



# Tips on Monitoring and Managing your z/VM and Linux on System z

***Session 8478***

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# Acknowledgements

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  - ▶ Mike Sine
  - ▶ Jon vonWolfersdorf
  - ▶ Kevin Yash



# Agenda

- Why is it needed?
  - ▶ New work loads
  - ▶ New monitoring needs
- Brief Product Overview
  - ▶ VM Performance overview
  - ▶ A monitoring infrastructure – ITM
- System Tips
- Monitoring Scenario
- Additional Product Integration

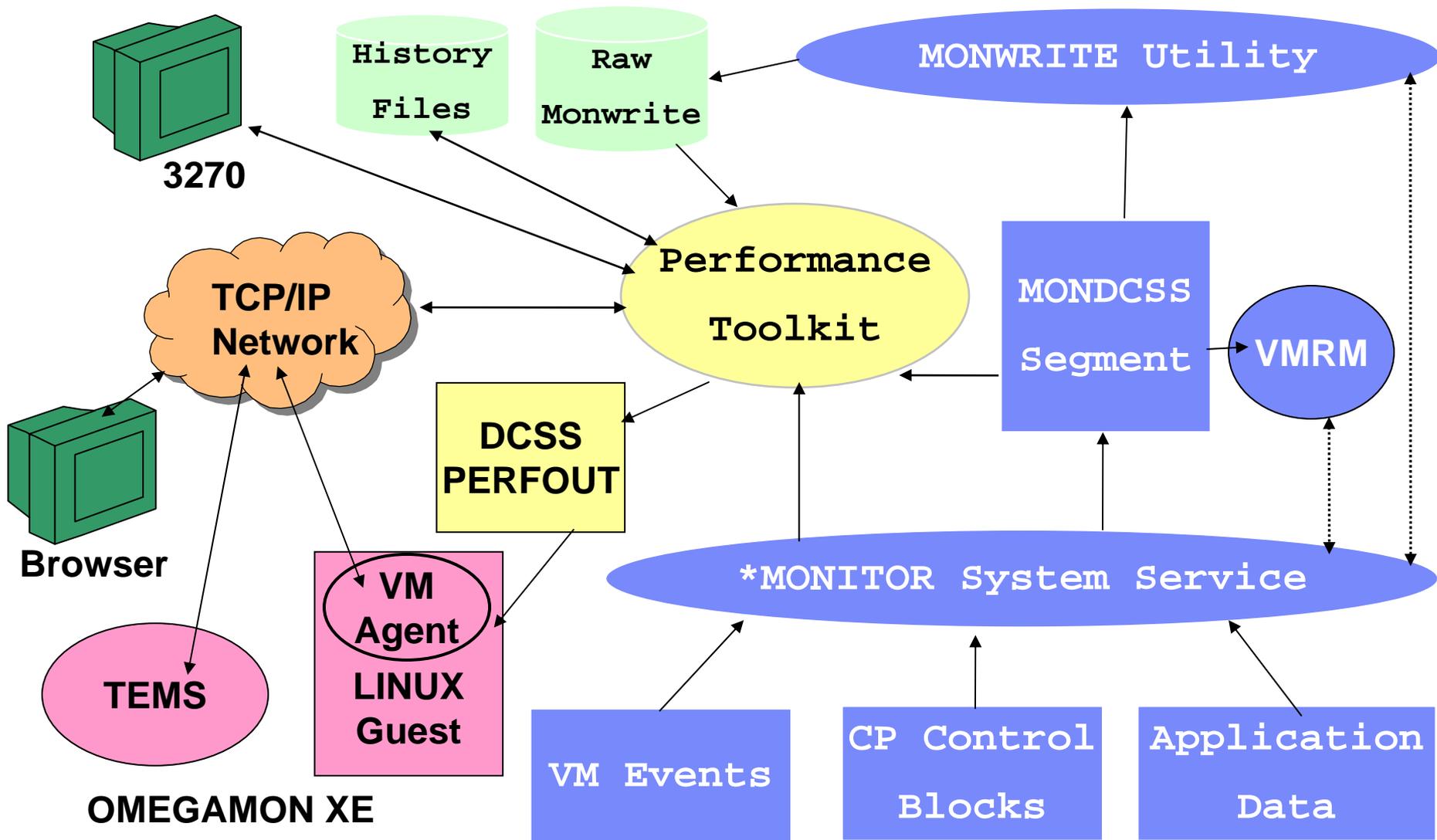


# Opportunity

- New workload
  - ▶ Linux on zSeries/System z
  - ▶ WAS, DB2, Oracle, Java
- Performance
  - ▶ Real and Virtual resources
  - ▶ Monitoring needs
  - ▶ Managing needs
- Need to be able to do Systems management
  - ▶ Suite of products
    - OMEGAMON XE on z/VM and Linux
    - Operations Manager for z/VM
    - Tape Manager for z/VM
    - Backup and Restore Manager for z/VM
    - Archive Manager for z/VM



# z/VM Performance Overview - 5,000 Foot View



# z/VM Performance Toolkit Overview

- Full-Screen operator console (FCON)
- Real Time performance monitor capability for z/VM.
  - ▶ CPU Performance
  - ▶ Storage Utilization
  - ▶ Channel, I/O Device Performance
  - ▶ Detailed I/O Analysis
  - ▶ Detailed User Performance data
  - ▶ TCP/IP Server Performance
  - ▶ Linux Performance data
- 3270 interface, with ability to exploit GDDM graphics.
- Web server capability.
- Ability to customize screens.
- Some integration with other platform monitors (Linux).



FCX124 Performance Screen Selection (FL520 VM63967) GDLMV7

### General System Data

1. CPU load and trans.
2. Storage utilization
3. Reserved
4. Priv. operations
5. System counters
6. CP IUCV services
7. SPOOL file display\*
8. LPAR data
9. Shared segments
- A. Shared data spaces
- B. Virt. disks in stor.
- C. Transact. statistics
- D. Monitor data
- E. Monitor settings
- F. System settings
- G. System configuration
- H. VM Resource Manager
- I. Exceptions
- K. User defined data\*

### I/O Data

11. Channel load
12. Control units
13. I/O device load\*
14. CP owned disks\*
15. Cache extend. func.\*
16. DASD I/O assist
17. DASD seek distance\*
18. I/O prior. queueing\*
19. I/O configuration
- 1A. I/O config. changes

### User Data

21. User resource usage\*
22. User paging load\*
23. User wait states\*
24. User response time\*
25. Resources/transact.\*
26. User communication\*
27. Multitasking users\*
28. User configuration\*
29. Linux systems\*

### History Data (by Time)

31. Graphics selection
32. History data files\*
33. Benchmark displays\*
34. Correlation coeff.
35. System summary\*
36. Auxiliary storage
37. CP communications\*
38. DASD load
39. Minidisk cache\*
- 3A. Storage mgmt. data\*
- 3B. Proc. load & config\*
- 3C. Logical part. load
- 3D. Response time (all)\*
- 3E. RSK data menu\*
- 3F. Scheduler queues
- 3G. Scheduler data
- 3H. SFS/BFS logs menu\*
- 3I. System log
- 3K. TCP/IP data menu\*
- 3L. User communication
- 3M. User wait states

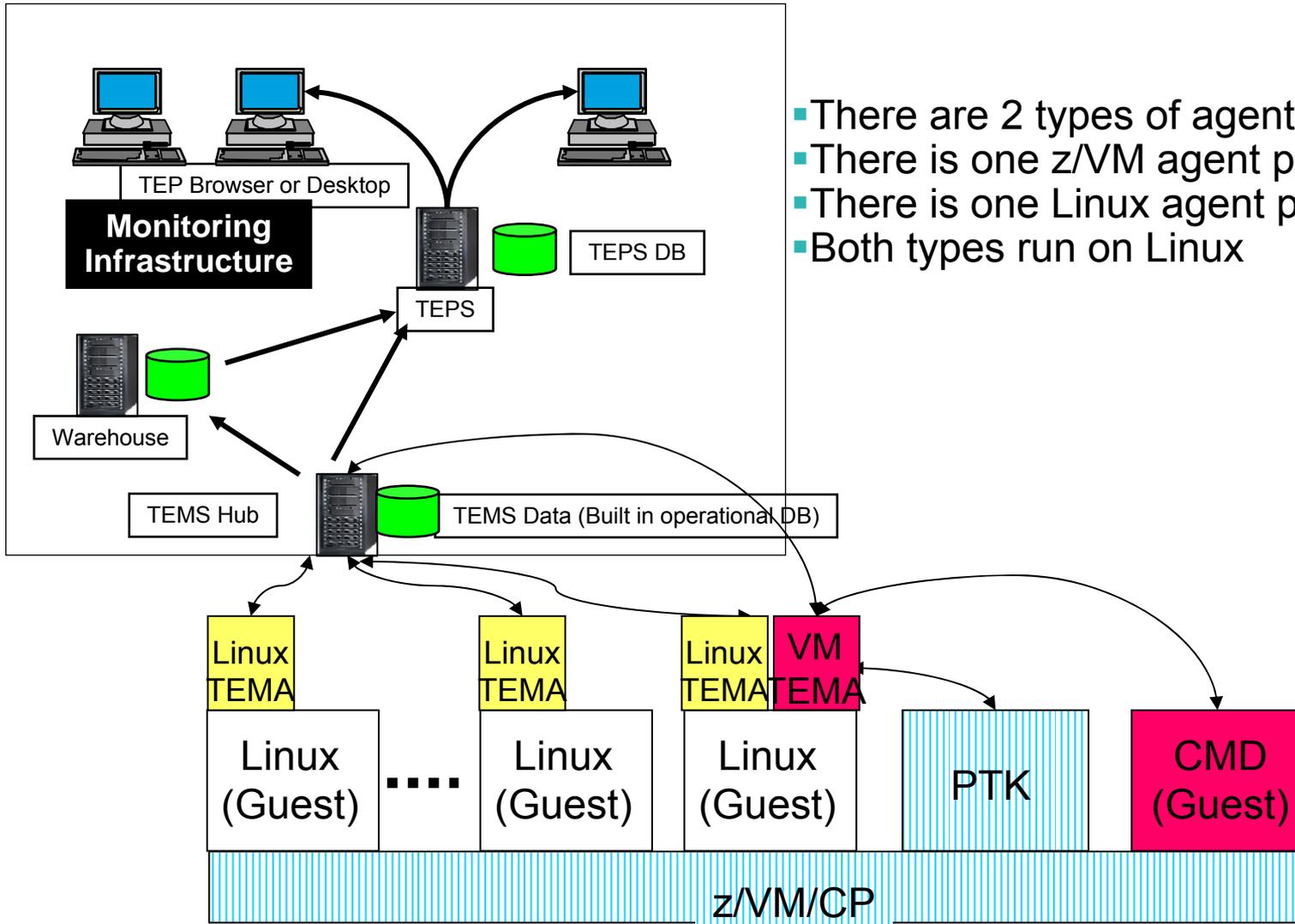
Pointers to related or more detailed performance data  
can be found on displays marked with an asterisk (\*).

Select performance screen with cursor and hit ENTER

Command ==> \_\_\_\_\_

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

# OMEGAMON XE on z/VM and Linux agents



- There are 2 types of agents
- There is one z/VM agent per z/VM LPAR
- There is one Linux agent per Linux Guest
- Both types run on Linux

# Tivoli Enterprise Portal

## Improve your ability to Diagnose and Resolve Problems

Selectable Chart Options

Navigation Tree

View Zoom

Splitter controls

Intelligent Linking

The screenshot displays the Tivoli Enterprise Portal interface for monitoring OS/390 UNIX processes. It features a navigation tree on the left, two bar charts (UNIX Run Time and CPU Times) in the middle, and a data table at the bottom. Callouts highlight various UI elements: 'Selectable Chart Options' points to the chart toolbar; 'Navigation Tree' points to the left-hand menu; 'View Zoom' points to a zoom control on the CPU Times chart; 'Splitter controls' points to window management icons; and 'Intelligent Linking' points to a link icon in the table header.

MVS Status	Process Status	Execution State	Process ID	Parent Process ID	Leader Session ID	Process Group	Foreground Pro
Normal	Multiple_Tasks_In_Process_+Pthrea...	Running_not_in_kernel_wait	50462921	1	50462821	50462821	
Normal	Multiple_Tasks_In_Process_+Pthrea...	Running_not_in_kernel_wait	33685615	1	33685615	33685615	
Normal	Multiple_Tasks_In_Process_+Pthrea...	Running_not_in_kernel_wait	50462832	1	50462832	50462832	
Normal	Multiple_Tasks_In_Process_+Pthrea...	Running_not_in_kernel_wait	33685672	1	33685672	33685672	
Swapped_Out	Multiple_Tasks_In_Process_+Pthrea...	Running_not_in_kernel_wait	16908492	1	16908492	16908492	
Swapped_Out	Multiple_Tasks_In_Process_+Pthrea...	Running_not_in_kernel_wait	33685727	1	33685727	33685727	
Normal	Multiple_Tasks_In_Process_+Pthrea...	Running_not_in_kernel_wait	16908519	1	16908519	16908519	
Normal	Multiple_Tasks_In_Process_+Pthrea...	Running_not_in_kernel_wait	50462998	1	50462998	50462998	

# Situations

- A situation describes one or more conditions that you want to test
  - ▶ Each condition compares a user-specified value against attribute data collected from managed systems
- If all conditions are met, the situation evaluates to true and an alert indicator icon appears on the TEP to let you know that a problem exists
- When you create a situation, you can also specify automated responses to take place when the situation becomes true (Take Action)
- Each management agent comes with a set of pre-defined situations that can be set to start running as soon as the management agent is connected



# Workspaces to Manage z/VM and Linux

## z/VM

- **Processors**
- **SYSTEM Utilization, spinlocks**
- **Workload**
  - ▶ Linux Appldata
  - ▶ Scaled & total CPU values
- **LPAR Utilization**
- **PAGING and SPOOLING Utilization**
- **DASD**
- **Minidisk Cache**
- **Virtual Disks**
- **Channels**
- **CCW Translation**
- **REAL STORAGE Utilization**
- **NETWORK Utilization (Hiper Socket and Virtual Switch)**
- **TCPIP Utilization – Server**
- **TCPIP Utilization – Users**
- **Resource Constraint (Wait states)**
- **System Health**

## Linux

- **Linux OS**
- **System Information**
  - ▶ CPU aggregation
  - ▶ Virtual Memory Statistics
- **Process**
- **Users**
- **Disk Usage**
- **File Information**
- **Network**



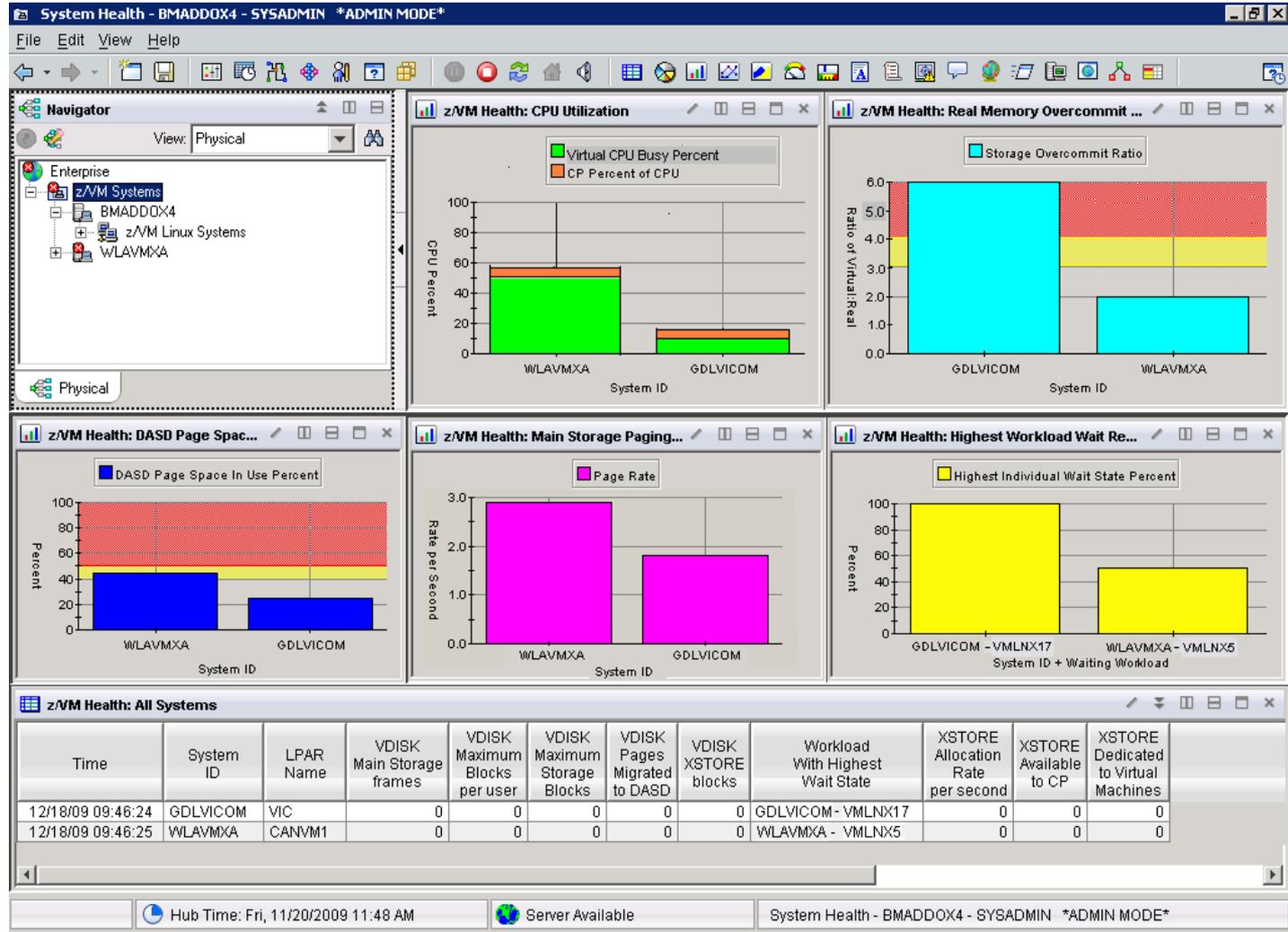
# Tips and Scenarios

- Overall health of your z/VM systems
- Managing CP Owned Volumes
- Paging rate problems
- LPAR and processor usage
- Spin Locks
- Virtual Disks
- Minidisk Cache
- DASD
- I/O contention
- Sizing Linux guests
- System running slowly—how to debug



# Tips—Overall Health of Your System

At a quick glance you can see the %CPU usage, what your overcommit ratio is, the number of users in a wait state, and paging rates of all your z/VM systems



# Tips—Overall Health of Your System

- Things to look for
  - ▶ CPU usage
    - Is any one system using more CPU than expected
    - Is any one system using less CPU than expected—you may have an underutilized processor and be wasting capacity
    - Remember, a DEDICATED processor will show 100%
  - ▶ Users waiting for resources
    - Number of users at the end of the monitoring interval who are either in:
      - Eligible list—waiting to enter the dispatch list
      - Nondispatchable
        - Waiting for paging
        - Waiting for I/O completion
      - Dispatchable
        - Waiting for a processor

# Tips—Overall Health of Your System

- Things to look for
  - ▶ Overcommit
    - ▶ What is the overcommit for each LPAR
      - Rule of thumb value is between 2.0 and 3.0
      - This may vary depending on how your system is used
        - If it is a test system, and many of the guests are idle, then a higher overcommit may not be a problem
        - If this is a key production system, 3.0 may be too high.
      - Good metric for helping you decide where to add additional Linux guests



# Tips—Overall Health of Your System

- Things to look for
  - ▶ System paging rate
    - Number of page reads per second
    - Not a complete indicator of your paging effectiveness, but a good first glance
      - If the rate is low, and you don't have many users waiting for paging to complete (dispatch list), then you don't have a problem
      - If rate is low and you DO have many users in dispatch list, it may be an indication of a paging problem.
        - High dispatch list number could be for other reasons such as I/O contention. You need to check.
    - If the rate is high, then you may need to tune your paging subsystem.
    - High and low are relative. You need to keep historical data so you can tell when your rate has changed dramatically.

# Tips—CP Owned Volumes

One place to check to see if you need to add more space on your CP-Owned volumes

CP Owned Devices - NPMIPSVT3 - SYSADMIN

View: Physical

- Enterprise
  - z/VM Systems
    - linux-kxa8:VL
      - z/VM Linux Systems
        - Channel
        - CP Owned Devices
        - DASD
        - LPAR

Physical

Paging and Spooling Space

Top 5 Page Extent Utilization

Top 5 Dump Extent Utilization

Top 5 Spool Extent Utilization

CP Device Table (Paging and Spooling)

Time	System ID	LPAR Name	Device VOLSER	Device Address	PAGING SPOOLING	Allocation	Available Slots	Device Type	Device End Extent	Device Percent Full	Device Start Extent	Device Slots Used
07/07/09 15:09:09	GDLVMK4	K4	K4FBA2	0201	T-DISK	11247	1405	9336	11250	0	4	0
07/07/09 15:09:09	GDLVMK4	K4	K44E8A	4E8A	T-DISK	10016	1009620	3390	10016	44	1	793260
07/07/09 15:09:09	GDLVMK4	K4	K44E8D	4E8D	SPOOLING	10016	1189980	3390	10016	34	1	612900
07/07/09 15:09:09	GDLVMK4	K4	K44E8E	4E8E	PAGING	10016	1730880	3390	10016	4	1	72000
07/07/09 15:09:09	GDLVMK4	K4	K44E8F	4E8F	SPOOLING	5016	334080	3390	5016	63	1	568800
07/07/09 15:09:09	GDLVMK4	K4	K44E8F	4E8F	PAGING	5000	819000	3390	10016	9	5017	81000

Hub Time: Tue, 07/07/2009 03:10 PM Server Available CP Owned Devices - NPMIPSVT3 - SYSADMIN

Start Manage Tivoli Enterprise ... CP Owned Devices - ... 3:11 PM

# Tips—CP Owned Volumes

- CP-Owned Volumes
  - ▶ Consist of
    - Page, Spool, Tdisk, Directory and Dump (subset of spool)
  - ▶ Considerations
    - Spool
      - Used mainly for Reader and Print files, Dumps and Named Saved Systems
      - If full, can I delete old spool files, or do I need more?
      - Good to have an automatic cleanup program, perhaps based on age of spool file (SFPURGER utility)
    - Page
      - Are my volumes getting full—do I need to add more
      - Is my paging spread out sufficiently



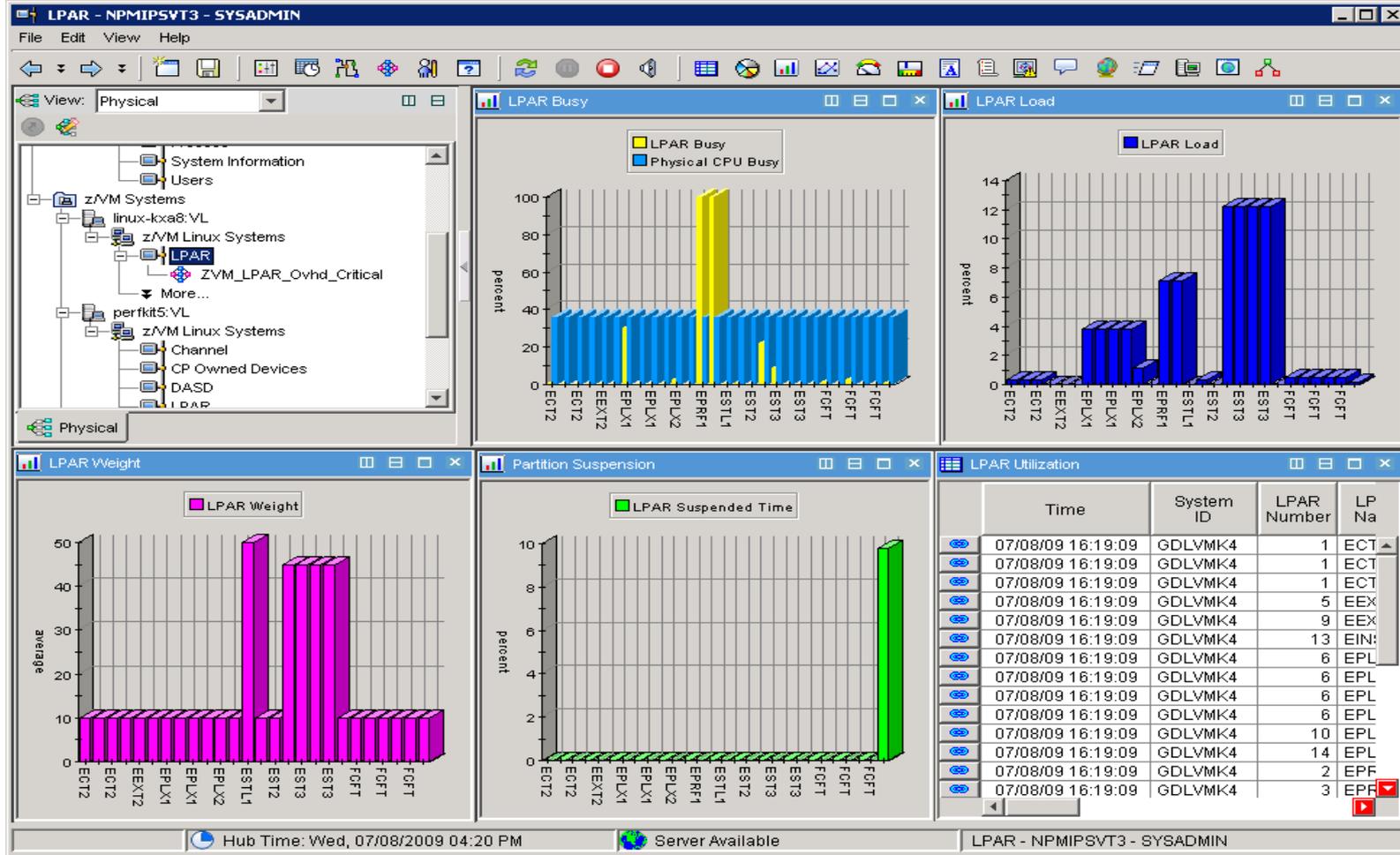
## Tips—CP Owned Volumes (paging)

- General tips
  - ▶ Page space utilization should always be < 50%
  - ▶ Never put Paging and Spool space on the same volume
  - ▶ Allocate Spool and Page volumes to try and reduce I/O contention by separating them as much as possible (control unit, channel, etc)
  - ▶ Dedicated paging devices reduce contention for paging
  - ▶ Don't put highly used files on the same volume as paging and spool space, such as the CMS system disk
  - ▶ Use devices of the same size and geometry
  - ▶ Use your fastest devices for Paging
  - ▶ Multiple Paging devices allow more overlap of paging operations
  - ▶ Large contiguous free space allows for greater paging efficiency
  - ▶ Expanded storage should be used for paging, up to 2G



# Tips—LPAR Usage

**LPAR workspace allows you to look at all your LPARs across the CEC**



# Tips—LPAR Usage

- Considerations
  - ▶ Are the LPAR weights balanced as you expected
  - ▶ Do you have any dedicated processors, and should you?
  - ▶ Do you have the right number of processors per LPAR?
    - Too few means tasks must wait for a processor
      - Multi-threaded applications can use multiple processors concurrently
    - Too many means extra overhead
  - ▶ Look at the %Busy
    - Are there some processors being underutilized?
      - Are they needed?
      - Can you shift work (virtual machines) to them
  - ▶ Look at multiple intervals, or use historical data before jumping to conclusions
  - ▶ May want to drill down to individual processors for more details



# System Processor Utilization Workspace

System - KYASH3 - SYSADMIN

File Edit View Help

Navigator View: Physical

- z/VM Linux Systems
  - Channel
  - CP Owned Devices
  - DASD
  - LPAR
  - Network
  - Real Storage
  - System

Physical

CPU Utilization

CP Percent of CPU: 0

Percent of CPU: 5

Current Users

- Average Number of Eligible Users
- Average Number of Users
- Number of Dialed Users

Total to Virtual Ratio: 1.10

User Dispatching Queues

- Expand User Queue 1
- Expand User Queue 2
- Expand User Queue 3
- In Queue Users

System Utilization

LPAR Name	Active Users	Average Number of Users	Tasks in Wait	CP Percent of CPU	Percent of CPU	Number Active CPU's	Number of Dialed Users	Average Number of Eligible Users	LPAR Busy Percent	Non-Trivial Trans Rate	Trivial Transaction Rate	Total to Virtual Ratio	In Queue Users	I/O Operation Wait Queue	System Transaction Rate	Us Waiti Reso
ANVM1	18	40	0	0	5	2	40	0.00	5.90	0.22	1.02	1.10	6	0	26.70	

Hub Time: Fri, 07/24/2009 11:50 AM

Server Available

System - KYASH3 - SYSADMIN

# Processor Utilization

- **Total Processor Utilization** This is the processor utilization from the VM perspective and includes CP, VM System, and Virtual CPU time.
- **System Time:** This is the processor time used by the VM control program for system functions that are not directly related to any one virtual machine. This should be less than 10% of the total.
- **CP Processor Time:** This is the processor time used by the VM control program in support of individual virtual machines.
- **Virtual Processor Time: (Emulation Time):** This is processor time consumed by the virtual machine and the applications within it.
- **Total to Virtual Ratio** The ratio of total processor time to virtual processor time is often used as an indicator of z/VM efficiency or overhead. The closer to 1.0, the better the z/VM efficiency. RoT: Should explore causes of a ratio over 1.30.



