSphere MQ end-to-end monitoring
ITM for Web Infrastructure[C S]	Managing WebSphere on Linux	Web applications and servers monitoring
IBM Tivoli Switch Analyzer [S]	Unable to isolate problems to the switch	Isolate problem to switch port/ card/ blade
IBM Tivoli Storage Manager (TSM) [C S] **IBM TSM for SANs**[C] **and for Databases**[C] **(Oracle)**	Long restore times to recover a Linux file	Common storage backup solution end-to-end
IBM Tivoli Configuration Manager[C S]	Long application or patch rollouts	Rollout software fixes and applications from the central site.
IBM Tivoli Access Manager for Operating Systems [CS] **IBM Tivoli Identity Manager**[C]	Complex security concerns for access to a mixed z/OS, OS/390, and Linux environment	Centralized security management for OS/390 host and distributed systems
IBM Tivoli Analyzer for Lotus Domino[C S]	What is health of Domino Server	Performance analysis of Domino Server
ITM for Applications[C]	Unhappy with mySAP.com availability	Full cycle management of mySAP.com
IBM Tivoli Web Site Analyzer[C]	Unhappy with web site performance	Monitor health and effectiveness of Web
IBM Tivoli Risk Manager[C S]	Web Site taken down due to hacker attacks	Intrusion detection against cyber-attacks
IBM Tivoli Access Manager for e-business[C S]	Security concerns about web access to applications	Controlled Web access to key applications
IBM Tivoli Privacy Manager[C S]	Who has access to what?	Enterprise wide security policies
IBM Directory Server[C S]	Lack of comprehensive application directory	LDAP application identity management
IBM Directory Integrator[C S]	Mismatch of security across enterprise	Synchronize security data across enterprise
IBM Tivoli Remote Control [S]	Difficult to reproduce customer problems	Remotely controlling problem systems.
IBM Tivoli NetView for z/OS [M]	IT staff with limited distributed tools skills	Issue Linux commands from a z/OS tool
IBM Tivoli System Automation for Multiplatforms [S]	Maintaining high availability	Automatically recover server outages
IBM Tivoli Intelligent ThinkDynamic Orchestrator[C] **IBM Tivoli Provisioning Manager**[C]	Unable to respond to changing demand on Servers and Network resources	Automatically add capacity, on demand
IBM Tivoli Business Systems Manager [M]	Unable to qualify impact of any problem.	Quick root cause discovery
IBM Tivoli Service Level Advisor [S]	Unable to measure service levels	Predict when service levels will be
IBM Performance toolkit for VM [S]	What if Linux is running on zVM, how do I manage that environment?	Use IBM supported zVM management tools http://www.vm.ibm.com/perf/perfprod.html

IBM Monitoring of Linux on zSeries

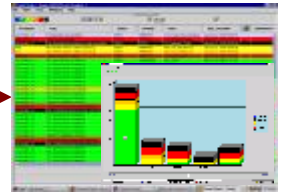


NetView for z/OS Leverages Linux on the zSeries





NetView Distributed Console (Integrated TCP/IP Services)



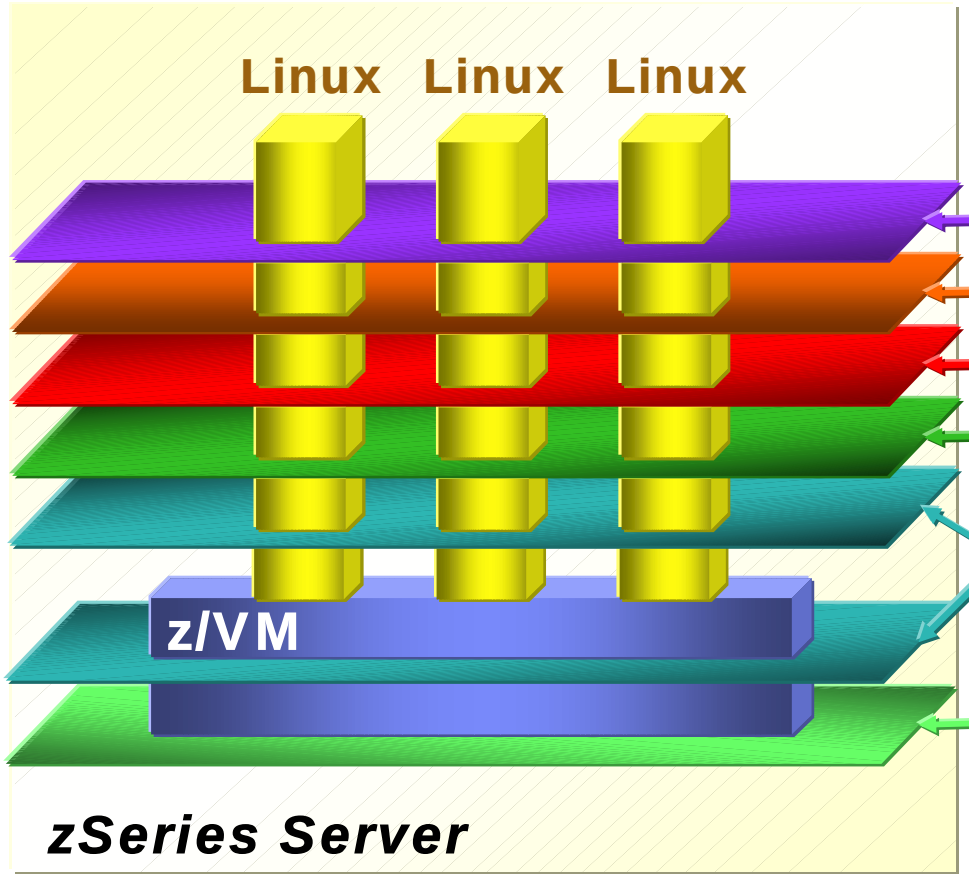
Tivoli Enterprise Console (Correlate Events)

NetView for z/OS Web Console (Thin client)

NetView Management Console (Java Client for Topology)

* Included with NetView for z/OS

IBM Automation of Linux on zSeries Environment



IBM Tivoli Provisioning and Orchestration

IBM Tivoli Enterprise Console

IBM Tivoli Monitoring

IBM Tivoli SA for Multiplatforms

IBM Tivoli System Automation for z/OS
IBM Tivoli NetView for z/OS

z/VM Built-in Tools

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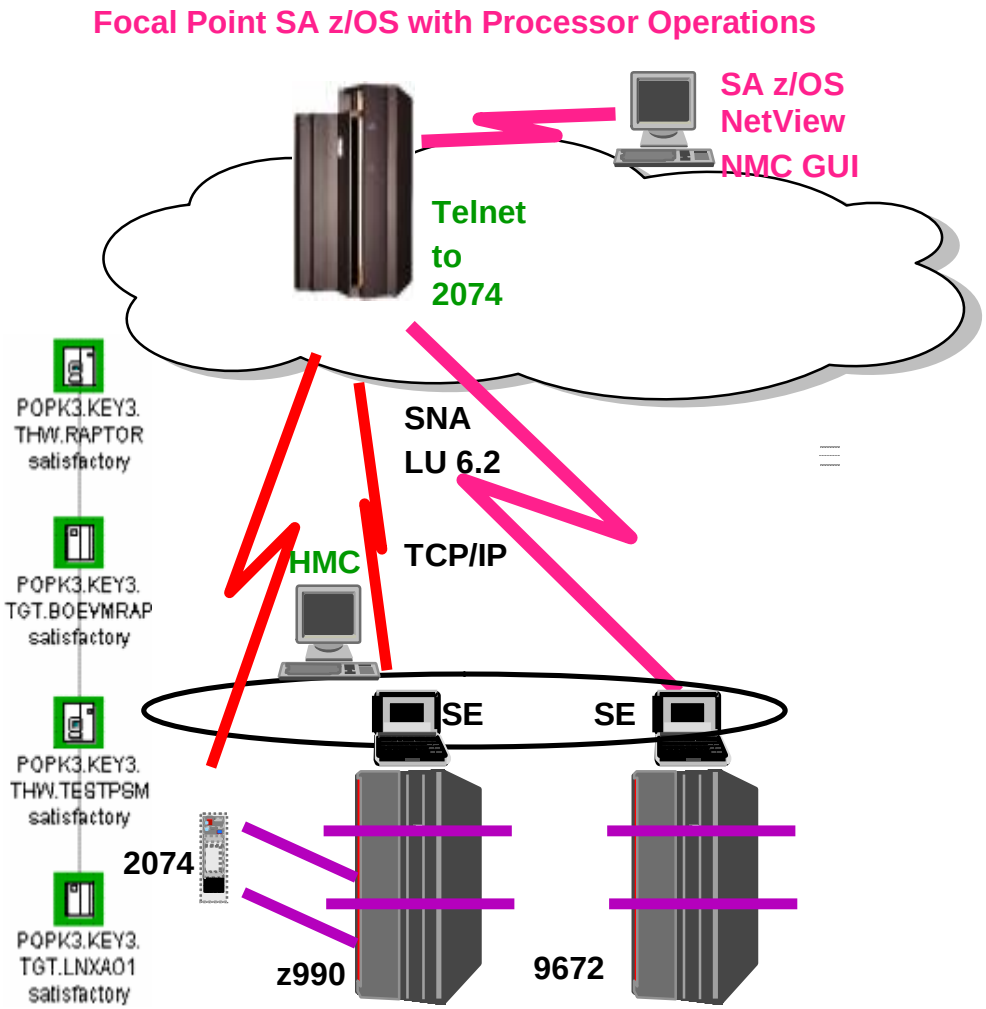
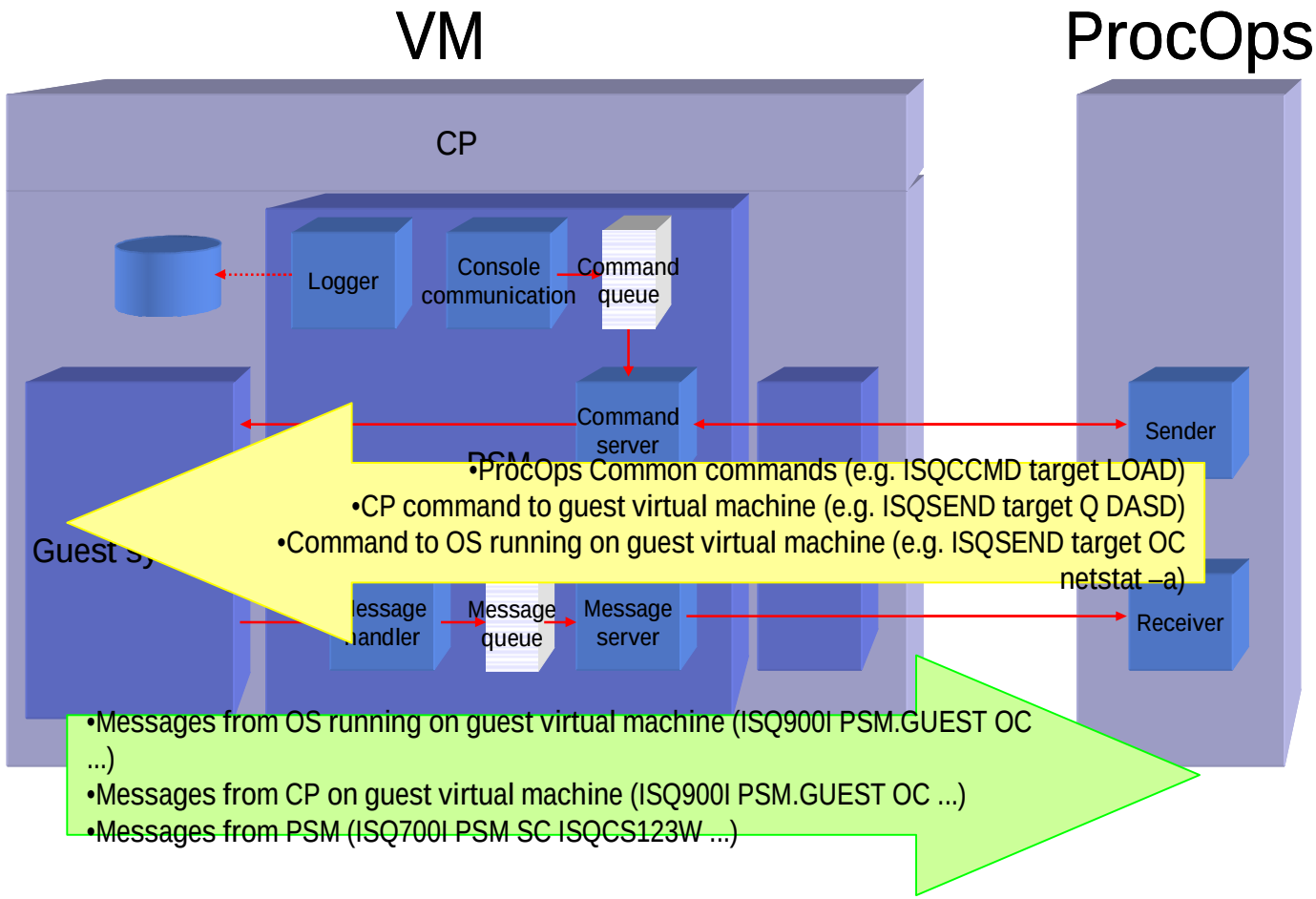
Console automation and Linux boot

z/VM & Linux console automation and boot



- **External Automation**
  - At IML & IPL/Boot time
  - At runtime (status update)
- **Single Point Of Control**
  - 1 platform
  - For eServer consoles
- **Easy to Configure**
  - by SA customization dialog
- **Ease of Use**
  - Common commands for all supported hardware and OS: z/OS, **Linux**, z/VM, OS/390, VSE, TPF

Architecture



Common Commands

- **ACTIVATE** CP XAUTOLOG
- **CBU** not supported for guest systems
- **DEACTIVATE** CP FORCE
- **EXTINT** CP EXTERNAL KEY
- **LOAD** CP IPL
- **RESTART** CP SYSTEM RESTART
- **START** CP BEGIN
- **STOP** CP STOP
- **SYSRESET** CP SYSTEM RESET / SYSTEM CLEAR

Simplified!

Entering Commands to a Guest System

- Enter a command to guest operating system

```
ISQSEND LINUX02  OC  ps -ef
```

- Enter a command to CP on guest machine

```
ISQSEND MVS2   SC   DISPLAY PSW
```

Message Traffic from Guest Systems

- Message from guest machine operating system

```
ISQ900I  PSM1. LINUX02 OC   Linux version 2.4.21-75-default
(root@s390z06) (gcc version 3.2.2) #1 SMP Fri Oct 31 20:01:22 UTC
2003
```

- Message from CP on the virtual machine

```
ISQ900I PSM1.MVS2  OC  HCPGSP2627I The virtual machine is placed in
CP mode due to a SIGP initial CPU reset from CPU 00.
```

- Message from the PSM itself

```
ISQ700I PSM1 SC ISQCS0314E Message Handler has failed.
```

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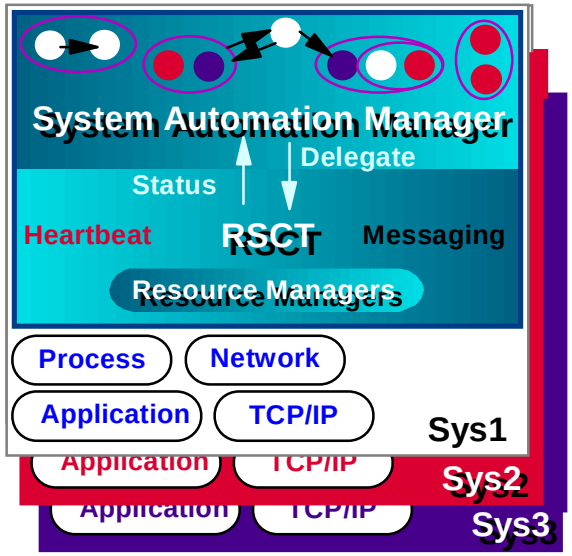
Mainframe-like High Availability for Linux Disaster Recovery

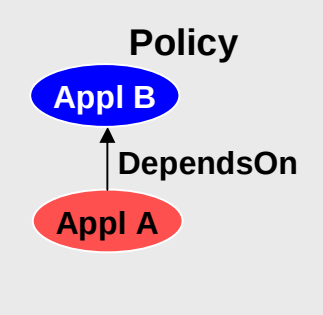
IBM Tivoli System Automation for Multiplatforms provides policy-based application and resource self-healing

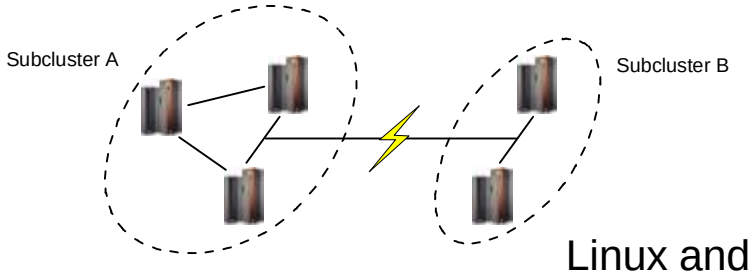


Manages application availability by:

- Fast detection of outage through **monitoring**
- Sophisticated knowledge about **application components** and their **relationships**
- **Quick and consistent recovery** of failed resources and whole applications either in place or on another system in a AIX or Linux cluster
- 64bit Support for zSeries Linux
  - SLES7 & 8
- Support virtual communications when running Linux on zSeries under z/VM
  - HiperSockets, VM Guest LAN, CTC

IBM Tivoli System Automation for Multiplatforms





Linux and AIX

Represent a complex e-business application as a single group consisting of cluster-wide components

