



Tivoli Monitoring

# z/VM and Linux Performance Management

## *New Product Overview*

**Tivoli** software

**ON** DEMAND BUSINESS™

## z/VM Workspaces

- **z/VM Linux Default Workspace**
- **PAGING and SPOOLING Utilization**
- **DASD**
- **LPAR Utilization**
- **NETWORK Utilization (Hiper Socket and Virtual Switch)**
- **REAL STORAGE Utilization**
- **TCPIP Utilization – Server**
- **TCPIP Utilization - Users**
- **SYSTEM Utilization**
- **System Terminal Workspace**
- **Workload (z/VM User ID) Activity**
- **Linux Workload Workspace**
- **AppIData Workspace**



# z/VM Linux Default Workspace

The screenshot displays the z/VM Linux Systems management console. The main window shows a tree view of the system hierarchy, including Linux Systems, Linux OS, and z/VM Linux Systems. The z/VM Linux Systems window is active, showing a list of collectors and their status.

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

The Situation Event Console window shows two events:

Status	Situation Name	Display Item	Source
Open	ZVM_Avail_Mean2G_Low		vmInx10.tivlab.raleigh
Open	ZVM_LPAR_Busy_Critical		vmInx10.tivlab.raleigh

Three monitoring charts are visible:

- DASD Activity:** A horizontal bar chart showing Percent Busy for various DASD devices. The y-axis lists device IDs: 5692, 3211, 1621, 2619. The x-axis represents Percent Busy from 0 to 100.
- z/VM User CPU Utilization:** A horizontal bar chart showing CPU utilization for users PERFKIT and VMLNX3. The legend includes CP % of CPU (blue), CPU Percent (green), and Virtual CPU % (red).
- z/VM User Working Set and Storage:** A horizontal bar chart showing Resident Pages (blue), Resident Pages 2G (green), and Working Set Size (red) for users OPER1, VMLNX41, and VMLNX1. The x-axis represents Working Set Size from 0 to 60000.

The taskbar at the bottom shows the system time as Wed, 06/21/2006 09:47 AM and the server status as Available. The taskbar includes icons for Start, Windows Task Manager, CNPS, Manage Tivoli Enterprise, and several open applications.

# PAGING and SPOOLING Utilization

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

View: Physical

Enterprise

- Linux Systems
  - vmrlnx10
    - 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	Device 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.
  
- **Policies provide advanced automation processes**
- **Historical data option to show previous information**



# 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

System ID	Percent Busy
VMSY06	100
VMSY44	65
VMSY12	55
VMSY34	45
VMSY02	35

Top 5 I/O Rate

System ID	Number of Start I/Os
VMSY11	1250
VMSY06	1150
VMSY12	700
VMSY02	400
VMSY01	250

Top 5 Service Time for DASD I/O

Top 5 I/O Queue Depth

System ID	Average Queued I/O
VMSY02	45
VMSY06	45
VMSY44	45
VMSY12	35
VMSY11	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 (IO 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 - PHKMSM - SYSADMIN \*ADMIN MODE\*

File Edit View Help

View: Physical

Enterprise

- Linux Systems
  - vmnx10
    - Linux OS
      - zVM Linux Systems
        - CP-Owned\_Devices(Page\_Spool)
        - DASD
        - LPAR**
        - Network
        - Real\_Storage
        - System
        - TCPIP
        - Workload
      - vmnx11

Physical

LPAR Busy

LPAR Name	LPAR Busy (%)	Physical CPU Busy (%)
TEST	18	33
VM1	33	12
MVS1	12	4
MVS2	4	0
LINUXST	0	23
VSE1	23	18
VM2	18	16
MVS2	16	0

LPAR Load

LPAR Name	LPAR Load (%)
TEST	50
VM1	45
MVS1	60
MVS2	15
LINUXST	35
VSE1	10
VM2	1000
MVS2	5

LPAR Weight

LPAR Name	LPAR Weight (average)
TEST	5
VM1	5
MVS1	5
MVS2	45
LINUXST	55
VSE1	15
VM2	45
MVS2	15

Partition Suspension

LPAR Name	LPAR Suspended Time (%)
TEST	7
VM1	4.5
MVS1	5.5
MVS2	4.5
LINUXST	3.5
VSE1	1.5
VM2	1.5
MVS2	3

LPAR Utilization

Time	System ID	LPAR Number	LPAR Name	LPAR Busy
06/21/06 09:49:40	WLAVMXA	1	TEST	18
06/21/06 09:49:40	WLAVMXA	2	VM1	33
06/21/06 09:49:40	WLAVMXA	3	MVS1	12
06/21/06 09:49:40	WLAVMXA	4	MVS2	4
06/21/06 09:49:40	WLAVMXA	5	LINUXST	0
06/21/06 09:49:40	WLAVMXA	6	VSE1	23
06/21/06 09:49:40	WLAVMXA	7	VM2	18
06/21/06 09:49:40	WLAVMXA	8	MVS2	16

Hub Time: Wed, 06/21/2006 09:48 AM    Server Available    LPAR - PHKMSM - SYSADMIN \*ADMIN MODE\*

Start    Windows Task Manager    CNPS    Manage Tivoli Enterprise ...    9:48 AM

LPAR - PHKMSM - SYS...    Document1 - Microsoft W...



# 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.
  - ▶ 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.

# NETWORK Utilization (Hipersockets and Virtual Switch)

The screenshot displays the Tivoli Enterprise Performance Center (TEPC) interface for monitoring network utilization. The left pane shows a tree view of the system hierarchy, including Enterprise, Linux Systems, and z/VM Linux Systems, with 'Network' selected under the 'z/VM Linux Systems' node.