# Spinlock Workspace

npmipsvt3.tivlab.raleigh.ibm.com - Remote Desktop

Physical

- CP Owned Devices
- DASD
- LPAR
- Network
- Real Storage
- System
- TCP/IP
- Workload

vmlnx11:VL

- z/VM Linux Systems
- Channel
- CP Owned Devices
- DASD
- LPAR
- Network
- Real Storage

### Top 5 Locks per Second

Lock Name	Exclusive Spin Lock Rate per Second	Shared Spin Lock Rate per Second
SRMATDLK	52	0
SRMSLOCK	14	0
HCPTRQLK	8	0
RSAAVDLK	0	0
RSA2GDLK	0	0

### Top 5 Locks by Duration

Lock Name	Exclusive Time Spinning on Locks in Microseconds	Shared Time Spinning on Locks in Microseconds
SRMSLOCK	2.7	0
SRMATDLK	1.7	0
HCPTRQLK	0.6	0
RSAAVDLK	0	0
RSA2GDLK	0	0

### Top 5 Percent of Elapsed Time in Spin L...

Lock Name	Exclusive Time Spinning on Locks Percent	Shared Time Spinning on Locks Percent
SRMATDLK	0	0
RSAAVDLK	0	0
RSA2GDLK	0	0
BUTDLKEY	0	0
HCPTRLK	0	0

### Spin Lock Activity

LPAR Name	Lock Name	Total Spin Lock Calls per Second	Time Spinning on Locks in Microseconds	Time Spinning on Locks Percent	Exclusive Spin Lock Rate per Second	Exclusive Time Spinning on Locks in Microseconds	Exclusive Time Spinning on Locks Percent
VIC	SRMSLOCK	13.7	2.57	0.00	13.7	2.57	0.00
VIC	SRMATDLK	51.7	1.77	0.00	51.7	1.77	0.00
VIC	HCPTRQLK	5.9	0.59	0.00	5.9	0.59	0.00
VIC	SRMALOCK	0.0	0.00	0.00	0.0	0.00	0.00
VIC	HCPPGDPL	0.0	0.00	0.00	0.0	0.00	0.00
VIC	HCPPGDSL	0.0	0.00	0.00	0.0	0.00	0.00
VIC	HCPPGDTL	0.0	0.00	0.00	0.0	0.00	0.00
VIC	HCPPGDAL	0.0	0.00	0.00	0.0	0.00	0.00
VIC	RSAAVLLK	0.0	0.00	0.00	0.0	0.00	0.00
VIC	RSACALLK	0.0	0.00	0.00	0.0	0.00	0.00
VIC	SYSDATLK	0.0	0.00	0.00	0.0	0.00	0.00
VIC	DCTLLOK	0.0	0.00	0.00	0.0	0.00	0.00

## Spin Lock Wait

- **Time Spinning on Locks Percent:**
  - ▶ The percentage of time processors spend spinning on formal spin locks. RoT: Should be less than 10%.
  - ▶ Increases as number of logical processors increases.



# VDISK Workspace

VDISK - KYASH3 - SYSADMIN

File Edit View Help

Navigator View: Physical

- Windows Systems
- z/VM Systems
  - vmlnx11:VL
    - z/VM Linux Systems
      - Channel
      - CP Owned Devices
      - DASD**
      - LPAR
      - Network
      - Real Storage
      - System
      - TCPIP
      - Workload

Physical

### Top 5 Paging Rates per Second

Rate per Second

VDISK Owner & Device Number

### Top 5 Expanded Storage Paging Rate...

Rate per Second

VDISK Owner & Device Number

### Top 5 Pages in Use

Page Count

VDISK Owner & Device Number

### Virtual Disk Activity

Page: 1 of 2

Time	System ID	LPAR Name	VDISK Owner	Device Number	VDISK Size	Number of Links	Virtual I/O's per Second	Pages Stolen per Second	Pa: fro pe
04/06/09 23:35:51	GDLVM7	GDLVM7	ACKERK	0299	100,000	1	0.00	0.00	
04/06/09 23:35:51	GDLVM7	GDLVM7	ANGELOM	0700	7,000,000	1	0.00	0.00	
04/06/09 23:35:51	GDLVM7	GDLVM7	AVATAR	1111	4,000,000	1	0.00	0.00	
04/06/09 23:35:51	GDLVM7	GDLVM7	BIGANG	0700	7,000,000	1	0.00	0.00	
04/06/09 23:35:51	GDLVM7	GDLVM7	BRIANKT	0F00	1,440,000	1	0.00	0.00	
04/06/09 23:35:51	GDLVM7	GDLVM7	CORAKR	05FF	10,000,000	1	0.00	0.06	
04/06/09 23:35:51	GDLVM7	GDLVM7	CORAK2	05FF	20,000	1	0.00	0.00	
04/06/09 23:35:51	GDLVM7	GDLVM7	CRASTDA	0999	4,000,000	1	0.00	0.01	
04/06/09 23:35:51	GDLVM7	GDLVM7	DENISE	1111	4,000,000	1	0.00	0.00	
04/06/09 23:35:51	GDLVM7	GDLVM7	DENISE	020E	5,000,000	1	0.00	0.00	
04/06/09 23:35:51	GDLVM7	GDLVM7	DENISE2	1111	4,000,000	1	0.00	0.00	

Hub Time: Mon, 04/06/2009 11:38 PM    Server Available    VDISK - KYASH3 - SYSADMIN

# VDISK

- What is it?
  - ▶ FBA (Fixed Block Architecture disk) device emulated in-memory
    - Translation: Very fast “device”.
  - ▶ High performance paging device for Linux on z.
  - ▶ Memory is allocated by CP from the Dynamic Paging Area
  - ▶ Allocated only when referenced
    - Allocating a 10 MB device does NOT instantly consume 10 MB of pages.
    - Pages are allocated when needed.
  - ▶ Not recommended in a memory-constrained z/VM system.



# OMEGAMON MDISK Cache Allocations

Minidisk Cache - KYASH3 - SYSADMIN

File Edit View Help

Navigator View: Physical

- z/VM Systems
  - perkit5:VL
  - vmnx11:VL
    - z/VM Linux Systems
      - Channel
      - CP Owned Devices
      - DASD**
      - LPAR
      - Network
      - Real Storage
      - System
      - TCPIP
      - Workload

Physical

**Cache Requests**

Rate per Second

**Main Storage Frames**

Frames

**Cache Age**

Seconds

**Cache Expanded Storage**

Blocks

**Minidisk Cache Activity**

System ID	Partition Size in Blocks	Max Cache Size in Blocks	Actual Cache Size in Blocks	Fair Share Size in Blocks	Min p
WLAVMXA	14336	4096	2660	2048	

Hub Time: Thu, 07/23/2009 06:58 PM    Server Available    Minidisk Cache - KYASH3 - SYSADMIN

# Minidisk Cache

- z/VM minidisk cache is a write-through cache:
  - ▶ Improves read I/O performance.
  - ▶ But it's not free.
- Not recommended for:
  - ▶ Memory constrained systems.
  - ▶ Linux swap file disks.
- Default system settings are less than optimal.
- Recommended settings:
  - ▶ Eliminate MDC in expanded storage.
    - **SET MDC XSTORE 0M 0M**
  - ▶ Limit MDC in central storage – 10% is a good starting point.
    - **SET MDC STORE 0M 256M**
  - ▶ Monitor with OMEGAMON XE and/or the Q MDC command.



# DASD I/O Workspace

DASD - KYASH3 - SYSADMIN

File Edit View Help

**Navigator**

View: Physical

- z/VM Systems
  - perkit5:VL
  - vmnx11:VL
    - z/VM Linux Systems
      - Channel
      - CP Owned Devices
      - DASD**
      - LPAR
      - Network
      - Real Storage
      - System
      - TCPIP
      - Workload

**Top 5 Device Busy**

**Top 5 I/O Rate**

**Top 5 Servi...**

**Top 5 I/O...**

**DASD I/O Activity**

Volume Serial Number	Device Address	Device Type	Connection Time	Percent Busy	Average Queued IO	Average Service Time	Number IO per Second	Average Disconnect Time
VM54SP	5A1A	3390	0.60	0	0.00	0.90	3	0.00
VM54RS	5AE9	3390	0.50	0	0.00	0.80	0	0.00
VM5L51	5A57	3390	0.40	0	0.00	0.70	0	0.00
VM5L54	5A5A	3390	0.30	0	0.00	0.70	0	0.00
VM5L50	5A56	3390	0.30	0	0.00	0.70	0	0.00
VM53PA	5A08	3390	0.40	0	0.00	0.70	0	0.00
VMCD02	5A04	3390	0.40	0	0.00	0.70	0	0.00
VM5L53	5A59	3390	0.30	0	0.00	0.70	0	0.00
VMCD05	5A3A	3390	0.30	0	0.00	0.60	0	0.00
VM5LHC	5A39	3390	0.30	0	0.00	0.60	0	0.00
VM54GS	5A35	3390	0.30	0	0.00	0.60	0	0.00

Hub Time: Fri, 07/24/2009 12:06 PM    Server Available    DASD - KYASH3 - SYSADMIN

# Direct Access Storage Devices (DASD)

- **Avg Pending Time for DASD**

- ▶ Average pending time for real DASD I/Os. RoT: Should be less than 1 millisecond.

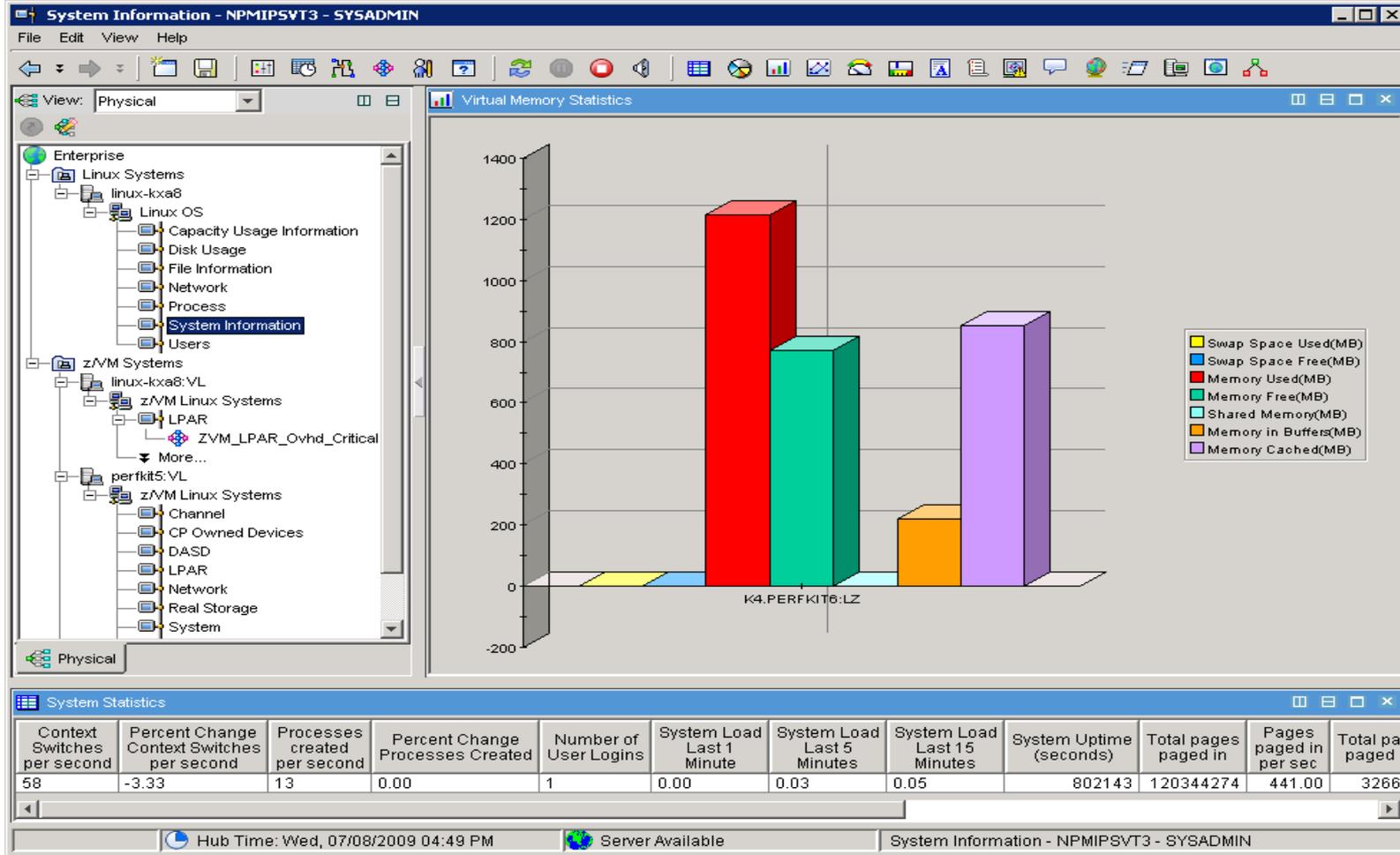
- **Items worth keeping an eye on:**

- ▶ **Number of I/O's per Second, Percent Busy**
- ▶ **Avg Service Time** Average service time for real DASD devices (sum of the pending, connect, and disconnect times).
- ▶ **DASD I/O Rate** Rate of traditional real I/Os per second to real DASD devices. Worth monitoring.



# Sizing Linux Guests

Memory usage of a particular Linux virtual machine



# Sizing Linux Guests

- Considerations
  - ▶ More memory is not always better
    - Linux will use all available memory
      - Any space it doesn't need will be used as file buffer cache. Notice the large amount of cache used in example—indicates that guest may be sized too large
      - Larger Linux guests means that z/VM has to swap out larger virtual machines when running other guests
    - One method—use monitor to watch for swapping. Shrink guest size until it starts swapping.
    - Another method. Look at the Working Set Size for the Virtual Machine. This shows what z/VM is using for the guest. May still be too large if storage is used for cache
    - To handle some swapping, define a Vdisk. This is much faster than swapping to a real device
  - ▶ Don't define more virtual processors than you have logical processors

# Sizing Linux Guests

Working Set Size can be found on the Workload workspace of the z/VM agent

The screenshot displays the Workload - NPMIPSVT3 - SYSADMIN interface. It features several performance charts and a table of z/VM workloads.

**Top 5 CPU Users:** A bar chart showing CPU usage for users PERFKIT3, PERFKIT4, PERFKIT5, MPROUTE, and KWUSER2. PERFKIT3 has the highest usage.

**Top 5 Page Rate:** A bar chart showing page rates for DATAMOVE, DIRMANT, EREP, GOS, and HMFSSERVE. DATAMOVE has the highest rate.

**Top 5 Paging Operations:** A bar chart showing page reads and writes for DATAMOVE, DIRMANT, EREP, GOS, and HMFSSERVE.

**Top 5 Working Set Size:** A bar chart showing working set sizes for PERFKIT5, KWUSER2, KWUSER1, PERFKIT4, and PERFKIT3. PERFKIT5 has the largest working set.

**All z/VM Workloads Table:**

Time	System ID	LPAR Name	User ID	Total CP % of CPU	CP Seconds	Total CPU Percent	CPU Seconds	Session Time	Total Virtual CPU%	Virtual Seconds	Page Rate	Page Reads	Page Writes	Resident Pages	Resider Pages > 2GB
07/09/09 08:39:17	GDLVICOM	VIC	PERFKIT5	0.01	0	0.37	0	1	0.36	0	0.00	0.00	0.00	25795	33606
07/09/09 08:39:17	GDLVICOM	VIC	KWUSER2	0.02	0	0.20	0	1	0.18	0	0.00	0.00	0.00	14212	17934
07/09/09 08:39:17	GDLVICOM	VIC	KWUSER1	0.04	0	0.13	0	1	0.09	0	0.00	0.00	0.00	12855	16743
07/09/09 08:39:17	GDLVICOM	VIC	PERFKIT4	0.04	0	0.58	0	1	0.54	0	0.00	0.00	0.00	4768	6067
07/09/09 08:39:17	GDLVICOM	VIC	PERFKIT3	0.25	0	7.27	4	1	7.02	4	0.00	0.00	0.00	5173	5951

Hub Time: Thu, 07/09/2009 08:42 AM | Server Available | Workload - NPMIPSVT3 - SYSADMIN

# Scenario—System Running Slowly

System is running slowly. Check Workload workspace to see if any particular user is hogging the CPU.

Workload - Microsoft Internet Explorer

Address: http://hqdnt2.demopkg.ibm.com:1920///cnp/kdh/lib/cnp.html?-12000=DNET740&5001=MOPHYSICAL&1021A=REPORT&1020=zdemolx.demopkg.ibm.com:VL@KVLWKL99&2400=

Links: IBM Business Transformation Homepage, IBM Internal Help Homepage, IBM Standard Software Installer, Windows Marketplace

Welcome DNET740  
Tivoli Enterprise Portal

View: Physical

Physical

Top 5 CPU Users

Top 5 Page Rate

Top 5 Paging Operations

Top 5 Working Set Size

All z/VM Workloads

Time	System ID	LPAR Name	User ID	CP % of CPU	CP Seconds	CPU Percent	CPU Seconds	Session Time	Virtual CPU %	Virtual Seconds	Page Rate	Page Reads	Page Writes	Resident Pages	Resid Page > 2G
02/07/08 14:12:24	TEC1ZVM		OMEGLNX2	0.03	0	97.30	58	1	97.26	58	0.00	0.00	0.00	60712	
02/07/08 14:12:24	TEC1ZVM		OMEGLNX1	0.02	0	0.13	0	1	0.11	0	0.00	0.00	0.00	23734	
02/07/08 14:12:24	TEC1ZVM		VMSFRV1	0.00	0	0.00	0	1	0.00	0	0.00	0.00	0.00	454	

Hub Time: Thu, 02/07/2008 02:11 PM Server Available Workload - hqdnt2.demopkg.ibm.com - DNET740 \*ADMIN MODE\*

Applet CMWApplet started

start Problem loading ... Session A - [24 ... Local Disk (C:) SHARE\_Orlando... Workload - Mic... 100% 3:12 PM

# Scenario—System Running Slowly (cont)

**Predefined  
Link to take  
You directly  
To the Process  
workspace**

The screenshot displays the Tivoli Enterprise Portal interface within a Microsoft Internet Explorer browser window. The main content area shows several performance dashboards:

- Top 5 CPU Users:** A bar chart showing CPU usage for processes like OMEGLNX2, OMEGLNX1, BKRADMIN, DATADVE, and OIRMAINT.
- Top 5 Page Rate:** A bar chart showing page rates for processes like BKRADMIN, BKREKUP, BKRCATLS, DATADVE, and OIRMAINT.
- Top 5 Paging Operations:** A bar chart showing page reads and writes.
- Top 5 Working Set Size:** A bar chart showing working set sizes.

At the bottom, a table lists system processes with columns for User ID, CP % of CPU, CP Seconds, CPU Percent, CPU Seconds, Session Time, Virtual CPU %, Virtual Seconds, Page Rate, Page Reads, Page Writes, Resident Pages, and Resident Pages > 2GB. The first row shows OMEGLNX2 with a CPU usage of 78.50%.

A context menu is open over the first row of the table, with the 'Process link' option highlighted. Other options include 'DNET544\_zLinux System Information', 'Link Wizard...', and 'Link Anchor...'.

The browser window title is 'Workload - Microsoft Internet Explorer' and the address bar shows 'http://hqdnt2.demopkg.ibm.com:1920//cnp/kdh/lib/cnp.html?...'.

# Scenario—System Running Slowly (cont)

See if there is a process which is using too much CPU

Process Command name (Unicode)	Process ID	Process Parent ID	Process State	Process System CPU (Percent)	Process User CPU (Percent)	Cumulative Process System CPU (Percent)	Cumulative Process User CPU (Percent)	Kernel Priority	Nice Value	Total Size(pages)	Residen Size(pag
stress1	11852	11851	Running	0.11	96.44	0.00	0.00	25	0	479	
klzagent	1729	1	Sleeping	0.03	0.02	0.00	0.00	16	0	18044	
kwlagent	11447	1	Sleeping	0.04	0.01	0.00	0.00	16	0	14832	
cupsd	1128	1	Sleeping	0.00	0.00	0.00	0.00	16	0	2116	

# Scenario—System Running Slowly (cont)

You can issue a Take Action command to stop the offending process

The screenshot displays the Tivoli Enterprise Portal interface. The main window shows a tree view of system components, with 'Process' selected under 'z/VM System'. An 'Edit Action' dialog box is open, showing the following details:

- Action Identity:** Name: Kill\_Transaction, Description: (empty), Monitored Application: Linux OS
- Action Command:** Type: System Command, Command: kill -9 11851

The 'Process Information Detail' table at the bottom of the portal shows the following data:

Process Command name (Unicode)	Process ID	Process Parent ID	Process State	Process System CPU (Percent)	Process User CPU (Percent)	Cumulative Process System CPU (Percent)	Cumulative Process User CPU (Percent)	Kernel Priority	Nice Value	Total Size(pages)	Residen Size(pag)
stress1	11852	11851	Running	0.11	96.44	0.00	0.00	25	0	479	
kizagent	1729	1	Sleeping	0.03	0.02	0.00	0.00	16	0	18044	
kwlagent	11447	1	Sleeping	0.04	0.01	0.00	0.00	16	0	14832	
cuxcd	11328	1	Sleeping	0.00	0.00	0.00	0.00	16	0	2416	

The 'Percent Usage' graph on the right shows relative process system and user CPU usage over time, with the x-axis ranging from 0.01 to 0.04. The status bar at the bottom indicates 'Hub Time: Thu, 02/07/2008 02:14 PM', 'Server Available', and 'Process - hqndt2.demopkg.ibm.com - DNET740 \*ADMIN MODE\*'. The taskbar shows the system is running at 100% CPU usage.

## Related Sessions

- 8493/94 Introduction to z/VM
- 9115 z/VM Performance Introduction
- 8450 z/VM Performance Update
- 8451 z/VM System Limits
- 8449 z/VM Performance Case Studies



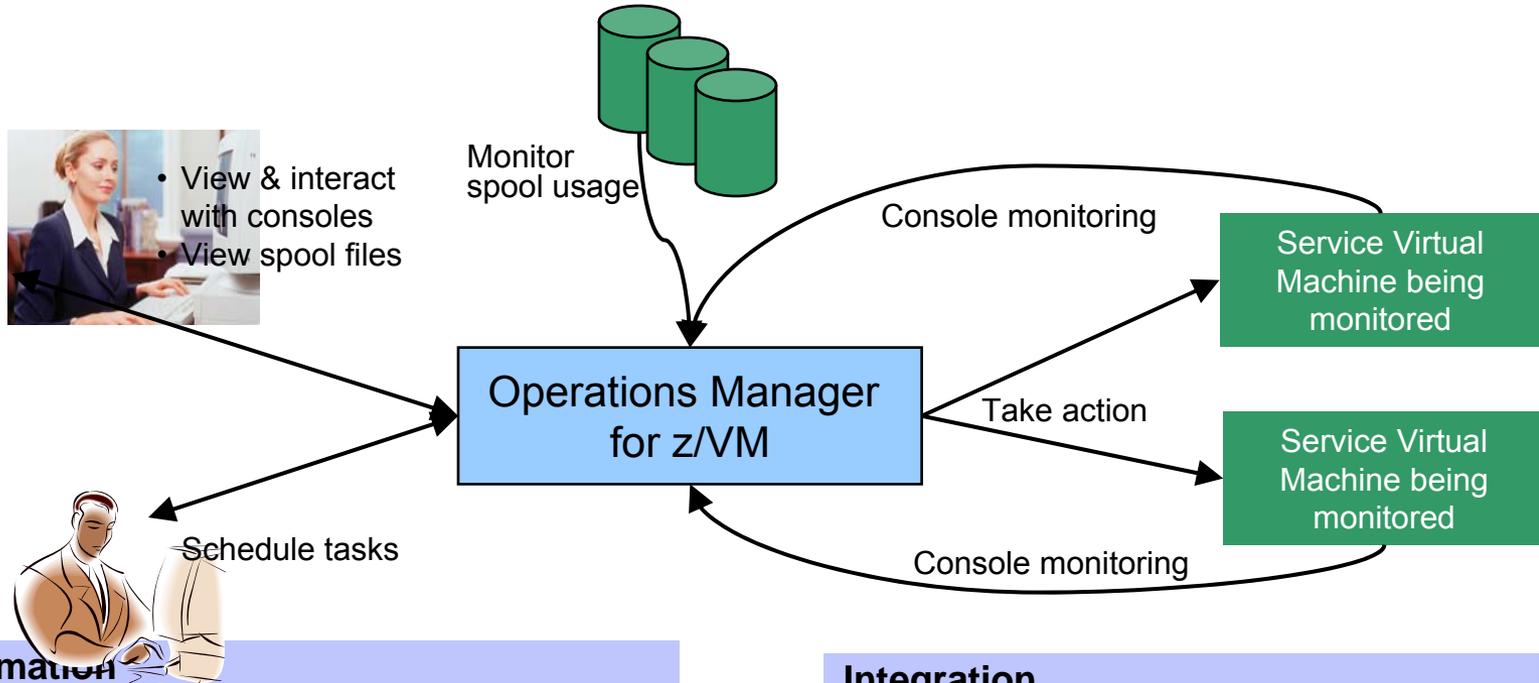
# Operations Manager for z/VM

## Increase productivity

- Authorized users view and interact with monitored virtual machines without logging onto them
- Multiple users view/interact with a virtual machine simultaneously

## Improve system availability

- Monitor virtual machines and processes
- Take automated actions based on console messages
- Reduce problems due to operator error



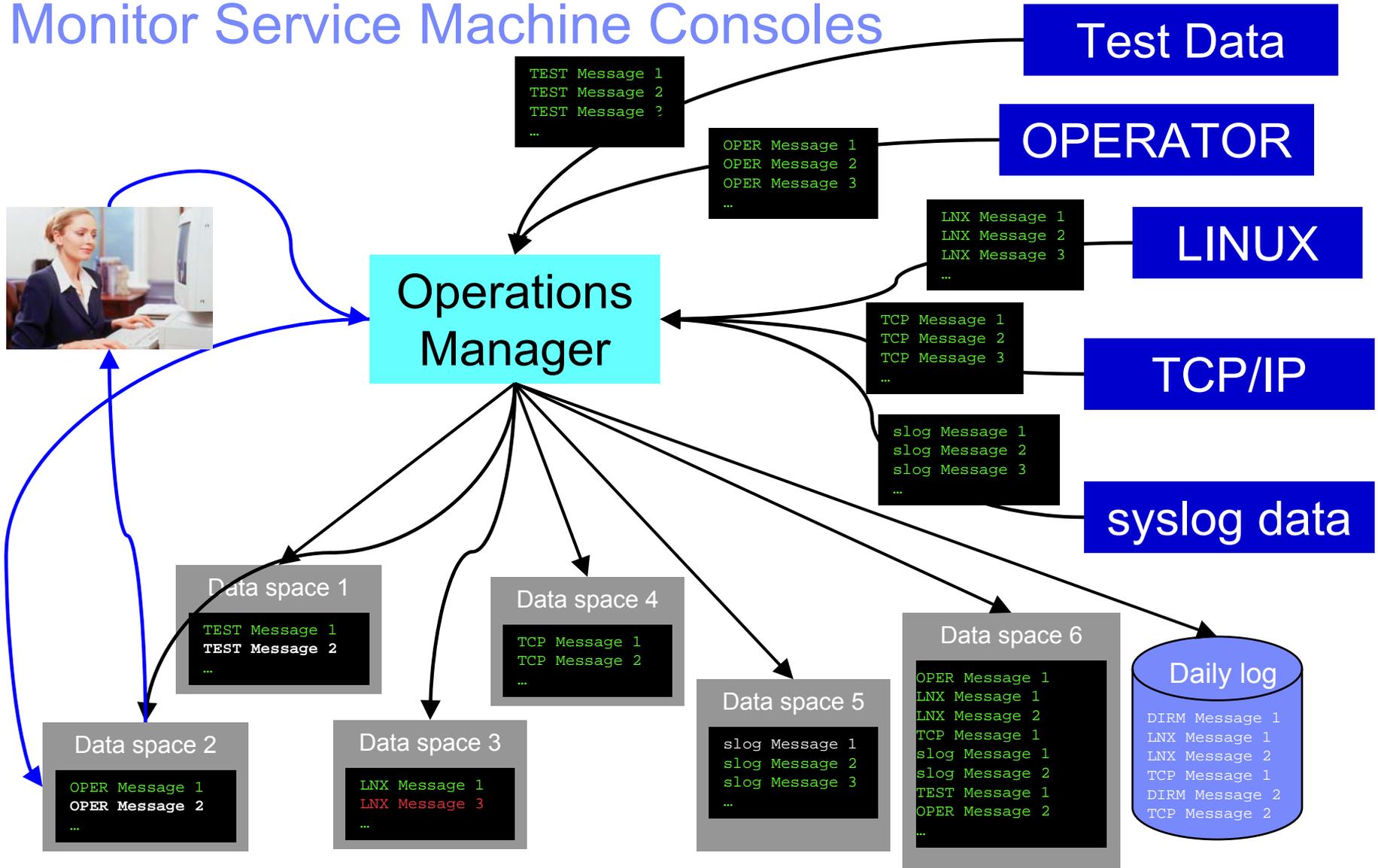
## Automation

- Routine activities done more effectively with minimal operations staff
- Schedule tasks to occur on a regular basis

## Integration

Fulfill take action requests from OMEGAMON XE on z/VM and Linux

# Monitor Service Machine Consoles



# Monitor Service Machines

- Define rules to
  - ▶ Scan console messages for text matching
    - Includes column, wildcard, and exclusion support
    - Optionally restrict to specific user ID(s)
  - ▶ Take actions based on matches
- Multiple rules can apply to one message
  - ▶ Rules processed in order of definition in the configuration file
  - ▶ FINAL option available to indicate no additional rules should be evaluated