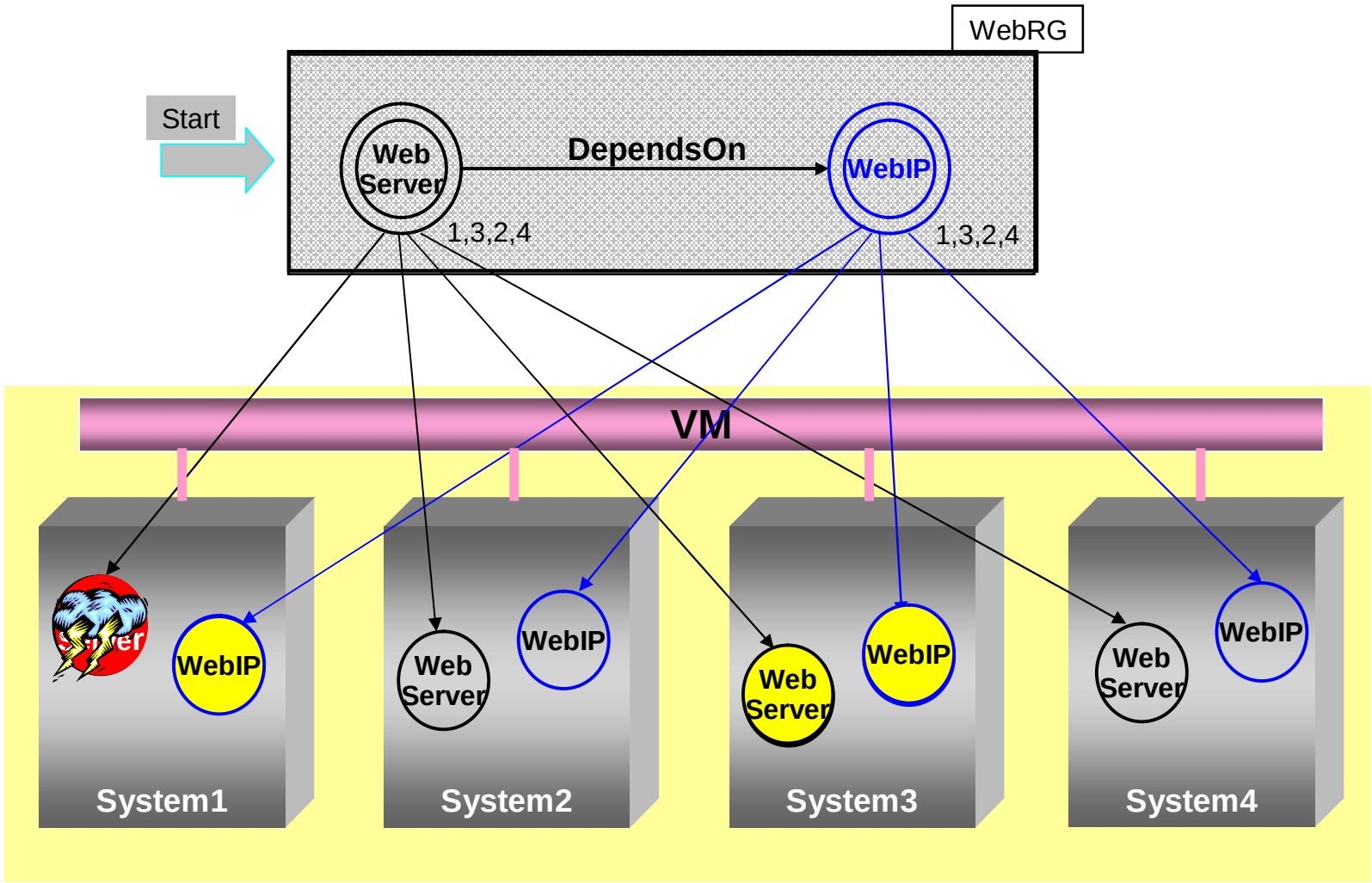
- Simplified Operations
  - Frees operators from remembering:
    - Applications startup order
    - What needs to run where
  - Simple to Start, stop, and monitor
- Reduces operator interventions

§ Policy based automation

§ No programming skills required

§ Is used with xDR for Remote site disaster recovery

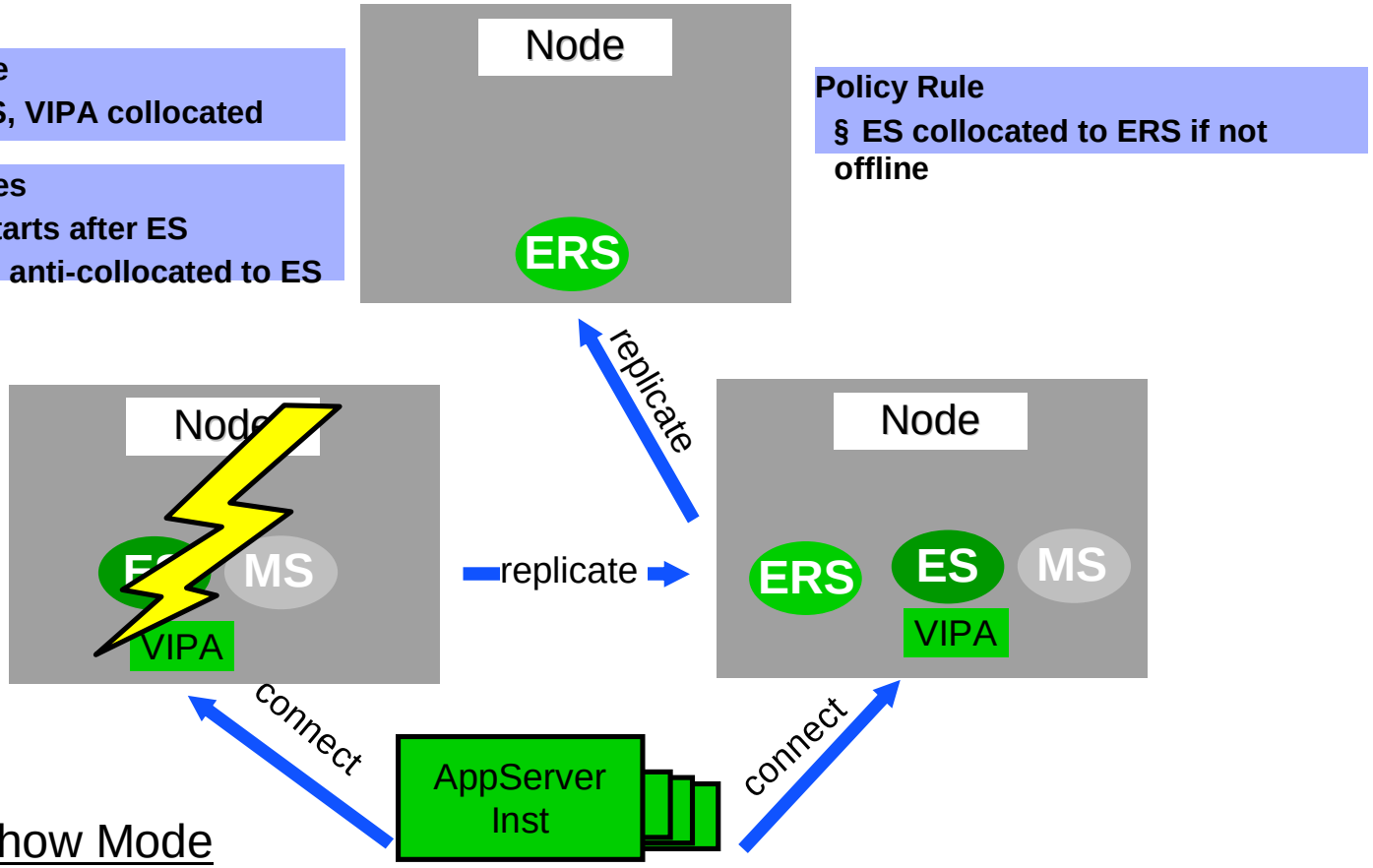
zSeries Scenario: Apache Web Server /ServiceIP



Example: mySAP® Enqueue Server HA

Policy Rule
- §ES, MS, VIPA collocated

Policy Rules
- §ERS starts after ES
- §ERS is anti-collocated to ES



Policy Rule
- § ES collocated to ERS if not offline

Run in Screen Show Mode

RedPaper - mySAP Business Suite Managed by IBM Tivoli System Automation for Linux
http://publib-b.boulder.ibm.com/Redbooks.nsf/9445fa5b416f6e32852569ae006bb65f/f9c4cb60a451c7ed86256d490056eebd?OpenDocument

Disaster Recovery for zSeries Linux

- Industrial Strength DR Solution for Linux for zSeries based on GDPS
  - Enables lower skilled operators to perform DR if specialists unavailable
  - Pretested DR solution with highest probability of success
  - Continous availability through HyperSwap even in DR case
- High customer value for coordinated Linux for zSeries – z/OS DR
  - Coordinated planned and unplanned transparent HyperSwap
    - E.g. because storage subsystems are used by both, Linux for zSeries and z/OS
  - Coordinated site takeover
  - In-place re-IPL of failing operating system images
- xDR for zSeries consists of the following parts:
  - Linux for zSeries: SuSE SLES 8 refresh
  - z/VM V5R1 GA 9/24/2004
  - System Automation for Multiplatforms V1.2
  - Service offering GDPS 3.1 SPE with xDR for zSeries 8 / 2004

GDPS can manage ESS for any platform (z & open)

GDPS: planned site takeover (IPL OS, reconfig DASD)

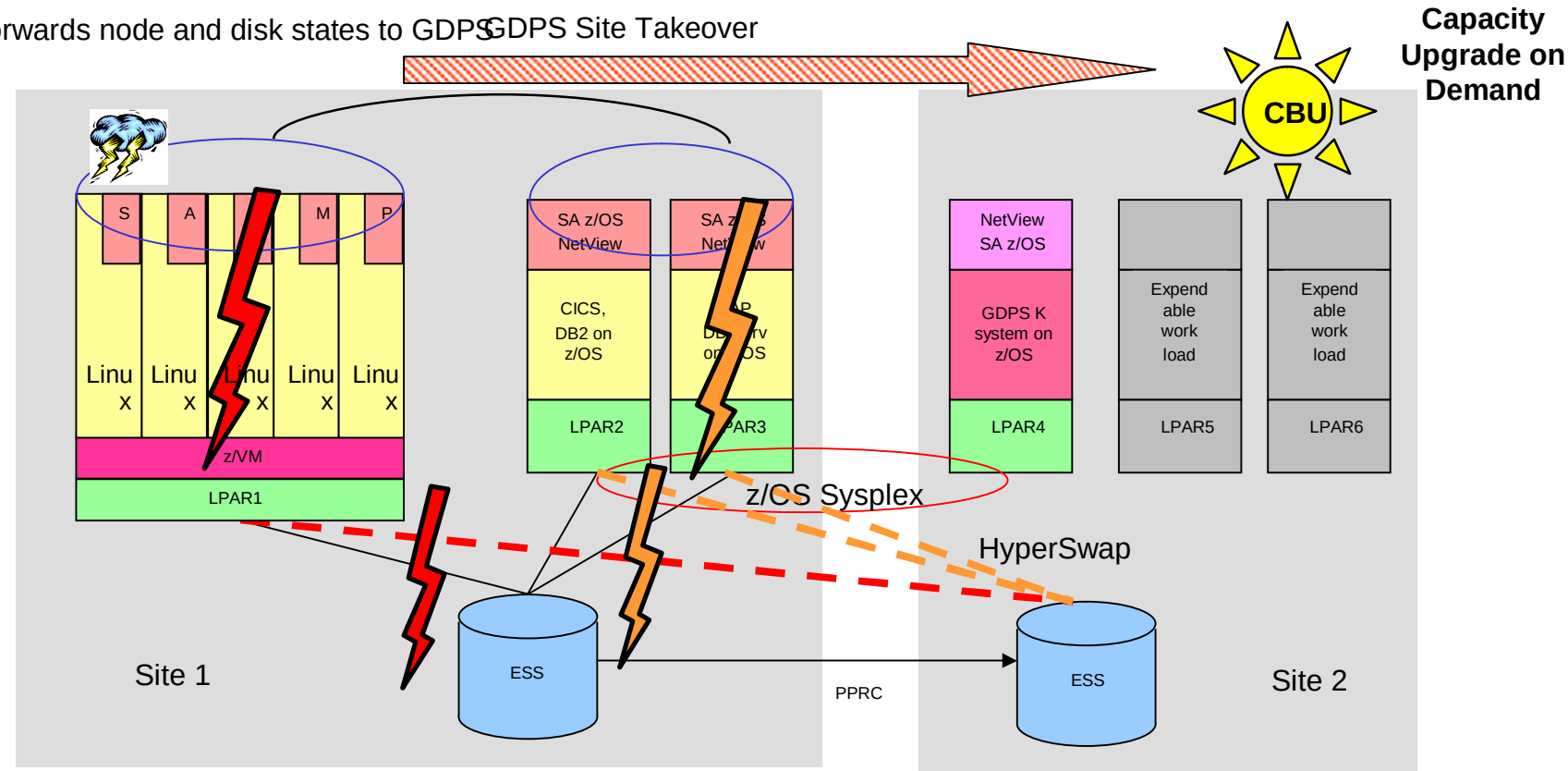
GDPS: unplanned site takeover or re-ipl in place triggered by z/OS

xDR for zSeries: unplanned coordinated site takeover (or re-ipl in place) triggered by Linux for zSeries

xDR for zSeries: planned coordinated HyperSwap

xDR for zSeries: unplanned coordinated HyperSwap or site takeover triggered by Linux for zSeries

SA MP forwards node and disk states to GDPS



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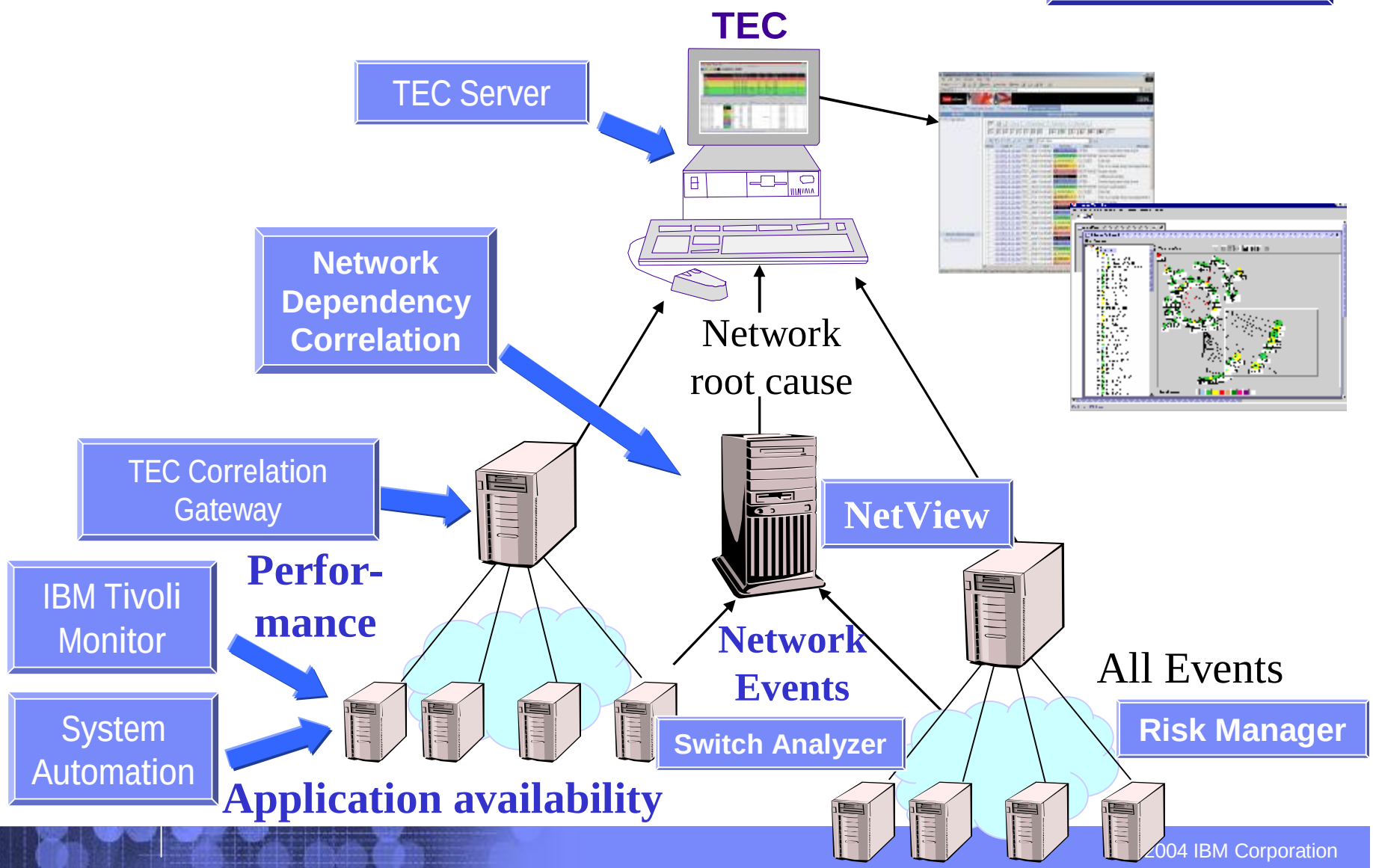
Event management