The main area contains several performance charts and tables:

- Hipersockets Messages Transferred:** A bar chart showing 'Transferred Total Messages' (blue bar, ~10.5) and 'Transferred LPAR Messages' (green bar, ~4.5) in packets per second.
- Hipersockets Failed Send Messages:** A bar chart showing 'Failed LPAR No Buffer' (yellow bar, ~0.8), 'Failed LPAR Other' (blue bar, ~0.1), and 'Failed Total No Buffer' (red bar, ~0.7) in packets per second.
- Virtual Switch Traffic (Bytes):** A bar chart showing 'Transmit Bytes' (green bar, ~6.0) and 'Receive Bytes' (blue bar, ~6.5) in bytes per second.
- Virtual Switch Traffic (Packets):** A bar chart showing 'Receive Packets' (yellow bar, ~0.8), 'Receive Packets Discard' (blue bar, ~0.1), 'Transmit Packets' (red bar, ~0.8), and 'Transmit Packets Discard' (cyan bar, ~4.0) in packets per second.
- Hipersockets Utilization Table:**

Time	System ID	LPAR Name	Channel Path	Shar Indic:
06/21/06 09:49:40	WLAVMXA	LPAR001	2619	YES
- Virtual Switch Utilization Table:**

Time	System ID	LPAR Name	Real Device Address	User
06/21/06 09:49:40	WLAVMXA	LPAR001	2619	candl

The bottom status bar shows the system time as 'Wed, 06/21/2006 09:51 AM' and the server status as 'Server Available'. The taskbar at the bottom includes the Start button, Windows Task Manager, and several open applications.

# 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)

## ■ 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 ).

# REAL STORAGE Utilization

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

View: Physical

Enterprise

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

Physical

Number of Frames

Number of Frames > 2GB

Free Stor Used

Deferred Pages

Available Frames Mean

Available Frames Mean > 2GB

Available Pages Low Thresh

Available Pages Low Thresh > 2GB

System Page Rate

Page Rate

123.00

System Resource Utilization

Pot Page Space In Use

Pot Spool Space In Use

Pot TDisk Space In Use

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 Use
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\*

Windows Task Manager

CNPS

Manage Tivoli Enterprise ...

Real\_Storage - PHKM...

9:49 AM

Document1 - Microsoft W...

# 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**

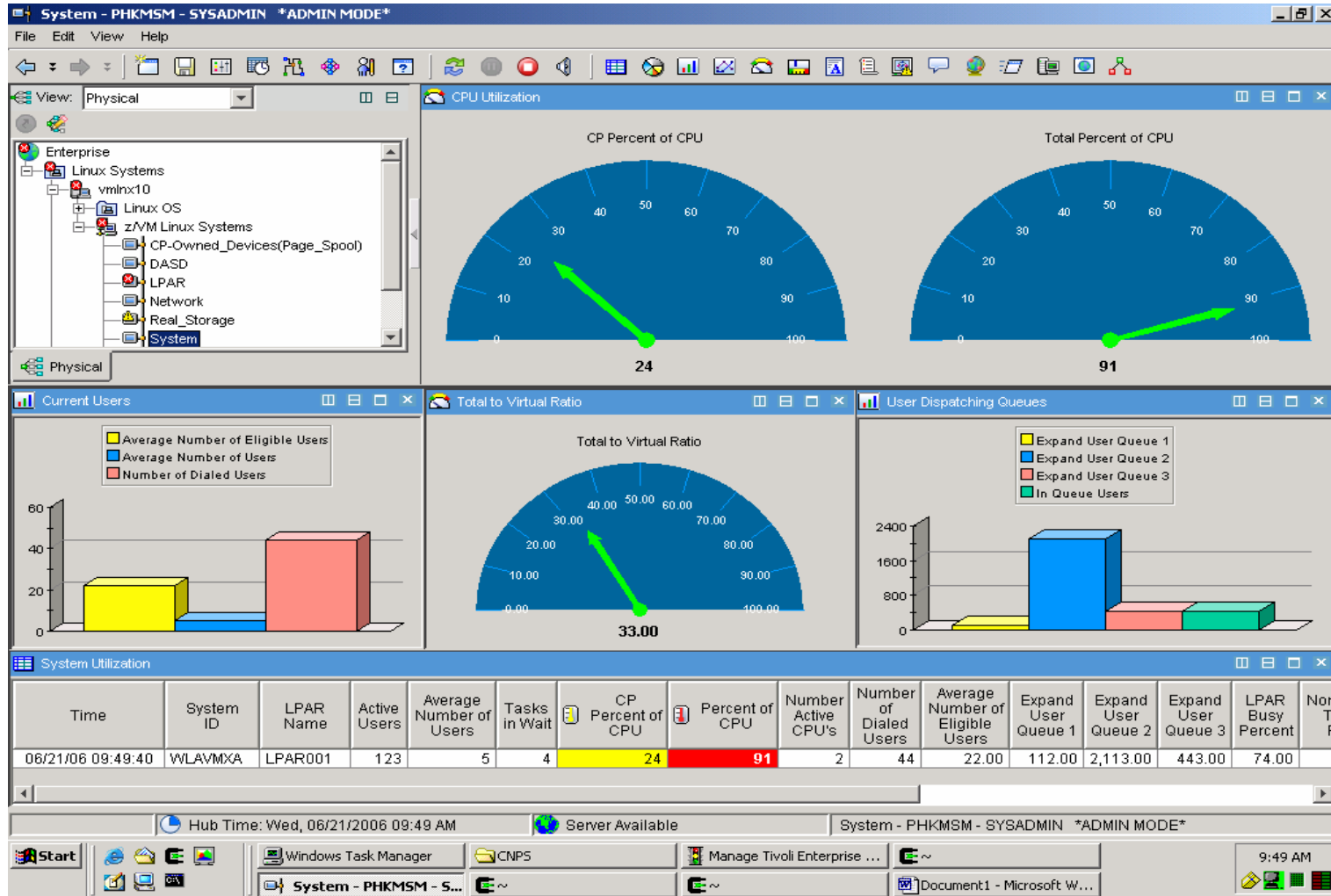
- TOD clock at start of interval (Approximately 1 second accuracy).
- SYSID of z/VM System.
- Assigned logical partition number.
- Userid or group name.
- Rate of page-ins and page-outs for this workload (in pages/sec.).

