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Linux Systems Management on zSeries Session 9282

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§ Linux Systems Management on zSeries

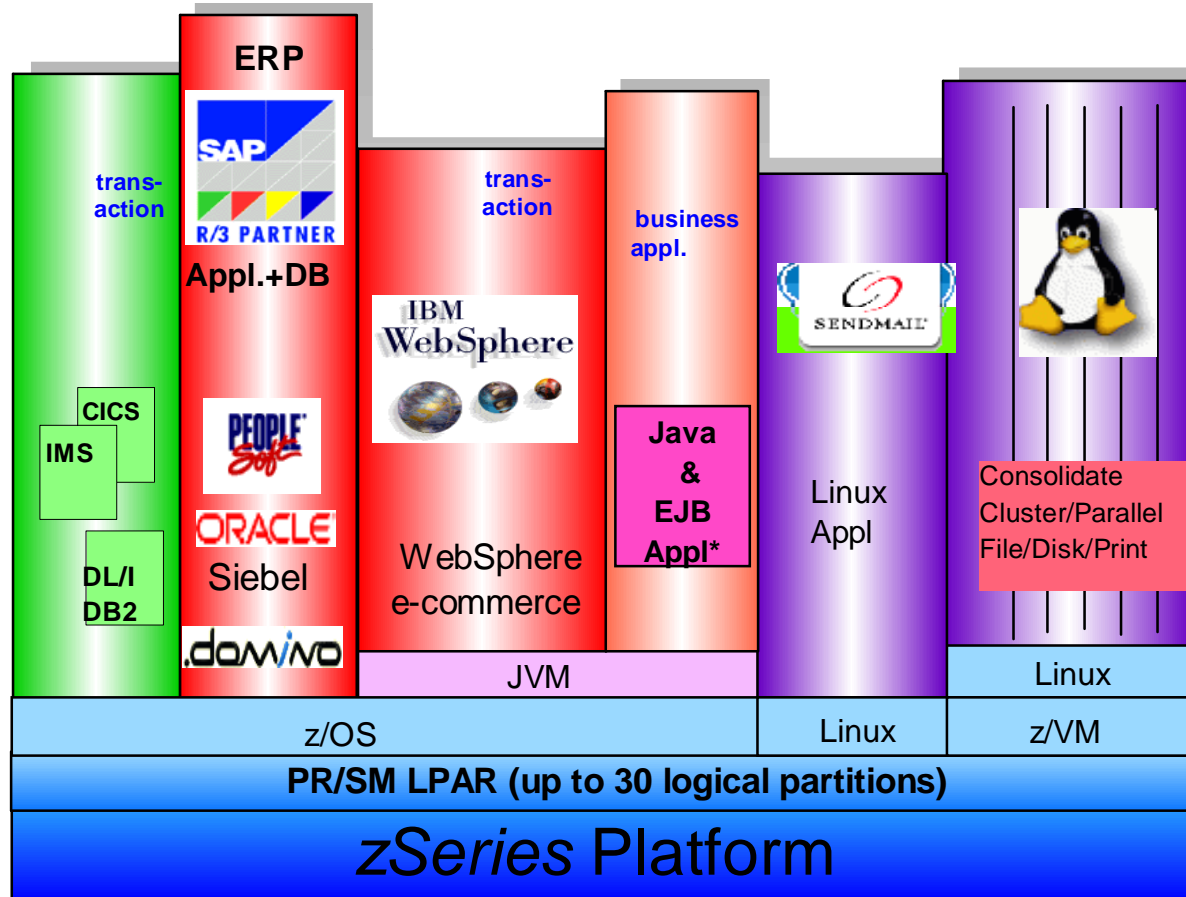
zSeries has unique Linux management capabilities that are integrated into z/VM and z/OS products and tools.

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

- § 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



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

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



BSM

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



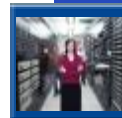
Availability

- § 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*



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



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



Provisioning

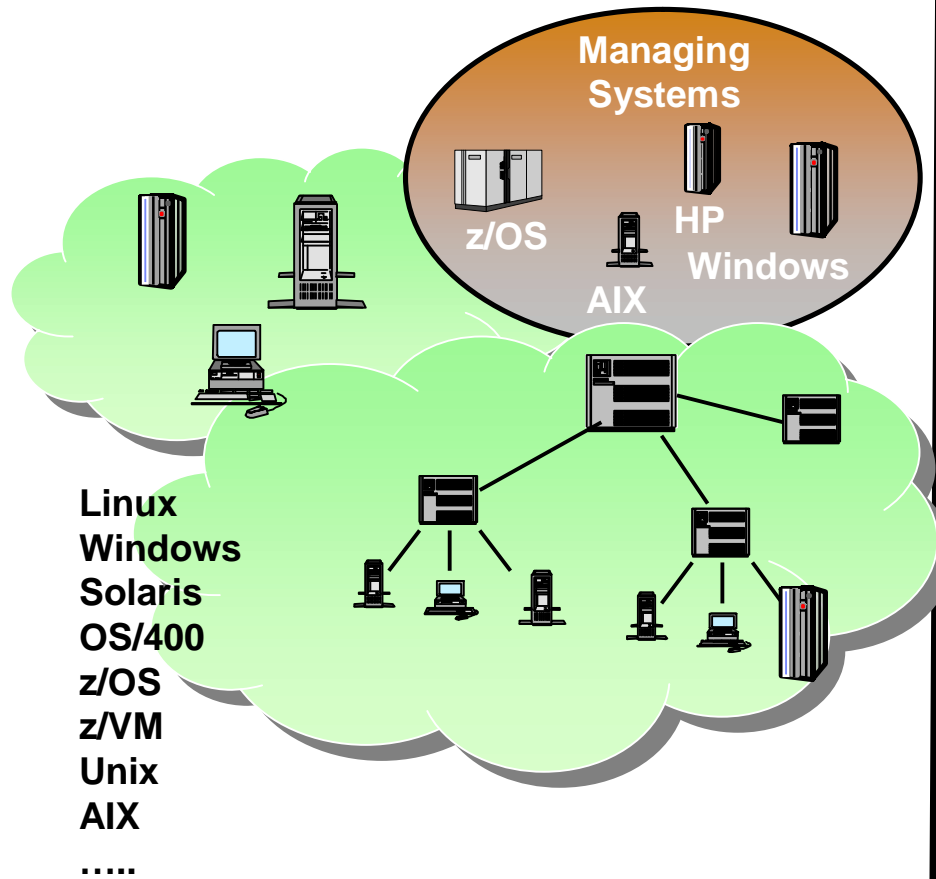
- § Tivoli Provisioning Manager
- § Tivoli Configuration Manger
- § Tivoli Identity Manager
- § Remote Control
- § Workload Scheduler



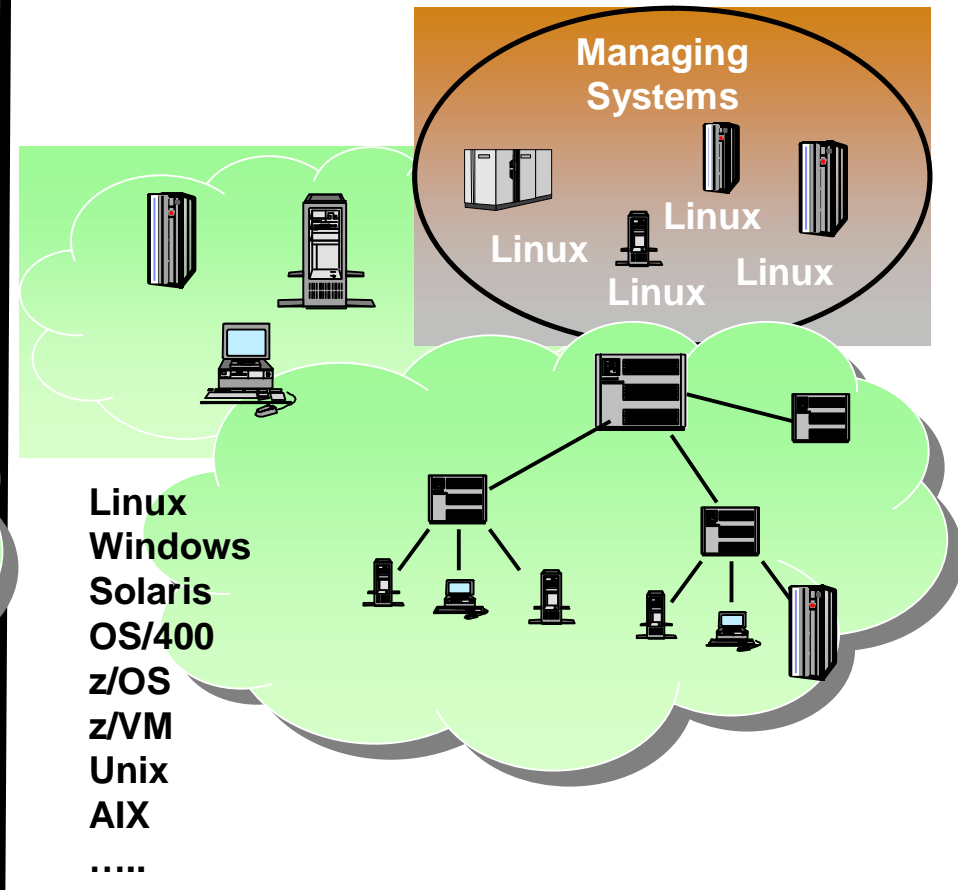
Orchestration

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

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

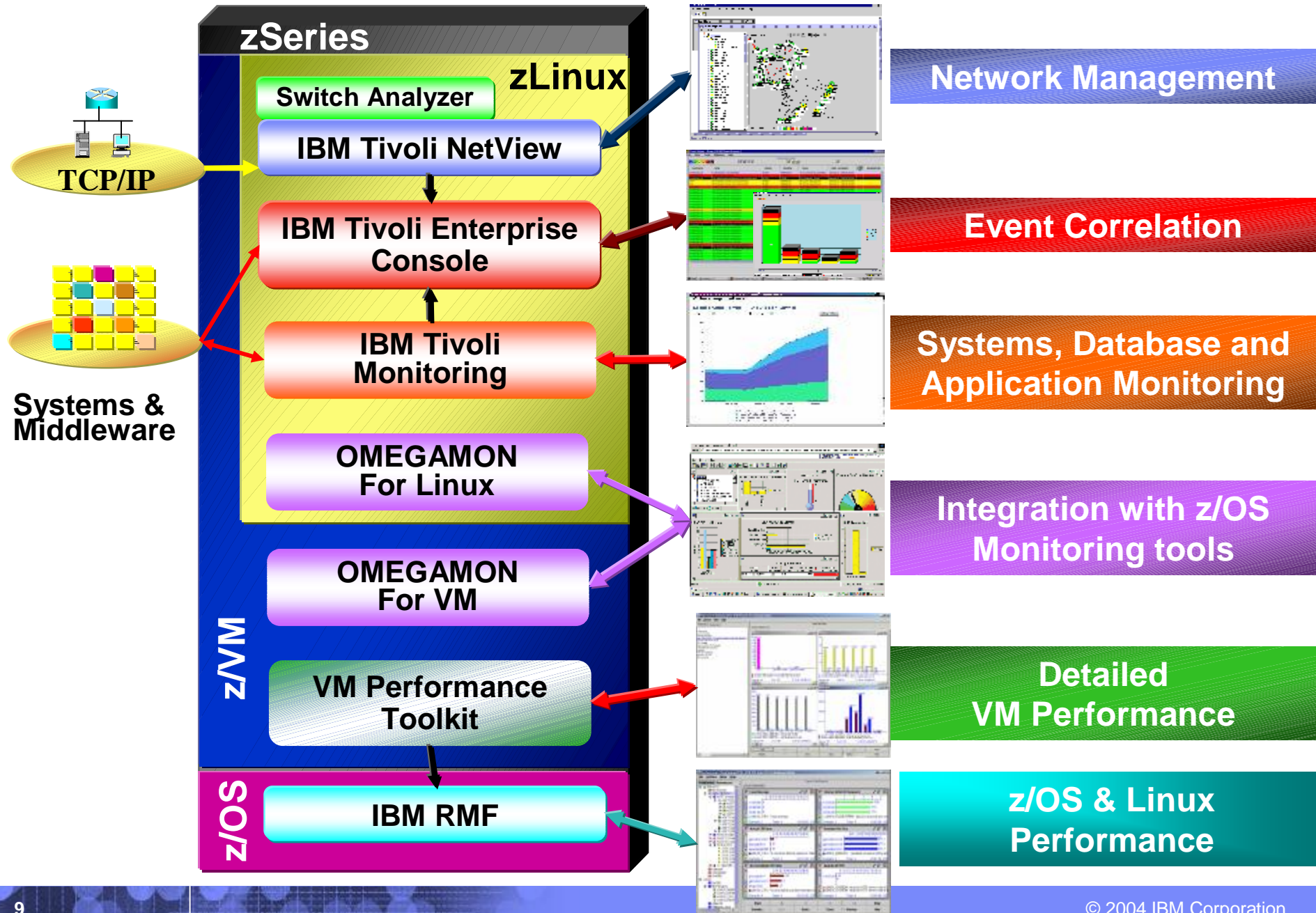


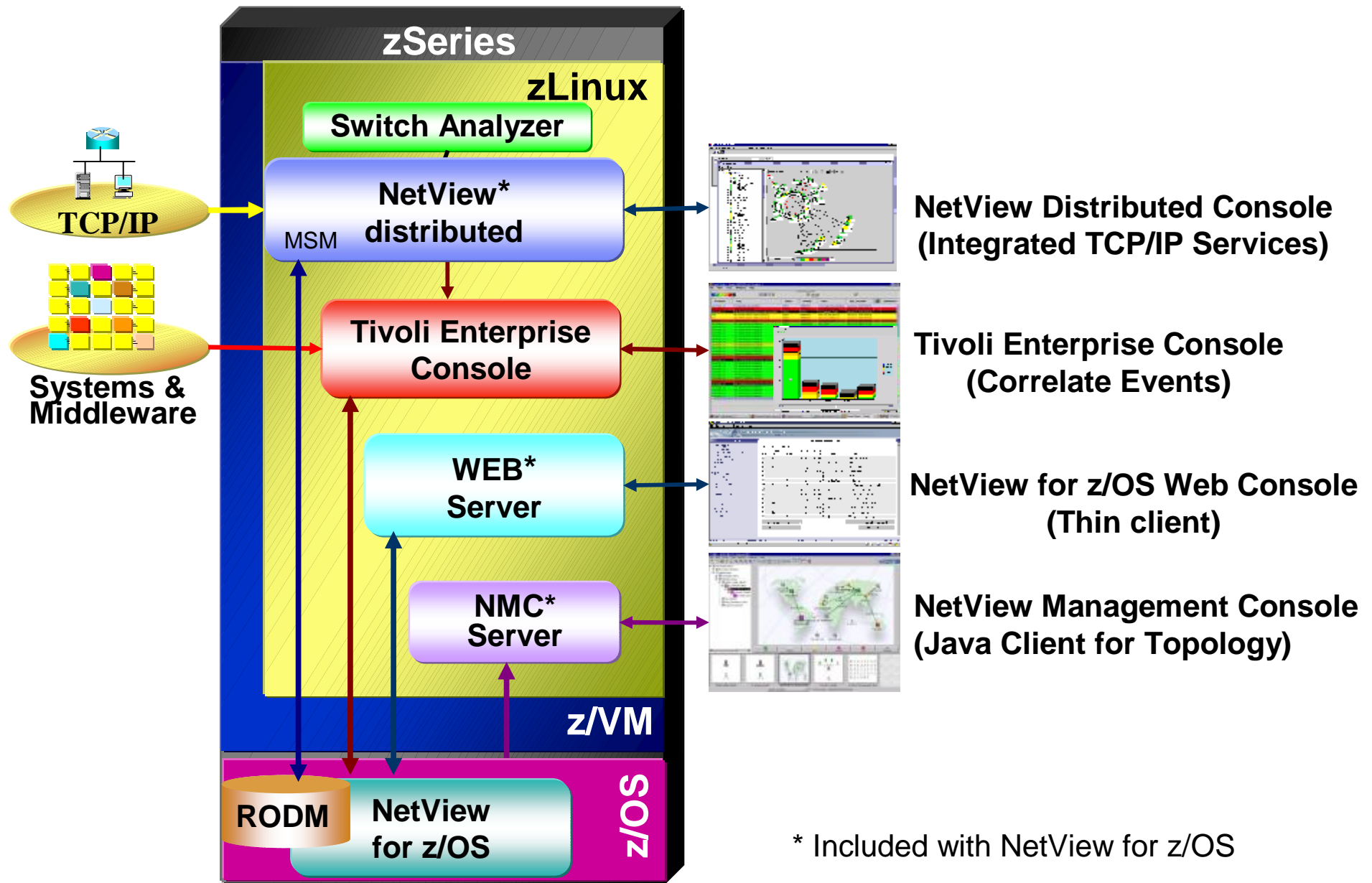
Linux as a Management Platform (Tivoli calls this a server)

