Linux Systems Management on zSeries
Session 9282

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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
New Workloads

zSeries Platform

PR/SM LPAR (up to 30 logical partitions)

z/OS

Linux

z/VM

*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 Manager
- Tivoli Identity Manager
- Remote Control
- Workload Scheduler

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

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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)

Managing Systems

z/OS
HP
AIX
Windows

z/OS
Solaris
OS/400
z/VM
Unix
AIX

.....

Linux
Windows
Solaris
OS/400
z/OS
z/VM
Unix
AIX

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

- **Switch Analyzer**
- **NetView**
  - * distributed
  - * MLM
- **Tivoli Enterprise Console**
- **WEB**
  - * Server
- **NMC**
  - * Server

- **TCP/IP**
- **Systems & Middleware**

- **zSeries**
  - **zLinux**
  - **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)

- **z/VM**
  - **NetView for z/OS**
  - **RODM**

* Included with NetView for z/OS
Console automation and Linux boot
SA z/OS Processor Operations

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

- ProcOps Common commands (e.g. ISQCCMD target LOAD)
- CP command to guest virtual machine (e.g. ISQSEND target Q DASD)
- Command to OS running on guest virtual machine (e.g. ISQSEND target OC
  netstat –a)
- Messages from OS running on guest virtual machine (ISQ900I PSM.GUEST OC ...
)
- Messages from CP on guest virtual machine (ISQ900I PSM.GUEST OC ...)
- Messages from PSM (ISQ700I PSM SC ISQCS123W ...)
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!
Enter a command to guest operating system

\texttt{ISQSEND LINUX02 OC \textit{ps -ef}}

Enter a command to CP on guest machine

\texttt{ISQSEND MVS2 SC DISPLAY PSW}
Message Traffic from Guest Systems

Message from guest machine operating system
ISQ9001  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
ISQ9001  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
ISQ7001  PSM1 SC  ISQCS0314E Message Handler has failed.
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
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

Start

Web Server DependsOn WebIP
1,3,2,4 1,3,2,4

WebIP

System1 System2 System3 System4
Web Server Web Server Web Server Web Server
WebIP WebIP WebIP WebIP
Example: mySAP® Enqueue Server HA

Policy Rule
- ES, MS, VIPA collocated

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

Node

ERS

Node

ERS

ES

MS

VIPA

VIPA

Run in Screen Show Mode

RedPaper - mySAP Business Suite Managed by IBM Tivoli System Automation for 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
- Continuous 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

GDPS Site Takeover

HyperSwap

Site 1

Site 2

ESS

ESS

CBU

Capacity Upgrade on Demand
Event management
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
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.
Performance monitoring

z/VM Performance Toolkit
z/OS RMF
z/VM Monitor data collection
*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.


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.
### Performance Screen Selection

<table>
<thead>
<tr>
<th>General System Data</th>
<th>I/O Data</th>
<th>History Data (by Time)</th>
</tr>
</thead>
<tbody>
<tr>
<td>2. Storage utilization</td>
<td>12. Control units</td>
<td>32. History data files*</td>
</tr>
<tr>
<td>3. Storage subpools</td>
<td>13. I/O device load*</td>
<td>33. Benchmark displays*</td>
</tr>
<tr>
<td>5. System counters</td>
<td>15. Cache extend. func.*</td>
<td>35. System summary*</td>
</tr>
<tr>
<td>6. CP IUCV services</td>
<td>16. DASD I/O assist</td>
<td>36. Auxiliary storage</td>
</tr>
<tr>
<td>7. SPQOL file display*</td>
<td>17. DASD seek distance*</td>
<td>37. CP communications*</td>
</tr>
<tr>
<td>8. LPAR data</td>
<td>18. I/O prior. queueing*</td>
<td>38. DASD load</td>
</tr>
<tr>
<td>A. Shared data spaces</td>
<td>20. I/O config. changes</td>
<td>40. Paging activity</td>
</tr>
<tr>
<td>B. Virt. disks in stor.</td>
<td>User Data</td>
<td>41. Proc. load &amp; config*</td>
</tr>
<tr>
<td>C. Transact. statistics</td>
<td>21. User resource usage*</td>
<td>42. Logical part. load</td>
</tr>
<tr>
<td>D. Monitor data</td>
<td>22. User paging load*</td>
<td>D. Response time (all)*</td>
</tr>
<tr>
<td>E. Monitor settings</td>
<td>23. User wait states*</td>
<td>3D. RSK data menu*</td>
</tr>
<tr>
<td>F. System settings</td>
<td>24. User response time*</td>
<td>3E. Scheduler queues</td>
</tr>
<tr>
<td>G. System configuration</td>
<td>25. Resources/transact.*</td>
<td>3F. Scheduler data</td>
</tr>
<tr>
<td>H. VM Resource Manager</td>
<td>26. User communication*</td>
<td>3G. SFS/BFS logs menu*</td>
</tr>
<tr>
<td>I. Exceptions</td>
<td>27. Multitasking users*</td>
<td>3H. System log</td>
</tr>
<tr>
<td>K. User defined data*</td>
<td>28. User configuration*</td>
<td>3I. TGP/IP data menu*</td>
</tr>
<tr>
<td></td>
<td>29. Linux systems*</td>
<td>3J. User communication</td>
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<tr>
<td></td>
<td></td>
<td>3K. User wait states</td>
</tr>
</tbody>
</table>