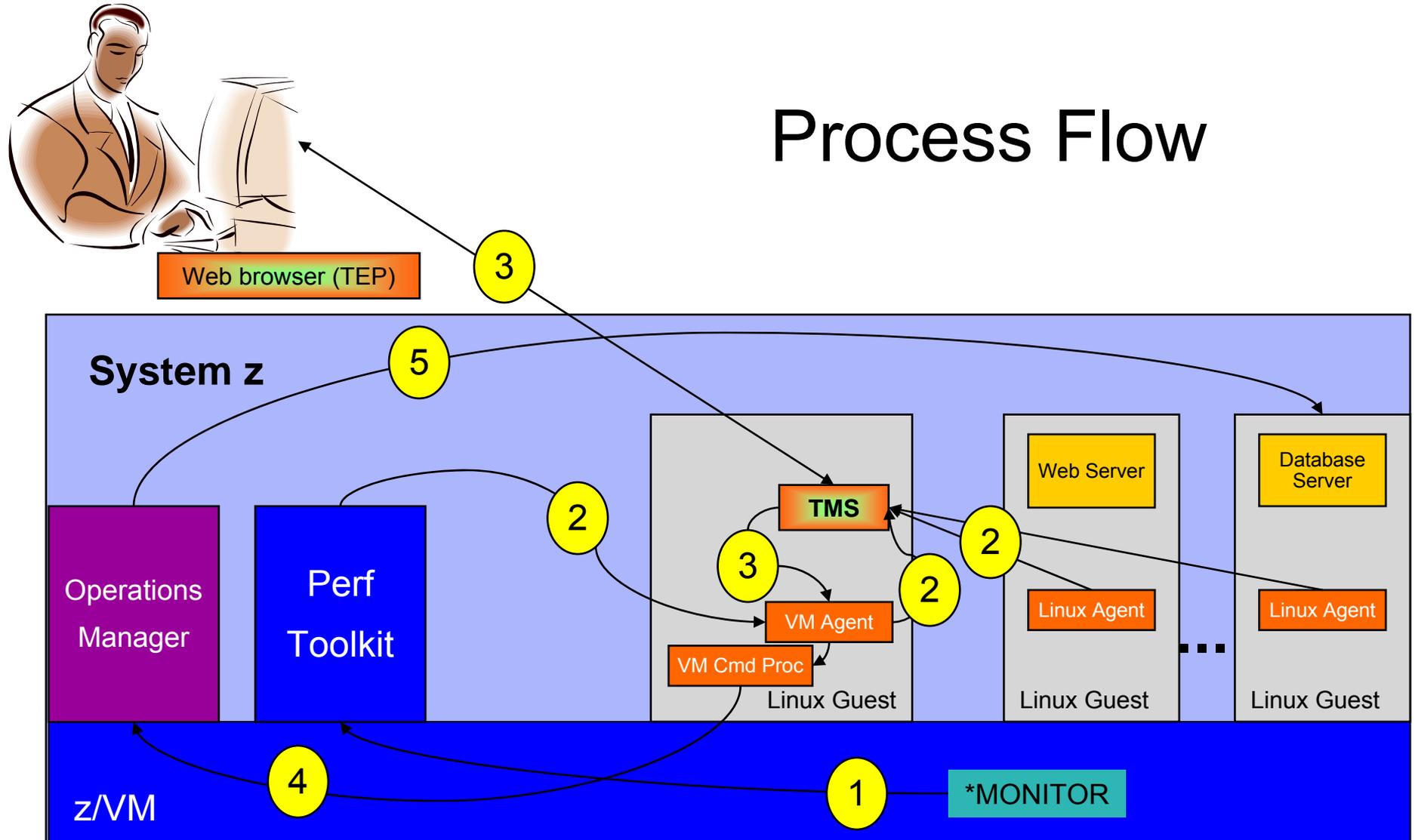
## Sample Scenario: Adjusting Resources for a Linux Guest

- Virtual CPU consumption is high for a Linux guest
- OMEGAMON detects the alert
  - ▶ Sends message to console monitored by Operations Manager
- Action is triggered by a rule in Operations Manager
- Operations Manager issues CP commands to tune the guest
  - ▶ SET QUICKDSP
  - ▶ SET SHARE
- Ability to monitor the output is key



# OMEGAMON XE and Operations Manager for z/VM

## Process Flow



# Adjusting resources for a Linux guest

The screenshot displays the Tivoli Enterprise Portal interface with three main components:

- Navigator:** Shows a tree view with 'High CPU' selected under 'Linux Systems'.
- has107:LZ Process View from Linux Agent:** A horizontal bar chart showing 'Process Busy CPU (Percent)' for various processes. The y-axis lists processes like oqueueD, bash, kthread, cms, cron, portmap, resmgrd, kjournald, ksotfingd0, appldata, java, and hog. The x-axis is 'Linux Virtual CPU %' from 0 to 100. The 'hog' process shows a significant CPU usage spike.
- z/VM CPU Percent View from Performance Toolkit:** A line graph showing 'has107:LZ Real CPU %' over time. The y-axis ranges from 0 to 16. The x-axis shows time from 12:44:30 to 12:54:00. A sharp increase in CPU usage is visible around 12:47:30.
- Terminal.1:** A terminal window showing system messages and actions, including:
 

```

10/05/2009 00:00:00
10/05/2009 06:44:39 * MSG FROM DEMOADMIN: this user is abending, please alert o
10/05/2009 06:44:39 * -- Operations Manager Action ALRTOMMI scheduled for execu
10/05/2009 06:55:00 * MSG FROM DEMOADMIN: this user is abending, please send me
10/05/2009 06:55:00 * -- Operations Manager Action EMAIL scheduled for execu
10/05/2009 09:59:33 * MSG FROM DEMOADMIN: this user is abending, please send al
10/05/2009 09:59:33 * -- Operations Manager Action ALRTOMMI scheduled for execu
10/05/2009 11:12:37 * MSG FROM DEMOADMIN: this is an abend message please e-mai
10/05/2009 11:12:37 * -- Operations Manager Action EMAIL scheduled for execu
10/05/2009 11:25:45 * MSG FROM DEMOADMIN: this is an abend message please alert
10/05/2009 11:25:45 * -- Operations Manager Action ALRTOMMI scheduled for execu
10/05/2009 12:48:17 * MSG FROM OMEGACMD: GUEST NEEDS CPU PRIORITY
10/05/2009 12:48:17 * -- Operations Manager Action GUSTCPUB scheduled for execu
10/05/2009 12:48:17 * MSG FROM OMEGACMD: GUEST NEEDS CPU PRIORITY
10/05/2009 12:48:17 * -- Operations Manager Action GUSTCPUB scheduled for execu
            
```

# Operations Manager Configuration

- Define a rule to look for the message from OMEGAMON:

```
DEFRULE NAME(GUSTCPU),+  
  MATCH(*NEEDS CPU PRIORITY*),+  
  ACTION(GUESTCPU)
```

- Define actions to highlight the message and call an EXEC to adjust CPU, passing the guest name

```
DEFACTN NAME(GUESTCPU),+  
  INPUT(AHI),+  
  NEXTACTN(GUSTCPUB)  
*  
DEFACTN NAME(GUSTCPUB),+  
  COMMAND(EXEC VCPU &4),+  
  ENV(LVM),+  
  OUTPUT(LOG)
```

# OMEGAMON Configuration

The screenshot shows the 'Situations for - Workload' configuration window. The left pane shows a tree view under 'Workload' with 'z/VM Linux Systems' expanded, listing several situations: 'CPU\_GREATER\_30' (selected), 'ZVM\_User\_CPU\_Critical', 'ZVM\_User\_CPU\_High', 'ZVM\_Virtual\_CPU\_Critical', and 'ZVM\_Virtual\_CPU\_High'. The main pane is for the 'CPU\_GREATER\_30' situation.

**Name:** CPU\_GREATER\_30

**Description:** For WKLDDemo

**Formula:**

	CPU Percent
1	> 30.00
2	
3	

**User ID:** The identifier of the user or the group name of the workload. The value format is an alphanumeric text string with a maximum of 8 characters.

**Situation Formula Capacity:** 4%

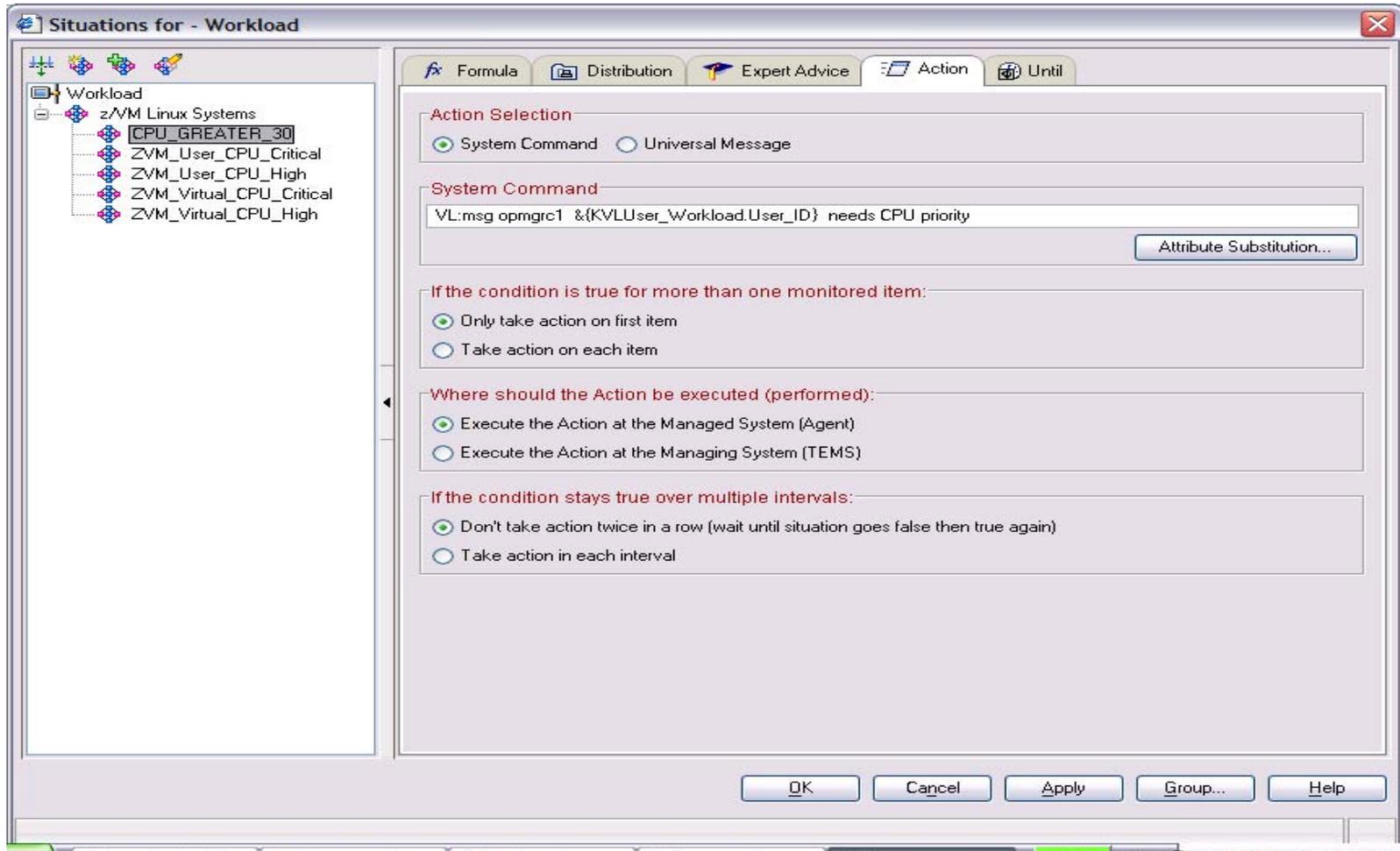
**Sampling interval:** 0 / 0 : 0 : 30 (ddd hh mm ss)

**Sound:**  Enable critical.wav (Buttons: Play, Edit...)

**State:** Critical (Buttons: Run at startup)

Buttons at the bottom: OK, Cancel, Apply, Group..., Help

# OMEGAMON Configuration



## Additional Automation Scenarios

- ▶ Automating and scheduling the backup of a Linux guest
- ▶ Send a message or e-mail if spool usage is too high
  - Tools to find and view spool files based on size, owner, and/or date
- ▶ Automate the response to a disk full condition
- ▶ Take actions based on messages in Linux syslog data



# BACKUP



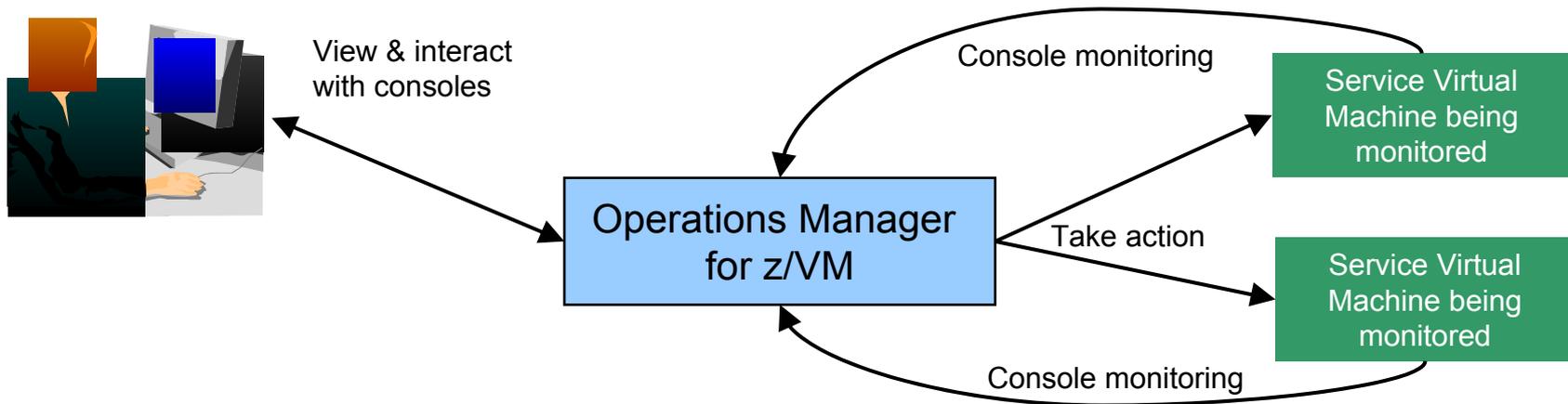
# Operations Manager for z/VM

## ➤ Increase productivity

- Authorized users view and interact with monitored virtual machines without logging onto them
- Multiple users view/interact with a virtual machine simultaneously

## ➤ Improve system availability

- Monitor virtual machines and processes
- Take automated actions based on console messages
- Reduce problems due to operator error



### Automation

Routine activities done more effectively with minimal operations staff

### Integration

Fulfill take action requests from OMEGAMON XE on z/VM and Linux

# Operations Manager for z/VM and OMEGAMON XE on z/VM and Linux

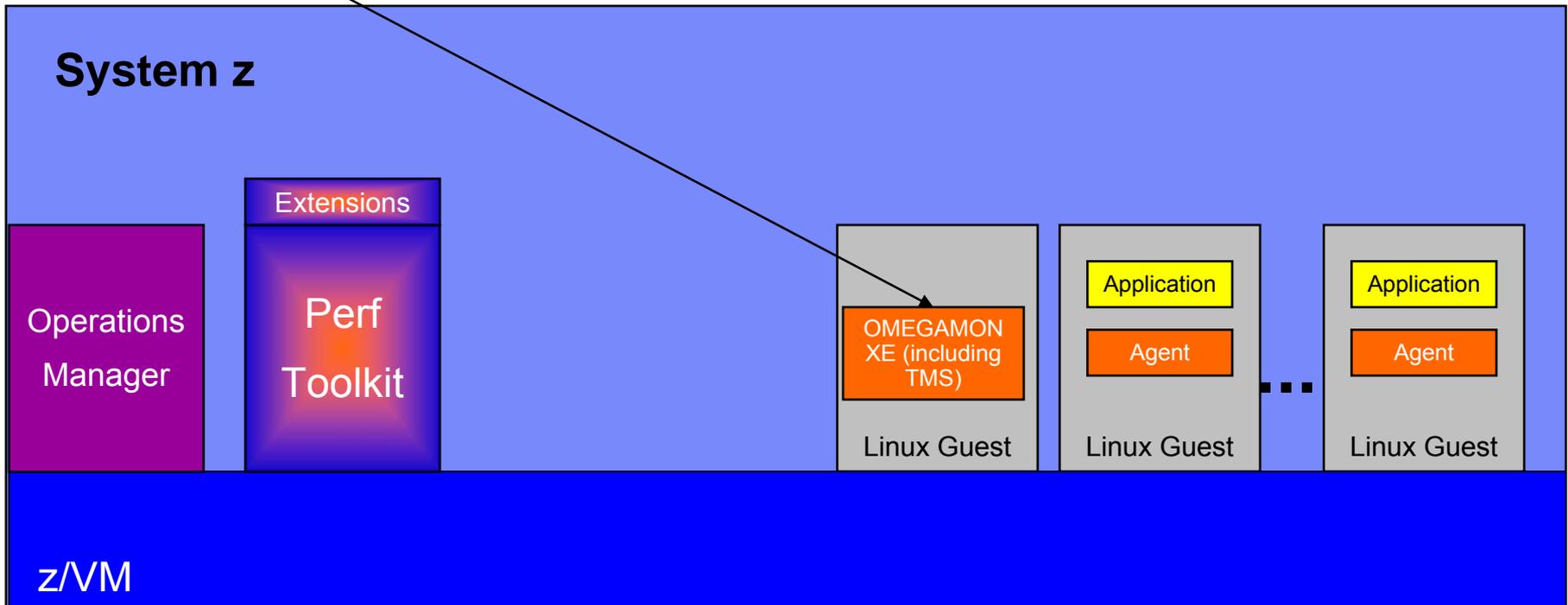


## ➤ OMEGAMON XE on z/VM and Linux

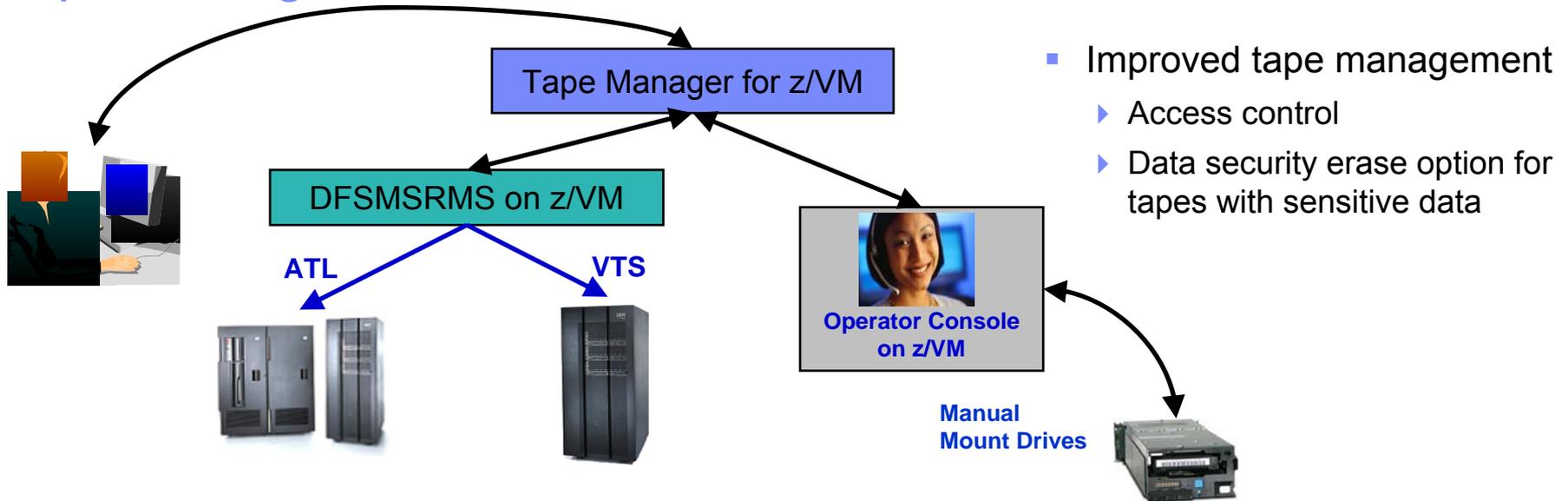
- Performance monitoring for z/VM and Linux guests
- Part of Tivoli Management Services (TMS) infrastructure

## ➤ Operations Manager for z/VM

- Monitor consoles of z/VM service machines and guest user IDs
- Take actions based on console messages
  - Respond to “take action” requests from OMEGAMON
- Schedule routine tasks



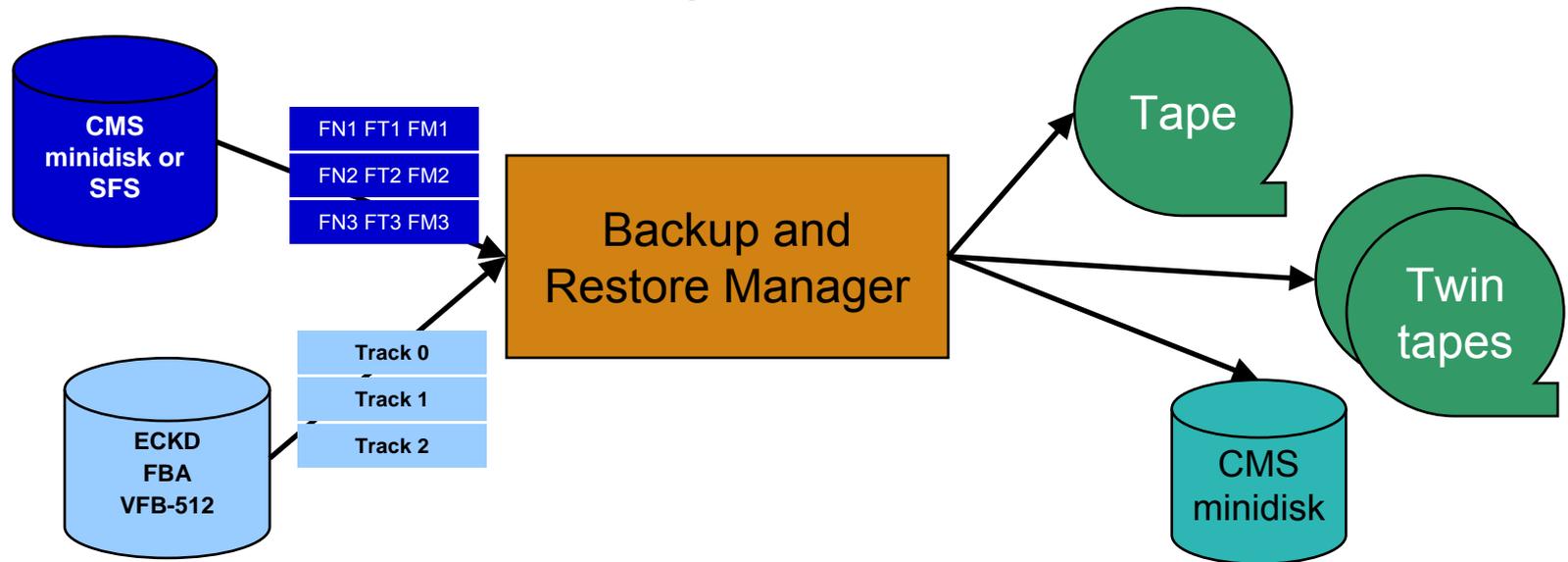
# Tape Manager for z/VM



- Improved tape management
  - ▶ Access control
  - ▶ Data security erase option for tapes with sensitive data

- Effective management of tapes in ATL or VTS
  - ▶ Granular access control
  - ▶ Expiration processing
  - ▶ Notification for low threshold for tape resources
- Improved accuracy of manual tape processing
  - ▶ Automated interface to Operator for manual mounts
  - ▶ Verification of mount before given to requesting user
    - Internal tape label (verified again when user detaches the tape)
    - Read/Write verification
- Share tape devices with z/OS or other systems
- Integrated management of z/OS and z/VM tapes
  - ▶ Optionally use DFSMSRmm on z/OS as the tape catalog for z/VM and z/OS tapes
  - ▶ Tapes, access control, and retention managed by the existing RMM catalog
  - ▶ Accessible via Tape Manager on z/VM

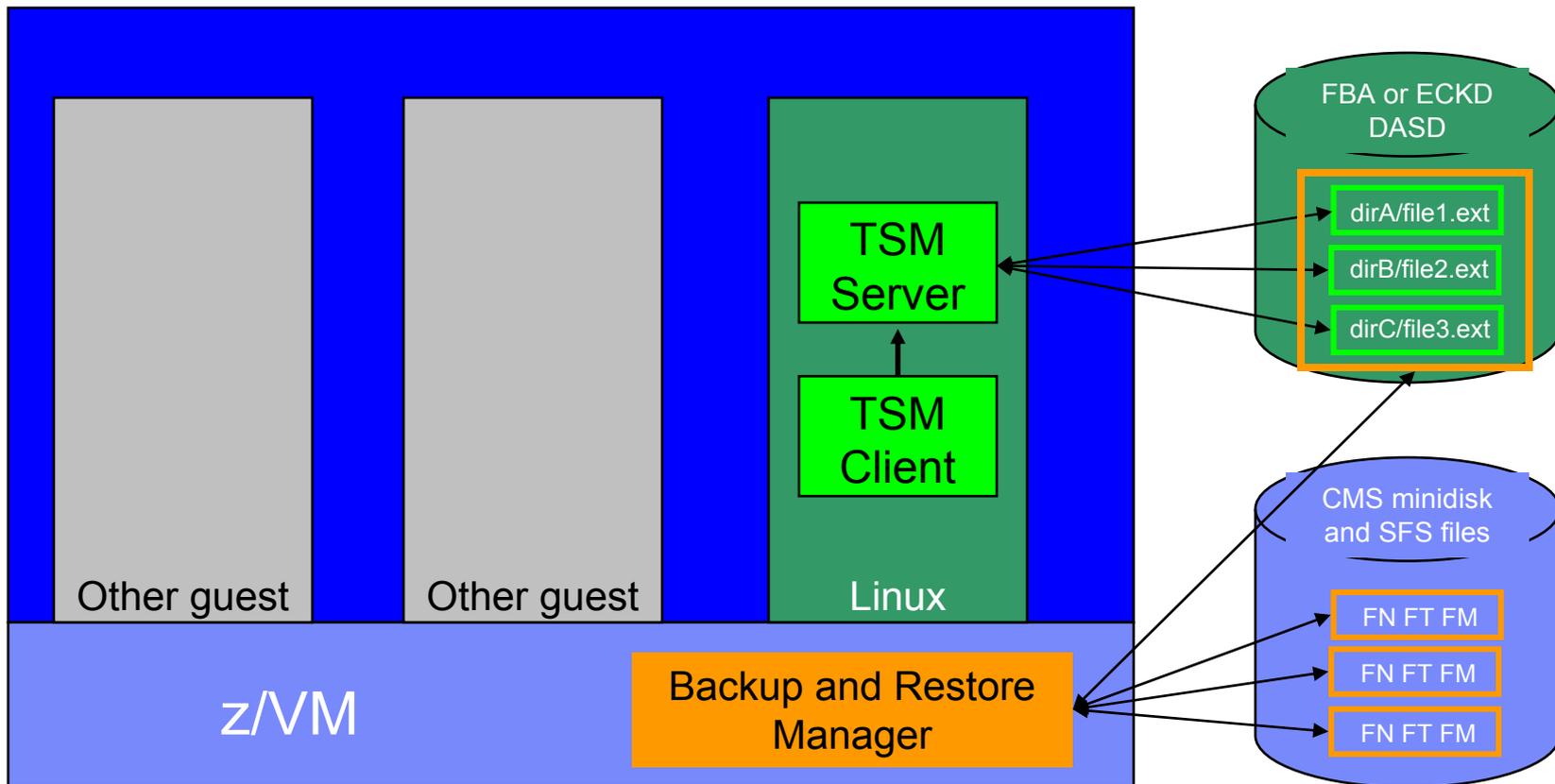
# Backup and Restore Manager for z/VM



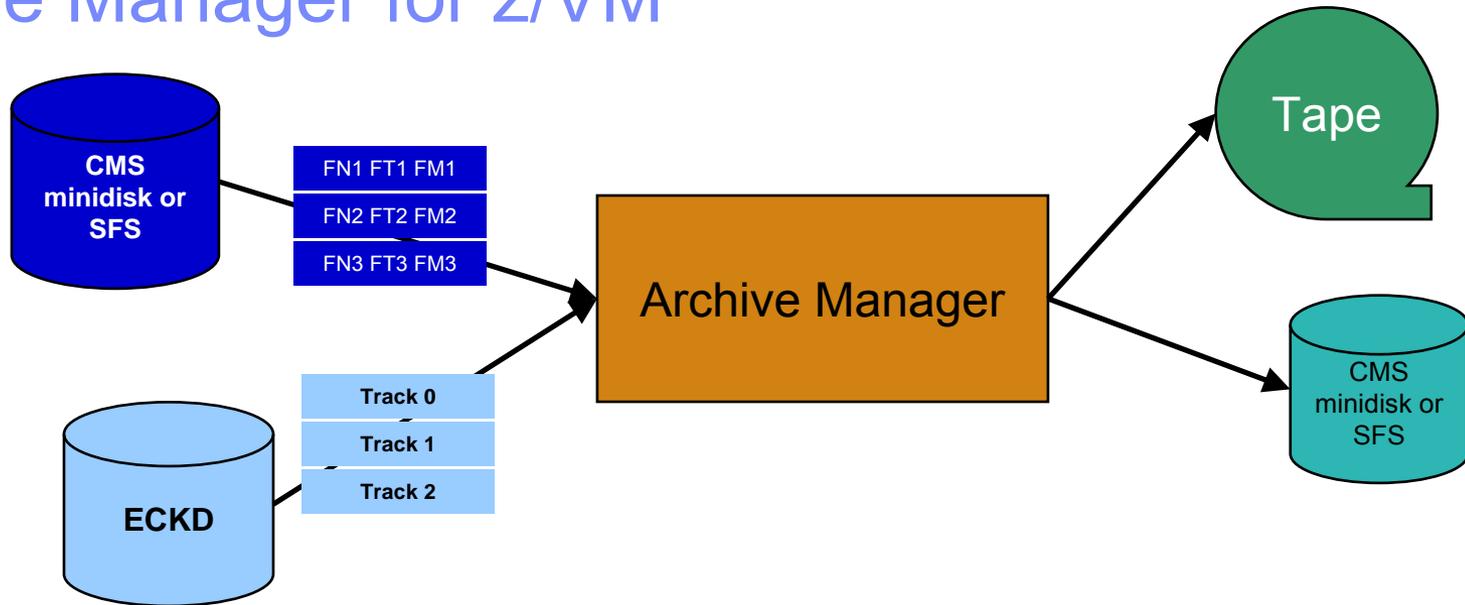
- **System backups available for Disaster Recovery**
- **Guest backups available for restoring to a previous state/level**
- **Backups of user data available for**
  - ▶ Restoring to a previous state/level
  - ▶ Replacing files accidentally erased
- **Flexible selection of data to back up**
  - ▶ Include/exclude minidisks, directories, DASD extents
  - ▶ Review of backup job before submission
- **Reduced backup window with concurrent processing**
  - ▶ Multiple worker service machines sharing the job
- **Users restore their own data**
  - ▶ No administrator interaction required
- **Management of backup data**
  - ▶ Retention set as part of the backup job
  - ▶ Automatic aging and pruning of the backup catalog
  - ▶ View/query the list of expired backups
- **Integration with Tape Manager for z/VM**

# Backup and Restore Manager and Linux Guests

*Using Backup and Restore Manager with Tivoli Store Manager*



# Archive Manager for z/VM



- Improve end user satisfaction and productivity
  - ▶ Users manage their own disk space
  - ▶ Move infrequently used files to tape or other disk
  - ▶ Archive and recall functions are controlled by the user
    - No administrator intervention required
  - ▶ Archived data staged to DASD, then tape if applicable
    - Users don't wait for a tape mount for archive request to complete
- Reduce DASD space requirements
  - ▶ Archive older files to less expensive storage media
  - ▶ Continue to provide users access to the archived data/files
- Control location, retention, and access to archived data
- Integration with Tape Manager for z/VM

## For More Information

- Product Web sites
  - ▶ <http://www.ibm.com/software/stormgmt/zvm/>
    - Publications
    - Pre-requisites
    - Announcements
    - Support
- e-mail: Tracy Dean, [tld1@us.ibm.com](mailto:tld1@us.ibm.com)



The following pages contain screenshots and a list of all the data available via the OMEAGMON on z/VM and Linux and the Linux OS agents



# z/VM Linux Default Workspace

The screenshot displays the z/VM Linux Systems administration interface. The main window is titled "z/VM Linux Systems - PHKMSM - SYSADMIN \*ADMIN MODE\*". The interface is divided into several panes:

- Left Pane:** A tree view showing the system hierarchy: Enterprise > Linux Systems > vmlnx10 > Linux OS > z/VM Linux Systems. Other categories include CP-Owned\_Devices(P), DASP, LPAR, Network, Real\_Storage, System, TCPIP, and Workload.
- Top Center Pane:** "z/VM PTK Collector Status" table showing the status of various collectors.
- Top Right Pane:** "Situation Event Console" showing a list of events with columns for Status, Situation Name, Display Item, and Source.
- Bottom Left Pane:** "DASD Activity" bar chart showing "Percent Busy" for various DASD devices.
- Bottom Center Pane:** "z/VM User CPU Utilization" bar chart showing "CP % of CPU", "CPU Percent", and "Virtual CPU %" for users PERPHKT and VMLNX3.
- Bottom Right Pane:** "z/VM User Working Set and Storage" bar chart showing "Resident Pages", "Resident Pages 2G", and "Working Set Size" for users OPER1, VMLNX4, and VMLNX1.

