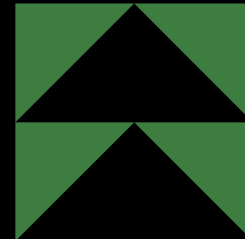
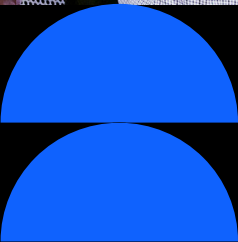
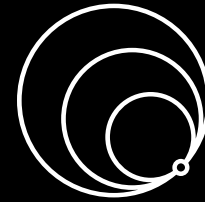
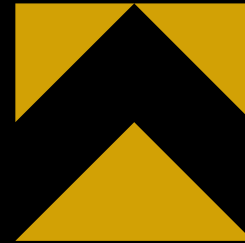
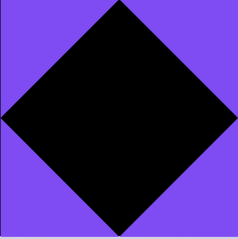
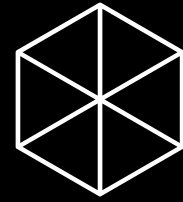


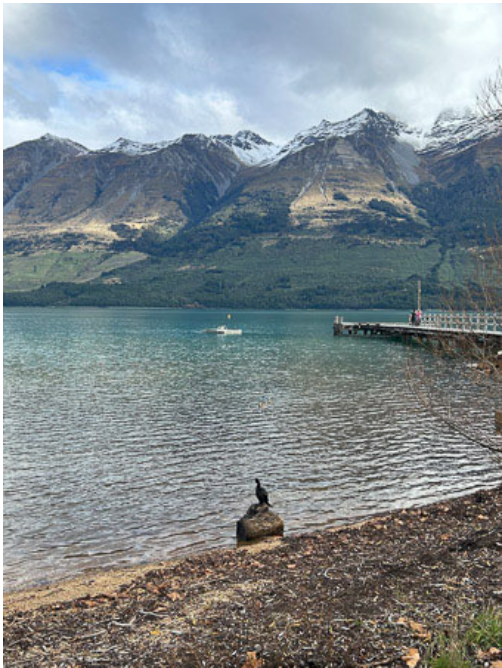
IBM TechXchange 2025 conference

Unlocking Virtualization Performance: Top Tips for Managing Your VIO Servers Session 1074

Jaqui Lynch
Circle4 Consulting
Owner



Unlocking Virtualization Performance: Top Tips for Managing Your VIO Servers



IBM Techxchange October 2025
Session 1074 10/8/2025 1030am

Jaqui Lynch

Circle4 Consulting

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<http://www.circle4.com/ptechu/viostoptips-oct2025.pdf> (updated 10/7/2025)

Agenda

1. Optimizing performance for AI and Cloud Workloads
2. Upgrades and Patch Management
 1. Stay current – upgrade regularly
 1. If you don't the upgrades become very complex and take longer
 2. Install Hiper fixes and fixes to java, ssh, ssl, python, invscout, rpm, perl, etc
 3. Use vio commands for maintenance
 4. Always have a second disk available for updates and quick failback
 5. Use dual vio so you get concurrent update
 6. Don't forget to update I/O firmware (pay attention to patch order)
 7. Keep it simple
 8. Document well
3. HMC Enhancements
 1. Backup regularly
 1. New backup function on HMC950 to backup VIO to HMC
4. Other
 1. Give vio plenty of resources
 1. Entitlement, memory, HBA queues, virtual buffers
 2. Make sure storage is zoned and mapped for LPM
 3. Use NTP to get consistent time

Articles at Techchannel on various topics:

<https://techchannel.com/contributor/jaqui-lynch/>

1. Optimizing Performance for AI and Cloud Workloads

Staying current is critical

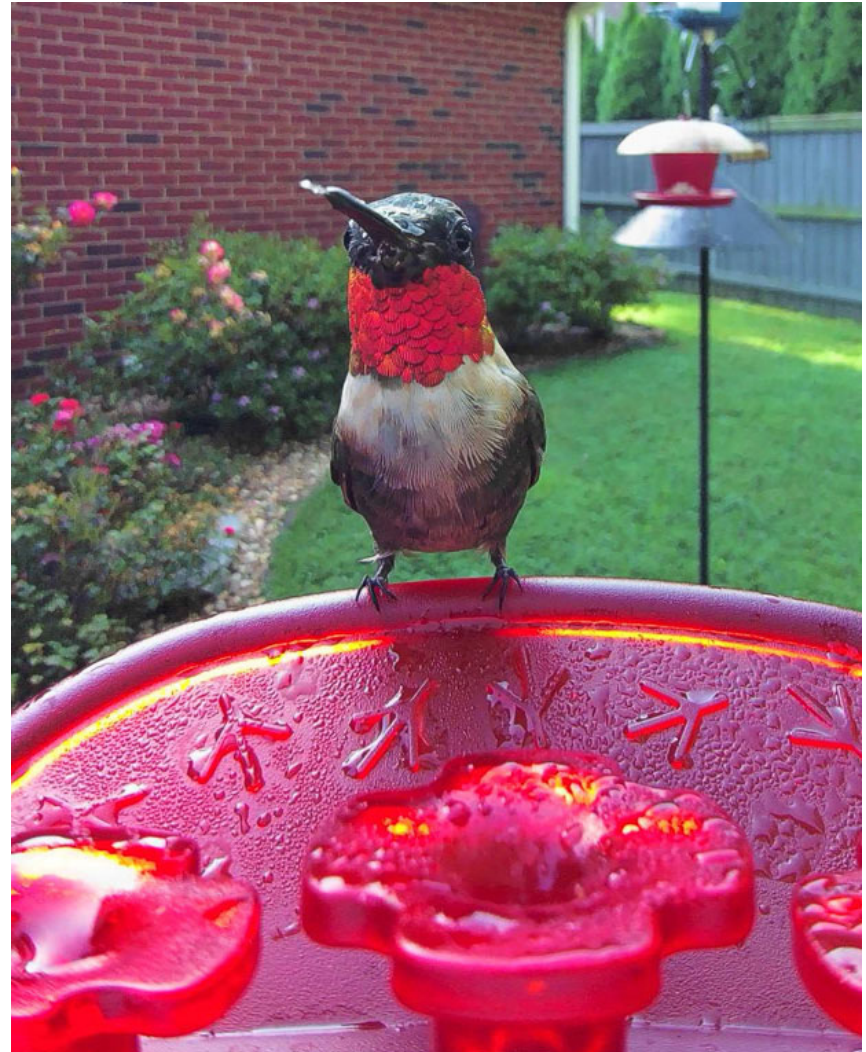
- Firmware
- I/O Firmware
- VIO software
- Operating System
- SAN and switch levels
- eFixes
- HMC