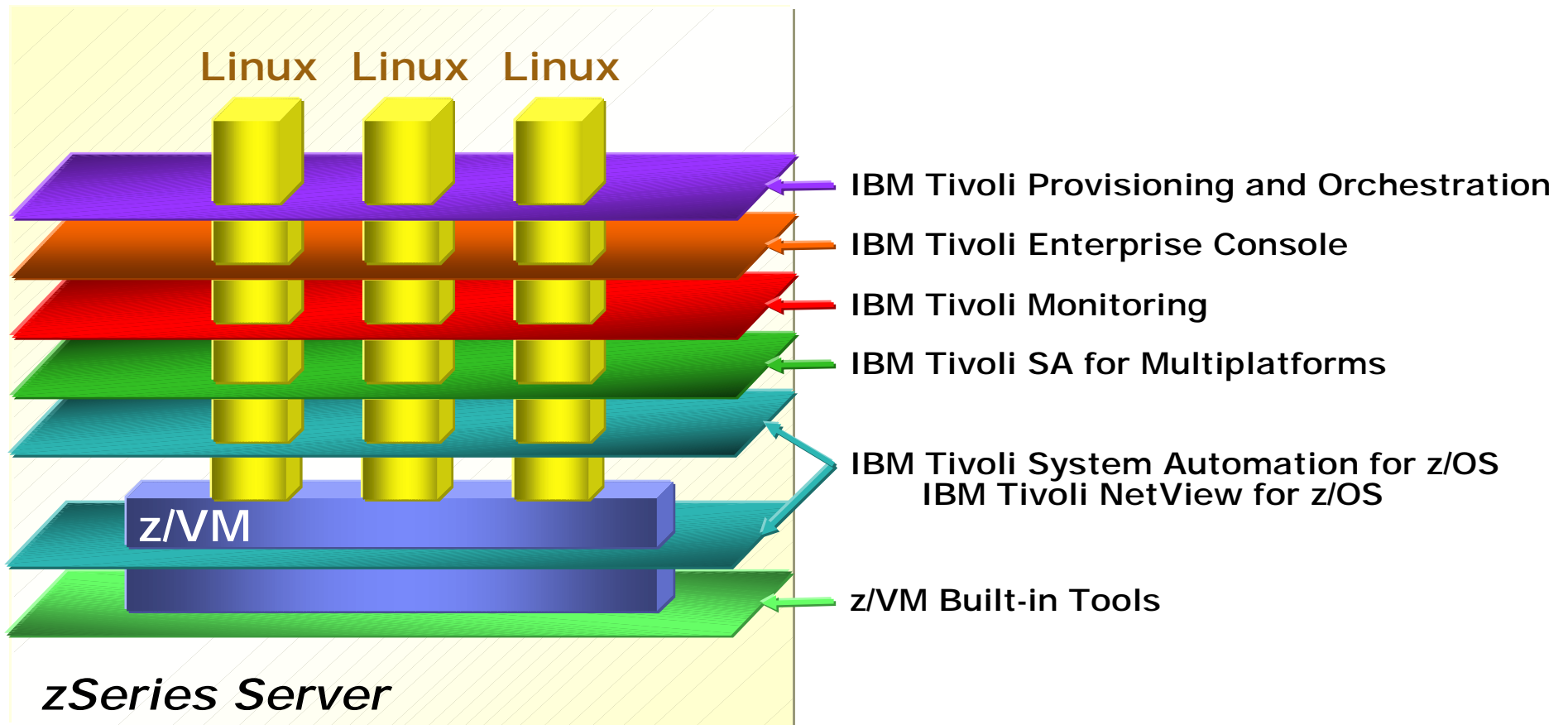


Tivoli Management of Linux on zSeries	Challenges	Value
IBM Tivoli Workload Scheduler ^{C S}	Multiple job schedulers	One job scheduling for z/OS and Linux Servers
IBM Tivoli Monitoring (ITM) ^{C S}	Linux system performance problems	Centralized monitoring and control of systems
IBM Tivoli Enterprise Console ^{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 ^{CS 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









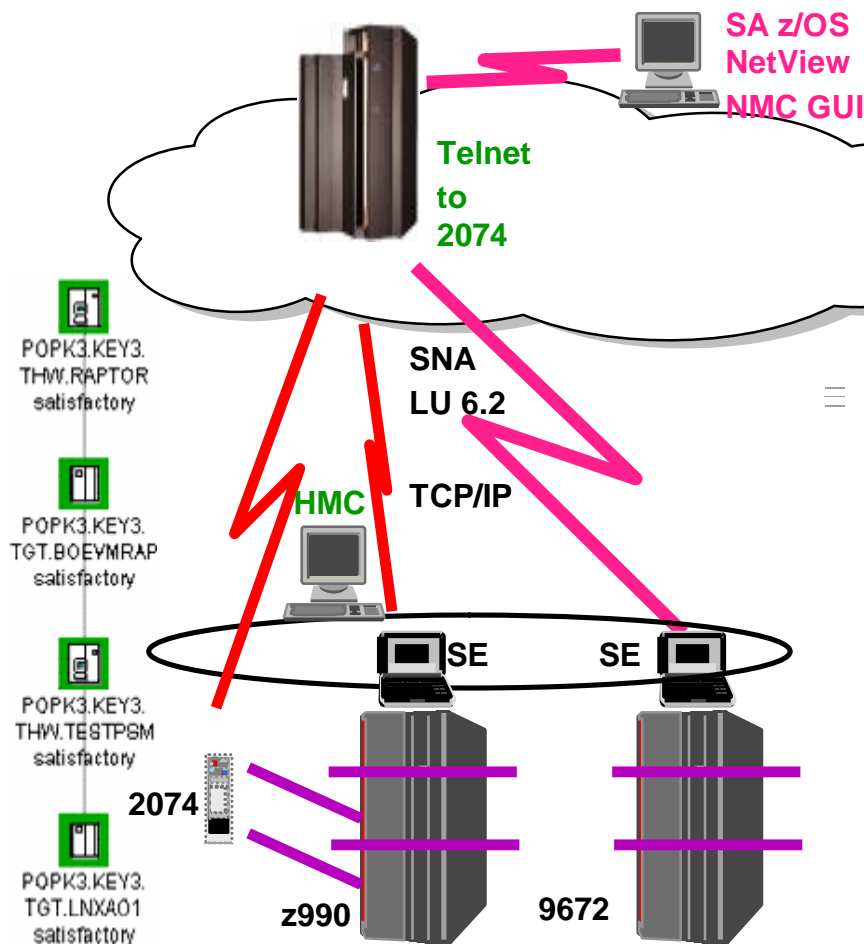
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Console automation and Linux boot

z/VM & Linux console automation and boot

Focal Point SA z/OS with Processor Operations



§ External Automation

At IML & IPL/Boot time

At runtime (status update)

§ Single Point Of Control

1 platform

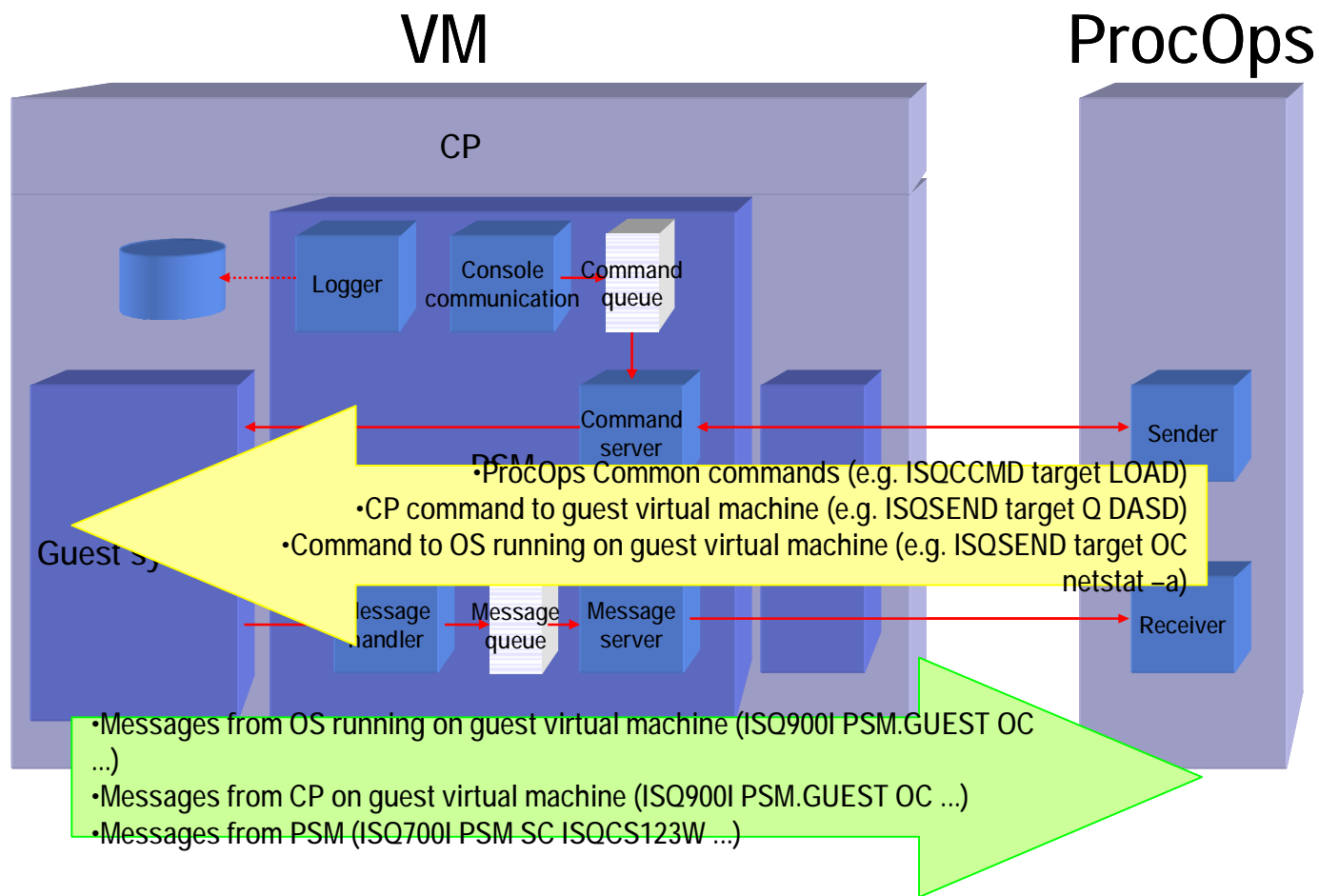
For eServer consoles

§ 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



§ 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

```
ISQSEND LINUX02 0C ps -ef
```

§ Enter a command to CP on guest machine

```
ISQSEND MWS2 SC DISPLAY PSW
```


§ Message from guest machine operating system

```
ISQ900I PSM1. LINUX02 0C 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 0C 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.
```

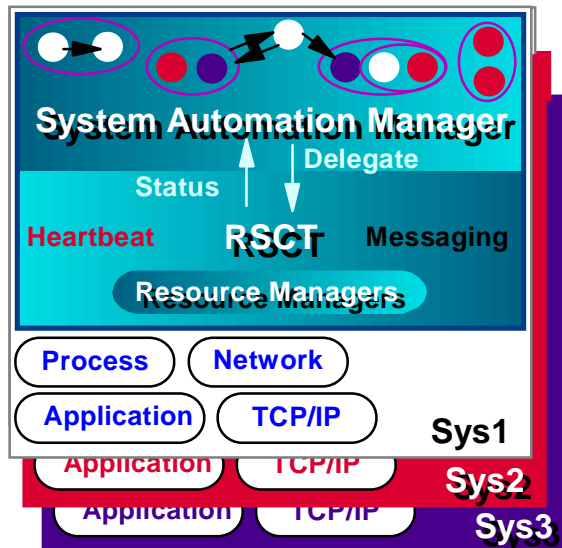


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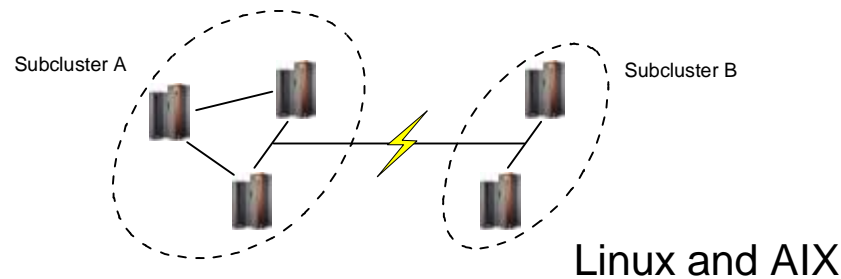
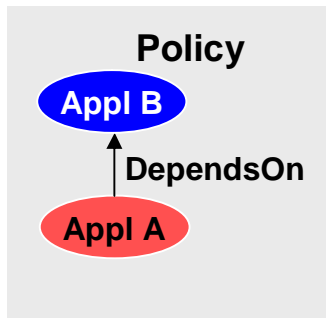
Mainframe-like High Availability for Linux Disaster Recovery

