p016262
Care and Feeding of VIO Servers

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Agenda

- Best Practices Setup
- Installation
- Maintenance and Upgrades
- Backup and recovery
- Monitoring
- Wrap-up/Questions
- Backup Material
  - HMC and Firmware Maintenance
    - Useful VIOS and HMC Commands
  - Associated articles
    - Complete Guide to Systems Maintenance
      - http://tinyurl.com/hbbcefr
    - Maintaining the HMC
      - http://ibmsystemsmag.com/aix/administrator/systemsmanagement/hmc-maintenance/
  - Replay of Virtual User Group session from August 2017 can be found at:
    - http://www.tinyurl.com/ibmaixvug

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Best practices setup

Fundamentals before you start

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Stay Current

VIOS Lifecycle

Version	GA	EOM	EOS/EOL
1.5	11/07	2008	09/11
2.1	11/08	2010	09/12
2.2.0.0	9/10	2011	09/13
2.2.1	10/11	10/12	04/15
2.2.2	10/12	10/13	09/16
2.2.3	4Q13		11/17
2.2.4	2Q15		12/18
2.2.4.40	4/21/17		12/18
2.2.5	4Q16		11/2019
2.2.5.10	11/12/16		11/2019
2.2.5.20	4/14/17		11/2019
2.2.6	10/27/17		

Latest release (as of 8/21/2017):
2.2.5.20 service pack (applies to the 2.2.5.0 or 2.2.5.10) – as of April 14, 2017
Download updates from Fix Central:
http://www-933.ibm.com/support/fixcentral/
Download base from entitled software:
https://www-05.ibm.com/servers/eserver/ess/ProtectedServlet.wss

Readme for 2.2.5.20
https://www-01.ibm.com/support/docview.wss?rs=0&uid=isg400003267

NIM Master needs to be at 6.1.9.9 or 7.1.4.4 at a minimum

HMC latest version is v8.8.6.0 SP2 (MH01690) (8/3/2017) – prereq is 8.8.6.0 MH01654 min.
https://delivery04.dhe.ibm.com/sar/CMA/HMA/072b3/0/MH01690.readme.html

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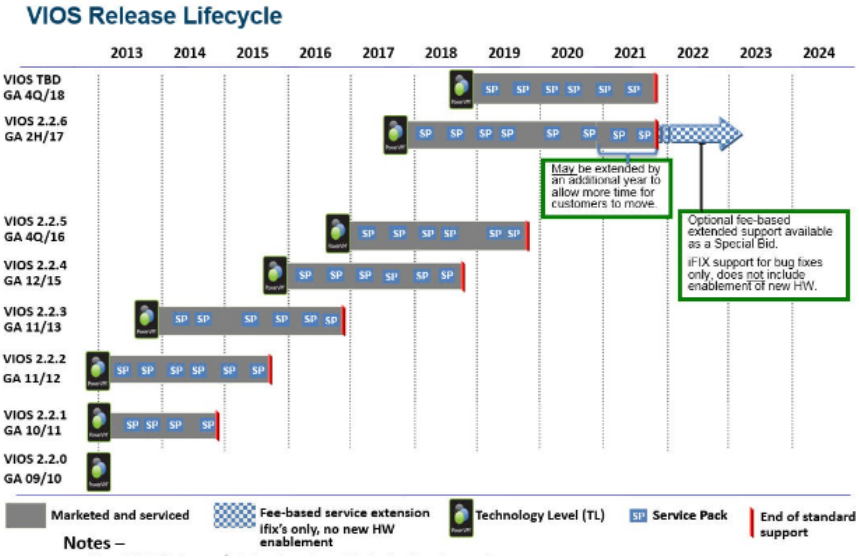
VIOS Release Lifecycle



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PowerVM 2.2.5

Support for E850C server
Support for DDR4 memory for POWER8 servers
Technology preview of Software Defined Networking
Increased scaling for memory per partition and SR-IOV adapters
- Up to 32TB per LPAR
- Doubles number of supported SR-IOV adapters per LPAR

Large send offload for large packet transfers
LPM Improvements
RAS enhancements
vNIC failover

PowerVM 2.2.5 consists of:
VIOS version 2.2.5
System firmware release 860
HMC v8.8.6.0
NovaLink version 1.0.0.4

GA is set for November 11, 2016 for PowerVM
November 18, 2016 for HMC and HMC virtual Appliance
December 16, 2016 for PowerVC and PowerVM NovaLink
https://www-01.ibm.com/common/ssi/rep_ca/4/897/ENUS216-384/ENUS216-384.PDF

NOTE IVM goes away after PowerVM 2.2.* and/or Power8

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Use FLRT and check Prereqs

FLRT Home Page:
http://www14.software.ibm.com/webapp/set2/flrt/home
https://www-304.ibm.com/support/customercare/flrt/
FLRT Lite
http://www14.software.ibm.com/webapp/set2/flrt/liteHome
VIOS to NIM Master Mapping:
http://www14.software.ibm.com/webapp/set2/sas/f/flrt/viostable.html
System Software Maps for VIOS:
http://www-01.ibm.com/support/docview.wss?uid=ssm1platformvios
AIX/VIOS Security Tables:
http://www14.software.ibm.com/webapp/set2/sas/f/flrt3/Sec_APARs.html
VIOS Hiper Tables:
http://www14.software.ibm.com/webapp/set2/flrt/doc?page=hiper#vios_hiper
Also check MPIO driver versions as there are specific requirements for each VIO release

AIX Support Lifecycle
https://www-01.ibm.com/support/docview.wss?uid=isg3T1012517

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Minimum NIM Master Levels for VIOS Clients

http://www14.software.ibm.com/support/customercare/flrt/sas?page=viostable

VIOS Release	VIOS Level	Minimum NIM master level		
VIOS 2.2.5	VIOS 2.2.5.20	AIX 6100-09-09	7100-04-04	7200-01-02
	VIOS 2.2.5.10	AIX 6100-09-08	7100-04-03	7200-01-01
	VIOS 2.2.5.0	AIX 6100-09-08	7100-04-03	
VIOS 2.2.4	VIOS 2.2.4.40	AIX 6100-09-09	7100-04-04	7200-01-02
	VIOS 2.2.4.30	AIX 6100-09-08	7100-04-03	7200-01-01
	VIOS 2.2.4.23	AIX 6100-09-07	7100-04-02	7200-00-02
	VIOS 2.2.4.22	AIX 6100-09-07	7100-04-02	7200-00-02
	VIOS 2.2.4.21	AIX 6100-09-07	7100-04-02	7200-00-02
	VIOS 2.2.4.20	AIX 6100-09-07	7100-04-02	7200-00-02
	VIOS 2.2.4.10	AIX 6100-09-06	7100-04-01	7200-00-01
	VIOS 2.2.4.0	AIX 6100-09-06	7100-04-01	7200-00-01

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Changes to Fix Central

- IBM has moved from anonymous FTP to Secure FTP
- http://www-01.ibm.com/support/docview.wss?uid=isg3T1024541

- On AIX this means you will be provided with a userid and password to login when you request the fixes
- ftp –s –I delivery04-mul.dhe.ibm.com
- When prompted for userid and password use the ones provided
- passive (to set passive mode)
- binary (to download as binary)
- mget * (to download fixes)
- Quit

You can also use sftp – i.e. once they give you a userid and password:
sftp user@delivery04-mul.dhe.ibm.com
Put in password when prompted then type in "mget *" then quit when done

CRITICAL VIOS PATCH
http://www14.software.ibm.com/webapp/set2/subscriptions/onvdq?mode=18&ID=5223
http://www-01.ibm.com/support/docview.wss?uid=isg1IV91339
http://www.ibmsystemsmag.com/Blogs/AIXchange/February-2017/Article-Misses-the-Point-on-VIOS-Use/

Applies to all levels back to 2.2.3

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General

- Keep it simple
- Ensure LMB is the same on all servers if you want to use LPM
- Use hot pluggable adapters rather than built in ones
  Easier maintenance
- Use dual VIO to allow for concurrent updates
- All adapters should be desired, not required
- Don't mix multipath drivers / HBAs
- Run HMC Scanner and/or Sysplan before and after all changes
- Plan for at least one update per year (IBM normally puts out 2)
- Separate VIOs for production and non prod on large systems
- Test failover (SEA failover and disk if vio goes down)
- Use VIO commands wherever possible rather than going into oem_setup_env
- mirror vio rootvg
- NOTE – v2 requires at LEAST 30GB in rootvg
- Fix Paging- By default VIO has a 512MB hd6 and a 1.5GB paging00 on the same LUN
- Add logging and set up dump devices properly
- Run VIOS Advisor regularly
- Check errpt regularly
- NEVER run at 100% entitlement – ensure it is high enough and there are plenty of VPs and memory
- Backup regularly – use NIM or scripts

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Sizing

Use Systems Planning Tool – run in compatibility mode with Windows 10
- Plan and design configuration
- http://www-947.ibm.com/systems/support/tools/systemplanningtool/

Try Workload Estimator
- http://www-947.ibm.com/systems/support/tools/estimator/index.html

VIOS and Virtualization Performance Advisors
- https://www-304.ibm.com/support/docview.wss?uid=aixtools159f1226
- https://www.ibm.com/developerworks/community/wikis/home?lang=en#!/wiki/Power%20Systems/page/PowerVM%20Virtualization%20Performance%20Advisor

Minimums
- Memory 4GB
- Cores .5 entitlement and 2VPs
- BUT remember that the more VFCs and high performance adapters the more memory and CPU you will need
- Also VIO servers perform based on entitlement not VPs
- So you could need more like 6 or 8GB and an entitlement of 1.5 or 2.