- **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 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) Server Bytes per Second TCP/IP Server Segments per Second

Enterprise

- Linux Systems
  - vmnlx10
    - Linux OS
    - z/VM Linux Systems
      - CP-Owned\_Devices(Page\_Spool)
      - DASD
      - LPAR
      - Network
      - Real\_Storage
      - System
      - TCPIP
      - Workload
  - vmnlx11

Physical

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
	AVMXA	LPAR001	Server4	43.20	10.01	21.00	
	AVMXA	LPAR001	Server5	112.00	12.00	33.00	
	AVMXA	LPAR001	Server6	302.00	21.00	42.00	
	AVMXA	LPAR001	Server7	445.60	54.00	5.00	
	AVMXA	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

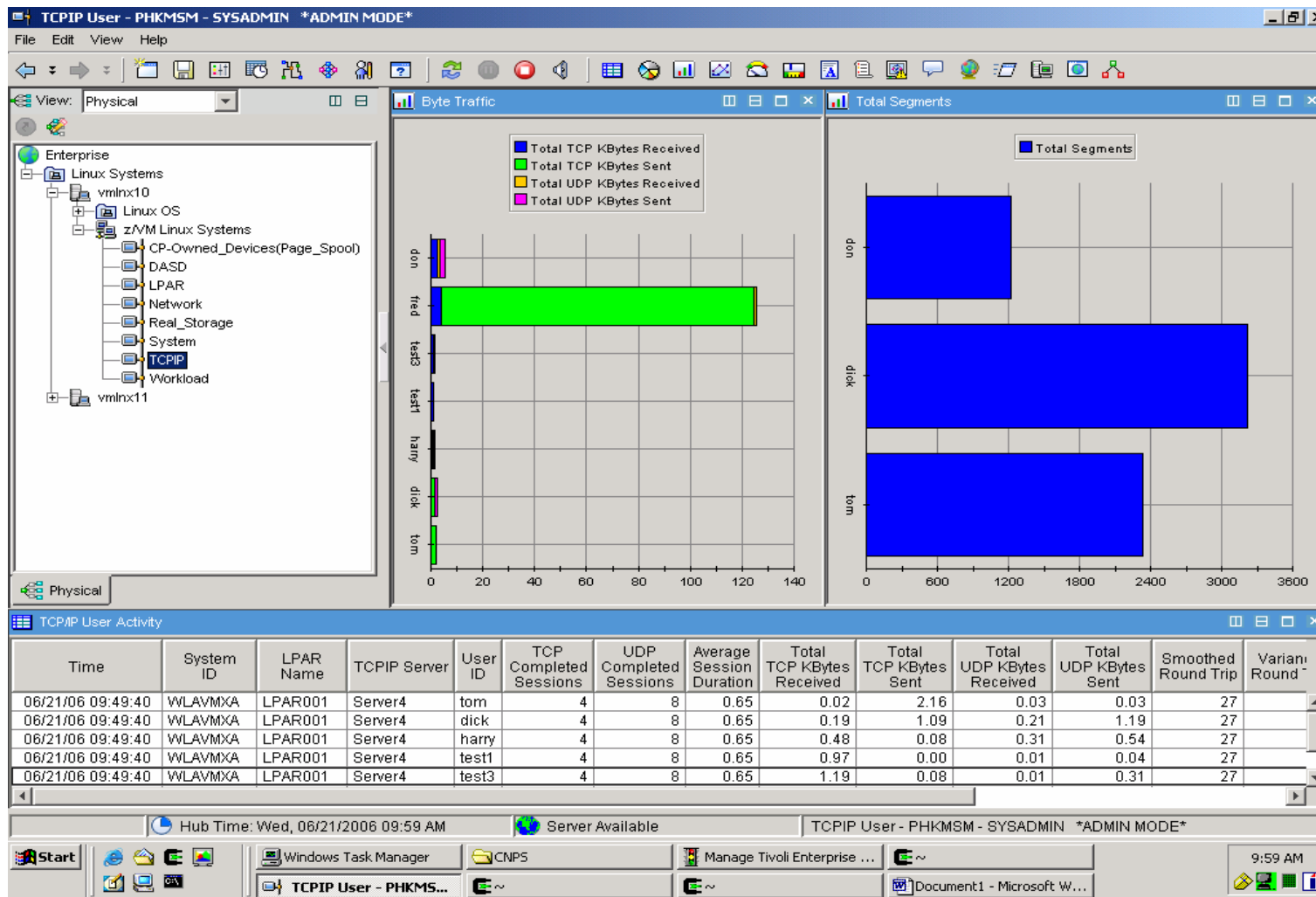
- **TCPIP Workspace**
  - ▶ This Workspace displays data about the TCPIP Servers running on the z/VM system.
  
- **TCPIP Server Activity (TCPIP Table)**
  - ▶ All attributes are collected for the current reporting interval
  
- **Description**
  - ▶ TOD clock at start of interval (Approximately 1 second 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 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

# System Terminal Workspace

The screenshot displays the System Terminal Workspace interface. At the top, a window titled "System\_Terminal - PHKOCH - SYSADMIN" contains a menu bar (File, Edit, View, Help) and a toolbar. Below this is a tree view on the left showing a hierarchy of systems under "Enterprise", including "Linux Systems", "Windows Systems", and "PHKOCH". Under "PHKOCH", there are sub-items like "Universal Agent", "Universal Data Provider", and "VMSYS1:ZVM00". The "SYSTEM" item is selected. The main terminal window shows a VMS login screen with a logo of vertical bars, the text "built on IBM Virtualization Technology", and a login prompt: "Fill in your USERID and PASSWORD (which will not appear) and press ENTER. If you are already logged on, enter LOGON userid HERE on the COMMAND line. USERID ==>".

Below the terminal window is a "Take Action" dialog box. It has a section for "Action" with a dropdown menu set to "<Select Action>" and a "Command:" text field. To the right of the command field is an "Arguments..." button. Below this is a section for "Destination System(s)" with an empty text area and a "Run" button at the bottom right.