**z/VM PTK Collector Status Table:**

Time	Collector Name	Status
06/21/06 09:49:40	Performance Toolkit Collector	ACTIV
06/21/06 09:49:40	LPAR	ACTIV
06/21/06 09:49:40	System	ACTIV
06/21/06 09:49:40	Storage	ACTIV
06/21/06 09:49:40	CP Owned	ACTIV
06/21/06 09:49:40	DASD	ACTIV
06/21/06 09:49:40	Workload	ACTIV
06/21/06 09:49:40	Hipersocket	ACTIV
06/21/06 09:49:40	Virtual Switch	ACTIV
06/21/06 09:49:40	TCPIP	ACTIV
06/21/06 09:49:40	TCPIP User	ACTIV
06/21/06 09:49:40	Linux Application	INAC

**Situation Event Console Table:**

Status	Situation Name	Display Item	Source
Open	ZVM_Avail_Mean2G_Low		vmlnx10.tivlab.raleigh
Open	ZVM_LPAR_Busy_Critical		vmlnx10.tivlab.raleigh

At the bottom of the interface, the taskbar shows the Start button, Windows Task Manager, and several open applications including CNPS, Manage Tivoli Enterprise, and Document1 - Microsoft W... The system tray displays the Hub Time as "Wed, 06/21/2006 09:47 AM" and the Server status as "Available".

# PAGING and SPOOLING Utilization

**Paging\_Spooling - PHKMSM - SYSADMIN \*ADMIN MODE\***

File Edit View Help

View: Physical

Enterprise

- Linux Systems
  - vmInx10
    - Linux OS
      - z/VM Linux Systems
        - CP-Owned\_Devices(Page\_Spool)**
          - DASD
          - LPAR
          - Network
          - Real\_Storage
          - System

Physical

**Paging and Spooling Space**

**Top 5 Page Extent Utilization**

**Top 5 Dump Extent Utilization**

**Top 5 Spool Extent Utilization**

**CP-Device Table (Paging and Spooling)**

Time	System ID	LPAR Name	Device VOLSER	Device Address	PAGING/SPOOLING	Allocation	Available Slots	Device Type	Device End Extent	Device Percent Full	Device Start Extent	Devices Slots Used
06/21/06 09:49:40	WLAVMXA	LPAR001	VMSY03	2412	PAGING	10	1	3390	540	1	5	3
06/21/06 09:49:40	WLAVMXA	LPAR001	VMSY03	2114	SPOOLING	23	12	3390	540	52	5	3
06/21/06 09:49:40	WLAVMXA	LPAR001	VMSY03	2213	SPOOLING	33	33	3390	540	0	5	3
06/21/06 09:49:40	WLAVMXA	LPAR001	VMSY03	1423	UNKNOWN	12	1	3390	540	8	5	3

Hub Time: Wed, 06/21/2006 09:50 AM Server Available

Paging\_Spooling - PHKMSM - SYSADMIN \*ADMIN MODE\*

Start Windows Task Manager CNPS Manage Tivoli Enterprise ... ~ 9:50 AM

Paging\_Spooling - PH... ~ Document1 - Microsoft W...

# PAGING and SPOOLING Utilization

- **Paging\_Spooling Workspace**
  - ▶ This workspace displays data on the paging and spooling devices for the whole z/VM system.
  
- **CP-Device Table**
  - ▶ All attributes are collected for the current reporting interval
  
- **Description**
  - ▶ TOD clock at start of interval (Approximately 1 second accuracy).
  - ▶ SYSID of z/VM System.
  - ▶ Assigned logical partition number.
  - ▶ Real address of CP-owned DASD.
  - ▶ Number of cylinders or blocks allocated for the CP-owned extent.
  - ▶ Number of slots available on the CP-Owned device at the time the sample was taken.
  - ▶ Type of DASD (for example: 3370 or 3380).
  - ▶ Primary Purpose of this device.
  - ▶ End extent allocated on CP-owned device. (cylinder or block number)
  - ▶ Percentage of space on the CP-Owned volume in use at the time the sample was taken.
  - ▶ Starting cylinder or block number for the CP-Owned device extent.
  - ▶ Number of used slots on the CP-Owned device at the time the sample was taken.
  - ▶ Volume serial number of CP-owned DASD.

# DASD

**DASD - PHKMSM - SYSADMIN \*ADMIN MODE\***

File Edit View Help

View: Physical

Enterprise

- Linux Systems
  - vmlnx10
    - Linux OS
    - z/VM Linux Systems
      - CP-Owned\_Devices(Page\_Spool)
      - DASD**
      - LPAR
      - Network
      - Real\_Storage
      - System
      - TCPIP
      - Workload
  - vmlnx11

Physical

**Top 5 Percent Busy**

Volume	Percent Busy
VMST068	100
VMST044	65
VMST112	55
VMST034	45
VMST002	35

**Top 5 I/O Rate**

Volume	Number of Start I/Os
VMST111	1250
VMST068	1150
VMST112	700
VMST002	350
VMST001	250

**Top 5 Service Time for DASD I/O**

Volume	Connection Time	Average Disconnect Time	Average Pending Time
VMST044	450	50	10
VMST002	350	100	10
VMST112	350	10	10
VMST068	120	10	10
VMST034	80	10	10

**Top 5 I/O Queue Depth**

Volume	Average Queued I/O
VMST002	45
VMST068	45
VMST044	45
VMST112	35
VMST111	30

**DASD I/O Activity**

Time	System ID	LPAR Name	Volume Serial Number	Device Address
06/21/06 09:49:40	WLAVMXA	LPAR001	VMSY04	2619
06/21/06 09:49:40	WLAVMXA	LPAR001	VMSY01	2611
06/21/06 09:49:40	WLAVMXA	LPAR001	VMSY11	1621
06/21/06 09:49:40	WLAVMXA	LPAR001	VMSY02	2345
06/21/06 09:49:40	WLAVMXA	LPAR001	VMSY12	3211
06/21/06 09:49:40	WLAVMXA	LPAR001	VMSY44	4352
06/21/06 09:49:40	WLAVMXA	LPAR001	VMSY34	5532
06/21/06 09:49:40	WLAVMXA	LPAR001	VMSY66	1233

Hub Time: Wed, 06/21/2006 09:50 AM Server Available DASD - PHKMSM - SYSADMIN \*ADMIN MODE\*

Start Windows Task Manager CNPS Manage Tivoli Enterprise ... 9:50 AM

DASD - PHKMSM - SY... Document1 - Microsoft W...

# DASD

- **DASD Workspace**

- ▶ The DASD workspace provides several views that show the busiest I/O devices on the overall z/VM system.

- **DASD I/O Activity Table (I/O TABLE)**

- ▶ All attributes are collected for the current reporting interval

- **Description**

- ▶ TOD clock at start of interval (Approximately 1 second accuracy)
- ▶ SYSID of z/VM System.
- ▶ Assigned logical partition number.
- ▶ Real address of device.
- ▶ Type of device (for example: 3370 or 3380).
- ▶ Average time this device was in CONNECT state during the interval.
- ▶ Percentage of time the device was found busy.
- ▶ Average number of I/Os queued on the device.
- ▶ Number of I/Os started on this device.
- ▶ I/Os per second to this device (I/O rate).
- ▶ Average time this device was in DISCONNECT state during the reporting interval.
- ▶ Average time this device was in PENDING state during the reporting interval.
- ▶ Average service time for this device in milliseconds.
- ▶ Volume serial number if DASD device.

# LPAR Utilization

LPAR - bmaddox3.raleigh.ibm.com - SYSADMIN

File Edit View Help

View: Physical

- Enterprise
  - Linux Systems
  - z/VM Systems
    - vmInx11:VL
      - z/VM Linux Systems
        - Channel
        - CP Owned Devices
        - DASD
        - LPAR**
        - Network
        - Real Storage
        - System
        - TCPIP
        - Workload

Physical

### LPAR Busy

LPAR Name	LPAR Busy (%)	Physical CPU Busy (%)
CANSYSA	~95	~35
CANVM1	~10	~35
RALHCD	~5	~35
TIVVMT01	~5	~35
TIVVM8	~5	~35

### LPAR Load

LPAR Name	LPAR Load (%)
CANSYSA	~35
CANVM1	~5
RALHCD	~0
TIVVMT01	~0
TIVVM8	~0

### LPAR Weight

LPAR Name	LPAR Weight (Average)
CANSYSA	~100
CANVM1	~115
RALHCD	~5
TIVVMT01	~10
TIVVM8	~100

### Partition Suspension

LPAR Name	LPAR Suspended Time (%)
CANSYSA	~0.0
CANVM1	~1.5
RALHCD	~0.0
TIVVMT01	~0.0
TIVVM8	0.00 (TIVVM8)

### LPAR Utilization

Time	System ID	LPAR Number	LPAR Name
08/07/08 17:36:55	WLAVMXA	1	CANSYSA
08/07/08 17:36:55	WLAVMXA	2	CANVM1
08/07/08 17:36:55	WLAVMXA	5	RALHCD
08/07/08 17:36:55	WLAVMXA	3	TIVVMT01
08/07/08 17:36:55	WLAVMXA	4	TIVVM8

Hub Time: Thu, 08/07/2008 05:40 PM    Server Available    LPAR - bmaddox3.raleigh.ibm.com - SYSADMIN

start    Local Dis...    Session ...    Manage ...    LPAR - ...    Phillis a...    Window...    Microsof...    100%    5:36 PM

# Processor Utilization

Processor - bmaddox3.raleigh.ibm.com - SYSADMIN

File Edit View Help

View: Physical

- Enterprise
  - Linux Systems
  - z/VM Systems
    - vmnx11:VL
      - z/VM Linux Systems
        - Channel
        - CP Owned Devices
        - DASD
        - LPAR**
        - Network
        - Real Storage
        - System
        - TCPIP
        - Workload

Physical

### LPAR Weight

LPAR Name	Average Weight
CANVSA	~105
CANVM1	~115
RALH0D	~5
TIVVM101	~10
TIVVM8	~105

### LPAR Load

Category	Value
LPAR Load	2.10 (CANVM1)
z/VM CPU Load	~13
Logical CPU Load	~13

### LPAR Processor Busy

LPAR Name & Processor Number	LPAR Busy (%)	LPAR Overhead Percent (%)
CANVM1 - 0	~3.5	~3.5
CANVM1 - 1	~9.5	~9.5

### LPAR Processor Utilization

System ID	LPAR Number	LPAR Name	LPAR Partition ID	LPAR CPU	LPAR Capped	LPAR Weight	LPAR Wait	LPAR Load	LPAR Status	Processor Type	Processor Number	LPAR Status
WLAVMXA	2	CANVM1	01	2	NO	114.00	NO	2.10	ACTIVE*	CP	0	
WLAVMXA	2	CANVM1	01	2	NO	114.00	NO	2.10	ACTIVE*	CP	1	

Hub Time: Thu, 08/07/2008 05:40 PM    Server Available    Processor - bmaddox3.raleigh.ibm.com - SYSADMIN

start    Local Dis...    Session ...    Manage ...    Proces...    Phillis a...    Window...    Microsof...    100%    5:36 PM

# LPAR Utilization

- LPAR Utilization Workspace
  - ▶ The LPAR Utilization Workspace provides information about the overall utilization of the system complex. The LPAR Workspace is connected to the LPAR entry on the Navigator.
  
- **LPAR Utilization table (Data is taken from the IRA LPAR Table)**
  - ▶ All attributes are collected for the current reporting interval
  
- **Description**
  - ▶ TOD clock at start of interval (Approximately 1 second accuracy).
  - ▶ SYSID of z/VM System.
  - ▶ Assigned logical partition number.
  - ▶ Assigned name of the logical partition.
  - ▶ Utilization of the system based on the number of logical processors available.
  - ▶ Computed as:  $(\text{Dispatch time} / \text{Elapsed time}) * \text{Number of LPs}$  Total amount of time that all of the logical processors for this LPAR were busy during the reporting interval.
  - ▶ Number of logical processors assigned to this LPAR.
  - ▶ Average percentage of elapsed time that logical processors were 'suspended', i.e. could not give service to the guest system due to LPAR management time and contention for real processors, where the 'suspended' time is calculated as the difference between elapsed time and the sum of processor busy time and voluntary wait time for the same processor as seen by the VM system that is active in the partition.
  - ▶ Amount of logical CPU busy which was due to LP dispatching overhead.

# LPAR Utilization (cont)

- ▶ Average percentage of elapsed time that the logical processors spent for LPAR management. This information is available only on systems with the LPAR management time facility.
- ▶ Status of the logical partition during the reporting interval. Can be ACTIVE or INACTIVE. The partition that was used to collect the LPAR data will have an asterisk (\*) appended (for example, 'ACTIVE\*').
- ▶ Status of the WAIT bit for the logical processors within this LPAR. If any LP has the WAIT bit ON, this field will contain 'YES'.
- ▶ Average weight of all logical processors defined for this LPAR. The weight values for dedicated processors will be 1000.
- ▶ Utilization of the system based on the number of physical processors available
- ▶ The CPU type of the logical processors defined for the partition. Possible values are:
  - CP
  - ICF
  - IFL
  - ZIIP
  - ZAAP
  - Special
  - Unknown.

# NETWORK Utilization (Hipersocket)

Network - bmaddox3.raleigh.ibm.com - SYSADMIN

File Edit View Help

View: Physical

- Enterprise
  - Linux Systems
  - z/VM Systems
    - vmInx11:VL
      - z/VM Linux Systems
        - Channel
        - CP Owned Devices
        - DASD
        - LPAR
        - Network**
        - Real Storage
        - System

Physical

**Top 5 HiperSockets Message Rate per Second**

Rate per Second

Channel Path

**Top 5 HiperSockets Message Failure Rate per S...**

Rate per Second

Channel Path

**Top 5 Virtual Switch Devices Receive ...**

Rate per Second

Real Device Address

**HiperSockets Activity**

Time	System ID	LPAR Name	Channel Path	Sharing Indicator	Transferred Total Messages	Transferred Total Data Units	Failed Total No Buffer	Transferred LPAR Messages	Transferred LPAR Data Units	Failed LPAR No Buffer	Failed LPAR Other
The hexadecimal identifier for the channel path.											

**Virtual Switch Activity**

Time	System ID	LPAR Name	Real Device Address	User ID	VSWITCH Timeout	Transmit Bytes	Transmit Packets Rate per Second	Transmit Packets Discarded Rate per Second
08/07/08 17:39:54	WLAVMXXA	CANVM1	2E66	WLACTL1	300	1,354.00	2.00	0.0

Hub Time: Thu, 08/07/2008 05:43 PM    Server Available    Network - bmaddox3.raleigh.ibm.com - SYSADMIN

start    Local Dis...    Session ...    Manage ...    Networ...    Phillie a...    Window...    Microsof...    100%    5:39 PM

# NETWORK Utilization (Hipersockets)

## ■ NETWORK Workspace

- ▶ This workspace displays data about the utilization of the hipersocket and virtual switch devices on the z/VM system

## ■ Hipersocket Utilization (HIPERSOCKET TABLE)

- ▶ All attributes are collected for the current reporting interval

## ■ Description

- ▶ TOD clock at start of interval (Approximately 1 second accuracy).
- ▶ SYSID of z/VM System.
- ▶ Assigned logical partition number.
- ▶ Hex channel path identifier.
- ▶ Sharing indicator for the channel YES - shared with other LPARs, NO - Dedicated channel.
- ▶ Number of messages sent per second for the whole system.
- ▶ Number of data units sent per second for the whole system.
- ▶ Number of sends per second that failed due to no receiver buffer for the whole system.
- ▶ Number of messages sent per second for this partition.
- ▶ Number of data units sent per second for this partition.
- ▶ Number of sends per second that failed due to no receiver buffer for this partition.
- ▶ Number of sends per second that failed due to other problems for this partition.

# NETWORK Utilization (Virtual Switch)

VSWITCH - bmaddox3.raleigh.ibm.com - SYSADMIN
\_ □ ×

File Edit View Help

View: Physical

- Enterprise
- Linux Systems
- z/VM Systems
  - vmInx11:VL
    - z/VM Linux Systems
      - Channel
      - CP Owned Devices
      - DASD
      - LPAR
      - Network
      - Real Storage
      - System

Physical

Top 5 Lock Requests Rate per Second

Rate per Second

Real Device Address

Top 5 Lock Defers Rate per Second

Rate per Second

Real Device Address

Top 5 Transmit Packets Rate per Second

Rate per Second

Real Device Address

Top 5 Receive Packets Rate per Second

Rate per Second

Real Device Address

Top 5 Signals Issued Rate per Second

Rate per Second

Real Device Address

Virtual Switch Activity

Time	System ID	LPAR Name	Real Device Address	User ID	VSWITCH Timeout	Transmit Bytes	Transmit Packets Rate per Second	Transmit Packets Discarded Rate per Second	Receive Bytes	Receive Packets Rate per Second	Receive Packets Discarded Rate per Second	QSV

Hub Time: Thu, 08/07/2008 05:42 PM    Server Available    VSWITCH - bmaddox3.raleigh.ibm.com - SYSADMIN

# NETWORK Utilization (Virtual Switch)

## ■ NETWORK Workspace

- ▶ This workspace displays data about the utilization of the hipersocket and virtual switch devices on the z/VM system

## ■ Virtual Switch Utilization Table (VIRT SWITCH TABLE)

- ▶ All attributes are collected for the current reporting interval

## ■ Description

- ▶ TOD clock at start of interval (Approximately 1 second accuracy).
- ▶ SYSID of z/VM System.
- ▶ Assigned logical partition number.
- ▶ Real Device Address.
- ▶ User id of the virtual machine the device is currently attached to.
- ▶ Timeout value for the virtual switch in seconds.
- ▶ Number of bytes transmitted per second.
- ▶ Number of packets transmitted per second.
- ▶ Number of outbound packets discarded per second.
- ▶ Number of bytes received per second.
- ▶ Number of packets received per second.
- ▶ Number of inbound packets discarded per second.
- ▶ Queue storage value (Values 1 - 8 ).

## Virtual Switch (cont)

- ▶ The name of the link aggregation port group in use for this virtual switch
- ▶ The number of input buffers processed per second
- ▶ The number of input queue overflows per second
- ▶ The number of interrupts, such as Peripheral Component Interconnect (PCI) interrupts, that resulted in input queue processing, per second.
- ▶ The number of interrupts, such as Peripheral Component Interconnect (PCI) interrupts, that resulted in input queue processing, per second
- ▶ The LAN Management IP address
- ▶ The number of times per second that the CP monitor waited for the network lock
- ▶ The load balancing interval
- ▶ The number of lock requests made for the network lock, per second
- ▶ The LAN Management Media Access Control (MAC) address
- ▶ The Open Systems Adapter (OSA) device microcode level
- ▶ The number of output buffers processed per second



# Virtual Switch (cont)

- ▶ The number of output queue overflows per second
- ▶ The number of read signals issued per second
- ▶ The number of times per second that CP monitor waited for any lock when receiving data on this VSWITCH port
- ▶ The number of times per second that CP monitor waited for any lock when sending data from this VSWITCH port
- ▶ The session layer, either 2 or 3 of the Open Systems Interconnection (OSI) seven-layer model
- ▶ The number of sync signals issued per second
- ▶ The number of Link Aggregation Control Protocol (LACP) Packet Data Units (PDUs) received on this port
- ▶ The number of LACP PDUs sent on this port
- ▶ The number of marker PDUs received
- ▶ The number of marker PDUs sent to this port in response to receiving a marker PDU from the partner port
- ▶ The number of marker PDUs sent to this port
- ▶ The total number of times the virtual switch timed out while waiting for a marker response PDU for a marker request sent by CP monitor to a partner port
- ▶ The number of write signals issued per second



# REAL STORAGE Utilization

Real\_Storage - PHKMSM - SYSADMIN \*ADMIN MODE\*

File Edit View Help

View: Physical

Enterprise

- Linux Systems
  - vmLinux10
    - Linux OS
      - z/VM Linux Systems
        - CP-Owned\_Devices(Page\_Spool)
        - DASD
        - LPAR
        - Network
        - Real\_Storage
        - System

Physical

Administrator Users... (Ctrl+U)

Available Frames Mean

System Page Rate

Page Rate

123.00

System Resource Utilization

Page Wait Queue

Page Wait Queue

33

z/VM Storage Utilization

Time	System ID	LPAR Name	Number of Frames	Number of Frames > 2GB	Available Frames High Thresh	Available Frames High Thresh > 2GB	Available Frames Mean	Available Frames Mean > 2GB	Available Pages Low Thresh	Available Pages Low Thresh > 2GB	System Paging Rate	Number of Dynamic Frames	Demand Scan Fails	Free Us
06/21/0...	WLAVMXA	LPAR001	3	3	28000	28000	28	333	71	55	332	0	22	:

Hub Time: Wed, 06/21/2006 09:49 AM

Server Available

Real\_Storage - PHKMSM - SYSADMIN \*ADMIN MODE\*

Start

Windows Task Manager

CNPS

Manage Tivoli Enterprise ...

Real\_Storage - PHK...

Document1 - Microsoft W...

9:49 AM

# REAL STORAGE Utilization

## ▪ REALSTORAGE Workspace

- ▶ The Real Storage Utilization workspace provides several views for the overall Storage and Paging activity for the z/VM system. Additionally, the Linux Group Paging Activity view displays z/VM paging activity specific to the Linux guests.

## ▪ z/VM Storage Utilization (SYSTEM TABLE storage attributes only)

- ▶ This Table reflects only the portion of the System table that contains storage related attributes.
- ▶ All attributes are collected for the current reporting interval

## ▪ Description

- ▶ TOD clock at start of interval (Approximately 1 second accuracy).
- ▶ SYSID of z/VM System.
- ▶ Assigned logical partition number.
- ▶ Number of frames currently on the available list.
- ▶ High threshold for the available list replenishment subsystem.
- ▶ Average number of page frames on the available list.
- ▶ Low threshold for the available list replenishment subsystem.
- ▶ System-wide I/O paging rate. Related statistics appear elsewhere by DASD volume.
- ▶ Number of frames allocated to the dynamic paging area.
- ▶ Number of times the demand scan was invoked and could not replenish the available list to its threshold.
- ▶ Number of frames used by free-storage management.
- ▶ Number of deferred pages waiting for a frame.
- ▶ Total number of free-storage requests during the reporting interval.
- ▶ Total number of free-storage releases during the reporting interval.
- ▶ Number of pages per second being read in by the system.
- ▶ System resource weight for paging. Used by the scheduler to decide how much of a bottleneck the paging resources are.
- ▶ Average system-wide percent of paging space in use. Related statistics appear elsewhere by DASD volume.
- ▶ Percent of SPOOL space in use for the entire system.
- ▶ Percent of temporary disk space in use for the entire system.
- ▶ Average number of page faults per second for single-page reads during the reporting interval.
- ▶ Percentage of real storage available to the Dynamic Paging Area.
- ▶ Average number of users in queue waiting to be dispatched.
- ▶ Percent of all virtual machines in a page wait state.

# REAL STORAGE Utilization (cont.)

- **REALSTORAGE Workspace (cont)**
- The Real Storage Utilization workspace provides several views for the overall Storage and Paging activity for the z/VM system. Additionally, the Linux Group Paging Activity view displays z/VM paging activity specific to the Linux guests.
  
- **Linux Storage Utilization (WORKLOAD TABLE storage attributes only)**
- This Table reflects only the portion of the Workload table that contains storage related attributes used by the Real Storage Workspace.
- All attributes are collected for the current reporting interval
  
- **Description**
- TOD clock at start of interval (Approximately 1 second accuracy).
- SYSID of z/VM System.
- Assigned logical partition number.
- Userid or group name.
- Rate of page-ins and page-outs for this workload (in pages/sec.).
  
- **Linkage and Secondary Workspaces:**
- A link exists from the Linux Storage Utilization Table. Each row in the table is keyed to a Linux Guest. Selecting the link for a specific row will take the user to the Linux Storage Utilization Workspace for the selected Linux Guest.
- There are no Secondary Workspaces for the System Workspace

# SYSTEM Utilization

**System - PHKMSM - SYSADMIN \*ADMIN MODE\***

View: Physical

Enterprise

- Linux Systems
  - vmlnx10
    - Linux OS
      - z/VM Linux Systems
        - CP-Owned\_Devices(Page\_Spool)
        - DASD
        - LPAR
        - Network
        - Real\_Storage
        - System**

Physical

**CPU Utilization**

CP Percent of CPU: 24

Total Percent of CPU: 91

**Current Users**

- Average Number of Eligible Users
- Average Number of Users
- Number of Dialed Users

**Total to Virtual Ratio**

Total to Virtual Ratio: 33.00

**User Dispatching Queues**

- Expand User Queue 1
- Expand User Queue 2
- Expand User Queue 3
- In Queue Users

**System Utilization**

Time	System ID	LPAR Name	Active Users	Average Number of Users	Tasks in Wait	CP Percent of CPU	Percent of CPU	Number Active CPU's	Number of Dialed Users	Average Number of Eligible Users	Expand User Queue 1	Expand User Queue 2	Expand User Queue 3	LPAR Busy Percent	Nor T F
06/21/06 09:49:40	WLAVMXA	LPAR001	123	5	4	24	91	2	44	22.00	112.00	2,113.00	443.00	74.00	

Hub Time: Wed, 06/21/2006 09:49 AM

Server Available

System - PHKMSM - SYSADMIN \*ADMIN MODE\*

Windows Task Manager | CNPS | Manage Tivoli Enterprise ... | 9:49 AM

System - PHKMSM - S... | Document1 - Microsoft W...

# SYSTEM Utilization

- **The SYSTEM Workspace**
  - ▶ The System Utilization workspaces provide a view into the CPU utilization for the VM LPAR. The System Workspace is connected to the SYSTEM entry on the Navigator.
  