All of these can impact performance

2. Upgrades and Patch Management

Don't forget NIM
Also: HMC, firmware
and I/O firmware



Stay Current

<http://www14.software.ibm.com/webapp/set2/flrt/liteTable?prodKey=vios>

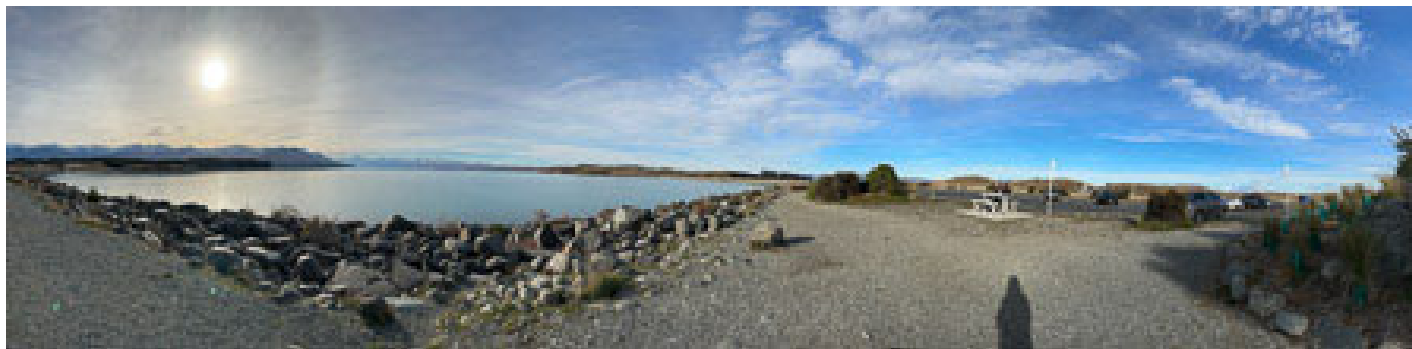
Version	Recommended Update	Recommended Upgrade	Release Date	EoSPS Date	Next Pack Date
4.1.1.10			2025.07.23	2027.12.31	2025.12.05
4.1.1.0			2024.12.12	2027.12.31	
4.1.0.40		4.1.1.0	2025.07.23	2026.11.30	
4.1.0.30		4.1.1.0	2025.02.07	2026.11.30	
4.1.0.21	4.1.0.30	4.1.1.0	2024.06.07	2026.11.30	
4.1.0.20	4.1.0.30	4.1.1.0	2024.06.07	2026.11.30	
4.1.0.10	4.1.0.30	4.1.1.0	2023.11.10	2026.11.30	
4.1.0.0	4.1.0.30	4.1.1.0	2023.11.10	2026.11.30	
3.1.4.60			2025.07.23	2026.04.30	
3.1.4.50		4.1.1.0	2024.12.12	2026.04.30	
3.1.4.41	3.1.4.50	4.1.1.0	2024.06.07	2026.04.30	
3.1.4.40	3.1.4.50	4.1.1.0	2024.06.07	2026.04.30	
3.1.4.31	3.1.4.50	4.1.1.0	2023.11.10	2026.04.30	
3.1.4.30	3.1.4.50	4.1.1.0	2023.11.10	2026.04.30	
3.1.4.21	3.1.4.50	4.1.1.0	2023.04.28	2026.04.30	
3.1.4.20	3.1.4.50	4.1.1.0	2023.04.28	2026.04.30	
3.1.4.10	3.1.4.50	4.1.1.0	2022.12.02	2026.04.30	
3.1.3.40		4.1.1.0	2023.07.28	2024.09.30	
3.1.0.30	3.1.0.60	4.1.1.0	2020.05.15	2021.11.30	
3.1.0.21	3.1.0.60	4.1.1.0	2019.05.08	2021.11.30	
3.1.0.10	3.1.0.60	4.1.1.0	2018.11.09	2021.11.30	
2.2.6.65			2020.07.17	2020.09.30	
2.2.6.61	2.2.6.65		2020.05.15	2020.09.30	

NOTE all levels prior to 2.2.5 went EOS as of December 2018
2.2.5 went end of service 9/30/2019
2.2.6 went end of service 9/30/2020 – TIME TO UPGRADE TO V4
2.2 service extension ended 6/30/2023
All levels prior to 3.1.3.40 went EOSPS by 11/30/2022

******PowerVM 4.1.0.10 GA 11/20/2023**
V4 has been around for along time now!

Patch order

1. Read the readmes
2. Usually do HMC first
3. Then server firmware
4. NIM server (it should be standalone and needs to be at highest level) plus I/O firmware, build NIM resources for new VIO Level
5. Then VIO servers and any I/O firmware
6. LPARs – AIX, IBM i, Linux
7. Note I document everything before I start
8. I write up every step of the upgrade before I do it and then tweak as I go along



PowerVM 4.1.1.10

GA 4.1.1.10 – 7/23/2025

4.1.1.10 New Features

See: www.ibm.com/support/pages/node/7239827

viosupgrade enhancements

viosbr enhancements

VFC enhancements

NFS mounted ISO images support in Virtual Media Library

Remove unwanted language message filesets

Shared Storage Pool Enhancements

LPM validation enhancements

Virtual Ethernet multi queue feature

Ability to run alt_root_vg in phases

chdev has a new option –dynupdate to support dynamic updates of supported device attributes

Equivalent of AIX 7300-03-01

Use viosupgrade tool and flash image from ESS to go from v3.1.* to 4.1.0.10

To avoid issues with padmin login after the update see:

<https://www.ibm.com/support/pages/node/7145269>

Readme at:

<https://www.ibm.com/support/pages/node/7065507>

VIOS levels

Latest is 4.1.1.10 which is based on AIX 7.3.3.1 - as of 7/23/2025

You can install directly from the flash copy which is at v4.1.1.10. You can also use this copy to upgrade directly from VIOS v3.1.0.0

It is preferred that your system be at v3.1.4.30 prior to upgrading if possible

If you are running v2.2.6 the VIO must be upgraded to v3.1.0 before patching to the higher levels

If you are running SSP then you need to be at v3.1.3.x or later prior to upgrading to v4.1

Download 4.1.1.10 flash copy from entitled software: <https://www.ibm.com/servers/eserver/ess/index.wss>

Current Flash copy is called:

Virtual_IO_Server_Base_Install_4.1.1.10_Flash_072025_LCD8292403.iso

You can download the 4.1.1.10 update with all prerequisites from Fix Central: <http://www-933.ibm.com/support/fixcentral/>