Pay attention to adapter placement – adapter slots have different priorities
Details are in the redbook for each server – look for the technical overview

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More on Sizing

If using 10Gb or 8Gb adapters need more memory for buffering and more CPU to handle traffic

i.e. 512MB for each active high performance adapter port
140MB per VFC client in the VIO

vSCSI uses more CPU in the VIO than NPIV

High values for VIO adapter slots can also increase memory needs

Not uncommon to see a VIO now needing 6-8GB memory and entitlement of 1-2 cores

rootvg needs at least 30GB
Add an extra disk if want to use FBO – don't put it in rootvg as it will make backups of rootvg enormous

VIOS Sizing Considerations:
http://www14.software.ibm.com/webapp/set2/sas/f/vios/documentation/perf.html

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Memory Planning

http://www.circle4.com/ptechu/memoryplan.xlsx
Note div - use 64 for all pre p7+ – 128 for p7+ and p8

POWER Systems Memory Overhead Approximation Calculator
USE AS IS - NO GUARANTEES - UPDATED 5/22/2017
Complete the information below so that calculations will be accurate

Memory Installed in box in MB	1048576	1TB
Memory active in box in MB	1048576	
LMB size for server	256	
Extra High performance adapter ports per VIO These include 10Gb network and 8Gb fibre	4	4 x 10gb/1gb network cards - 2 per network VIO)
VFCs (NPIV) per VIO server	10	
I/O drawers attached	6	4 x pcie fanouts in 2 drawers and 2 x exp24s disk drawers
POWER6/7 only - IVE/HEA ports active	0	Change to number of ports in use
safety net for memory in MB	512	
Active memory mirroring?	2	Set to 2 if using mirroring — Includes HPTs, TCEs and hypervisors
Divisor	128	Set to 128 if p7+ or P8

Spreadsheet assumes 2 x VIO servers configured equally

This spreadsheet is an approximation - the author takes no responsibility for the output
Use at your own risk
Output should be compared to the output from:
IBM SPT http://www-947.ibm.com/systems/support/tools/systemplanningtool/
IBM WLE http://www-912.ibm.com/wle/EstimatorServlet
Questions can be sent to jaqui@circle4.com

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Cover Page

Memory Planning Worksheet
USE AS IS - NO GUARANTEES - UPDATED 5/14/17

This gives a rough estimate
Assumes LMB size is 256 MB
Each active IVE port adds 102 MB

Max RAM Capacity — Ram installed 1048576 GB (1024 GB) — Ram Active 1048576 GB (1024 GB)
LMB below in MB
Change the LMB size on this line to match MRO on HMC — MB LMB = 256
Used the largest to show worst possible
Extra high performance ports per VIO 4
VFC per vio 10

LPAR NAME	Desired Memory MB	Maximum Memory MB	Ohead Max Div 64 or 128	OH/LMB MB	Roundup OH MB	Includes Memory mirroring Actual Ohead (MB) OH * LMB		Extra high Perf ports	if NPIV	
vios1	6144	7168	56	0.22	1	512	1400			
vios2	6144	7168	56	0.22	1	512	1400			
vion1	6144	7168	56	0.22	1	512		2048		10Gb network ports
vion2	6144	7168	56	0.22	1	512		2048		10Gb network ports
LPAR1	12032	16384	128	0.50	1	512				
LPAR2	20224	24576	192	0.75	1	512				
LPAR3	14336	16384	128	0.50	1	512				
LPAR4	16384	24576	192	0.75	1	512				
LPAR5	3072	4096	32	0.13	1	512				
LPAR6	2048	4096	32	0.13	1	512				
LPAR7	17152	17152	134	0.52	1	512				
LPAR8	65536	71680	560	2.19	3	1536				
LPAR9	32768	36864	288	1.13	2	1024				
HYPERVISOR						1536				
I/O drawer (I use 512 per 2)						3072				
Safety Net						1024				
Additional unaccounted for						0				
							MB Total	High Perf	NPIV	
MB Total	208128	244480	1910	7.4609375	16	13824	221952.00	4096	2800	
GB Total	*203*					*13.50*	*216.75*	*4.00*	*2.73*	
							GB Total			
				Total when Add High Perf & NPIV				*223.48*	GB	
				So total overhead would be				*20.23*	GB	
				Combined New Memory needed including Overhead total				*223.48*		
						spare memory		*800.52*		

NOTES
8GB and 10GB extra high performance adapters
For each active port add 512MB
If NPIV then 140MB per VFC adapter per client
i.e. 20 ports per VIO without NPIV would be 20 * 512 = 10GB plus VIOS base for each VIOS
if NPIV then we allocate per client so if there are 20 clients on each VIO then each
VIO needs 20 * 140 = 2.8GB above the base

This spreadsheet is an approximation - the author takes no responsibility for the output
Use at your own risk
Output should be compared to the output from: IBM SPT http://www-947.ibm.com/systems/support/tools/systemplanningtool/
IBM WLE http://www-912.ibm.com/wle/EstimatorServlet

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Actual Data

HBA Settings

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HBA Tuning

- Make the same tuning changes you would make on AIX

- Set num_cmd_elems and max_xfer_size on the fiber adapters on VIO

  chdev -l fcs0 -a max_xfer_size=0x200000 -a num_cmd_elems=1024 -P

  chdev -l fcs1 -a max_xfer_size=0x200000 -a num_cmd_elems=1024 -P

Check these numbers are supported by your disk vendor

- If NPIV also set on clients
- Client setting cannot be higher than the VIOs
- Pay attention to adapter layout and priorities

- NOTE – as of AIX v7.1 tl2 (or 6.1 tl8) num_cmd_elems is limited to 256 on the VFCs so set num_cmd_elems to the high number on the VIO but to no more than 256 on the NPIV clients
- See: http://www-01.ibm.com/support/docview.wss?uid=isg1IV63282
- **Increased again to 2048 in July 2016**
- http://www-01.ibm.com/support/docview.wss?uid=isg1IV76270
- This upper limit is set in the client LPAR not the VIO server
  - VIO must be rebooted to at least the client value prior to client change.

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Adapter Tuning 1/2

fcs0

bus_intr_lvl	115	Bus interrupt level	False	
bus_io_addr	0xdfc00	Bus I/O address	False	
bus_mem_addr	0xe8040000	Bus memory address	False	
init_link	al	INIT Link flags	True	
intr_priority	3	Interrupt priority	False	
lg_term_dma	0x800000	Long term DMA	True	
max_xfer_size	**0x100000**	**Maximum Transfer Size**	**True**	**(16MB DMA)**
num_cmd_elems	**200**	**Maximum number of COMMANDS to queue to the adapter**	**True**	
pref_alpa	0x1	Preferred AL_PA	True	
sw_fc_class	2	FC Class for Fabric	True	

Changes I often make (test first)

max_xfer_size	0x200000	Maximum Transfer Size	True	***128MB DMA area for data I/O***
num_cmd_elems	1024	Maximum number of COMMANDS to queue to the adapter	True	

Often I raise this to 2048 – **check with your disk vendor**
lg_term_dma is the DMA area for control I/O

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Adapter Tuning 2/2

Check these are ok with your disk vendor!!! And also for the adapter.

chdev -l fcs0 -a max_xfer_size=0x200000 -a num_cmd_elems=1024 -P
chdev -l fcs1 -a max_xfer_size=0x200000 -a num_cmd_elems=1024 -P

At AIX 6.1 TL2 VFCs will always use a 128MB DMA memory area even with default max_xfer_size

DMA area (max_xfer_size) controls the max IO size the adapter can send to the disk subsystem (default is 16MB). To use full bandwidth of adapter this needs to be 128MB.

Remember to make changes to both VIO servers and client LPARs if using NPIV.
VIO server setting must be at least as large as the client setting and rebooted prior.

Remember VFCs on the client may be limited to num_cmd_elems=256 after AIX 6.1 tl8 or 7.1 tl2

See Dan Braden Techdoc for more on tuning these:
http://www-03.ibm.com/support/techdocs/atsmastr.nsf/WebIndex/TD105745

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My VIO Server and NPIV Client Adapter Settings

VIO SERVER

#lsattr -El fcs0

lg_term_dma	0x800000	Long term DMA	True
max_xfer_size	0x200000	Maximum Transfer Size	True
num_cmd_elems	2048	Max number of COMMANDS to queue to the adapter	True

NPIV Client (running at defaults before changes)

#lsattr -El fcs0

lg_term_dma	0x800000	Long term DMA	True
max_xfer_size	0x200000	Maximum Transfer Size	True
num_cmd_elems	256	Maximum Number of COMMAND Elements	True

NOTE NPIV client must be <= to settings on VIO

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Network

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Virtual Ethernet

Link aggregation
- Put vio1 aggregate on a different switch to vio2 aggregate
- Provides redundancy without having to use NIB
- Allows full bandwidth and less network traffic (NIB is pingy)
- Basically SEA failover with full redundancy and bandwidth

Pay attention to entitlement
- VE performance scales by entitlement not VPs

If VIOS only handling network then disable network threading on the virtual Ethernet
- chdev –dev ent? thread=0
- Non threaded improves LAN performance
- Threaded (default) is best for mixed vSCSI and LAN

http://www14.software.ibm.com/webapp/set2/sas/f/vios/documentation/perf.html

Turn on large send on VE adapters
- chdev –dev ent? –attr large_send=yes

Turn on large send on the SEA
- chdev –dev entx –attr largesend=1

NOTE do not do this if you are supporting Linux or IBM i LPARs with the VE/SEA
See **http://tinyurl.com/gpe5zgd for update on changes for Linux and Large send/receive**
Also **http://tinyurl.com/lm6x5er for info for large send in general and also IBM i**

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SEA with link Aggregate

Figure 10-30 shows the aggregation of two plus one adapters to a single pseudo-Ethernet device, including a backup feature.