- All attributes are collected for the current reporting interval
  
- **Description**
  - ▶ TOD clock at start of interval (Approximately 1 second accuracy).
  - ▶ SYSID of z/VM System.
  - ▶ Assigned logical partition number.
  - ▶ Number of users who had any activity since the last sampling interval.
  - ▶ Average number of users logged on.
  - ▶ Number of tasks that cannot be executed because they are waiting for a frame.
  - ▶ Percentage of CPU utilized by CP.
  - ▶ Total CPU utilization (CP and virtual combined). If you are running multiple processors, this value is the sum of CPU utilization for all processors and can be greater than 100%.
  - ▶ Number of active processors.
  - ▶ Number of users who are dialed to VM.
  - ▶ Average number of users waiting in the eligible list.
  - ▶ Number of short running (interactive) users in the eligible list for the E1 queue.
  - ▶ Number of medium-running users in the eligible list for the E2 queue.
  - ▶ Number of long-running users in the eligible list for the E3 queue.
  - ▶ Total number of trivial transactions processed during the reporting interval.
  - ▶ Ratio of total CPU time to virtual CPU time.
  - ▶ Average number of users in queue waiting to be dispatched.
  - ▶ Percent of all virtual machines in an I/O wait state.
  
- **Linkage and Secondary Workspaces:**
  - ▶ A link is established on the table to the System\_Terminal Workspace. This is a direct link to the workspace and does not require any DWL connections.
  - ▶ There are no Secondary Workspaces for the System Workspace

# TCPIP Utilization - Server

TCPIP - PHKMSM - SYSADMIN \*ADMIN MODE\*

File Edit View Help

View: Physical Situation Editor... (Ctrl+E)

Enterprise

- Linux Systems
  - vmlnx10
    - Linux OS
    - z/VM Linux Systems
      - CP-Owned\_Devices(Page\_Spool)
      - DASD
      - LPAR
      - Network
      - Real\_Storage
      - System
      - TCPIP**
      - Workload
  - vmlnx11

Physical

Server Bytes per Second

TCPIP Server Segments per Second

TCPIP Server Connection Activity

TCPIP Server Activity

Time	System ID	LPAR Name	TCPIP Server	Conn Open Init	Conn Open Accept	Conn Open Failed	Conn F
	AVMXXA	LPAR001	Server4	43.20	10.01	21.00	
	AVMXXA	LPAR001	Server5	112.00	12.00	33.00	
	AVMXXA	LPAR001	Server6	302.00	21.00	42.00	
	AVMXXA	LPAR001	Server7	445.60	54.00	5.00	
	AVMXXA	LPAR001	Server8	64.09	21.00	112.00	

Hub Time: Wed, 06/21/2006 09:51 AM Server Available TCPIP - PHKMSM - SYSADMIN \*ADMIN MODE\*

Start Windows Task Manager CNPS Manage Tivoli Enterprise ... 9:52 AM

TCPIP - PHKMSM - SY... Document1 - Microsoft W...

# TCPIP Utilization - Server

- **TCPIP Workspace**
  - ▶ This Workspace displays data about the TCPIP Servers running on the z/VM system.
  
- **TCPIP Server Activity (TCPIP Table)**
  - ▶ All attributes are collected for the current reporting interval
  
- **Description**
  - ▶ TOD clock at start of interval (Approximately 1 second accuracy).
  - ▶ SYSID of z/VM System.
  - ▶ Assigned logical partition number.
  - ▶ Name of the TCP/IP Server.
  - ▶ Rate per second at which TCP connection open requests were initiated.
  - ▶ Rate per second at which TCP connection open requests were accepted.
  - ▶ Rate per second for TCP connection open failures.
  - ▶ Reset rate per second for TCP Connections.
  - ▶ Read requests per second.
  - ▶ Write requests per second.
  - ▶ Number of bytes received per second.
  - ▶ Number of bytes sent.
  - ▶ TCP segments received rate per second.
  - ▶ TCP segments transmit rate per second.
  - ▶ Rate at which TCP segments were retransmitted, per second.
  - ▶ Rate at which TCP segments were received that had errors, per second.
  - ▶ Rate at which TCP segments were transmitted that included a reset, in seconds.
  - ▶ ARP requests received rate per second.
  - ▶ Rate at which ARP replies were transmitted, per seconds.
  - ▶ Rate at which ARP requests were transmitted, per second.

# TCPIP Utilization – Server (cont)

- **TCPIP Workspace (cont)**
  - ▶ This Workspace displays data about the TCPIP Servers running on the z/VM system.
  
- **TCPIP Server Activity (TCPIP Table) (cont)**
  - ▶ All attributes are collected for the current reporting interval
  
- **Description (cont)**
  - ▶ Activity control block pool level.
  - ▶ Client control block pool level.
  - ▶ Regular envelope pool level.
  - ▶ Large envelope pool level.
  - ▶ Raw IP Control Block Pool level.
  - ▶ Socket control block pool level.
  - ▶ BSD-type socket control block pool level.
  - ▶ TCP control block pool level.
  - ▶ UDP control block pool level.
  - ▶ Regular data buffer pool level.
  - ▶ Small data buffer pool level.
  - ▶ Tiny data buffer pool level.
  - ▶ Segment acknowledgement control block pool level.
  - ▶ Fixed page storage pool level.
  
- **Linkage and Secondary Workspaces:**
  - ▶ A link exists from the TCPIP Server Activity Table. Each row in the table is keyed to a TCP/IP Server. Selecting the link for a specific row will take the user to the TCPIP User Workspace for the selected Server.
  - ▶ There are no Secondary Workspaces for the System Workspace

# TCPIP Utilization - Users

TCPIP User - PHKMSM - SYSADMIN \*ADMIN MODE\*

File Edit View Help

View: Physical

Enterprise

- Linux Systems
  - vmlnx10
    - Linux OS
      - z/VM Linux Systems
        - CP-Owned\_Devices(Page\_Spool)
        - DASD
        - LPAR
        - Network
        - Real\_Storage
        - System
        - TCPIP
        - Workload
- vmlnx11

Physical

Byte Traffic

Total Segments

TCPIP User Activity

Time	System ID	LPAR Name	TCPIP Server	User ID	TCP Completed Sessions	UDP Completed Sessions	Average Session Duration	Total TCP KBytes Received	Total TCP KBytes Sent	Total UDP KBytes Received	Total UDP KBytes Sent	Smoothed Round Trip	Variance Round Trip
06/21/06 09:49:40	WLAVMXA	LPAR001	Server4	tom	4	8	0.65	0.02	2.16	0.03	0.03	27	
06/21/06 09:49:40	WLAVMXA	LPAR001	Server4	dick	4	8	0.65	0.19	1.09	0.21	1.19	27	
06/21/06 09:49:40	WLAVMXA	LPAR001	Server4	harry	4	8	0.65	0.48	0.08	0.31	0.54	27	
06/21/06 09:49:40	WLAVMXA	LPAR001	Server4	test1	4	8	0.65	0.97	0.00	0.01	0.04	27	
06/21/06 09:49:40	WLAVMXA	LPAR001	Server4	test3	4	8	0.65	1.19	0.08	0.01	0.31	27	

Hub Time: Wed, 06/21/2006 09:59 AM Server Available TCPIP User - PHKMSM - SYSADMIN \*ADMIN MODE\*

Start Windows Task Manager CNPS Manage Tivoli Enterprise ... 9:59 AM

TCPIP User - PHKMS... Document1 - Microsoft W...

# TCPIP Utilization - Users

- **TCPIP User Workspace**
  - ▶ This workspace displays data about the main users of the TCPIP function for the server selected on the previous workspace.
  
- **TCPIP User Activity (TCPIP USER)**
  - ▶ All attributes are collected for the current reporting interval
  
- **Description**
  - ▶ TOD clock at start of interval (Approximately 1 second accuracy).
  - ▶ SYSID of z/VM System.
  - ▶ Assigned logical partition number.
  - ▶ Name of the TCP/IP server that the user is connected to.
  - ▶ Userid of the virtual machine that handled the local side of the conn.
  - ▶ Number of completed TCP sessions.
  - ▶ Number of completed UDP sessions.
  - ▶ Average elapsed time from open to close for sessions.
  - ▶ Number of bytes received during TCP sessions.
  - ▶ Number of bytes sent during TCP sessions.
  - ▶ Number of bytes received during UDP sessions.
  - ▶ Number of bytes sent during UDP sessions.
  - ▶ Smoothed round trip time, in seconds.
  - ▶ Round trip variance time, in seconds.
  - ▶ Total number of segments.
  - ▶ Maximum number of unacknowledged segments.
  - ▶ Maximum input buffer queue size.
  - ▶ Maximum output buffer queue size.
  
- **Linkage and Secondary Workspaces:**
  - ▶ Link from the TCPIP User Activity Table to the Linux Network Workspace for the selected Linux Guest system. (Each row in the table will be for a specific guest system). This function requires DWL to be implemented.
  - ▶ There are no Secondary Workspaces for the System Workspace





# WORKLOAD (z/VM User ID) Activity

Workload - PHKM5M - SYSADMIN \*ADMIN MODE\*

File Edit View Help

View: Physical

Enterprise

- Linux Systems
  - vmlnx10
    - Linux OS
      - z/VM Linux Systems
        - CP-Owned\_Devices(Page\_Spool)
          - DASD
            - LPAR
              - Network
                - Real\_Storage
                  - System

Physical

Top 5 CPU Users

| User    | CP % of CPU | Virtual CPU % |
|---------|-------------|---------------|
| PERFKIT | ~40         | ~90           |
| VMLNX3  | ~10         | ~40           |
| OPER2   | ~5          | ~10           |
| VMLNX2  | ~5          | ~15           |
| VMLNX4  | ~10         | ~10           |

Top 5 Page Rate

| User    | Page Rate |
|---------|-----------|
| PERFKIT | ~55       |
| VMLNX3  | ~45       |
| VMLNX4  | ~25       |
| VMLNX2  | ~15       |
| VMLNX4  | ~10       |

Top 5 Paging Operations

| User    | Page Reads | Page Writes |
|---------|------------|-------------|
| VMLNX2  | ~75        | ~55         |
| VMLNX32 | ~65        | ~45         |
| VMLNX3  | ~55        | ~35         |
| VMLNX4  | ~45        | ~25         |
| PERFKIT | ~15        | ~85         |

Top 5 Working Set Size

| User    | Working Set Size |
|---------|------------------|
| OPER1   | ~45000           |
| PERFKIT | ~10000           |
| VMLNX1  | ~10000           |
| VMLNX4  | ~10000           |
| VMLNX3  | ~10000           |

All z/VM Workloads

| Time              | System ID | LPAR Name | User ID | CP % of CPU | CP Seconds | CPU Percent | CPU Seconds | Session Time | Virtual CPU % | Virtual Seconds | Page Rate | Page Reads | Page Writes | Resident Pages | Resident Pages > 2GB |
|-------------------|-----------|-----------|---------|-------------|------------|-------------|-------------|--------------|---------------|-----------------|-----------|------------|-------------|----------------|----------------------|
| 06/21/06 09:49:40 | WLAVMXA   | LPAR001   | VMLNX1  | 0.01        | 0          | 0.06        | 2           | 2            | 0.05          | 1               | 0.01      | 0.01       | 0.01        | 43             | 76                   |
| 06/21/06 09:49:40 | WLAVMXA   | LPAR001   | VMLNX2  | 0.11        | 2          | 1.00        | 123         | 123          | 1.00          | 1               | 3.00      | 77.00      | 54.00       | 55             | 4                    |
| 06/21/06 09:49:40 | WLAVMXA   | LPAR001   | VMLNX3  | 0.21        | 4          | 32.00       | 231         | 231          | 32.00         | 1               | 4.3       | 45.00      | 23.00       | 65             | 45                   |

Hub Time: Wed, 06/21/2006 09:55 AM Server Available Workload - PHKM5M - SYSADMIN \*ADMIN MODE\*

Start Windows Task Manager CNPS Manage Tivoli Enterprise ... 9:55 AM

Workload - PHKM5M ... Document1 - Microsoft W...

# WORKLOAD (z/VM User ID) Activity

- **Workload Workspace**
  - ▶ This workspace displays the system usage (by userid/workload) for all users on the z/VM system.
  
- **All z/VM Workloads (Workload Table)**
  
- **Description**
  - ▶ TOD clock at start of interval (Approximately 1 second accuracy).
  - ▶ SYSID of z/VM System.
  - ▶ Assigned logical partition number.
  - ▶ Userid or group name.
  - ▶ Number of Virtual CPUs (VCPUs)
  - ▶ Percent of total CPU used by the system to manage this workload.
  - ▶ Percent of total CPU used by the system to manage this workload scaled by number of VCPUs
  - ▶ Total CP seconds used by this workload (to nearest second).
  - ▶ Percent of total CPU used by the system to manage this workload.
  - ▶ Percent of total CPU used by the system to manage this workload. scaled by number of VCPUs
  - ▶ Total CPU seconds used by this workload (to nearest second).
  - ▶ Total time this workload was logged on (to nearest second), or aggregation of group.
  - ▶ Percent of virtual CPU utilization for the workload specified.
  - ▶ Percent of virtual CPU utilization for the workload specified scaled by number of VCPUs
  - ▶ Total virtual CPU seconds used by this workload (to nearest second).

# WORKLOAD (z/VM User ID) Activity (cont)

## ■ Description

- ▶ The rate of page-ins and page-outs for this workload (in pages/sec.).
- ▶ Number of page reads over the specified period of time.
- ▶ Number of page writes over the specified period of time.
- ▶ The current number of pages physically in main storage for this workload.
- ▶ Average storage size for this workload.
- ▶ The number of megabytes of expanded storage attached to this workload.
- ▶ The number of expanded pages moved for this workload.
- ▶ The number of expanded storage blocks allocated to this workload by CP for paging.
- ▶ A user's projected working set size. This value is calculated each time a user drops from queue, and is based on the number of pages referenced during the last stay in queue.
- ▶ Name of the group that this workload belongs to [Primarily used to determine which VMs are Linux guest hosts.]

## ■ Linkage and Secondary Workspaces:

- ▶ No Links from this Workspace
- ▶ Secondary Workspaces from the WORKLOAD Navigator is the Linux Workload Workspace
  - Right Mouse click on WORKLOAD Navigator to go to Linux Workload workspace.



# Linux Workload Workspace

**Linux Guest System Workloads Table:**

| Workload Group | Time              | System ID | LPAR Name | User ID | CP % of CPU | CPU Seconds | CPU Percent | CPU Seconds | Session Time | Virtual CPU % | Virtual Seconds | Page Rate | Page Reads | Page Writes | Res Pa |
|----------------|-------------------|-----------|-----------|---------|-------------|-------------|-------------|-------------|--------------|---------------|-----------------|-----------|------------|-------------|--------|
| LINUX          | 06/21/06 09:49:40 | WLAVMXA   | LPAR001   | VMLNX1  | 0.01        | 0           | 0.06        | 2           | 2            | 0.05          | 1               | 0.01      | 0.01       | 0.01        |        |
| LINUX          | 06/21/06 09:49:40 | WLAVMXA   | LPAR001   | VMLNX2  | 0.11        | 2           | 1.00        | 123         | 123          | 1.00          | 1               | 3.00      | 77.00      | 54.00       |        |
| LINUX          | 06/21/06 09:49:40 | WLAVMXA   | LPAR001   | VMLNX3  | 0.24        | 1           | 32.00       | 231         | 231          | 32.00         | 1               | 43        | 45.00      | 23.00       |        |

# Linux Workload Workspace

- **Linux Workload Workspace**

- ▶ This workspace displays the same information as the Workload Workspace, but only for the guest systems which have the GROUP set to Linux.

- **Linux Workloads (Workload Table)**

- **Description**

- ▶ TOD clock at start of interval (Approximately 1 second accuracy).
- ▶ SYSID of z/VM System.
- ▶ Assigned logical partition number.
- ▶ Userid or group name.
- ▶ Percent of total CPU used by the system to manage this workload.
- ▶ Total CP seconds used by this workload (to nearest second).
- ▶ Percent of total CPU used by the system to manage this workload.
- ▶ Total CPU seconds used by this workload (to nearest second).
- ▶ Total time this workload was logged on (to nearest second), or aggregation of group.
- ▶ Percent of virtual CPU utilization for the workload specified.
- ▶ Total virtual CPU seconds used by this workload (to nearest second).
- ▶ The rate of page-ins and page-outs for this workload (in pages/sec.).
- ▶ Number of page reads over the specified period of time.
- ▶ Number of page writes over the specified period of time.
- ▶ The current number of pages physically in main storage for this workload.
- ▶ Average storage size for this workload.
- ▶ The number of megabytes of expanded storage attached to this workload.
- ▶ The number of expanded pages moved for this workload.
- ▶ The number of expanded storage blocks allocated to this workload by CP for paging.
- ▶ A user's projected working set size. This value is calculated each time a user drops from queue, and is based on the number of pages referenced during the last stay in queue.
- ▶ Name of the group that this workload belongs to [Primarily used to determine which VMs are Linux guest hosts.]

- **Linkage and Secondary Workspaces:**

- ▶ Link from the Linux Workloads table to the OMEGAMON XE for Linux System Information Workspace for the selected Linux Guest system (by row).
- ▶ There are no Secondary Workspaces for the Workloads Workspace

# AppData Workspace

The screenshot displays the AppData workspace interface. On the left, a tree view shows the hierarchy: Enterprise > Linux Systems > vmlnx10 > Linux OS > z/V M Linux Systems. A context menu is open over the 'z/V M Linux Systems' folder, with 'Link To...' selected. The 'Link To...' submenu is also open, listing various workspace linking options.

The main area contains two data tables. The top table is titled 'Linux Guest Workload Data' and has the following data:

| Time              | System ID | LPAR Name | User ID | CP % of CPU | CP Seconds | CPU Percent | CPU Seconds | Session Time | Virtual CPU % | Vir Sec |
|-------------------|-----------|-----------|---------|-------------|------------|-------------|-------------|--------------|---------------|---------|
| 06/21/06 09:39:58 | WLAVMXA   | CANVM1    | VMLNX10 | 0.13        | 0          | 0.62        | 1           | 1            | 0.48          |         |
| 06/21/06 09:39:58 | WLAVMXA   | CANVM1    | VMLNX11 | 0.12        | 0          | 0.60        | 1           | 1            | 0.47          |         |

The bottom table is partially visible and has the following data:

| Time              | Percent Soft IRQs | Percent I/O Wait | Percent CPU Idle | Runnable Processes | Processes Waiting for I/O | Total Processes | Avg La |
|-------------------|-------------------|------------------|------------------|--------------------|---------------------------|-----------------|--------|
| 06/21/06 09:39:58 | 3.00              | 0.50             | 0.00             | 0                  | 0                         | 145             |        |
| 06/21/06 09:39:58 | 0.00              | 0.00             | 0.00             | 3                  | 0                         | 100             |        |

The status bar at the bottom shows 'Hub Time: Wed, 06/21/2006 09:41 AM', 'Server Available', and the window title 'AppData - PHKMSM - SYSADMIN \*ADMIN MODE\*'. The Windows taskbar at the very bottom shows the Start button, taskbar icons for Windows Task Manager, CNPS, Manage Tivoli Enterprise, and a document, along with the system clock showing 9:41 AM.

# AppData Workspace

## ▪ AppData Workspace

- ▶ This workspace displays information about Linux(R) workload activity and storage utilization

## ▪ Description

- ▶ The name that uniquely identifies the active z/VM system.
- ▶ The name assigned to the logical partition.
- ▶ The user identification or group name of the Linux guest.
- ▶ The number of virtual central processing units (CPUs) defined for the Linux guest system.
- ▶ The percent of total CPU used by this Linux virtual machine.
- ▶ The percent of CPU used by this Linux virtual machine, running in user mode.
- ▶ The percent of CPU used by this Linux virtual machine, running in kernel mode.
- ▶ The percent of CPU used by the Linux virtual machine, running in 'nice' mode (with modified priority).
- ▶ The percent of interrupts (IRQs).
- ▶ The percent of soft interrupts (IRQs).
- ▶ The percent of time spent by the virtual machine in an I/O wait state
- ▶ The percent of time spent by the virtual machine in a CPU idle state.
- ▶ The number of runnable processes at sampling time.
- ▶ The number of processes waiting for I/O.
- ▶ The total number of processes at sampling time.
- ▶ The average number of processes found running during the last minute.
- ▶ The average number of processes found running during the last five minutes.
- ▶ The average number of processes found running during the last fifteen minutes.
- ▶ The total size of the main memory, in megabytes
- ▶ The percent of main memory used.
- ▶ The percent of main memory used.
- ▶ The total size of the high memory, in megabytes.
- ▶ The percent of high memory used.



# AppData Workspace (cont)

## ■ Description

The size of the memory that is usable by more than one process, in megabytes.

- ▶ The size of the memory that is reserved for buffers and for free cache, in megabytes.
- ▶ The size of the memory that is used for buffers, in megabytes.
- ▶ The total amount of swap space, both used and available, in megabytes.
- ▶ The percent of swap space used.
- ▶ The number of pages swapped in, at the rate of 4-kilobyte pages per second.
- ▶ The number of pages swapped out, at the rate of 4-kilobyte pages per second.
- ▶ The rate of page allocations (the number of pages obtained from the available list), in 4 kilobyte pages per second.
- ▶ The rate per second of major page faults for the process.
- ▶ The rate per second of minor page faults for the process.
- ▶ The block I/O data read rate, in kilobytes per second.
- ▶ The block I/O data write rate, in kilobytes per second.
- ▶ The number of networking interfaces defined.
- ▶ The rate per second of packets received.
- ▶ The rate per second of packets transmitted.
- ▶ The rate per second of bytes received.
- ▶ The rate per second of bytes received.
- ▶ The number of bad packets received, per second.
- ▶ The rate per second of packet transmit problems.
- ▶ The rate per second, of no space found in Linux buffers.
- ▶ The rate per second, of no space available in Linux.
- ▶ The rate per second of collisions while transmitting.



# AppData Workspace (cont)

## Linkage:

- ▶ Link from AppData to Linux Process
- ▶ Link from AppData to Linux System Information Workspace
- ▶ Link from AppData to Linux Virtual Memory Workspace
- ▶ Link from AppData to Linux Disk IO Rate Workspace
- ▶ Link from AppData to Linux Network Workspace
- ▶ Link from AppData to Linux Sockets Workspace
- ▶ Link from AppData to Linux Capacity Usage Workspace
- ▶ Link from AppData to Linux CPU Averages Workspace
- ▶ Link from AppData to Linux Virtual Memory Trend Workspace



# Resource Constraint Workspace

Resource Constraint - NPMIPSVT3 - SYSADMIN

File Edit View Help

Navigator View: Physical

- Channel
- CP Owned Devices
- DASD
- LPAR
- Network
- Real Storage
- System
- TCPIP
- Workload

Physical

### Top 5 Workloads Waiting for Resources

### Top 5 I/O Wait Percent

### Top 5 CPU Wait Percent

### Top 5 Page Wait Percent

### All z/VM Workload Resource Constraint

| Time              | System ID | LPAR Name | User ID  | Active Percent | Running Percent | CPU Wait Percent | Loading Percent | Page Wait Percent | I/O Wait Percent | Instruction Simulation Wait Percent | Test Idle Wait Percent | Console Function Wait Percent | SVM and Test Idle List Wait Percent | SVM and Eligible List Wait Percent | SVM & Dorm List W Percent |
|-------------------|-----------|-----------|----------|----------------|-----------------|------------------|-----------------|-------------------|------------------|-------------------------------------|------------------------|-------------------------------|-------------------------------------|------------------------------------|---------------------------|
| 02/26/10 14:51:18 | WLAVMXA   | CANVM1    | >System< | 18             | 6               | 0                | 0               | 0                 | 0                | 0                                   | 62                     | 0                             | 0                                   | 0                                  |                           |
| 02/26/10 14:51:18 | WLAVMXA   | CANVM1    | GNDRR2   | 100            | 40              | 0                | 0               | 0                 | 0                | 0                                   | 0                      | 0                             | 0                                   | 0                                  |                           |
| 02/26/10 14:51:18 | WLAVMXA   | CANVM1    | GNDRR3   | 100            | 10              | 0                | 0               | 0                 | 0                | 0                                   | 0                      | 0                             | 0                                   | 0                                  |                           |
| 02/26/10 14:51:18 | WLAVMXA   | CANVM1    | VMLNX11  | 100            | 0               | 0                | 0               | 0                 | 0                | 0                                   | 100                    | 0                             | 0                                   | 0                                  |                           |

Hub Time: Fri, 02/26/2010 02:54 PM Server Available Resource Constraint - NPMIPSVT3 - SYSADMIN

Start 2 Windows ... Windows Tas... 4 Windows ... Add or Remo... Manage Tivoli... Resource C... 2:55 PM

# Resource Constraint Workspace

## ▪ Linux Workload Workspace

- ▶ workspace provides information about what percentage of an interval a virtual machine is prevented from running, due to various wait conditions

## ▪ Description

- ▶ TOD clock at start of interval (Approximately 1 second accuracy).
- ▶ SYSID of z/VM System.
- ▶ Percentage of samples where the user was active, either consuming CPU or waiting for some service
- ▶ Percentage of active samples where the user was in console function wait, that is, waiting for the central processor to execute one of the console function commands. By using these commands, a user can alter the state and configuration of the virtual machine (for example LINK, ATTACH, and DETACH).
- ▶ Percentage of active measurements where the user was in the eligible list (any class).
- ▶ Percentage of active samples where the user was in I/O wait state.
- ▶ Percentage of active samples where the user was in instruction simulation wait, that is, waiting for the central processor to complete simulation of a privileged instruction.
- ▶ Percentage of active measurements where the user was in the limit list, that is in the dispatch list waiting for CPU, but prevented from running by a maximum share setting.

# Resource Constraint Workspace

## ■ Description (cont)

- ▶ Percentage of active samples where the user was in loading state, that is with a high page read rate.
- ▶ Percentage of active measurements where the user was found in other states.
- ▶ Percentage of page active wait, that is the virtual machine has loaded a wait PSW while waiting for the completion of a page read operation. This state is to be expected for guest systems running with a PAGEX ON setting.
- ▶ Percentage of active samples where the user was found in page wait state.
- ▶ Percentage of active measurements where the user was in Qx (in the dispatch list as class x user). x can be 0, 1, 2 or 3.
- ▶ Percentage of active samples where the user was running on a real processor.
- ▶ Percentage of active samples where the user was in both SVM wait and in the dormant list. This status is counted as active since the machine is actually waiting for something, and not idle.
- ▶ Percentage of active samples where the user was in both SVM wait and in the eligible list (resource wait).

# Resource Constraint Workspace

## ■ Description (cont)

- ▶ Percentage of active samples where the user was in both SVM wait and test idle wait. SVM wait state indicates that the user was waiting for the completion of a communication with a service virtual machine.
- ▶ Percentage of active samples where the user was in test idle wait, that is waiting to be dropped from the dispatch list.
- ▶ Percentage of active measurements where the user was found in a state other than the preceding states, while an I/O operation started by this machine had not yet completed.
- ▶ Percentage of active samples where the user was waiting to run on the real CPU.