Release Notes for 4.1.1.10 Fix Pack - www.ibm.com/support/pages/node/7239827

Make sure to check the box to include prerequisites

NIM Master needs to be at 7300-03-01 at a minimum for v4.1.1.10

Check required HMC and firmware levels

Minimum server level is POWER8 and above

NOTE POWER7 only supports up to VIOS 3.1.2

Lifecycle: <http://www-01.ibm.com/support/docview.wss?uid=isg3T1023504>

When installing a new server read the redbook to ensure your VIO level, HMC, etc are supported

As an example all POWER 11 servers require v4.1.1.10 of the VIO and V11 of the HMC

Note the following Hiper for NPIV and specific adapters: <https://www.ibm.com/support/pages/node/7172778>

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:

<https://www.ibm.com/support/pages/node/6561917>

System Software Maps for VIOS:

<http://www-01.ibm.com/support/docview.wss?uid=ssm1platformvios>

AIX/VIOS Security Tables:

https://esupport.ibm.com/customercare/flrt/doc?page=security&os=vios_sec

VIOS Hiper Tables:

https://esupport.ibm.com/customercare/flrt/doc?page=hiper&os=vios_hiper

Also check MPIO driver versions as there are specific requirements for each VIO release

Support Lifecycle

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

VIOS - <https://www.ibm.com/support/pages/powervm-vios-lifecycle-information>

Create backup to padmin account

- I do this so there are no shared accounts (security) and also in case something happens to padmin
- Create userid (in my case jlynch) and set the password

- Isrole PAdmin

PAdminauthorizations=vios.device,vios.fs,vios.install,vios.lvm,vios.network,vios.security,vios.system,vios.oemsetupenv,vios.system.cluster,aix.system.config.artex rolist= groups=staff visibility=1 screens=* dfltmsg= msgcat=auth_mode=INVOKER id=23

- Isrole CacheAdm

CacheAdm authorizations=cache.device.config,cache.device.manage rolist= groups= visibility=1 screens=* dfltmsg=SSD Cache Device Administrator msgcat=cache_ssd.cat msgnum=5 msgset=3 auth_mode=INVOKER id=25

- As padmin

chuser -attr default_roles=PAdmin,CacheAdm roles=PAdmin,CacheAdm jlynch
Copy the .profile from /home/padmin to /home/jlynch

Dual VIO

- Use dual VIO to allow for concurrent updates
- If properly setup you can update one vio and reboot it while the other is managing the environment
- Test failover (SEA or other network failover and disk if VIO goes down)
- Test what happens if you lose one side of a network aggregate
- Requires a split backplane if you are using internal disks on some servers
- Provides greater redundancy and flexibility
- Can have one pair managing everything or can have a pair for network and a pair for disk I/O

Reboot periodically

- Updating or just rebooting a VIO server that has not been rebooted for 2 years is terrifying – my worst was 1745 days. My rule of thumb is to reboot at least every 6 months, preferably every 3 months
- If you have dual vio servers and they are redundant this should cause no issues
- I always do a viosbr backup, then a bosboot and rewrite the bootlist before any reboot.
- Recovery, if issues with the upgrade, is to point the bootlist to the cloned disk and reboot
- Finally, if I am doing patching and the VIO has not been rebooted lately, I start with a reboot BEFORE making any changes. If > 45 days I always start the upgrade with a clean reboot after rewriting the boot image (bosboot) and the boot list (bootlist)
- And of course, check errpt before making any changes. You don't want to make changes before fixing any outstanding issues.

Always have a second disk

If the VIO is on internal disk you should mirror rootvg

I run mirrored and break the mirror when I need the second disk to clone prior to maintenance

Make sure ordered server has a split backplane (if needed) and at least 4 disks, so you can have two vio servers on internal disks with the disks split across the backplanes

Newer servers that use NVME don't need a split backplane

If the VIO is on the SAN you should still have the second disk

A second disk is required for version upgrades

Then when you do maintenance, you can use `alt_disk_copy` to take a clone before making changes

`alt_disk_copy -V -B -d hdisk1`

-B tells it not to change the bootlist, -V is verbose mode

Takes a clone of rootvg to hdisk1 which will show as `altinst_rootvg` on an lsvg

If you want to use FBO (file backed optical) add a 3rd disk in its own VG so rootvg does not get huge

That disk can be on the SAN or internal. I put it on my least busy VIO server

Keep rootvg small and clean

I usually give my VIO 150GB LUNs if on SAN, although I prefer internal disks

Internal disks means that if I have a SAN problem, I can still boot the VIO for debugging

VIO disks

Here is what I see on one of my VIO servers that has 4 internal NVME disks

```
$ ioslevel
```

```
4.1.0.21
```

```
$ lspv
```

NAME	PVID	VG	STATUS
hdisk0	00ce48d003f8524f	rootvg	active
hdisk1	00ce48d03ca02f6a	altinst_rootvg	
hdisk2	none	None	
hdisk3	00ce48d008d89922	fbovg	active

```
$ lspv -size
```

NAME	PVID	SIZE(megabytes)
hdisk0	00ce48d003f8524f	270648
hdisk1	00ce48d03ca02f6a	270648
hdisk2	none	270648
hdisk3	00ce48d008d89922	270648

Use alt_disk_copy prior to changes

- Have two disks so you can take a clone
- If rootvg is mirrored you will need to unmirror for maintenance
- No need to mirror if the VIO is on the SAN, but always mirror rootvg if the VIO is on internal disk

```
# lspv | grep root
```

```
hdisk0      00ce48c008314b9f      rootvg      active
hdisk1      00ce48c03c8f2115      altinst_rootvg
```

```
# bootinfo -b
```

```
hdisk0
```

```
exportvg altinst_rootvg
```

```
alt_disk_copy -V -B -d hdisk1
```

I also take a mkysb backup to my NIM server

I always do a bosboot and rewrite the bootlist before any reboot

Recovery, if issues with the upgrade, is to point the bootlist to the cloned disk and reboot

Use VIO commands for updates and patching

- For updates use updateios
 - Load the fix pack or service pack into a directory
 - I use an NFS mount from my NIM server, you can do that or create it locally
 - `updateios -accept -install -dev /usr/local/soft/vios41110-FP`
- For upgrades (v2 to v3 or v3 to v4) use viosupgrade on the VIO
 - Note NIM also has a viosupgrade command – it has a different syntax and may not handle currently installed eFixes and iFixes very well
- If you need to update java, ssh and ssl
 - Put patches in their own directory and then use updateios against that directory
 - `updateios -accept -install -dev /usr/local/soft/javasshssl-vio-aug272025`
- eFixes and iFixes
 - `emgr` to list patches
 - Use updateios to install or remove them
 - Only resort to `emgr` to install a patch if updateios fails

