



Session V51

New Features of the z/VM V5.3 Hypervisor

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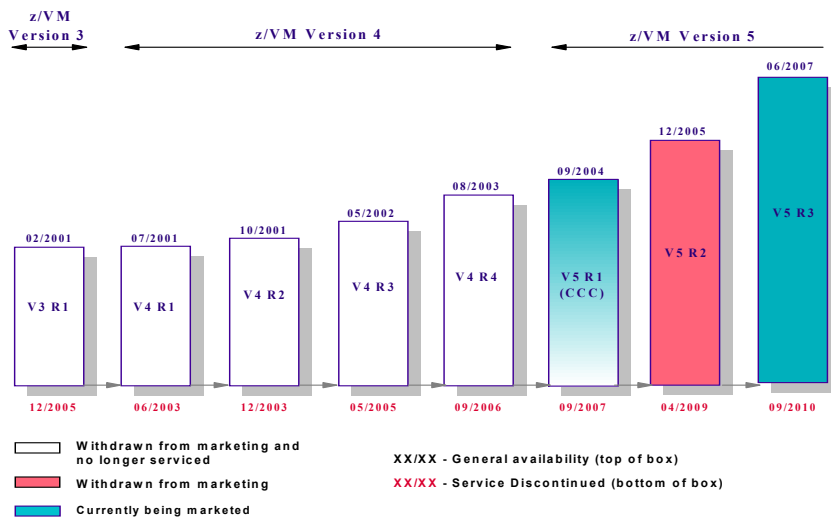
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Agenda

- Product Evolution
- z/VM 5.3 CP Enhancements Overview
- z/VM 5.3 CP Enhancements
 - ▶ Scalability and Constraint Relief
 - ▶ Virtualization
 - ▶ Security
 - ▶ Virtual Networking
 - ▶ Systems Management
 - ▶ Miscellaneous
- Statements of Direction

z/VM Evolution



z/VM 5.3 CP Enhancements Overview

- **Scalability and Constraint Relief**
 - ▶ Support 256 GB of real storage and 8 TB of virtual storage
 - ▶ Allow 32 real processors in a single z/VM image
 - ▶ Collaborative memory management
 - ▶ HyperPAV support for IBM System Storage DS8000
 - ▶ Enhanced FlashCopy support
 - ▶ SAN Volume Controller support
- **Security**
 - ▶ Enhanced system security with longer passwords
 - ▶ Tape data protection with support for encryption
- **Systems Management**
 - ▶ Enhanced guest configuration
 - ▶ Asynchronous CP command responses
 - ▶ VM event notification
 - ▶ z/VM integrated systems management
- **Virtualization**
 - ▶ Guest support for IBM System z specialty engines
 - ▶ Enhanced Virtual Switch and Guest LAN usability
 - ▶ Guest support for Modified Indirect Data Address Words (MIDAWs)
 - ▶ Guest ASCII console support
 - ▶ Enhanced SCSI support
- **Virtual Networking**
 - ▶ Improved virtual network management
 - ▶ Link aggregation
- **Miscellaneous**
 - ▶ Shutdown message time stamps
 - ▶ SYSEVENT Query Virtual Server
 - ▶ TRSOURCE for LDEVs
 - ▶ QUERY IUVCV

Scalability and Constraint Relief

- **Support 256 GB of real storage and 8 TB of virtual storage**
- **Allow 32 real processors in a single z/VM image**
- **Collaborative memory management**
- **HyperPAV support for IBM System Storage DS8000**
- **Enhanced FlashCopy support**
- **SAN Volume Controller support**

Scalability and Constraint Relief ...

- **Support 256 GB of Central Storage and 8 TB of virtual storage**
 - ▶ PGMBKs (Page Management Blocks) moved above 2G
 - Relieves constraint on total amount of virtual storage
 - ▶ Contiguous frame management improvements
- **Expanded storage limit remains at 128 GB**

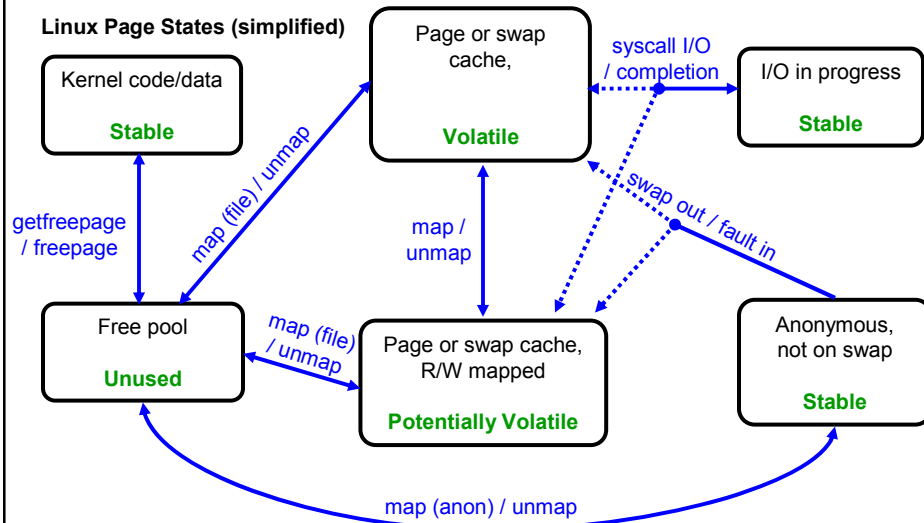
Scalability and Constraint Relief ...

- **Support 32 Processors**
 - ▶ **Actually extended to 64 processors**
 - CPU bit masks expanded
 - Scheduler lock redesigned
 - Shared/exclusive spin lock
 - Allows more concurrent scheduling activity
 - ▶ **Performance degradation observed between 36-42 processors**
 - Dependent on work load characteristics
 - ▶ **New spin locks monitor record**
 - MRSYTLCK – Formal Spin Lock Data (Sample)
 - Data for 26 spin locks
 - Extensible format

Scalability and Constraint Relief ...

- **Collaborative Memory Management (CMM)**
 - ▶ Coordinates memory state and page management between Linux and z/VM at the level of individual pages
 - ▶ Exploits Collaborative Memory Management Assist (CMMA) on System z9 EC and BC
 - New Extract and Set Storage Attributes (ESSA) instruction
 - Exploits Host Page-Management Assist (HPMA)
 - ▶ Linux exploitation under discussion with Open Source community
 - Some progress at July 2007 Ottawa Linux Summit

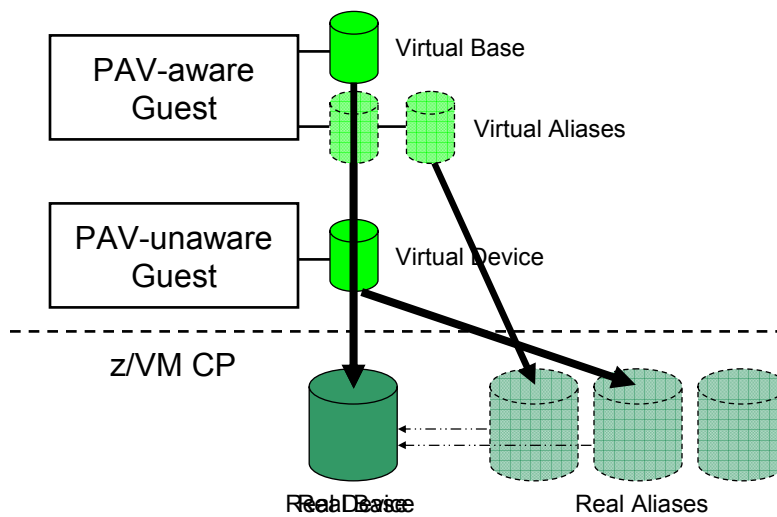
Collaborative Memory Management (CMM)



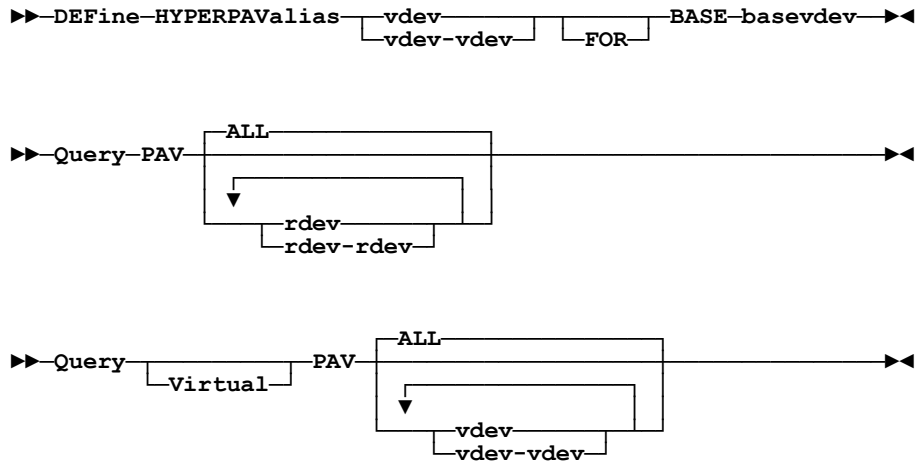
Scalability and Constraint Relief ...