# Channel Workspace

Channel - Microsoft Internet Explorer

Tivoli Enterprise Portal Welcome SYSADMIN Log out IBM

File Edit View Help

Navigator View: Physical

- Enterprise
  - Linux Systems
  - z/VM Systems
    - vmhx11:VL
      - z/VM Linux Systems
        - Channel
        - CP Owned Devices
        - DASD
        - LPAR
        - Network
        - Real Storage
        - System
        - TCPIP
        - Workload

Physical

### Top 5 z/VM Channel Busy

| CHPID | Interval Busy Conditions Percent | Average Busy Conditions Percent |
|-------|----------------------------------|---------------------------------|
| 2C    | 5.0                              | 4.0                             |
| 3C    | 5.0                              | 4.0                             |
| 91    | 4.0                              | 5.0                             |
| 92    | 4.0                              | 2.0                             |
| 93    | 4.0                              | 5.0                             |

### Top 5 LPAR Channel Busy - Owning Part...

| CHPID | Interval Busy Conditions Percent | Average Busy Conditions Percent |
|-------|----------------------------------|---------------------------------|
| 10    | 0.0                              | 0.0                             |
| 12    | 0.0                              | 0.0                             |
| 13    | 0.0                              | 0.0                             |
| 14    | 0.0                              | 0.0                             |
| 15    | 0.0                              | 0.0                             |

### Top 5 LPAR Channels by Inte...

- Channel Busy Distribution 11-20 Percent
- Channel Busy Distribution 21-30 Percent
- Channel Busy Distribution 31-40 Percent
- Channel Busy Distribution 41-50 Percent
- Channel Busy Distribution 51-60 Percent
- Channel Busy Distribution 61-70 Percent
- Channel Busy Distribution 71-80 Percent
- Channel Busy Distribution 81-90 Percent
- Channel Busy Distribution 91-100 Percent

### z/VM Channel Busy

| Time              | System ID | CHPID | Model Grou |
|-------------------|-----------|-------|------------|
| 02/14/08 17:32:33 | WLAVMXA   | 2C    | ESCON      |
| 02/14/08 17:32:33 | WLAVMXA   | 3C    | ESCON      |
| 02/14/08 17:32:33 | WLAVMXA   | 91    | FICON      |
| 02/14/08 17:32:33 | WLAVMXA   | 92    | FICON      |
| 02/14/08 17:32:33 | WLAVMXA   | 93    | FICON      |
| 02/14/08 17:32:33 | WLAVMXA   | 95    | FICON      |
| 02/14/08 17:32:33 | WLAVMXA   | E8    | OSD        |
| 02/14/08 17:32:33 | WLAVMXA   | EA    | OSD        |
| 02/14/08 17:32:33 | WLAVMXA   | EB    | OSD        |
| 02/14/08 17:32:33 | WLAVMXA   | 94    | FICON      |

### LPAR Channel Busy - Owning Partition

| Time              | System ID | CHPID | Model Group | Grou |
|-------------------|-----------|-------|-------------|------|
| 02/14/08 17:32:33 | WLAVMXA   | 10    | ESCON       | 00   |
| 02/14/08 17:32:33 | WLAVMXA   | 12    | ESCON       | 00   |
| 02/14/08 17:32:33 | WLAVMXA   | 13    | ESCON       | 00   |
| 02/14/08 17:32:33 | WLAVMXA   | 14    | ESCON       | 00   |
| 02/14/08 17:32:33 | WLAVMXA   | 15    | ESCON       | 00   |
| 02/14/08 17:32:33 | WLAVMXA   | 20    | ESCON       | 00   |
| 02/14/08 17:32:33 | WLAVMXA   | 22    | ESCON       | 00   |
| 02/14/08 17:32:33 | WLAVMXA   | 23    | ESCON       | 00   |
| 02/14/08 17:32:33 | WLAVMXA   | 28    | ESCON       | 00   |
| 02/14/08 17:32:33 | WLAVMXA   | 29    | ESCON       | 00   |

Hub Time: Thu, 02/14/2008 05:37 PM Server Available Channel - bmaddox3.raleigh.ibm.com - SYSADMIN

start Session A - [24 x ... Local Disk (C:) Microsoft PowerP... Channel - Microso... Help - - Mozilla Fir... 100% 5:34 PM

# Channel Workspace

- **Channel Workspace**

- ▶ This workspace displays channel load data for all active channel paths

- **Description**

- ▶ The name assigned to the logical partition
- ▶ Description of the channel model group
- ▶ The average percentage of 'busy' conditions found
- ▶ CHPID value assigned to each installed channel path of the system
- ▶ The channel load distribution for each of the active channels
- ▶ The hexadecimal channel model group qualifier
- ▶ The percentage of 'busy' conditions found for the last interval



# FICON Channel Workspace

http://bmaddox3.raleigh.ibm.com:1920 - FICON Channels - Microsoft Internet Explorer

Tivoli Enterprise Portal Welcome SYSADMIN Log out IBM

File Edit View Help

**Navigator**

View: Physical

- Enterprise
  - Linux Systems
  - z/VM Systems
    - vmlnx11:VL
      - z/VM Linux Systems
        - Channel
        - CP Owned Devices
        - DASD
        - LPAR
        - Network
        - Real Storage
        - System
        - TCPIP
        - Workload

Physical

**FICON Channel Utilization - System**

**FICON Channel Utilization - Owning P...**

**FICON Channel Utilization - Tr...**

**FICON Channel Utilization**

| Time              | System ID | CHPID | Channel Shared Indicator | Bus Cycles Percent | Work Units Percent | Data Write Percent | Data Read Percent | Owning LPAR Work Units Percent | Ow D |
|-------------------|-----------|-------|--------------------------|--------------------|--------------------|--------------------|-------------------|--------------------------------|------|
| 02/14/08 17:49:34 | WLAVMXA   | 90    | Yes                      | 0.00               | 0.01               | 0.00               | 0.00              | 0.00                           |      |
| 02/14/08 17:49:34 | WLAVMXA   | 91    | Yes                      | 0.00               | 0.03               | 0.00               | 0.00              | 0.00                           |      |
| 02/14/08 17:49:34 | WLAVMXA   | 92    | Yes                      | 0.00               | 0.01               | 0.00               | 0.00              | 0.00                           |      |
| 02/14/08 17:49:34 | WLAVMXA   | 93    | Yes                      | 0.00               | 0.03               | 0.00               | 0.00              | 0.00                           |      |
| 02/14/08 17:49:34 | WLAVMXA   | 94    | Yes                      | 0.00               | 0.00               | 0.00               | 0.00              | 0.00                           |      |
| 02/14/08 17:49:34 | WLAVMXA   | 95    | Yes                      | 0.00               | 0.01               | 0.00               | 0.00              | 0.00                           |      |
| 02/14/08 17:49:34 | WLAVMXA   | 96    | Yes                      | 0.00               | 0.01               | 0.00               | 0.00              | 0.00                           |      |
| 02/14/08 17:49:34 | WLAVMXA   | E0    | Yes                      | 0.00               | 0.00               | 0.00               | 0.00              | 0.00                           |      |
| 02/14/08 17:49:34 | WLAVMXA   | E1    | Yes                      | 0.00               | 0.00               | 0.00               | 0.00              | 0.00                           |      |
| 02/14/08 17:49:34 | WLAVMXA   | E4    | Yes                      | 0.00               | 0.00               | 0.00               | 0.00              | 0.00                           |      |

# FICON Channel Workspace

- **FICON Channel Workspace**

- ▶ This workspace displays FICON channel load data.

- **Description**

- ▶ The name assigned to the logical partition
- ▶ The bus cycles utilization for the whole system
- ▶ CHPID value assigned to each installed channel path of the system
- ▶ The channel shared indicator
- ▶ The data units read utilization for the whole system
- ▶ The data units write utilization for the whole system
- ▶ The work units utilization for the entire system
- ▶ The data units read utilization for the owning logical partition
- ▶ The data units write utilization for the owning logical partition
- ▶ The work units utilization for the owning logical partition
- ▶ The total number of bytes read per second for the entire system
- ▶ The total number of bytes written per second for the entire system



# Minidisk Cache Workspace

http://bmaddox3.raleigh.ibm.com:1920 - Minidisk Cache - Microsoft Internet Explorer

Tivoli Enterprise Portal Welcome SYSADMIN Log out IBM

File Edit View Help

File Edit View Help

**Navigator**

View: Physical

- Enterprise
  - Linux Systems
  - z/VM Systems
    - vmlnx11:VL
      - z/VM Linux Systems
        - Channel
        - CP Owned Devices
        - DASD**
        - LPAR
        - Network
        - Real Storage
        - System
        - TCPIP
        - Workload

Physical

**Cache Requests**

**Main Storage Frames**

**Cache Age**

**Cache Expanded Storage**

**Minidisk Cache Activity**

| Time              | System ID | Partition Size in Blocks | Max Cache Size in Blocks | Actual Cache Size in Blocks |
|-------------------|-----------|--------------------------|--------------------------|-----------------------------|
| 02/14/08 18:00:34 | WLAVMxA   | 16384                    | 4096                     |                             |

Hub Time: Thu, 02/14/2008 06:05 PM Server Available Minidisk Cache - bmaddox3.raleigh.ibm.com - SYSADMIN

start Session A - [24 x ...] Local Disk (C:) Microsoft PowerP... http://bmaddox3... Help -- Mozilla Fir... 100% 6:01 PM

# Minidisk Cache Workspace

## ■ Minidisk Cache Workspace

- ▶ This workspace displays minidisk cache storage data.

## ■ Description

- ▶ The number of expanded storage blocks used for minidisk caching
- ▶ The actual number of main storage page frames used for the minidisk cache below the 2 GB line
- ▶ The actual number of main storage page frames used for the minidisk cache above the 2 GB line
- ▶ The actual number of expanded storage blocks used for the minidisk cache
- ▶ The average age of paging XSTORE blocks
- ▶ The bias for minidisk cache usage of real storage
- ▶ The number of blocks per second that were invalidated following an invalidation request
- ▶ The estimated average age in seconds of a minidisk cache block
- ▶ The done rate for successfully translated channel command words
- ▶ The number of CCWs that were found to be not eligible for translation
- ▶ The rate per second that blocks could not be moved into the minidisk cache because their user's fair share limit was exceeded
- ▶ The fair share limit for the minidisk cache
- ▶ The percentage of requests that were full hits
- ▶ The ideal number of main storage page frames in the minidisk cache



# Minidisk Cache Workspace (cont)

- ▶ The ideal number of expanded storage blocks in the minidisk cache
- ▶ The insertions per second into the in-transit waiting queue
- ▶ The number of requests per second to invalidate minidisk cache blocks, due to an I/O to a virtual device via a non-cacheable I/O interface
- ▶ The MDC bias for main storage
- ▶ The bias for minidisk cache use of expanded storage
- ▶ The maximum number of expanded storage blocks that can be used for minidisk caching
- ▶ The maximum number of main storage page frames to be used for the minidisk cache
- ▶ The maximum number of expanded storage blocks to be used for the minidisk cache
- ▶ The number of read requests to the minidisk cache, per second, where all the requested blocks were found in the cache
- ▶ The minimum number of main storage page frames to be used for the minidisk cache
- ▶ The minimum number of expanded storage blocks to be used for the minidisk cache
- ▶ The aborted translation attempts per second for network devices



# CCW Translation Workspace

http://bmaddox3.raleigh.ibm.com:1920 - CCW Translations - Microsoft Internet Explorer

Tivoli Enterprise Portal Welcome SYSADMIN Log out

File Edit View Help

**Navigator**

View: Physical

- Enterprise
  - Linux Systems
  - z/VM Systems
    - vmlnx11:VL
      - z/VM Linux Systems
        - Channel
        - CP Owned Devices
        - DASD**
        - LPAR
        - Network
        - Real Storage
        - System
        - TCPIP
        - Workload

Physical

**DASD CCW Translations**

**DASD and Network CCW Translations**

| Time              | System ID | Total CCWs per Second | CCWs Translated per Second | Translations Aborted per Second | CCWs Not Eligible per Second | Total Network CCWs Translated per Second | Network CCWs Translated per Second | Network CCWS Aborted per Second | Network CCWS Not Eligible per Second | LPAR Name |
|-------------------|-----------|-----------------------|----------------------------|---------------------------------|------------------------------|--|------------------------------------|---------------------------------|--------------------------------------|-----------|
| 02/14/08 18:17:33 | WLAVMXA   | 1.00                  | 1.00                       | 0.00                            | 0.00                         | 0.00                                     | 0.00                               | 0.00                            | 0.00                                 | CANVM1    |

Hub Time: Thu, 02/14/2008 06:21 PM Server Available CCW Translations - bmaddox3.raleigh.ibm.com - SYSADMIN

start Session A - [24 x ... Local Disk (C:) Microsoft PowerP... http://bmaddox3... Help -- Mozilla Fir... 100% 6:17 PM

# CCW Translation Workspace

- ▶ The done rate for networks
- ▶ The number of CCWs that were found to be not eligible for translation
- ▶ The number of main storage pages deleted from cache per second
- ▶ The rate at which minidisk cache blocks are moved, per second, from expanded storage to central storage
- ▶ The rate at which minidisk cache blocks are moved per second from central storage to expanded storage
- ▶ The size of the CP partition in expanded storage
- ▶ The rate at which the steal function was invoked to steal expanded storage pages from the minidisk cache
- ▶ The total number of CCWs handled per second for DASD
- ▶ The total number of CCWs handled per second for networks
- ▶ The aborted translation attempts per second for DASD
- ▶ The number of XSTORE pages deleted from cache
- ▶ The number of times the steal function was invoked to steal expanded storage pages from cache



# DASD Cache Workspace

DASD Cache - bmaddox3.raleigh.ibm.com - SYSADMIN
\_ [ ] X

File Edit View Help

View: Physical

- Enterprise
- Linux Systems
- z/VM Systems
  - vmnx11:VL
    - z/VM Linux Systems
      - Channel
      - CP Owned Devices
      - DASD**
      - LPAR
      - Network
      - Real Storage
      - System
      - TCPIP
      - Workload

Physical

**Top 5 Cache Rate per Second: Compone...**

**Top 5 Percent Total Cache I/O for Staging/De...**

**Top 5 Highest I/O Rate per Second**

**Top 5 Cache Rate per Second**

**DASD Cache Activity**

Page: 1 of 2

| Time              | System ID | LPAR Name | Storage Director ID |
|-------------------|-----------|-----------|---------------------|
| 08/07/08 17:41:55 | WLAVMXA   | CANVM1    | 32                  |
| 08/07/08 17:41:55 | WLAVMXA   | CANVM1    | 32                  |
| 08/07/08 17:41:55 | WLAVMXA   | CANVM1    | 32                  |
| 08/07/08 17:41:55 | WLAVMXA   | CANVM1    | 32                  |
| 08/07/08 17:41:55 | WLAVMXA   | CANVM1    | 32                  |
| 08/07/08 17:41:55 | WLAVMXA   | CANVM1    | 32                  |
| 08/07/08 17:41:55 | WLAVMXA   | CANVM1    | 32                  |
| 08/07/08 17:41:55 | WLAVMXA   | CANVM1    | 32                  |
| 08/07/08 17:41:55 | WLAVMXA   | CANVM1    | 34                  |
| 08/07/08 17:41:55 | WLAVMXA   | CANVM1    | 34                  |
| 08/07/08 17:41:55 | WLAVMXA   | CANVM1    | 34                  |
| 08/07/08 17:41:55 | WLAVMXA   | CANVM1    | 34                  |
| 08/07/08 17:41:55 | WLAVMXA   | CANVM1    | 34                  |
| 08/07/08 17:41:55 | WLAVMXA   | CANVM1    | 34                  |
| 08/07/08 17:41:55 | WLAVMXA   | CANVM1    | 34                  |

Hub Time: Thu, 08/07/2008 05:45 PM
Server Available
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# DASD Cache Workspace

- ▶ The base address for the Parallel Access Volume (PAV).
- ▶ The percentage of I/O operations that bypassed caching voluntarily
- ▶ The number of bypass cache requests per second
- ▶ The percentage of cache fast write operations, based on total write activity
- ▶ The percentage of cache fast write hits, based on the sum of all cache fast-write operations.
- ▶ The percentage of cache to DASD transfer operations
- ▶ The percentage of cachable read operations, based on total I/O activity
- ▶ The percentage of read hits, based on the sum of all cachable read operations
- ▶ The percentage of total hits (read + DASD fast write + cache fast write), based on the sum of all cachable read and write operations
- ▶ The percentage of write hits (DASD fast write + cache fast write), based on the sum of all DASD and cache fast write operations
- ▶ The caching status. Possible options are:
  - ACTIVATED
  - DEACTIVATED
  - DEACTIVE PENDING
  - UNKNOWN



# DASD Cache Workspace (cont)

- ▶ The storage controller subsystem identifier.
- ▶ The percentage of DASD fast write operations that were forced to bypass the cache and access DASD directly due to nonvolatile storage constraints
- ▶ The percentage of DASD fast write hits, based on the sum of all DASD fast-write operations
- ▶ The percentage of DASD fast write operations, based on total write activity.
- ▶ The status of DASD fast write Possible options are:
  - ACTIVATED
  - DEACTIVATED
  - DEACTIVE PENDING
  - UNKNOWN
- ▶ The real address of the storage device managed by the z/VM Control Program.
- ▶ The type and model of the device managed by the z/VM Control Program
- ▶ The dual copy indicator. Possible options are:
  - DUPLEX PAIR AVAILABLE
  - DUPLEX PAIR PENDING
  - FAILED DUPLEX
  - SUSPENDED DUPLEX
  - DUPLEX NOT ACTIVE
  - UNKNOWN



## DASD Cache Workspace (cont)

- ▶ The number of fast write I/O requests per second over this storage director
- ▶ The total fast-write rate per second (cache fast write + DASD fast write).
- ▶ The percentage of fast-write read requests
- ▶ The percentage of fast-write read requests that did not need DASD access
- ▶ The sum of normal, sequential, and fast write (for IBM DASD subsystems only) I/O requests, per second (read + write
- ▶ The number of inhibit cache load requests per second.
- ▶ The name assigned to the logical partition
- ▶ The percentage of nonsequential DASD to cache transfer operations
- ▶ The nonsequential read rate (read normal + read cache fast write), per second
- ▶ The number of normal I/O requests, per second, over this storage director
- ▶ The percentage of normal read requests
- ▶ The normal read percentage. That is, the percentage of read requests that did not need DASD access
- ▶ The overall percentage of read requests (normal, sequential, and fast write) to the total I/O activity of the device



# DASD Cache Workspace (cont)

- ▶ The overall percentage of read hits. That is, the percentage of read requests that did not need DASD access (normal, sequential, and fast write)
- ▶ The percentage of sequential DASD to cache transfer operations.
- ▶ The number of sequential I/O requests, per second, over this storage director
- ▶ The percentage of sequential read requests. That is, the percentage of read requests that did not require DASD access
- ▶ The percentage of sequential read hits
- ▶ The sequential read rate (read sequential) per second.
- ▶ 3880-13/23 storage director ID. For IBM DASD subsystems, the last two hexadecimal digits of the service set identifier (SSID) will be inserted
- ▶ The number of timeouts that occurred while waiting for data from the control unit
- ▶ The total I/O rate, per second, for the disk as it is recorded by the cache control unit. That is, where multiple systems are connected to one control unit, the total I/O activity from all systems is shown
- ▶ The I/O rate per second, as indicated by subchannel measurement block data for the system that does the monitoring
- ▶ The overall percentage of write hits to write requests. On 3880 control units, this refers to "write normal" hits

# Control Unit Cache Workspace

Control Unit Cache - bmaddox3.raleigh.ibm.com - SYSADMIN
\_ □ ×

File Edit View Help

View: Physical

- Enterprise
- Linux Systems
- z/Vm Systems
  - vm1nx11:VL
    - z/Vm Linux Systems
      - Channel
      - CP Owned Devices
      - DASD**
      - LPAR
      - Network
      - Real Storage
      - System
      - TCPIP

Physical

**Top 5 Cache Control Unit Rate per Second**

| Subsystem ID | Cache I/O Rate | Subchannel Measurement Block I/O Rate |
|--------------|----------------|---------------------------------------|
| 425A         | ~3.8           | ~3.8                                  |
| 425B         | ~1.5           | ~1.5                                  |
| 4034         | ~0.8           | ~0.8                                  |
| 8003         | ~0.7           | ~0.7                                  |
| 4032         | ~0.5           | ~0.5                                  |

**Top 5 Cache Control Unit Load Data Time**

| Subsystem ID | Average Response Time msec |
|--------------|----------------------------|
| 9558         | ~0.50                      |
| 9558         | ~0.50                      |
| 425A         | ~0.32                      |
| 4088         | ~0.22                      |
| 4032         | ~0.20                      |

**Top 5 Cache Control Unit Load Busy Percent**

| Subsystem ID | Busy Percent |
|--------------|--------------|
| 4032         | ~0.05        |
| 4034         | ~0.05        |
| 4087         | ~0.05        |
| 4088         | ~0.05        |
| 4089         | ~0.05        |

**Top 5 Cache Control Unit Data Rate per ...**

| Subsystem ID | Nonsequential Read Rate per Second | Sequential Read Rate per Second | Fast Write Rate per Second |
|--------------|------------------------------------|---------------------------------|----------------------------|
| 4032         | ~0.4                               | ~0.1                            | ~0.1                       |
| 4034         | ~0.7                               | ~0.1                            | ~0.1                       |
| 4087         | ~0.1                               | ~0.1                            | ~0.1                       |
| 4088         | ~0.1                               | ~0.1                            | ~0.1                       |
| 4089         | ~0.1                               | ~0.1                            | ~0.1                       |

**Top 5 Available Cache Controller Memory**

| Subsystem ID | Volatile Storage Configured Mbytes | Volatile Storage Available Mbytes |
|--------------|------------------------------------|-----------------------------------|
| 9558         | ~4000                              | ~4000                             |
| 9558         | ~4000                              | ~4000                             |
| 8009         | ~14000                             | ~12000                            |
| 8000         | ~14000                             | ~12000                            |
| 8003         | ~14000                             | ~12000                            |

**Cache Controller Utilization**

| Time              | System ID | LPAR Name | Subsystem ID | Control Unit Type | Volatile Storage Configured Mbytes | Volatile Storage Available Mbytes | Nonvolatile Storage Configured Mbytes | Nonvolatile Storage Available Mbytes | Cache I/O Rate | Subchannel Measurement Block I/O Rate | Busy Percent | Average Pending Time msec | Average Discont Time msec |
|-------------------|-----------|-----------|--------------|-------------------|------------------------------------|-----------------------------------|---------------------------------------|--------------------------------------|----------------|---------------------------------------|--------------|---------------------------|---------------------------|
| 08/07/08 17:42:55 | WLA VMXA  | CANVM1    | 4032         | 2107-E8           | 30048                              | 26178                             | 1049                                  | 1049                                 | 0.3            | 0.3                                   | 0            | 0.1                       |                           |
| 08/07/08 17:42:55 | WLA VMXA  | CANVM1    | 4034         | 2107-E8           | 30048                              | 26178                             | 1049                                  | 1049                                 | 0.7            | 0.7                                   | 0            | 0.1                       |                           |

Hub Time: Thu, 08/07/2008 05:46 PM    Server Available    Control Unit Cache - bmaddox3.raleigh.ibm.com - SYSADMIN

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# Control Unit Cache Workspace

- ▶ The average connected time, in milliseconds.
- ▶ The average disconnected time, in milliseconds.
- ▶ The average function pending time, in milliseconds
- ▶ The average percentage of read hits
- ▶ The average response time, in milliseconds, for the device.
- ▶ The average service time, in milliseconds
- ▶ The average percentage of write hits, for DASD and cache fast write operations
- ▶ The average busy percentage for all connected disks
- ▶ The total I/O activity as it is recorded by the cache control unit
- ▶ The average percentage of cache fast-write operations, based on the sum of all write operations
- ▶ The average percentage of cache fast write hits
- ▶ The type and model of the control unit



# Control Unit Cache Workspace (cont)

- ▶ The average percentage of DASD fast write hits
- ▶ The average percentage of DASD fast-write operations, based on the sum of all write operations
- ▶ The total fast-write rate per second
- ▶ The total nonsequential read rate per second.
- ▶ The amount of nonvolatile storage that is available
- ▶ The size of configured nonvolatile storage
- ▶ The average percentage on read operations, based on the sum of read and write
- ▶ The total sequential read rate per second.
- ▶ The total I/O activity as determined from count fields in the subchannel measurement blocks of the system that does the monitoring
- ▶ The subsystem identifier for the control unit
- ▶ The amount of cache storage that is available
- ▶ The size of configured cache storage



# Spin Locks Workspace

Spin Locks - bmaddox3.raleigh.ibm.com - SYSADMIN
\_ □ ×

File Edit View Help

View: Physical

- Enterprise
- Linux Systems
- z/VM Systems
  - vmnx11:VL
    - z/VM Linux Systems
      - Channel
      - CP Owned Devices
      - DASD
      - LPAR
      - Network
      - Real Storage
      - System**
      - TCPIP
      - Workload

Physical

Top 5 Locks per Second

| Lock Name | Rate per Second |
|-----------|-----------------|
| SRMSLOCK  | 5.0             |
| HCPTROLK  | 1.5             |
| SRMATDLK  | 1.0             |
| RSAAVGLK  | 0.0             |
| RSAGGLK   | 0.0             |

Top 5 Locks by Duration

| Lock Name | Microseconds |
|-----------|--------------|
| HCPTROLK  | 210          |
| RSAGGLK   | 50           |
| SRMATDLK  | 35           |
| SRMSLOCK  | 25           |
| SYSDATLK  | 10           |

Top 5 Percent of Elapsed Time in Spin L...

| Lock Name | Percent |
|-----------|---------|
| HCPTROLK  | 0.010   |
| SRMATDLK  | 0.000   |
| RSAAVGLK  | 0.000   |
| RSAGGLK   | 0.000   |
| HCPTMFLK  | 0.000   |

Spin Lock Activity

| Time  | System ID | LPAR Name | Lock Name  | Total Spin Lock Calls per Second | Time Spinning on Locks in Microseconds | Time Spinning on Locks Percent | Exclusive Spin Lock Rate per Second |
|---|-----------|-----------|------------|----------------------------------|--|--------------------------------|-------------------------------------|
| 08/07/08 17:...   |           |           | K          | 0.8                              | 22.40                                  | 0.00                           | 0.8                                 |
| The date and time at the end of the CP Monitor sample interval. |           |           |            | 0.0                              | 0.00                                   | 0.00                           | 0.0                                 |
| 08/07/08 17:...   |           |           | K          | 0.0                              | 0.00                                   | 0.00                           | 0.0                                 |
| 08/07/08 17:44:54   | WLAVMXA   | CANVM1    | BUTDLKEY   | 0.0                              | 0.00                                   | 0.00                           | 0.0                                 |
| 08/07/08 17:44:54   | WLAVMXA   | CANVM1    | HCPTMFLK   | 0.0                              | 0.00                                   | 0.00                           | 0.0                                 |
| 08/07/08 17:44:54   | WLAVMXA   | CANVM1    | RSAGGLK    | 0.0                              | 38.90                                  | 0.00                           | 0.0                                 |
| 08/07/08 17:44:54   | WLAVMXA   | CANVM1    | HCPRCCSL   | 0.0                              | 0.00                                   | 0.00                           | 0.0                                 |
| 08/07/08 17:44:54   | WLAVMXA   | CANVM1    | RSASXGLK   | 0.0                              | 0.00                                   | 0.00                           | 0.0                                 |
| 08/07/08 17:44:54   | WLAVMXA   | CANVM1    | HCPRCCMA   | 0.0                              | 0.00                                   | 0.00                           | 0.0                                 |
| 08/07/08 17:44:54   | WLAVMXA   | CANVM1    | RCCSFQL    | 0.0                              | 0.00                                   | 0.00                           | 0.0                                 |
| 08/07/08 17:44:54   | WLAVMXA   | CANVM1    | RSANOGLK   | 0.0                              | 0.00                                   | 0.00                           | 0.0                                 |
| 08/07/08 17:44:54   | WLAVMXA   | CANVM1    | NSIINI SLK | 0.0                              | 0.00                                   | 0.00                           | 0.0                                 |

Hub Time: Thu, 08/07/2008 05:48 PM    Server Available    Spin Locks - bmaddox3.raleigh.ibm.com - SYSADMIN

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# Spin Locks Workspace

- ▶ The name of the data space
- ▶ The virtual device number of the VDISK
- ▶ The number of locked data space pages
- ▶ The number of links to the virtual disk
- ▶ The number of slots occupied on auxiliary storage
- ▶ The number of data space pages moved from central storage to expanded storage, per second
- ▶ The number of data space pages read from DASD, per second
- ▶ The number of data space pages stolen per second
- ▶ The number of data space pages moved from expanded storage to central storage, per second
- ▶ The number of data space pages migrated from expanded storage to DASD, per second
- ▶ The number of data space pages written to DASD, per second
- ▶ The number of data space pages resident in central storage
- ▶ The user ID of the owner of the VDISK
- ▶ The size of the VDISK,
- ▶ The virtual I/O rate, per second, to the VDISK
- ▶ The number of XSTORE blocks occupied by the data space

# Virtual Disk Workspace

VDISK - bmaddox3.raleigh.ibm.com - SYSADMIN
\_ [X]

File Edit View Help

View: Physical

- Enterprise
- Linux Systems
- z/VM Systems
  - vmhx11:VL
    - z/VM Linux Systems
      - Channel
      - CP Owned Devices
      - DASD**
      - LPAR
      - Network
      - Real Storage
      - System
      - TCPIP
      - Workload

Physical

Top 5 Paging Rates per Second

Rate per Second

VDISK Owner & Device Number

Top 5 Expanded Storage Paging Rates per Sec...