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



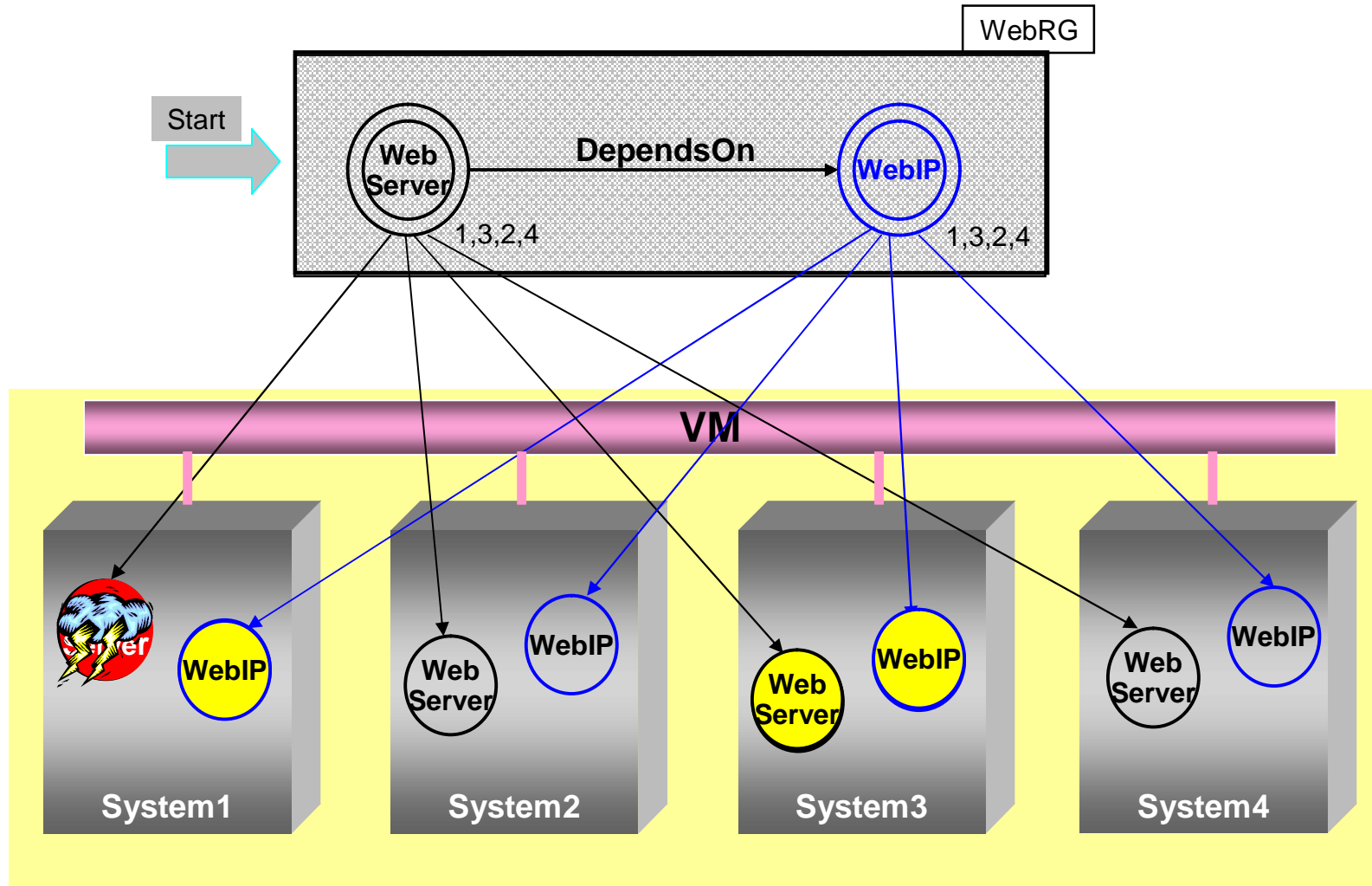
Represent a complex e-business application as a single group consisting of cluster-wide components

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

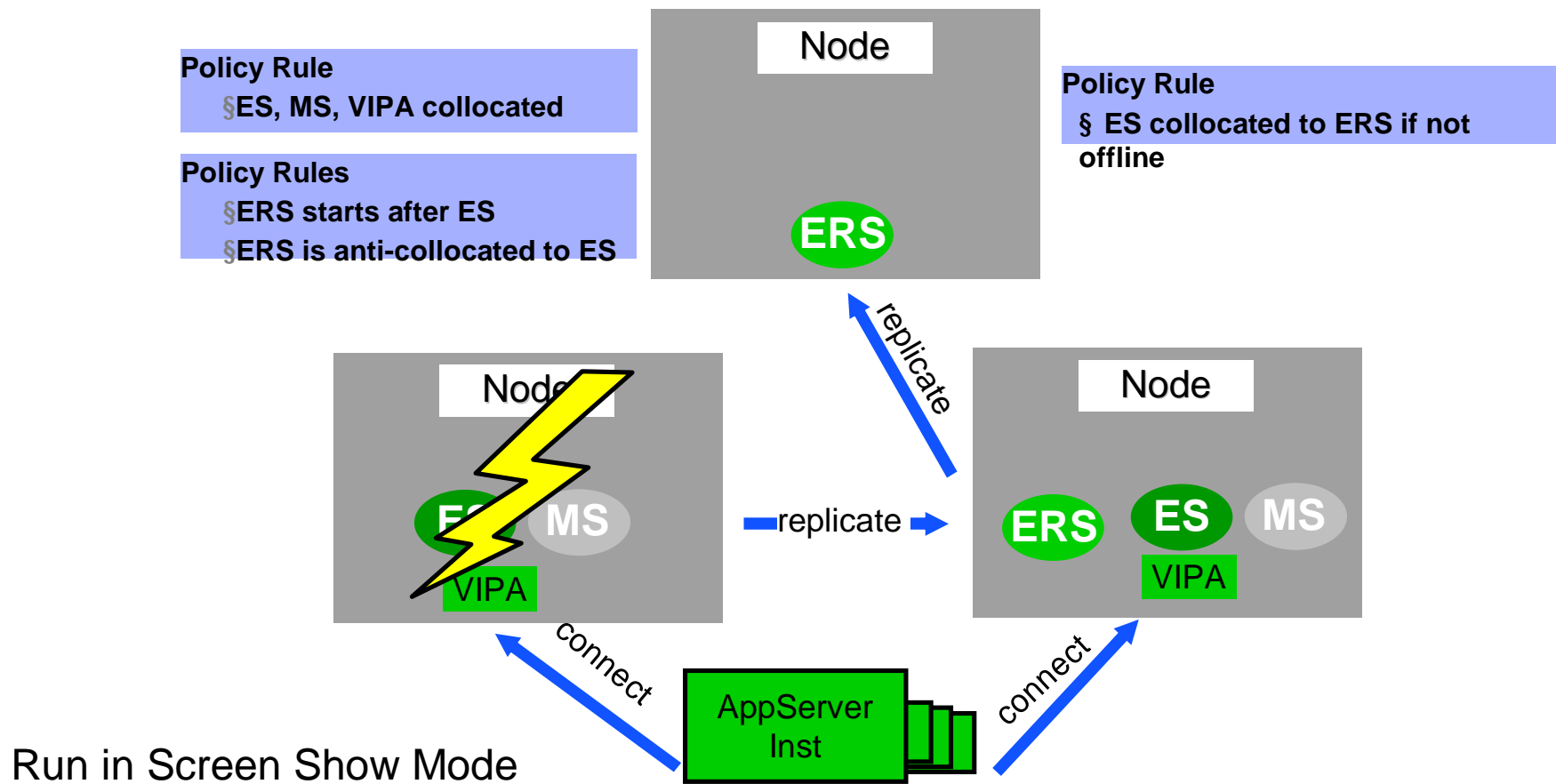
§ Policy based automation

§ No programming skills required

§ Is used with xDR for Remote site disaster recovery



Example: mySAP® Enqueue Server HA



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

<http://publib-b.boulder.ibm.com/Redbooks.nsf/9445fa5b416f6e32852569ae006bb65f/f9c4cb60a451c7ed86256d490056eebd?OpenDocument>

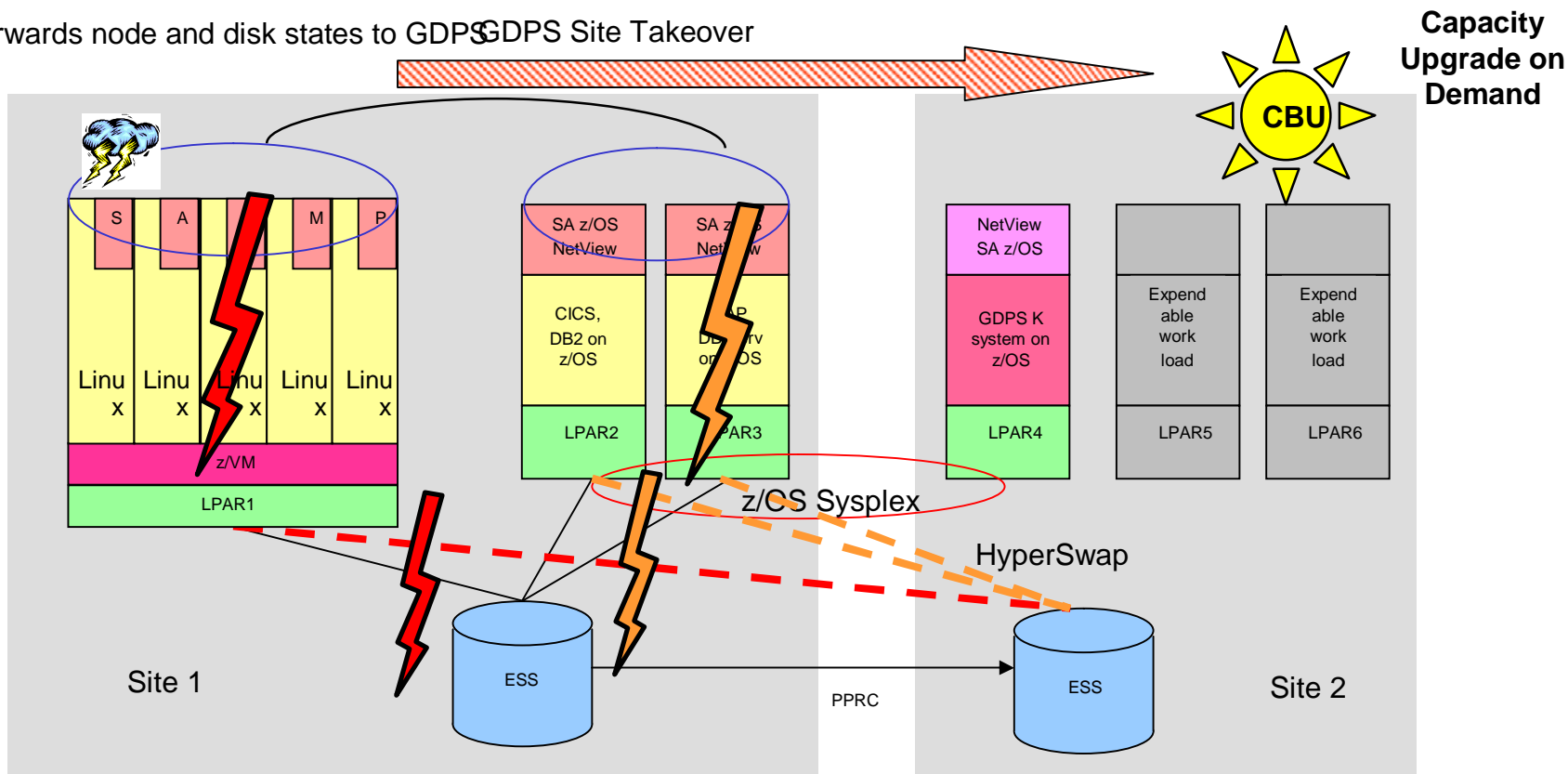
- § Industrial Strength DR Solution for Linux for zSeries based on GDPS
 - Enables lower skilled operators to perform DR if specialists unavailable
 - Pretested DR solution with highest probability of success
 - Continuous availability through HyperSwap even in DR case
- § High customer value for coordinated 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





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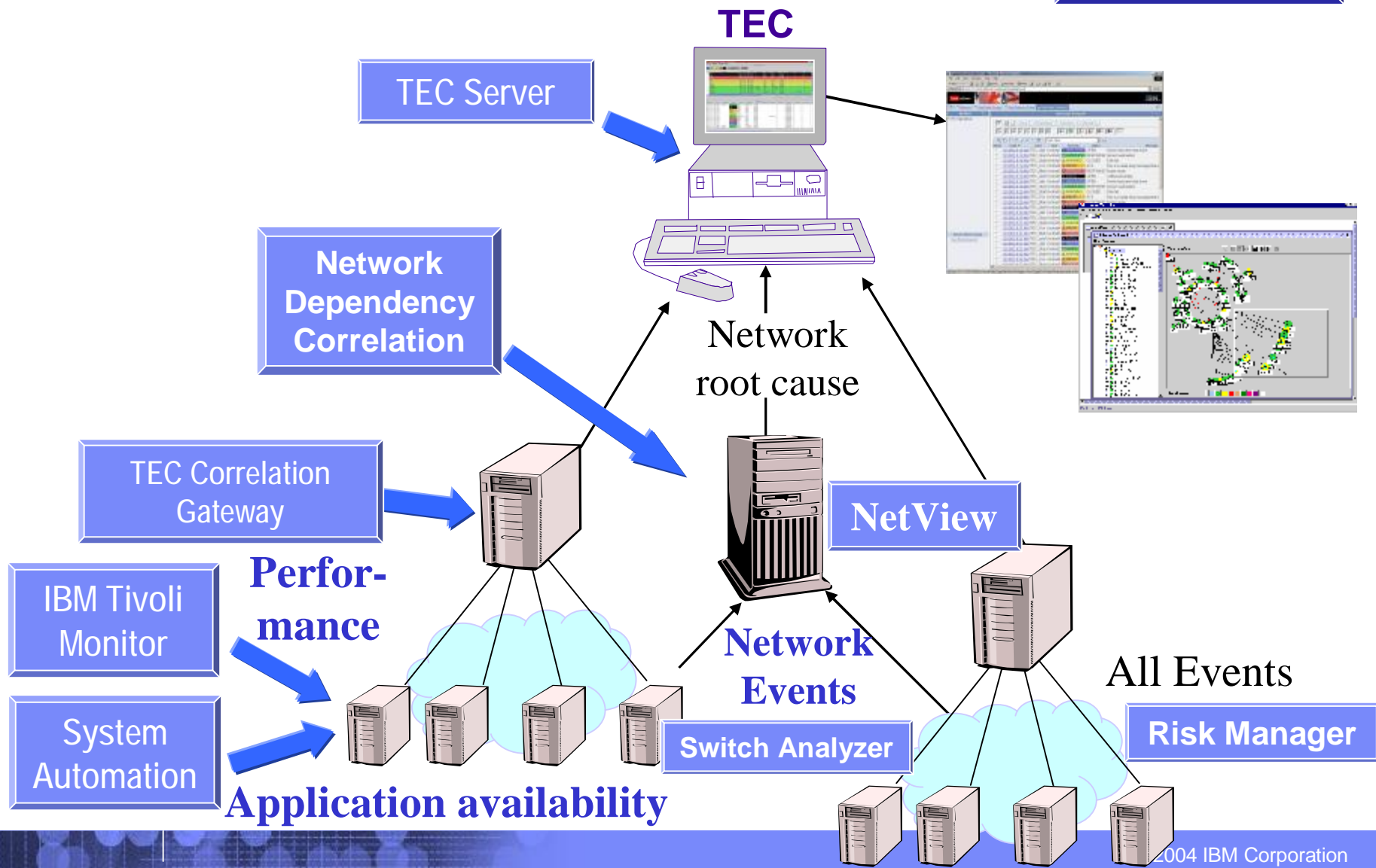