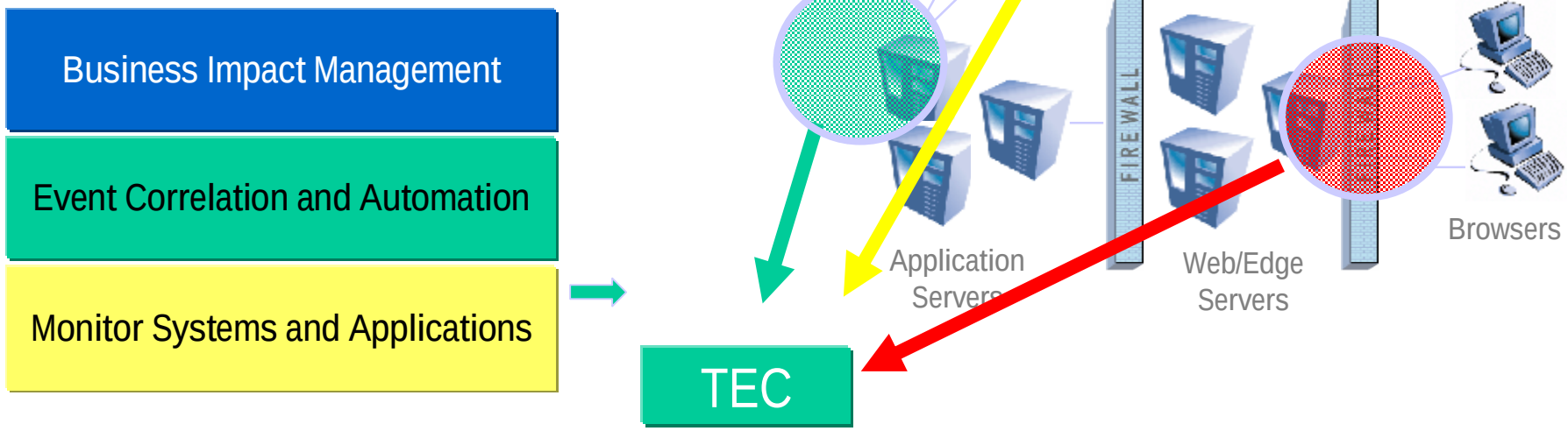
Tivoli Solution for Event Correlation

Tivoli Solution for Root Cause



TEC Event Correlation Focuses on Multiple Resources

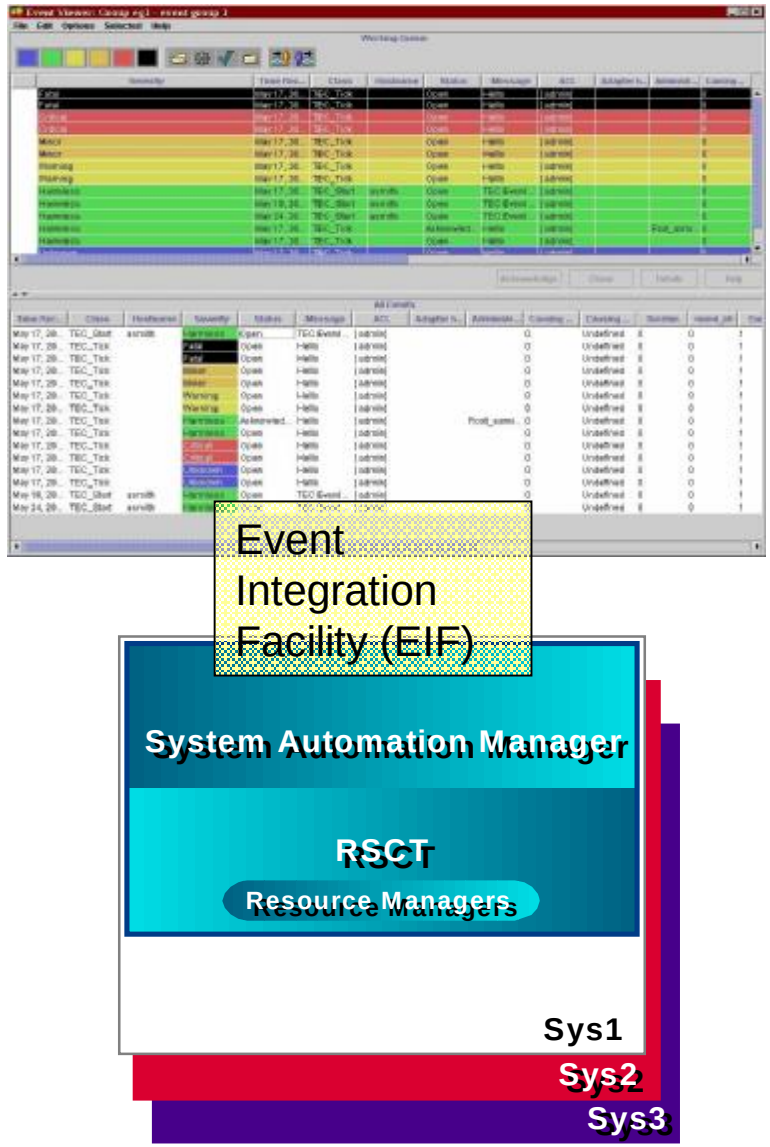
- **Receive and correlate events**
  - From networks and systems and security devices
- **NetView to monitors devices and SNMP Traps**
- **ITM to monitor servers**
- **ITM PACs to monitor applications**
- **TEC Adapters to monitor Servers**
- **Risk Manager to monitor Firewalls and Edge systems**



System Automation TEC Notification

Generation of TEC Events

- Configuration and status changes externalized
  - Resource status change
  - Cluster status change
  - Resource creation/deletion/modification
  - Relationship creation/deletion
  - Request add/cancel
- **Enabling the TEC publisher function**
  - Customize the publisher configuration file and the TEC EIF file
  - samctrl –e P. By default the publisher is disabled.
  - Import,compile,load,and activate the TEC baroc file in the TEC server.



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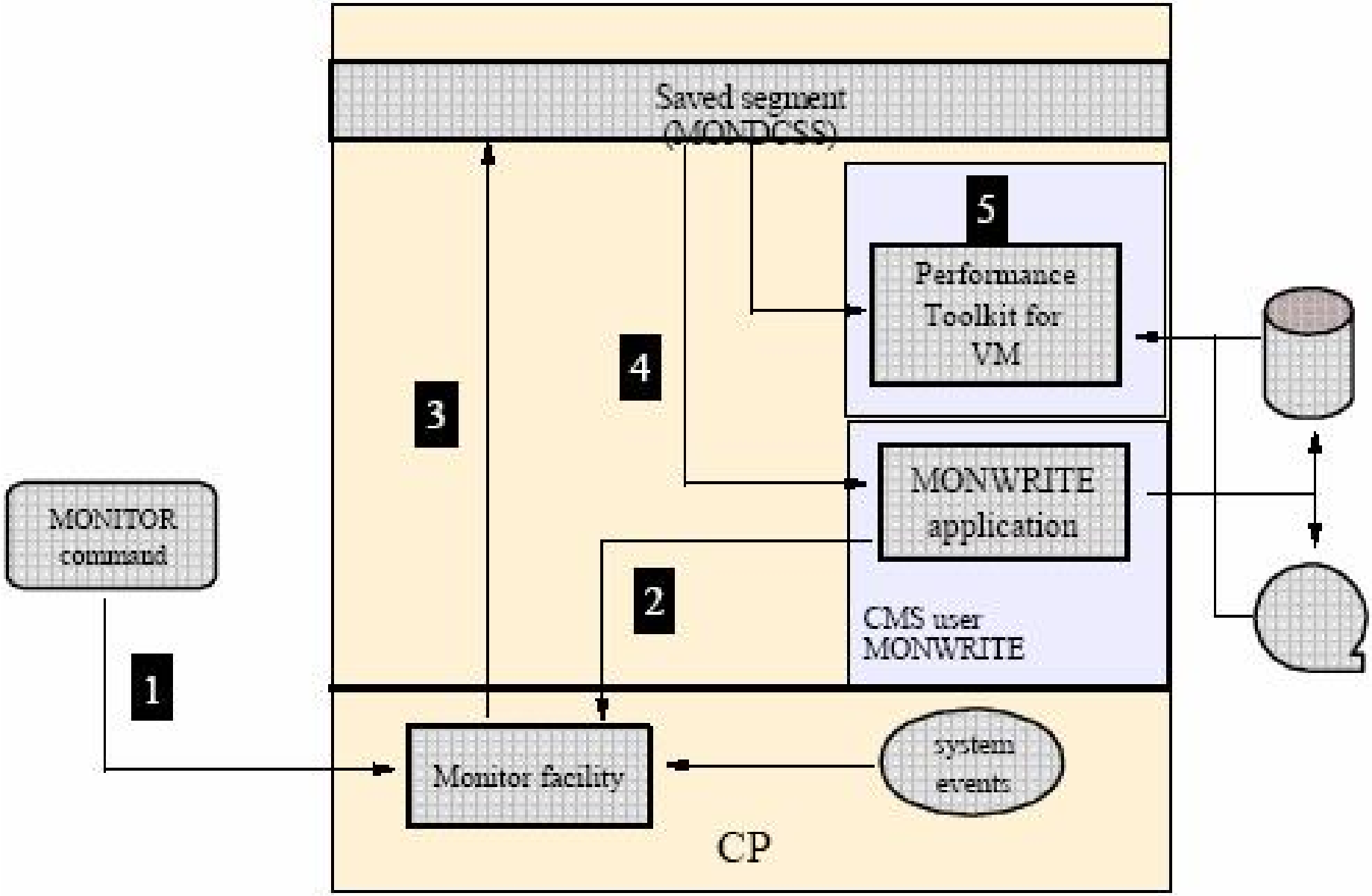
Performance monitoring

z/VM Performance Toolkit
z/OS RMF

z/VM Monitor data collection

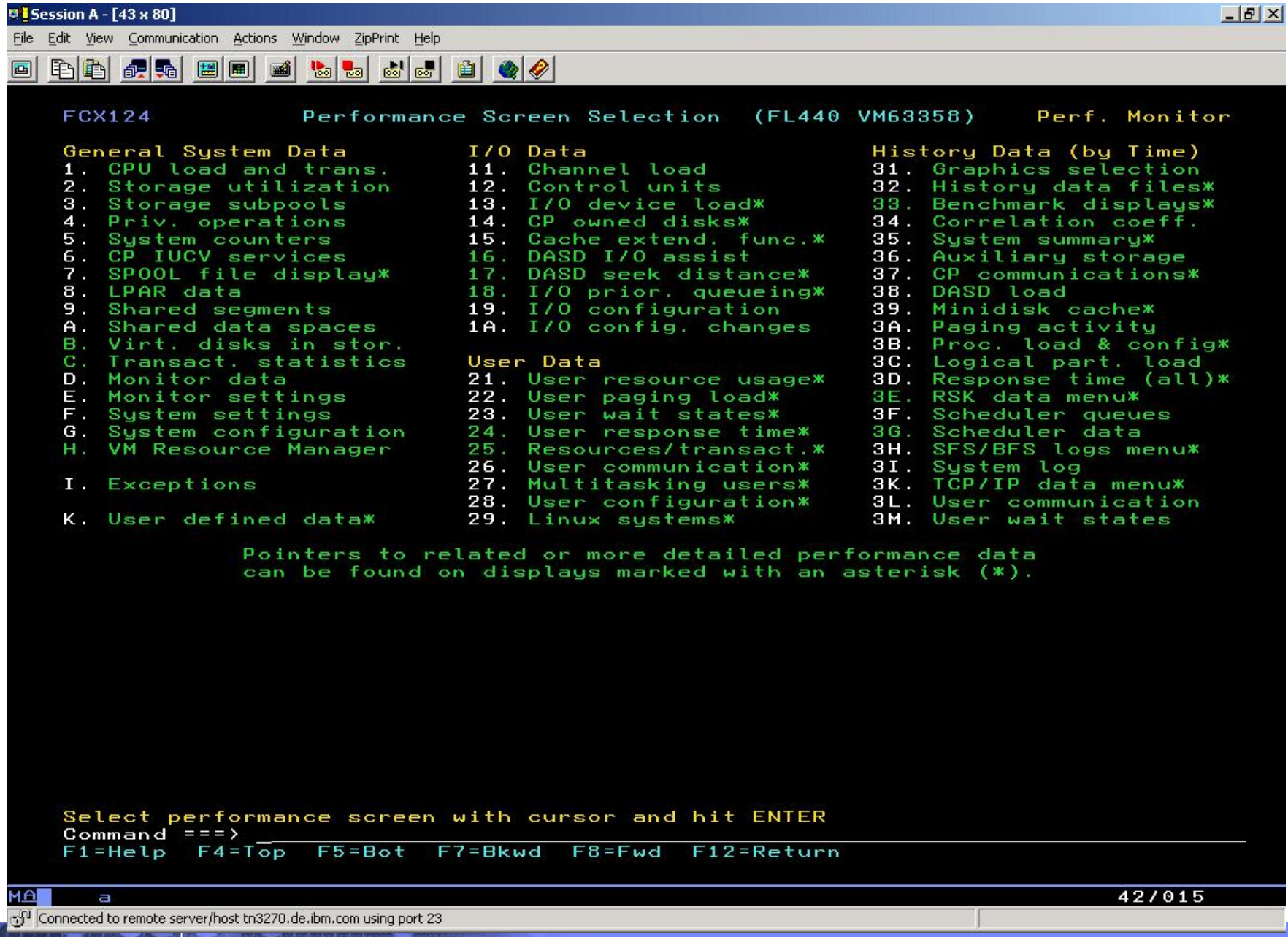


z/VM CP Monitor records

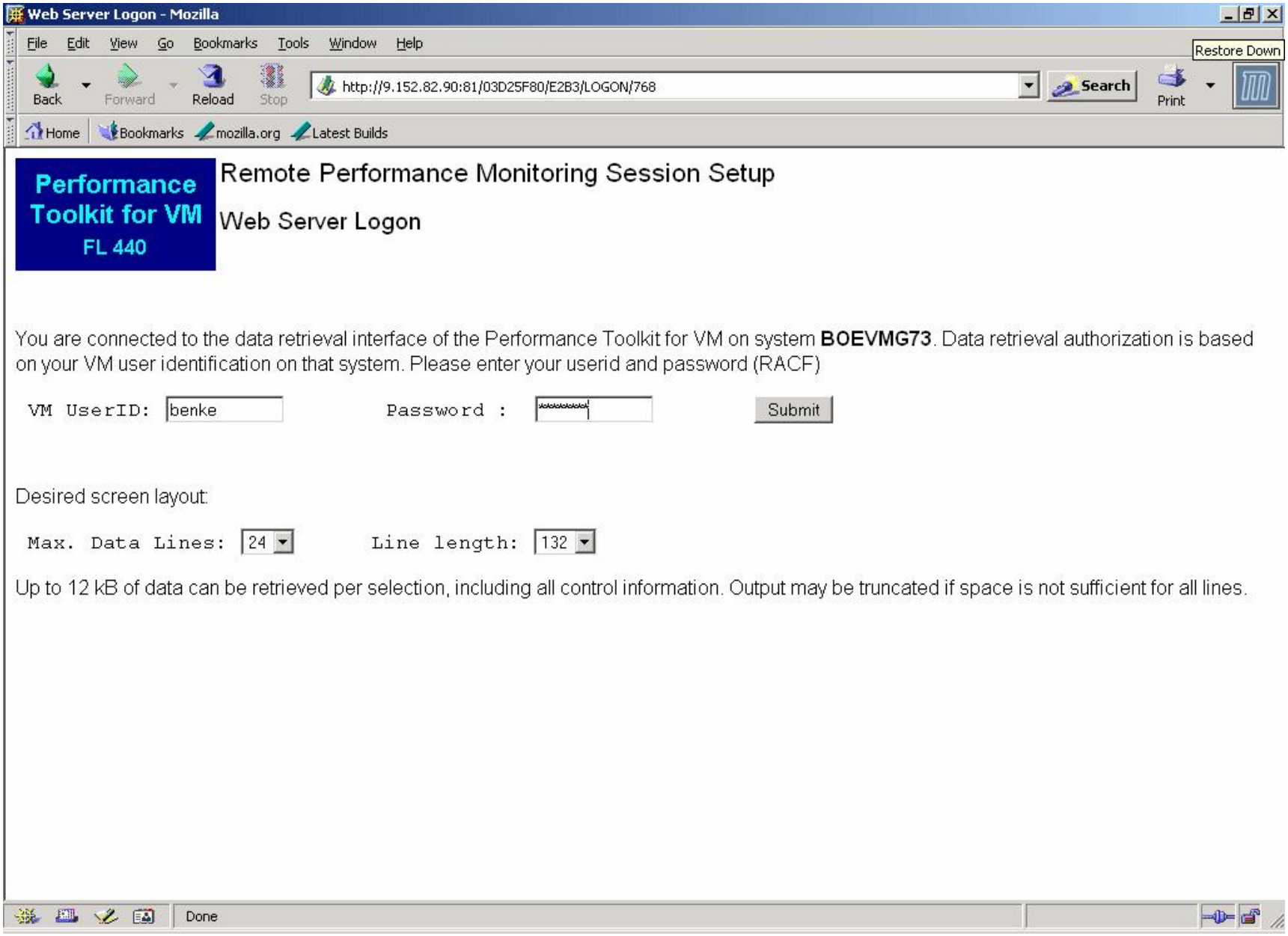
- *MONITOR CP system service writes z/VM Monitor records in MONITOR DCSS shared memory segment
- This data can be externalized by tools like CMS MONWRITE or analyzed by applications like z/VM Performance Toolkit
- The layouts of CP Monitor Records can be found on *http://www.vm.ibm.com/library/* (z/VM Monitor Records)

- Some Linux on zSeries internal performance records integrated as well
  - Using virtual CPU timers, therefore don‘t causing significant overhead on otherwise idle virtual servers

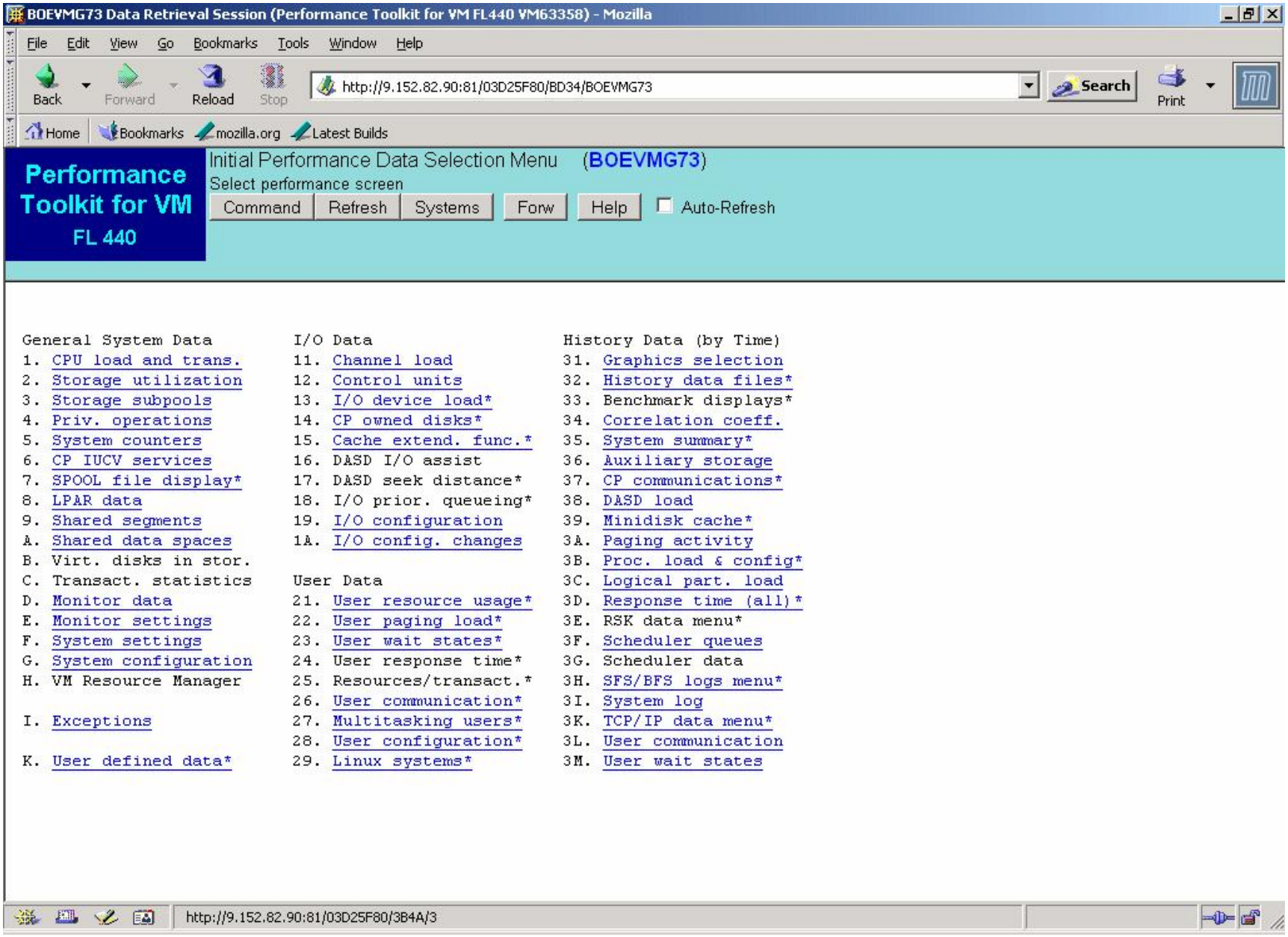
z/VM Performance Toolkit 3270 Startup Screen