Pointers to related or more detailed performance data can be found on displays marked with an asterisk (*).

Select performance screen with cursor and hit ENTER

**Command ==>**

F1=Help  F4=Top  F5=Bot  F7=bkwd  F8=fwd  F12=return
Remote Performance Monitoring Session Setup

Web Server Logon

You are connected to the data retrieval interface of the Performance Toolkit for VM on system BOEVMG73. Data retrieval authorization is based on your VM user identification on that system. Please enter your userid and password (RACF).

VM UserID: [blank]  Password: [blank]  Submit

Desired screen layout:

Max. Data Lines: [24]  Line length: [132]

Up to 12 kB of data can be retrieved per selection, including all control information. Output may be truncated if space is not sufficient for all lines.
### Performance Toolkit for VM FL 440

**Initial Performance Data Selection Menu**

<table>
<thead>
<tr>
<th>Performance Area</th>
<th>Category</th>
<th>Sub-Category</th>
</tr>
</thead>
<tbody>
<tr>
<td>General System Data</td>
<td>CPU load and usage</td>
<td>1. CPU load and usage</td>
</tr>
<tr>
<td></td>
<td>Storage utilization</td>
<td>2. Storage utilization</td>
</tr>
<tr>
<td></td>
<td>Priv. operations</td>
<td>4. Priv. operations</td>
</tr>
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<td></td>
<td>System counters</td>
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<td>6. CP IUCV services</td>
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<td>SPOOL file display</td>
<td>7. SPOOL file display</td>
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<td></td>
<td>LPAR data</td>
<td>8. LPAR data</td>
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<tr>
<td></td>
<td>Shared segments</td>
<td>9. Shared segments</td>
</tr>
<tr>
<td></td>
<td>Shared data spaces</td>
<td>A. Shared data spaces</td>
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<tr>
<td></td>
<td>Virt. disks in store</td>
<td>B. Virt. disks in store</td>
</tr>
<tr>
<td></td>
<td>Transaction statistics</td>
<td>C. Transaction statistics</td>
</tr>
<tr>
<td></td>
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<td>D. Monitor data</td>
</tr>
<tr>
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<td>E. Monitor settings</td>
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<tr>
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<td>H. Exceptions</td>
</tr>
<tr>
<td></td>
<td>User defined data</td>
<td>I. User defined data</td>
</tr>
<tr>
<td>I/O Data</td>
<td>I/O Data</td>
<td>11. Channel load</td>
</tr>
<tr>
<td></td>
<td></td>
<td>12. Control units</td>
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<tr>
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<td>14. CP owned disks*</td>
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<td></td>
<td></td>
<td>15. Cache extend, flush*</td>
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</tr>
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<td></td>
<td></td>
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</tr>
<tr>
<td></td>
<td></td>
<td>32. Benchmark display*</td>
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<td></td>
<td></td>
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<td></td>
<td></td>
<td>34. System summary*</td>
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<td>39. Paging activity</td>
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<td>40. Logical port, load</td>
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<td>41. Response time (all)*</td>
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<td></td>
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<td></td>
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<td>47. TCP/IP data menu*</td>
</tr>
<tr>
<td></td>
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<td>48. User communication</td>
</tr>
<tr>
<td></td>
<td></td>
<td>49. User wait states</td>
</tr>
</tbody>
</table>
**z/VM PT: Storage Utilization**