Event management



Tivoli Solution for Event Correlation

Tivoli Solution for Root Cause



§ Receive and correlate events

- From networks and systems and security devices

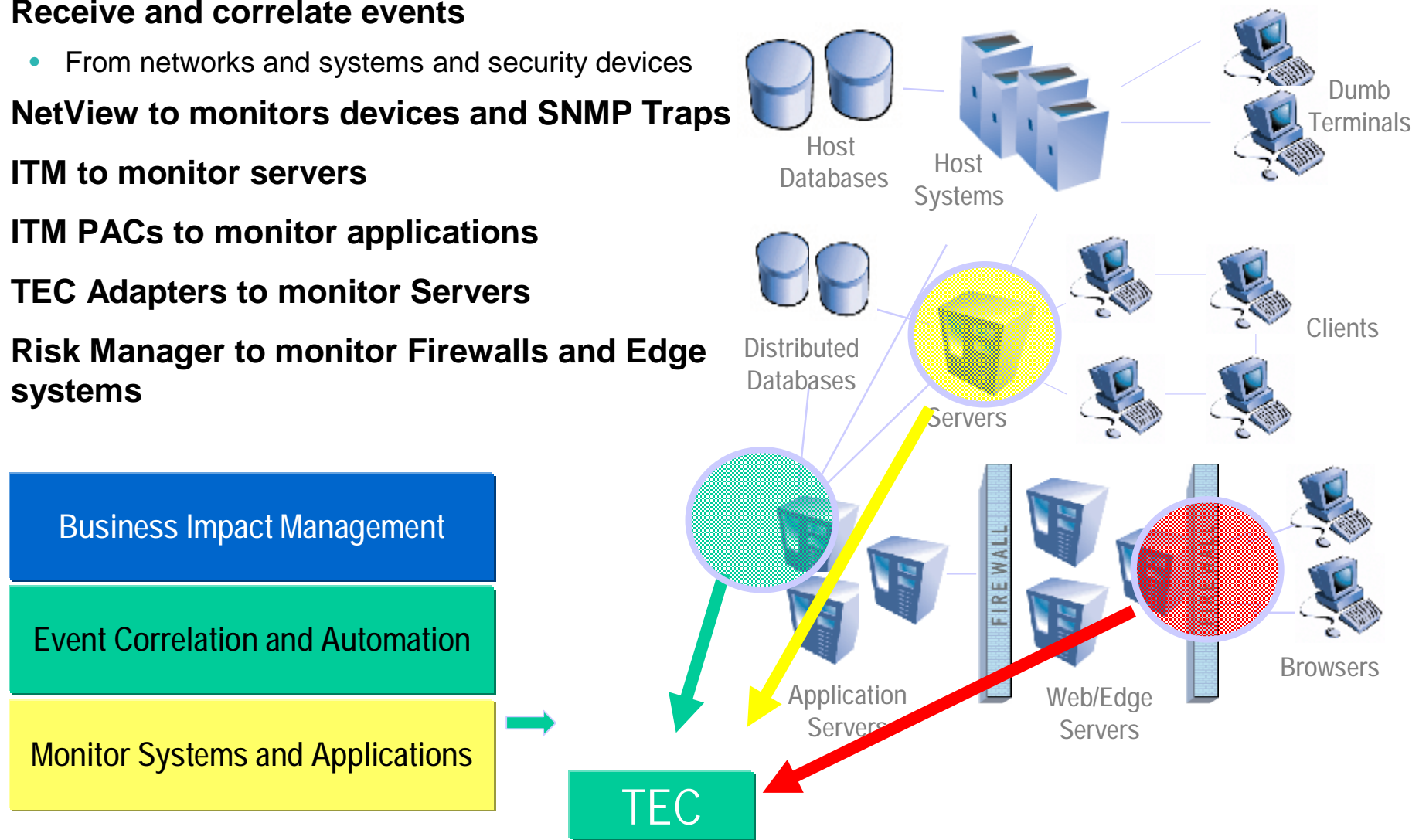
§ NetView to monitors devices and SNMP Traps

§ 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**

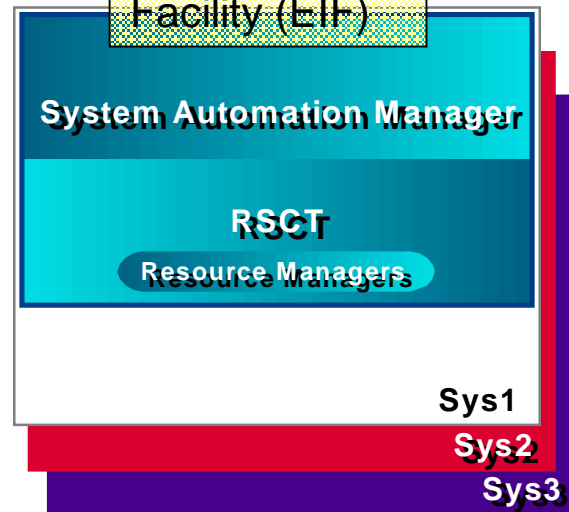
Customize the publisher configuration file and the TEC EIF file

`samctrl -e P`. By default the publisher is disabled.

Import, compile, load, and activate the TEC baroc file in the TEC server.

Time	Severity	Class	Instance	Status	Message	Action
May 17, 20...	Error	TEC_Task	Open	Open	...	...
May 17, 20...	Warning	TEC_Task	Open	Open
May 17, 20...	Info	TEC_Task	Open	Open

Event Integration Facility (EIF)



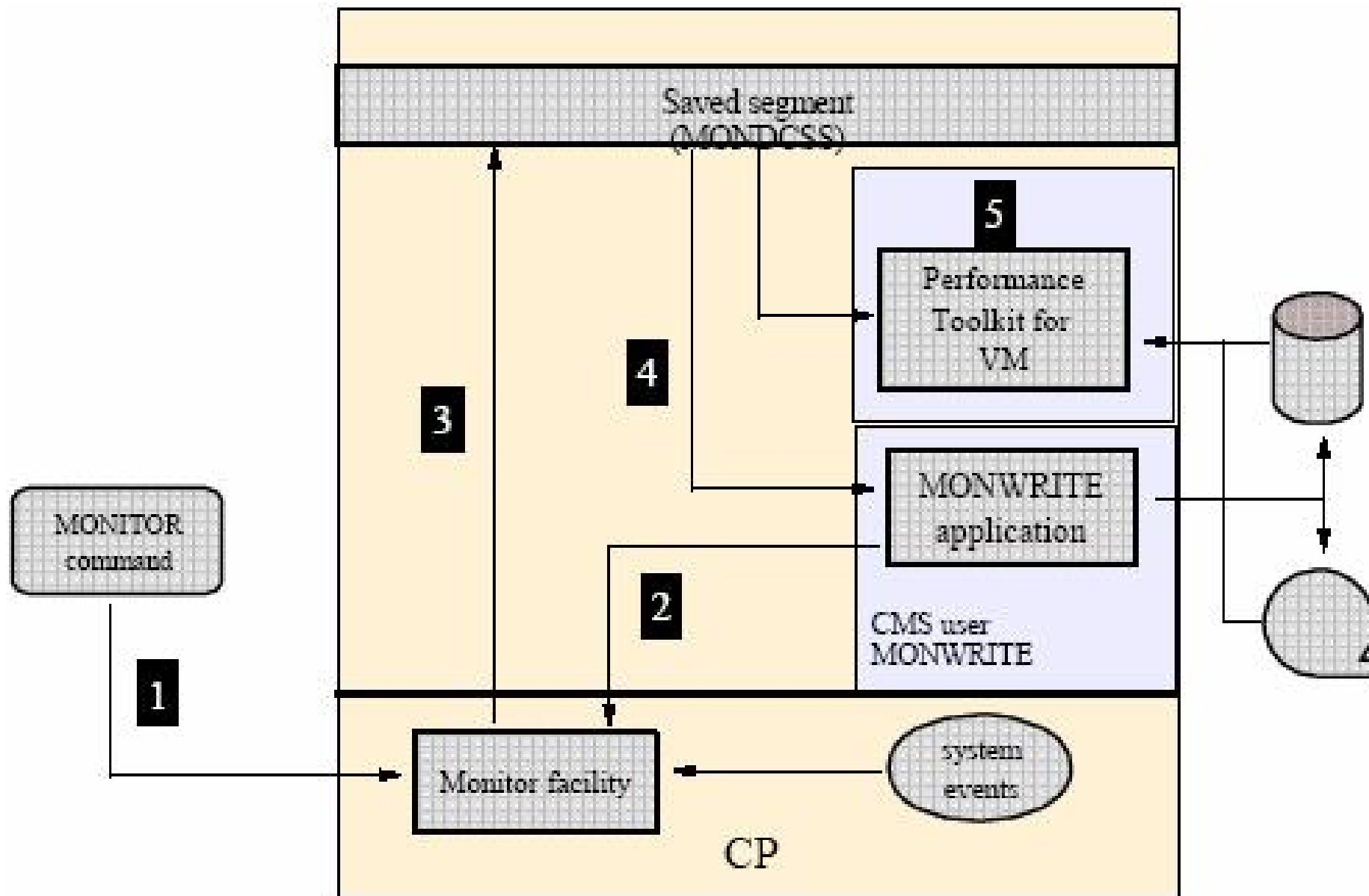


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Performance monitoring

z/VM Performance Toolkit
z/OS RMF



- § *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



Session A - [43 x 80]

File Edit View Communication Actions Window ZipPrint Help

FCX124 Performance Screen Selection (FL440 VM63358) Perf. Monitor

General System Data	I/O Data	History Data (by Time)
1. CPU load and trans.	11. Channel load	31. Graphics selection
2. Storage utilization	12. Control units	32. History data files*
3. Storage subpools	13. I/O device load*	33. Benchmark displays*
4. Priv. operations	14. CP owned disks*	34. Correlation coeff.
5. System counters	15. Cache extend. func.*	35. System summary*
6. CP IUCV services	16. DASD I/O assist	36. Auxiliary storage
7. SPOOL file display*	17. DASD seek distance*	37. CP communications*
8. LPAR data	18. I/O prior. queueing*	38. DASD load
9. Shared segments	19. I/O configuration	39. Minidisk cache*
A. Shared data spaces	1A. I/O config. changes	3A. Paging activity
B. Virt. disks in stor.		3B. Proc. load & config*
C. Transact. statistics	User Data	3C. Logical part. load
D. Monitor data	21. User resource usage*	3D. Response time (all)*
E. Monitor settings	22. User paging load*	3E. RSK data menu*
F. System settings	23. User wait states*	3F. Scheduler queues
G. System configuration	24. User response time*	3G. Scheduler data
H. VM Resource Manager	25. Resources/transact.*	3H. SFS/BFS logs menu*
	26. User communication*	3I. System log
I. Exceptions	27. Multitasking users*	3K. TCP/IP data menu*
	28. User configuration*	3L. User communication
K. User defined data*	29. Linux systems*	3M. User wait states

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

MA a 42/015

Connected to remote server/host tn3270.de.ibm.com using port 23

The screenshot shows a Mozilla browser window titled "Web Server Logon - Mozilla". The address bar contains the URL `http://9.152.82.90:81/03D25F80/E2B3/LOGON/768`. The page content includes a blue box with the text "Performance Toolkit for VM FL 440". The main heading is "Remote Performance Monitoring Session Setup Web Server Logon". Below this, a message states: "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)". There are two input fields: "VM UserID:" with the value "benke" and "Password:" with masked characters. A "Submit" button is to the right. Below the input fields, it says "Desired screen layout:" followed by "Max. Data Lines:" with a dropdown menu set to "24" and "Line length:" with a dropdown menu set to "132". A final message reads: "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." The browser status bar at the bottom shows "Done" and some navigation icons.

BOEVMG73 Data Retrieval Session (Performance Toolkit for VM FL440 VM63358) - Mozilla

File Edit View Go Bookmarks Tools Window Help

Back Forward Reload Stop <http://9.152.82.90:81/03D25F80/BD34/BOEVMG73> Search Print

Home Bookmarks mozilla.org Latest Builds

Performance Toolkit for VM FL 440

Initial Performance Data Selection Menu (BOEVMG73)

Select performance screen

Command Refresh Systems Forw Help Auto-Refresh

General System Data	I/O Data	History Data (by Time)
1. CPU load and trans.	11. Channel load	31. Graphics selection
2. Storage utilization	12. Control units	32. History data files*
3. Storage subpools	13. I/O device load*	33. Benchmark displays*
4. Priv. operations	14. CP owned disks*	34. Correlation coeff.
5. System counters	15. Cache extend. func.*	35. System summary*
6. CP IUCV services	16. DASD I/O assist	36. Auxiliary storage
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C. Transact. statistics	User Data	3C. Logical part. load
D. Monitor data	21. User resource usage*	3D. Response time (all)*
E. Monitor settings	22. User paging load*	3E. RSK data menu*
F. System settings	23. User wait states*	3F. Scheduler queues
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	28. User configuration*	3L. User communication
K. User defined data*	29. Linux systems*	3M. User wait states

http://9.152.82.90:81/03D25F80/3B4A/3

z/VM PT: Storage Utilization



```
Session A - [43 x 80]
File Edit View Communication Actions Window ZipPrint Help
[Icons]

FCX103      CPU 2084  SER F80CA  Interval 13:30:39 - 16:10:39  Perf. Monitor

Main storage utilization:
Total real storage      12'288MB
Total available        12'288MB
Offline storage frames      0kB
SYSGEN storage size     12'288MB
CP resident nucleus     2'940kB
Shared storage         19'924kB
FREE storage pages      6'188kB
FREE stor. subpools     1'540kB
Subpool stor. utilization 92%
Total DPA size          1'997MB
Locked pages           46'404kB
Trace table            4'900kB
Pageable               1'947MB
Storage utilization     2%
Tasks waiting for a frame 0
Tasks waiting for a page 0/s

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/s
Page write rate         0/s
Page read blocking factor 27
Page write blocking factor ...
Migrate-out blocking factor ...
Paging SSCH rate        0/s
SPOOL read rate         0/s
SPOOL write rate        0/s

Enter 'FREesub' command for Free Storage Subpool details
Command ==>
F1=Help  F4=Top  F5=Bot  F7=Bkwd  F8=Fwd  F12=Return

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 1768s
Average age at migration ...s

MDCACHE utilization:
Min. size in XSTORE    0kB
Max. size in XSTORE    2'048MB
Ideal size in XSTORE   2'046MB
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. 9'144MB
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/s
MDISK cache write rate .../s
MDISK cache read hit rate 0/s
MDISK cache read hit ratio 97%

VDISKs:
System limit (blocks)  3654k
User limit (blocks)    0
Main store page frames 0
Expanded stor. pages   0
Pages on DASD          0

MA a 42/015
Connected to remote server/host tn3270.de.ibm.com using port 23
```

z/VM PT: System Counters



Session A - [43 x 80]