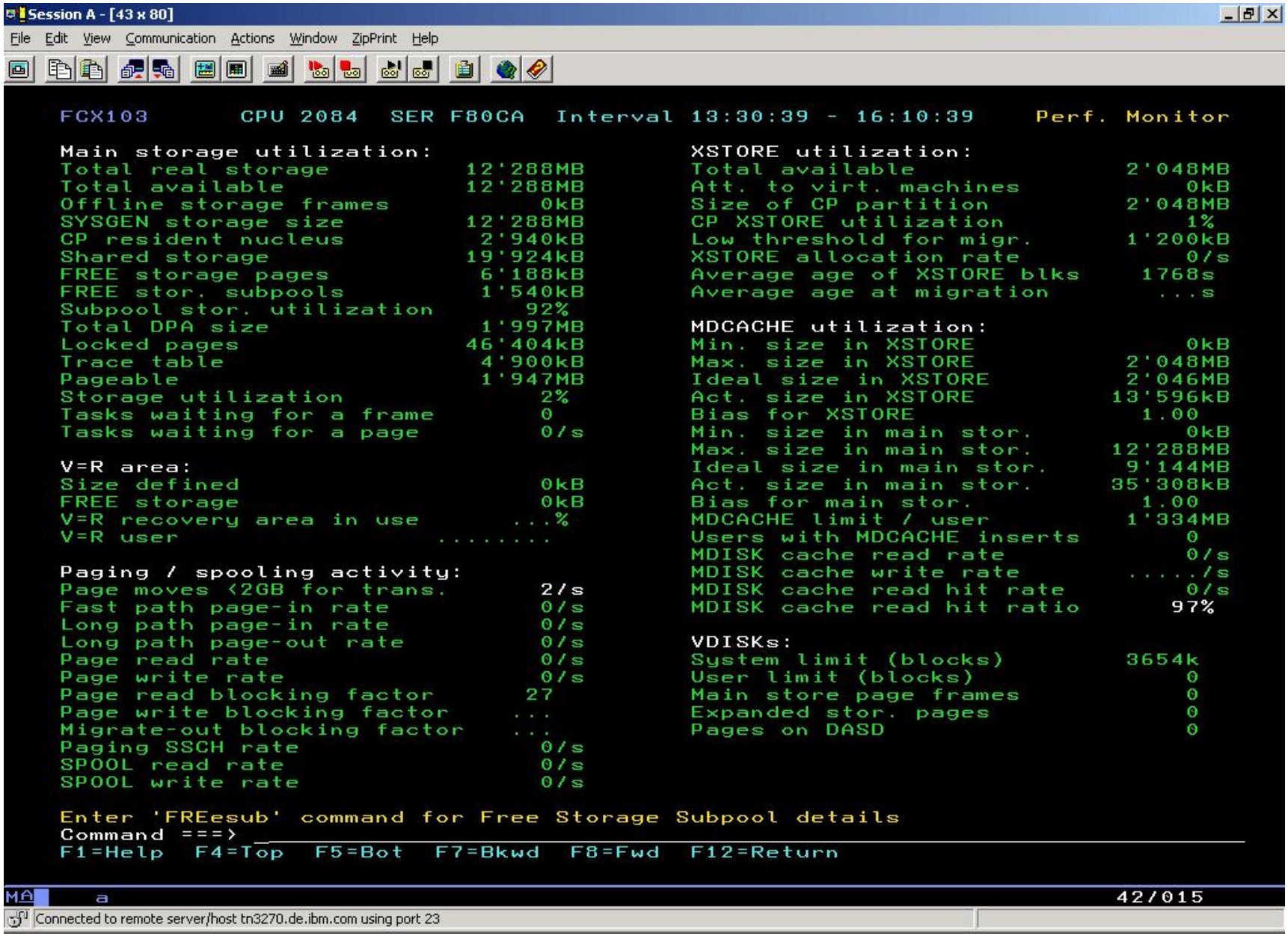
Connect to z/VM PT Web Browser Interface



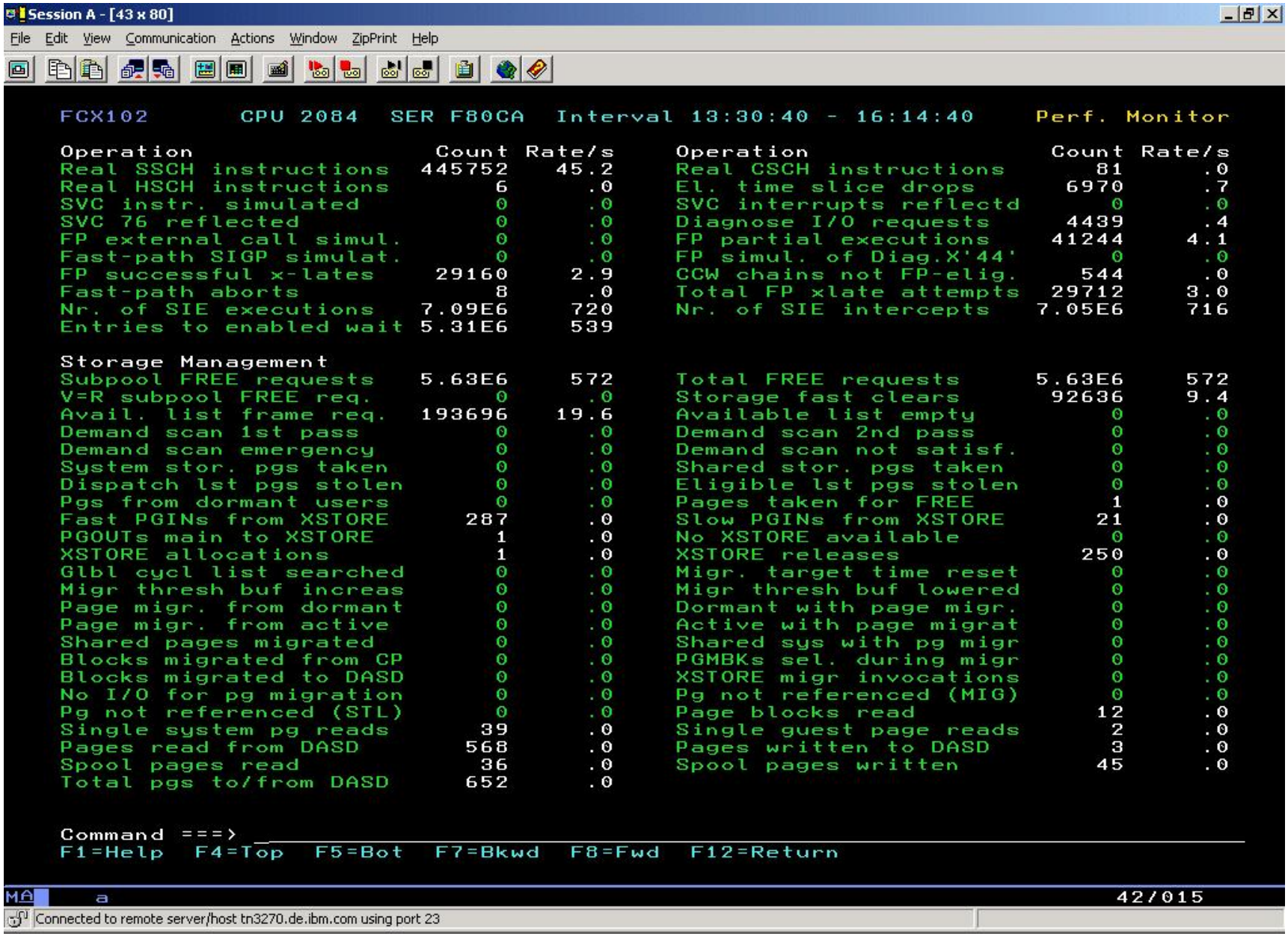
z/VM PT Web Browser Main Menu



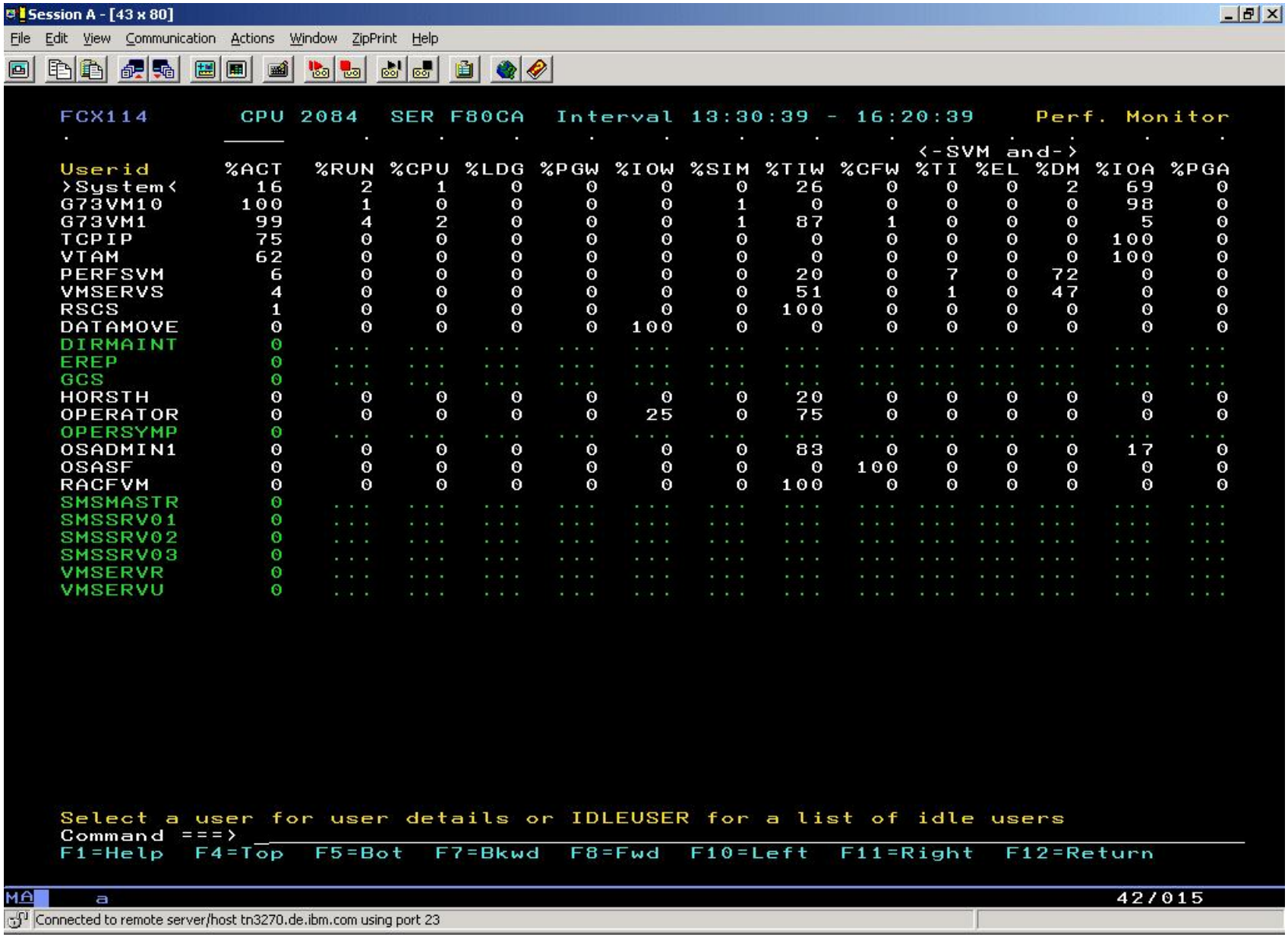
z/VM PT: Storage Utilization



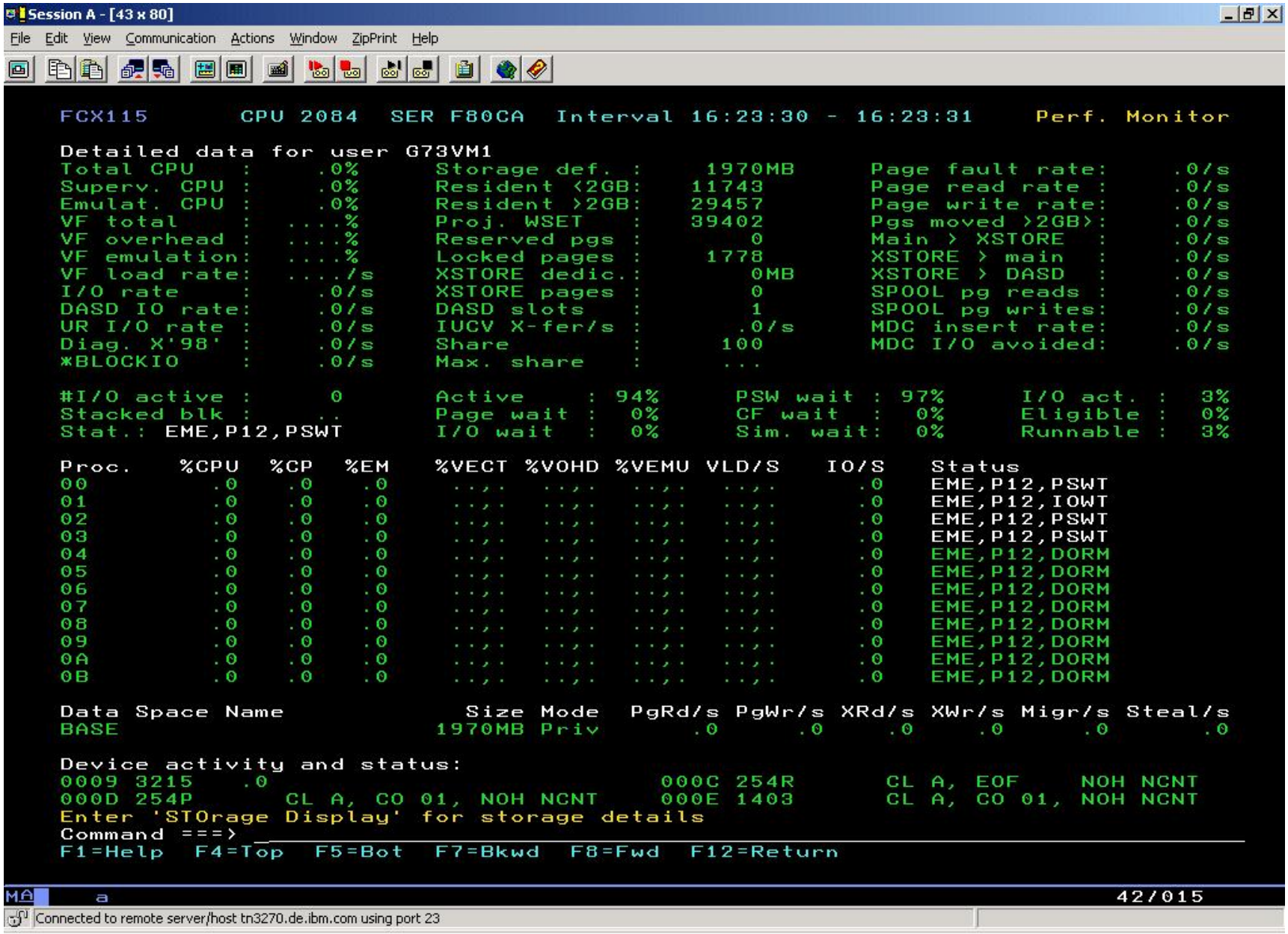
z/VM PT: System Counters



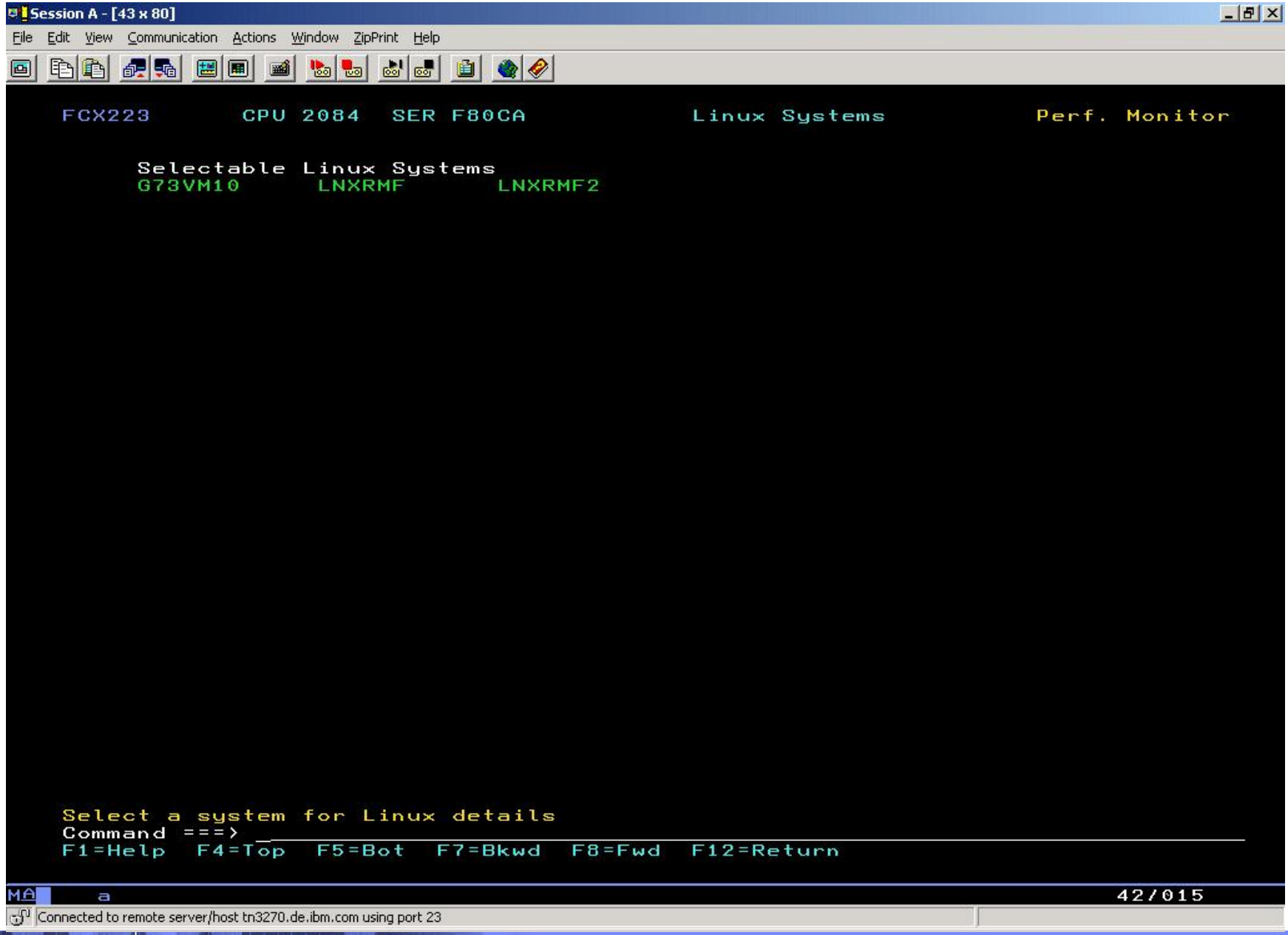
z/VM PT: %using and %delay – like states …