**Main storage utilization:**
- Total real storage: 12'288MB
- Total available: 12'288MB
- Offline storage frames: 0kB
- SYSGEN storage size: 12'256MB
- CP resident nucleus: 2'940kB
- Shared storage: 19'924kB
- FREE storage pages: 6'150kB
- FREE stor. subpools: 1'540kB
- Subpool stor. utilization: 92%
- Total DPA size: 1'997MB
- Locked pages: 4'404kB
- Trace table: 4'960kB
- Pageable: 1'347MB
- Storage utilization: 2%
- Tasks waiting for a frame: 0
- Tasks waiting for a page: 0

**V&R area:**
- Size defined: 0kB
- FREE storage: 0kB
- V&R recovery area in use: ...
- V&R user: ...

**Paging / spooling activity:**
- Page moves (2GB for trans.): 2/s
- Fast path page-in rate: 0/s
- Long path page-in rate: 0/s
- Long path page-out rate: 0/s
- Page read rate: 0/x
- Page write rate: 0/x
- Page read blocking factor: 27%
- Page write blocking factor: ...
- Migrate-out blocking factor: ...
- Paging SSCP rate: 0/s
- SPOOL read rate: 0/s
- SPOOL write rate: 0/s

**XSTORE utilization:**
- Total available: 2'048MB
- Att. to virt. machines: 0kB
- Size of CP partition: 2'048MB
- CP XSTORE utilization: 1%
- Low threshold for migr: 1'200kB
- XSTORE allocation rate: 0/s
- Average age of XSTORE blks: 176s
- Average age at migration: ...

**MDCACHE utilization:**
- Min. size in XSTORE: 0kB
- Max. size in XSTORE: 2'048MB
- Ideal size in XSTORE: 2'048MB
- Act. size in XSTORE: 13'596kB
- Bias for XSTORE: 1.00
- Min. size in main stor: 0kB
- Max. size in main stor: 12'288MB
- Ideal size in main stor: 9'144kB
- Act. size in main stor: 35'308kB
- Bias for main stor: 1.00
- MDCACHE limit / user: 1'334MB
- Users with MDCACHE inserts: 0
- MDISK cache read rate: 0/e
- MDISK cache write rate: 0/e
- MDISK cache read hit rate: 0/s
- MDISK cache read hit ratio: 97%

**VDISKs:**
- System limit (blocks): 3654kB
- User limit (blocks): 0
- Main store page frames: 0
- Expanded stor. pages: 0
- Pages on DASD: 0
### FCX102: z/VM System Counters

<table>
<thead>
<tr>
<th>Operation</th>
<th>Count</th>
<th>Rate/s</th>
</tr>
</thead>
<tbody>
<tr>
<td>Real SSCH instructions</td>
<td>445752</td>
<td>45.2</td>
</tr>
<tr>
<td>Real HSCH instructions</td>
<td>6</td>
<td>0.0</td>
</tr>
<tr>
<td>SVC instr. simulated</td>
<td>0</td>
<td>0.0</td>
</tr>
<tr>
<td>SVC 76 reflected</td>
<td>0</td>
<td>0.0</td>
</tr>
<tr>
<td>FP external call simul.</td>
<td>0</td>
<td>0.0</td>
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<tr>
<td>Fast-path SIQP simulat.</td>
<td>0</td>
<td>0.0</td>
</tr>
<tr>
<td>FP successful x-lates</td>
<td>29160</td>
<td>2.9</td>
</tr>
<tr>
<td>Fast-path aborts</td>
<td>8</td>
<td>0.0</td>
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<tr>
<td>Nr. of BIE executions</td>
<td>7,099</td>
<td>720</td>
</tr>
<tr>
<td>Entries to enabled wait</td>
<td>5,31E6</td>
<td>539</td>
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</tbody>
</table>