VIO commands from my VIO 4.1.1.10 update

```
updateios -commit
updateios -accept -install -dev /usr/local/software/powervm41/powervm411-10-FP
updateios -accept -install -dev /usr/local/software/flrtfixes/python-3.11.13.0
updateios -accept -install -dev /usr/local/software/flrtfixes/python-3.9.23.0
updateios -accept -install -dev /usr/local/software/flrtfixes/rpm_418120067
updateios -accept -install -dev /usr/local/software/flrtfixes/vioupdates-aug252025
```

```
ioslevel
4.1.1.10
```

```
oem_setup_env
updtvpkg
```

Always run this any time you update the O/S, especially rpm

```
# emgr -l
ID STATE LABEL          INSTALL TIME   UPDATED BY ABSTRACT
=====
1  S  11053sa      08/25/25 18:08:42   ifix for Libcurl CVEs
2  S  3272899ma    08/25/25 18:09:03   ifix for OpenSSH CVE's
3   S  IJ55269s1a   08/25/25 18:09:42   IJ55269 - POTENTIAL SECURITY ISSUE
```

```
cd /usr/local/software/flrtvc
./flrtvc-0812-.ksh
All vulnerabilities fixed.
```

Install Hiper and other fixes



Updating Java, SSH and SSL (as of 8/25/2024)

- SSH and SSL are obtained from the Web Download Pack which has moved to:
 - <https://www-01.ibm.com/marketing/iwm/iwm/web/pickUrxNew.do?source=aixbp>
- Untar the files and put all ssh, ssl and java files (Java7 and java8) into a directory. I used /usr/local/soft/javasshssl
- \$updateios -commit
- \$updateios -accept -install -dev /usr/local/soft/javasshssl
 - There are about 96 to go on
- #!slpp -l | grep Java8
- Make sure Java8.sdk/jre and Java8_64.sdk/jre are on
- \$updateios -commit
- **\$updateios -remove Java6**
 - Removes 7 filesets
- **\$updateios -remove Java6_64**
 - Removes 7 filesets
- As of 3.1.0.21 you can also remove Java7 the same way you remove Java6 above
- Latest Java7 is 7.0.0.715 and Java8 is 8.0.0.851
- Latest SSH is 9.9.3015.1000
- Latest SSL is 3.0.15.1001



Remove SSH language filesets

If you don't need them, you can remove the SSH language filesets as padmin using `updateios -remove`. Otherwise, they may stay backlevel.

```
updateios -remove openssh.msg.CA_ES  
updateios -remove openssh.msg.CS_CZ  
updateios -remove openssh.msg.DE_DE  
updateios -remove openssh.msg.ES_ES  
updateios -remove openssh.msg.FR_FR  
updateios -remove openssh.msg.HU_HU  
updateios -remove openssh.msg.IT_IT  
updateios -remove openssh.msg.JA_JP  
updateios -remove openssh.msg.Ja_JP  
updateios -remove openssh.msg.KO_KR  
updateios -remove openssh.msg.PL_PL  
updateios -remove openssh.msg.PT_BR  
updateios -remove openssh.msg.RU_RU  
updateios -remove openssh.msg.SK_SK  
updateios -remove openssh.msg.ZH_CN  
updateios -remove openssh.msg.ZH_TW
```

```
updateios -remove openssh.msg.ca_ES  
updateios -remove openssh.msg.cs_CZ  
updateios -remove openssh.msg.de_DE  
updateios -remove openssh.msg.es_ES  
updateios -remove openssh.msg.fr_FR  
updateios -remove openssh.msg.hu_HU  
updateios -remove openssh.msg.it_IT  
updateios -remove openssh.msg.ja_JP  
updateios -remove openssh.msg.ko_KR  
updateios -remove openssh.msg.pl_PL  
updateios -remove openssh.msg.pt_BR  
updateios -remove openssh.msg.ru_RU  
updateios -remove openssh.msg.sk_SK  
updateios -remove openssh.msg.zh_CN  
updateios -remove openssh.msg.zh_TW  
updateios -remove openssh.msg.EN_US
```

Efixes and ifixes

Many security patches are put on using efixes or ifixes (VIOS and AIX)

The VIO server also needs these to be applied – **use FLRTVC to determine what fixes are needed**

Run flrtvc and download and install the ifixes that are needed

<https://www-304.ibm.com/webapp/set2/sas/f/flrt/flrtvc.html>

Security fixes are found as tar files at: <https://public.dhe.ibm.com/aix/efixes/security/>

`/usr/sbin/emgr -l` lists the installed eFixes and iFixes

`emgr -P` lists the patches and the packages they affect

To apply a fix

Copy them into a directory (`/usr/local/soft/vioflrt2`)

```
# ls -l /usr/local/soft/vioflrt2
```

```
total 38904
```

```
-rw-r----- 1 root system 1395899 Aug 25 16:25 11053sa.250506.epkg.Z
-rw-r----- 1 root system 13374601 Aug 25 16:25 3272899ma.250521.epkg.Z
-rw-r----- 1 root system 5131215 Aug 25 16:25 IJ55269s1a.250716.epkg.Z
```

```
updateios -commit
```

```
updateios -accept -install -dev /usr/local/soft/vioflrt2
```

NOTE `updateios -commit` will not work with efixes applied so make sure to do an `updateios -commit` prior to applying ifixes
If you run `emgr -P` and `emgr -l` and there are no fixes listed, then you most likely have security holes that need patching.

Efixes and ifixes

All VIOS Hipers: http://www14.software.ibm.com/webapp/set2/flrt/doc?page=hiper&os=vios_hiper

Managing ifixes on a VIO server:

<https://www.ibm.com/support/pages/managing-ifix-vio-server>

Fixes are typically accessed using ftp or https at:

<https://aix.software.ibm.com/aix/ifixes>

<https://aix.software.ibm.com/aix/efixes>

<https://aix.software.ibm.com/aix/efixes/security/>

You can replace aix.software.ibm.com with public.dhe.ibm.com if needed

FLRTVC provides the direct link

Removal

To remove an efix or ifix:

```
# /usr/sbin/emgr -r -L <EFIX label>
```

```
emgr -r -L IJ16586s3a
```

Efixes and ifixes for 4.1.1.10 as of 8/27/2025

For 4.1.1.10 as of 8/27/2025 several patches are needed once SSH, SSL and Java are updated:

```
vio1# emgr -l
```

ID	STATE	LABEL	INSTALL TIME	UPDATED BY	ABSTRACT
1	S	11053sa	08/25/25 18:56:24		ifix for Libcurl CVEs
2	S	3272899ma	08/25/25 18:56:45		ifix for OpenSSH CVE's
3	S	IJ55269s1a	08/25/25 18:57:24		IJ55269 - POTENTIAL SECURITY ISSUE