- **DS8000 HyperPAV Support**
 - ▶ **Dynamic alias assignment**
 - Only for duration of I/O operation
 - Reduces number of real alias device addresses required
 - Allows better reaction to shifting bandwidth requirements
 - ▶ **Guest support for HyperPAV-aware guests (z/OS)**
 - ▶ **Host support for HyperPAV-unaware guests (everyone else)**
 - ▶ **Base and alias devices belong to one of up to 16,000 pools**
 - ▶ **Number of virtual aliases limited to**
 $\min(254, \text{aliases in base device pool})$

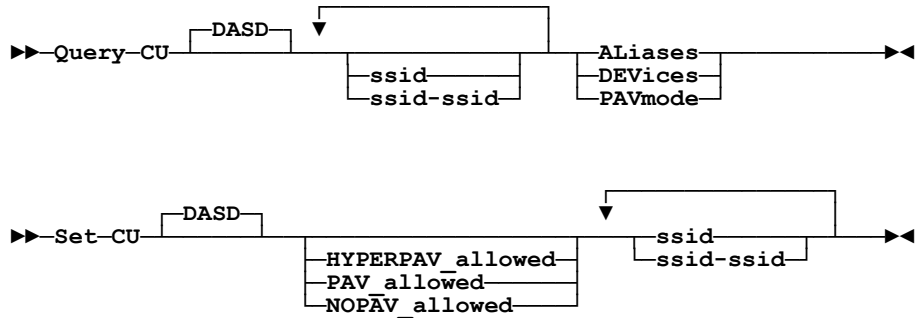
HyperPAV Support



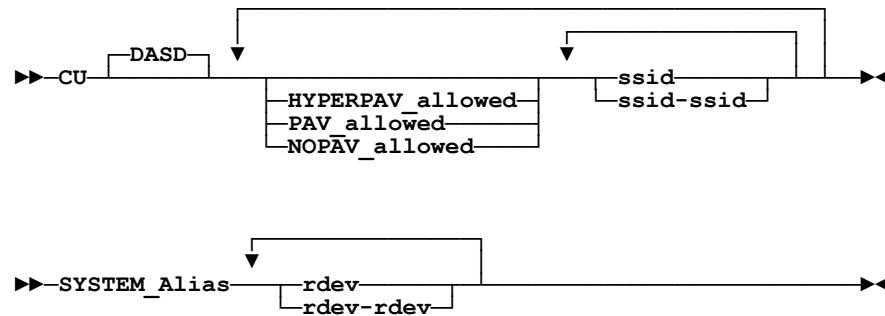
HyperPAV Support ...



HyperPAV Support ...



HyperPAV Support ...



Scalability and Constraint Relief ...

- **Enhanced FlashCopy Support**
 - ▶ **Multiple FLASHCOPY targets (up to 12)**
 - Requires FlashCopy Version 2
 - ▶ **New SYNCHRONOUS option**
 - Automatic for FlashCopy Version 2
 - Simulated for FlashCopy Version 1
 - ▶ **New QUERY VIRTUAL FLASHCOPY command**
 - ▶ **Improved error handling**
 - ▶ **CPHX can be used to terminate FLASHCOPY retry wait loop**

SAN Volume Controller Support

Supported Operating Systems:

- Novell NetWare Clustering
- VMware Win / NW guests
- Microsoft MSCS MPIO, VSS, GDS x64 **New**
- IBM AIX HACMP/XD GPFS / VIO **New**
- HP/UX 11i V2 TRU64 OpenVMS ServiceGuard Clustering **New**
- Sun Solaris 10 VCS Clustering SUN Cluster **New**
- Linux System z Intel, Power RHEL / SUSE With LVM **New**

Storage Engines:

- IBM ESS, DS, N series, Lightning, Thunder, Tagma Store, EVA MA/EMA, XP
- Hitachi Lightning, Thunder, Tagma Store, USP, NSC55
- HP EVA MA/EMA, XP
- EMC Symm, CLARiiON
- Sun FC4700, 9910/9960, 9970/9980
- NetApp FAS 3020, 3050
- STK D173, 178, 220, 240, 280, FLX210, 240, 280, 380

Connectivity: 1024 Hosts, Cisco McData Brocade, SAN with 4Gbps fabric, SAN Volume Controller, SAN Volume Controller, Continuous Copy, Metro Mirror, Global Mirror.

IBM ESS, FASiT	IBM DS4K / 6K	IBM DS8000	IBM DS4800	Hitachi Lightning	Hitachi Thunder	Hitachi Tagma Store	HP EVA	HP MA/EMA	HP XP	EMC Symm	EMC/Dell CLARiiON	Sun FC4700	Sun 9910/9960	Sun 9970/9980	NetApp FAS 3020, 3050	STK D173, 178, 220, 240, 280, FLX210, 240, 280, 380
		3700	5200	5500	9980V	9200	3000/5000	8000	48, 128	8000	FC4700	9910/9960	9970/9980			
		9970V	95xV	9520V	95xV	USP, NSC55	4000/6000	8000	512, 1024	DMX	DMX					

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SAN Volume Controller Support ...

```

▶▶-Set-EDEVICE- ... -ATTRIBUTES- 1750 ...
    | 2105
    | 2107
    | 2145
    | SCSI
  
```

Note:

- 1750 = DS6000
- 2105 = TotalStorage ESS
- 2107 = DS8000
- 2145 = SVC
- SCSI = generic

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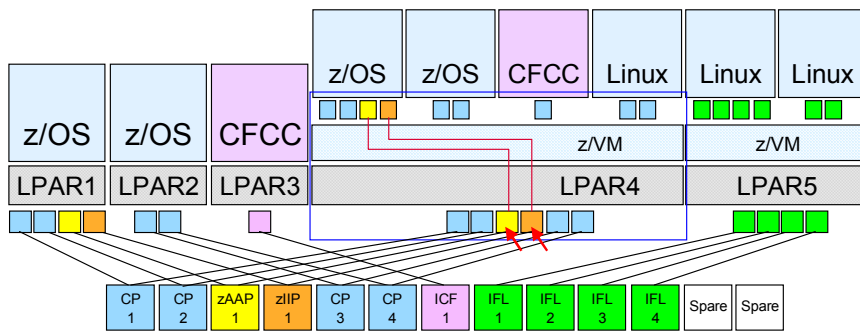
Virtualization

- Guest support for IBM System z specialty engines
- Enhanced VSWITCH and Guest LAN usability
- Guest support for Modified Indirect Data Address Words (MIDAWs)
- Guest ASCII console support
- Enhanced SCSI support

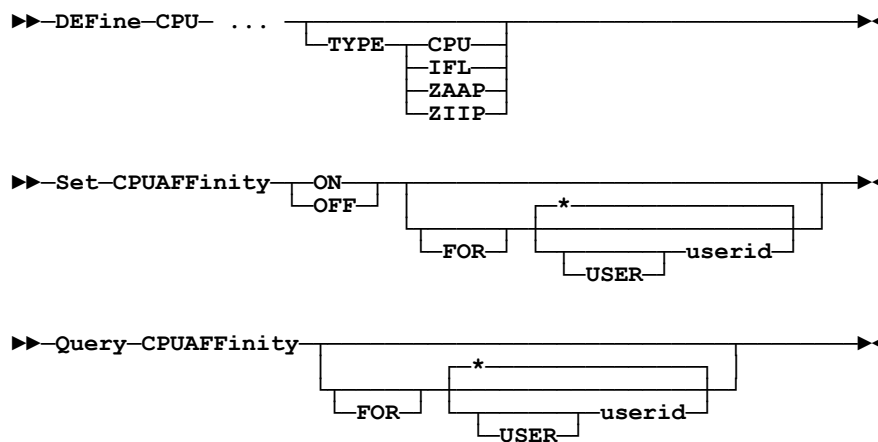
Virtualization ...

- **Guest Specialty Engine Support**
 - ▶ In ESA/390 logical partitions, virtual machines may have virtual IFLs or virtual CPs
 - Virtual machine with virtual CP(s) can have virtual zIIP(s) and zAAP(s)
 - zAAP support requires z890, z990, or System z9
 - zIIP support requires System z9
 - ▶ In Linux-only logical partitions with CPs, virtual machines may have virtual IFLs or virtual CPs
 - ▶ In Linux-only logical partitions with IFLs, virtual machines have virtual IFLs
 - ▶ Simulation support dispatches virtual IFLs, zIIPs, and zAAPs on real CPs
 - ▶ Virtualization support can dispatch them on the corresponding real engine type, if available
 - CPU affinity can be controlled
 - ▶ Primary real processor type is type of IPL processor (CP or IFL)
 - ▶ Described in new section of *Running Guest Operating Systems*

Guest Specialty Engine Support



Guest Specialty Engine Support ...