### Storage Management

<table>
<thead>
<tr>
<th>Operation</th>
<th>Count</th>
<th>Rate/s</th>
</tr>
</thead>
<tbody>
<tr>
<td>Subpool FREE reqs</td>
<td>5,63E6</td>
<td>572</td>
</tr>
<tr>
<td>V-R subpool FREE req.</td>
<td>0</td>
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<tr>
<td>Avail. list frame req.</td>
<td>193696</td>
<td>19.6</td>
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<tr>
<td>Demand scan list pass</td>
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<td>0.0</td>
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<td>Demand scan emergency</td>
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<td>0.0</td>
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<tr>
<td>System stor. pgs taken</td>
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<tr>
<td>Dispatch list pgs stolen</td>
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<td>Pgs from dormant users</td>
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<tr>
<td>Fast PGINs from XSTORE</td>
<td>287</td>
<td>0.0</td>
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<tr>
<td>P00UTs main to XSTORE</td>
<td>1</td>
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<tr>
<td>XSTORE allocations</td>
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<td>Globl cycl list searched</td>
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<tr>
<td>Migr. threshold inc.</td>
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<tr>
<td>Page migr. from dormant</td>
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<td>0.0</td>
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<tr>
<td>Page migr. from active</td>
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</tr>
<tr>
<td>Shared pages migrated</td>
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<tr>
<td>Blocks migrated from CP</td>
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<tr>
<td>Blocks migrated to DASD</td>
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<tr>
<td>No I/O for pg migration</td>
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<td>Pg not referenced STL</td>
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<tr>
<td>Single system pg reads</td>
<td>39</td>
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<tr>
<td>Pages read from DASD</td>
<td>566</td>
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<tr>
<td>Spool pages read</td>
<td>36</td>
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<tr>
<td>Total pgs to/from DASD</td>
<td>652</td>
<td>0.0</td>
</tr>
</tbody>
</table>

---

`Command ==>`  
`F1=Help  F4=Top  F5=Bot  F7=Bkwd  F8=Fwd  F12=Return`
**z/VM PT: %using and %delay – like states …**

### Performance Monitor - CPU Utilization

<table>
<thead>
<tr>
<th>Userid</th>
<th>%ACT</th>
<th>%RUN</th>
<th>%CPU</th>
<th>%LDG</th>
<th>%PGW</th>
<th>%IOW</th>
<th>%SIM</th>
<th>%TIW</th>
<th>%CFW</th>
<th>%TI</th>
<th>%EL</th>
<th>%DM</th>
<th>%IA</th>
<th>%PGA</th>
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<td>2%</td>
<td>1%</td>
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<td>G73VM10</td>
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</tr>
</tbody>
</table>

Select a user for user details or IDLEUSER for a list of idle users.

Command ==> 42/015

© 2004 IBM Corporation
### z/VM PT: User Details

#### Detailed data for user G78VM:

- **Total CPU Usage**: 0.0%
- **Superv. CPU Usage**: 0.0%
- **Emul. CPU Usage**: 0.0%
- **VF Total**: 0.0%
- **VF Overhead**: 0.0%
- **VF Emulation**: 0.0%
- **VF Load Rate**: 0.0/s
- **I/O Rate**: 0.0/s
- **DASD I/O Rate**: 0.0/s
- **UR I/O Rate**: 0.0/s
- **Diag. Xfer Rate**: 0.0/s
- **Max. Share**: 0.0/s

#### I/O active:

- **Active**: 0
- **Page Wait**: 0%
- **CF Wait**: 0%
- **Sim. Wait**: 0%
- **I/O Wait**: 0%
- **I/O act.**: 3%
- **PSW Wait**: 97%
- **I/O act.**: 3%

#### Status:

- **Proc. %CPU %CP %EM %VECT %VOHD %VEMU VLD/S IO/S Status**
  - **00**: EME, P12, PSWT
  - **01**: EME, P12, IOWT
  - **02**: EME, P12, PSWT
  - **03**: EME, P12, DORM
  - **04**: EME, P12, DORM
  - **05**: EME, P12, DORM
  - **06**: EME, P12, DORM
  - **07**: EME, P12, DORM
  - **08**: EME, P12, DORM
  - **09**: EME, P12, DORM
  - **0A**: EME, P12, DORM
  - **0B**: EME, P12, DORM

#### Device activity and status:

- **Device Name**: CL NAME=BASE
- **Size**: 1970MB
- **Mode**: Priv
- **PgRd/s**: 0
- **PgWr/s**: 0
- **Xrd/s**: 0
- **XWr/s**: 0
- **Migr/s**: 0
- **Steal/s**: 0