The status bar at the bottom of the workspace shows "Ready", "Hub Time: Wed, 08/24/2005 11:05 AM", "Server Available.", and "System\_Terminal - PHKOCH - SYSADMIN".

# WORKLOAD (z/VM User ID) Activity

Workload - PHKM5M - 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

### Top 5 CPU Users

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

### Top 5 Page Rate

| User    | Page Rate |
|---------|-----------|
| PERFKIT | ~55       |
| VMLNX3  | ~45       |
| VMLNX2  | ~25       |
| VMLNX32 | ~15       |
| VMLNX4  | ~10       |

### Top 5 Paging Operations

| User    | Page Reads | Page Writes |
|---------|------------|-------------|
| VMLNX2  | ~75        | ~55         |
| VMLNX32 | ~65        | ~45         |
| VMLNX3  | ~55        | ~35         |
| VMLNX2  | ~45        | ~25         |
| PERFKIT | ~25        | ~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        | 1          | 32.00       | 231         | 231          | 32.00         | 1               | 43        | 46.00      | 23.00       | 66             | 46                   |

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

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.
  - ▶ 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:**
  - ▶ 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

The screenshot displays the 'Linux Workload - PHKMSM - SYSADMIN \*ADMIN MODE\*' application. The interface includes a tree view on the left, several performance charts, and a data table at the bottom.

**Top 5 CPU Linux Guest Systems Chart:** Shows CP % of CPU (yellow) and Virtual CPU % (blue) for VMLNX4, VMLNX3, and VMLNX2.

**Top 5 Linux Guest System Page Rate Chart:** Shows Page Rate (green) for VMLNX3, VMLNX2, VMLNX32, VMLNX41, and VMLNX44.

**Top 5 Linux Guest System Working Set Size Chart:** Shows Working Set Size (blue) for VMLNX1, VMLNX41, VMLNX31, VMLNX42, and VMLNX44.

**Linux Guest System Workloads Table:**

| Workload Group | 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 | 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  | 0.21        | 1          | 32.00       | 231         | 231          | 32.00         | 1               | 43        | 45.00      | 23.00       |        |

System tray information: Hub Time: Wed, 06/21/2006 09:56 AM; Server Available; Linux\_Workload - PHKMSM - SYSADMIN \*ADMIN MODE\* 9:56 AM.

# 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 application interface. The main window title is "AppData - PHKMSM - SYSADMIN \*ADMIN MODE\*". The interface includes a menu bar (File, Edit, View, Help), a toolbar, and a tree view on the left showing a hierarchy: Enterprise > Linux Systems > vmlnx10 > Linux OS > z/VM Linux Systems. A context menu is open over the "z/VM Linux Systems" folder, with "Link To..." selected. This menu lists several options for linking data to different workspaces, such as "AppData to Linux Process Workspace" and "AppData to Linux System Information Workspace".

Two data tables are visible in the main workspace area:

| 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          |         |

| 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 application title. The Windows taskbar at the very bottom shows the Start button, taskbar icons for Windows Task Manager, CNPS, and Tivoli Enterprise, along with the system clock showing 9:41 AM.

# AppIData Workspace

- **AppIData 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.