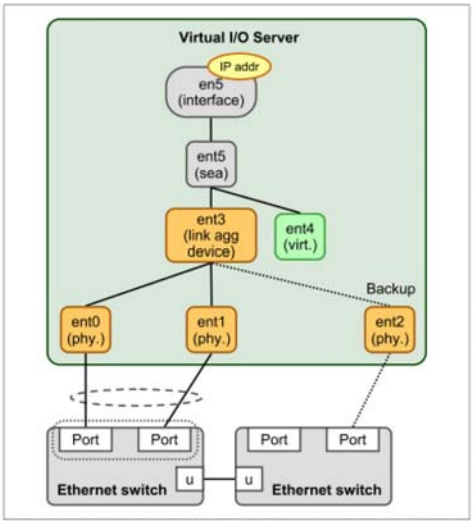

Figure 10-30 Link Aggregation (EtherChannel) on the Virtual I/O Server

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Starter set of tunables - Network

Typically we set the following:

NETWORK
no -p -o rfc1323=1
no -p -o tcp_sendspace=262144
no -p -o tcp_recvspace=262144
no -p -o udp_sendspace=65536
no -p -o udp_recvspace=655360

Also check the actual NIC interfaces and make sure they are set to at least these values
You can't set udp_sendspace > 65536 as IP has an upper limit of 65536 bytes per packet

Check sb_max is at least 1040000 – increase as needed

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My VIO Server SEA

```
# ifconfig -a
en6:
flags=1e080863,580<UP,BROADCAST,NOTRAILERS,RUNNING,SIMPLEX,MULTICAST,GROUPRT,64BIT,CHECKSUM_OFFLOAD(ACTIVE),CHAIN>

      inet  192.168.2.5   netmask 0xffffff00 broadcast 192.168.2.255
       tcp_sendspace 262144   tcp_recvspace 262144   rfc1323 1

lo0:
flags=e08084b,1c0<UP,BROADCAST,LOOPBACK,RUNNING,SIMPLEX,MULTICAST,GROUPRT,64BIT,LARGESEND,CHAIN>
      inet 127.0.0.1 netmask 0xff000000 broadcast 127.255.255.255
      inet6 ::1%1/0
       tcp_sendspace 131072    tcp_recvspace 131072    rfc1323 1
```

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Network Performance and Throughput

- Depends on:
  - Available CPU power
    - **Scales by entitlement not by VPs**
  - MTU size
  - Distance between receiver and sender
  - Offloading features
  - Coalescing and aggregation features
  - TCP configuration
  - Firmware on adapters and server
  - Ensuring all known efixes are on for 10GbE issues

- Network Performance Presentation at:
- http://youtu.be/8pth2ujGWK0
- http://www.circle4.com/movies/networkperf/networkperf.pdf

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VIO 2.2.3 SEA Changes

Traditional SEA setup
ent0-3 are the physical adapters
ent4 is the virtual adapter defined at the HMC with external access
(SEA goes here)
VIO1 is priority 1 and VIO2 is priority 2
ent5 is the virtual adapter on Vlan 1 with no external
(IP will go here)
ent6 is the control channel on vlan 255 or you can leave this out and let it default to 4095 on mkvdev
OLD
Add a virtual network to the profile to be used for the control channel (used vlan 255 in this case)
mkvdev –sea ent0 –vadapter ent4 –default ent4 –defaultid 1 –attr ha_mode=auto ctl_chan=ent6
Creates ent7 as the SEA and uses ent6 for the control channel
NEW
mkvdev –sea ent0 –vadapter ent4 –default ent4 –defaultid 1 –attr ha_mode=auto
Above creates ent7 as SEA and defaults to vlan 4095 for control channel

Do not mess up priorities or ctl_chan or you will cause a spanning tree loop

Update with 2.2.3
See chapter 4 of SG248198- Redbook on 2.2.3 Enhancements

SEA setup has been simplified
Requirement removed for dedicated control channel and VLAN ID for each SEA failover configuration
Multiple SEA pairs can now share VLAN 4095 within the same virtual switch and no ctl_chan is needed
HMC (>= 7.8) reserves 4095 for internal management traffic
Requires VIOS 2.2.3, HMC 7.7.8 and firmware 780 or higher
Not available on 770/780 B models

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Installation

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Install Options

- From DVD – complete install

- Using NIM
- http://www-01.ibm.com/support/docview.wss?uid=isg3T1011386
- Minimum NIM levels
- http://www14.software.ibm.com/webapp/set2/sas/f/flrt/viostable.html

- Using HMC - check vios install box
- Commandline - installios:
- http://www-01.ibm.com/support/knowledgecenter/POWER7/p7hb1l/iphb1_vios_configuring_installhmc.htm?cp=POWER7%2F14-8-0-2-2-1-1
- GUI:
- http://ibmsystemsmag.blogs.com/aixchange/2013/05/vios-installation-via-gui.html
- **Network between HMC and VIO LPAR must be alive and not aggregated**
- From a mksysb
- http://pic.dhe.ibm.com/infocenter/flexsys/information/index.jsp?topic=%2Fcom.ibm.acc.psm.resources.doc%2Fvios%2Fsdmc_vios-vios_backup_restore_file_nim.html

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VIOS and NIM

- Use of NIM to back up, install, and update the VIOS is supported.

- **Note**: For install, always create the SPOT resource directly from the VIOS **mksysb** image. Do NOT update the SPOT from an LPP_SOURCE.

- Use of NIM to update the VIOS is supported as follows:

Ensure that the NIM Master is at the appropriate level to support the VIOS image.

- http://www14.software.ibm.com/webapp/set2/sas/f/flrt/viostable.html

- On the NIM Master, use the operation **updateios** to update the VIOS Server.
- "**nim –o updateios –a lpp_source=lpp_source1 ... ...**"

- On the NIM Master, use the operation **alt_disk_install** to update an alternate disk copy of the VIOS Server.
- "**nim –o alt_disk_install –a source=rootvg –a disk=target_disk –a fix_bundle=(Value) ... ...**"

- If NIM is not used to update the VIOS, only the **updateios** or the **alt_root_vg** command from the padmin shell can be used to update the VIOS.

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VIOS and NIM

- Add VIOS partition as a NIM client

- Copy the VIOS mksysb image from the CD to your NIM master
  - On VIOS 2.2 media there are 3 images now – the 3rd is on DVD 2
  - Copy all 3 images individually to a directory and then use cat to combine them

cat /export/mksysb/vios2.2/mksysb_image /export/mksysb/vios2.2/mksysb_image2 /export/mksysb/vios2.2/mksysb_image3 >/export/mksysb/nim_vios2.2mksysb

- Define mksysb resource to NIM master

- Define spot on NIM master
  - The source for the SPOT will be the combined mksysb
  - The SPOT CANNOT be created from an LPP_Source

- Copy the bosinst.data from the DVD and create a viosbosinst resource

- You can now use bos_inst to do a mksysb install once the partition profile is defined

- http://www-01.ibm.com/support/docview.wss?uid=isg3T1011386

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Cloning disks

After installing vio1, if you have all the disks in vio1 you can take a clone to build vio2
If your server has a split backplane then you can make a clone
Make sure the 4 disks are split (2 and 2) across the backplane
vio1 is using hdisk0 and hdisk1, hdisk2 and 3 are on the other adapter and will be used for vio2
Put all the disks into vio1 (both adapters)
Install vio1 on hdisk0 – from NIM, DVD, HMC …..
Now clone it to hdisk2

```
alt_disk_copy –d hdisk2
```

Remove vio2 hdisks from vio1, Shutdown vio1, Remove vio2 resources from vio1 profile and reactivate vio1
Clean up vio1 removing any extra disks, etc that now show as defined. Also remove the adapter definitions for them.
Reboot vio1 to ensure changes are good

Activate vio2
Remove any disks, adapters, networks etc that show as defined on vio2
Now cleanup vio2 (see next slide)

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Cleaning up after cloning vio

Cleanup vio2:
stopsrc -g rsct_rm; stopsrc -g rsct
Clear Nodeid
chdev -l cluster0 -a node_uuid=00000000-0000-0000-0000-000000000000
OR
/usr/bin/odmdelete -o CuAt -q 'attribute=node_uuid'

Generate new nodeid
/usr/sbin/rsct/bin/mknodeid -f

lsattr -El cluster0
/usr/sbin/rsct/bin/lsnodeid
/usr/sbin/rsct/install/bin/recfgct

lspartition -dlpar
lssrc -g rsct_rm; lssrc –g rsct
You may have to start ctcas – startsrc –s ctcas
To be safe - reboot

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Maintenance and Upgrades

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Updating VIOS

Run lsvopt and make sure no one is using the FBO devices

1. Normally upgrade HMC first then firmware then VIOS and then AIX
2. BUT – check the readme for all of the above first to make sure there is not a different required order
3. Download the updates and cross-check compatibility using FLRT
4. Read the readme again
5. Run errpt to check for problems,check there are no stale partitions, missing disks or paths, etc
   - lsvg rootvg checks for stale PPs and physical volumes.
   - lsvg -p rootvg looks for missing disks.
   - lspath - checks for missing paths.
   - errpt checks for errors.
6. Ensure all paths on clients are redundant so LPARs will stay up when this VIOS is rebooted
7. Run HMC Scanner or sysplan to document prior to changes
8. Backup the VIOS
9. Mount the NFS filesystem or DVD or FBO image to be used for update
10. If using SSPs there are specific additional steps outlined in the README

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Migration 1/2

Back the VIO up before doing anything and again when done!
If migrating from a pre v2 level ensure VP folding is turn off after the migration

1. In order to migrate to v2.* your HMC must be at v7 or later at least 7.7.4
If VIOS is lower than v2.1 then you must migrate to 2.1.0 using the migration DVD

2. Migrating from prior to v1.3
    Basically this is a reinstall

3. Migrating from v1.3 or v1.4
    Need the migration DVD for VIOS 1.5 or the updates
    Need to update to VIOS 1.5.2.6-FP-11.1 SP-02 prior to upgrade to v2

4. Migrating from v1.5.2.6-FP-11.1 SP-02 or higher
    Need the migration DVD for VIOS v2
    Boot from the DVD in SMS mode and tell it to do a migration upgrade

Note – once at v2.1 you need to update to 2.2.3.1 prior to applying 2.2.3.4
2.2.3.4 requires a minimum release of 2.2.3.0 in order to be applied
2.2.5.20 can be applied to 2.2.5.0 and above
Instructions are in the readme for a single step process if you are between 2.2.1.1 and 2.2.4.x

Single step update requires VIO between 2.2.1.1 and 2.2.2.x
NIM allows you to create a single merged lpp_source to get around this but cannot be used with SDDPCM

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Migration 2/2

5. See Power VM Managing and Monitoring Redbook – Chapter 11
http://www.redbooks.ibm.com/redbooks/pdfs/sg247590.pdf

NOTE IBM has a simplified migration offering
http://www.ibmsystemsmag.com/ibmi/trends/ibmannouncements/vios_migration/

Once you are on v2.1 then upgrades are all done using updateios or nim
There are specific concerns around updates if you are running SSPs (Shared storage pools)

Always double check with readme as some minipacks require a minimal level prior to the upgrade so you may have to do multiple updates.