---

*Connected to remote server host b3270.de.bnr.com using port 23*
Linux Performance Data Selection for System LX00001

System Data
- Processes created per second: 0.45
- Context switches per second: 62.1
- Apache: Requests per second: 0.016
  - Bytes per request: 4263
  - Busy threads: 1
  - Idle threads: 5
  - 404 Errors per minute: 0

S Perform. Reports Description
- LXCPU LX00001 CPU utilization details
- LXMEM LX00001 Memory utilization & activity details
- LXNETWRK LX00001 Network activity (overall & by device)
- LXFILSYS LX00001 File system size and utilization

Select Linux performance details
Command ===>
F1=Help F4=Top F5=Bot F7=Bkwd F8=Fwd F12=Return
Linux CPU Utilization for System LX00001

<table>
<thead>
<tr>
<th>Processor</th>
<th>Percent CPU Utilization</th>
<th>Accumulated (s)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Total</td>
<td>User</td>
</tr>
<tr>
<td>Mean</td>
<td>0.65</td>
<td>0.2</td>
</tr>
<tr>
<td>cpu0</td>
<td>0.89</td>
<td>0.23</td>
</tr>
<tr>
<td>cpu1</td>
<td>0.43</td>
<td>0.18</td>
</tr>
</tbody>
</table>

Process Name

<table>
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<tr>
<th>Name</th>
<th>Total</th>
<th>User</th>
<th>Kernel</th>
<th>Nice</th>
<th>Idle</th>
<th>TotTm</th>
<th>UserTm</th>
<th>KernTm</th>
</tr>
</thead>
<tbody>
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<td>ksoftirqd_CPU0.4</td>
<td>0.26</td>
<td>...</td>
<td>0.26</td>
<td>19</td>
<td>---</td>
<td>13.61</td>
<td>...</td>
<td>13.61</td>
</tr>
<tr>
<td>gpmdsrv.2425</td>
<td>0.11</td>
<td>0.1</td>
<td>0.01</td>
<td>0</td>
<td>0.36</td>
<td>0.26</td>
<td>0.1</td>
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<tr>
<td>procgat.2390</td>
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<td>0.06</td>
<td>...</td>
<td>---</td>
<td>4.95</td>
<td>0.59</td>
<td>4.36</td>
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</tr>
<tr>
<td>java.782</td>
<td>0.05</td>
<td>0.01</td>
<td>0.03</td>
<td>0</td>
<td>---</td>
<td>5.59</td>
<td>1.98</td>
<td>3.61</td>
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<tr>
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<tr>
<td>db2sysc.492</td>
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<td>0</td>
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</tr>
<tr>
<td>db2sysc.493</td>
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<td>0</td>
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<td>---</td>
<td>...</td>
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<tr>
<td>db2sysc.494</td>
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<td>0</td>
<td>---</td>
<td>...</td>
<td>...</td>
<td>...</td>
</tr>
</tbody>
</table>
Accessing Linux Performance Data: Concept

- LINUX1 (LPAR)
- LINUX2 (LPAR)
- LINUX3
- FCONX
- TCP/IP
- z/OS
- z/VM
- FC MONCOLL LINUXUSR ON
- 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)
Enhanced RMFPMS Web Browser Interface

This metric measures the number of processes created per second. If this number is high, then a large number of processes are being started. Each time a process is created, there is some amount of overhead associated with this creation; this overhead can become a performance problem if the rate of process creation becomes large.
you can now create your own customizable view even in a Web browser like Mozilla, Explorer, Netscape.