Guest Specialty Engine Support ...

- **INDICATE LOAD** shows processor type

- ▶ PROC 0000-006% CP PROC 0001-003% CP
 - PROC 0002-003% ZAAP

- **INDICATE USER EXPANDED** shows virtual processor type and affinity and resources used on real primary and real secondary processors

- ▶ CPU 00: Ctime=15 01:49:23 Vtime=0 00:06:58 Ttime=0 00:07:33
 - Rdr=22514 Prt=465884 Pch=7088 IO=353978
 - Type=CP CPUAffinity=ON
 - VtimePrimary=0 00:06:58 TtimePrimary=0 00:07:33
 - VtimeSecondary=0 00:00:00 TtimeSecondary=0 00:00:00
 - CPU 01: Ctime=0 00:00:07 Vtime=0 00:00:00 Ttime=0 00:00:00
 - Rdr=0 Prt=0 Pch=0 IO=0
 - Type=ZIIP CPUAffinity=SUPP
 - VtimePrimary=0 00:00:00 TtimePrimary=0 00:00:00
 - VtimeSecondary=0 00:00:00 TtimeSecondary=0 00:00:00

Guest Specialty Engine Support ...

- **INDICATE USER** shows virtual processor type and affinity and resources used on real primary and real secondary processors

- ▶ USERID=ROMNEY MACH=ESA STOR=128M VIRT=V XSTORE=NONE
 - IPLSYS=CMS DEVNUM=00022
 - PAGES: RES=00001646 WS=00001626 LOCKEDREAL=00000000 RESVD=00000000
 - NPREF=00000020 PREF=00000000 READS=00008061 WRITES=00011948
 - XSTORE=000284 READS=001585 WRITES=003445 MIGRATES=001249
 - CPU 00: CTIME=68:17 VTIME=002:16 TTIME=003:11 IO=001498
 - RDR=001474 PRT=000000 PCH=000000 TYPE=CP CPUAFFIN=ON
 - CPU 01: CTIME=00:00 VTIME=000:00 TTIME=000:00 IO=000000
 - RDR=000000 PRT=000000 PCH=000000 TYPE=ZIIP CPUAFFIN=SUPP

Guest Specialty Engine Support ...

- **QUERY PROCESSORS** shows real processor type
 - ▶ PROCESSOR 00 MASTER CP
 - PROCESSOR 01 ALTERNATE CP
 - PROCESSOR 02 ALTERNATE ZAAP
- **QUERY VIRTUAL CPUS** shows virtual processor type and affinity
 - ▶ CPU 00 ID FF319B9E20948000 (BASE) CP CPUAFF ON
 - CPU 01 ID FF319B9E20948000 STOPPED ZIIP CPUAFF SUPP
- **DEDICATE** and **UNDEDICATE** only allowed for virtual processor that matches primary real type
- Cannot **VARY OFF** last primary real processor
- **DEFINE CRYPTO** only allowed for virtual CP

Guest Specialty Engine Support ...

- **Accounting records**
 - ▶ Type 01 record includes virtual and real processor type code
 - May be multiple records per guest virtual CPU
 - CPU time used on primary real processor
 - CPU time used on secondary real processor
 - Accounting performed when **DEFINE CPU** command changes type
 - ▶ Type 0D record includes secondary CPU capability value

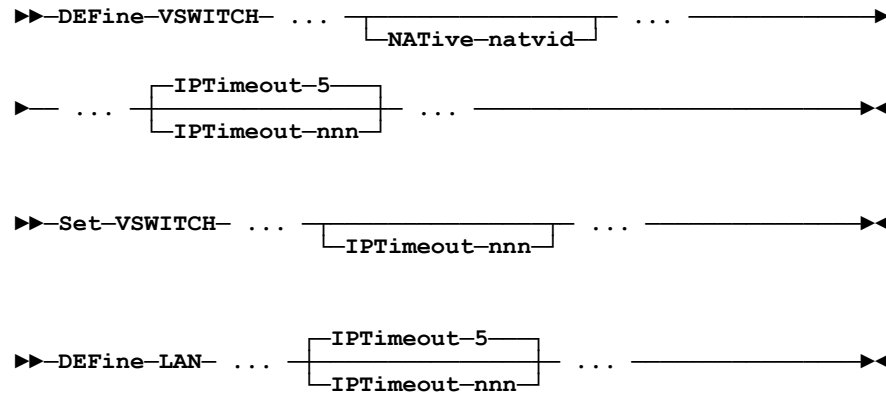
Guest Specialty Engine Support ...

- **Monitor records**
 - ▶ Real processor type added to Monitor, System, Scheduler, Storage, and Processor domain processor-specific records
 - ▶ Virtual processor type and secondary processor CPU times added to User domain Logoff, Activity, Interaction, and Transaction End records
 - ▶ Virtual processor type added to User domain DEFINE CPU and DETACH CPU records
 - ▶ New records
 - MRSYTSPT – Scheduler Activity by Processor Type (Sample)
 - MRSCLSA – SET CPUAFFINITY Changes (Event)

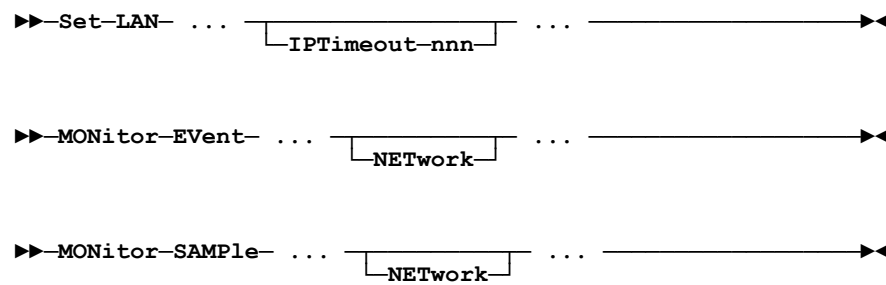
Virtualization ...

- **Guest LAN and Virtual Switch Ease-of-Use**
 - ▶ Authorized VLAN identifier set and promiscuous mode authorizations changed immediately
 - ▶ Native VLAN identifier may be configured for untagged traffic
 - ▶ IP address timeout support added for Guest LAN and IP virtual switch
 - ▶ New Virtual Network monitor domain
 - MRVNDSSES - Virtual NIC Session Activity (Sample)
 - MRVNDLSU - Virtual Network Guest Link State - Link Up (Event)
 - MRVNDLSD - Virtual Network Guest Link State - Link Down (Event)

Guest LAN/VSWITCH Ease-of-Use



Guest LAN/VSWITCH Ease-of-Use ...



Virtualization ...

- **Guest MIDAW Support**
 - ▶ **Modified IDAW – Indirect Data Address Word**
 - Can designate multiple non-contiguous data areas in storage
 - Each MIDAW includes data address, count field, and flags
 - ▶ **Allows guest to exploit new System z9 hardware capability**
 - More flexible and performance-efficient than CCW data chaining
 - Each IDAW-referenced data area must end at 2K or 4K boundary
 - (M)IDAW fetching more efficient than CCW fetching
 - ▶ **Diagnose X'210' (Retrieve Device Information) indicates if device is MIDAW-capable**

Virtualization ...

- **Guest ASCII Console Support**
 - ▶ **HMC supports integrated ASCII console**
 - Behaves like VT220
 - Enables cursor addressing
 - Provides familiar look and feel for Linux full-screen applications (e.g., vi, emacs)
 - ▶ **Can be dedicated to a (Linux or z/VM) guest**
 - Because Linux ignores errors (e.g., if console DETACHed), can switch from guest to guest at will
 - ▶ **Provides recovery mechanism when normal network access not available**

Guest ASCII Console Support

The screenshot shows the HMC Hardware Management Console Workplace (Version 1.8.2) interface. The main area displays a grid of virtual machines (VMs) under the heading 'CPC Images Work Area'. The VMs listed are:

- P0011EC1 CHUCK (ZVMCHUCK)
- P0011EC1 JOHN (JNS_VM52)
- P0011EC1 PAM (RICH_VM) - This VM is highlighted with a grey background.
- P0011EC1 RICH (RICH_VM)
- P0011EC1 STAN
- P0011EC1 TEST2
- P0011EC1 WOLFF (WOLFF510)

On the right side, there is a 'CPC Recovery' panel with various options. A black arrow points to the 'Integrated ASCII Console' option, which is highlighted with a yellow background. Other options include PSW Restart, Reset Clear, Load, Single Object Operations, Start, Stop, Reset Normal, and Help.

At the bottom of the window, there is a status bar with the text: 'Use CPC Recovery tasks to recover from CPC hardware or software errors.'

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Guest ASCII Console Support ...