Rate per Second

VDISK Owner & Device Number

Top 5 Pages in Use

Page Count

VDISK Owner & Device Number

Virtual Disk Activity

| Time              | System ID | LPAR Name | VDISK Owner | Device Number | VDISK Size | Number of Links | Virtual I/O's per Second | Pages Stolen per Second | Page from per E |
|-------------------|-----------|-----------|-------------|---------------|------------|-----------------|--------------------------|-------------------------|-----------------|
| 08/07/08 17:52:54 | WLAVMXA   | CANVM1    | NEILLRD     | 0334          | 500,000    | 1               | 0.63                     | 0.00                    |                 |
| 08/07/08 17:52:54 | WLAVMXA   | CANVM1    | NEILLRD     | 0335          | 100,000    | 1               | 0.18                     | 0.00                    |                 |
| 08/07/08 17:52:54 | WLAVMXA   | CANVM1    | NEILLRD     | 0333          | 1,000,000  | 1               | 0.97                     | 0.00                    |                 |

Hub Time: Thu, 08/07/2008 05:56 PM
Server Available
VDISK - bmaddox3.raleigh.ibm.com - SYSADMIN

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# Virtual Disk Workspace

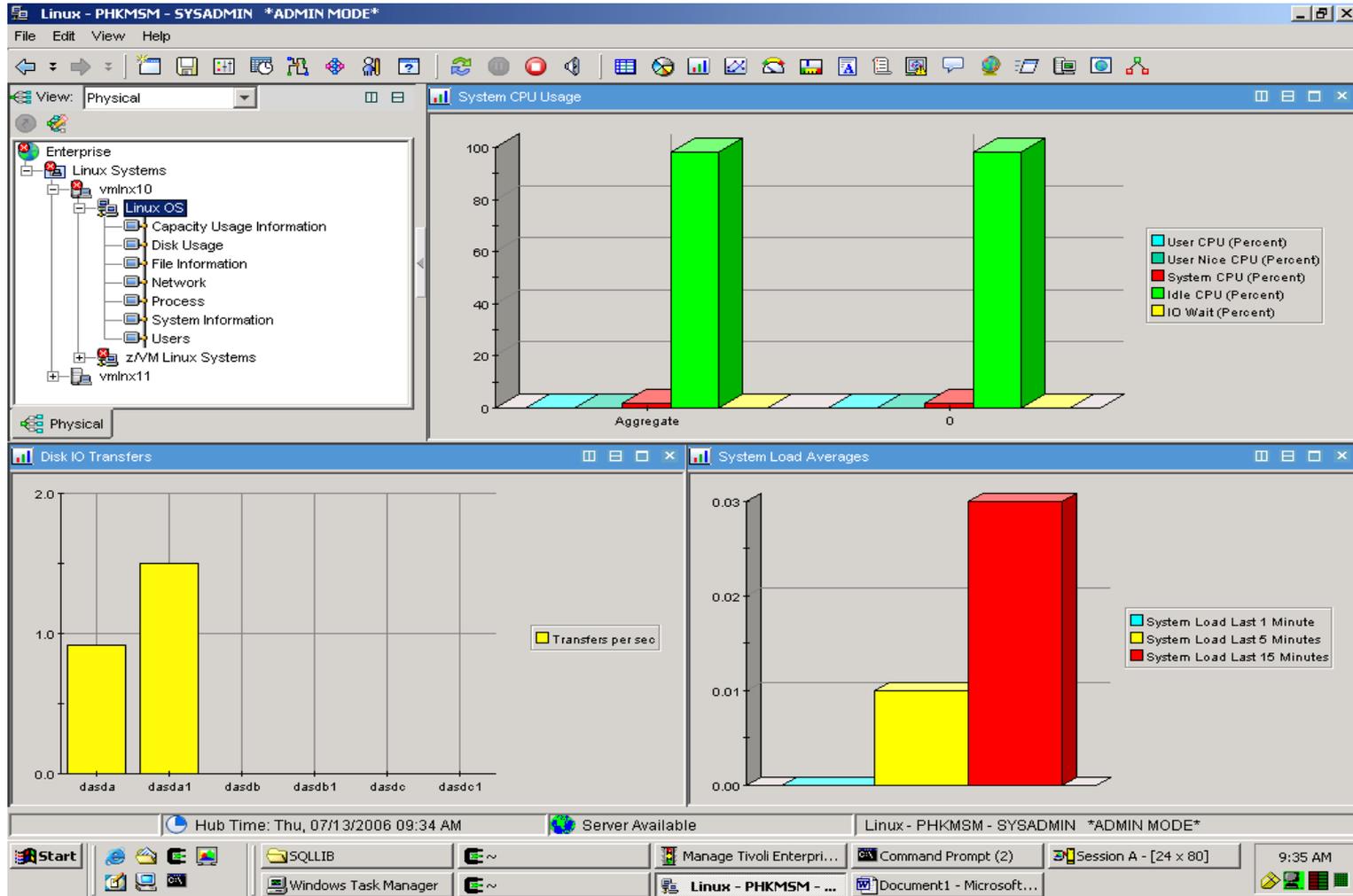
- ▶ The name of the data space
- ▶ The virtual device number of the VDISK
- ▶ The number of locked data space pages
- ▶ The number of links to the virtual disk.
- ▶ The number of slots occupied on auxiliary storage
- ▶ The number of data space pages moved from central storage to expanded storage, per second
- ▶ The number of data space pages read from DASD, per second
- ▶ The number of data space pages stolen per second
- ▶ The number of data space pages moved from expanded storage to central storage, per second
- ▶ The number of data space pages migrated from expanded storage to DASD, per second
- ▶ The number of data space pages written to DASD, per second
- ▶ The number of data space pages resident in central storage
- ▶ The user ID of the owner of the VDISK
- ▶ The size of the VDISK
- ▶ The virtual I/O rate, per second, to the VDISK
- ▶ The number of XSTORE blocks occupied by the data space

# Linux on zSeries Primary Workspaces

- **Linux OS**
- **Capacity Usage**
- **Disk Usage**
- **File Information**
- **Network**
- **Process**
- **System Information**
- **Users**



# Linux OS



# Linux OS Workspace

- **Linux OS Workspace**

- ▶ This workspace displays overall system data for the Linux system

- **Linux OS**

- **Description**

- ▶ Bar chart showing the percentages of CPU usage, by user CPU, user nice, system, and idle categories
- ▶ Bar chart showing the number of transfers per second that were issued to each device
- ▶ Bar chart showing the load on the system's processor during the previous one, five, and fifteen minutes



# Capacity Usage

**Capacity Usage Information - PHKMSM - SYSADMIN \*ADMIN MODE\***

File Edit View Help

View: Physical

- Enterprise
  - Linux Systems
    - vmlinx10
      - Linux OS
        - Capacity Usage Information**
        - Disk Usage
        - File Information
        - Network
        - Process
        - System Information
        - Users
      - z/VM Linux Systems
        - vmlinx11

**Disk Space Usage**

**Current Disk Usage**

- Space Used Percent (Red)
- Space Available Percent (Blue)

**Disk Usage Averages (Hourly Updates)**

**Disk Usage Averages**

- Days until Full Disk at Moving Avg (Yellow)
- Days until Full Disk at Current Rate (Blue)
- Days until Full Disk Low Water Mark (Red)
- Days until Full Disk at Peak Rate (Green)

| Disk Name               | Space Used (MBytes) | Space Available (MBytes) | Disk Usage Rate (Bytes/Hr) | High Water Mark Disk Usage Rate (Bytes/Hr) | High Water Mark Timestamp | Disk Usage Moving Avg (Bytes/Hr) | Days until Full Disk at Moving Avg | Days until Full Disk at Current Rate | Days until Full Disk Low Water Mark | Days until Full Disk at Peak Rate |
|-------------------------|---------------------|--------------------------|----------------------------|--|---------------------------|----------------------------------|------------------------------------|--------------------------------------|-------------------------------------|-----------------------------------|
| /dev/dasda1             | 3441                | 2183                     | 0                          | 0  | 07/13/06 09:19:34         | 0                                | 0                                  | 0                                    | 0                                   | 0                                 |
| /dev/mapper/pvols-lvol0 | 847                 | 356                      | 0                          | 0  | 07/13/06 09:19:34         | 0                                | 0                                  | 0                                    | 0                                   | 0                                 |
| devpts                  | 0                   | 0                        | 0                          | 0  | 07/13/06 09:19:34         | 0                                | 0                                  | 0                                    | 0                                   | 0                                 |
| proc                    | 0                   | 0                        | 0                          | 0  | 07/13/06 09:19:34         | 0                                | 0                                  | 0                                    | 0                                   | 0                                 |
| tmpfs                   | 0                   | 120                      | 0                          | 0  | 07/13/06 09:19:34         | 0                                | 0                                  | 0                                    | 0                                   | 0                                 |

Hub Time: Thu, 07/13/2006 09:35 AM    Server Available    Capacity Usage Information - PHKMSM - SYSADMIN \*ADMIN MODE\*

Start    SQLLIB    Windows Task Manager    Manage Tivoli Enterpri...    Command Prompt (2)    Session A - [24 x 80]    9:35 AM

Capacity Usage Inf...    Document1 - Microsoft...

# Capacity Usage Workspace

## ■ Capacity Usage Information Workspace

- ▶ This workspace displays the health of your system by providing CPU, disk, and swap space usage statistics.

## ■ Description

- ▶ The name of the physical disk partition where the file system is mounted.
- ▶ The amount of disk space currently in use on a file system, expressed in megabytes.
- ▶ The amount of unused space currently available to non-superusers on a file system, expressed in megabytes.
- ▶ The bytes per hour of disk usage over the last sample period.
- ▶ The bytes per hour rate that represents the high water mark of disk usage.
- ▶ The date and time that the disk usage reaches a high water mark
- ▶ The bytes per hour of disk usage averaged over all previous samples.
- ▶ The number of days until the disk is full based on the moving average rate of disk usage.
- ▶ The number of days until the disk is full based on the current rate of disk usage.
- ▶ The number of days until the disk is full based on the disk usage rate that represents the low water mark.
- ▶ The number of days until the disk is full based on the peak rate of disk usage.

# CPU Averages

CPU Averages - DEPTF72A - SYSADMIN

File Edit View Help

View: Physical

- TCPIP
- Workload
- Windows Systems
  - GDLVICOM
  - Linux OS
    - Capacity Usage Information
    - Disk Usage
    - File Information
    - Network
    - Process
    - System Information
    - Users
  - z/VM Linux Systems
  - CP Owned Devices(Paging Spooling)

Physical

Current Overall CPU Usage

CPU Averages (Hourly Updates)

CPU Usage Trends

| Estimated Days until CPU Upgrade | Total CPU Used Current Average (Percent) | Total CPU Used Moving Average (Percent) | User Nice CPU Current Average (Percent) | User Nice CPU Moving Average (Percent) | User CPU Current Average (Percent) | User CPU Moving Average (Percent) | System CPU Current Average (Percent) | System CPU Moving Average (Percent) | Idle CPU (Percent) | Idle CPU Moving Average (Percent) |
|----------------------------------|--|---|---|--|------------------------------------|-----------------------------------|--------------------------------------|-------------------------------------|--------------------|-----------------------------------|
| 0                                | 0.00                                     | 9.71                                    | 0.00                                    | 0.00                                   | 6.96                               | 5.97                              | 4.30                                 | 2.43                                | 88.71              | 90.30                             |

Hub Time: Mon, 11/20/2006 02:00 PM    Server Available    CPU Averages - DEPTF72A - SYSADMIN

# CPU Averages Workspace

## ■ CPU Averages Workspace

- ▶ This workspace displays the average CPU usage and shows trends that might indicate whether the usage is increasing

## ■ Description

- ▶ The number of days until CPU Usage Moving average hits 100% rate.
- ▶ The current average of CPU usage, expressed as a percentage.
- ▶ The moving average of CPU usage, expressed as a percentage
- ▶ The current average of the user nice CPU time, expressed as a percentage
- ▶ The moving average of the user nice CPU time, expressed as a percentage.
- ▶ The current average of the user CPU time, expressed as a percentage.
- ▶ The moving average of the user CPU time, expressed as a percentage.
- ▶ The current average of the system CPU time, expressed as a percentage
- ▶ The moving average of the system CPU time, expressed as a percentage.
- ▶ The current average of the system's idle CPU time, expressed as a percentage.
- ▶ The moving average of the system's idle CPU time, expressed as a percentage.
- ▶ The current average of the wait CPU time, expressed as a percentage.
- ▶ The moving current average of the wait CPU time, expressed as a percentage.

# Virtual Memory Usage Trends

Virtual Memory Usage Trends - DEPTF72A - SYSADMIN
[Close] [Maximize] [Refresh]

File Edit View Help

View: Physical

- TCPIP
- Workload
- Windows Systems
  - GDLVICOM
    - Linux OS
      - Capacity Usage Information
      - Disk Usage
      - File Information
      - Network
      - Process
      - System Information
      - Users
    - z/VM Linux Systems
    - CP Owned Devices(Paging Spooling)

Current Virtual Memory Usage

**Memory Usage**

Virtual Memory Averages (Hourly Updates)

**Virtual Memory Usage Trends**

Swap Space Usage Trends

| Total Swap Space(MB)<br>(Moving Average) | Swap Space Used(MB)<br>(Moving Average) | Swap Space Used per hour<br>(bytes per hour) | Days till Swap Space Full | Peak Swap Space Used(MB) | Minimum Days to Swap Full | Low Water Mark for Free real memory(KB) |
|--|---|--|---------------------------|--------------------------|---------------------------|---|
| 0  | 0                                       | 0  | 0                         | 0                        | 0                         | 172172                                  |

Hub Time: Mon, 11/20/2006 02:01 PM    Server Available    Virtual Memory Usage Trends - DEPTF72A - SYSADMIN

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# Virtual Memory Usage Trends Workspace

## ■ Virtual Memory Usage Trends Workspace

- ▶ This workspace displays information about current memory usage and usage and swap space usage trends

## ■ Description

- ▶ The moving average of total swap space, expressed in megabytes.
- ▶ The moving average of swap space used, expressed in megabytes
- ▶ The swap space usage rate, expressed in bytes per hour.
- ▶ The predicted number of days until swap space is completely used (moving average).
- ▶ The minimum number of days until swap space is completely used (peak rate based).
- ▶ The lowest level that free real memory has reached, expressed in kilobytes.



# Disk Usage

**Disk Usage - PHKMSM - SYSADMIN \*ADMIN MODE\***

File Edit View Help

View: Physical

Enterprise

- Linux Systems
  - vmlnx10
    - Linux OS
      - Capacity Usage Information
      - Disk Usage**
      - File Information
      - Network
      - Process
      - System Information
      - Users
  - vmlnx11
- z/VM Linux Systems

Physical

**Space Used Percent**

Space Used Percent

**Inodes Used Percent**

Inodes Used Percent

**Disk Usage**

| Mount Point (Unicode) | Disk Name          | Size (MBytes) | Space Used (MBytes) | Space Available (MBytes) | Total Inodes | Inod Use |
|-----------------------|--------------------|---------------|---------------------|--------------------------|--------------|----------|
| /                     | /dev/dasda1        | 5624          | 3441                | 2182                     | 0            |          |
| /proc                 | proc               | 0             | 0                   | 0                        | 0            | 0        |
| /dev/shm              | tmpfs              | 120           | 0                   | 120                      | 30928        |          |
| /dev/pts              | devpts             | 0             | 0                   | 0                        | 0            | 0        |
| /products             | /dev/mapper/pvo... | 1203          | 847                 | 356                      | 0            |          |

**Disk Space**

Space Used (MBytes)  
Space Available (MBytes)

Hub Time: Thu, 07/13/2006 09:36 AM    Server Available    Disk Usage - PHKMSM - SYSADMIN \*ADMIN MODE\*

Start    SQLLIB    Windows Task Manager    Manage Tivoli Enterpri...    Command Prompt (2)    Session A - [24 x 80]    9:36 AM

Disk Usage - PHKM...    Document1 - Microsoft...

# Disk Usage Workspace

## ■ Disk Usage Workspace

- ▶ This workspace displays information about the health of storage space within your monitored systems

## ■ Description

- ▶ The path name of the directory to which a file system is mounted. This is the virtual name for the directory.
- ▶ The name of the physical disk partition where the file system is mounted
- ▶ The total size of a file system, expressed in megabytes.
- ▶ The amount of disk space currently in use on a file system, expressed in megabytes
- ▶ The amount of unused space currently available to non-superusers on a file system, expressed in megabytes
- ▶ The number of inodes allocated on a file system
- ▶ The number of inodes currently allocated to files on the file system.
- ▶ The number of inodes currently available on your file system.
- ▶ The space currently used on the file system, expressed as a percentage of the sum of used and available space.
- ▶ The percentage of inodes currently allocated to files, calculated by dividing the Inodes Used value by the Total Inodes value.
- ▶ The file system type, such as hsfs, nfs, tmpfs, and ufs.
- ▶ The amount of unused space currently available to non-superusers on a file system, expressed as a percentage.

# File Information

File Information - PHKMSM - SYSADMIN \*ADMIN MODE\*

View: Physical

Enterprise

- Linux Systems
  - vmlnx10
    - Linux OS
      - Capacity Usage Information
      - Disk Usage
      - File Information**
      - Network
      - Process
      - System Information
      - Users
    - z/VM Linux Systems
      - vmlnx11

Physical

File Size - Top Ten

| Path (Unicode) | File (Unicode) | Size MB | Owner (Unicode) | Group (Unicode) | Last Changed Time | Last Accessed Time | Links | Access | Type | Link Name (Unicode) |
|----------------|----------------|---------|-----------------|-----------------|-------------------|--------------------|-------|--------|------|---------------------|
| /              | dev            | 0.116   | root            | root            | 06/26/06 10:28:05 | 07/13/06 04:25:44  | 12    | 1363   | Dir  |                     |
| /              | sbin           | 0.010   | root            | root            | 08/18/05 09:48:42 | 07/13/06 04:30:27  | 3     | 1363   | Dir  |                     |
| /              | etc            | 0.008   | root            | root            | 06/30/06 14:04:27 | 07/13/06 04:25:49  | 90    | 1363   | Dir  |                     |
| /              | lib            | 0.003   | root            | root            | 08/18/05 09:32:30 | 07/13/06 04:25:55  | 12    | 1363   | Dir  |                     |
| /              | bin            | 0.002   | root            | root            | 11/04/05 15:57:34 | 07/13/06 04:25:44  | 2     | 1363   | Dir  |                     |
| /              | ..             | 0.000   | root            | root            | 06/26/06 10:26:10 | 07/13/06 09:40:00  | 23    | 1363   | Dir  |                     |
| /              | mnt            | 0.000   | root            | root            | 06/26/06 14:19:11 | 07/10/06 01:48:30  | 6     | 1363   | Dir  |                     |
| /              | opt            | 0.000   | root            | root            | 11/04/05 16:05:42 | 07/13/06 04:25:56  | 7     | 1363   | Dir  |                     |
| /              | .              | 0.000   | root            | root            | 06/26/06 10:26:10 | 07/13/06 09:40:00  | 23    | 1363   | Dir  |                     |
| /              | tmp            | 0.000   | root            | root            | 07/13/06 09:30:01 | 07/10/06 01:48:52  | 15    | 3361   | Dir  |                     |

Hub Time: Thu, 07/13/2006 09:37 AM

Server Available

File Information - PHKMSM - SYSADMIN \*ADMIN MODE\*

Start

SQLLIB

Windows Task Manager

Manage Tivoli Enterpri...

Command Prompt (2)

Session A - [24 x 80]

9:37 AM

File Information - ...

Document1 - Microsoft...

# File Information Workspace

## ■ File Information Workspace

- ▶ This workspace displays information about the top ten files in size on your system

## ■ Description

- ▶ The path name of the directory to which a file system is mounted. This is the virtual name for the directory.
- ▶ The name of the file
- ▶ The size of the file in megabytes
- ▶ The owner of the file
- ▶ The group that the file belongs to
- ▶ The date of the last time the file was changed
- ▶ The date of the last time the file was accessed
- ▶ The number of links to the file
- ▶ The access permissions for the file
- ▶ Whether the file is a file or a directory
- ▶ The link name of the file



# File Information

All Files - DEPTF72A - SYSADMIN

File Edit View Help

View: Physical

File Size - Top Ten

| Path | File                 | Size MB | Owner | Group | Last Changed Time | Last Accessed Time | Links | Access | Type | Link Name |
|------|----------------------|---------|-------|-------|-------------------|--------------------|-------|--------|------|-----------|
| /    | dev                  | 120.000 | root  | root  | 08/04/06 07:14:58 | 09/13/06 04:16:11  | 14    | 755    | Dir  |           |
| /    | a.out                | 13.000  | root  | root  | 10/11/05 12:19:20 | 01/06/06 07:10:42  | 1     | 755    | File |           |
| /    | hogmem               | 13.000  | root  | root  | 10/11/05 12:19:38 | 07/28/06 07:34:29  | 1     | 755    | File |           |
| /    | sbin                 | 10.000  | root  | root  | 01/26/06 05:38:34 | 09/13/06 08:07:54  | 3     | 755    | Dir  |           |
| /    | etc                  | 7.000   | root  | root  | 09/07/06 12:12:52 | 09/13/06 04:16:11  | 84    | 755    | Dir  |           |
| /    | lib64                | 3.000   | root  | root  | 01/25/06 08:30:05 | 09/13/06 04:16:48  | 5     | 755    | Dir  |           |
| /    | bin                  | 3.000   | root  | root  | 03/22/06 12:43:39 | 09/13/06 07:59:20  | 2     | 755    | Dir  |           |
| /    | tivoli               | 3.000   | root  | root  | 09/13/06 08:03:32 | 09/13/06 08:31:11  | 5     | 777    | Dir  |           |
| /    | lib                  | 2.000   | root  | root  | 01/25/06 08:20:59 | 09/13/06 04:16:12  | 11    | 755    | Dir  |           |
| /    | root                 | 1.000   | root  | root  | 08/16/06 14:03:04 | 09/13/06 08:00:51  | 16    | 700    | Dir  |           |
| /    | tmp                  | 1.000   | root  | root  | 09/13/06 08:30:01 | 09/07/06 12:08:09  | 10    | 1777   | Dir  |           |
| /    | StartupErrorMessages | 0.000   | root  | root  | 08/04/06 07:14:40 | 07/28/06 07:34:29  | 1     | 644    | File |           |
| /    | hogmem.c             | 0.000   | root  | root  | 10/11/05 12:19:14 | 07/28/06 07:34:29  | 1     | 644    | File |           |
| /    | secrets.tdb          | 0.000   | root  | root  | 03/15/05 12:50:42 | 03/15/05 12:50:42  | 1     | 600    | File |           |
| /    | kalena               | 0.000   | root  | root  | 08/03/06 11:13:43 | 08/22/06 12:53:47  | 1     | 755    | File |           |
| /    | linuxShare           | 0.000   | root  | root  | 06/20/05 10:09:18 | 09/13/06 04:16:48  | 2     | 755    | Dir  |           |
| /    | linuxImages          | 0.000   | root  | root  | 08/17/06 17:08:12 | 09/13/06 04:16:48  | 2     | 755    | Dir  |           |
| /    | .rmfprms_started     | 0.000   | root  | root  | 08/04/06 04:49:55 | 08/04/06 04:49:55  | 1     | 644    | File |           |

Physical

All Files

Hub Time: Mon, 11/20/2006 02:02 PM Server Available All Files - DEPTF72A - SYSADMIN

# All Files Information Workspace

## ■ All Files Information Workspace

- ▶ This workspace displays information about all the files on your system

## ■ Description

- ▶ The path name of the directory to which a file system is mounted. This is the virtual name for the directory.
- ▶ The name of the file
- ▶ The size of the file in megabytes
- ▶ The owner of the file
- ▶ The group that the file belongs to
- ▶ The date of the last time the file was changed
- ▶ The date of the last time the file was accessed
- ▶ The number of links to the file
- ▶ The access permissions for the file
- ▶ Whether the file is a file or a directory
- ▶ The link name of the file



# Network

Network - PHKMSM - SYSADMIN \*ADMIN MODE\*

File Edit View Help

View: Physical

Enterprise

- Linux Systems
  - vmlnx10
    - Linux OS
      - Capacity Usage Information
      - Disk Usage
      - File Information
      - Network**
      - Process
      - System Information
      - Users
  - z/VM Linux Systems
    - vmlnx11

Physical

Network Errors

Legend: Input Errors (red), Output Errors (yellow), Collisions (green)

Network Activity

Legend: Packets Received per sec (yellow), Packets Transmitted per sec (blue)

Network Devices

| Network Interface Name | Interface IP Address | Interface Status | Total Collisions | Collisions per minute | Collisions (Percent) | Input FIFO Buffer Overruns | Carrier Losses | Errors (Percent) | Input Errors per minute | Output Errors per minute | Input Errors | Output Errors | Packet Framing Errors | Received Count (KBytes) |
|------------------------|----------------------|------------------|------------------|-----------------------|----------------------|----------------------------|----------------|------------------|-------------------------|--------------------------|--------------|---------------|-----------------------|-------------------------|
| lo                     | 127.0.0.1            | UP               | 0                | 0                     | 0                    | 0                          | 0              | 0                | 0                       | 0                        | 0            | 0             | 0                     | 4263                    |
| ctc0                   | 9.42.42.210          | UP               | 0                | 0                     | 0                    | 0                          | 0              | 0                | 0                       | 0                        | 0            | 0             | 0                     | 40177                   |
| sit0                   |                      | DOWN             | 0                | 0                     | 0                    | 0                          | 0              | 0                | 0                       | 0                        | 0            | 0             | 0                     | 0                       |

Hub Time: Thu, 07/13/2006 09:37 AM Server Available Network - PHKMSM - SYSADMIN \*ADMIN MODE\*

Start | SQLLIB | Windows Task Manager | Manage Tivoli Enteri... | Command Prompt (2) | Session A - [24 x 80] | 9:37 AM

Network - PHKMSM... | Document1 - Microsoft...

# Network Workspace

## ■ Network Workspace

- ▶ This workspace displays information about the network components within your monitored systems

## ■ Description

- ▶ The Dynamic Name Server (DNS) entry associated with the IP address of the network interface.
- ▶ The Internet Protocol (IP) address of the network interface.
- ▶ An indication of whether or not a network interface is currently available
- ▶ The number of times during the sampling period that a packet transmitted by the network interface collided with another packet.
- ▶ The number of times a packet collided with another packet per minute.
- ▶ Of the total number of packets transmitted in this sample period, the percentage involved in a collision.
- ▶ The number of input FIFO buffer overruns that occurred during the sampling period.
- ▶ The number of carrier losses that occurred in the interface
- ▶ Of the total number of packets received and transmitted, the percentage that were in error during this sample period.
- ▶ The number of packets with errors received per minute by the interface.
- ▶ The number of packet transmission errors per minute during the monitoring interval.
- ▶ The number of packets received with errors in the interface.
- ▶ The number of packets packet transmission errors in the interface.
- ▶ The number of packet framing errors that occurred in the interface.
- ▶ The number of packets received by the interface during the sampling period
- ▶ The number of bytes received per second by the interface.
- ▶ The number of kilobytes transmitted by an interface since boot time.
- ▶ The number of bytes received per second by the interface.
- ▶ The number of packets received by the interface during the sampling period.
- ▶ The number of packets received per second by the interface.
- ▶ The number of input packets dropped by the device driver.
- ▶ The number of output packets dropped by the device driver.
- ▶ The number of output FIFO buffer overruns that occurred during the sampling period.
- ▶ The number of packets transmitted by the interface during the sampling period.
- ▶ The number of packets transmitted per second by the interface.
- ▶ The maximum packet size (in bytes) for the specified network interface

# Sockets Information

Sockets Information - DEPTF72A - SYSADMIN
File Edit View Help

View: Physical

- TCPIP
- Workload
- Windows Systems
  - GDLVICOM
    - Linux OS
      - Capacity Usage Information
      - Disk Usage
      - File Information
      - Network
      - Process
      - System Information
      - Users
- z/VM Linux Systems
- CP Owned Devices(Paging Spod)

Sockets Used by Protocol

Network Activity

Sockets Services Information

| Socket Owner Name (Unicode) | Local Port | Socket Protocol | Receive Queue Bytes | Send Queue (Bytes) | Local Address | Local Service Name | Foreign Address | Socket State | Socket UID | Socket Inode | Foreign Port |
|-----------------------------|------------|-----------------|---------------------|--------------------|---------------|--------------------|-----------------|--------------|------------|--------------|--------------|
| root                        | 38078      | TCP             | 0                   | 0                  | 9.60.9.55     | *                  | 9.27.131.184    | TIME WAIT    | 0          | 0            | 1918         |
| root                        | 38076      | TCP             | 0                   | 0                  | 127.0.0.1     | *                  | 127.0.0.1       | TIME WAIT    | 0          | 0            | 3661         |
| root                        | 38074      | TCP             | 0                   | 0                  | 127.0.0.1     | *                  | 127.0.0.1       | TIME WAIT    | 0          | 0            | 1920         |
| candle                      | 38050      | TCP             | 0                   | 0                  | *             | *                  | *               | LISTEN       | 1001       | 498271       | 0            |
| root                        | 2049       | TCP             | 0                   | 0                  | *             | *                  | *               | LISTEN       | 0          | 7270         | 0            |
| candle                      | 1920       | TCP             | 0                   | 0                  | *             | *                  | *               | LISTEN       | 1001       | 498276       | 0            |
| root                        | 32770      | TCP             | 0                   | 0                  | *             | *                  | *               | LISTEN       | 0          | 7283         | 0            |
| candle                      | 38052      | TCP             | 0                   | 0                  | *             | *                  | *               | LISTEN       | 1001       | 498273       | 0            |
| root                        | 5801       | TCP             | 0                   | 0                  | *             | *                  | *               | LISTEN       | 0          | 7666         | 0            |
| root                        | 5802       | TCP             | 0                   | 0                  | *             | *                  | *               | LISTEN       | 0          | 7667         | 0            |
| root                        | 5803       | TCP             | 0                   | 0                  | *             | *                  | *               | LISTEN       | 0          | 7668         | 0            |
| root                        | 139        | TCP             | 0                   | 0                  | *             | *                  | *               | LISTEN       | 0          | 7189         | 0            |
| root                        | 427        | TCP             | 0                   | 0                  | 9.60.9.55     | *                  | *               | LISTEN       | 0          | 7054         | 0            |
| root                        | 427        | TCP             | 0                   | 0                  | 127.0.0.1     | *                  | *               | LISTEN       | 0          | 7053         | 0            |
| candle                      | 3661       | TCP             | 0                   | 0                  | *             | *                  | *               | LISTEN       | 1001       | 498278       | 0            |
| root                        | 5901       | TCP             | 0                   | 0                  | *             | *                  | *               | LISTEN       | 0          | 7663         | 0            |
| root                        | 5902       | TCP             | 0                   | 0                  | *             | *                  | *               | LISTEN       | 0          | 7664         | 0            |
| root                        | 5903       | TCP             | 0                   | 0                  | *             | *                  | *               | LISTEN       | 0          | 7665         | 0            |

Hub Time: Mon, 11/20/2006 02:03 PM
Server Available
Sockets Information - DEPTF72A - SYSADMIN

# Sockets Information Workspace

## ■ Sockets Information Workspace

- ▶ This workspace displays information about the socket connections within your monitored systems

## ■ Description

- ▶ The user name associated with the user ID that owns or started the socket connection.
- ▶ The local port number.
- ▶ Protocol used by the socket.
- ▶ The count of bytes not copied by the user program connected to this socket.
- ▶ The count of bytes not acknowledged by the remote host.
- ▶ The address of the local end of the socket, presented as a dotted IP address.
- ▶ The local port number translated to a service name from the etc/services subdirectory.
- ▶ The address of the remote end of the socket.
- ▶ The state of the socket.
- ▶ The user ID of the owner of the socket.
- ▶ The inode used by the socket.
- ▶ The number of the foreign port.