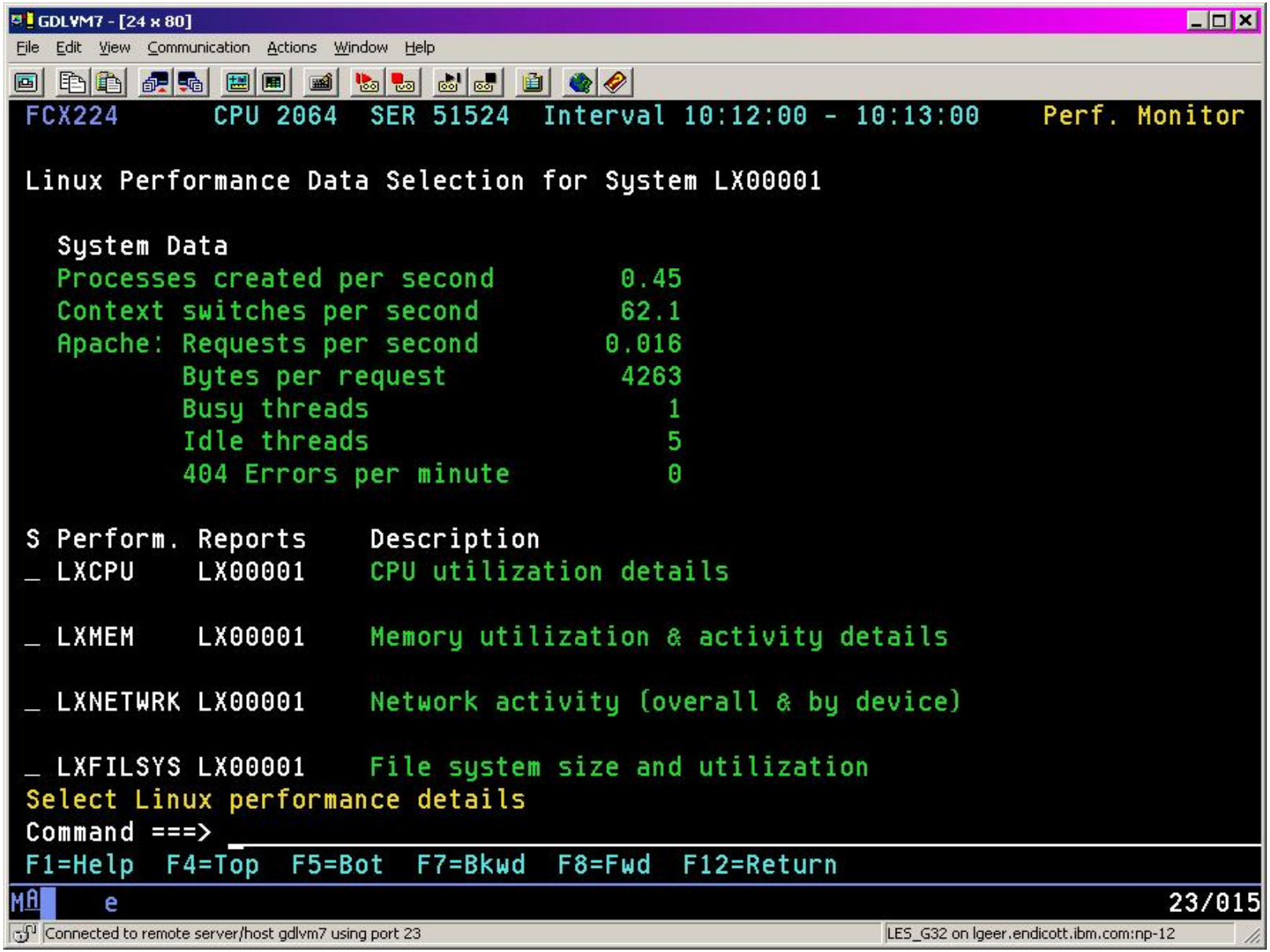
z/VM PT: User Details



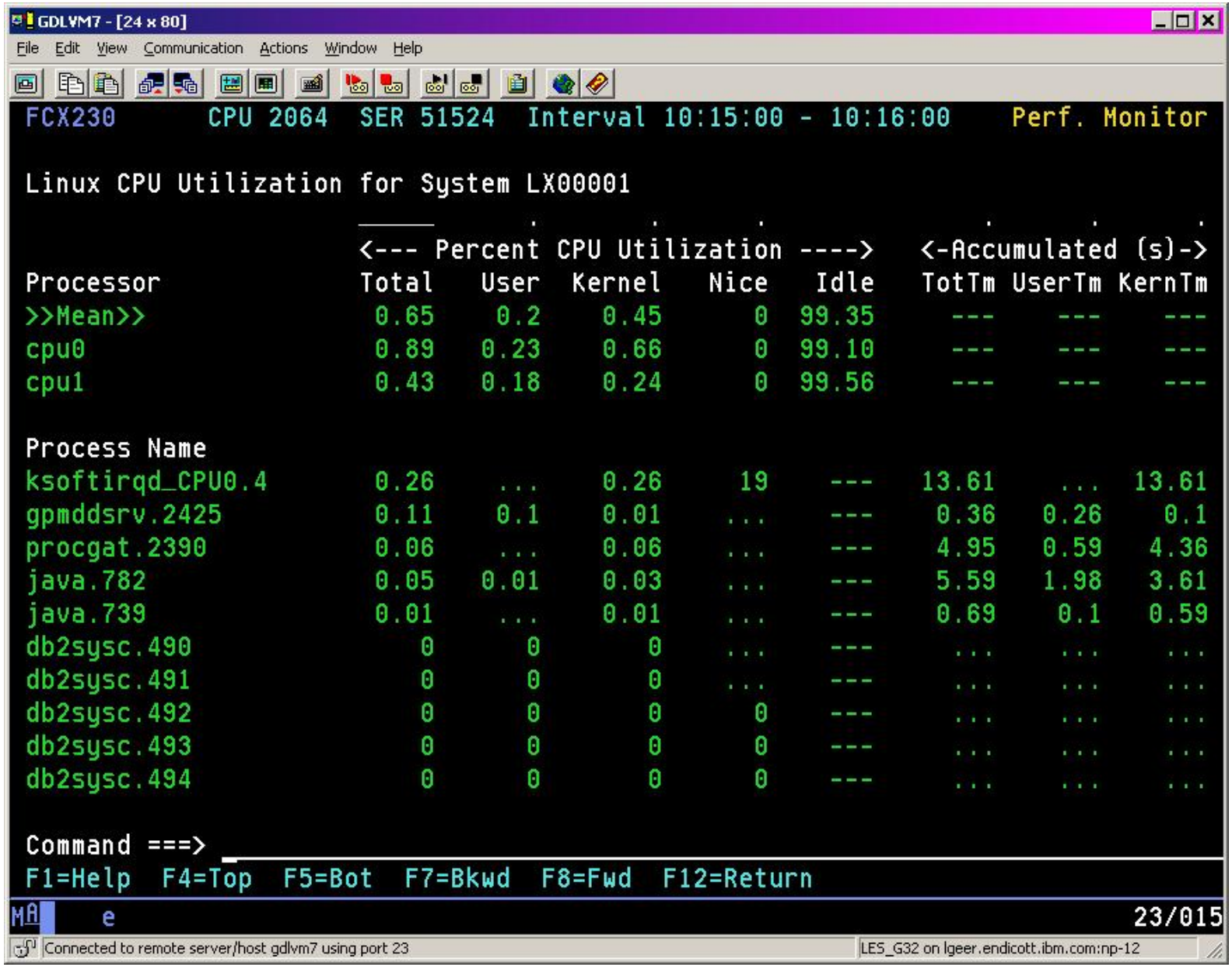
z/VM PT: Linux Systems (data from RMF gatherer)