File Edit View Communication Actions Window ZipPrint Help

FCX102 CPU 2084 SER F80CA Interval 13:30:40 - 16:14:40 Perf. Monitor

Operation	Count	Rate/s	Operation	Count	Rate/s
Real SSCH instructions	445752	45.2	Real CSCH instructions	81	.0
Real HSCH instructions	6	.0	El. time slice drops	6970	.7
SVC instr. simulated	0	.0	SVC interrupts reflectd	0	.0
SVC 76 reflected	0	.0	Diagnose I/O requests	4439	.4
FP external call simul.	0	.0	FP partial executions	41244	4.1
Fast-path SIGP simulat.	0	.0	FP simul. of Diag.X'44'	0	.0
FP successful x-lates	29160	2.9	CCW chains not FP-elig.	544	.0
Fast-path aborts	8	.0	Total FP xlate attempts	29712	3.0
Nr. of SIE executions	7.09E6	720	Nr. of SIE intercepts	7.05E6	716
Entries to enabled wait	5.31E6	539			
Storage Management			Total FREE requests		
Subpool FREE requests	5.63E6	572	Storage fast clears	92636	9.4
V=R subpool FREE req.	0	.0	Available list empty	0	.0
Avail. list frame req.	193696	19.6	Demand scan 2nd pass	0	.0
Demand scan 1st pass	0	.0	Demand scan not satisf.	0	.0
Demand scan emergency	0	.0	Shared stor. pgs taken	0	.0
System stor. pgs taken	0	.0	Eligible lst pgs stolen	0	.0
Dispatch lst pgs stolen	0	.0	Pages taken for FREE	1	.0
Pgs from dormant users	0	.0	Slow PGINs from XSTORE	21	.0
Fast PGINs from XSTORE	287	.0	No XSTORE available	0	.0
PGOUTs main to XSTORE	1	.0	XSTORE releases	250	.0
XSTORE allocations	1	.0	Migr. target time reset	0	.0
Glbl cycl list searched	0	.0	Migr thresh buf lowered	0	.0
Migr thresh buf increas	0	.0	Dormant with page migr.	0	.0
Page migr. from dormant	0	.0	Active with page migrat	0	.0
Page migr. from active	0	.0	Shared sys with pg migr	0	.0
Shared pages migrated	0	.0	PGMBKs sel. during migr	0	.0
Blocks migrated from CP	0	.0	XSTORE migr invocations	0	.0
Blocks migrated to DASD	0	.0	Pg not referenced (MIG)	0	.0
No I/O for pg migration	0	.0	Page blocks read	12	.0
Pg not referenced (STL)	0	.0	Single guest page reads	2	.0
Single system pg reads	39	.0	Pages written to DASD	3	.0
Pages read from DASD	568	.0	Spool pages written	45	.0
Spool pages read	36	.0			
Total pgs to/from DASD	652	.0			

Command ==>
F1=Help F4=Top F5=Bot F7=Bkwd F8=Fwd F12=Return

MA a 42/015

Connected to remote server/host tn3270.de.ibm.com using port 23

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



Session A - [43 x 80]

File Edit View Communication Actions Window ZipPrint Help

FCX114 CPU 2084 SER F80CA Interval 13:30:39 - 16:20:39 Perf. Monitor

Userid	%ACT	%RUN	%CPU	%LDG	%PGW	%IOW	%SIM	%TIW	%CFW	<-SVM and->				%IOA	%PGA
										%TI	%EL	%DM	%IOA		
>System<	16	2	1	0	0	0	0	26	0	0	0	2	69	0	
G73VM10	100	1	0	0	0	0	1	0	0	0	0	0	98	0	
G73VM1	99	4	2	0	0	0	1	87	1	0	0	0	5	0	
TCPIP	75	0	0	0	0	0	0	0	0	0	0	0	100	0	
VTAM	62	0	0	0	0	0	0	0	0	0	0	0	100	0	
PERFSVM	6	0	0	0	0	0	0	20	0	7	0	72	0	0	
VMSERVS	4	0	0	0	0	0	0	51	0	1	0	47	0	0	
RSCS	1	0	0	0	0	0	0	100	0	0	0	0	0	0	
DATAMOVE	0	0	0	0	0	100	0	0	0	0	0	0	0	0	
DIRMAINT	0	...	...	...	...	...	...	...	...	...	...	...	...	...
EREP	0	...	...	...	...	...	...	...	...	...	...	...	...	...
GCS	0	...	...	...	...	...	...	...	...	...	...	...	...	...
HORSTH	0	0	0	0	0	0	0	20	0	0	0	0	0	0	
OPERATOR	0	0	0	0	0	25	0	75	0	0	0	0	0	0	
OPERSYMP	0	...	...	...	...	...	...	...	...	...	...	...	...	...
OSADMIN1	0	0	0	0	0	0	0	83	0	0	0	0	17	0	
OSASF	0	0	0	0	0	0	0	0	100	0	0	0	0	0	
RACFVM	0	0	0	0	0	0	0	100	0	0	0	0	0	0	
SMSMASTR	0	...	...	...	...	...	...	...	...	...	...	...	...	...
SMSSRV01	0	...	...	...	...	...	...	...	...	...	...	...	...	...
SMSSRV02	0	...	...	...	...	...	...	...	...	...	...	...	...	...
SMSSRV03	0	...	...	...	...	...	...	...	...	...	...	...	...	...
VMSEVR	0	...	...	...	...	...	...	...	...	...	...	...	...	...
VMSEVRU	0	...	...	...	...	...	...	...	...	...	...	...	...	...

Select a user for user details or IDLEUSER for a list of idle users
Command ==>
F1=Help F4=Top F5=Bot F7=Bkwd F8=Fwd F10=Left F11=Right F12=Return

MA a 42/015
Connected to remote server/host tn3270.de.ibm.com using port 23

z/VM PT: User Details



```

Session A - [43 x 80]
File Edit View Communication Actions Window ZipPrint Help
[Icons]

FCGX115      CPU 2084  SER F80CA  Interval 16:23:30 - 16:23:31  Perf. Monitor

Detailed data for user G73VM1
Total CPU      : .0%      Storage def.   : 1970MB      Page fault rate: .0/s
Superv. CPU    : .0%      Resident <2GB: 11743      Page read rate : .0/s
Emulat. CPU    : .0%      Resident >2GB: 29457      Page write rate: .0/s
VF total       : . . . .%  Proj. WSET     : 39402      Pgs moved >2GB>: .0/s
VF overhead    : . . . .%  Reserved pgs  : 0           Main > XSTORE  : .0/s
VF emulation   : . . . .%  Locked pages  : 1778      XSTORE > main  : .0/s
VF load rate   : . . . /s  XSTORE dedic.: 0MB       XSTORE > DASD  : .0/s
I/O rate      : .0/s      XSTORE pages  : 0           SPOOL pg reads : .0/s
DASD IO rate  : .0/s      DASD slots    : 1           SPOOL pg writes: .0/s
UR I/O rate   : .0/s      IUCV X-fer/s  : .0/s       MDC insert rate: .0/s
Diag. X'98'   : .0/s      Share         : 100        MDC I/O avoided: .0/s
*BLOCKIO     : .0/s      Max. share    : . . .

#I/O active   : 0        Active        : 94%      PSW wait      : 97%      I/O act.     : 3%
Stacked blk   : ..      Page wait     : 0%       CF wait       : 0%       Eligible     : 0%
Stat.: EME,P12,PSWT  I/O wait     : 0%       Sim. wait    : 0%       Runnable     : 3%

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

Data Space Name      Size Mode  PgRd/s PgWr/s XRd/s XWr/s Migr/s Steal/s
BASE                 1970MB Priv  .0     .0     .0     .0     .0     .0

Device activity and status:
0009 3215 .0          000C 254R          CL A, EOF      NOH NCNT
000D 254P          CL A, CO 01, NOH NCNT 000E 1403      CL A, CO 01, NOH NCNT
Enter 'STorage Display' for storage details
Command ==>
F1=Help  F4=Top  F5=Bot  F7=Bkwd  F8=Fwd  F12=Return

MA a 42/015
Connected to remote server/host tn3270.de.ibm.com using port 23
    
```

The screenshot shows a terminal window titled "Session A - [43 x 80]" with a menu bar (File, Edit, View, Communication, Actions, Window, ZipPrint, Help) and a toolbar. The main display area has a black background with green and yellow text. At the top, it shows system information: "FCX223 CPU 2084 SER F80CA Linux Systems Perf. Monitor". Below this, it lists "Selectable Linux Systems" with three entries: "G73VM10", "LNXRMF", and "LNXRMF2". At the bottom of the main area, it prompts "Select a system for Linux details" and shows "Command ==>". Below the command line, it lists function key shortcuts: "F1=Help F4=Top F5=Bot F7=Bkwd F8=Fwd F12=Return". The bottom status bar shows "MA a" on the left, "42/015" on the right, and a connection status "Connected to remote server/host tn3270.de.ibm.com using port 23" in the center.

```
GDLVM7 - [24 x 80]
File Edit View Communication Actions Window Help
FCX224 CPU 2064 SER 51524 Interval 10:12:00 - 10:13:00 Perf. Monitor

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

MA e 23/015
Connected to remote server/host gdlvm7 using port 23 LES_G32 on lgeer.endicott.ibm.com:np-12
```



```

GDLVM7 - [24 x 80]
File Edit View Communication Actions Window Help
FCX230 CPU 2064 SER 51524 Interval 10:15:00 - 10:16:00 Perf. Monitor

Linux CPU Utilization for System LX00001

<--- Percent CPU Utilization ---> <-Accumulated (s)->
Processor Total User Kernel Nice Idle TotTm UserTm KernTm
>>Mean>> 0.65 0.2 0.45 0 99.35 --- --- ---
cpu0 0.89 0.23 0.66 0 99.10 --- --- ---
cpu1 0.43 0.18 0.24 0 99.56 --- --- ---

Process Name
ksoftirqd_CPU0.4 0.26 ... 0.26 19 --- 13.61 ... 13.61
gpmddsrv.2425 0.11 0.1 0.01 ... --- 0.36 0.26 0.1
procgat.2390 0.06 ... 0.06 ... --- 4.95 0.59 4.36
java.782 0.05 0.01 0.03 ... --- 5.59 1.98 3.61
java.739 0.01 ... 0.01 ... --- 0.69 0.1 0.59
db2sysc.490 0 0 0 ... --- ... ...
db2sysc.491 0 0 0 ... --- ... ...
db2sysc.492 0 0 0 0 --- ... ...
db2sysc.493 0 0 0 0 --- ... ...
db2sysc.494 0 0 0 0 --- ... ...

Command ==>
F1=Help F4=Top F5=Bot F7=Bkwd F8=Fwd F12=Return

MA e 23/015
Connected to remote server/host gdlvm7 using port 23 LES_G32 on lgeer.endicott.ibm.com:np-12
    
```

```

Session A - [43 x 80]
File Edit View Communication Actions Window ZipPrint Help

FGX229      CPU 2084  SER F80CA  Interval 13:30:00 - 16:26:00      Perf. Monitor

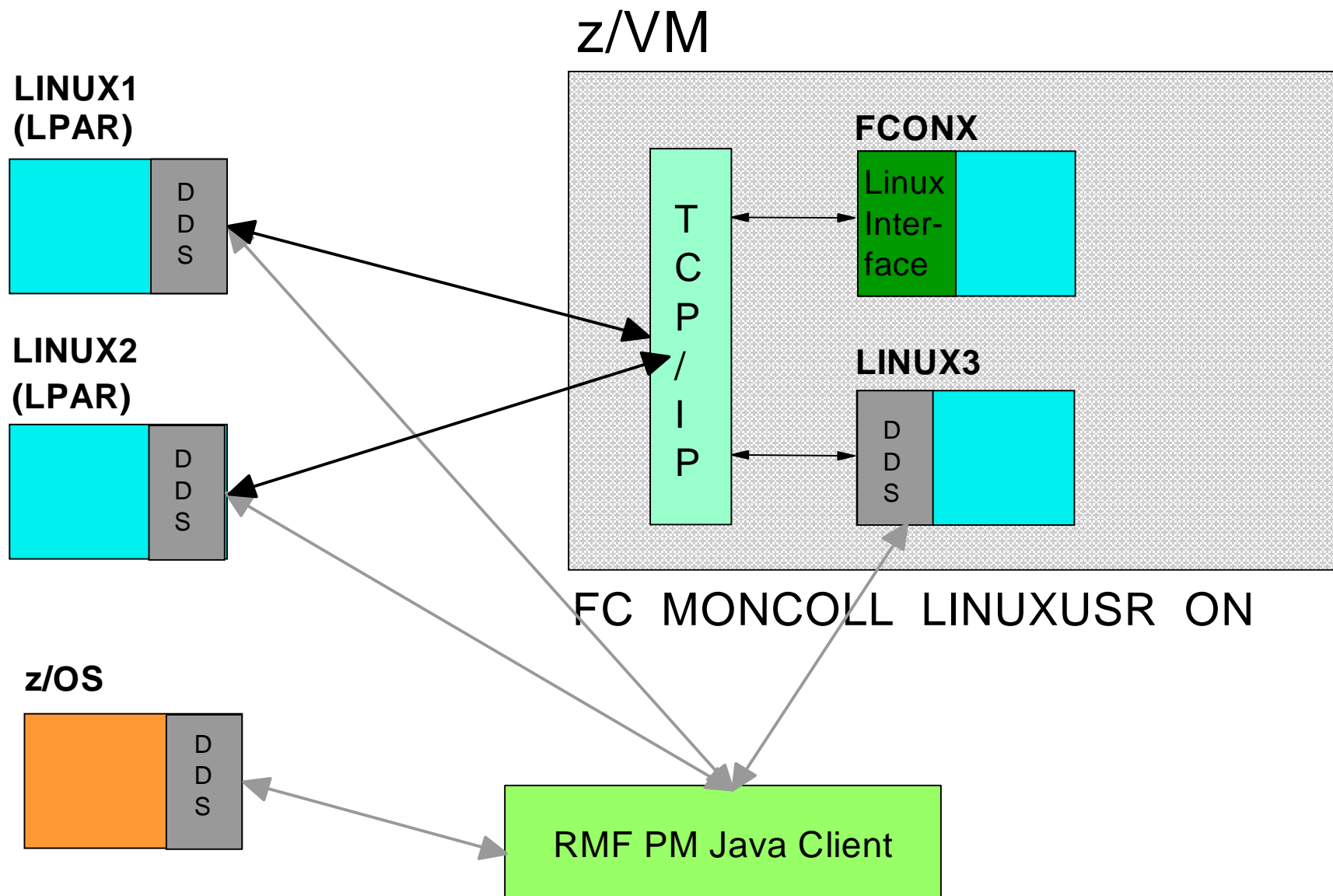
Linux Memory Util. & Activity Details for System LNXRMF2

Total memory size          123MB      Swap space size          492MB
Total memory used          119MB      % Swap space used        0.18%
  Used for buffer           6MB        Swap-in rate              0/s
  Used for shared           0MB        Swap-out rate             0/s
  Used for cache            12MB       Page-in rate              0.051/s
Total free memory          3MB        Page-out rate             6.075/s

Process Name              <----- Size -----> <----- Page Fault Rate/s ----->
                          (Bytes)      (kB)      Minor Major <-Incl.Children->
                          VirtSize   ResidSet  MinPgFlt MajPgFlt MinPFltC MajPFltC
gpmddsrv.20558            37150700  2176     0      0      0      0
gpmddsrv.20559            37150700  2176     0      0      0      0
gpmddsrv.20560            37150700  2176     0      0      0      0
gpmddsrv.20561            37150700  2176     0      0      0      0
gpmddsrv.20562            37150700  2176     0      0      0      0
gpmddsrv.20563            37150700  2176     0      0      0      0
ntpd.495                  2162690   2104     . . . . . . . . . . . . . . . .
sshd.25984                 5103620   2060     0      0      0      0
bash.25985                 3108860   1920     0      0      0      0
gengat.20547               2715650   1152     0      0      0      0
procgat.20553              2715650   1128     1      0      0      0
netgat.20550               2711550   1080     0      0      0      0
filegat.20544              2764800   1032     0      0      4      13
sshd.319                   4386820   796      0      0      0      0
qmgr.492                   7458820   736     . . . . . . . . . . . . . . . .
klogd.274                  1929220   672     0      0      0      0
nscd.475                   12079100  480     1      0      0      0
nscd.479                   12079100  480     0      0      0      0
nscd.480                   12079100  480     0      0      0      0
nscd.483                   12079100  480     . . . . . . . . . . . . . . . .

Command ===>
F1=Help  F4=Top  F5=Bot  F7=Bkwd  F8=Fwd  F12=Return

Mâ a 42/015
Connected to remote server/host tn3270.de.ibm.com using port 23
    
```