The screenshot shows the 'Integrated ASCII Console for P0011EC1.PAM' window. The console displays the contents of the /etc/passwd file for the PAM user. The text shown is:

```

# Author: Florian La Roche, 1996
# Please send feedback to http://www.suse.de/feedback
#
# This is the main configuration file of /sbin/init, which
# is executed by the kernel on startup. It describes what
# scripts are used for the different run-levels.
#
# All scripts for runlevel changes are in /etc/init.d/.
#
# This file may be modified by SuSEconfig unless CHECK_INITTAB
# in /etc/suseconfig/suseconfig is set to "no"
#
# The default runlevel is defined here
id:3:initdefault:
#
# First script to be executed, if not booting in emergency (-b) mode
s1::bootwait:/etc/init.d/boot
#
# /etc/init.d/rc takes care of runlevel handling
#
# runlevel 0 is System halt (do not use this for initdefault!)
# runlevel 1 is Single user mode
test2:-

```

The background of the console window shows the same VM grid as in the previous screenshot, with P0011EC1 PAM highlighted.

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Guest ASCII Console Support ...

- **New system object (not a device) – SYSASCII**
 - ▶ Reported “free” or “attached to” guest
 - ▶ Reported “active” if ASCII console session open on HMC
 - ▶ Otherwise “inactive”
- **Operated on by**
 - ▶ ATTACH
 - ▶ DETACH
 - ▶ QUERY
 - ▶ QUERY VIRTUAL

Guest ASCII Console Support ...

```

▶▶ ATTach-SYSAscii [TO] [userid]
                    [ * ]
▶▶ DETach-SYSAscii [FRom] [userid]
                    [ * ]
▶▶ DETach-SYSAscii
▶▶ Query-SYSAscii
▶▶ Query [Virtual] SYSAscii

```

Guest ASCII Console Support ...

- A Linux guest must be configured to use the ASCII console, as described in "Linux on zSeries Device Drivers, Features, and Commands"
 - ▶ Device `ttys1` is the full-screen mode ASCII console device driver
- Add a line to `/etc/inittab`
 - ▶ `<id>: 2345:respawn:/sbin/agetty -L 9600 ttyS1 linux`
- Guest must be booted with kernel parameter
 - `console=ttys1`
 - or `console=ttys0 console=ttys1`
 to activate the full-screen console device driver

Virtualization ...

- Enhanced SCSI Support
 - ▶ Dynamic preferred path discovery
 - DS6000
 - PREFERRED option no longer supported on SET EDEVICE
 - ▶ Fast format
 - ESS and DS8000
 - New Diagnose X'A4' (Synchronous Block I/O) Format function
 - Support reported by Diagnose X'210' (Retrieve Device Information)
 - ▶ Duplicate LUN checking
 - ▶ Point-to-point support
 - Eliminates need for switched Fibre Channel fabric
 - ▶ Additional device information in QUERY EDEVICE DETAILS response
 - Device vendor, product identification, revision level, cache status (if applicable), connection type (switched or Point-to-point) for each path

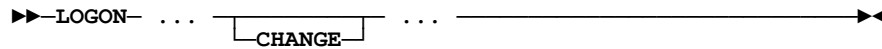
Security

- **Passphrase support**
- **Tape encryption support**

Security ...

- **Passphrase Support**
 - ▶ Allow ESM to support longer and more complex passwords (password phrases or passphrases)
 - May be up to 200 characters long
 - May include any hexadecimal character, including blank
 - May require enclosure in single quotation marks
 - ▶ RACF/VM Feature supports up to 100-character passphrases
 - ▶ z/VM logo extends password field to end of line (width – 15)
 - ▶ No line-editing performed on user identifier (entered at system logon screen) or password
 - ▶ z/VM User Directory does not support passphrases
 - ▶ AUTOLOG, XAUTOLOG, LINK, APPC do not support passphrases

PassPhrase Support



PassPhrase Support ...

- **New Diagnose X'88' subcode 8**
 - ▶ **Similar to subcode 0 but**
 - Supports passphrases
 - Handles password case
 - Invokes ESM if present
 - Optionally asks ESM about agent's LOGON BY authority for target
 - Validates uppercase password against User Directory if no ESM
- **New Diagnose X'88' subcode X'FF'**
 - ▶ Determine ability to use other Diagnose X'88' functions

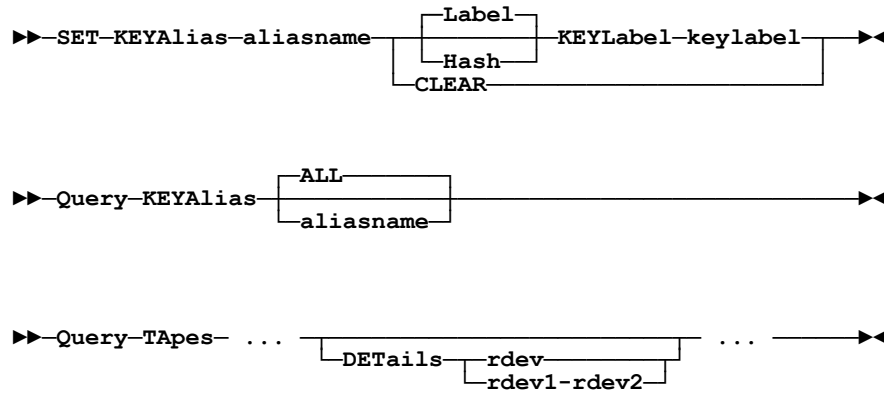
Security ...

- **Tape Encryption Support**
 - ▶ IBM System Storage TS1120 Tape Drive (3592 E05)
 - ▶ Support KEY option for various commands and utilities
 - ATTACH command
 - SET RDEVICE command
 - DASD Dump/Restore (DDR) utility
 - ▶ Enable encryption automatically for encryption-unaware guests using the default key or a designated key label
 - ▶ Enhance related z/VM tape support facilities
 - SPXTAPE command
 - QUERY TAPES DETAILS
 - QUERY VIRTUAL TAPES

Tape Encryption Support

- Add key selection capability
 - ▶ ATTACH command
 - ▶ SET RDEVICE command
 - ▶ SET KEYALIAS command
 - ▶ QUERY KEYALIAS command
- Allow encryption-aware guests to exploit hardware facilities
 - ▶ Can use in-band key manager
- z/VM support requires an out-of-band key manager
 - ▶ IP attachment
- Delivered via PTFs for APAR VM64063 on z/VM 5.1 and 5.2
- ATL support delivered via PTF for DFSMS/VM FL221 APAR VM64062
 - ▶ Tape encryption support for z/VSE guests
- Diagnose X'210' (Retrieve Device Information) identifies 3592 E05 devices

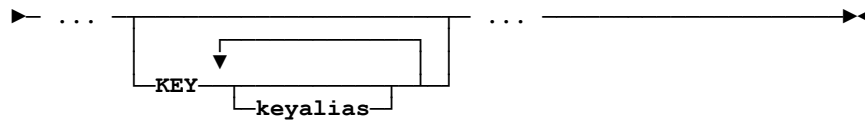
Tape Encryption Support ...



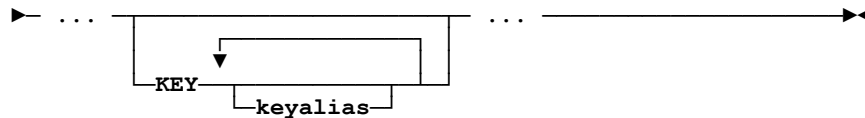
Tape Encryption Support ...

▶▶ ATTach- ...

Options for Dedicated Tape Device:

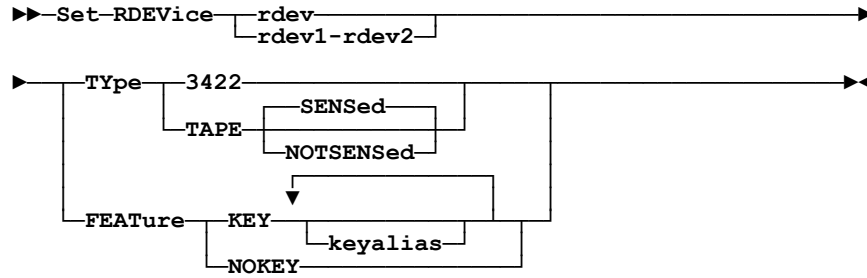


Options for Shared Tape Device:



•Multi-user ATTACH allowed if KEY operands are identical

Tape Encryption Support ...



Tape Encryption Support ...

▶▶-DDR- ...

I/O Definition Control Statements:

▶▶-OUTput-devno-type- ... [KEY]

LABEL/HASH Control Statements for Encryption Key Labels:

▶▶ LABEL1
 HASH1 labelvalue
 LABEL2
 HASH2

Tape Encryption Support ...