NOTE – the media repository cannot have anything loaded during an upgrade

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Updating VIOS with fixpacks or SPs

From 2.2.3.2 to 2.2.3.3
As padmin run “updateios –commit” to ensure any uncommitted updates are committed
Check to ensure there are no missing filesets prior to updates
Check repository has nothing loaded

$ ioslevel
2.2.3.2
$cat /usr/ios/cli/ios.level
$cat /usr/ios/cli/SPLEVEL.TXT
The above two will get you the IOS level and the SP
$ updateios -commit
All updates have been committed.

$ oem_setup_env
# /usr/sbin/emgr –P
There is no efix data on this system.

Now run checks

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PRE Install Checks for VIOS 2.2.3.2 to 2.2.3.3 Update

Did VIO2 (secondary VIO first):
$ ioslevel
2.2.3.2
$ oem_setup_env
#df –g - make sure no filesystems are full
#oslevel -s
6100-09-02-1412
instfix -i | grep ML
  All filesets for 6.1.0.0_AIX_ML were found.
  All filesets for 6100-00_AIX_ML were found.
  All filesets for 6100-01_AIX_ML were found.
  All filesets for 6100-02_AIX_ML were found.
  All filesets for 6100-03_AIX_ML were found.
  All filesets for 6100-04_AIX_ML were found.
  All filesets for 6100-05_AIX_ML were found.
  All filesets for 6100-06_AIX_ML were found.
  All filesets for 6100-07_AIX_ML were found.
  All filesets for 6100-08_AIX_ML were found.
  All filesets for 6100-09_AIX_ML were found.
lppchk -v
lppchk -vm3
oslevel -s -l 6100-09-02-1412
#errpt | more – check there are no errors

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Continue 2.2.3.3 update Backup 1/2

Back it up:
./save-viostuff.sh
mkdir: 0653-358 Cannot create /home/padmin/saveit.
/home/padmin/saveit: Do not specify an existing file.

ls -l /home/padmin/saveit
total 824
-rw-r--r-- 1 root staff 118 Jul 22 12:33 b740vio2.disktmp.txt
-rw-r--r-- 1 root staff 24 Jul 22 12:33 b740vio2.ioslevel.txt
-rw-r--r-- 1 root staff 16 Jul 22 12:33 b740vio2.oslevel.txt
-rw-r--r-- 1 root staff 8038 Jul 22 12:33 b740vio2.vioadapter.txt
-rw-r--r-- 1 root staff 4528 Jul 22 12:33 b740vio2.viodisk.txt
-rw-r--r-- 1 root staff 59593 Jul 22 12:33 b740vio2.viodisks.txt
-rw-r--r-- 1 root staff 8800 Jul 22 12:33 b740vio2.violsdevv.txt
-rw-r--r-- 1 root staff 11967 Jul 22 12:33 b740vio2.violsmapall.npiv.txt
-rw-r--r-- 1 root staff 19363 Jul 22 12:33 b740vio2.violsmapall.txt
-rw-r--r-- 1 root staff 4595 Jul 22 12:33 b740vio2.vioslots.txt
-rw-r--r-- 1 root staff 227944 Jul 22 12:33 b740vio2.viovpd.txt
-rw-r--r-- 1 root staff 37 Jul 22 12:33 cfgname.txt
-rw-r--r-- 1 root staff 0 Jul 22 12:33 entstat.txt
-rw-r--r-- 1 root staff 240 Jul 22 12:33 firewall.txt
-rw-r--r-- 1 root staff 652 Jul 22 12:33 hostmap.txt
-rw-r--r-- 1 root staff 5970 Jul 22 12:33 optimize.txt
-rw-r--r-- 1 root staff 713 Jul 22 12:33 routinfo.txt
-rw-r--r-- 1 root staff 240 Jul 22 12:33 user.txt
-rw-r--r-- 1 root staff 15071 Jul 22 12:33 view.txt

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Continue 2.2.3.3 update Backup 2/2

$ viosbr -backup -file /home/padmin/saveit/b740vio2-backup
Backup of this node (b740vio2) successful

oem_setup_env
mount /usr/local/backups
su - padmin -c "ioscli backupios -file /usr/local/backups/b740vio2-jul2214.mksysb -mksysb"
/usr/local/backups/b740vio2-jul2214.mksysb doesn't exist.
Creating /usr/local/backups/b740vio2-jul2214.mksysb
*** Here it is doing a savevgstructs for rootclients_vg *******
Creating information file for volume group rootclients_vg.
Creating list of files to back up.
Backing up 6 files
6 of 6 files (100%)
0512-038 savevg: Backup Completed Successfully.
Backup in progress. This command can take a considerable amount of time
to complete, please be patient...

Creating information file (/image.data) for rootvg.
Creating list of files to back up.
Backing up 160374 files.....
39229 of 160374 files (24%).....
160374 of 160374 files (100%)
0512-038 savevg: Backup Completed Successfully.

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Continue 2.2.3.3 update Install 1/3

- Download from Fix Central the iso image for 2.2.3.3 – I do this to my NIM server
- It came down as H52175995.iso
- mkdir /cdrom
- loopmount -i H52175995.iso -o "-V cdrfs -o ro" -m /cdrom
- smitty bffcreate – I do this on my NIM server and create a directory to put the files in that the VIO has access to
- In this case /usr/local/soft/vios2233

- **Normally I copy the files locally to the VIO in case I lose the network during the install**

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Continue 2.2.3.3 update Install 2/3

Now on the VIO:
$ updateios -accept -install -dev /usr/local/soft/vios2233

```
*******************************************************************************
installp PREVIEW:  installation will not actually occur.
*******************************************************************************
+-----------------------------------------------------------------------------+
                    Pre-installation Verification...
+-----------------------------------------------------------------------------+
Verifying selections...done
Verifying requisites...done
Results...
SUCCESSES
---------
  Filesets listed in this section passed pre-installation verification
  and will be installed.
  Mandatory Fileset Updates
  -------------------------
  (being installed automatically due to their importance)
  bos.rte.install 6.1.9.16              # LPP Install Commands
  << End of Success Section >>
```

Prompts you to reply Y which you do and it installs them

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Continue 2.2.3.3 update Install 3/3

After bos.rte.install is installed it then prompts you re installing the other 272 fixes
Check estimated space needed and free space and if all is good then:
Reply Y and they begin installing – takes about 2 hours depending

$ioslevel
Shows as 2.2.3.3

$oem_setup_env
oslevel -s
6100-09-03-1415

lspv | grep rootvg
hdisk0 00f6934cc34a30f3 rootvg active
hdisk1 00f6934c30e34699 rootvg active

bosboot –a –d hdisk0
bosboot –a –d hdisk1
bootlist –m normal hdisk0 hdisk1

Now reboot and then run post install tests

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POST Install Checks

$ ioslevel
2.2.3.3
$ oem_setup_env

oslevel -s
Should show: 6100-09-03-1415
6100-09-03-1415
instfix -i | grep ML
All filesets for 6100-00_AIX_ML were found.
All filesets for 6100-01_AIX_ML were found.
All filesets for 6100-02_AIX_ML were found.
All filesets for 6100-03_AIX_ML were found.
All filesets for 6100-04_AIX_ML were found.
All filesets for 6100-05_AIX_ML were found.
All filesets for 6100-06_AIX_ML were found.
All filesets for 6100-07_AIX_ML were found.
All filesets for 6.1.0.0_AIX_ML were found.
All filesets for 6100-08_AIX_ML were found.
All filesets for 6100-09_AIX_ML were found.
lppchk -v
lppchk -vm3
oslevel -s -l 6100-09-03-1415
#errpt | more – check there are no errors

You should run flrtvc and will probably have to upgrade your openssl, openssh and Java to resolve security issues

Once all checks are passed and VIO2 is back up then go do the same upgrade to VIO1

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Updating - VIOS Problems

```
oem_setup_env
oslevel –s
6100-00-00-0000
instfix -i | grep ML
   All filesets for 6100-07_AIX_ML were found.
   All filesets for 6.1.0.0_AIX_ML were found.
   Not all filesets for 6100-08_AIX_ML were found.
This means there are missing filesets
# oslevel -sq
Known Service Packs
-------------------
6100-08-02-1316
6100-08-01-1245

# oslevel -s -l 6100-08-02-1316
Fileset                          Actual Level      Service Pack Level
-------------------------------------------------------------------------------
bos.alt_disk_install.boot_images      6.1.8.0          6.1.8.15
bos.loc.utf.ES_ES                     6.1.7.15         6.1.8.15

These filesets should be corrected prior to updating
Either use updateios to update them or to remove them
```

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Remove or update problem filesets

```
DO NOT USE SMITTY – use updateios

Issues with bos.suma
updateios –remove bos.suma

# oslevel -s -l 6100-08-02-1316
Fileset                          Actual Level      Service Pack Level
-------------------------------------------------------------------------------
bos.alt_disk_install.boot_images      6.1.8.0          6.1.8.15
bos.loc.utf.ES_ES                     6.1.7.15         6.1.8.15

updateios –remove bos.loc.utf.ES_ES

Upgrade alt disk
Copy images to be updated into a directory (/usr/local/soft/missing)
Run inutoc .

updateios –commit
Updateios -accept -install -dev /usr/local/soft/missing

Also remove efixes prior to updates:
/usr/sbin/emgr –P   lists them

To remove:
# /usr/sbin/emgr -r -L <EFIX label>
emgr -r -L IV46869m3a
```

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Efixes and ifixes

Many security patches are put on using efixes or ifixes
The VIO server also needs these to be applied – **use FLRTVC to determine what fixes are needed**

If you run emgr –l and there are no fixes listed then you most likely have security holes that need patching, specifically Java, openssh and openssl.