Performance Monitoring (PM) - RMF PM Java TM Technology Edition

File Actions View Help

PerfDesks Resources

IBM z/OS

- My Sysplex
 - aqts - MCLXCFO1, Syspl
 - AQFT, Image
 - AQFT, I/O-Subs
 - AQFT, All S
 - AQFT, All L
 - AQFT, All C
 - AQFT, All V
 - AQFT, Processo
 - AQFT, Storage
 - AQFT, Enqueue
 - AQFT, Operator
 - AQFT, SW-Subs
 - AQTS, Image
 - AQCF1, Coupling F.
 - AQCF2, Coupling F.
 - 51512, CPC
 - 51512, AQCF1,
 - 51512, AQFT, L
 - 51512, VICTES
 - 51512, VMTOO
 - 51512, WST3, L
 - 1119D, CPC
 - boesysf - SYSPLEX, Sys
 - boesclm
 - simulated - LOCAL1, Sys
 - SHARE
 - Linux
 - SAP
 - wlmtux
 - My Penguin
 - LINUX_MEMORY
 - LINUX_NETWORK
 - LINUX_CPU
 - LINUX_FILESYSTE
 - Inxbenk1
 - gfree18

Open PerfDesks

Linux-Overview Sysplex-Overview

Load Average

| Time | Load Average |
|----------|--------------|
| 18:41:00 | .16 |
| 18:42:00 | .06 |
| 18:43:00 | .25 |
| 18:44:00 | .09 |

LINUX_CPU - load average
Sample: 10 Total: 13

CPU Usage

| Time | cpu0 |
|----------|------|
| 18:41:00 | 3.01 |
| 18:42:00 | 1.49 |
| 18:43:00 | 1.51 |

LINUX_CPU - % cpu total active ti
LINUX_CPU - % cpu time in user n
LINUX_CPU - % cpu time in kernel
Sample: 13 Total: 13

Network

| Time | eth0 |
|----------|------|
| 18:41:00 | 85 |
| 18:42:00 | 0 |
| 18:43:00 | 0 |

LINUX_NETWORK - bytes received
LINUX_NETWORK - receive errors
LINUX_NETWORK - transmit errors
Sample: 13 Total: 13

Actual CPU time

| Process | CPU Time |
|--------------|----------|
| gpmddsv.3398 | 3.48 |
| procgat.1251 | .06 |
| init.1 | .05 |
| kupdated.7 | .03 |

LINUX_CPU - % cpu time total by
Sample: 13 Total: 13

zSeries DASD...

| Time | DASD io req |
|----------|-------------|
| 18:41:00 | 3.1 |
| 18:42:00 | 4.78 |
| 18:43:00 | 6.96 |
| 18:44:00 | 3.38 |

LINUX_FILESYSTEM - dasd io req
Sample: 10

Resident Set S...

| Process | Resident Set Size |
|-----------|-------------------|
| xfs.473 | 4016 |
| httpd.597 | 3220 |
| httpd.605 | 3212 |
| httpd.604 | 3212 |

LINUX_MEMORY - resident set size
Sample: 13 Total: 13

Accumulated ...

| Process | Accumulated CPU Time |
|--------------|----------------------|
| procgat.1251 | 87 |
| gpmddsv.3398 | 35 |
| kupdated.7 | 27 |
| gengat.1242 | 19 |

LINUX_CPU - accumulated cpu tim
Sample: 13 Total: 13

Filesystems f

/dev/dasd/6148/p

LINUX_FILESYSTEM - % free by t
LINUX_FILESYSTEM - Apache HTTP S
Sample: 13 Total: 13

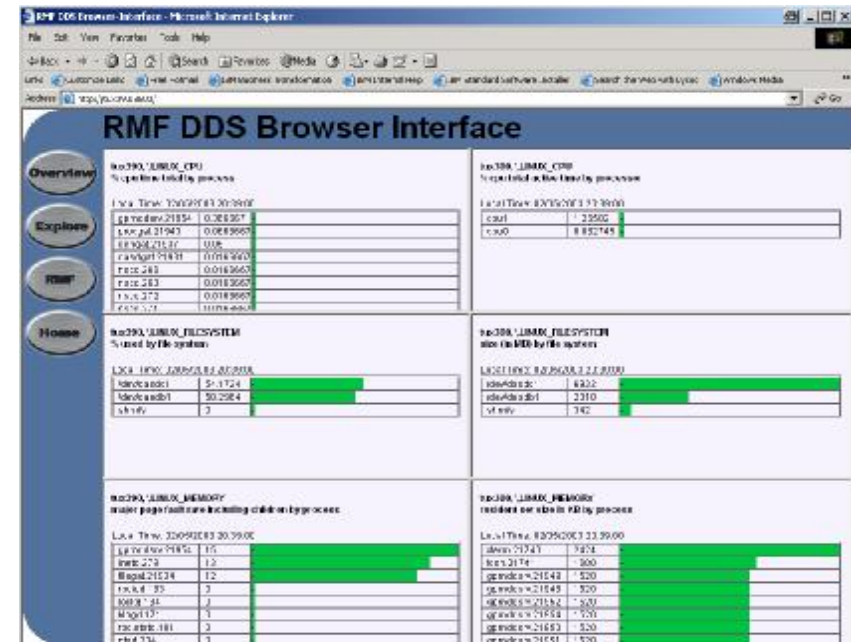
.51512.CPC

| | |
|-------------------------------------|-------|
| Machine family | 2064 |
| Machine type | 116 |
| Serial Number | 51512 |
| Capacity (MSU/hour) | 441 |
| Number of CP engines | 16 |
| Number of ICF/IFL engines | 0 |
| Number of configured partitions ... | 6 |

Start |< |> |>| Stop

Sample... Sync Save... Close Startup Help

- § 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)



The screenshot shows the 'Save Plot' dialog box in the IBM RMF PM Java TM Technology Edition. The plot area displays a line graph with several data series. Below the plot, the following information is visible:

04/04 19:15:54
04/04 19:24:54
LINUX_CPU - % cpu time total by process -filtered
- procgat.14022 - netgat.14017 - gengat.14008

From: 2001/04/04 19:15:54

Maximum Values:

- procgat.14022(0.05)
- netgat.14017(0.0333333)
- gengat.14008(0.0333333)
- nscd.275(0.0166667)
- nscd.276(0.0166667)
- nscd.270(0.0166667)
- nscd.273(0.0166667)
- nscd.274(0.0166667)

The 'Save Plot' dialog box is open, showing the following fields:

- Save in: private
- File name: wk1
- Save as type: All Files (*.*)

Buttons: Save, Cancel, Print..., Help

The screenshot shows the 'Spreadsheet' dialog box in the IBM RMF PM Java TM Technology Edition. The dialog box is titled 'Spreadsheet' and has a menu bar with 'Images', 'Options', 'Advanced', and 'Help'. The main area is divided into several sections:

- Choose the fixed component:** A dropdown menu with 'image is fixed' selected.
- Select some metrics:** A list of metrics including '% used by file system', 'available (in MB) by file system', 'dashed average response time per request', 'dashed average response time per sector', 'dashed requests per second', 'in (in MB) by file system', and 'total size of all file systems (in MB)'. The 'dashed average response time per request' metric is selected.
- Insert the period of time:** A section with 'date' and 'time' fields for 'start' and 'end'. The start date is 15/08/2002 and the start time is 08:00:00. The end date is 15/08/2002 and the end time is 22:00:00.
- Range:** A dropdown menu with '30 min' selected.

Buttons: back, ok, cancel

RMF DDS Browser Interface

Overview

My View

Explore

RMF

Home

inxrmf2, .LINUX_CPU
% cpu time total by process

Local Time: 07/28/2003 20:02:00

| | |
|----------------|-----------|
| procat.5183 | 0.0166667 |
| hscd.417 | 0.0166667 |
| sshd.329 | 0 |
| kjournald.24 | 0 |
| mdrecoveryd.14 | 0 |
| kupdated.12 | 0 |

inxrmf2, .LINUX_FILESYSTEM
% used by file system

Local Time: 07/28/2003 20:02:00

| | |
|-------------|---------|
| /dev/dasdb1 | 43.4109 |
| shmfs | 0 |

inxrmf2, .LINUX_MEMORY
major page fault rate including children b...

Local Time: 07/28/2003 20:02:00

| | |
|----------------|----|
| filegat.5174 | 13 |
| kjournald.24 | 0 |
| lvm-mpd.50 | 0 |
| mdrecoveryd.14 | 0 |
| kupdated.12 | 0 |
| kinoded.13 | 0 |

Automatic refresh in 20 seconds ...

Metrics Help - Mozilla

rate of processes created (per second)

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 become large.

RMF DDS Browser Interface

Overview

My View

Explore

RMF

Home

Available metrics for: .Inxrmf2.LINUX_SYSTEM

| Metric description | Help | Id |
|---|-----------------------------|--------|
| Apache HTTP server: bytes per request | Explanation | 400310 |
| Apache HTTP server: number of busy threads | Explanation | 400320 |
| Apache HTTP server: number of idle threads | Explanation | 400330 |
| Apache HTTP server: rate of 404 errors (per second) | Explanation | 400340 |
| Apache HTTP server: rate of requests (per second) | Explanation | 400300 |
| rate of context switches (per second) | Explanation | 400020 |
| rate of processes created (per second) | Explanation | 400010 |

My View - Mozilla

File Edit View Go Bookmarks Tools Window Help

Back Forward

http://Inxrmf2:8803/gpm/include/ovw.htm Search

Home Bookmarks Print

**Inxrmf2, 'LINUX_NETWORK
transmit errors per second**

Local Time: 07/28/2003 20:08:00

| | |
|--|---|
| | 0 |
|--|---|

**Inxrmf2, 'LINUX_MEMORY
resident set size in KB by process**

Local Time: 07/28/2003 20:08:00

| Process | Resident Set Size (KB) | Bar |
|-----------------|------------------------|----------------------------------|
| gpmddsv.5190 | 2264 | <div style="width: 100%;"></div> |
| gpmddsv.5191 | 2264 | <div style="width: 100%;"></div> |
| gpmddsv.5188 | 2264 | <div style="width: 100%;"></div> |
| gpmddsv.5189 | 2264 | <div style="width: 100%;"></div> |
| gpmddsv.18299 | 2264 | <div style="width: 100%;"></div> |
| gpmddsv.18300 | 2264 | <div style="width: 100%;"></div> |
| gpmddsv.5192 | 2264 | <div style="width: 100%;"></div> |
| pickup.18183 | 1472 | <div style="width: 65%;"></div> |
| gengat.5177 | 1216 | <div style="width: 53%;"></div> |
| filegat.5174 | 1176 | <div style="width: 52%;"></div> |
| clustergat.5168 | 1036 | <div style="width: 46%;"></div> |
| master.384 | 884 | <div style="width: 39%;"></div> |

**Inxrmf2, 'LINUX_CPU
load average**

Local Time: 07/28/2003 20:08:00

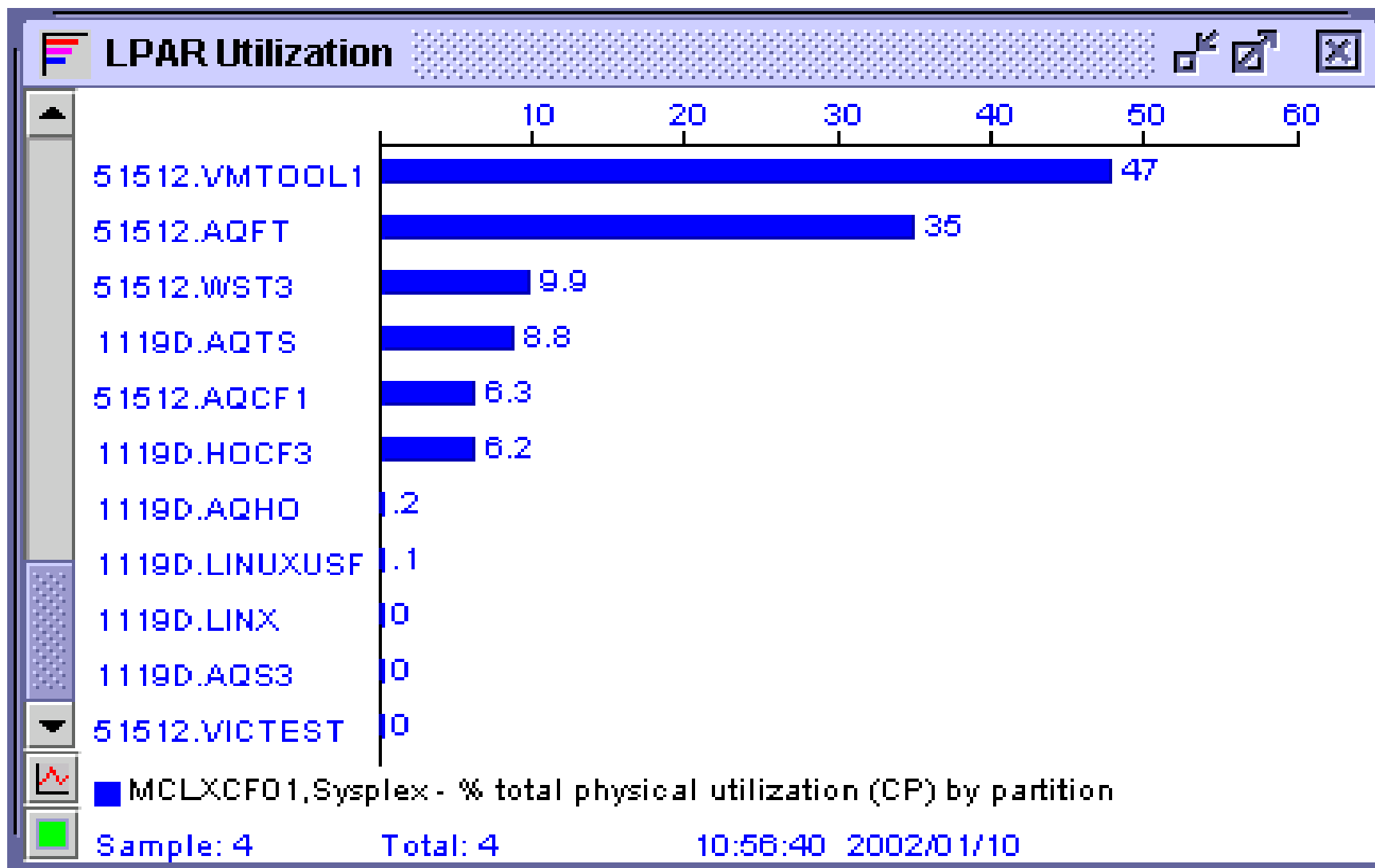
| | | |
|--|------|----------------------------------|
| | 0.15 | <div style="width: 100%;"></div> |
|--|------|----------------------------------|