# AppIData 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.



# AppIData Workspace (cont)

## Linkage:

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



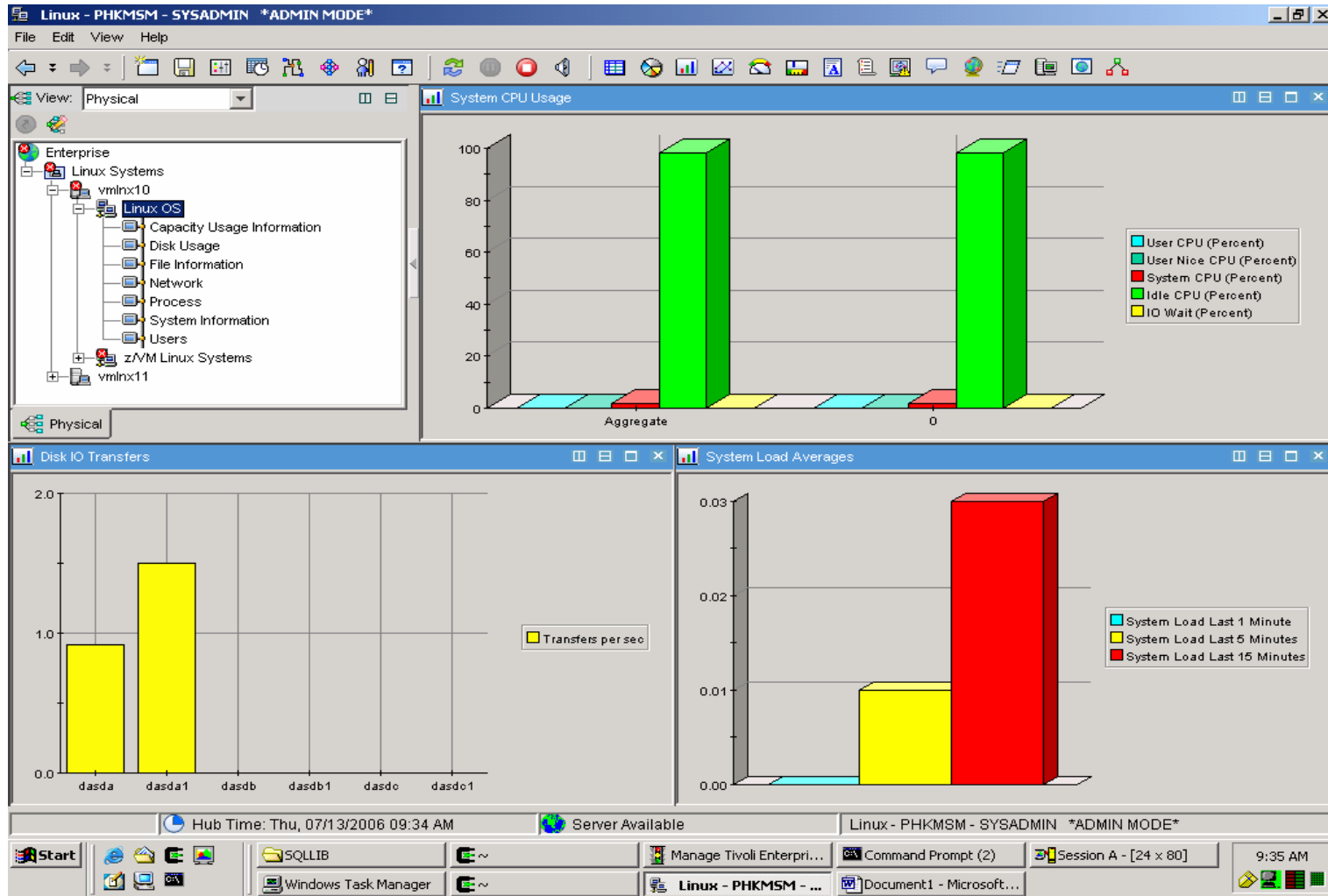
# Linux on zSeries Primary Workspaces

- **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\*

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

Disk Space Usage

Current Disk Usage

Disk Usage Averages (Hourly Updates)

Disk Usage Averages

| 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 Enter...

Capacity Usage Inf...

Command Prompt (2)

Session A - [24 x 80]

9:35 AM

Document1 - Microsoft...

# Capacity Usage Workspace

## ■ Capacity Usage Information Workspace

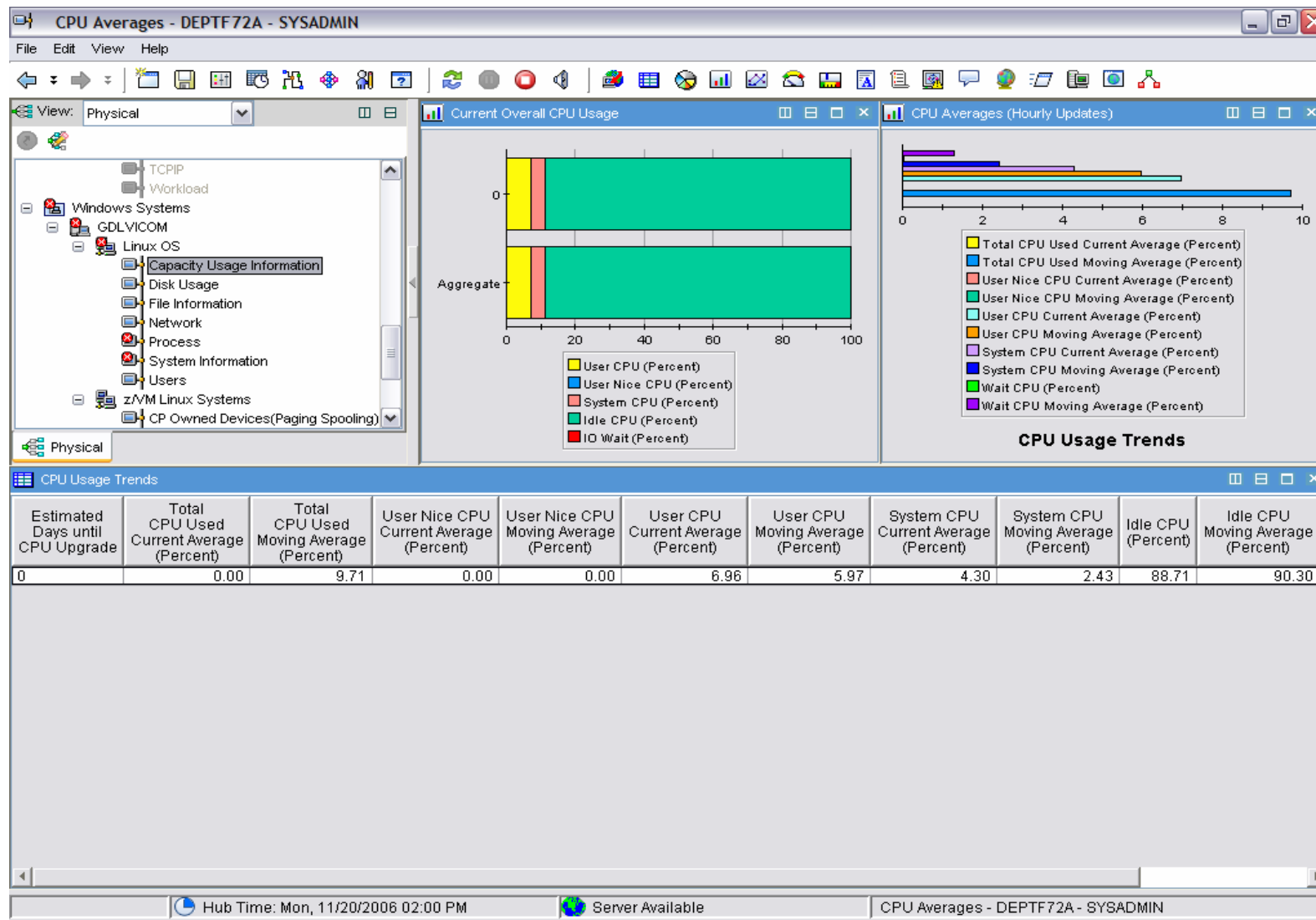
- ▶ This workspace displays the health of your system by providing CPU, disk, and swap space usage statistics.