- **SPXTAPE DUMP** honors **ATTACH** or **SET RDEVICE KEY** settings and enables for encryption as required
- **QUERY TAPES DETAILS** reports encryption-capable drives and displays active (set by **ATTACH**) and inactive (set by **SET RDEVICE**) key labels
- **QUERY VIRTUAL TAPES** reports encryption-capable devices

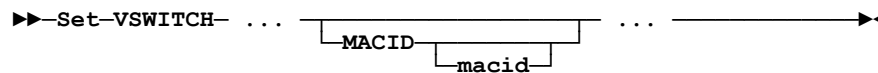
Virtual Networking

- **Enhanced virtual network management**
- **Link aggregation and failover**

Virtual Networking ...

- **Enhanced Virtual Network Management**
 - ▶ **Support for SNMP agent virtual machine**
 - **MACID on SET VSWITCH**
 - Concatenated to system MACPREFIX to define virtual switch MAC address
 - Can be system-assigned
 - **Enhanced QUERY VSWITCH response shows**
 - MACID associated with VSWITCH
 - Management ID (TCP/IP stack userid) and IP address associated with SNMP agent
 - Port numbers and associated interface indices
 - **Enhanced QUERY VIRTUAL NIC response**
 - Shows port number and associated interface index

Enhanced Virtual Network Management



Enhanced Virtual Network Management ...

- **New Diagnose X'26C' (Access Certain System Information) subcodes**
 - ▶ X'00000008' - Return virtual LAN system information
 - ▶ X'0000000C' - Return controller list
 - ▶ X'00000010' - Return controller information
 - ▶ X'00000014' - Return guest LAN list
 - ▶ X'00000018' - Return guest LAN information
 - ▶ X'0000001C' - Return virtual switch list
 - ▶ X'00000020' - Return virtual switch information
 - ▶ X'00000024' - Return virtual port or NIC information

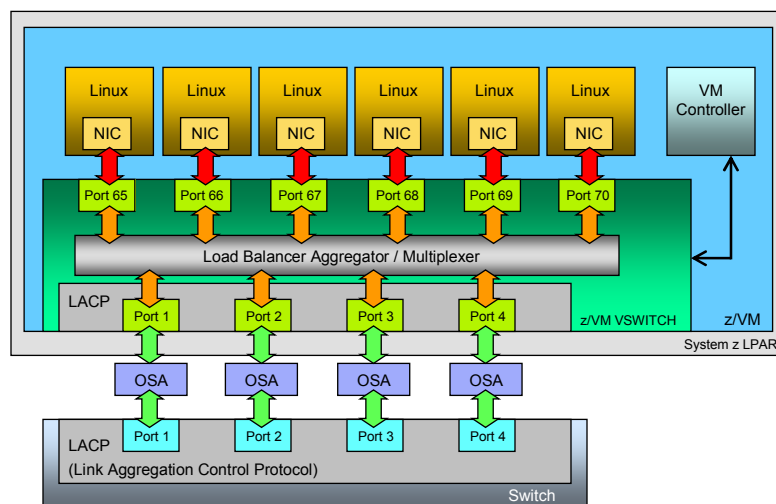
Enhanced Virtual Network Management ...

- **Changed Monitor records**
 - ▶ Management user ID and switch IP and MAC addresses added to
 - MRIODVSW - Virtual Switch Activity (Sample)
 - MRIODVSF - Virtual Switch Failure (Event)
 - MRIODVSR - Virtual Switch Recovery (event)

Virtual Networking ...

- **Link aggregation and failover**
 - ▶ Requires System z9 OSA Express-2
 - ▶ Allow up to eight OSAs to be associated with a virtual switch
 - ▶ Up to 128 named link aggregation groups supported
 - ▶ Links aggregated for data transmission
 - Optional time-driven balancing of conversations across links in group (30-second granularity)
 - Increased bandwidth
 - Improved recoverability
 - ▶ DEFINE VSWITCH and SET VSWITCH allow link aggregation group specification
 - ▶ QUERY CONTROLLER reports "LINKAGG"
 - ▶ QUERY PORT displays link aggregation group and device information
 - ▶ QUERY VSWITCH displays link aggregation group name
 - ▶ SET PORT defines link aggregation group

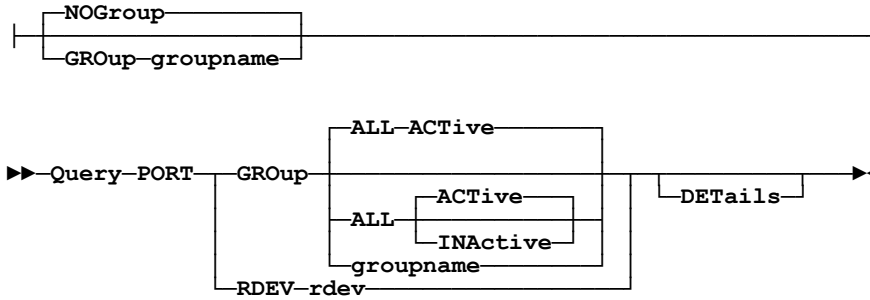
Link Aggregation



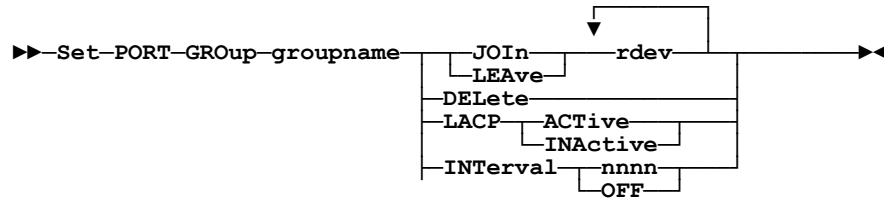
Link Aggregation ...

▶▶ `DEfINE-VSWITCH-switchname-...`

Ethernet Options:



Link Aggregation ...



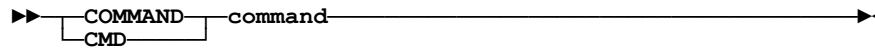
Systems Management

- **Enhanced guest configuration**
- **Asynchronous CP command responses**
- **VM event notification**
- **Integrated systems management**

Systems Management ...

- **Enhanced Guest Configuration**
 - ▶ **User Directory COMMAND statement**
 - ▶ **Allows (almost) any CP command to be executed for a guest**
 - After LOGON complete, immediately before IPL
 - Any privilege class
 - Subject to ESM auditing
 - Multiple statements allowed
 - ▶ **Reduces need for future directory control statement enhancement**
 - E.g., Specialty engines defined via **COMMAND DEFINE CPU** rather than by extensions to CPU statement

Enhanced Guest Configuration



```

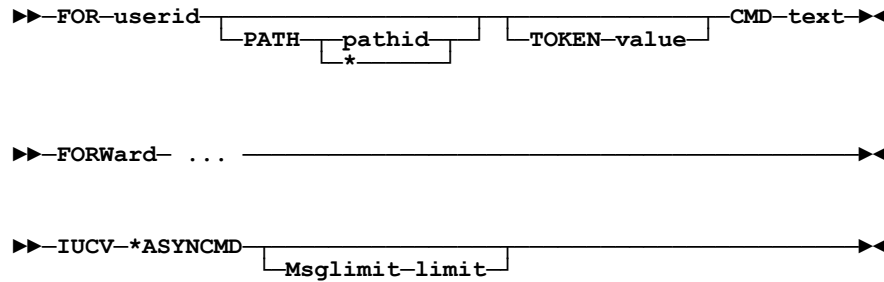
USER U1      U1PW 32M 32G G
IPL 190     PARM AUTOOCR
COMMAND VARY ON 1234
COMMAND ATTACH 1234 TO &USERID AS 4567
CONSOLE 009 3215 T MAINT
SPOOL 00C 2540 READER A
SPOOL 00D 2540 PUNCH A
SPOOL 00E 1403 A
      .
      .

```

Systems Management ...

- **Asynchronous CP Command Responses**
 - ▶ **New FOR command allows one user to execute CP commands on behalf of another**
 - Issuer must have SECUSER authority or Class C privileges
 - Target must have appropriate authorization for subject command
 - ▶ **Responses come to issuer**
 - `userid : [token :]text`
 - ▶ **No indication to target (except for side-effects)**
 - E.g., FOR OPERATOR LOGOFF
 - ▶ **Not recommended for use with asynchronous commands (e.g., SPXTAPE)**
 - ▶ **New *ASYNCMD IUCV System Service allows programmatic use**

Asynchronous CP Command Responses



Asynchronous CP Command Responses ...

*ASYNCMD Command Response Record:

1-8	9-24	25	26-28	29-32	33	34-n
User ID	Token	0	Component ID	Message Number	Severity	Text

*ASYNCMD End-of-Command Record:

1-8	9-24	25	26-29	30-33
User ID	Token	1	Return Code	Messages Discarded

Systems Management ...