**Inxrmf2, 'LINUX_CPU
accumulated cpu time total by process**

Local Time: 07/28/2003 20:08:00

| Process | CPU Time (seconds) | Bar |
|------------------|--------------------|----------------------------------|
| sshd.329 | 495.08 | <div style="width: 100%;"></div> |
| procgat.5183 | 138.04 | <div style="width: 28%;"></div> |
| ksoftirqd_CPU2.9 | 39.72 | <div style="width: 8%;"></div> |
| kswapd.10 | 37.21 | <div style="width: 7%;"></div> |
| nscd.410 | 35.91 | <div style="width: 7%;"></div> |
| ksoftirqd_CPU1.8 | 33.92 | <div style="width: 7%;"></div> |
| kupdated.12 | 31.11 | <div style="width: 6%;"></div> |
| kjournald.24 | 28.27 | <div style="width: 6%;"></div> |
| cron.399 | 27.34 | <div style="width: 5%;"></div> |
| init.1 | 21.74 | <div style="width: 4%;"></div> |
| gengat.5177 | 19.08 | <div style="width: 4%;"></div> |
| netgat.5180 | 15.1 | <div style="width: 3%;"></div> |

Automatic refresh in 28 seconds ...





IBM Software Group
IBM Systems and Technology Group



Orchestration and Provisioning

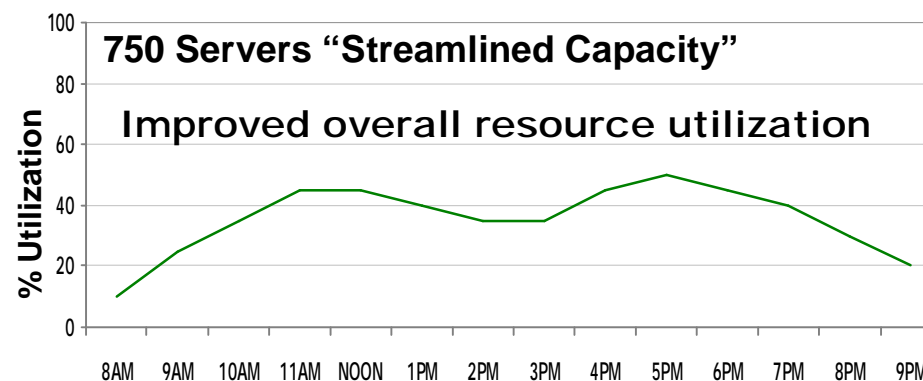


§ Provisioning

Handles all resource setup and configuration automatically

Streamlined execution of your company's best practices

Human evaluation still drives actions – execution errors reduced



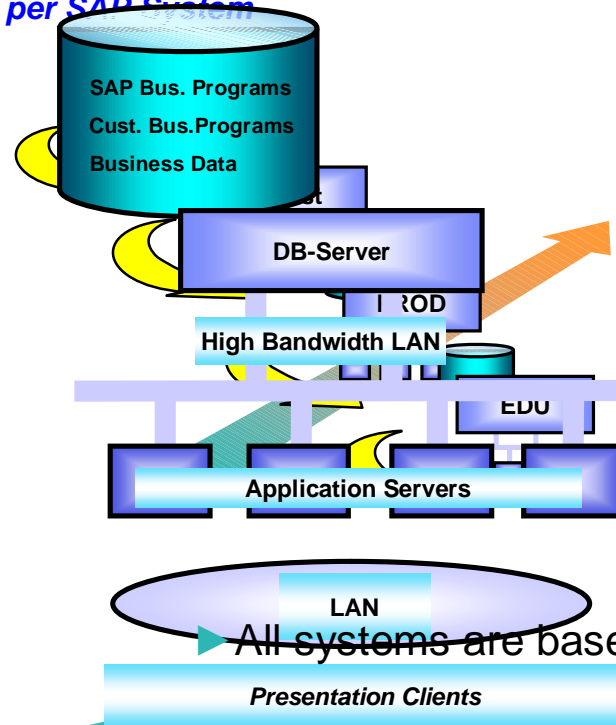
§ Orchestration

- 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 |

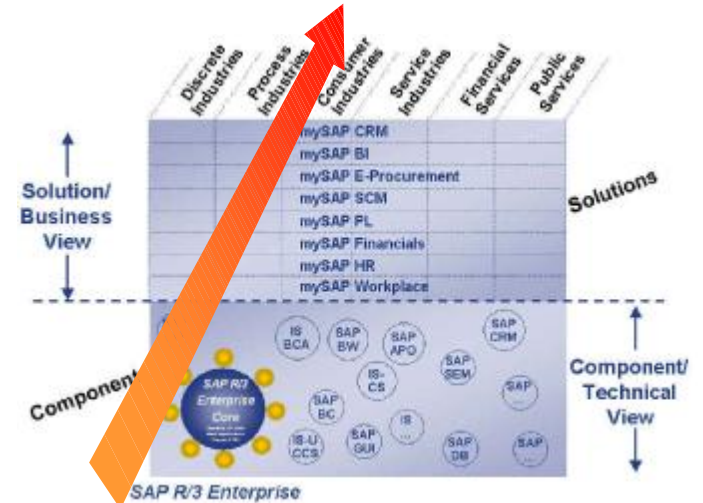
Multiple Servers
per SAP System
Multiple Operational Stages
per SAP System



▶ All systems are based on **dedicated resources**

**Workload based
Growth**

Business Transformation



Multiple SAP Systems
per mySAP Solution

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



§ 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.

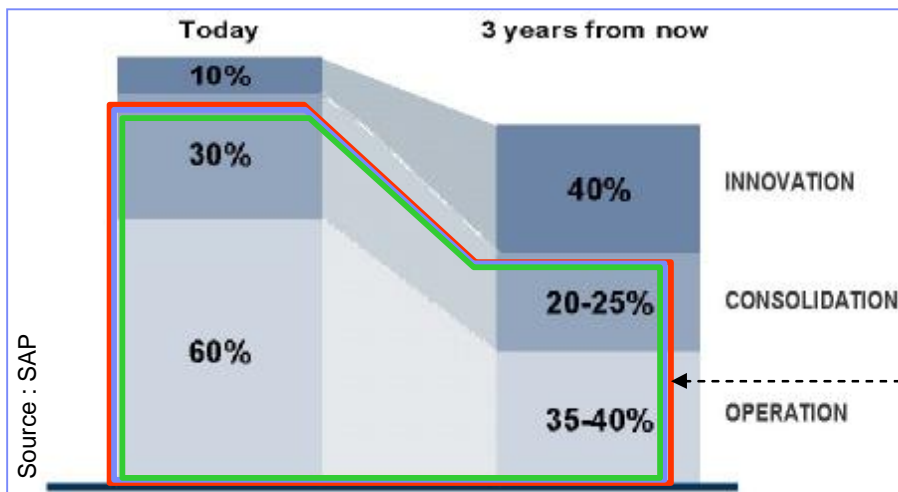
§ Underutilization:

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



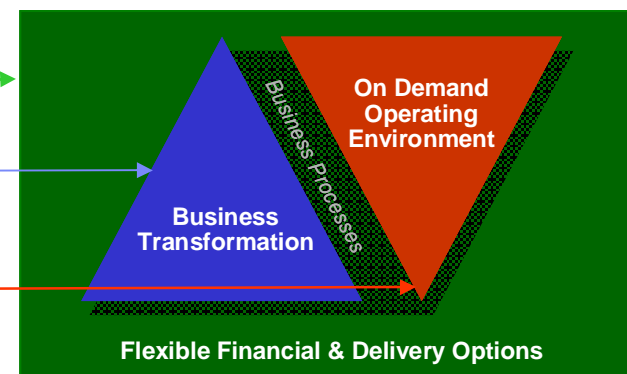
SAP Cost Control Vision



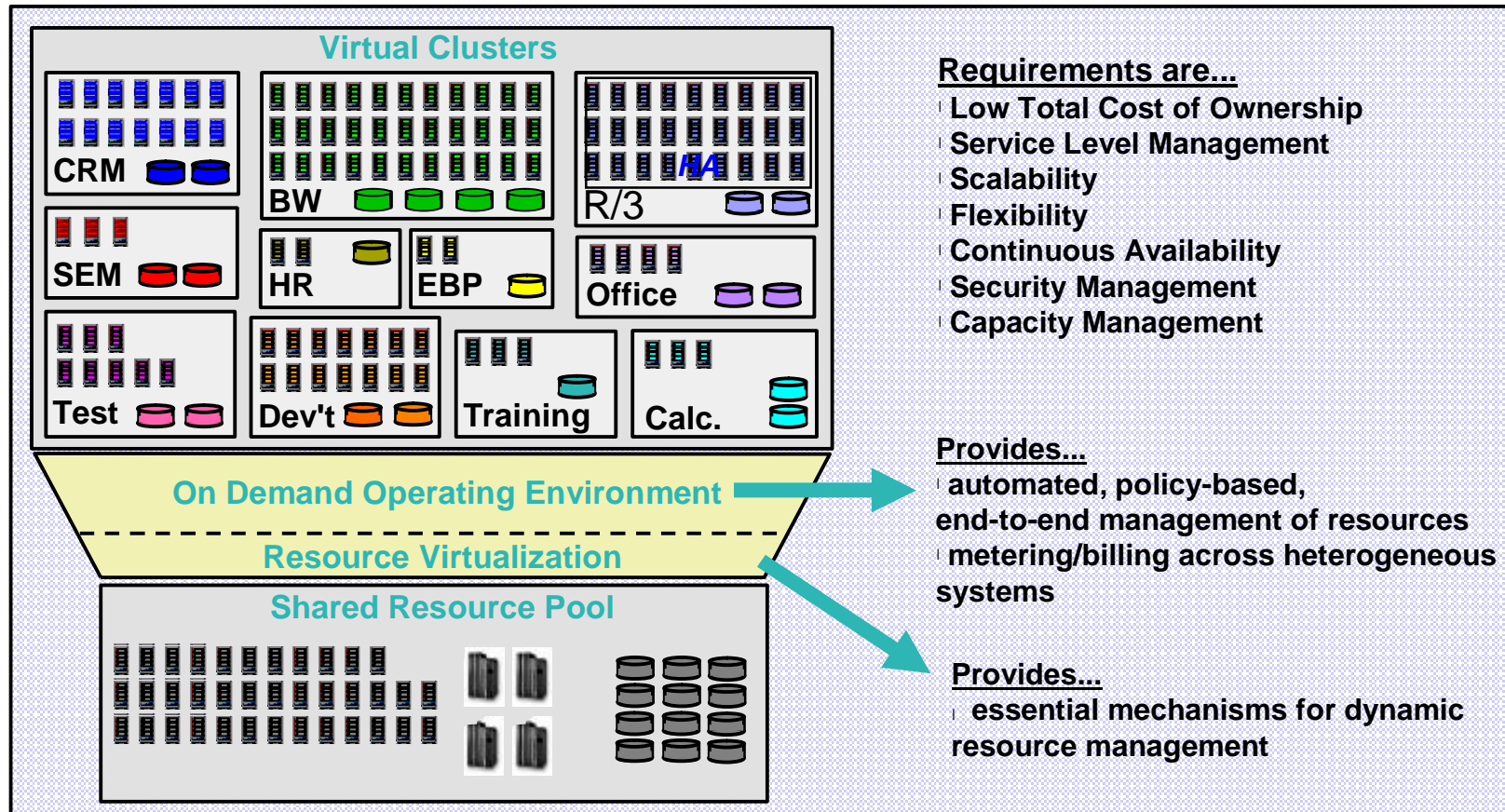
- § on demand helps reducing the TCO of an corporate business and IT landscape
- § on demand areas match up with the SAP cost components
- § on demand can help accelerate the savings process

SAP Cost Component Vision

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



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

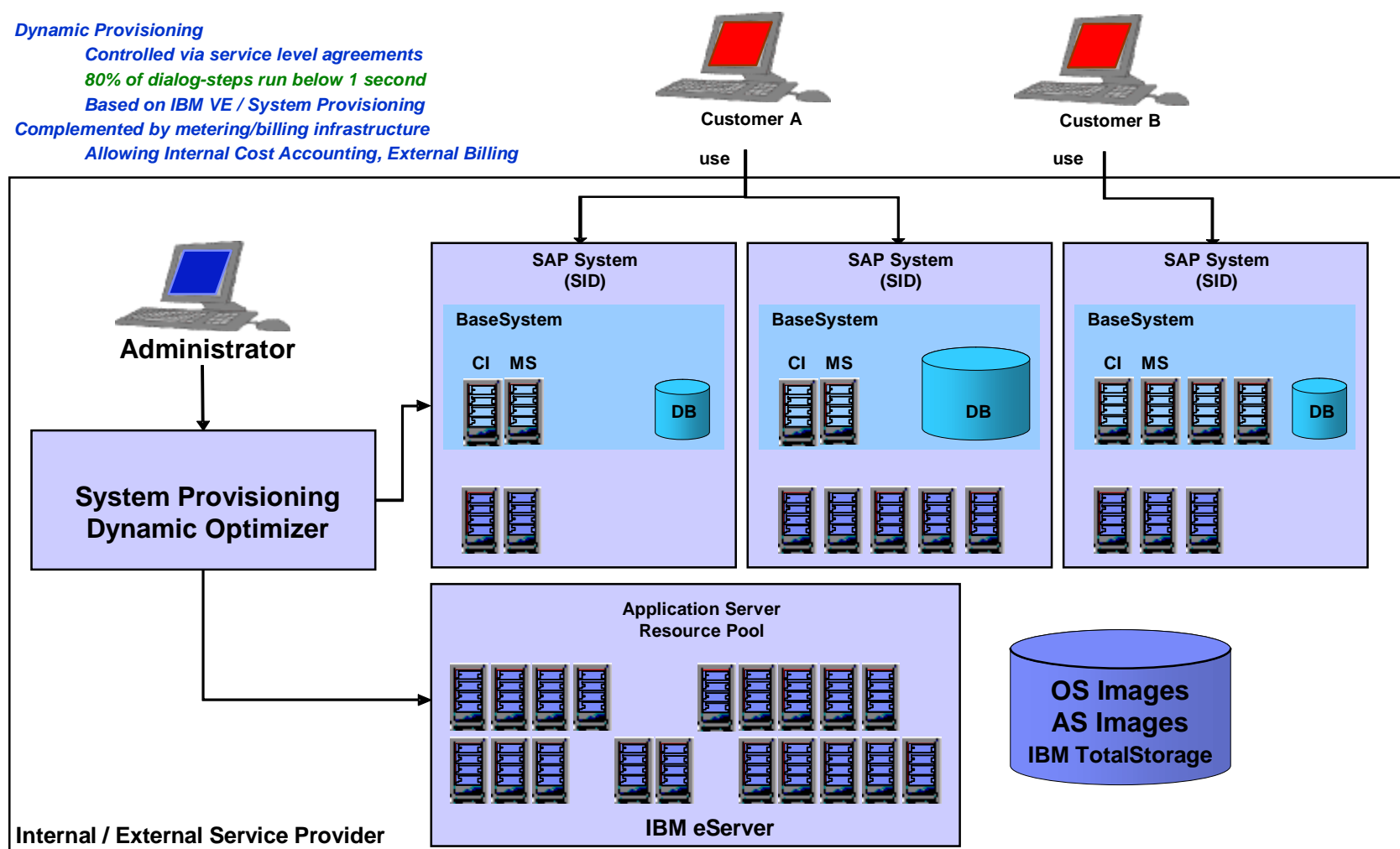
Controlled via service level agreements

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



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.