# RPC Statistics

RPC Statistics - DEPTF72A - SYSADMIN

File Edit View Help

View: Physical

- TCPIP
- Workload
- Windows Systems
  - GDLVICOM
    - Linux OS
      - Capacity Usage Information
      - Disk Usage
      - File Information
      - Network
      - Process
      - System Information
      - Users
    - z/VM Linux Systems
    - CP Owned Devices(Paging Spod

Network Errors

| Interface | Input Errors | Output Errors | Collisions |
|-----------|--------------|---------------|------------|
| lo        | 0            | 0             | 0          |
| sit0      | 0            | 0             | 0          |
| eth0      | 0            | 0             | 0          |
| hsi0      | 0            | ~8000         | 0          |

RPC Network Activity

| Category                               | Value |
|--|-------|
| RPC Total Server Calls Received        | 24    |
| RPC Server Calls Rejected              | 0     |
| RPC Server Call Authorization Failures | 0     |
| RPC Server Invalid Client Request      | 0     |
| RPC Packets with Malformed Header      | 0     |
| RPC Client Calls                       | 0     |
| Calls Retransmitted                    | 0     |
| Times Authentication Refreshed         | 0     |

RPC Statistics

| RPC Total Server Calls Received | RPC Server Calls Rejected | RPC Server Call Authorization Failures | RPC Server Invalid Client Request | RPC Packets with Malformed Header | RPC Client Calls | RPC Calls Retransmitted | Times Authentication Refreshed |
|---------------------------------|---------------------------|--|-----------------------------------|-----------------------------------|------------------|-------------------------|--------------------------------|
| 24                              | 0                         | 0                                      | 0                                 | 0                                 | 0                | 0                       | 0                              |

Hub Time: Mon, 11/20/2006 02:03 PM    Server Available    RPC Statistics - DEPTF72A - SYSADMIN

# RPC Statistics Workspace

## ■ RPC Statistics Workspace

- ▶ This workspace displays statistics on the number and type of remote procedure calls being made to the server and clients

## ■ Description

- ▶ The total number of calls made to the server (both valid and not valid).
- ▶ The number of calls made to the server, which were rejected.
- ▶ The number of packets that were received at the server with authorizations that were not valid.
- ▶ The number of packets that were received at the server, which had client requests that were not valid
- ▶ The number of packets that were received at the server with header records that were not properly formatted.
- ▶ The number of calls to the server made by the server's clients.
- ▶ The number of client calls that needed to be transmitted again.
- ▶ The number of times the authentication of a client was refreshed.

# NFS Statistics

NFS Statistics - DEPTF72A - SYSADMIN

File Edit View Help

View: Physical

- TCPIP
- Workload
- Windows Systems
  - GDLVICOM
  - Linux OS
    - Capacity Usage Information
    - Disk Usage
    - File Information
    - Network
  - Process
  - System Information
  - Users
- z/VM Linux Systems
- CP Owned Devices(Paging Spoc)

Physical

Network Errors

Input Errors  
Output Errors  
Collisions

RPC Network Activity

- RPC Total Server Calls Received
- RPC Server Calls Rejected
- RPC Server Call Authorization Failures
- RPC Server Invalid Client Request
- RPC Packets with Malformed Header
- RPC Client Calls
- Calls Retransmitted
- Times Authentication Refreshed

| Location | NFS Version | null Calls | null Calls Percent | getattr Calls | getattr Calls Percent | setattr Calls | setattr Calls percent | root Calls | root Calls Percent | Lookups | Lookups Percent | Read Link Calls | Read Link Calls Percent | Read Calls | Read Calls Percent |
|----------|-------------|------------|--------------------|---------------|-----------------------|---------------|-----------------------|------------|--------------------|---------|-----------------|-----------------|-------------------------|------------|--------------------|
| Client   | v2          | 0          | N/A                | 0             | N/A                   | 0             | N/A                   | 0          | N/A                | 0       | N/A             | 0               | N/A                     | 0          | N/A                |
| Server   | v2          | 2          | 8                  | 0             | 0                     | 0             | 0                     | 0          | 0                  | 10      | 41              | 0               | 0                       | 0          | 0                  |
| Client   | v3          | 0          | N/A                | 0             | N/A                   | 0             | N/A                   | N/A        | N/A                | 0       | N/A             | 0               | N/A                     | 0          | N/A                |
| Server   | v3          | 0          | N/A                | 0             | N/A                   | 0             | N/A                   | N/A        | N/A                | 0       | N/A             | 0               | N/A                     | 0          | N/A                |

Hub Time: Mon, 11/20/2006 02:04 PM    Server Available    NFS Statistics - DEPTF72A - SYSADMIN

# NFS Statistics Workspace

- **NFS Statistics Workspace**

- ▶ This workspace displays statistics on the operations involving the Network File System

- **Description**

- ▶ The location of the origin of the call in the Network File System.
- ▶ The software version associated with the NFS server.
- ▶ The number of calls made to the NFS server from NFS clients which contained no data
- ▶ Of the total number of calls made to the NFS server, the percentage that contained no data.
- ▶ The number of calls made to the NFS server which contained a get attribute (getattr) operation.
- ▶ Of the total number of calls made to the NFS server, the percentage that contained get attribute (getattr) operations.
- ▶ The number of calls made to the NFS server which contained a set attribute (setattr) operation.
- ▶ Of the total number of calls made to the NFS server, the percentage that contained a set attribute (setattr) operation.
- ▶ The number of calls made to the NFS server which contained root calls.
- ▶ Of the total number of calls made to the NFS server, the percentage that were root calls
- ▶ The number of read directory plus (readdirplus) calls made to the NFS server to return the name, the file ID, attributes, and file handle.
- ▶ The number of total calls and percentage of calls that were:
  - Lookups
  - Read link
  - Read
  - Write cache
  - Writes
  - File creates
  - Remove files
  - Rename files
  - Link
  - Symbolic link
  - Make directory
  - Remove directory
  - Read directory
  - File system statistics
  - Access
  - Make node
  - File system info
  - Pathconf
  - Commit

# Process

The screenshot displays the Tivoli Enterprise Console interface for monitoring processes. The left pane shows a tree view with 'Process' selected under 'Linux OS'. The main area contains two charts: 'Process CPU Percent Usage' and 'Process + Child CPU Percent Usage'. The 'Process Information Detail' table provides the following data:

| Process Command name (Unicode) | Process ID | Process Parent ID | Process State | Process System CPU (Percent) | Process User CPU (Percent) | Cumulative Process System CPU (Percent) | Cumulative Process User CPU (Percent) | Kernel Priority | Nice Value | Total Size(pages) | Resident Se Size(pages) |
|--------------------------------|------------|-------------------|---------------|------------------------------|----------------------------|---|---------------------------------------|-----------------|------------|-------------------|-------------------------|
| klzagent                       | 9064       | 1                 | Sleeping      | 0.12                         | 0.37                       | 0.00                                    | 0.00                                  | 16              | 0          | 19371             | 294                     |
| pdflush                        | 12         | 4                 | Sleeping      | 0.06                         | 0.00                       | 0.00                                    | 0.00                                  | 15              | 0          | 0                 |                         |
| kswapd0                        | 13         | 1                 | Sleeping      | 0.03                         | 0.00                       | 0.00                                    | 0.00                                  | 16              | 0          | 0                 |                         |
| slpd                           | 2029       | 1                 | Sleeping      | 0.02                         | 0.01                       | 0.00                                    | 0.00                                  | 16              | 0          | 888               | 291                     |
| cupsd                          | 2105       | 1                 | Sleeping      | 0.01                         | 0.00                       | 0.00                                    | 0.00                                  | 16              | 0          | 1771              | 811                     |
| pickup                         | 8756       | 2190              | Sleeping      | 0.00                         | 0.01                       | 0.00                                    | 0.00                                  | 17              | 0          | 1196              | 391                     |
| events/0                       | 4          | 1                 | Sleeping      | 0.00                         | 0.00                       | 0.00                                    | 0.00                                  | 5               | -10        | 0                 |                         |
| kslowcrw                       | 8          | 4                 | Sleeping      | 0.00                         | 0.00                       | 0.00                                    | 0.00                                  | 15              | -10        | 0                 |                         |
| init                           | 1          | 0                 | Sleeping      | 0.00                         | 0.00                       | 1.15                                    | 1.50                                  | 16              | 0          | 157               | 61                      |
| cio                            | 6          | 4                 | Sleeping      | 0.00                         | 0.00                       | 0.00                                    | 0.00                                  | 15              | -10        | 0                 |                         |
| cio_notify                     | 7          | 4                 | Sleeping      | 0.00                         | 0.00                       | 0.00                                    | 0.00                                  | 15              | -10        | 0                 |                         |
| aio/0                          | 14         | 4                 | Sleeping      | 0.00                         | 0.00                       | 0.00                                    | 0.00                                  | 15              | -10        | 0                 |                         |
| kblockd/0                      | 5          | 4                 | Sleeping      | 0.00                         | 0.00                       | 0.00                                    | 0.00                                  | 5               | -10        | 0                 |                         |
| kmcheck                        | 43         | 1                 | Sleeping      | 0.00                         | 0.00                       | 0.00                                    | 0.00                                  | 25              | 0          | 0                 |                         |

# Process Workspace

## ■ Process Workspace

- ▶ This workspace displays the health of specific processes within your monitored systems

## ■ Description

- ▶ The name of the process command.
- ▶ The identifier of the process.
- ▶ The identifier for the parent process.
- ▶ The state of the process (Sleeping, Disk, Running, Zombie, Trace, Dead, or N/A).
- ▶ The percentage of CPU time spent in kernel mode by process.
- ▶ The percentage of CPU time spent in user mode by process.
- ▶ The percentage of cumulative CPU time spent in kernel mode by process.
- ▶ The percentage of cumulative CPU time spent in user mode by process.
- ▶ The kernel scheduling priority.
- ▶ The standard Linux nice level.
- ▶ The number of pages that the process has in real memory.
- ▶ The number of pages the process has in real memory.
- ▶ The number of pages of shared (mmap'd) memory.
- ▶ The number of pages of text resident (mmap'd) memory.
- ▶ The number of pages of shared (mmap'd) memory.
- ▶ The size of the data set based on the number of pages.
- ▶ Pages that have been modified (dirty) in buffer (main memory), but not yet copied to the cache
- ▶ The data size (in kilobytes) of the virtual memory.
- ▶ The size (in kilobytes) of locked pages of the virtual memory
- ▶ The data size (in kilobytes) of the virtual memory.
- ▶ The stack size (in kilobytes) of the virtual memory.
- ▶ The executable size (in kilobytes) of the virtual memory.
- ▶ The library size (in kilobytes) of the virtual memory.
- ▶ The total number of minor page faults (including child processes) since the start of the process.
- ▶ The total number of major page faults (including child processes) since the start of the process.
- ▶ The process command line string.
- ▶ The ID of the process CPU.
- ▶ Of the total system CPU usage, the percentage that was user CPU usage.



# Process User

Process User Information - DEPTF72A - SYSADMIN

File Edit View Help

View: Physical

- TCPIP
- Workload
- Windows Systems
  - GDLVICOM
    - Linux OS
      - Capacity Usage Information
      - Disk Usage
      - File Information
      - Network
      - Process
      - System Information
      - Users
- z/VM Linux Systems
  - CP Owned Devices(Paging Spo

Process CPU Percent Usage

Page: 1 of 2

Process + Child CPU Percent Usage

Page: 1 of 2

Process User Information

Page: 1 of 2

| Process ID | Real User name (Unicode) | Effective User ID | Saved User ID | File System User ID | Real Group ID | Effective Group ID | Saved Group ID | File System Group ID | Effective User name (Unicode) | Saved User name (Unicode) | File System User name (Unicode) | Real Group name (Unicode) | Effective Group name (Unicode) | File System Group name (Unicode) |
|------------|--------------------------|-------------------|---------------|---------------------|---------------|--------------------|----------------|----------------------|-------------------------------|---------------------------|---------------------------------|---------------------------|--------------------------------|----------------------------------|
| 1          | root                     | 0                 | 0             | 0                   | 0             | 0                  | 0              | 0                    | root                          | root                      | root                            | root                      | root                           | root                             |
| 2          | root                     | 0                 | 0             | 0                   | 0             | 0                  | 0              | 0                    | root                          | root                      | root                            | root                      | root                           | root                             |
| 3          | root                     | 0                 | 0             | 0                   | 0             | 0                  | 0              | 0                    | root                          | root                      | root                            | root                      | root                           | root                             |
| 4          | root                     | 0                 | 0             | 0                   | 0             | 0                  | 0              | 0                    | root                          | root                      | root                            | root                      | root                           | root                             |
| 5          | root                     | 0                 | 0             | 0                   | 0             | 0                  | 0              | 0                    | root                          | root                      | root                            | root                      | root                           | root                             |
| 6          | root                     | 0                 | 0             | 0                   | 0             | 0                  | 0              | 0                    | root                          | root                      | root                            | root                      | root                           | root                             |
| 43         | root                     | 0                 | 0             | 0                   | 0             | 0                  | 0              | 0                    | root                          | root                      | root                            | root                      | root                           | root                             |
| 44         | root                     | 0                 | 0             | 0                   | 0             | 0                  | 0              | 0                    | root                          | root                      | root                            | root                      | root                           | root                             |
| 45         | root                     | 0                 | 0             | 0                   | 0             | 0                  | 0              | 0                    | root                          | root                      | root                            | root                      | root                           | root                             |
| 100        | root                     | 0                 | 0             | 0                   | 0             | 0                  | 0              | 0                    | root                          | root                      | root                            | root                      | root                           | root                             |
| 105        | root                     | 0                 | 0             | 0                   | 0             | 0                  | 0              | 0                    | root                          | root                      | root                            | root                      | root                           | root                             |
| 104        | root                     | 0                 | 0             | 0                   | 0             | 0                  | 0              | 0                    | root                          | root                      | root                            | root                      | root                           | root                             |
| 658        | root                     | 0                 | 0             | 0                   | 0             | 0                  | 0              | 0                    | root                          | root                      | root                            | root                      | root                           | root                             |
| 1035       | root                     | 0                 | 0             | 0                   | 0             | 0                  | 0              | 0                    | root                          | root                      | root                            | root                      | root                           | root                             |
| 1208       | root                     | 0                 | 0             | 0                   | 0             | 0                  | 0              | 0                    | root                          | root                      | root                            | root                      | root                           | root                             |

Hub Time: Mon, 11/20/2006 02:04 PM Server Available Process User Information - DEPTF72A - SYSADMIN

# Process User Workspace

## ■ Process User Workspace

- ▶ This workspace displays process owners of your monitored Linux system and details their usage

## ■ Description

- ▶ The identifier associated with the process.
- ▶ The identifier of the effective user.
- ▶ The identifier of the saved user.
- ▶ The identifier of the file system user.
- ▶ The identifier of the real group.
- ▶ The identifier of the effective group.
- ▶ The identifier of the saved group.
- ▶ The identifier of the file system group.
- ▶ The name of the effective user.
- ▶ The name of the saved user.
- ▶ The name of the file system user.
- ▶ The name of the real group.
- ▶ The effective group name.
- ▶ The name of the file system group.
- ▶ The name of the saved group.

# System Information

System Information - PHKMSM - SYSADMIN \*ADMIN MODE\*

View: Physical

- Enterprise
  - Linux Systems
    - vmlnx10
      - Linux OS
        - Capacity Usage Information
        - Disk Usage
        - File Information
        - Network
        - Process
        - System Information
        - Users
      - z/VM Linux Systems
        - vmlnx11

### System Load

| System Load                 | Value  |
|-----------------------------|--------|
| System Load Last 1 Minute   | ~0.001 |
| System Load Last 5 Minutes  | ~0.010 |
| System Load Last 15 Minutes | ~0.010 |

### Paging Rates

| Paging Rate              | Value |
|--------------------------|-------|
| Pages paged in per sec   | ~12   |
| Pages paged out per sec  | ~5    |
| Pages Swapped In         | ~0.5  |
| Pages Swapped in per sec | ~0.5  |

### CPU Usage

| CPU Usage               | Value |
|-------------------------|-------|
| User CPU (Percent)      | ~5    |
| User Nice CPU (Percent) | ~0    |
| System CPU (Percent)    | ~95   |
| Idle CPU (Percent)      | ~95   |

### System Statistics

| Context Switches per second | Percent Change Context Switches per second | Processes created per second | Percent Change Processes Created | Number of User Logins | System Load |
|-----------------------------|--|------------------------------|----------------------------------|-----------------------|-------------|
| 44                          | 528.57                                     | 0                            | 0.00                             | 3                     | 0.00        |

### Virtual Memory Statistics

| Virtual Memory Stat | Value (MB) |
|---------------------|------------|
| Swap Space Used     | ~5         |
| Swap Space Free     | ~210       |
| Memory Used         | ~220       |
| Memory Free         | ~20        |
| Shared Memory       | ~5         |
| Memory in Buffers   | ~60        |
| Memory Cached       | ~50        |

Hub Time: Thu, 07/13/2006 09:38 AM    Server Available    System Information - PHKMSM - SYSADMIN \*ADMIN MODE\*

Start    SQLLIB    Windows Task Manager    Manage Tivoli Enterpri...    Command Prompt (2)    Session A - [24 x 80]    9:38 AM

System Informatio...    Document1 - Microsoft...

# System Information Workspace

## ■ System Information Workspace

- ▶ This workspace displays data associated with CPU usage, system loads, and process creation

## ■ Description

- ▶ The number of context switches per second.
- ▶ The percentage change in the number of context switches per second.
- ▶ The number of processes created per second.
- ▶ The percentage change in the number of processes per second.
- ▶ The current number of users logged in.
- ▶ The load on the system for the last minute.
- ▶ The load on the system for the last five minutes.
- ▶ The load on the system for the last fifteen minutes.
- ▶ The system uptime in number of seconds.
- ▶ The total number of pages paged in.
- ▶ The total number of pages paged in per second.
- ▶ The total number of pages paged out.
- ▶ The total number of pages paged out per second.
- ▶ The total number of pages swapped in.
- ▶ The total number of pages swapped in per second.
- ▶ The total number of pages swapped out.
- ▶ The total number of pages swapped out per second.
- ▶ The total number of pages faults per second (both major and minor).
- ▶ The total number of major faults per second.

# Virtual Memory Statistics

Virtual Memory Statistics - DEPTF72A - SYSADMIN

File Edit View Help

View: Physical

- TCPIP
- Workload
- Windows Systems
  - GDLVICOM
    - Linux OS
      - Capacity Usage Information
      - Disk Usage
      - File Information
      - Network
      - Process
      - System Information
      - Users
- z/VM Linux Systems
- CP Owned Devices(Paging Spo...

Context Switches Percent Change: -48.60

Context Switches Per Second: 2337

| Total Swap Space(MB) | Swap Space Used(MB) | Swap Space Free(MB) | Total Memory(MB) | Memory Used(MB) | Memory Free(MB) | Shared Memory(MB) |
|----------------------|---------------------|---------------------|------------------|-----------------|-----------------|-------------------|
| 0.00                 | 0.00                | 0.00                | 243.35           | 75.22           | 168.13          | 0.00              |

Virtual Memory Statistics

Hub Time: Mon, 11/20/2006 02:05 PM

Server Available

Virtual Memory Statistics - DEPTF72A - SYSADMIN

# Virtual Memory Workspace

- **Virtual Memory Workspace**

- ▶ This workspace displays data associated with memory usage.

- **Description**

- ▶ The total size (in megabytes) of swap space.
- ▶ The size (in megabytes) of swap space used.
- ▶ The size (in megabytes) of swap space free.
- ▶ The total size (in megabytes) of physical memory.
- ▶ The size (in megabytes) of physical memory used.
- ▶ The size (in megabytes) of physical memory free.
- ▶ The size (in megabytes) of physical memory shared.
- ▶ The size (in megabytes) of physical memory in buffers.
- ▶ The size (in megabytes) of physical memory cached.



# Disk I/O Rate

Disk IO Rate - DEPTF72A - SYSADMIN
[Close] [Maximize] [Refresh]

File Edit View Help

View: Physical

- TCPIP
- Workload
- Windows Systems
  - GDLVICOM
  - Linux OS
    - Capacity Usage Information
    - Disk Usage
    - File Information
    - Network
    - Process
    - System Information
    - Users
- z/VM Linux Systems
- CP Owned Devices(Paging Spo...

Disk IO Rate

| Device | Transfers per sec | Block Reads per sec | Blocks Written per sec |
|--------|-------------------|---------------------|------------------------|
| dasda  | 90.38             | 172.86              | 2696.95                |
| dasda1 | 308.57            | 172.86              | 2450.11                |
| dasdb  | 0.00              | 0.00                | 0.00                   |
| dasdb1 | 0.00              | 0.00                | 0.00                   |

Disk IO Rate

| Device Name | Transfers per sec | Block Reads per sec | Blocks Written per sec | Blocks Read | Blocks Written | Device Major Number | Device Minor Number |
|-------------|-------------------|---------------------|------------------------|-------------|----------------|---------------------|---------------------|
| dasda       | 90.38             | 172.86              | 2696.95                | 11526128    | 23505632       | 94                  |                     |
| dasda1      | 308.57            | 172.86              | 2450.11                | 11526072    | 23559888       | 94                  |                     |
| dasdb       | 0.00              | 0.00                | 0.00                   | 6180056     | 16833112       | 94                  |                     |
| dasdb1      | 0.00              | 0.00                | 0.00                   | 6180008     | 16833112       | 94                  |                     |

Disk Space Usage

| Path     | Space Used (MBytes) | Space Available (MBytes) |
|----------|---------------------|--------------------------|
| /        | ~2100               | ~300                     |
| /proc    | 0                   | 0                        |
| /sys     | 0                   | 0                        |
| /dev/shm | 0                   | ~100                     |
| /tivoli  | ~1800               | ~500                     |

Hub Time: Mon, 11/20/2006 02:05 PM    Server Available    Disk IO Rate - DEPTF72A - SYSADMIN

# Disk I/O Rate Workspace

## ■ Disk I/O Rate Workspace

- ▶ This workspace displays input/output statistics, including the transfer rates, block read rates, and block write rates

## ■ Description

- ▶ The name of the device as it appears under the dev subdirectory.
- ▶ The number of transfers per second that were issued to the device.
- ▶ The amount of data read from the drive expressed in a number of blocks per second.
- ▶ The amount of data written to the drive expressed in a number of blocks per second.
- ▶ The total number of blocks read.
- ▶ The total number of blocks written.
- ▶ The major number of the device.
- ▶ The distinctive minor number for device.



# Disk I/O Extended Rate

Disk IO Extended Rate - DEPTF72A - SYSADMIN

File Edit View Help

View: Physical

- TCPIP
- Workload
- Windows Systems
  - GDLVICOM
    - Linux OS
      - Capacity Usage Information
      - Disk Usage
      - File Information
      - Network
      - Process
      - System Information
      - Users
- z/VM Linux Systems
- CP Owned Devices(Paging Spo...

Physical

Disk Service Time

| Device | Average Service time (ms) |
|--------|---------------------------|
| dasda  | 1.11                      |
| dasdb  | 0.00                      |

Disk Activity

| Device | Read Sectors per sec | Write Sectors per sec |
|--------|----------------------|-----------------------|
| dasda  | 0.03                 | 221.27                |
| dasdb  | 0.00                 | 0.00                  |

| Device Name | Read reqs merged per sec | Write reqs merged per sec | Read reqs per sec | Write reqs per sec | Read Sectors per sec | Write Sectors per sec | Average Request Size (Sectors) | Average Request Queue Length | Average Wait Time (ms) | Average Service time (ms) | Percent CPU time used |
|-------------|--------------------------|---------------------------|-------------------|--------------------|----------------------|-----------------------|--------------------------------|------------------------------|------------------------|---------------------------|-----------------------|
| dasda       | 0.03                     | 221.27                    | 2.27              | 88.07              | 172.86               | 2696.68               | 31.75                          | 74836.47                     | 856.18                 | 1.11                      | 0.10                  |
| dasdb       | 0.00                     | 0.00                      | 0.00              | 0.00               | 0.00                 | 0.00                  | 0.00                           | 0.00                         | 0.00                   | 0.00                      | 0.00                  |

Hub Time: Mon, 11/20/2006 02:06 PM    Server Available    Disk IO Extended Rate - DEPTF72A - SYSADMIN

# Disk I/O Extended Rate Workspace

## ■ Disk I/O Extended Rate Workspace

- ▶ This workspace displays input/output statistics and calculations

## ■ Description

- ▶ The name of the device as it appears under the dev subdirectory.
- ▶ The number of read requests merged, per second, that were issued to the device.
- ▶ The number of write requests merged that were issued, per second, to the device.
- ▶ The number of read requests that were issued, per second, to the device.
- ▶ The number of write requests that were issued, per second, to the device.
- ▶ The number of sectors read, per second, from the device.
- ▶ The number of sectors written to the device, per second.
- ▶ The average size (in sectors) of the requests that were issued to the device.
- ▶ The average queue length of the requests that were issued to the device.
- ▶ The average time (in milliseconds) for I/O requests issued to the device to be served.
- ▶ The average service time (in milliseconds) for I/O requests that were issued to the device.
- ▶ Percentage of CPU time during which I/O requests were issued to the device.

# System Configuration

System Configuration - DEPTF72A - SYSADMIN

File Edit View Help

View: Physical

CPU Usage

Processor Configuration Information

| Processor ID | Processor Cache Size (Kb) | Processor Clock Speed (MHz) | Processor Family Number | Processor Model Number | Processor Model Name | Processor Vendor ID |
|--------------|---------------------------|-----------------------------|-------------------------|------------------------|----------------------|---------------------|
| 75           | 52                        | 72.000                      | 18                      | 86                     | strval               | strval              |

OS Version Information

| System Name | gcc version | OS Name | OS Vendor Information | OS Version        |
|-------------|-------------|---------|-----------------------|-------------------|
| GDLVICOM:LZ | 3.3.3       | Linux   | SuSE Linux            | 2.6.5-7.232-s390x |

Hub Time: Mon, 11/20/2006 02:06 PM Server Available System Configuration - DEPTF72A - SYSADMIN

# System Configuration Workspace

- **System Configuration Workspace**

- ▶ This workspace displays information about CPU usage, the processor's configuration, and operating system level

- **Description**

- ▶ The identification number of the processor.
- ▶ The size of the processor cache in kilobytes.
- ▶ The speed of the processor clock in megahertz.
- ▶ The family number of the processor.
- ▶ The model number of the processor.
- ▶ The model name of the processor.
- ▶ The identification of the processor's vendor or manufacturer.
- ▶ The name of the host system.
- ▶ The version of the GNU Compiler Collection (GCC) used to compile the kernel.
- ▶ The name of the operating system.
- ▶ The name of the operating system's vendor or manufacturer.
- ▶ The version of the operating system.

# Users

Users - PHKMSM - SYSADMIN \*ADMIN MODE\*

File Edit View Help

View: Physical

Enterprise

- Linux Systems
  - vmlnx10
    - Linux OS
      - Capacity Usage Information
      - Disk Usage
      - File Information
      - Network
      - Process
      - System Information
      - Users**
  - z/VM Linux Systems
    - vmlnx11

Physical

Process User Information

| Process ID | Effective User ID | Saved User ID | File System User ID | Real Group ID | Effective Group ID | Saved Group ID | File System Group ID | Real User name (Unicode) | Effective User name (Unicode) | Saved User name (Unicode) |
|------------|-------------------|---------------|---------------------|---------------|--------------------|----------------|----------------------|--------------------------|-------------------------------|---------------------------|
| 1          | 0                 | 0             | 0                   | 0             | 0                  | 0              | 0                    | root                     | root                          | root                      |
| 2          | 0                 | 0             | 0                   | 0             | 0                  | 0              | 0                    | root                     | root                          | root                      |
| 3          | 0                 | 0             | 0                   | 0             | 0                  | 0              | 0                    | root                     | root                          | root                      |
| 4          | 0                 | 0             | 0                   | 0             | 0                  | 0              | 0                    | root                     | root                          | root                      |
| 5          | 0                 | 0             | 0                   | 0             | 0                  | 0              | 0                    | root                     | root                          | root                      |
| 6          | 0                 | 0             | 0                   | 0             | 0                  | 0              | 0                    | root                     | root                          | root                      |
| 7          | 0                 | 0             | 0                   | 0             | 0                  | 0              | 0                    | root                     | root                          | root                      |
| 8          | 0                 | 0             | 0                   | 0             | 0                  | 0              | 0                    | root                     | root                          | root                      |
| 10         | 0                 | 0             | 0                   | 0             | 0                  | 0              | 0                    | root                     | root                          | root                      |
| 11         | 0                 | 0             | 0                   | 0             | 0                  | 0              | 0                    | root                     | root                          | root                      |
| 12         | 0                 | 0             | 0                   | 0             | 0                  | 0              | 0                    | root                     | root                          | root                      |
| 14         | 0                 | 0             | 0                   | 0             | 0                  | 0              | 0                    | root                     | root                          | root                      |
| 13         | 0                 | 0             | 0                   | 0             | 0                  | 0              | 0                    | root                     | root                          | root                      |
| 12         | 0                 | 0             | 0                   | 0             | 0                  | 0              | 0                    | root                     | root                          | root                      |

User Login Information

| User Name (Unicode) | User Login PID | Line  | Login Time        | Idle Time | Hostname(From)         |
|---------------------|----------------|-------|-------------------|-----------|------------------------|
| bmadd               | 2946           | pts/0 | 06/26/06 10:33:36 | 06:23:54  | linux3.raleigh.ibm.com |
| candle              | 5828           | pts/1 | 07/12/06 10:18:42 | 00:19:11  | phkmsm.raleigh.ibm.com |
| candle              | 29332          | pts/2 | 06/30/06 11:10:14 | 00:00:24  | phkmsm.raleigh.ibm.com |

Total User Logins

Hub Time: Thu, 07/13/2006 09:39 AM

Server Available

Users - PHKMSM - SYSADMIN \*ADMIN MODE\*

Start

SQLLIB

Windows Task Manager

Manage Tivoli Enterpri...

Command Prompt (2)

Session A - [24 x 80]

9:39 AM

Users - PHKMSM - ...

Document1 - Microsoft...