## ■ 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 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

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 Virtual Memory Usage

Memory Usage

- Swap Space Used(MB)
- Swap Space Free(MB)
- Memory Used(MB)
- Memory Free(MB)

Virtual Memory Averages (Hourly Updates)

Virtual Memory Usage Trends

- Total Swap Space(MB) (Moving Average)
- Swap Space Used(MB) (Moving Average)
- Swap Space Used per hour (bytes per hour)
- Peak Swap Space Used(MB)

Swap Space Usage Trends

| Total Swap Space(MB) (Moving Average) | Swap Space Used(MB) (Moving Average) | Swap Space Used per hour (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

# 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\***

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

**Space Used Percent**

| Mount Point             | Disk Name | Space Used (MBytes) | Space Available (MBytes) |
|-------------------------|-----------|---------------------|--------------------------|
| /dev/mapper/pvols-lvol0 |           | ~42                 | ~22                      |
| /dev/dasda1             |           | ~36                 | ~24                      |

**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            |          |
| /dev/shm              | tmpfs              | 120           | 0                   | 120                      | 30928        |          |
| /dev/pts              | devpts             | 0             | 0                   | 0                        | 0            |          |
| /products             | /dev/mapper/pvo... | 1203          | 847                 | 356                      | 0            |          |

**Disk Space**

Hub Time: Thu, 07/13/2006 09:36 AM    Server Available

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

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

# 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 hfs, 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
  - vmnlx10
    - Linux OS
      - Capacity Usage Information
      - Disk Usage
      - File Information**
      - Network
      - Process
      - System Information
      - Users
  - z/VM Linux Systems
    - vmnlx11

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

| File Name | Size (MB) |
|-----------|-----------|
| dev       | 120.000   |
| a.out     | 13.000    |
| hogmem    | 13.000    |
| sbin      | 10.000    |
| etc       | 7.000     |
| lib64     | 3.000     |
| bin       | 3.000     |
| tivoli    | 3.000     |
| lib       | 2.000     |
| tmp       | 1.000     |

Physical

All Files

| 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 |           |

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\*

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

Network Activity

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 Enterpri...

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

| Protocol    | Sockets in use | Highest Sockets Used |
|-------------|----------------|----------------------|
| FRAG        | ~10            | ~10                  |
| RAW         | ~10            | ~10                  |
| UDP         | ~10            | ~10                  |
| TCP         | ~10            | ~10                  |
| N/A (Total) | ~240           | ~240                 |

Network Activity

| Interface | Packets Received per sec | Packets Transmitted per sec |
|-----------|--------------------------|-----------------------------|
| lo        | ~1                       | ~1                          |
| sit0      | ~1                       | ~1                          |
| eth0      | ~1                       | ~1                          |
| hsi0      | ~40                      | ~40                         |

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)

Physical

Network Errors

RPC Network Activity

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

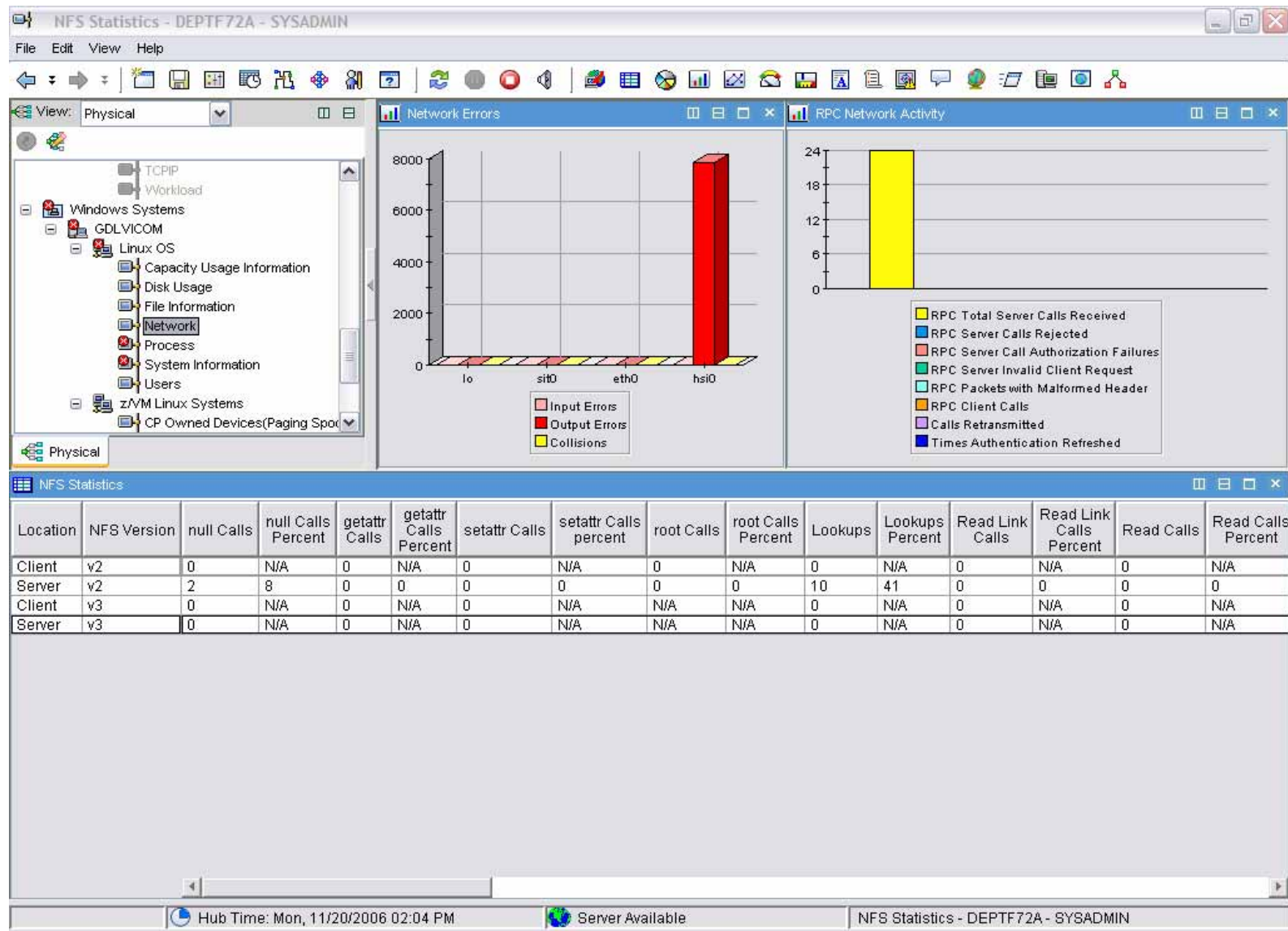
- ▶ This workspace displays statistics on the number and type of remote procedure calls being made to the server and clients