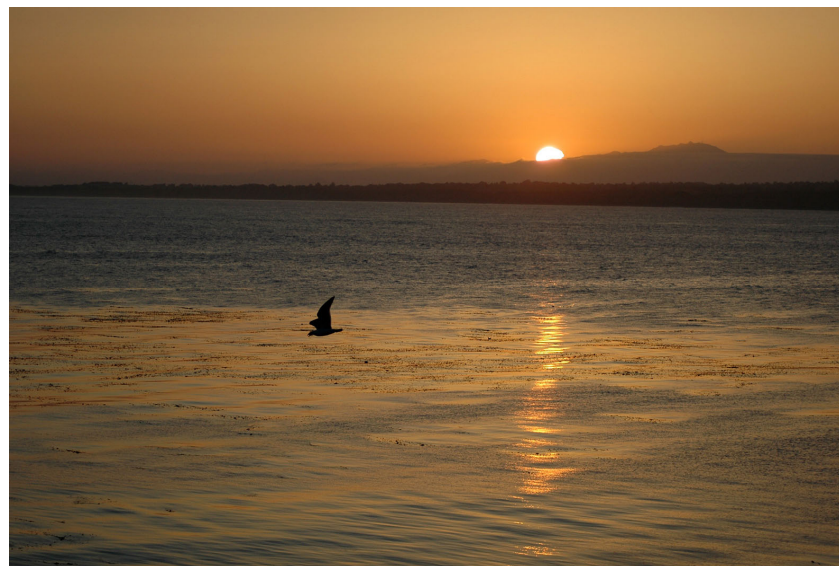
Plus other patches (using install via updateios)

Use `lspp -l | grep ????` To check these

rpm	4.18.1.2006 – should now be 2007
perl	5.38.2.3
tcl	8.6.10.1
python	3.11.13.0, 3.9.23.0
ssl	3.0.15.1001
ssh	9.9.3015.1000
java	8.0.0.851
invscout	2.2.0.28

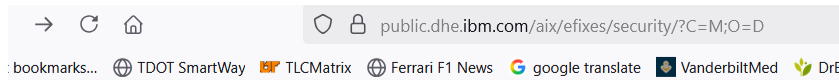
If `bind.rte` is installed it also needs patching

NEW RPM fix as of 6/10/2025 – tagged as 9.8/10



Efixes and ifixes

https://public.dhe.ibm.com/aix/efixes/security/rpm_advisory4.asc



The content on this page is publicly available information.

The directory structure is accessible and traversable by design.

Name	Last modified	Size	Description
Parent Directory	-	-	-
rpm_advisory4.asc	2025-10-06 15:01	7.8K	
rpm_advisory4.asc.4Ksig	2025-10-06 15:01	512	
rpm_advisory4.asc.sig	2025-10-06 15:01	256	
rpm_fix4.tar	2025-10-06 15:01	134M	
nas_advisory4.asc	2025-09-16 08:02	8.4K	
nas_advisory4.asc.4Ksig	2025-09-16 08:02	512	
nas_advisory4.asc.sig	2025-09-16 08:01	256	
nas_fix4.tar	2025-09-16 08:01	1.3M	
perl_advisory11.asc	2025-09-16 08:01	9.1K	
perl_advisory11.asc.4Ksig	2025-09-16 08:01	512	
perl_advisory11.asc.sig	2025-09-16 08:01	256	
perl_fix11.tar	2025-09-16 08:01	278M	
python_advisory16.asc	2025-08-20 08:02	10K	
python_advisory16.asc.4Ksig	2025-08-20 08:02	512	
python_advisory16.asc.sig	2025-08-20 08:02	256	
python_fix16.tar	2025-08-20 08:02	246M	
libxml2_advisory9.asc	2025-07-17 09:02	13K	
libxml2_advisory9.asc.4Ksig	2025-07-17 09:02	512	
libxml2_advisory9.asc.sig	2025-07-17 09:02	256	
libxml2_fix9.tar	2025-07-17 09:02	40M	

VULNERABILITY DETAILS:

CVEID: CVE-2025-6965

<https://www.cve.org/CVERecord?id=CVE-2025-6965>

DESCRIPTION: There exists a vulnerability in SQLite versions before 3.50.2 where the number of aggregate terms could exceed the number of columns available. This could lead to a memory corruption issue.

CVSS Base Score: 9.8

CVSS Environmental Score*: Undefined

CVSS Vector: (CVSS:3.1/AV:N/AC:L/PR:N/UI:N/S:U/C:H/I:H/A:H)

AFFECTED PRODUCTS AND VERSIONS:

AIX 7.2, 7.3
 VIOS 3.1, 4.1

The vulnerabilities in the following filesets are being addressed:

key_fileset = aix

Fileset	Lower Level	Upper Level	KEY
rpm.rte	4.15.1.1000	4.15.1.1016	key_w_fs
rpm.rte	4.15.1.2000	4.15.1.2014	key_w_fs
rpm.rte	4.18.1.2000	4.18.1.2006	key_w_fs

Note:

A. Latest level of RPM fileset is available from the web download site:

<https://www.ibm.com/resources/mrs/assets?source=aixbp>

Checks to run after update

These check for the expected oslevel as well as missing filesets, etc

```
vio1# oslevel -s
```

```
7300-03-01-2520
```

```
vio1# oslevel -s -l 7300-03-01-2520
```

```
vio1# instfix -i | grep ML
```

```
All filesets for 7.3.0.0_AIX_ML were found.
```

```
All filesets for 7300-00_AIX_ML were found.
```

```
All filesets for 7300-01_AIX_ML were found.
```

```
All filesets for 7300-02_AIX_ML were found.
```

```
All filesets for 7300-03_AIX_ML were found.
```

```
vio1# lppchk -v
```

```
vio1# lppchk -vm3
```