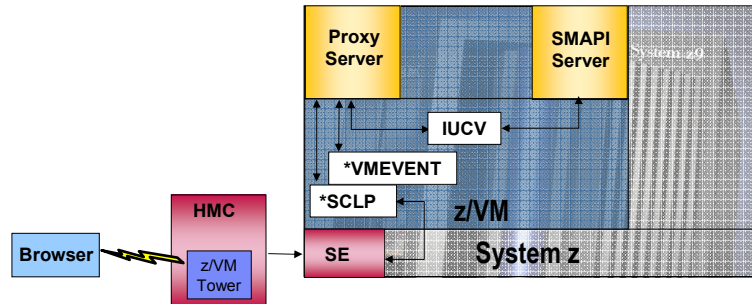
- **VM Event Notification**
 - ▶ New *VMEVENT IUCV system service
 - ▶ Notifies connected users of “significant” events
 - User LOGON
 - User LOGOFF
 - Failure conditions (those detected by protected application environment)
 - LOGOFF timeout initiated
 - Forced SLEEP initiated
 - Previous exception condition cleared
 - ▶ Notification identifies subject user and may provide additional data
 - ▶ Any exceptions status reported after initial CONNECT

Systems Management ...

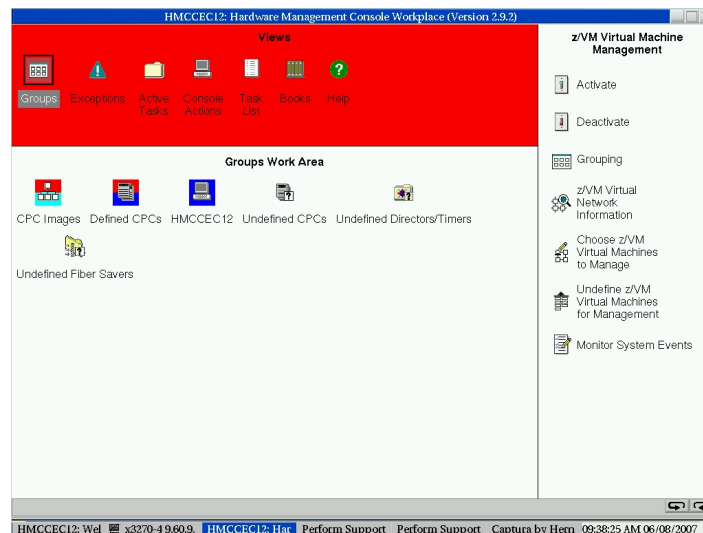
- **z/VM integrated systems management**
 - ▶ HMC recognizes z/VM logical partition
 - ▶ Extends management to virtual machine level
 - Select guests to manage
 - Display guest configuration
 - Display status
 - Display Guest LAN and Virtual Switch configurations
 - Activate guest
 - Deactivate guest
 - Grouping
 - Event monitoring

z/VM Integrated Systems Management

- Web-browser access to the HMC interfaces to z/VM services including the Systems Management API to activate and deactivate guests and display guest status



z/VM Integrated Systems Management ...



z/VM Integrated Systems Management ...

HMCCEC12: Hardware Management Console Workplace (Version 2.9.2)

HMCCEC12: Choose z/VM Virtual Machines to Manage

Select or deselect the z/VM virtual machines that are to be managed by this console.

Select Virtual machine name

- EFANOV
- EREP
- FTPSERVE
- GCS
- LATYPOVA
- MARUSOV
- MPROUTE
- OPERATOR
- OPERSYMP
- PVM
- REXECD
- RSCS
- RSCSDNS
- SAK00001
- TCPIP
- VMSEVR
- VMSEVRV
- VMSERVU
- VSMC1
- VSMC2

OK Cancel Help

z/VM Virtual Machine Management

- Activate
- Deactivate
- Grouping
- z/VM Virtual Network Information
- Choose z/VM Virtual Machines to Manage
- Undefine z/VM Virtual Machines for Management
- Monitor System Events

HMCCEC12: x3270-4960 HMCCEC12: Perform Supp Perform Supp Captura by He HMCCEC12: 09:40:05 AM 06/08/2007

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IBM Systems

z/VM Integrated Systems Management ...

HMCCEC12: Hardware Management Console Workplace (Version 2.9.2)

HMCCEC12: Choose z/VM Virtual Machines to Manage

Select or deselect the z/VM virtual machines that are to be managed by this console.

Select Virtual machine name

- EFANOV
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- MPROUTE
- OPERATOR
- OPERSYMP
- PVM
- REXECD
- RSCS
- RSCSDNS
- SAK00001
- TCPIP
- VMSEVR
- VMSEVRV
- VMSERVU
- VSMC1
- VSMC2

OK Cancel Help

z/VM Virtual Machine Management

- Activate
- Deactivate
- Grouping
- z/VM Virtual Network Information
- Choose z/VM Virtual Machines to Manage
- Undefine z/VM Virtual Machines for Management
- Monitor System Events

HMCCEC12: x3270-4960 HMCCEC12: Perform Supp Perform Supp Captura by He HMCCEC12: 09:40:53 AM 06/08/2007

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z/VM Integrated Systems Management ...

z/VM Integrated Systems Management ...

z/VM Integrated Systems Management ...

The screenshot displays the HMCCE12: Hardware Management Console Workplace (Version 2.9.2) interface. A central dialog box titled "Virtual Network Information for GCT2" is open, showing details for a virtual switch. The dialog has tabs for "Guest LAN" and "Virtual Switch". The "Virtual Switch" tab is active, displaying the following information:

- Virtual Switch: VSL2SW2
- Transport Type: Ethernet
- Queue Memory Limit: 8
- VLAN ID: 1
- Native VLAN ID: 1
- Switch Status: Active
- Real Device: 15104
- Port Type: Trunk
- MAC ID: 02-61-50-00-00-03
- Routing: Will act as a router
- OSA Device Ready: GVRP Enabled
- Controller Name: CONTROL2
- Device Status: Active
- Port Name: VSL2SW2
- Error Status: No Error
- Authorized User: LINUX5 2NDLYR2

The background shows a tree view of virtual machines and their components, including P00D6A8D GCT1, P00D6A8D GCT2, P00D6A8D GST1, P00D6A8D GST2, POLXSM12 LP04, POLXSM12 LP05, POLXSM12 LP11, and POLXSM12 LP12.

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z/VM Integrated Systems Management ...

The screenshot displays the HMCCE12: Hardware Management Console Workplace (Version 2.9.2) interface. A central dialog box titled "Virtual Machine Details for SMAPIC2" is open, showing details for a virtual machine. The dialog has tabs for "General", "Acceptable Status", "Image", and "Virtual Network". The "General" tab is active, displaying the following information:

- Host server: P00D6A8D
- Host image: GCT2
- Host operating system name: GDLGCT2
- Status: Operating

The background shows a tree view of virtual machines and their components, including SMAPIC2 [P00D6A8D:GCT2:GDLGCT2].

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z/VM Integrated Systems Management ...

HMCCECI2: Hardware Management Console Workplace (Version 2.9.2)

Views: Groups, Exceptions, Active Tasks, Console Actions, Task List, Books, Help

Virtual Machine Details for SMAPIC2

Virtual Machine Details for SMAPIC2

General | Acceptable Status | Image | Virtual Network

Acceptable Status

- Operating
- Forced sleep
- Communication not active
- Storage exceeded
- Image not activated
- Unknown
- Not operating
- Not activated
- Logoff timeout
- Image not operating
- Image not capable

Apply | Cancel | Help

HMCCECI2: x3270-4.9.60 HMCCECI2: Perform Supp Perform Supp Captura by He Virtual Machl 09:58:08 AM 06/08/2007

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z/VM Integrated Systems Management ...

HMCCECI2: Hardware Management Console Workplace (Version 2.9.2)

Views: Groups, Exceptions, Active Tasks, Console Actions, Task List, Books, Help

Virtual Machine Details for SMAPIC2

Virtual Machine Details for SMAPIC2

General | Acceptable Status | Image | Virtual Network

Memory Size: 64 MB
Share Type: Relative
Share Value: 100
Number of CPUs: 1

CPU Information

ID	Number	Status
FF026A8D20948000	0	Base

Device Information

Address	Type
0009	Console
000C	Reader
000D	Punch
000E	Print
0100	DA5D

Apply | Cancel | Help

HMCCECI2: x3270-4.9.60 HMCCECI2: Perform Supp Perform Supp Captura by He Virtual Machl 09:58:32 AM 06/08/2007

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z/VM Integrated Systems Management ...

The screenshot shows the HMCCECI2: Hardware Management Console Workplace (Version 2.9.2) interface. A window titled "Virtual Machine Details for TCPIP19" is open, displaying the "Virtual Network" tab. The window contains a table of virtual network adapters defined for this virtual machine.

Device	Type	Status	Number of devices	LAN name	LAN owner
1900	QDIO	Coupled and active	3	QDIOA	SYSTEM
1903	Hipersockets	Coupled but not active	3	HIPERA	SYSTEM
1906	Hipersockets	Coupled but not active	3	HIPERB	SYSTEM

Buttons for "Apply", "Cancel", and "Help" are visible at the bottom of the table.

z/VM Integrated Systems Management ...