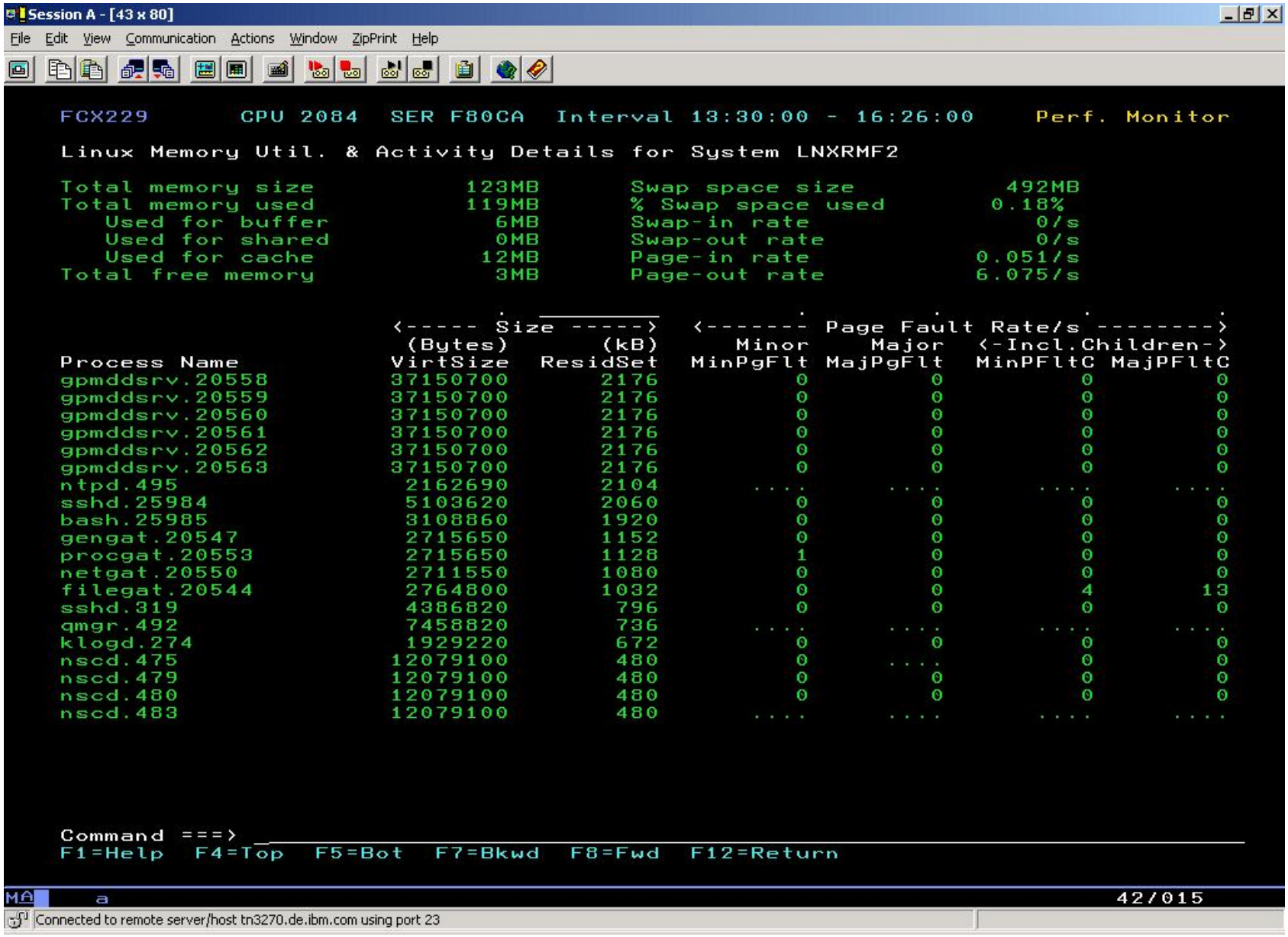
z/VM PT: Linux Overview



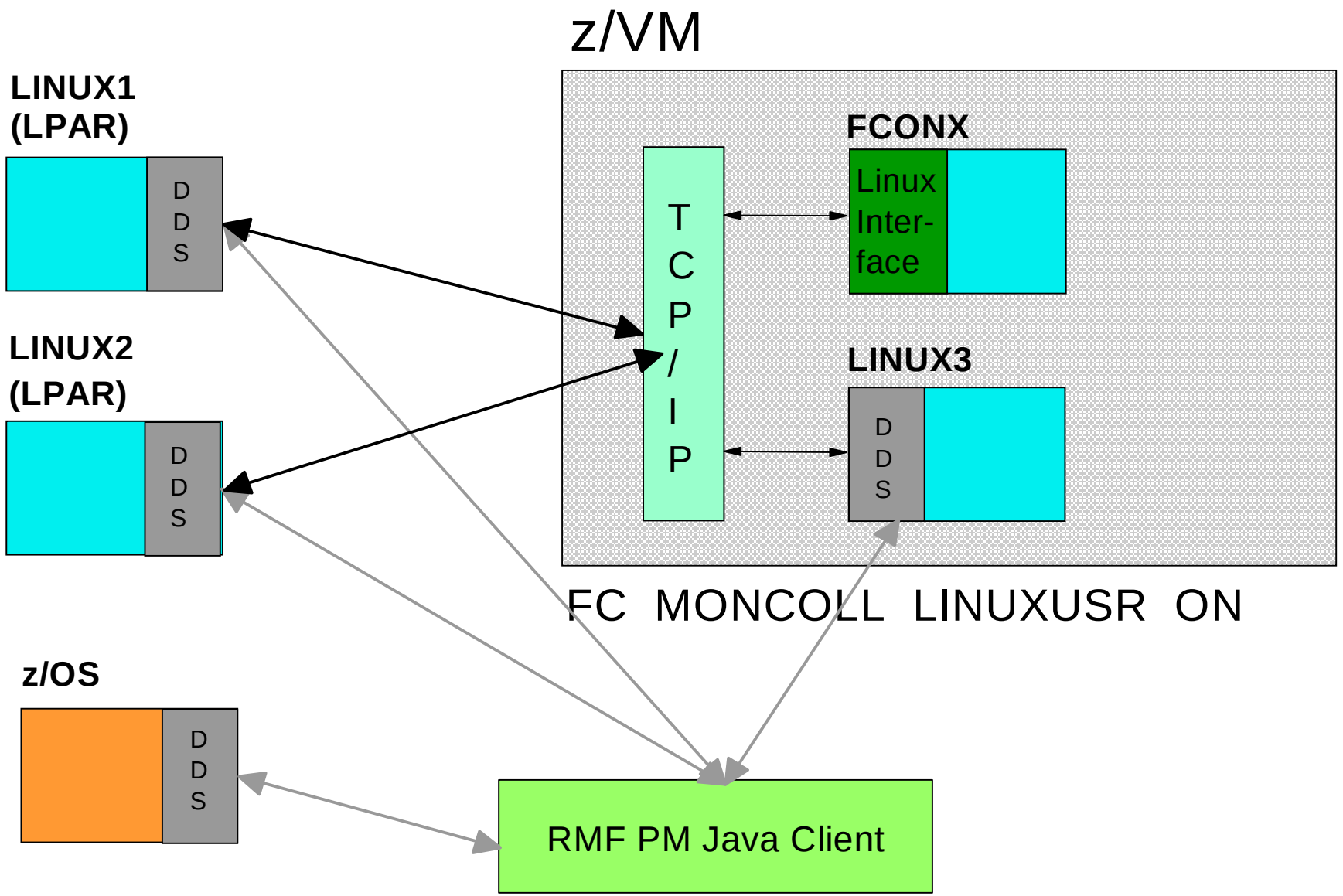
z/VM PT: Linux CPU



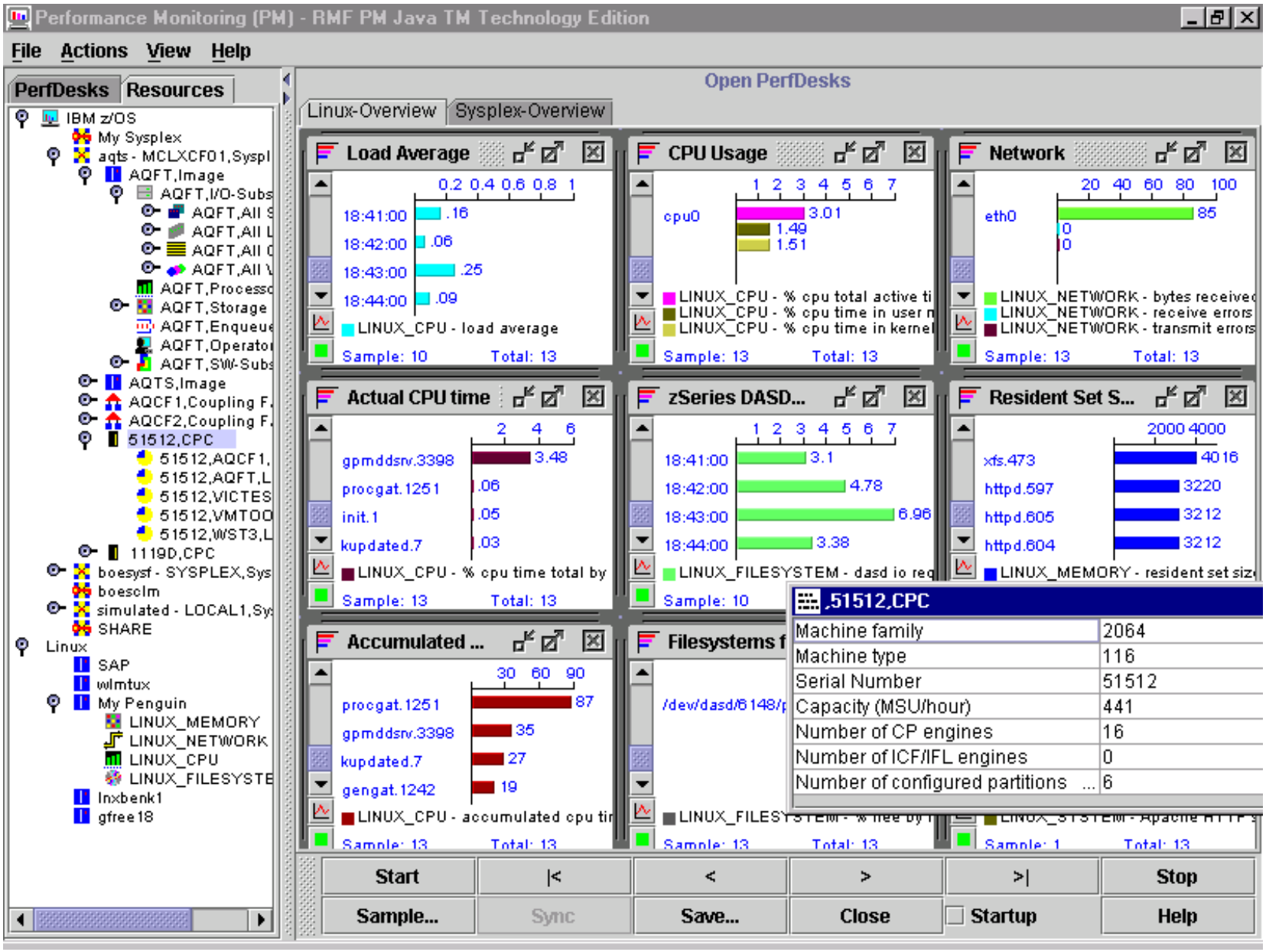
z/VM PT: Linux Memory



Accessing Linux Performance Data: Concept

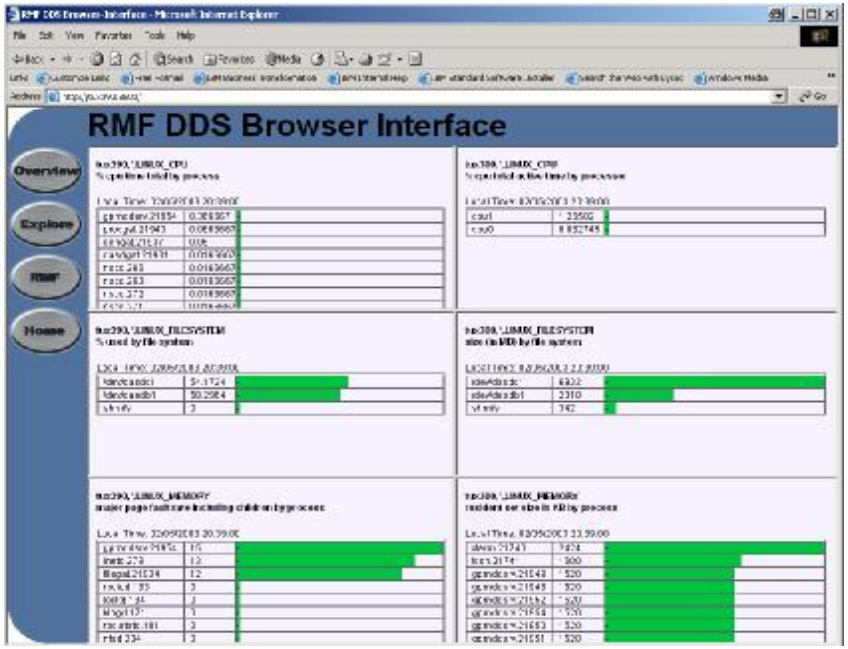


RMF PM Java Client

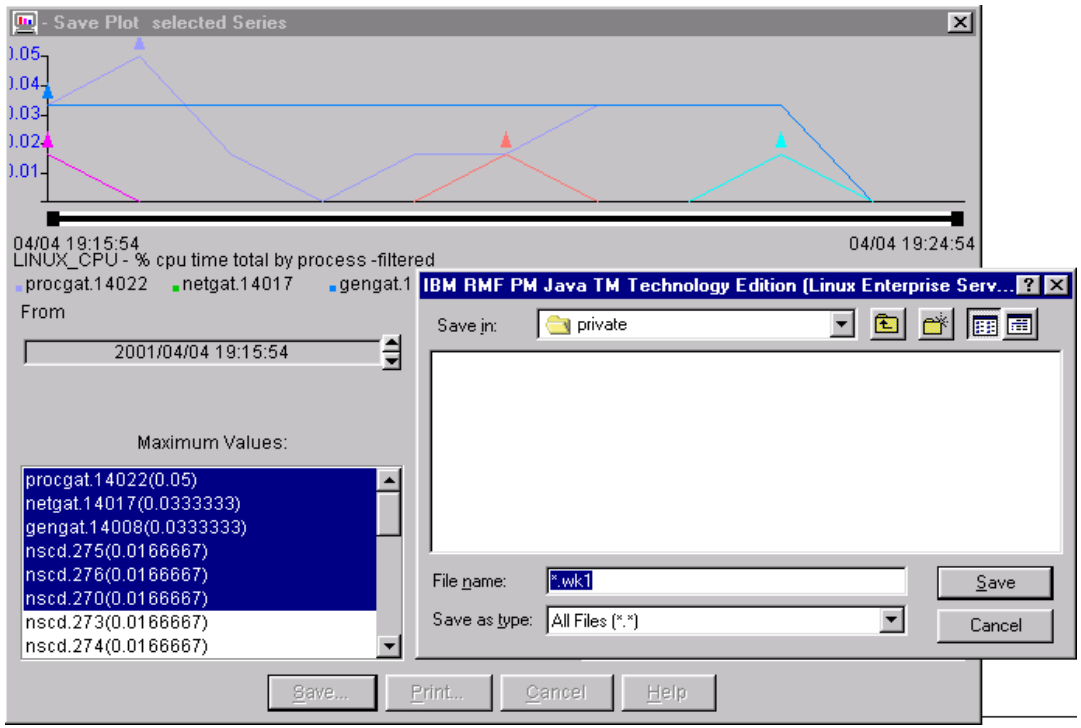


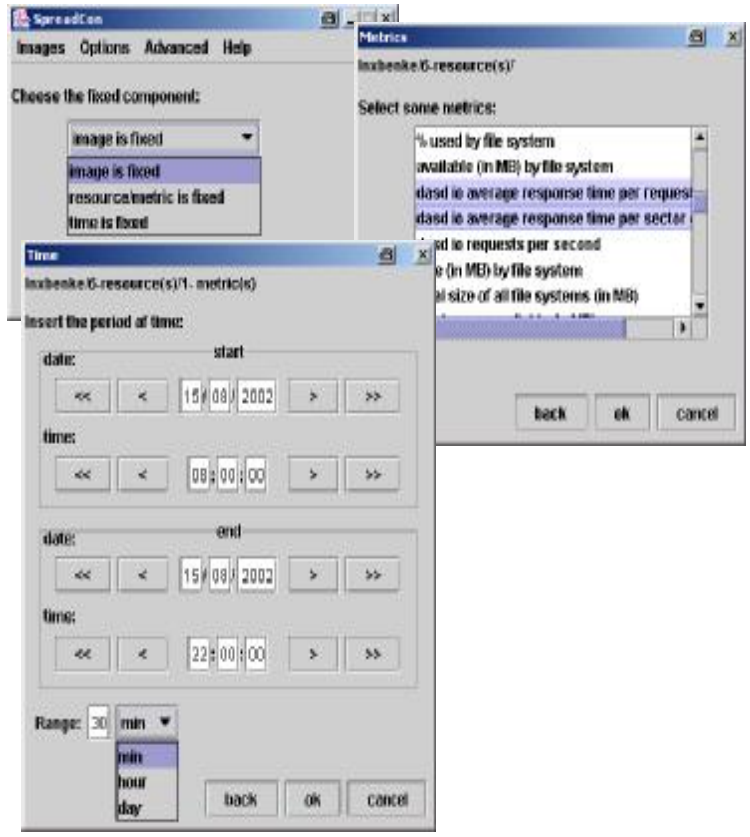
RMF PM Java Client: Features

- Positioned for online performance analysis and problem drill-down
- Can monitor multiple Linux server and multiple z/OS Sysplexes at the same time, in one application
- The performance analysis scenario can be saved
- Alternatively, you may use the web browser interface of the Distributed Data Server (DDS)

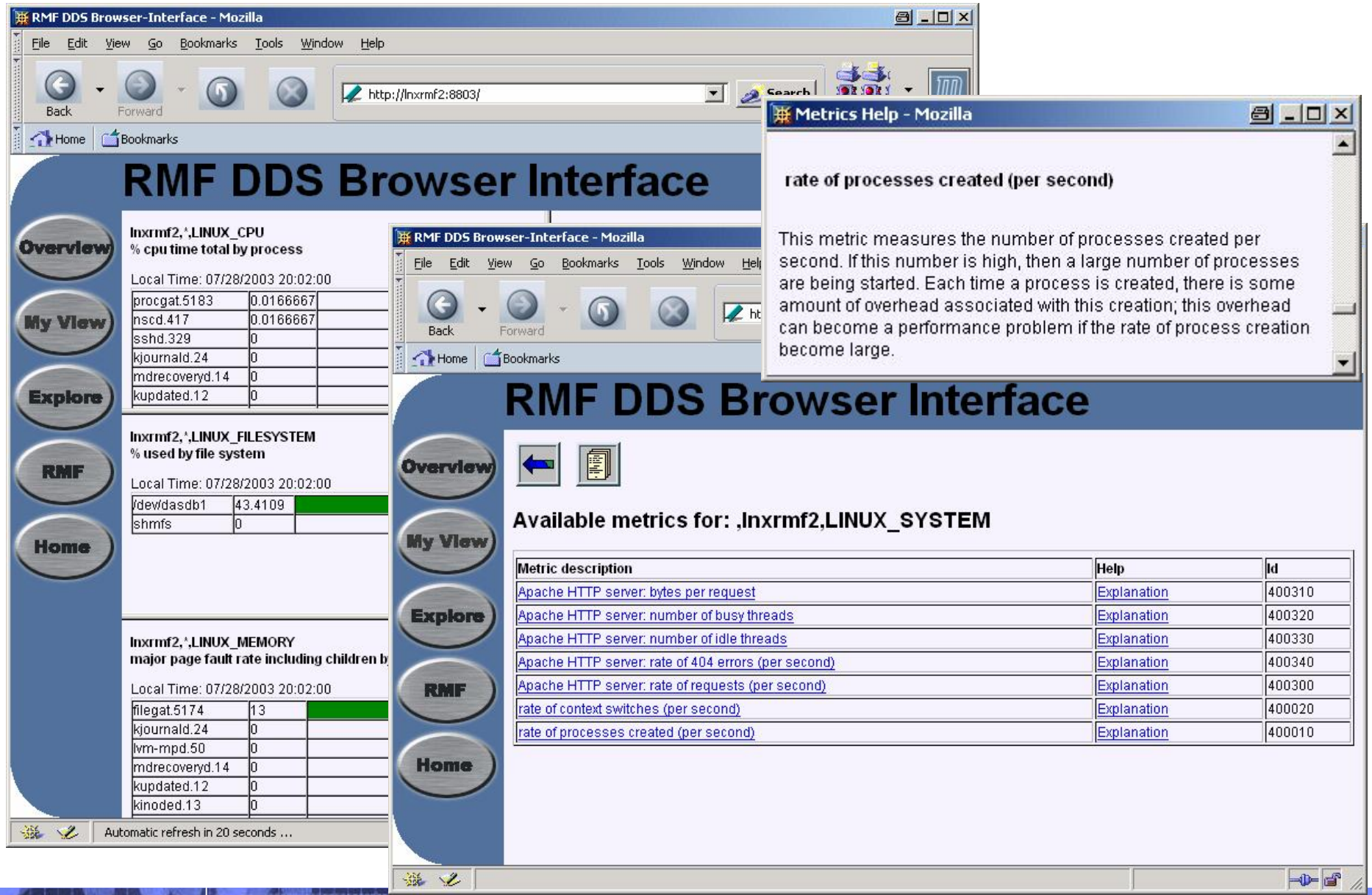


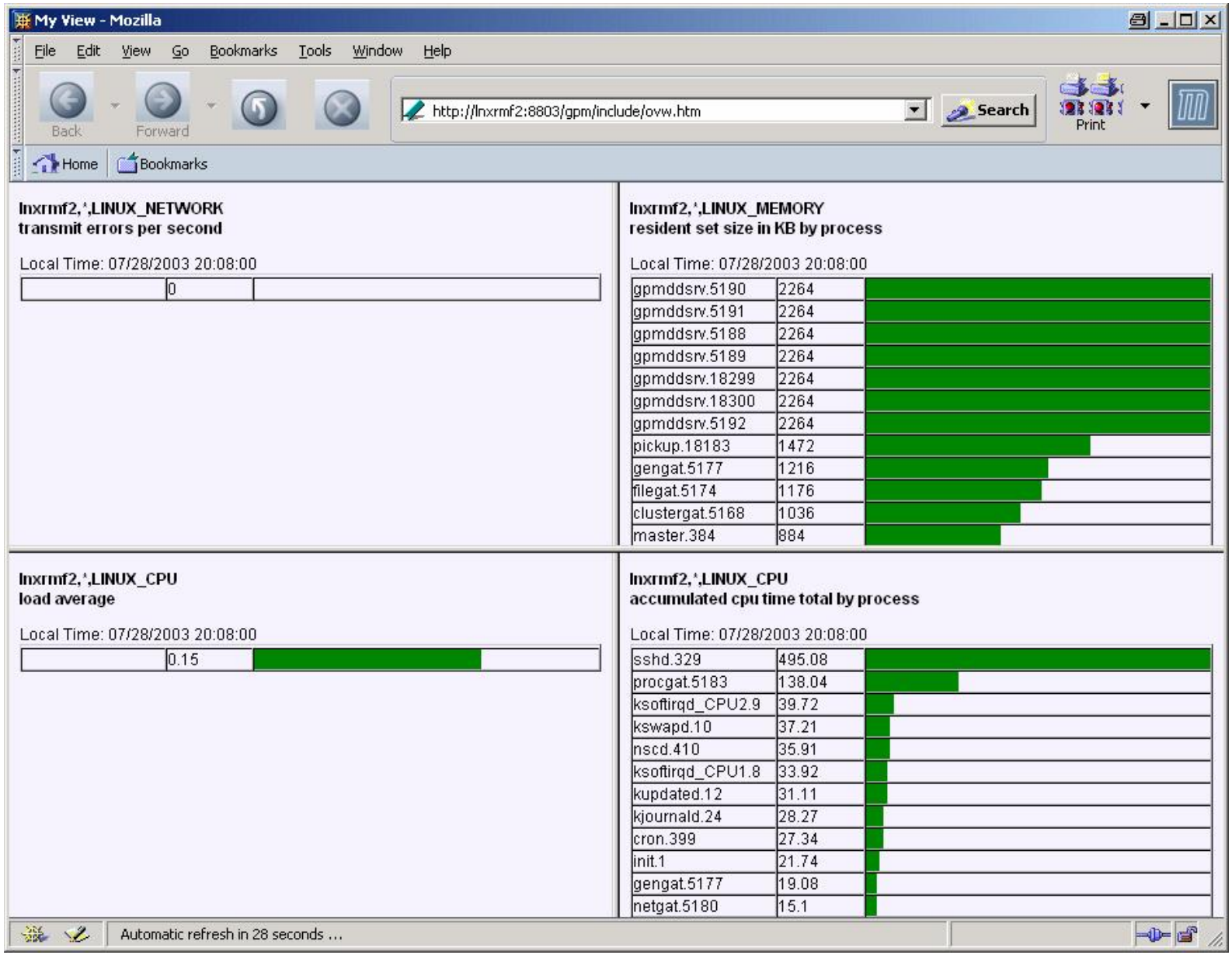
RMF PM: Spreadsheet Data



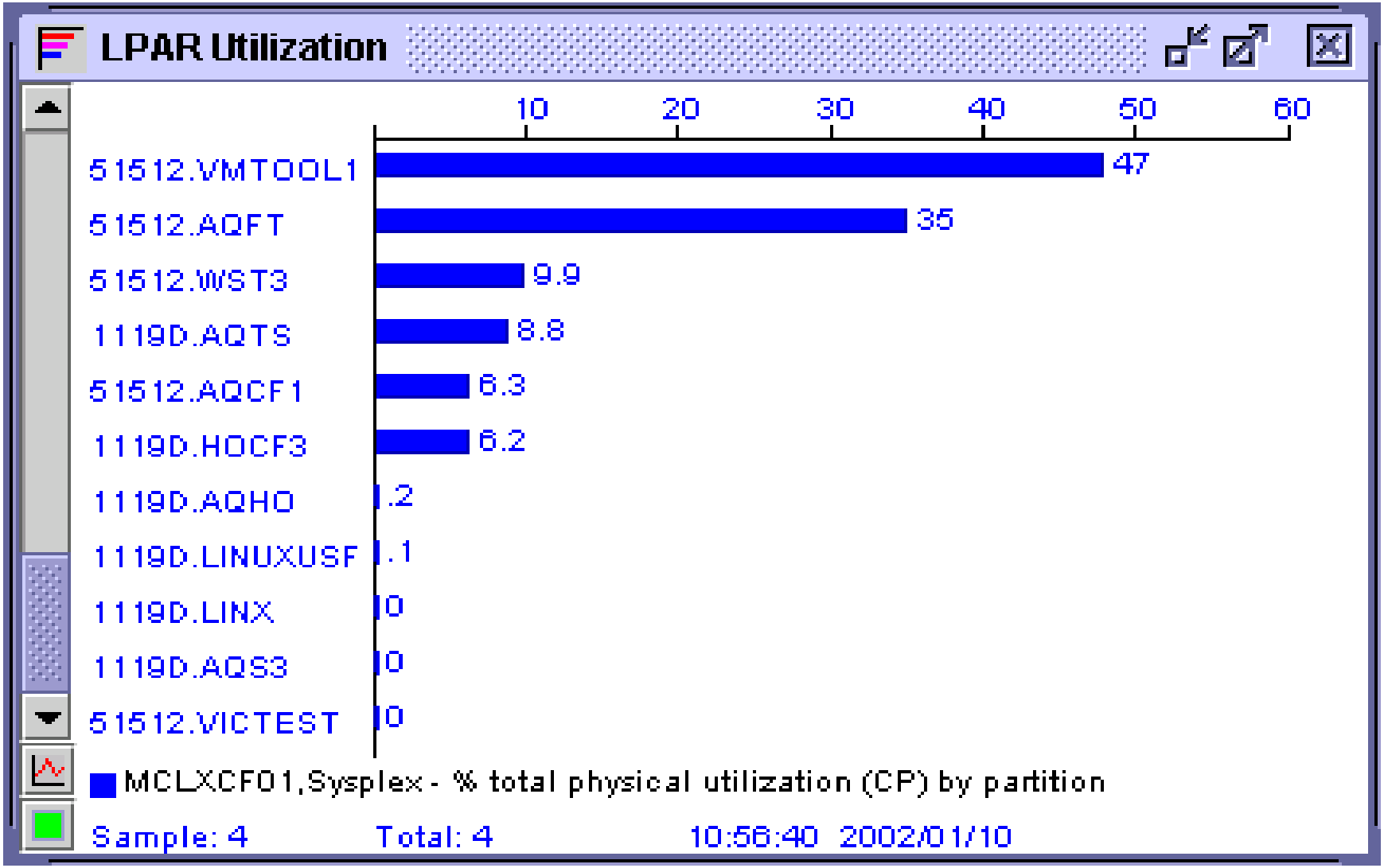


Enhanced RMFPMS Web Browser Interface





LPAR partition data from z/OS RMF



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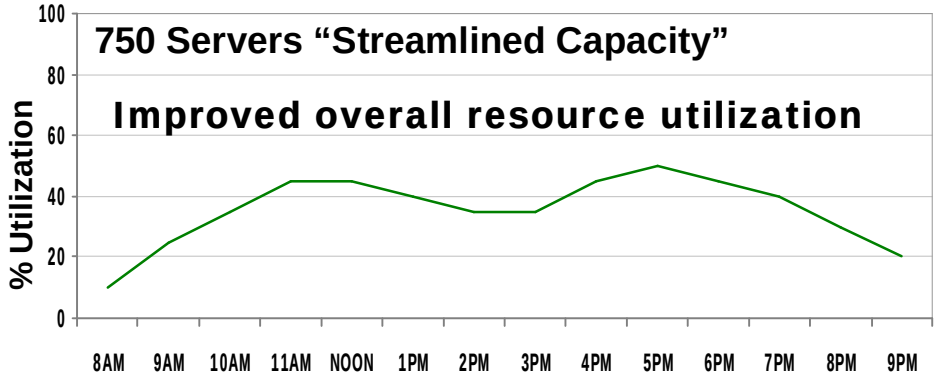
Orchestration and Provisioning