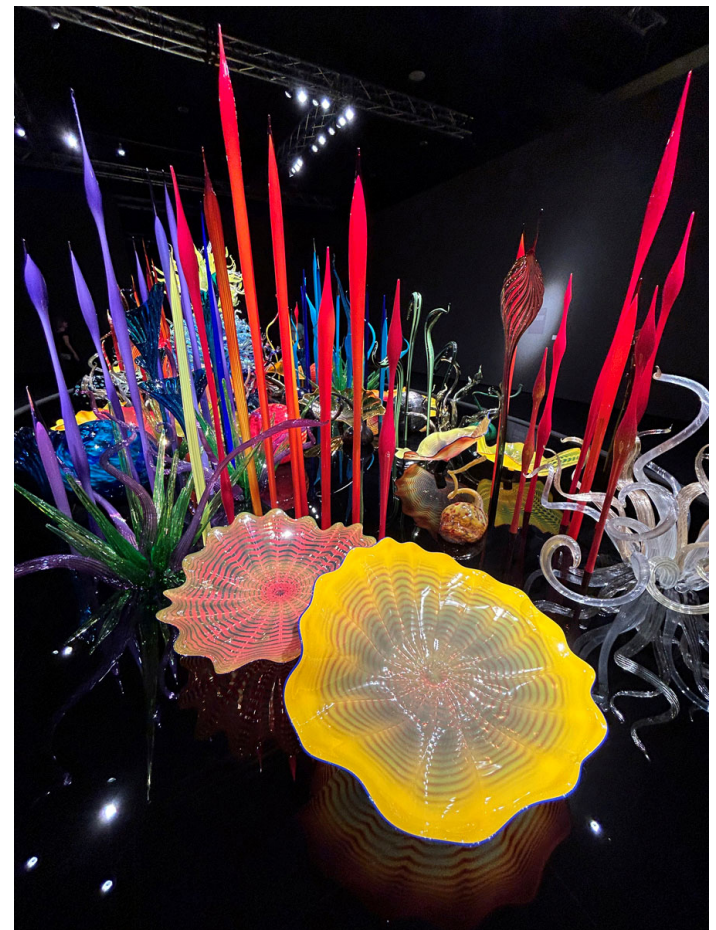
```
vio1# lppchk -c
```

```
vio1# instfix -icqk 7300-00_AIX_ML | grep :-:
```

```
vio1# instfix -icqk 7300-01_AIX_ML | grep :-:
```

```
vio1# instfix -icqk 7300-02_AIX_ML | grep :-:
```

```
vio1# instfix -icqk 7300-03_AIX_ML | grep :-:
```



Upgrade Notes

- See article <https://techchannel.com/systems-management/hmc-vio-tips/>
- And <https://techchannel.com/ibm-champions/powervm-v4-1-1-0-and-aix-7-3-3/>
- Make sure to install patches for your current VIO v3/v4 level to ensure you don't run into the issue where the VIO server account padmin can't login – the link below shows how to recover from the HMC
 - <https://www.ibm.com/support/pages/apar/IJ50326>
- Make sure to run “autoviosbr –nobackup” prior to the upgrade to avoid an error in viosupg.pl
- If you get an error on viosupgrade starting “lsfs: 0506-915” you may need to delete any custom dump files (sysdumpdev) if you have created them
- When upgrading from v4.1.0.10 to 4.1.0.21 my padmin account got expired as soon as I put the fixes on, so prior to rebooting, reset the password on padmin to ensure you can login after – you may have to change the password rules in /etc/security/user
- My backup account to padmin had no issues

Upgrade Notes – trustchk issue

1. During the updateios to 4.1.1.10 you may see the following:

```
0503-409 installp: bosboot verification starting...
```

```
installp: bosboot verification completed.
```

```
0503-408 installp: bosboot process starting...
```

```
trustchk: Verification of attributes failed: /usr/sbin/bootinfo
```

```
: accessauths
```

```
bosboot: Boot image is 69681 512 byte blocks.
```

2. You will also see it if you do a bosboot. This is a known issue and the fix is:

```
trustchk -y /usr/sbin/bootinfo
```

(it should come back with no output)

If it does, do it one more time.

```
trustchk -y /usr/sbin/bootinfo
```

```
bosboot -a -d /dev/ipldevice
```

```
bosboot -a -d hdisk?
```

Keep it simple and consistent

- 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***
- ***Check VLANs on trunk adapters match between the 2 VIO servers that are paired***
 - Second VIO server won't boot if they don't match
- Don't mix multipath drivers on 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)
- At least two VIO servers, but can also separate VIOs for production and non production, or network from storage on large systems
- Test failover (SEA failover and disk if VIO goes down)

Keep it simple and consistent

- Use VIO commands wherever possible rather than going into oem_setup_env and using smitty
- Mirror VIO rootvg if on internal disk
- Have a spare disk in your VIO to use for cloning prior to updates or for mirroring
 - This can be a SAN disk even if you are booting from internal disk
- NOTE – VIO requires at LEAST 30GB in rootvg – I give it 150GB if it's a SAN disk
- Fix Paging- By default VIO has a 512MB hd6 and a 1.5GB paging00 on the same LUN
 - On some systems it is 2 x 1GB page spaces
 - I switch this to one 8GB hd6 page space
- I add a third disk if I plan to use FBO (file backed optical) to share iso images
- Add logging and set up dump devices properly
- Run VIOS Advisor (part) 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**
 - Make sure these are mksysb bootable image backups

VIOS Advisor – part command

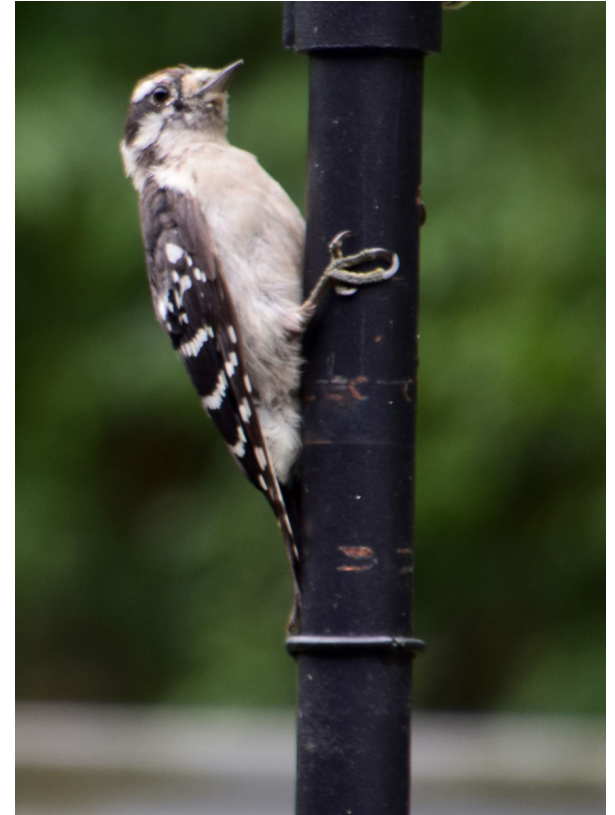
- Run as padmin
- Grab 2 x 20 second snaps
 - `part -i 10 -t 2 &`
- Analyse a current nmon recording file
 - `part -f /usr/local/perf/vioname_250823_0001.nmon`
- Try opening the xml file in your browser
- If it just provides you with the xml text instead of the processed output, then to make the xml file usable in your browser you may need to use xsltproc on Linux (there is a windows version I think)
- I used RHEL:
- Untar the .tar file created by part
- Change into the directory
- Then change the file from readonly for `vios_advisorv2.xsl`
- Edit `vios_advisorv2.xsl` and change the stylesheet on line 2 from 2.0 to 1.0
- Now run:
 - `Xsltproc -output vios_advisor_report.html vios_advisor_report.xml`
- Now when you click on the new html file to open it, you will see the formatted output