You should see something like:
emgr -l shows:

```
1   S   IV79944s1a 03/30/16 16:30:22        IV79944 for AIX 7.1 TL04 SP01
2   S   IV80191s1a 03/30/16 16:30:52        IV80191 for AIX 7.1 TL04 SP01
3   S   IV80586s1a 03/30/16 16:32:09        Security vulnerability with libmxl2.a
4  *Q*  IV81303s1a 03/30/16 16:33:06          CORE DUMP AFTER UPGRADE WHEN USING NIS
5   S   IV80743m9a 03/30/16 16:35:20         Ifix for OpenSSH CVE
6   S   IV81287m9a 03/30/16 16:36:18         OpenSSL CVEs on 1.0.1e
```

It will vary by O/S level and SP. This was for 7.1 tl04 sp1

You can find out what fixes you need by downloading and running FLRTVC
https://www-304.ibm.com/webapp/set2/sas/f/flrt/flrtvc.html
You should do this on AIX LPARs too

/usr/sbin/emgr –l lists them
To apply a fix change into the directory it is in and then:
emgr -p -e openssh-IV80743m9a.160127.epkg.Z
Remove the –p and run again if it is successful

To remove:
/usr/sbin/emgr -r -L <EFIX label>
emgr -r -L IV46869m3a

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Backup and recovery

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Backing up VIOS

- Use viosbr to backup user defined virtual and logical resources on the VIO
- Make sure to save that backup in rootvg
  - viosbr –backup –file /tmp/viosabkupbr
  - You can also use viosbr to view or restore
  - http://publib.boulder.ibm.com/infocenter/systems/scope/hw/topic/p7hcg/viosbr.htm

- You may also want to use snap to grab other critical data

- Mount NFS filesystem to backup to (in my case /backups)
- mkdir /backups/viosa

- Then as padmin run backupios which automatically calls savevgstruct:
- backupios –file /backups/viosa
- The above creates a nim_resources.tar package in that directory and it can be used to clone or restore VIO servers by NIM or installios (from HMC)

- You can also back it up as a mksysb file that is easy to restore
- backupios -file /backups/viosa.mksysb –mksysb

- If the media library is large and is on rootvg, then you can add the –nomedialib flag

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Backing up VIOS from root

As root run viosave.sh (see next slide)

su - padmin -c "ioscli viosbr –backup –file /tmp/viosabr.backup”

Mount the NFS repository for the backups (/nfsmnt)
su – padmin –c “ioscli backupios –file /nfsmnt/vio2-jul2114.mksysb -mksysb”

This backs it up to a bootable mksysb file

If using NIM to clone VIO servers don’t forget:
su – padmin –c “ioscli backupios -file /nfsmnt/nimbkups”

This creates a nim_resources.tar file that can be used for restores described at:
http://public.dhe.ibm.com/software/server/vios/docs/backupios_mod.pdf

Create a daily backup once a day and keep up to 7 in /home/padmin/cfgbackups
su - padmin -c "ioscli viosbr –backup -file viobkup –frequency daily numfiles 7”

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Document VIO Information – save-viostuff.sh

```
#! /bin/sh
#
day="`/bin/date +'%d'`"
month="`/bin/date +'%m'`"
year="`/bin/date +'%y'`"
set -- Dec Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec
shift $month
lmonth="$1"
machine=`uname -n`
directory="`/bin/date +'%m%d%Y_%H%M'`"
machine_directory=`printf "%s_%s" $machine $directory`
mkdir /home/padmin/saveit
cd /home/padmin/saveit
logit="/home/padmin/saveit/$machine"
logit1="/home/padmin/saveit/$machine"
su - padmin -c "ioscli ioslevel" >>$logit1.ioslevel.txt
su - padmin -c "ioscli lsdev -type disk" >>$logit1.viodisk.txt
su - padmin -c "ioscli lsdev -type adapter" >>$logit1.vioadapter.txt
su - padmin -c "ioscli lsdev -vpd" >>$logit1.viovpd.txt
su - padmin -c "ioscli lsdev -slots" >>$logit1.vioslots.txt
su - padmin -c "ioscli lsmap -all" >>$logit1.violsmapall.txt
su - padmin -c "ioscli lsmap -all -npiv" >>$logit1.violsmapall.npiv.txt
su - padmin -c "ioscli lsdev -virtual" >>$logit1.violsdevv.txt
su - padmin -c "ioscli cfgnamesrv -ls " >cfgname.txt
su - padmin -c "ioscli entstat -all ent9 "  >entstat.txt
su - padmin -c "ioscli hostmap -ls" >hostmap.txt
su - padmin -c "ioscli lsuser" >user.txt
su - padmin -c "ioscli netstat -routinfo" >routinfo.txt
su - padmin -c "ioscli optimizenet -list" >optimize.txt
su - padmin -c "ioscli viosecure -firewall view" >firewall.txt
su - padmin -c "ioscli viosecure -view -nonint" >view.txt
oslevel -s >$logit1.oslevel.txt
getlvodm -C > $logit1.disktmp.txt
while read label line
do
  echo "\n" >>$logit1.viodisks.txt
  echo "Hdisk is $label" >>$logit1.viodisks.txt
  echo " " >>$logit1.viodisks.txt
  su - padmin -c "ioscli lsdev -dev $label -attr" >>$logit1.viodisks.txt
done <"$logit1.disktmp.txt"
#
exit 0
```

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Monitoring

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Cpu and Memory

- Remember VIO scales by entitlement not VPs
- Ensure sufficient entitlement
- Watch for VCSWs – this is a sign of entitlement shortage
- If running close to entitlement on average increase entitlement
- If running close to VPs on average increase entitlement and VPs
- Consider running dedicated

- NEVER EVER let your VIO server page
- Clean up the VIO server page spaces

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nmon Monitoring

- nmon -ft –AOPV^dML -s 15 -c 120
  - Grabs a 30 minute nmon snapshot
  - A is async IO
  - M is mempages
  - t is top processes
  - L is large pages
  - **O is SEA on the VIO**
  - P is paging space
  - V is disk volume group
  - d is disk service times
  - ^ is fibre adapter stats
  - W is workload manager statistics if you have WLM enabled you can add this

If you want a 24 hour nmon use:

nmon -ft –AOPV^dML -s 150 -c 576

May need to enable accounting on the SEA first – this is done on the VIO
chdev –dev ent* -attr accounting=enabled

Can use entstat/seastat or topas/nmon to monitor – this is done on the vios
topas –E
nmon -O

VIOS performance advisor also reports on the SEAs

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Shared Processor Pool Monitoring

Turn on "Allow performance information collection" on the LPAR properties
- This is a dynamic change
- Without this being set on every LPAR the cross LPAR statistics won't be correct
- This includes APP and other statistics

topas –C
- Most important value is app – available pool processors
  - This represents the current number of free physical cores in the pool

nmon option p for pool monitoring
- To the right of PoolCPUs there is an unused column which is the number of free pool cores

nmon analyser LPAR Tab

lparstat
- Shows the app column and poolsize

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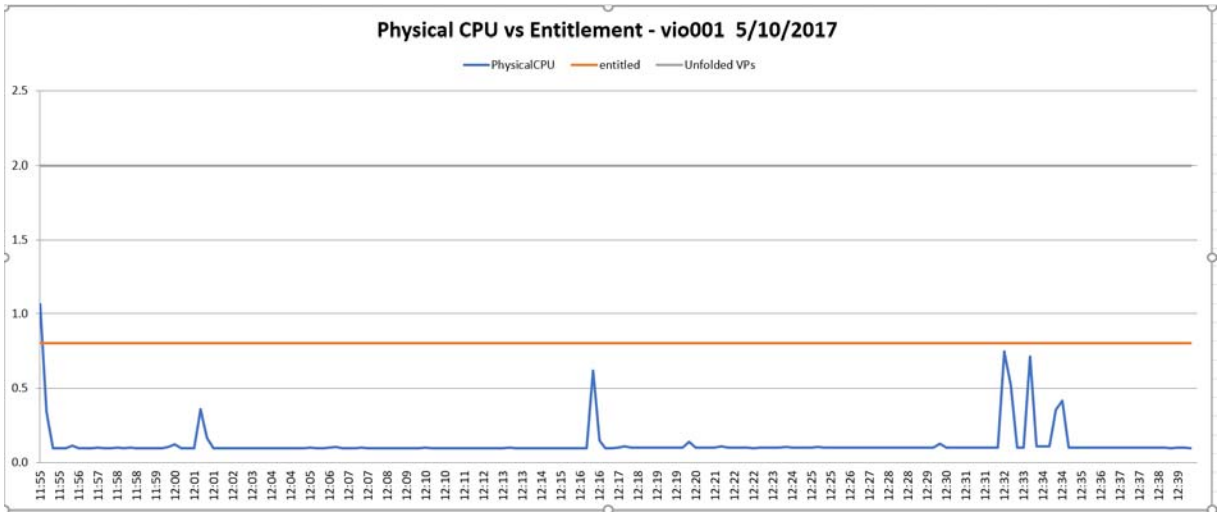
nmon Analyser LPAR Tab



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NPIV Statistics

- Normally need to use nmon to get information at each client LPAR
- Could also use –O when recording

- BUT as of v2.2.3
- VIOS Performance advisor supports NPIV aggregation information