| Inorm2: LINUX_NETWORK
| Transmit errors per second
| Local Time: 07/28/2003 20:08:00
| | 0 |
| Inorm2: LINUX_MEMORY
| resident set size in KB by process
| Local Time: 07/28/2003 20:08:00
| gpmddsen,5190 | 2264
| gpmddsen,5191 | 2264
| gpmddsen,5188 | 2264
| gpmddsen,5189 | 2264
| gpmddsen,5199 | 2264
| gpmddsen,5190 | 2264
| gpmddsen,5192 | 2264
| backup1,18183 | 1472
| kernel,5177 | 1218
| flagset,5174 | 1176
| cluster,5168 | 1036
| master,304 | 904

| Inorm2: LINUX_CPU
| load average
| Local Time: 07/28/2003 20:08:00
| 0.15 |

| Inorm2: LINUX_CPU
| accumulated cpu time total by process
| Local Time: 07/28/2003 20:08:00
| sshd,32 | 495.09
| procset,5183 | 138.04
| kesting_CPU2.9 | 90.72
| kernel,10 | 37.21
| nced,410 | 55.91
| kesting_CPU1.8 | 33.92
| kudatset,12 | 31.11
| loginacct,24 | 20.27
| cron,390 | 27.34
| init,1 | 21.74
| getfs,5177 | 19.08
| htdbg,5160 | 15.1

Automatic refresh in 28 seconds...
LPAR partition data from z/OS RMF
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

<table>
<thead>
<tr>
<th>IT Tasks</th>
<th>Automated Process</th>
<th>Manual Time</th>
<th>Automated Time</th>
</tr>
</thead>
<tbody>
<tr>
<td>Identify resource</td>
<td>Resources identified by business process</td>
<td>3 Days</td>
<td>&lt;1 Hour</td>
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<td>Variable</td>
<td>Automated</td>
</tr>
<tr>
<td><strong>Total Time</strong></td>
<td></td>
<td>13 - 23 Days</td>
<td>.5 Day</td>
</tr>
</tbody>
</table>
CIOs must reduce IT operational costs while optimizing resource utilization (people, hardware, software, ...)

All systems are based on dedicated resources

Workload based Growth

Business Transformation
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

- 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

### SAP Cost Control Vision

#### SAP Cost Component Vision

<table>
<thead>
<tr>
<th>Component</th>
<th>Savings Potential (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Miscellaneous</td>
<td>5%</td>
</tr>
<tr>
<td>Licences</td>
<td>7%</td>
</tr>
<tr>
<td>Implementation</td>
<td>13%</td>
</tr>
<tr>
<td>Integration</td>
<td>15%</td>
</tr>
<tr>
<td>Operations</td>
<td>20%</td>
</tr>
<tr>
<td>Interfacing</td>
<td>20%</td>
</tr>
<tr>
<td>Ongoing</td>
<td>20%</td>
</tr>
<tr>
<td>IT Infrastructure</td>
<td>20%</td>
</tr>
<tr>
<td><strong>Total Savings Potential</strong></td>
<td><strong>20-30%</strong></td>
</tr>
</tbody>
</table>

### Business Process Transformation

- On Demand Operating Environment
- Flexible Financial & Delivery Options
- IBM on demand plays
IT resources are pooled, virtualized, and allocated dynamically to satisfy changing business needs. 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

Customer A
Customer B

System Provisioning
Dynamic Optimizer

Administrator

SAP System (SID)
BaseSystem
CI
MS
DB

SAP System (SID)
BaseSystem
CI
MS
DB

SAP System (SID)
BaseSystem
CI
MS
DB

Use

Internal / External Service Provider

IBM eServer

IBM TotalStorage

OS Images
AS Images
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
**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

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<tr>
<td>Total Time</td>
<td></td>
<td>13 – 23 Days</td>
<td>Half Day</td>
</tr>
</tbody>
</table>

#### “On Demand” Orchestration

**Improved overall resource utilization**

- 8AM: On Demand Provisioning
- 10AM: On Demand Orchestration
- NOON: Improved overall resource utilization
- 2PM, 4PM, 6PM, 8PM: Reduced resource utilization
IBM Dynamic Infrastructure for mySAP Business Suite

IBM DI: Provisioning of SAP Systems

IBM Dynamic Infrastructure for mySAP Business Suite

IBM DI: Provisioning of SAP System Landscapes

zLinux On Demand based on ODI

IBM Dynamic Infrastructure SAP Inhouse Showcase

CeBIT 2005

© 2004 IBM Corporation
z/VM Automation using PROP
Programmable Operator facility (PROP)
Intercepts all messages and requests to the virtual 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
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
See also session 9136

z/VM – CMS Planning and Administration
SC24-6042-00

2 chapters devoted to PROP Chapter 5 and 6
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
Client Success Stories
Managing Linux

Colorado State University

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

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

“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
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)