Know how to get help

- If your upgrade goes south
- Make sure you have an IBM SFTP transferid to use to upload files
 - <https://www.secure.ecurep.ibm.com/transferids>
- Know how to get a perfpmr
 - <https://www.ibm.com/support/pages/readme-collecting-perfpmr>
 - Keep an up to date copy downloaded so you don't have to download it in a panic
- Know how to run snap
 - <https://www.ibm.com/support/pages/how-collect-snap-powervm-virtual-io-server-vios>
 - <https://www.ibm.com/support/pages/node/670105>
 - Uploading snap to Testcase
 - <https://www.ibm.com/support/pages/node/681391>
 - <https://www.ibm.com/support/pages/enhanced-customer-data-repository-ecurep-send-data-ftp>
- Opening a support ticket
 - <https://www.ibm.com/mysupport/s/my-cases>
- Have your VIO pre-documented as you will have to provide lots of information

Documentation is Critical

- Use HMCScanner and Sysplan
- Put together spreadsheet of documentation
- All equipment and serial numbers
- UAK expiration dates on servers
- HMC, asmi, hmc access, BMC, etc ids and passwords
- Customer numbers
- Server and I/O firmware levels, VIO and O/S levels
- HMC information including version, BMC and PNOR, networking etc
- IP addresses
- Resource profiles
- Adapter allocations
- Standards used for network, vSCSI, NPIV mappings
- Actual vSCSI assignments
- Actual NPIV vfcmaps
- Vfchosts and their associated WWPNs
- SEA and virtual ethernet VLAN assignments
- Switchports for SAN and network
- Power needs and PDU mapping
- Anything else you can think of



I/O Firmware updates

- Run “lsmcode -A” as root on the VIO to find out current levels
- I/O firmware updates are done using diag
 - Know the prereqs (read the readmes for clients as well as VIOS)
 - As an example: If the Virtual I/O servers are installed on POWER10 systems and configured with “32Gb PCIe4 2-Port FC Adapter, Feature Code(s) EN1J and EN1K”, then the requirement is to update the adapter microcode level to 7710812214105106.070115 before updating the Virtual I/O server to 3.1.4.10 level.
- Download the I/O firmware update from Fix Central
- Change into the directory
- ls
- For an en1b fiber adapter you may see
df1000e314101506.00014000020062400010.aix.rpm
- Unpack
rpm -ihv --ignoreos df1000e314101506.00014000020062400010.aix.rpm
- Install on fiber adapter
diag -T download fcs0

Update Network I/O Firmware

As root run: `lsmcode -A`

Check on Fix Central under Power I/O Firmware

You will need to know what kind of adapters you have (feature codes)

If you are updating the primary you can let it failover or you can force a failover

```
chdev -l ent14 -a ha_mode=standby
```

When done `chdev -l ent14 -a ha_mode=auto`

Example updating a 5899 network adapter with code uploaded to server

```
cd /software/adapters/5899
```

```
rpm -ivh --ignoreos e414571614102004.10240310.aix.rpm
```

```
diag -T download -d ent0
```

```
Updated all 4 ent0-ent3
```

You may have to unconfigure the SEA to do this (see next slide)

Sometimes the update does not show up on the primary ent in the SEA till after the reboot

Update I/O Firmware

You may have to unconfigure the SEA to do this (SEA here is on ent14)

```
ifconfig en14 down
```

```
ifconfig en14 detach
```

```
rmdev -l ent14
```

If the IP is on the real adapter, then:

```
ifconfig en4 down
```

```
ifconfig en4 detach
```

```
rmdev -l ent4
```

```
cfgmgr
```

Check microcode went on and sea came back

smitty tcpip and check ip is now on

```
ifconfig -a
```

Server Firmware updates

Power Systems  Power9, Power10 and Power11 System FW Release Planned Schedule (updated 07/26/2025)



Technology	MTM	Firmware Release Level	2024	2024	2025	2025	2025	2025
			3Q	4Q	1Q	2Q	3Q	4Q
P9	8335-GTG/GTH/GTX	OP940.xx EoRS 2026	OP940.70 07/31/24		OP940.80 02/21/25			
	9009-41A/22A/22N/42A/ 41G/22G/42G 9223-22H/42H/22S/42S 9040-MR9 9080-M9S	FW950 EoRS 4Q/2026	FW950.C0 09/20/24	FW950.D0 12/19/24		FW950.E0 05/16/25	FW950.F0	FW950.G0
P10	9105-22A/42A/22B/41B 9786-22H/42H 9043-MRX	FW1020 EoRS 3Q/2024	EoRS					
	9105-xxx and 9786-xxx 9043-MRX 9080-HEX	FW1030 EoRS 1Q/2025	FW1030.60 07/19/24	FW1030.70 12/02/24	EoRS			
	9105-xxx and 9786-xxx 9043-MRX 9080-HEX	FW1050 EoRS 4Q/2025	FW1050.12 07/19/24 FW1050.20 07/31/24 FW1050.21 09/13/24	FW1050.30 12/19/24	FW1050.40 03/28/25	FW1050.50 06/20/25	FW1050.60	FW1050.70
	9105-xxx and 9786-xxx 9043-MRX 9080-HEX	FW1060 EoRS 4Q/2029	FW1060.10 07/19/24	FW1060.20 11/22/24	FW1060.30 03/07/25	FW1060.40 05/16/25	FW1060.50	FW1060.60
P11	9824-xxx 9856-x2H 9043-MRU 9080-HEU	FW1110 EoRS 3Q/2030				FW1110.00 07/25/25 FW1110.01	FW1110.10	

<https://www.ibm.com/support/pages/node/6509382>

Get them from Fix Central

<http://www-933.ibm.com/support/fixcentral/>

Any change in version is disruptive (i.e. power off and on the server)

FW940 to FW950 is an example of a version change

Pink box indicates initial firmware level on that release

EoRS = End of Release Support. This means that there are no additional planned service packs on a firmware release.