- As of v2.2.2
- http://www-01.ibm.com/support/knowledgecenter/POWER7/p7hcg/fcstat.htm?cp=POWER7%2F1-8-3-8-2-60
- fcstat –n wwpn device_name
- i.e. fcstat –n C05012345678000 fcs0
- Provides statistics at the WWPN for the virtual adapter
- You can also try fcstat -client

- Also check out NPIVGRAPH for visualizing NPIV mappings:
- http://npivgraph.sourceforge.net/

- Review options on fcstat – fcstat –d and fcstat –e provide additional statistics on adapter usage
- https://www.ibm.com/support/knowledgecenter/en/ssw_aix_61/com.ibm.aix.cmds2/fcstat.htm

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netstat –v vio

SEA

Transmit Statistics:	Receive Statistics:
Packets: 83329901816	Packets: 83491933633
Bytes: 87482716994025	Bytes: 87620268594031
Interrupts: 0	Interrupts: 18848013287
Transmit Errors: 0	Receive Errors: 0
Packets Dropped: 0	**Packets Dropped: 67836309**
	Bad Packets: 0

Max Packets on S/W Transmit Queue: 374
S/W Transmit Queue Overflow: 0
Current S/W+H/W Transmit Queue Length: 0

Elapsed Time: 0 days 0 hours 0 minutes 0 seconds

Broadcast Packets: 1077222	Broadcast Packets: 1075746
Multicast Packets: 3194318	Multicast Packets: 3194313
No Carrier Sense: 0	CRC Errors: 0
DMA Underrun: 0	DMA Overrun: 0
Lost CTS Errors: 0	Alignment Errors: 0
Max Collision Errors: 0	**No Resource Errors: 67836309**

Virtual I/O Ethernet Adapter (l-lan) Specific Statistics:

Hypervisor Send Failures: 4043136
Receiver Failures: 4043136
Send Errors: 0
Hypervisor Receive Failures: 67836309

check those tiny, etc Buffers

"No Resource Errors" can occur when the appropriate amount of memory can not be added quickly to vent buffer space for a workload situation.
You can also see this on LPARs that use virtual Ethernet without an SEA

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Buffers

Virtual Trunk Statistics
Receive Information
Receive Buffers

Buffer Type	Tiny	Small	Medium	Large	Huge
Min Buffers	512	512	128	24	24
Max Buffers	2048	**2048**	256	64	64
Allocated	513	2042	128	24	24
Registered	511	506	128	24	24
History					
Max Allocated	532	**2048**	128	24	24
Lowest Registered	502	354	128	24	24

"Max Allocated" represents the maximum number of buffers ever allocated
"Min Buffers" is number of pre-allocated buffers
"Max Buffers" is an absolute threshhold for how many buffers can be allocated

chdev –l <veth> -a max_buf_small=4096 –P
chdev –l <veth> -a min_buf_small=2048 –P
Above increases min and max small buffers for the virtual ethernet adapter configured for the SEA above
Needs a reboot

Max buffers is an absolute threshold for how many buffers can be allocated
Use entstat –d (-all on vio) or netstat –v to get this information

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Thank you for your time

If you have questions please email me at:
jaqui@circle4.com or jlynch@flagshipsg.com

Also check out:
http://www.circle4.com/movies/

And the Virtual User Group
http://www.bit.ly/powersystemsvug

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HMC Maintenance

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Upgrading HMC from 7.7.7.0 to 7.7.8

ssh to HMC with 2 sessions

OUR HMC is 7042-cr6 installed at 7.7.7.0 SP2
Upgrading to HMC v7.7.8 MH01388

Step 1 Save upgrade data and then backup to USB stick or remote FTP using GUI
Step 2 check we have plenty of memory
monhmc -r mem -n 0
Mem: 4095732k total, 3978304k used, 117428k free, 311480k buffers
So our server has 4GB memory

monhmc -r disk -n 0
Check if filesystems are full
If they are in use a lot then
chhmcfs -o f -d 0
The above clears out all temp files
monhmc -r disk -n 0

Also lshmcfs shows all filesystems

Check for profile sizing:
http://www-01.ibm.com/support/docview.wss?uid=nas8N1019821

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Upgrading HMC from 7.7.7.0 to 7.7.8

ssh to HMC with 2 sessions

Since it is an upgrade we need to either use the media or do it via the CLI
On the first of the two ssh sessions: Login and cd /hmcdump
getupgfiles -h ftp.software.ibm.com -u anonymous --passwd ftp -d /software/server/hmc/network/v7780

On second ssh session:
ls -la /hmcdump
You will see files being loaded into the directory
Once everything is downloaded you will no longer see files in this directory
Exit this connection

On the first ssh session
chhmc -c altdiskboot -s enable --mode upgrade
The above tells it to set up to upgrade on boot

hmcshutdown -r -t now
Causes it to do the upgrade and takes about 20 minutes
HMC 778 is now apar MB03715 PTF MH01377

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Upgrading HMC from 7.7.7.0 to 7.7.8

Once it is back up we can do the updates:

In the GUI select Updates, Update HMC

Server information is:
ftp.software.ibm.com
anonymous login with your email as password
/software/server/hmc/fixes
Or for service packs
/software/server/hmc/updates

Mandatory fix apar MB03754 PTF MH01388
REBOOT HMC

Then do MH01404 is latest update (requires MH01388) using same process as above

After the reboot put in a new USB stick (if that is how backup was done)
Save upgrade data and then backup to USB stick or FTP server using the GUI

DVD has been disabled at one of the versions so you now need to backup to an FTP server or the 8GB USB stick that you may have purchased with the server.

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HMC v8

Required for POWER8

Runs on cr5 or C08 or higher

Will not run on earlier HMCs

Validates entitlement for POWER8

Introduces new Performance and Capacity Monitoring Task

Provides reports on resource utilization

NIST support – updates to JVM

LPM improvements to vSCSI performance

SR-IOV support

Dynamic partition remote restart can be changed when LPAR deactivated, not just at creation time

Absolute values for DLPAR

DOES NOT SUPPORT ANYTHING PRIOR TO POWER6

At 8.8.7 classic mode will go away so start using enhanced mode

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Upgrading to HMC v8

Check memory and hardware prereqs

i.e.no POWER5, etc

HMC must already be at v7.7.80 with fixpack MH01402 or HMC v7.7.9 prior to upgrade

NOTE – upgrading from any level prior to 7.7.8 is a reinstall not an upgrade

PowerVM 2.2.3.0 is required for the new performance metrics

Check prereqs if using redundant HMCs

Process:

Back it up

Get the upgrade files

Reboot to upgrade to v8

Apply first mandatory PTF (can do via GUI)

Reboot

Repeat till you run out of fixes

Backup again after the last reboot

To update to 8.8.6 your HMC must first be at v8.8.4+mandatory fix MH01560 or v8.8.5+mandatory fix MH01617

See article on HMC Maintenance at: http://ibmsystemsmag.com/aix/administrator/systemsmanagement/hmc-maintenance/

If going to 8.8.7 you will only have Enhanced Mode and Power6 will no longer be supported

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Useful HMC CLI Commands

monhmc -r mem -n 0	shows total, used and free memory of HMC
monhmc -r disk -n 0	shows filesystems and usage info (same as "df -k")
monhmc -r proc -n 0	shows cpu usage of each processor
monhmc -r swap -n 0	shows paging space usage
vtmenu	Get a console for an LPAR

getupgfiles -h ftp.software.ibm.com -u anonymous --passwd ftp -d /software/server/hmc/network/v8810

chhmc -c altdiskboot -s enable --mode upgrade	Boot from install image to upgrade
hmcshutdown -r -t now	Reboot now
lshmc –V	Show HMC version
chhmcfs -o f -d 0	Clear out old logfiles
lshmcfs	List HMC filesystems

lslic -m ??????? -F mtms,update_access_key_exp_date
where ?????? is the managed system name
It will reply with a line that includes the managed system name and the UAK expiry date

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HMC Scanner

- Latest HMC Scanner is available at http://tinyurl.com/HMCscanner
- Java program that uses SSH to connect to HMC, FSM or IVM to gather information about the system configuration – latest is 0.11.35 as of May 9, 2017
- I run it on one of the AIX Systems as follows:
  - ./hmcScanner.ksh servername hscroot -p password -stats
  - You can add -sanitize and it causes it to produce two spreadsheets – one that has been cleansed of identifying data
- Information is organized in tabs in an excel spreadsheet:
  - System summary: name, serial number, cores, memory, service processor IP for each server
  - LPAR Summary: list of all LPAR by serve with status, environment, version, processor mode
  - LPAR CPU: processor configuration of each LPAR
  - LPAR MEM: memory configuration of each LPAR
  - Physical Slots: list of all slots of each system with LPAR assignment, description, physical location and drc_index
  - Virtual Ethernet: network configuration of each virtual switch and each LPAR
  - Virtual SCSI: configuration of all virtual SCSI adapters, both client and server
  - VSCSI Map: devices mapped by each VIOS to partitions
  - Virtual Fibre: virtual fibre channel configuration of client and server with identification of physical adapter assigned
  - **SEA**: SEA configuration and statistics for all VIOS
  - SW Cores: LPAR and virtual processor pool configuration matrix to compute the number of software licenses. Simulation of alternative scenarios is possible.
  - CPU Pool Usage: monthly average history of CPU usage of each system. Based on last 12 months of lslparutil data.
  - Sys RAM Usage: monthly average history of physical memory assignement to each LPAR. Based on last 12 months of lslparutil data.
  - LPAR CPU Usage:monthly average history of CPU usage of each LPAR. Based on last 12 months of lslparutil data.
  - **CPU Pool Daily Usage**: 1 year of CPU usage of every pool and subpools of each system. Based on daily averages.
  - **LPAR Daily Usage**: 1 year of CPU usage of every LPAR of each system. Based on daily averages.
  - **CPU Pool HourlyUsage**: 2 months of CPU usage of every pool and subpools of each system. Based on hourly averages.
  - **LPAR Hourly Usage**: 2 months of CPU usage of every LPAR of each system. Based on hourly averages.