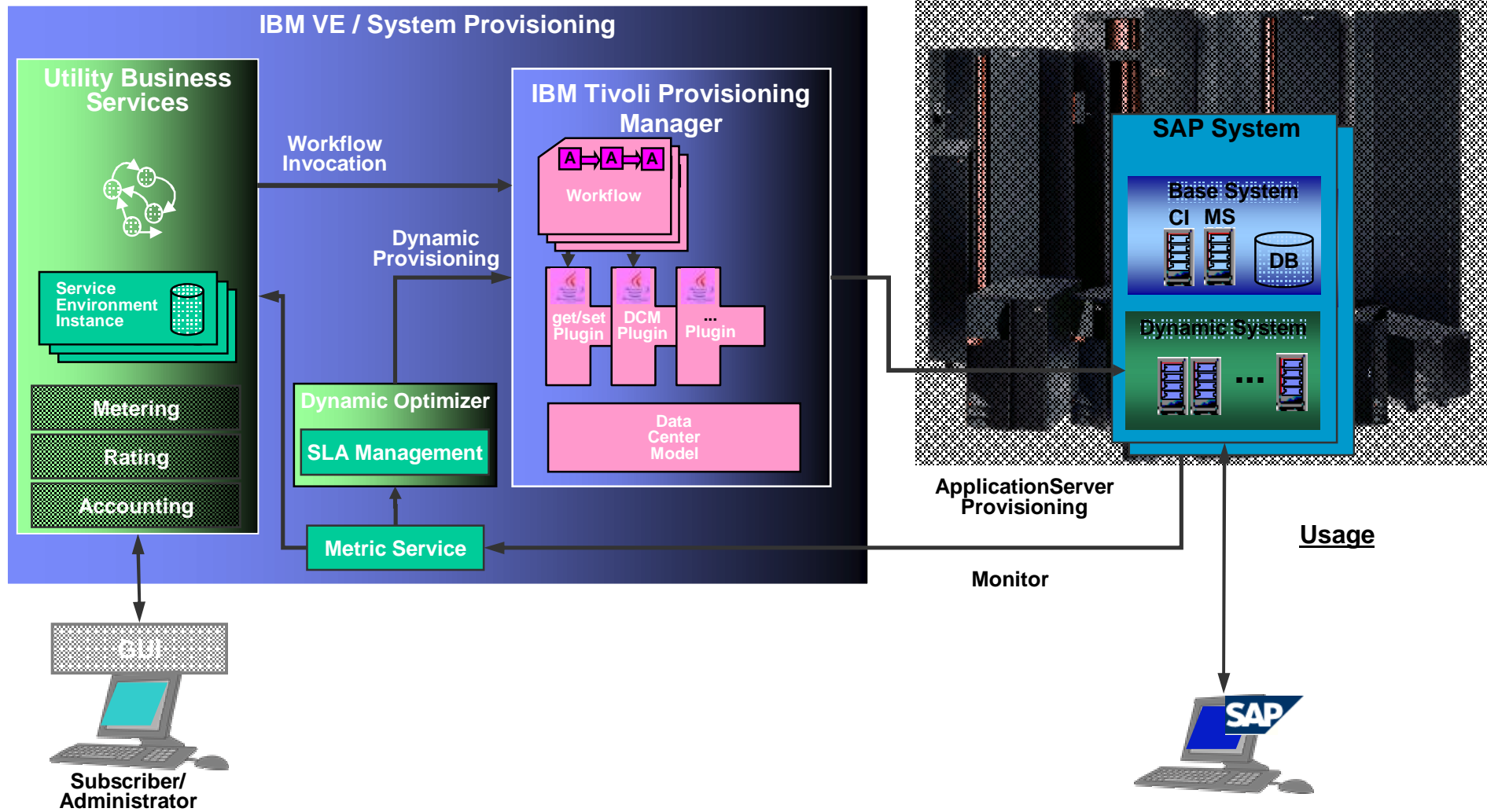


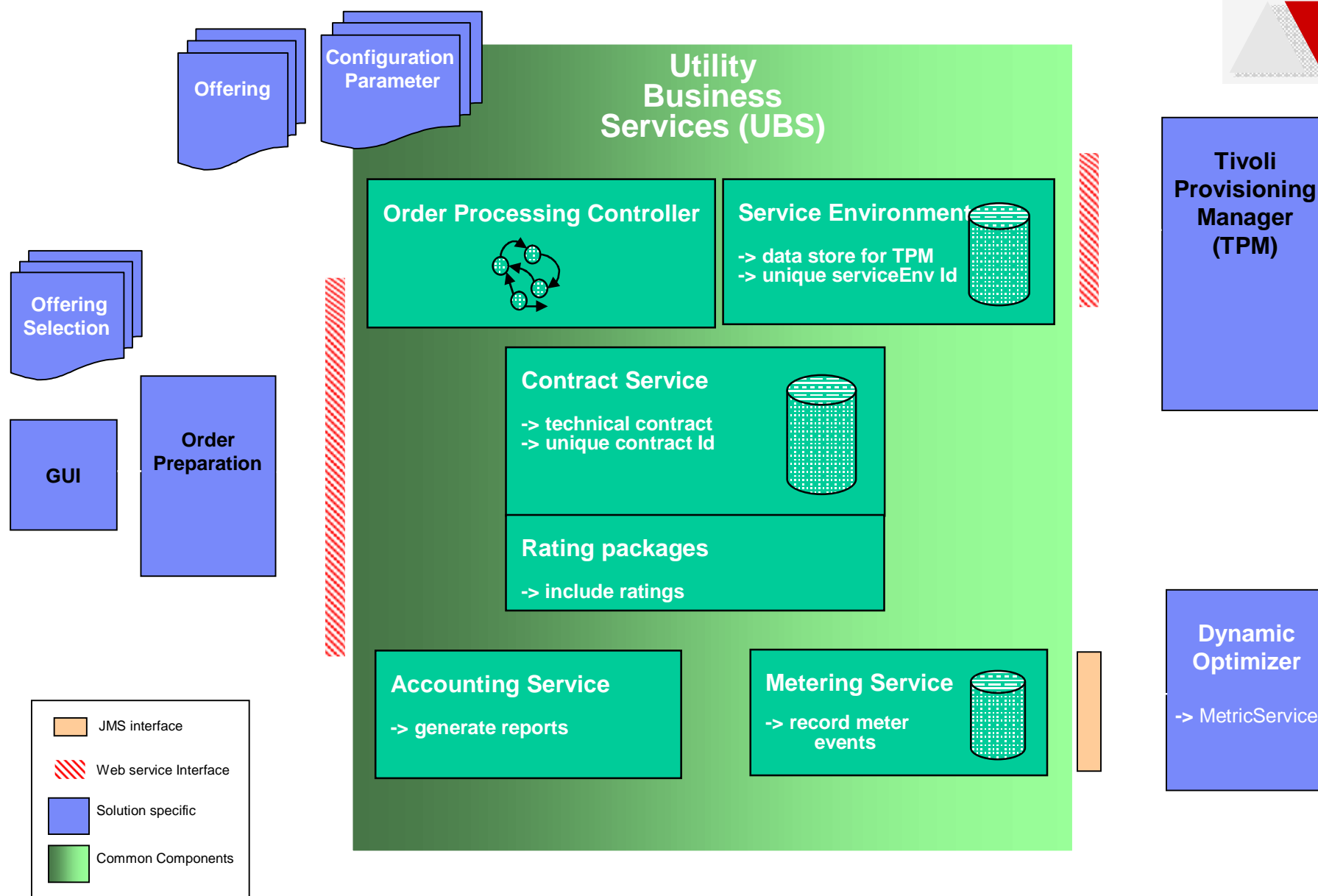
§ Internal cost accounting:

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

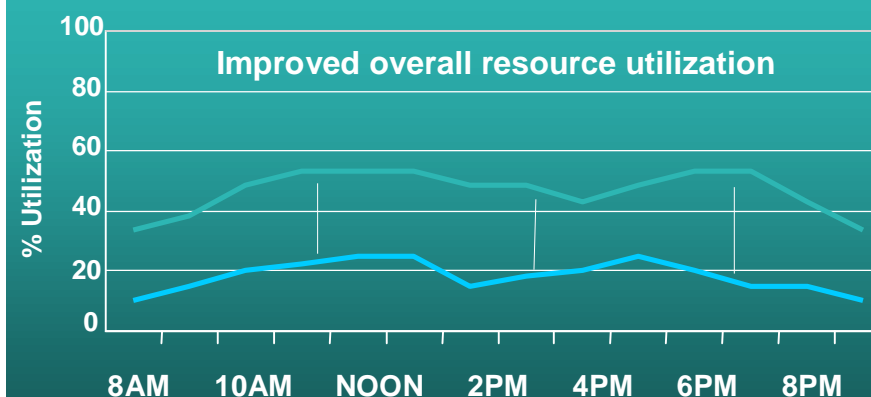
“On Demand” Provisioning

| 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 |

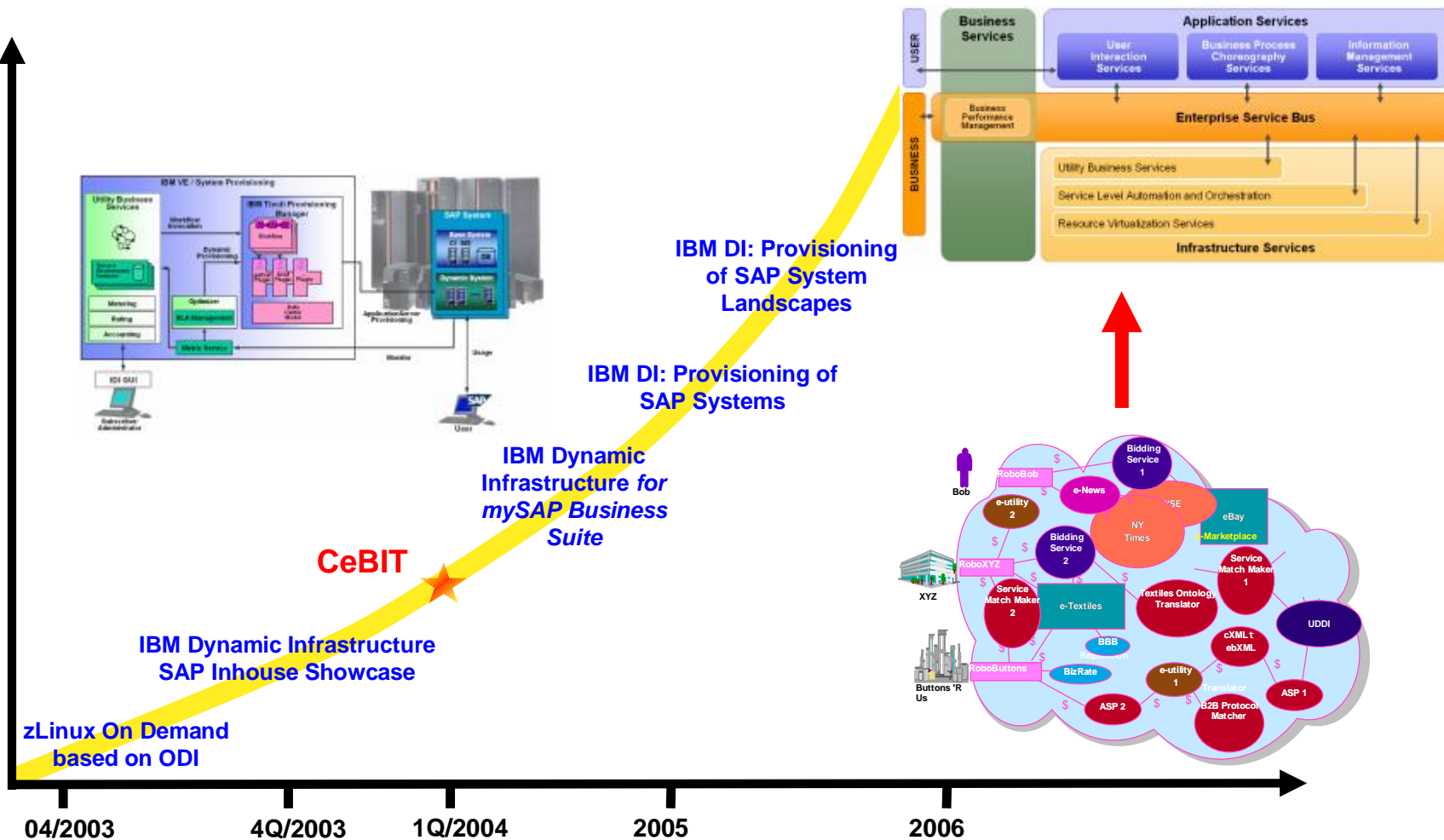
Orchestration

- § 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” Orchestration



IBM Dynamic Infrastructure for mySAP Business Suite





IBM Software Group
IBM Systems and Technology Group



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

§ Define

Logical Operator

Routing Table

Action Routines

Exits

Commands

- § 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



IBM Software Group
IBM Systems and Technology Group



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



| | | |
|------------------|--|---|
| Customer: | GAD eG | |
| Need: | <ul style="list-style-type: none"> • 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: | <ul style="list-style-type: none"> • 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

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

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