## ■ 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



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 Process Monitor interface. On the left is a tree view of the system hierarchy. The main area contains two charts: 'Process CPU Percent Usage' and 'Process + Child CPU Percent Usage'. Below the charts is a 'Process Information Detail' table.

| 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 Set Size(pages) |
|--------------------------------|------------|-------------------|---------------|------------------------------|----------------------------|---|---------------------------------------|-----------------|------------|-------------------|--------------------------|
| klzagent                       | 9064       | 1                 | Sleeping      | 0.12                         | 0.37                       | 0.00                                    | 0.00                                  | 16              | 0          | 19371             | 294                      |
| pdfflush                       | 12         | 4                 | Sleeping      | 0.06                         | 0.00                       | 0.00                                    | 0.00                                  | 15              | 0          | 0                 | 0                        |
| kswapd0                        | 13         | 1                 | Sleeping      | 0.03                         | 0.00                       | 0.00                                    | 0.00                                  | 16              | 0          | 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              | 81                       |
| pickup                         | 8756       | 2190              | Sleeping      | 0.00                         | 0.01                       | 0.00                                    | 0.00                                  | 17              | 0          | 1196              | 39                       |
| events/0                       | 4          | 1                 | Sleeping      | 0.00                         | 0.00                       | 0.00                                    | 0.00                                  | 5               | -10        | 0                 | 0                        |
| kslowcrw                       | 8          | 4                 | Sleeping      | 0.00                         | 0.00                       | 0.00                                    | 0.00                                  | 15              | -10        | 0                 | 0                        |
| init                           | 1          | 0                 | Sleeping      | 0.00                         | 0.00                       | 1.15                                    | 1.50                                  | 16              | 0          | 157               | 6                        |
| cio                            | 6          | 4                 | Sleeping      | 0.00                         | 0.00                       | 0.00                                    | 0.00                                  | 15              | -10        | 0                 | 0                        |
| cio_notify                     | 7          | 4                 | Sleeping      | 0.00                         | 0.00                       | 0.00                                    | 0.00                                  | 15              | -10        | 0                 | 0                        |
| aio/0                          | 14         | 4                 | Sleeping      | 0.00                         | 0.00                       | 0.00                                    | 0.00                                  | 15              | -10        | 0                 | 0                        |
| kblockd/0                      | 5          | 4                 | Sleeping      | 0.00                         | 0.00                       | 0.00                                    | 0.00                                  | 5               | -10        | 0                 | 0                        |
| kmcheck                        | 43         | 1                 | Sleeping      | 0.00                         | 0.00                       | 0.00                                    | 0.00                                  | 25              | 0          | 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

Physical

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

Physical

System Load

Paging Rates

CPU Usage

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

System Statistics

Virtual Memory Statistics

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

The screenshot displays the 'Virtual Memory Statistics - DEPTF72A - SYSADMIN' interface. It includes a tree view on the left, two line graphs at the top right, a table at the bottom left, and a 3D bar chart at the bottom right.

**Table: Virtual Memory Information**

| 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              |

**3D Bar Chart: Virtual Memory Statistics**

The chart shows memory usage for the system 'GDLVICOM:LZ'. The Y-axis represents memory in MB, ranging from 0 to 180. The legend includes:

- Swap Space Used(MB) (Yellow)
- Swap Space Free(MB) (Blue)
- Memory Used(MB) (Red)
- Memory Free(MB) (Green)
- Shared Memory(MB) (Cyan)
- Memory in Buffers(MB) (Orange)
- Memory Cached(MB) (Purple)

The chart shows a significant amount of Memory Free (Green) and Memory Used (Red).

**Context Switches Percent Change**

The line graph shows a sharp downward trend, indicated by a green arrow, with a value of -48.60.

**Context Switches Per Second**

The line graph shows a sharp downward trend, indicated by a green arrow, with a value of 2337.