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Running HMC Scanner

I run it from AIX as Windows and Java issues have caused problems

Right now I have HMCScanner11
./hmcScanner.ksh *hmcname* hscroot -p *password* –stats

```
hmcScanner version 0.11.0
Detecting manager type: HMC
Detecting managed systems: 3 systems present.
Starting managed system configuration collection:
  Scanning p720-Server-8202-E4B-SERIALBP: ..... DONE
  Scanning p740-Server-8205-E6B-SERIALCP: ..... DONE
  Scanning p750-Server-8233-E8B-SERIAL8P: ..... DONE
Collection successfully finished. Data is in /software/hmcscanner-11/srvrhmc/
Performance data collection:
  Loading p720-Server-8202-E4B-SERIALBP: . .
  Loading p740-Server-8205-E6B-SERIALCP: . .
  Loading p750-Server-8233-E8B-SERIAL8P: . .
..... DONE
```

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Firmware Maintenance

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Entitlement

See article at:
http://ibmsystemsmag.com/aix/administrator/systemsmanagement/debunking-myths-about-power-entitlement/

Starting with POWER8 IBM will be checking entitlement when applying firmware fixes.
Entitlement requires an HWMA (hardware maintenance agreement)

POWER8 (and later) servers require machine code "update entitlement at activation"
POWER8 and later servers contain an "update access key" (UAK)

Machine code update entitlement is checked using the UAK at each activation / installation

Entitlement check must pass before an update can proceed
Entitlement is checked based on existing terms and conditions
Security and safety fixes are exempt from the entitlement check

Server originally comes with UAK valid for default warranty
E850 and below is 3 years, E870 and above is 1 year
After UAK expires you request renewals through the Entitled Systems Support Site:
https://www-304.ibm.com/servers/eserver/ess/ProtectedServlet.wss
You will receive them for 180 days at a time as longs as you have an active HWMA

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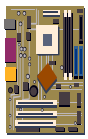
Maintaining Your Environment



- Firmware Code Matrix
  - https://www-304.ibm.com/support/customercare/sas/f/power5cm/home.html
- A good fix maintenance strategy is an important part of maintaining and managing your server. Regular maintenance of your server, and application of the latest fixes help to maximize server performance, and may reduce the impact of problems if they arise.
- It is recommended that all servers be kept on a supported release and current with latest available fix packages for HMC and server firmware fixes whenever possible.
- The most important scenario to avoid is remaining on a release so long that all subsequent releases that support a single-step upgrade are withdrawn from marketing. Without a single-step upgrade available, there are no supported ways for you to upgrade your server.

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General Firmware Strategies

- IBM releases new firmware for the following reasons:
  The addition of new system function.
  To correct or avoid a problem.

- There are some natural points at which firmware should be evaluated for potential updates:
- ✓ When a subscription notice advises of a critical or HIPER (highly pervasive) fix, the environment should be reviewed to determine if the fix should be applied.
- ✓ When one of the twice-yearly updates is released.
- ✓ Whenever new hardware is introduced into the environment the firmware pre-reqs and co-reqs should be evaluated.
- ✓ Anytime HMC firmware levels are adjusted.
- ✓ Whenever an outage is scheduled for a system which otherwise has limited opportunity to update or upgrade.
- ✓ When the firmware level your system is on is approaching end-of-service.
- ✓ If other similar hardware systems are being upgraded and firmware consistency can be maximized by a more homogenous firmware level.
- ✓ On a yearly cycle if firmware has not been updated or upgraded within the last year.

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Access to the Web

•Have web access in computer room to access the fixes and documentation

•Having a landline phone available to use for talking with support etc., it is helpful (what happens if your battery dies?)

•Have access to documentation for a server somewhere OTHER than on the server (ESPECIALLY restore procedures!)

- **Documentation**
- **Led codes**
- **Error Records**
- **Fixes**
- **TL**

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USEFUL COMMANDS

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Useful Commands

Command History
$ fc -l
725 lsrep
726 backupios -file /usr/local/backups/b750viobkp
727 exit
728 lsmap -vadapter vhost0
729 fc –l

Global command log
$ lsgcl | grep "Aug 9 2013"
Aug 9 2013, 08:25:35 root ioslevel
Aug 9 2013, 08:59:22 padmin license
Aug 9 2013, 09:00:29 padmin lsmap -vadapter vhost0
Aug 9 2013, 09:01:29 padmin lsgcl

Redirecting output when running as padmin
lsmap –all –npiv | tee npivdata.txt

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Useful Commands

vSCSI Commands

mkvdev -vdev hdisk2 -vadapter vhost0

mkvdev –fbo –vadapter vhost0

NPIV

Setup NPIV mappings

vfcmap –vadapter vfchost0 –fcp fcs0

lsmap –npiv –all

lsmap –vadapter vfchost0 –npiv

lsdev –virtual

lsnports

lsdev –slots

lscfg –vpl vfchost0

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Useful Commands

$ lsdev -virtual

```
name           status      description
ent5           Available   Virtual I/O Ethernet Adapter (l-lan)
ent6           Available   Virtual I/O Ethernet Adapter (l-lan)
ent7           Available   Virtual I/O Ethernet Adapter (l-lan)
vasi0          Available   Virtual Asynchronous Services Interface (VASI)
vbsd0          Available   Virtual Block Storage Device (VBSD)
vfchost0       Available   Virtual FC Server Adapter
vfchost1       Available   Virtual FC Server Adapter
vhost0         Available   Virtual SCSI Server Adapter
vhost1         Available   Virtual SCSI Server Adapter
vsa0           Available   LPAR Virtual Serial Adapter
b740ios1_rv1   Available   Virtual Target Device - Logical Volume
b740l1_rv1     Available   Virtual Target Device - Logical Volume
vtopt0         Available   Virtual Target Device - File-backed Optical
vtopt1         Available   Virtual Target Device - File-backed Optical
vtscsi0        Available   Virtual Target Device - Disk
vtscsi1        Available   Virtual Target Device - Disk
vtscsi2        Available   Virtual Target Device - Disk
vtscsi3        Available   Virtual Target Device - Disk
ent8           Available   Shared Ethernet Adapter
```

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Useful Commands

$ lsmap -vadapter vhost0

```
SVSA            Physloc                                      Client Partition ID
--------------- -------------------------------------------- ------------------
vhost0          U8205.E6B.1093XXX-V1-C21                     0x00000003

VTD                   b740l1_rv1
Status                Available
LUN                   0x8300000000000000
Backing device        lv_b740l1
Physloc
Mirrored              N/A

VTD                   vtopt0
Status                Available
LUN                   0x8200000000000000
Backing device
Physloc
Mirrored              N/A

VTD                   vtopt1
Status                Available
LUN                   0x8100000000000000
Backing device
Physloc
Mirrored              N/A
```

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Useful Commands

$ lsmap -vadapter vfchost0 -npiv

```
Name         Physloc                          ClntID ClntName       ClntOS
------------ -------------------------------- ------ -------------- -------
vfchost0     U8205.E6B.1093XXX-V1-C31         3

Status:NOT_LOGGED_IN
FC name:fcs0                    FC loc code:U78AA.001.WZSG8XX-P1-C5-T1
Ports logged in:0
Flags:4<NOT_LOGGED>
VFC client name:                VFC client DRC:
```

$ lsmap -vadapter vfchost4 -npiv

```
Name         Physloc                          ClntID ClntName       ClntOS
------------ -------------------------------- ------ -------------- -------
vfchost4     U8205.E6B.1093XXX-V1-C36         8 b740nl1       AIX

Status:LOGGED_IN
FC name:fcs0                    FC loc code:U78AA.001.WZSG8XX-P1-C5-T1
Ports logged in:3
Flags:a<LOGGED_IN,STRIP_MERGE>
VFC client name:fcs0            VFC client DRC:U8205.E6B.1093XXX-V8-C36
```

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Useful Commands

$ lsnports

```
name          physloc                         fabric tports aports swwpns awwpns
fcs0          U78AA.001.WZSG8XX-P1-C5-T1       1     64      63       2048      2041
```

$ lsdev -slots

```
# Slot                  Description       Device(s)
HEA 1                   Logical I/O Slot  lhea0 ent0
U8205.E6B.1093XXX-V1-C0      Virtual I/O Slot  vsa0
U8205.E6B.1093XXX-V1-C11     Virtual I/O Slot  ent5
U8205.E6B.1093XXX-V1-C12     Virtual I/O Slot  ent6
U8205.E6B.1093XXX-V1-C13     Virtual I/O Slot  ent7
U8205.E6B.1093XXX-V1-C21     Virtual I/O Slot  vhost0
U8205.E6B.1093XXX-V1-C22     Virtual I/O Slot  vhost1
U8205.E6B.1093XXX-V1-C23     Virtual I/O Slot  vhost2
U8205.E6B.1093XXX-V1-C31     Virtual I/O Slot  vfchost0
U8205.E6B.1093XXX-V1-C32     Virtual I/O Slot  vfchost1
U8205.E6B.1093XXX-V1-C33     Virtual I/O Slot  vfchost2
U8205.E6B.1093XXX-V1-C32769  Virtual I/O Slot  vasi0
U8205.E6B.1093XXX-V1-C32773  Virtual I/O Slot  vasi1
U8205.E6B.1093XXX-V1-C32774  Virtual I/O Slot  vasi2
U8205.E6B.1093XXX-V1-C32775  Virtual I/O Slot  vasi3
U8205.E6B.1093XXX-V1-C32776  Virtual I/O Slot  vasi4
```