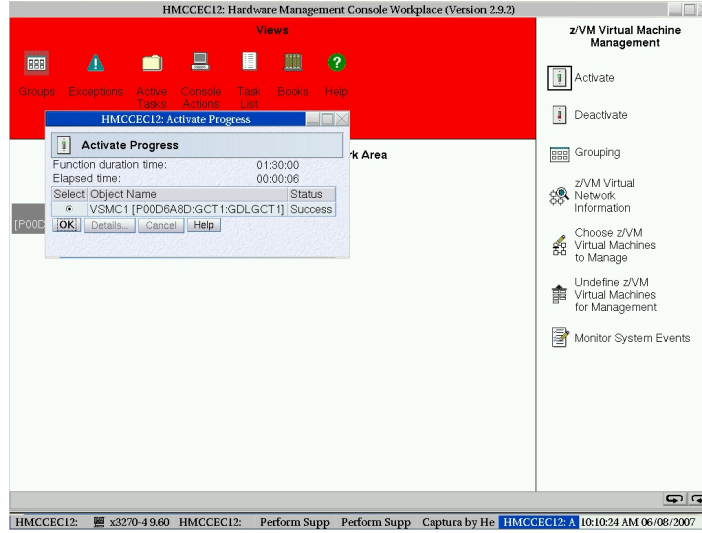
The screenshot shows the HMCCECI2: Hardware Management Console Workplace (Version 2.9.2) interface. A dialog box titled "HMCCECI2: Activate Task Confirmation" is open, displaying a warning message and a table of confirmation text for each target object.

Please review the following confirmation text for each target object before proceeding with the task. Do you want to continue with this task?

Object Name	Activation Profile	Last Used Profile	Confirmation Text
VSMC1:[P00D6A8D:GCT1:GDLGCT1]	Not applicable	Not applicable	Activate will cause operations to be disrupted, since it is currently in use and operating normally.

Buttons for "Yes", "No", "View Activation Profile...", and "Help" are visible at the bottom of the dialog.

z/VM Integrated Systems Management ...

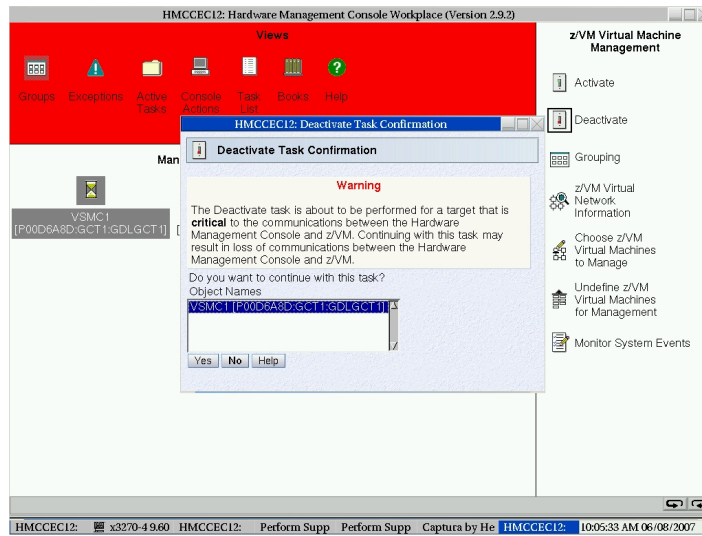


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z/VM Integrated Systems Management ...



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z/VM Integrated Systems Management ...

HMCCEC12: Hardware Management Console Workplace (Version 2.9.2)

Views: Groups, Exceptions, Active Tasks, Console Actions, Task List, Books, Help

z/VM Virtual Machine Management: Activate, Deactivate, Grouping, z/VM Virtual Network Information, Choose z/VM Virtual Machines to Manage, Undefine z/VM Virtual Machines for Management, Monitor System Events

HMCCEC12: x3270-4960 HMCCEC12: Perform Supp Perform Supp Capture by He HMCCEC12: 10:09:59 AM 06/08/2007

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z/VM Integrated Systems Management ...

HMCCEC12: Hardware Management Console Workplace (Version 2.9.2)

Views: Groups, Exceptions, Active Tasks, Console Actions, Task List, Books, Help

z/VM Virtual Machine Management: Activate, Deactivate, Grouping, z/VM Virtual Network Information, Choose z/VM Virtual Machines to Manage, Undefine z/VM Virtual Machines for Management, Monitor System Events

HMCCEC12: x3270-4960 HMCCEC12: Perform Supp Perform Supp Capture by He HMCCEC12: 10:08:15 AM 06/08/2007

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z/VM Integrated Systems Management ...

HMCCECI2: Hardware Management Console Workplace (Version 2.9.2)

Views

Group Exceptions Active Console Task Books Help
Tasks Actions List

z/VM Virtual Machine Management

- Activate
- Deactivate
- Grouping
- z/VM Virtual Network Information
- Choose z/VM Virtual Machines to Manage
- Undefine z/VM Virtual Machines for Management
- Monitor System Events

Create Pattern Match Group

Specify the type of group to be created, the group name, and the pattern to be used when determining if an object should be part of the group.

Group type:

- Defined CPC
- Image
- IBM Fiber Saver (2029)
- z/VM Virtual Machines**

New group name:

Managed Resource Pattern:

OK Cancel Help

HMCCECI2: x3270-4-960 HMCCECI2: Perform Supp Perform Supp Captura by He HMCCECI2: 10:08:54 AM 06/08/2007

z/VM Integrated Systems Management ...

HMCCECI2: Hardware Management Console Workplace (Version 2.9.2)

Views

Group Exceptions Active Console Task Books Help
Tasks Actions List

z/VM Virtual Machine Management

- Activate
- Deactivate
- Grouping
- z/VM Virtual Network Information
- Choose z/VM Virtual Machines to Manage
- Undefine z/VM Virtual Machines for Management
- Monitor System Events

Event Monitor Summary

Settings

SMTP Server:

SMTP Port:

Minimum time between emails:
(In seconds, minimum of 60)

Monitors

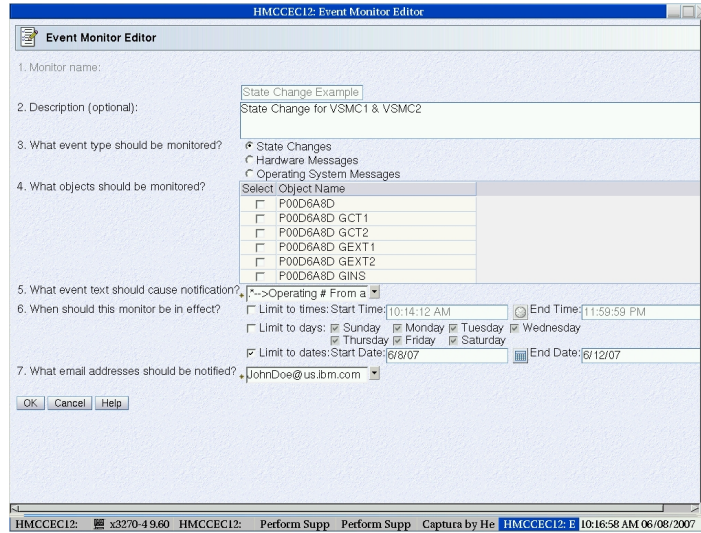
Select	Name	Description	Enabled
<input type="radio"/>	DTC-DISK Activate	DTCVSW1 & DTCVSW2	<input type="checkbox"/>
<input type="radio"/>	EREP	Image NOT activated	<input type="checkbox"/>
<input type="radio"/>	Forced Sleep	Forced Sleep condition for Maint	<input type="checkbox"/>
<input type="radio"/>	HW Msg Example	Example hardware message monitor.	<input type="checkbox"/>
<input type="radio"/>	Logoff Timeout	Logoff Timeout for Sysmon	<input type="checkbox"/>
<input type="radio"/>	Maint & Operator	Logoff Timeout	<input type="checkbox"/>
<input type="radio"/>	OS Msg Example	Example operating system message monitor.	<input type="checkbox"/>
<input type="radio"/>	OSADMIN	OSADMIN Operating	<input type="checkbox"/>
<input checked="" type="radio"/>	State Change Example	This is example of a state change monitor.	<input type="checkbox"/>
<input type="radio"/>	Storage Exceeded	Storage Exceeded on OSADMIN	<input type="checkbox"/>
<input type="radio"/>	VM CFT	CFT Images	<input type="checkbox"/>

Add... Edit... Delete

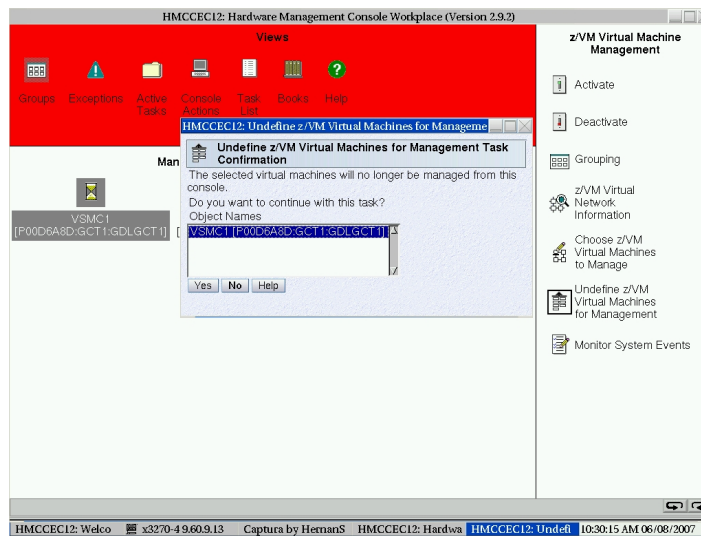
OK Test... Help

HMCCECI2: x3270-4-960 HMCCECI2: Perform Supp Perform Supp Captura by He HMCCECI2: E 10:13:44 AM 06/08/2007

z/VM Integrated Systems Management ...



z/VM Integrated Systems Management ...



z/VM Integrated Systems Management ...