§ Provisioning

Handles all resource setup and configuration automatically

Streamlined execution of your company's best practices

Human evaluation still drives actions – execution errors reduced

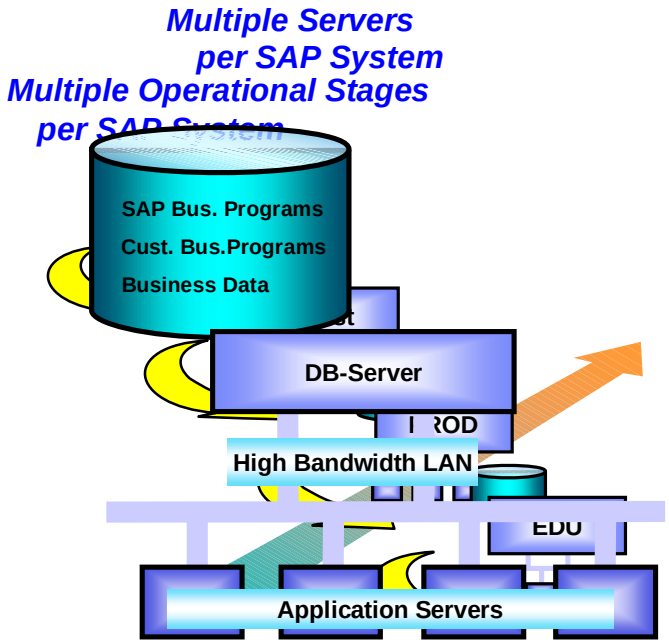


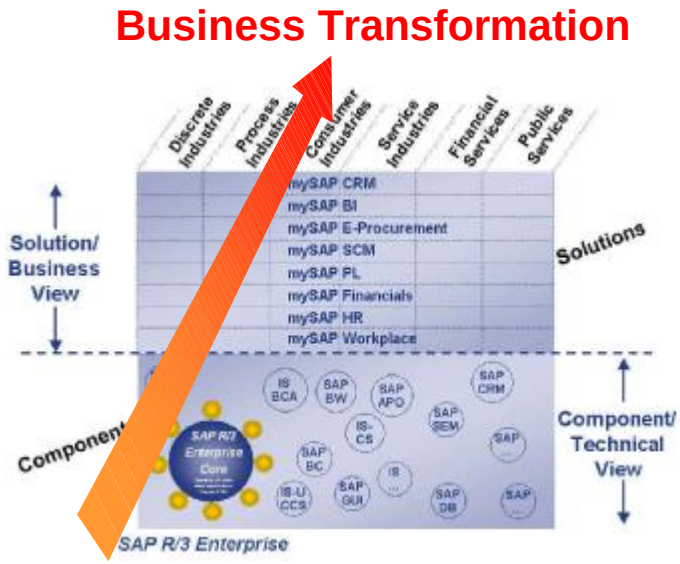
§ Orchestration

- Rapidly respond to changing business demands
- Senses conditions and triggers response
- Improve service levels with faster peak load support

IT Tasks	Automated Process	Manual Time	Automated Time
Identify resource	Resources identified by business process	3 Days	<1 Hour
Software installation	Remote OS install/software provisioning	5 – 10 Days	<1 Hour
Configure security and network settings	Automated configuration	5 - 10 Days	<1 Hour
Return server to free pool	Automated deallocation	Variable	Automated
Total Time		13 - 23 Days	.5 Day

SAP System Landscape Complexity





- All systems are based on dedicated resources

Workload based Growth

- CIOs must **reduce IT operational costs** while optimizing resource utilization (people, hardware, software, ...)

Customer Pain Points

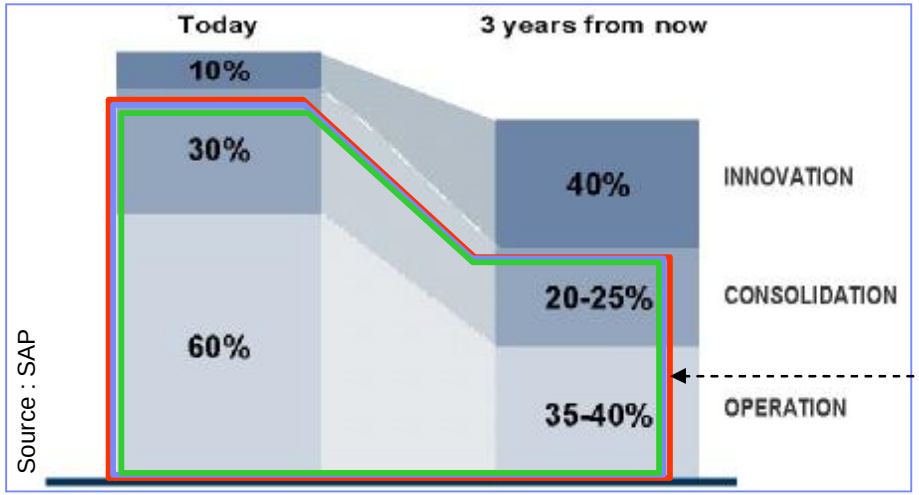
- **SAP Landscape growth:**
  The new mySAP Solution suite creates additional demand in HW, SW licenses and systems management, which drives significant investments.

- **Unsatisfactory deployment time:**
  The time from request to actual deployment is unsatisfying. If a systems needs additional capacity, a deployment time of one day or more for that environment is not acceptable. The ability to support ad hoc requests for new systems, created by the extreme dynamics of today's environment is rather limited.

- **Underutilization:**
  At the same time servers are manually set up on request and often not removed after the specific purpose has been fulfilled. As a result the server farm is ever growing, the average utilization is low. Instead of rapidly re-purposing existing servers, they constantly acquire new equipment.

Perfect Fit between SAP and IBM Strategies

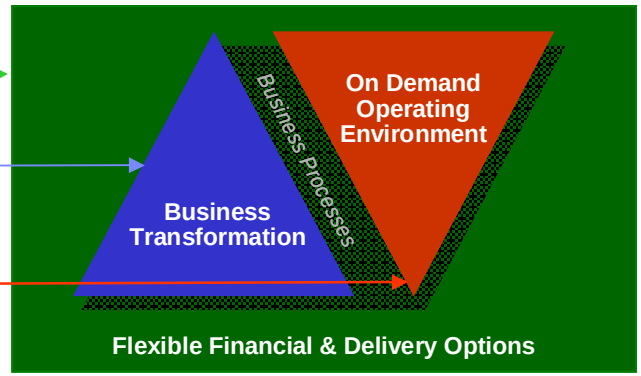
SAP Cost Control Vision



SAP Cost Component Vision

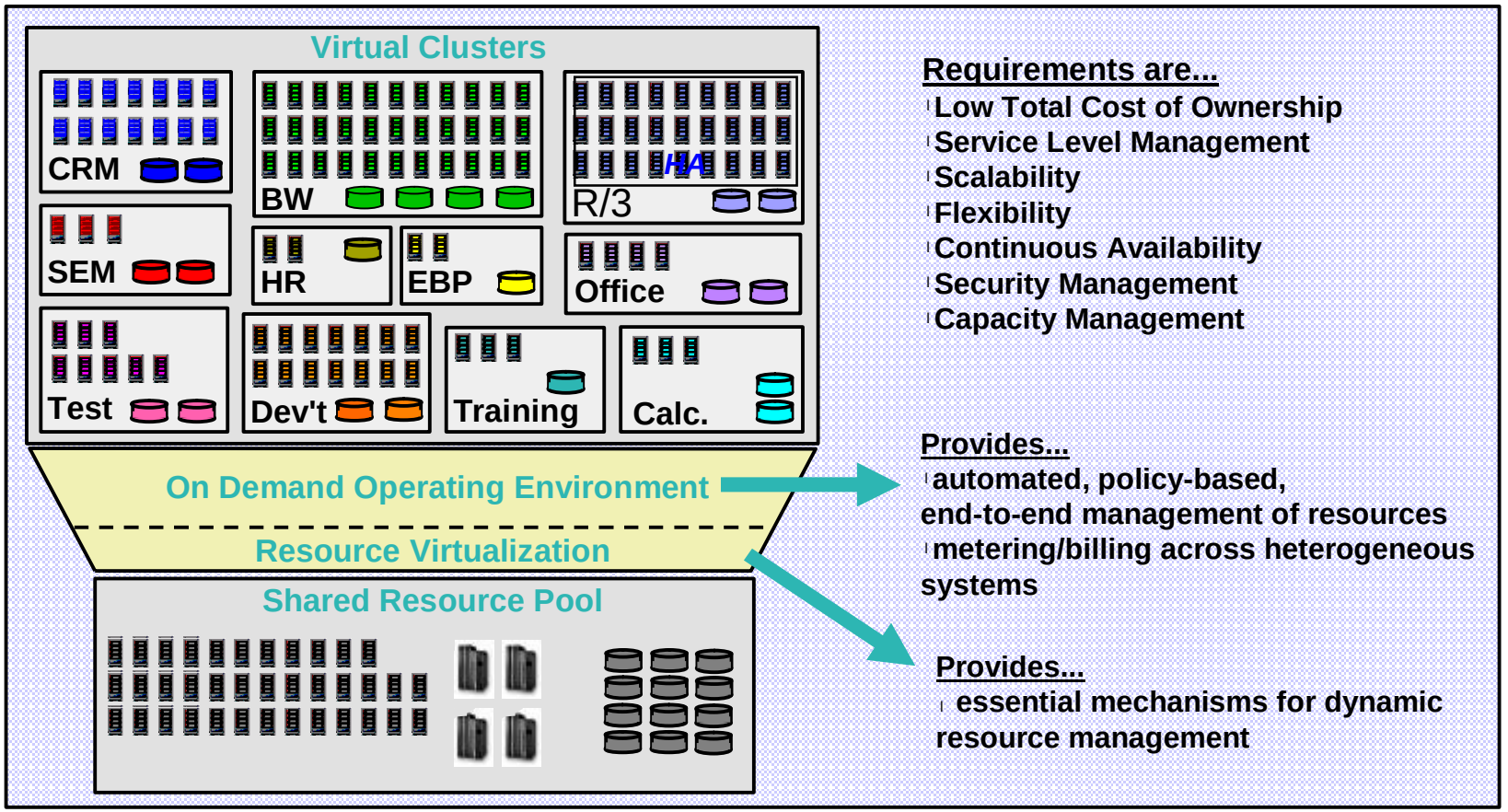
Miscellaneous	5%			
Licenses	7%	Business Suite	1%	SAP
Implementation				
Introduction	13%	Packaged Solutions	2-4%	+ Partner
Integration	15%			
Operations		SAP NetWeaver	8-12%	+ Partner
Interfacing	20%			
Ongoing	20%	Adaptive Computing Infrastructure	9-13%	+ Partner
IT Infrastructure	20%			
Total Savings Potential	20-30%			

- on demand helps reducing the TCO of an corporate business and IT landscape
- on demand areas match up with the SAP cost components
- on demand can help accelerate the savings process



IBM on demand plays

On Demand Computing for SAP - Vision



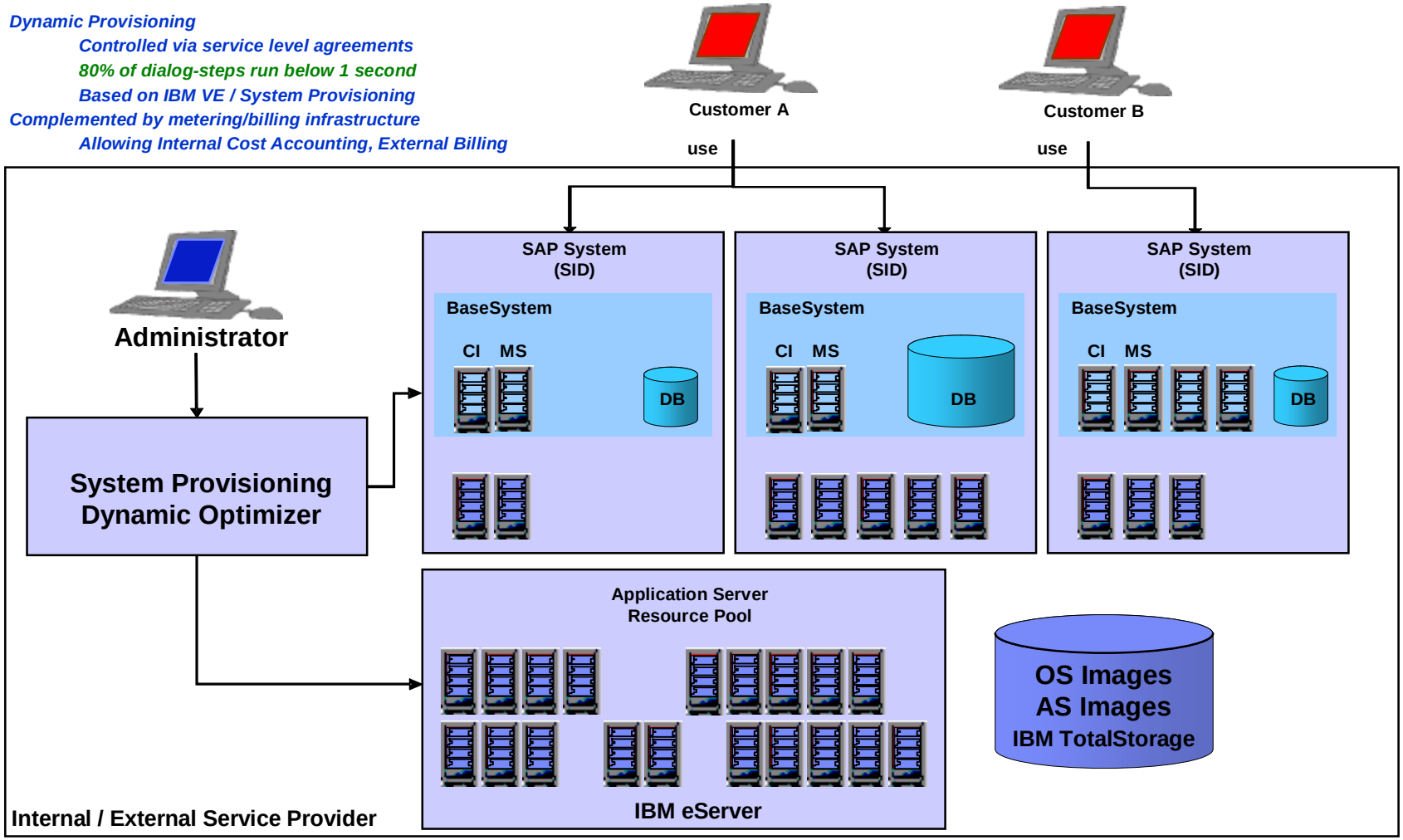
- **IT resources are pooled, virtualized, and allocated dynamically to satisfy changing business needs.**

è Resources are well utilized, workload priorities are used to control consumption, and consumers pay for what they use.

IBM Dynamic Infrastructure *for mySAP Business Suite*
Application Server Capacity On Demand

Dynamic Provisioning
- *Controlled via service level agreements*
- *80% of dialog-steps run below 1 second*
- *Based on IBM VE / System Provisioning*

Complemented by metering/billing infrastructure
- *Allowing Internal Cost Accounting, External Billing*



IBM Dynamic Infrastructure *for mySAP Business Suite*

New end-to-end solution

- Solution
  - **to optimize SAP system infrastructure**
  - **to simplify SAP infrastructure management**
  - **to reduce cost (TCO)**
- Provides
  - **automated, policy-based, end-to-end management of resources**
  - **and metering/billing across heterogeneous systems (SLA driven)**
- IT resources are pooled, virtualized, and allocated dynamically to satisfy changing business needs
- Dynamic vertical and horizontal virtualization capabilities
- Integrated Solution
  - **IBM Virtualization Engine**
    - **System Provisioning powered by IBM Tivoli Provisioning Manager**
    - **UBS / Orchestration / Automation for SAP**
  - **IBM Tivoli System Automation**
- Generates Business Value by:
  - **Server Consolidation**
  - **Dynamic Provisioning**
  - **Cost Savings**
  - **Internal Accounting, Enable external billing**

Business Value – Virtualization / Automation

- Dynamic provisioning**:**
  By allocating/deallocating application server resources policy based (e.g. 80% of dialog-steps are below 1 second) the system infrastructure shrinks and grows on demand. The utilization is increased, the deployment time is reduced and at the same time the systems management is simplified.