**System Information**

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

Virtual Memory Information

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**

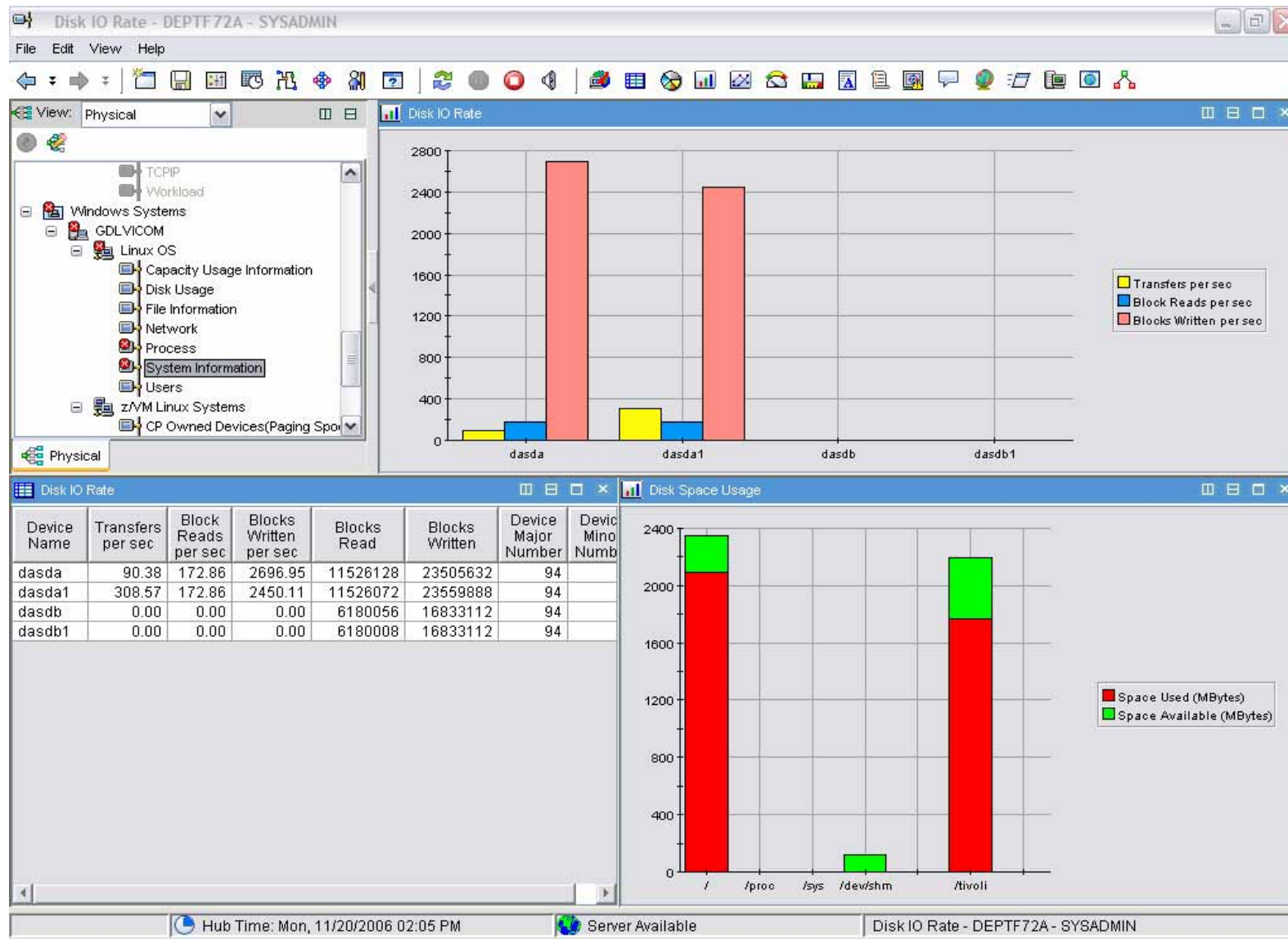
- ▶ This workspace displays data associated with memory usage.

- **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 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

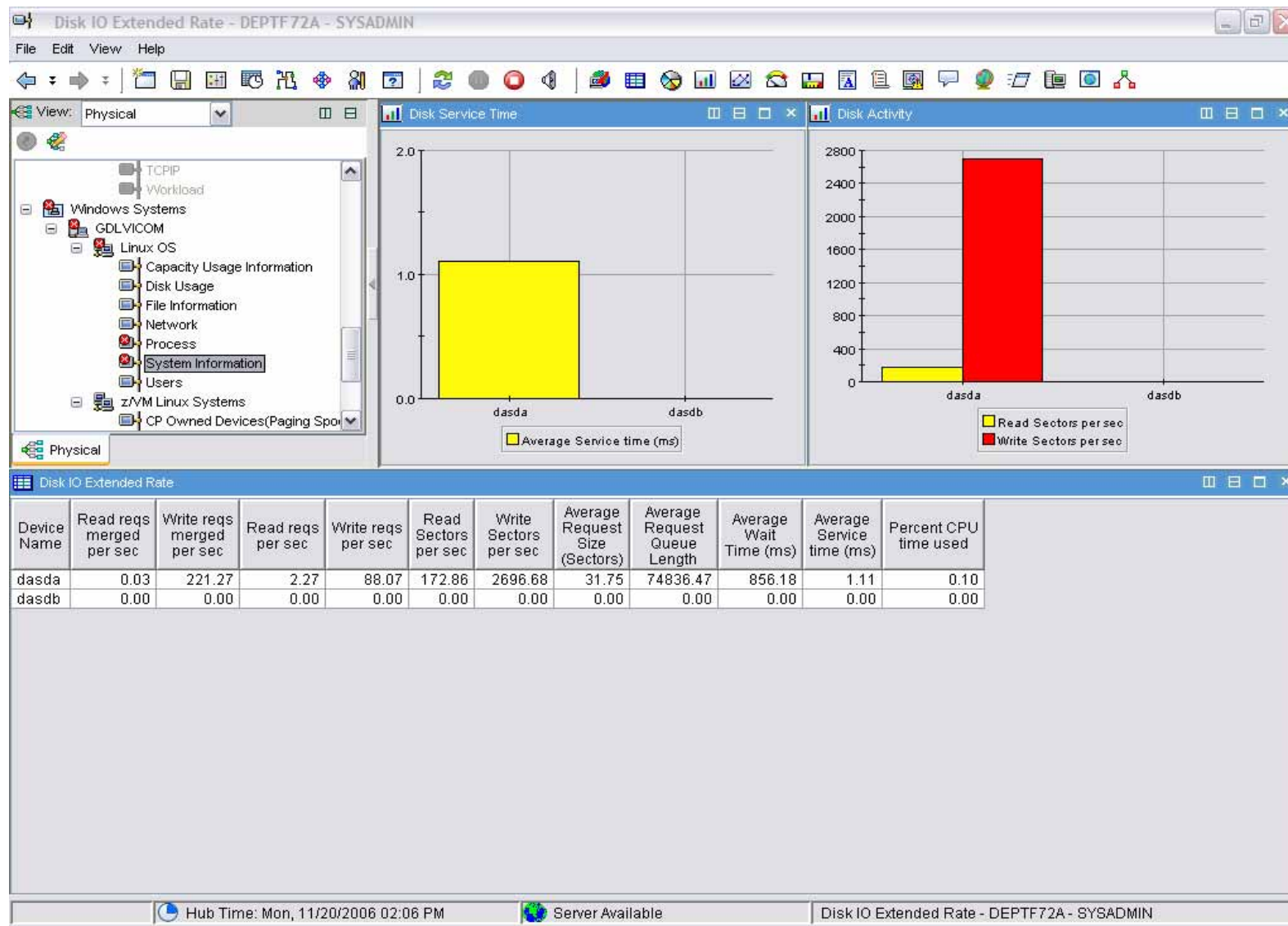
## ■ Description

- ▶ 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 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\*

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

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                      |

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...