The screenshot shows the HMCCECI2: Hardware Management Console Workplace (Version 2.9.2) interface. The main window is titled "Managed z/VM Virtual Machines Work Area" and displays a tree view with "VSMC2 [P00D6A8D.GCT1:GDLGCT1]". A red toolbar at the top contains icons for Group, Exceptions, Active Tasks, Console Actions, Task List, Books, and Help. On the right side, there is a "z/VM Virtual Machine Management" panel with the following options: Activate, Deactivate, Grouping, z/VM Virtual Network Information, Choose z/VM Virtual Machines to Manage, Undefine z/VM Virtual Machines for Management, and Monitor System Events. The status bar at the bottom indicates "HMCCECI2: Welcome to t x3270-49.609.13 Captura by HernanSoft HMCCECI2: Hardware Ma 10:30:51 AM 06/08/2007".

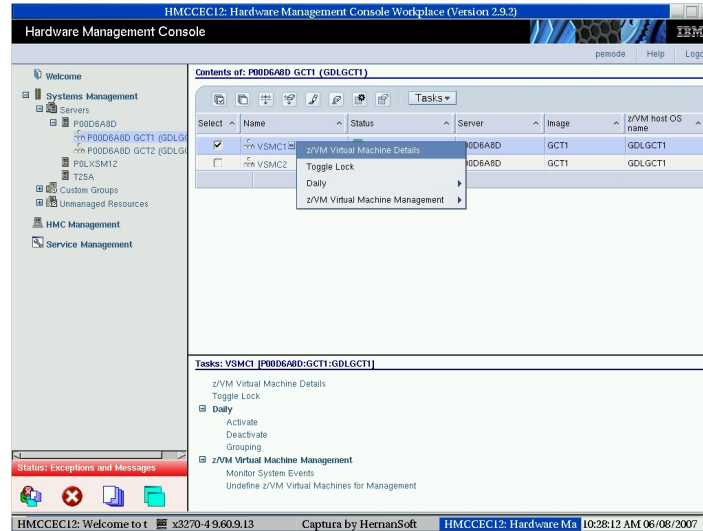
z/VM Integrated Systems Management ...

The screenshot shows the HMCCECI2: Hardware Management Console Workplace (Version 2.9.2) interface. The main window is titled "Hardware Management Console" and displays a tree view on the left with "Systems Management" expanded to show "Servers" and "P00D6A8D". The main content area shows "Contents of: P00D6A8D GCT1 (GDLGCT1)" with a table of virtual machines. The table has columns for Select, Name, Status, Server, Image, and z/VM host OS name. The data is as follows:

Select	Name	Status	Server	Image	z/VM host OS name
<input checked="" type="checkbox"/>	VSMC1	Operating	P00D6A8D	GCT1	GDLGCT1
<input type="checkbox"/>	VSMC2	Operating	P00D6A8D	GCT1	GDLGCT1

Below the table, it shows "Total: 2 Filtered: 2 Selected: 1". At the bottom, there is a "Tasks: VSMC1 [P00D6A8D:GCT1:GDLGCT1]" section with options for "z/VM Virtual Machine Details", "Toggle Lock", "Daily" (Activate, Deactivate, Grouping), and "z/VM Virtual Machine Management" (Monitor System Events, Undefine z/VM Virtual Machines for Management). The status bar at the bottom indicates "HMCCECI2: Welcome to t x3270-49.609.13 Captura by HernanSoft HMCCECI2: Hardware Ma 10:26:51 AM 06/08/2007".

z/VM Integrated Systems Management ...



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IBM Systems

z/VM Integrated Systems Management ...

- **No configuration or setup required**
- **Supported on any System z**
- **HMC must be at or above level 2.9.2**
- **Support Element (SE) must be at or above**
 - ▶ 2.9.2 for z9 EC and z9 BC
 - ▶ 1.8.2 for z990 and z890
 - ▶ 1.7.3 for z900 and z800
- **Requires MCL G40946 and PTFs for APARs VM64233 and VM64234**

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Miscellaneous

- Shutdown message time stamps
- SYSEVENT Query Virtual Server
- TRSOURCE for LDEVs
- QUERY IUCV

Miscellaneous ...

- Shutdown Message Time Stamps
 - ▶ Shutdown progress (HCPWRP963I)
 - ▶ Dump information (HCPDMP9252I)
 - ▶ Dump progress (HCPDMP9260I)
 - ▶ Dump complete (HCPDMP9261I)
 - ▶ Shutdown complete (HCPWRP961W)
 - ▶ System termination complete (HCPWRP9277I)

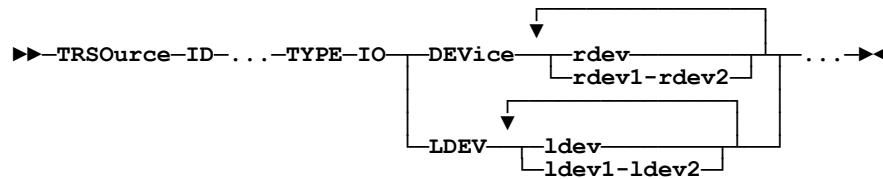
Miscellaneous ...

- **SYSEVENT Query Virtual Server**
 - ▶ Diagnose X'2E0'
 - ▶ Provides compatible equivalent of MVS SYSEVENT QVS service
 - Returns capacity in MSUs of CEC, LPAR, and virtual machine
 - Useful for sub-capacity pricing
 - Requested by ISV
 - ▶ APAR VM64122 for z/VM 5.1 and 5.2

Miscellaneous ...

- **TRSOURCE for LDEVs**
 - ▶ Option of TRSOURCE TYPE IO
 - LDEV must exist when TRSOURCE issued
 - ▶ Produces TRF file showing traffic between CP and LDEV host
 - ▶ QUERY TRSOURCE shows "LDEV" and associated address(es)
 - ▶ TRACERED output reports "LDEV" and associated address

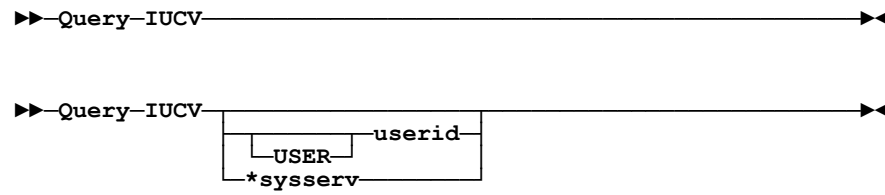
TRSOURCE For LDEVs



Miscellaneous ...

- **QUERY IUCV**
 - ▶ Allows any user to display information about own IUCV connections
 - ▶ Allows Class B user to display information about IUCV connections
 - For a specific user
 - For a specific IUCV System Service

QUERY IUCV



Statements of Direction

- Common Criteria Certification
- 3480 Distribution Medium

Statements of Direction ...

- **Common Criteria Certification**

IBM intends to evaluate z/VM V5.3 with the RACF Security Server optional feature for conformance to the Controlled Access Protection Profile (CAPP) and Labeled Security Protection Profile (LSPP) of the Common Criteria standard for IT security, ISO/IEC 15408, at Evaluation Assurance Level 4 (EAL4).

This new SOD represents a modification to IBM's previously expressed Statement of Direction of July 27, 2005, which stated IBM's intent "to evaluate z/VM V5.2 with the RACF for z/VM optional feature for conformance to the Controlled Access Protection Profile (CAPP) and Labeled Security Protection Profile (LSPP) of the Common Criteria standard for IT security, ISO/IEC 15408, at Evaluation Assurance Level 4 (EAL4)." Based on additional assessment of requirements, IBM no longer intends to evaluate z/VM V5.2.

Statements of Direction ...

- **3480 Distribution Medium**

IBM intends to withdraw 3480 tape as a distribution medium in a future z/VM release. z/VM is planned to continue distribution on 3590 tape and on DVD, and to be available for electronic delivery from ShopzSeries