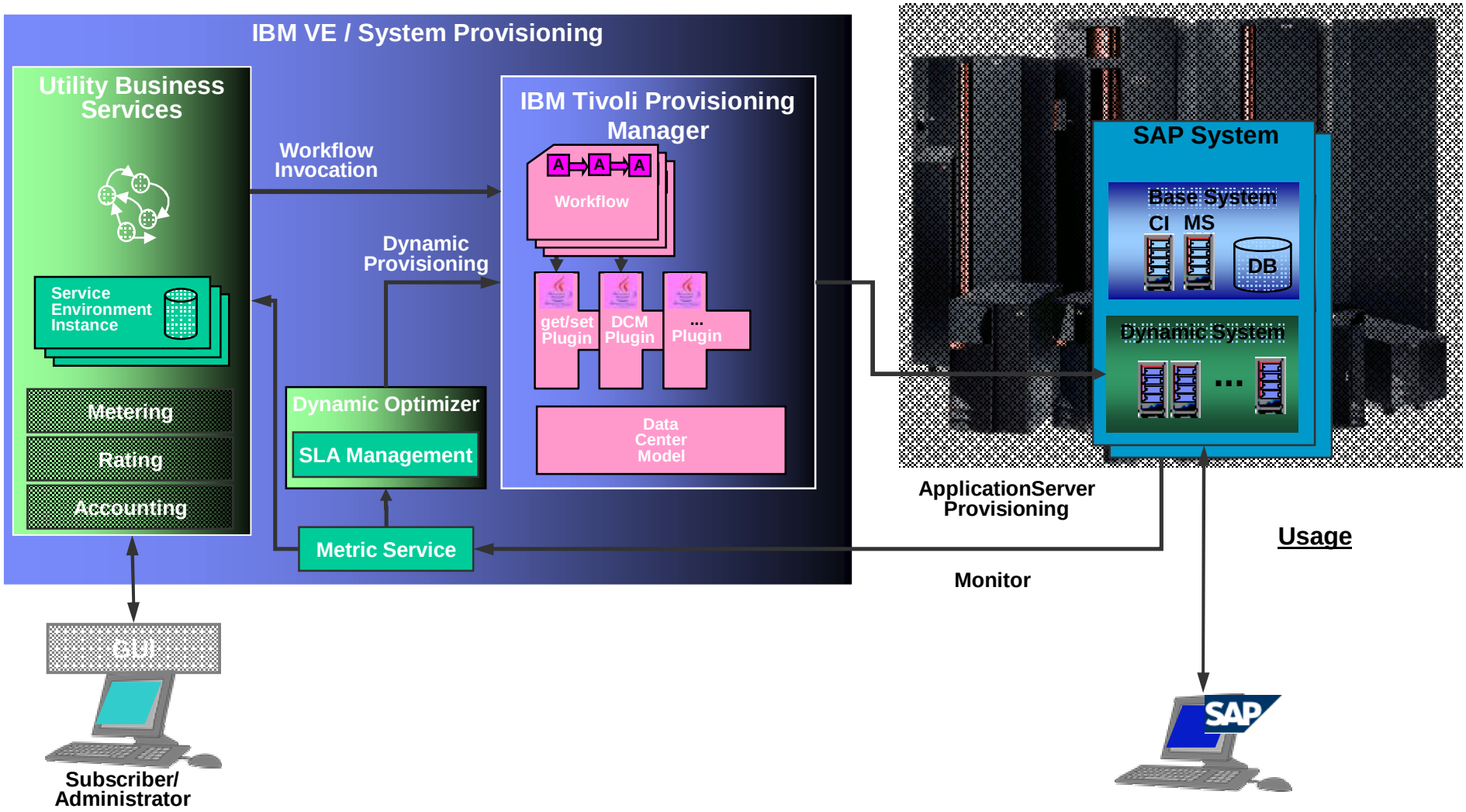
- Server Consolidation**:**
  Sizing of the infrastructure is no longer oriented on peak-workload. IBM eServer HW virtualization capabilities and the usage of virtual servers (shared pools instead of dedicated resources) significantly reduce the investments in HW and **systems management.**

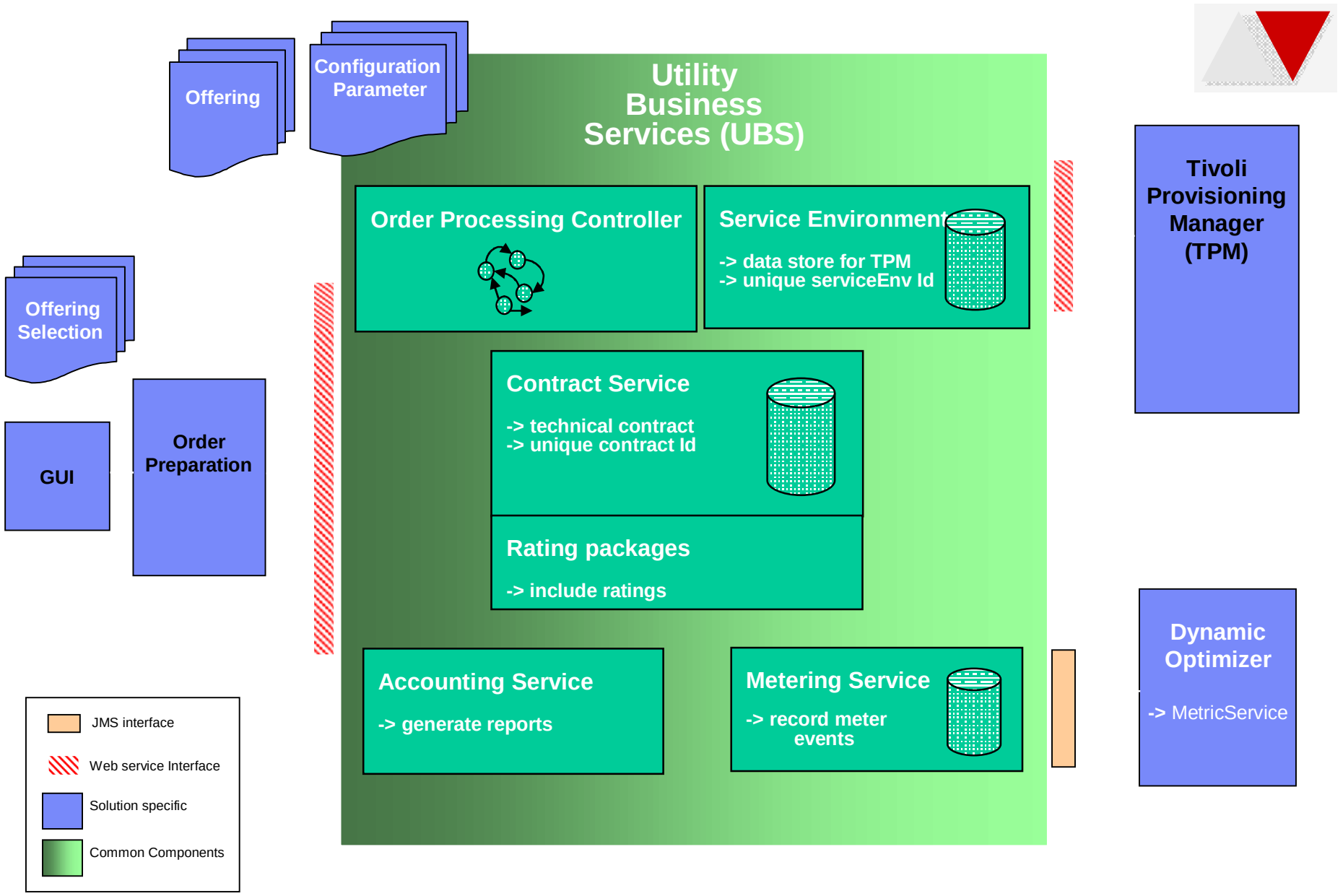
- Data security**:**
  De-provisioned servers are immediately scrubbed, thus guarantying no customer data is transferred between environments. This is a requirement for hosting environments, and has growing importance for internal service providers.

Business Value – Utility Business Services

- **Internal cost accounting:**
  Customers who act as offering/service provider for their lines of businesses or in hosting environments definitively need insight into the systems cost structure. Metric services allow them to perform internal accounting for SAP application servers on a virtualized infrastructure.

- **Enable external billing:**
  Tracking, aggregation and documentation of the usage of the resources and to relate this data with price, which was assigned at contract time on usage of resources is another critical functionality. By externalizing this data it is made available to standard billing systems.





Provisioning

- Adds, deletes, moves and configures servers, operating systems, middleware, applications, clusters and network resources
- Automates resource setup and configuration
- Executes IT processes in a consistent, customized and error-free manner

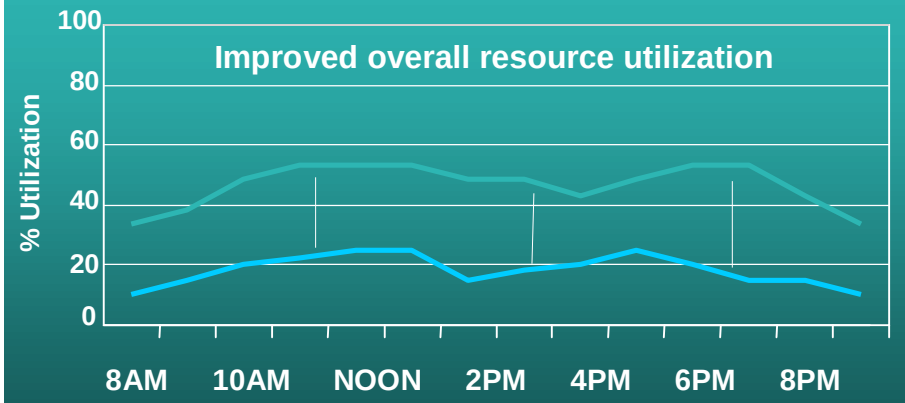
Orchestration

- **Senses conditions, anticipates trends and triggers a response to improve server utilization**
- **Recognizes and dynamically responds based on business priorities**
- **Maximizes business velocity by managing alignment of business processes and IT**

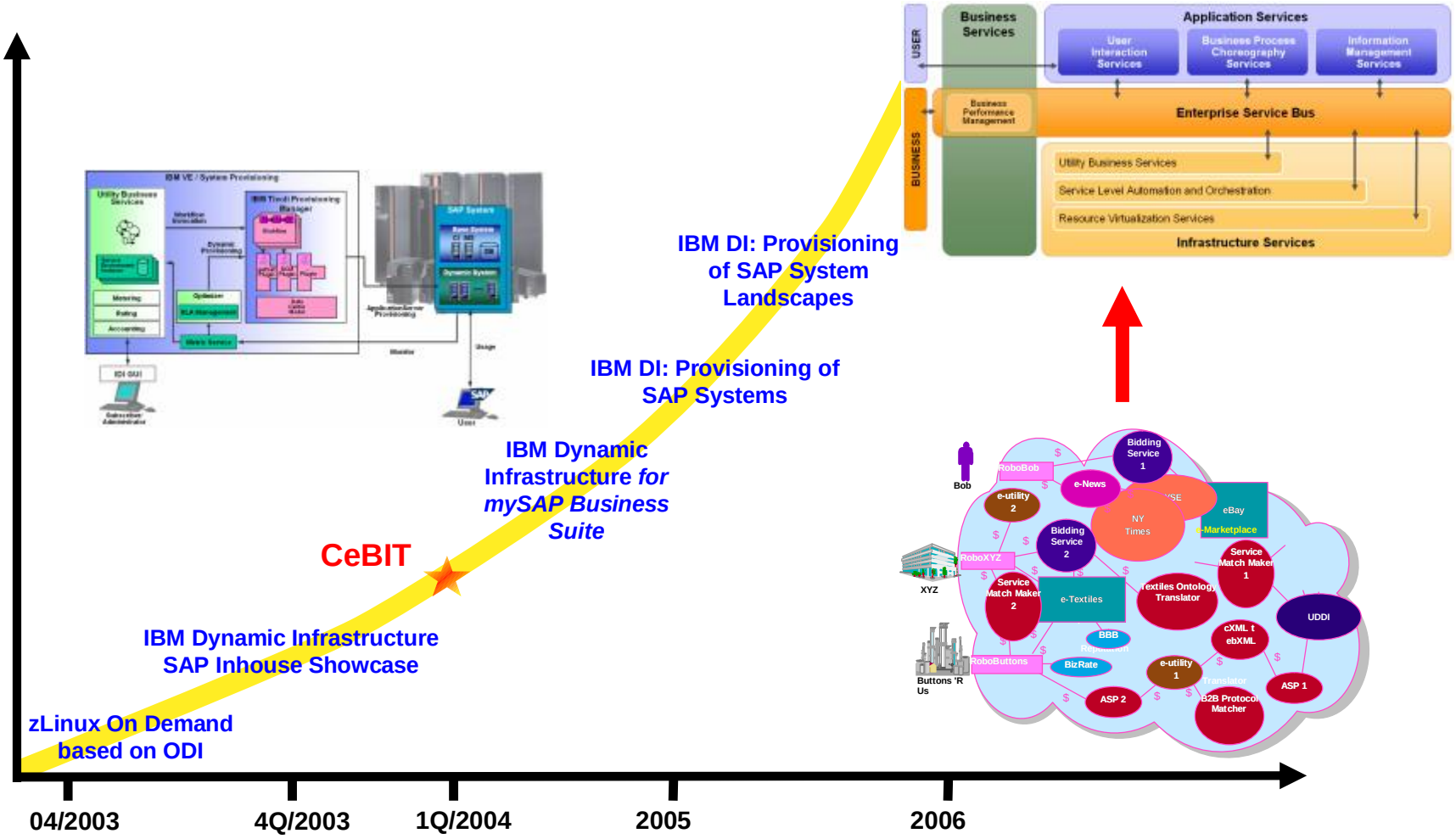
"On Demand" Provisioning

IT Tasks	Automated Process	Manual Time	Automated Time
Identify resource	**Resources identified by business process**	**3 Days**	**<1 Hour**
Software installation	**Remote OS install/ software provisioning**	**5 – 10 Days**	**<1 Hour**
Configure security and network settings	**Automated configuration**	**5 - 10 Days**	**<1 Hour**
Return server to free pool	**Automated deallocation**	**Variable**	**Automated**
Total Time		**13 – 23 Days**	**Half Day**

"On Demand" Orchestration



IBM Dynamic Infrastructure *for mySAP Business Suite*



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z/VM Automation using PROP

- Programmable Operator facility (PROP)
- Intercepts all messages and requests to the virt. Machine (userid)
- Preprogramming of action can be done
- Message filtering, message consolidation point
- Can act on behalf (rerouting) for security and control
  - Normally OPERATOR userid for automation, operation and monitoring
  - Can be any defined userid

PROP components

- Define
  - Logical Operator
  - Routing Table
  - Action Routines
  - Exits
  - Commands

Summary and benefits

- Filtering and logging of non-important messages
- Routing of important messages to “a real operator” or to z/OS System Automation
- Automation of routine responses and tasks
- Eases message traffic (single point of integration) to the operator

Get more Infos

- See also session 9136
- z/VM –CMS Planning and Administration SC24-6042-00
  - 2 chapters devoted to PROP Chapter 5 and 6

Summary

- Reduce skill requirements and implementation efforts by:
  - Extending z/OS management tools to Linux
  - Including zSeries Linux in Systems Management (Tivoli) solutions
  - Same solutions/tools on all platforms
- Focus on:
  - Automation
  - Maintaining High Availability
  - Reducing complexity
  - Integration
- Exploitation of zSeries strengths
  - Virtualization
  - Manageability
  - RAS

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Client Success Stories

Managing Linux

Colorado State University

Colorado State University
Knowledge to Go Places

To use Tivoli on a Linux S/390 Server to manage 500+ Linux servers (and potentially other servers) for research and development across 12 universities

IBM Tivoli Enterprise Console
IBM Tivoli Configuration Manager (SW Distribution)
IBM Tivoli Monitoring
IBM Tivoli Workload Scheduler
IBM Tivoli Storage Manager

Result:

- The Tivoli Solution maintains highest level of availability due to early detection and correction of problems in the environment
- Automated monitoring provides both cost savings and a higher quality Linux environment for the Linux Hub at CSU.
- Hundreds of students each semester benefit from the Linux environment being managed by Tivoli for research projects and course use.

"Tivoli is a very powerful product for managing large numbers of enterprise systems. For CSU, Tivoli products are a key part of our management strategy for providing round the clock monitoring (or 24x7) of the 500+ Linux instances on the CSU Linux Hub."

Dan Turk, Assistant Professor, Colorado State University

Software Provisioning

Customer:	GAD eG
Need:	• Support for Linux/zVM (centralized TMRs) • Replacement for NDM based Software Distribution • Data collection for verification of central configuration repository
Solution:	Tivoli software **IBM Tivoli Configuration Manager**
Result:	• Reduces central HW collection • Increased ease of operation • Increased scalability supporting future growth • Robustly supports migration from OS/2 world to Linux/Intel and Windows

"With IBM Tivoli and Configuration Manager 4.2 on Linux/zVM we have laid the innovative basis for the increasingly complex support needs of our growing number of customers."

- Hubert Ashege, Senior Consultant, GAD eG

Optimizing Workloads

Customer: Whirlpool Corporation

Need:
24x7 support for e-business systems
Higher quality service through measurement and management
Required integrated enterprise systems management solution
Comprehensive SAP R/3 management

Solution: Tivoli Enterprise Console, Tivoli Distributed Monitoring, Tivoli NetView, Tivoli Manager for SAP R/3, Tivoli Manager for Domino, Tivoli Workload Scheduler

Results:
Delivers 99.8% SAP R/3 availability with integrated scheduling of e-business applications
Reduces cost by eliminating manual intervention

"Without this level of management from Tivoli, Web servers might receive visitors but be unable to handle business transactions..... ...our online visitors get predictable, reliable access to our e-business applications and resources".

Jim Haney, Vice President of Architecture and Planning

Resources

- ***Yahoo Group Teamrooms groups.yahoo.com (NPMIP, NPM, NetView, TBSM_Users)***
- **Tivoli software homepage -- *http://www-3.ibm.com/software/tivoli/***
- **Tivoli UserGroups –*http://www-3.ibm.com/software/sysmgmt/products/support/Tivoli_User_Groups.html***
- **Tivoli Customer Portal --*https://www6.software.ibm.com/reg/tivoli/custport-l***
- **Tivoli Education -- *http://www-3.ibm.com/software/tivoli/education***
- **Tivoli Software Events -- *http://www-3.ibm.com/software/tivoli/news/events/***
- **Tivoli Best Practices -- *http://www-3.ibm.com/software/tivoli/features/oct2002/best.html***
- **IBM Link - *http://www.ibmlink.ibm.com/***.
- **IBM Manuals - *http://w3.ehone.ibm.com/public/applications/publications/cgibin/pbi.cgi***.
- **IBM Software for zSeries On Demand Events -*http://www-3.ibm.com/software/is/mp/s390/ondemand/***