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USEFUL HMC COMMANDS

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Useful HMC commands

hscroot@srvrhmc:~>lshmc -b
"bios=D6E149AUS-1.09
"

hscroot@srvrhmc:~>lshmc -r
ssh=enable,sshprotocol=,remotewebui=enable,xntp=disable,xntpserver=127.127.1.0,syslogserver=,syslogtcpserver=,syslogtlsserver=,altdiskboot=disable,ldap=disable,kerberos=disable,kerberos_default_realm=,kerberos_realm_kdc=,kerberos_clockskew=,kerberos_ticket_lifetime=,kpasswd_admin=,trace=,kerberos_keyfile_present=,kerberos_allow_weak_crypto=,legacyhmccomm=disable,security=legacy,sol=disabled

hscroot@srvrhmc:~>lshmc -e
emch=disabled,callhome=enabled,registered_hmcs=

On HMC check LMB sizes
hscroot@srvrhmc:~>lshwres -r mem -m p740-Server-8205-E6B-SERIALCP --level sys -F mem_region_size
256

Check entitlement
lslic -m ??????? -F mtms,update_access_key_exp_date
where ?????? is the managed system name
It will reply with a line that includes the managed system name and the expiry date

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Useful HMC commands – HMC Updates

ssh to HMC as hscroot or your userid

Use with great care

saveupgdata –r disk

getupgfiles -h public.dhe.ibm.com -u anonymous --passwd anonymous -d /software/server/hmc/network/v8860

ls –la /hmcdump

chhmc –c altdiskboot –s enable –mode upgrade

tail -f /tmp/HmcInstall.log during upgrade

Directories on FTP Server (ftp.software.ibm.com)
Upgrades: /software/server/hmc/network/v8860
Fixes: /software/server/hmc/fixes
Service Packs: /software/server/hmc/updates

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Useful HMC commands

ssh to HMC as hscroot or your userid

Useful Commands:

lshmc
vtmenu - way better than ascii console
lshwres

monhmc –r mem –n 0how much memory do I have?
monhmc –r proc –n 0 CPU usage
monhmc –r swap –n 0Page space
monhmc –r disk –n 0 What is my disk utilization?
chhmcfs –r disk –n 0 Clear out all temp files
lshmcfs

hmcshutdown –r –t now Reboot HMC

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Useful HMC commands – 7042-CR6

hscroot@srvrhmc:~>monhmc -r mem -n 0
Mem: 4043216k total, 3885308k used, 157908k free, 484132k buffers (has 4GB)

hscroot@srvrhmc:~>monhmc -r proc -n 0
Cpu0 : 0.0%us, 0.7%sy, 0.0%ni, 98.3%id, 1.0%wa, 0.0%hi, 0.0%si, 0.0%st
Cpu1 : 0.0%us, 0.0%sy, 0.0%ni,100.0%id, 0.0%wa, 0.0%hi, 0.0%si, 0.0%st
Cpu2 : 0.0%us, 0.0%sy, 0.0%ni,100.0%id, 0.0%wa, 0.0%hi, 0.0%si, 0.0%st
Cpu3 : 0.0%us, 0.0%sy, 0.0%ni,100.0%id, 0.0%wa, 0.0%hi, 0.0%si, 0.0%st

hscroot@srvrhmc:~>monhmc -r swap -n 0
Swap: 2040244k total, 137456k used, 1902788k free, 1036824k cached

hscroot@srvrhmc:~>monhmc -r disk -n 0

Filesystem	1K-blocks	Used	Available	Use%	Mounted on
/dev/sda2	16121184	7100064	8202208	47%	/
/dev/sda3	6040320	297672	5435808	6%	/var
/dev/mapper/HMCDataVG-HomeLV	10321208	245052	9551868	3%	/home
/dev/mapper/HMCDataVG-LogLV	8256952	1292372	6545152	17%	/var/hsc/log
/dev/mapper/HMCDataVG-DumpLV	123854820	319672	117243692	1%	/dump
/dev/mapper/HMCDataVG-ExtraLV	20642428	198692	19395160	2%	/extra
/dev/mapper/HMCDataVG-DataLV	227067260	455376	215077548	1%	/data

hscroot@srvrhmc:~>lshmcfs
filesystem=/var,filesystem_size=8063,filesystem_avail=6390,temp_files_start_time=07/14/2014 13:11:00,temp_files_size=783
filesystem=/dump,filesystem_size=120951,filesystem_avail=114495,temp_files_start_time=07/14/2014 21:09:00,temp_files_size=0
filesystem=/extra,filesystem_size=20158,filesystem_avail=18940,temp_files_start_time=none,temp_files_size=0
filesystem=/,filesystem_size=15743,filesystem_avail=8009,temp_files_start_time=07/22/2014 23:18:00,temp_files_size=0

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Useful HMC commands – 7042-CR7

hscroot@srvr8hmc:~>monhmc -r mem -n 0
Mem: 41263576k total, 3608896k used, 37654680k free, 551600k buffers
Either it has 41GB memory or there is a bug ☺

hscroot@srvr8hmc:~>monhmc -r proc -n 0
Cpu0 : 0.0%us, 0.0%sy, 0.0%ni,100.0%id, 0.0%wa, 0.0%hi, 0.0%si, 0.0%st
Cpu1 : 0.0%us, 0.3%sy, 0.0%ni, 99.7%id, 0.0%wa, 0.0%hi, 0.0%si, 0.0%st
Cpu2 : 0.0%us, 0.0%sy, 0.0%ni,100.0%id, 0.0%wa, 0.0%hi, 0.0%si, 0.0%st
Cpu3 : 0.0%us, 0.0%sy, 0.0%ni,100.0%id, 0.0%wa, 0.0%hi, 0.0%si, 0.0%st
Cpu4 : 0.0%us, 0.0%sy, 0.0%ni,100.0%id, 0.0%wa, 0.0%hi, 0.0%si, 0.0%st
Cpu5 : 0.0%us, 0.0%sy, 0.0%ni,100.0%id, 0.0%wa, 0.0%hi, 0.0%si, 0.0%st

hscroot@srvr8hmc:~>monhmc -r swap -n 0
Swap: 2040244k total, 0k used, 2040244k free, 934024k cached

hscroot@srvr8hmc:~>monhmc -r disk -n 0

Filesystem	1K-blocks	Used	Available	Use%	Mounted on
/dev/sda2	16121184	6715032	8587240	44%	/
/dev/sda3	6040320	270112	5463368	5%	/var
/dev/mapper/HMCDataVG-HomeLV	10321208	244856	9552064	3%	/home
/dev/mapper/HMCDataVG-LogLV	8256952	479796	7357728	7%	/var/hsc/log
/dev/mapper/HMCDataVG-DumpLV	61927420	187024	58594668	1%	/dump
/dev/mapper/HMCDataVG-ExtraLV	20642428	198692	19395160	2%	/extra
/dev/mapper/HMCDataVG-DataLV	144497320	195428	136961860	1%	/data

hscroot@srvr8hmc:~>lshmcfs
filesystem=/var,filesystem_size=8063,filesystem_avail=7185,temp_files_start_time=07/14/2014 16:33:00,temp_files_size=318
filesystem=/dump,filesystem_size=60475,filesystem_avail=57221,temp_files_start_time=07/14/2014 20:15:00,temp_files_size=0
filesystem=/extra,filesystem_size=20158,filesystem_avail=18940,temp_files_start_time=none,temp_files_size=0
filesystem=/,filesystem_size=15743,filesystem_avail=8385,temp_files_start_time=07/22/2014 22:43:00,temp_files_size=0

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Useful HMC commands

lshmc
- -V - Displays HMC version information.
- -v - Displays HMC VPD information.
- -r - Displays HMC remote access settings.
- -n - Displays HMC network settings.
- -b - Displays the BIOS level of the HMC.
- -l - Displays the current locale for the HMC.
- -L - Displays all supported locales for the HMC.
- -h - Displays HMC hardware information.
- -i - Displays HMC Integrated Management Module (IMM) settings.
- -e - Displays HMC settings for Events Manager for Call Home.
- -F [<attribute names>] - delimiter-separated list of the names of the attributes to be listed for the specified HMC setting. If no attribute names are specified, then all attributes will be listed.
- --header - prints a header of attribute names when -F is also specified
- --help - prints this help

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Useful HMC commands

ssh to HMC as hscroot or your userid

hscroot@srvrhmc:~>lshmc -V
"version= Version: 8
 Release: 8.1.0
 Service Pack: 0
HMC Build level 20140602.3
MH01421: Required fix for HMC V8R8.1.0 (06-03-2014)
MH01436: Fix for OpenSSL,GnuTLS (06-11-2014)
MH01441: Fix for HMC V8R8.1.0 (06-23-2014)
","base_version=V8R8.1.0
“

hscroot@srvrhmc:~>lshmc -v
"vpd=*FC ????????
*VC 20.0
*N2 Wed Jul 23 04:45:57 UTC 2014
*FC ????????
*DS Hardware Management Console
*TM 7042-CR6
*SE 102EEEC
*MN IBM
*PN 0B20PT
*SZ 4140253184
*OS Embedded Operating Systems
*NA 10.250.134.20
*FC ????????
*DS Platform Firmware
*RM V8R8.1.0.0
"

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References

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Useful Links

- Jaqui Lynch Articles
  - http://www.circle4.com/jaqui/eserver.html
- Jay Kruemke Twitter – chromeaix
  - https://twitter.com/chromeaix
- Nigel Griffiths Twitter – mr_nmon
  - https://twitter.com/mr_nmon
- Gareth Coates Twitter – power_gaz
  - https://twitter.com/power_gaz
- Jaqui's Movies
  - Movie replays
    - http://www.circle4.com/movies
- IBM US Virtual User Group
- http://www.tinyurl.com/ibmaixvug
- Power Systems UK User Group
  - http://tinyurl.com/PowerSystemsTechnicalWebinars

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VIOS Specific References

- SDD and SDDPCM Specific procedures for VIOS
  - http://www-01.ibm.com/support/docview.wss?uid=ssg1S7002686&aid=1
- SG24-7940 - PowerVM Virtualization - Introduction and Configuration
  - http://www.redbooks.ibm.com/redbooks/pdfs/sg247940.pdf
- SG24-7590 – PowerVM Virtualization – Managing and Monitoring
  - http://www.redbooks.ibm.com/redbooks/pdfs/sg247590.pdf
- SG24-8080 – Power Systems Performance Guide – Implementing and Optimizing
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