3. HMC Enhancements and Backup regularly



HMCScanner

- <https://www.ibm.com/support/pages/node/1117515>
- Download the 4/1/2025 version at:
- <https://www.ibm.com/support/pages/system/files/inline-files/hmcScanner-0.11.55.zip>
- HMC, systems, pools, cod, lpars, physical slots, virtual ethernet, virtual scsi, virtual fibre (with WWPNs), SEA, fibre channel (with WWNs), SRIOV physical and logical ports
- HMC TAB

Software	
Version	10
Release	3
Service Pack	1062
Build Level	2506170641
Base Version	V10R3
Fixes	

lshmc -V

```
"version= Version: 10
```

```
Release: 3
```

```
Service Pack: 1062
```

```
HMC Build level 2506170641
```

```
MF71710 - HMC V10R3 M1061
```

```
MF71722 - HMC V10R3 M1062
```

```
MF71728 - iFix for HMC V10R3 M1062
```

```
","base_version=V10R3
```

```
"
```

- You need to separately document BMC and PNOR levels and IP, and VMI IP as HMCScanner does not record these
- HMCScanner also does not seem to record the patches once you get to v10 – use lshmc -V

BEFORE Upgrading your VIO servers you should check that your HMC software and BMC and PNOR are at levels that support your VIO server level

Make sure your server also is supported

As an example, VIO servers above 3.1.2 are not supported on POWER7 servers

HMC BMC and PNOR

- The 7063-cr1 and 7063-cr2 have additional code for the BMC and PNOR
- These are not updated when the HMC code is updated, and they need to be kept up to date

- On my 7063-cr1 lshmc -b

"bios=open-power-IBM-P8DTU-7063CR1-20200610 – this is PNOR 3.11

- The above also shows on the HMC tab in the HMCScanner as BIOS

- My CR2 shows:

mowgli-ibm-OP9_v2.5_4.140-prod

Latest levels are:

7063-cr1 BMC 3.29 and PNOR 3.11 (20200610)

7063-cr2 BMC obmc-mowgli-op940.hmc-38

PNOR mowgli-IBM-OP9_v2.5_4.140

These are downloaded from Fix Central under Power Firmware

- **NOTE if you are installing POWER11 the CR1 is not supported so you may need a new HMC**
- **POWER11 requires HMC v11**

HMC Features

- HMC 950 added VIOS I/O configuration backups
 - Ability to perform VIOS IO Configuration backup, store it in the HMC and restore it later
 - Ability to perform VIOS backup and store the backup in the HMC. Later the backup can be used to restore the VIOS
- HMC V10 and later do not support POWER7/7+ and prior
- HMC V11 does not support POWER8 and prior
- HMC V11 adds POWER11 support
- The only supported HMCs are:
 - Virtual HMC
 - 7063-CR1 (V10 and prior only)
 - 7063-CR2 (All current versions)

New with HMC v10 and v11

- HMC v10
 - <https://community.ibm.com/community/user/power/blogs/manjunath-shanbhag1/2021/04/16/vios-maintenance-validation-and-backuprestore?CommunityKey=71e6bb8a-5b34-44da-be8b-277834a183b0&tab=recentcommunityblogsdashboard>
 - <https://community.ibm.com/community/user/power/blogs/manjunath-shanbhag1/2022/04/21/prepare-vios-for-maintenance-and-other-powervm-man>
- Adds a feature to validate and prepare vios for maintenance
- .This allows you to validate storage and network provided by the VIO server to the client partitions. This can save you from having to recover if you do an LPM where the storage is not correctly provisioned.
- HMC V11 Documentation
 - <https://www.ibm.com/docs/en/power11/9856-22H?topic=mh-managing-hmc-by-using-hmc-version-1111110-later>
 - <https://www.ibm.com/support/pages/updates-hmc-v11r1m1110>

HMC version

- New on the latest HMC versions are CLI commands to control Images
- My HMC (7063-cr2)

lshmc -V

```
"version= Version: 10
```

```
Release: 3
```

```
Service Pack: 1062
```

```
HMC Build level 2506170641
```

```
MF71710 - HMC V10R3 M1061
```

```
MF71722 - HMC V10R3 M1062
```

```
MF71728 - iFix for HMC V10R3 M1062
```

```
","base_version=V10R3
```

```
"
```

lshmc -b

```
"bios=mowgli-ibm-OP9_v2.5_4.140-prod
```

```
"
```



Some HMC commands that are useful

- `Issyscfg -r sys`
- `Issyscfg -r sys -F name,state`
- `Issyscfg -r lpar -m systemname -osrefresh -F name`
- `Issysconn -r vmi -m systemname`
- `Islic -m systemname -F mtms,update_access_key_exp_date`
- `Ishmc -V`
- `Ishmc -v`
- `Ishmc -b`
- `Ishmc -bmc`
- `Ishmc -n`
- `who -b`
- `Issysconn -r all`
 - If power10 or above this will show the vmi

IBM Supported Backup and Restore Methods for VIO Servers

- <https://www.ibm.com/docs/en/power8/8408-44E?topic=managing-backing-up-virtual-io-server>
https://www.ibm.com/docs/en/power-sys-solutions/0008-DEA?topic=P8DEA/p8hb1/p8hb1_vios_backup_restore.htm
- Note that IBM does not support (even at v3) backup and restore with **USB sticks**

Table 1. Backup and restoration methods for the VIOS

Backup method	Media	Restoration method
To tape	Tape	From tape
To DVD	DVD-RAM	From DVD
To remote file system	nim_resources.tar image	From an HMC using the Network Installation Management (NIM) on Linux facility and the installios command
To remote file system	mksysb image	From an AIX 5L™ NIM server and a standard mksysb system installation
Tivoli Storage Manager	mksysb image	Tivoli Storage Manager

You can backup and restore AIX from USB but VIO is not supported – see below for AIX information

<https://www.ibm.com/support/pages/using-and-taking-advantage-usb-devices-and-aix>

<https://www.ibm.com/support/pages/how-backup-powervmvios-system>

Backup Script to put in crontab

```
#!/bin/sh
#
machine=`uname -n`
mount /usr/local/backups
mkdir /usr/local/backups/$machine
umount /var/vio/VMLibrary
su - padmin -c "ioscli backupios -file /usr/local/backups/$machine -nomedialib"
su - padmin -c "ioscli backupios -file /usr/local/backups/vio-mksysbs/$machine.mksysb -nomedialib -mksysb"
mount /var/vio/VMLibrary
#
exit 0
```

NOTES

I do both kinds of backups so I can use NIMOL from HMC or NIM restore to recover – belts and suspenders!

The above can be put in root's crontab to run regularly

Don't forget to set up an NFS mount to the VIO from your NIM or NFS server

Do not allow ANY NFS mount to mount automatically at boot in case the NIM or NFS server is down at the time of boot

Also, regularly grab an HMCScanner report

<https://www.ibm.com/support/pages/hmc-scanner-power-server-config-and-performance-stats>

<https://www.ibm.com/support/pages/system/files/inline-files/hmcScanner-0.11.55.zip>

Use and check the virtual backup (viosbr)

The following adds a cron entry and will backup your VIO virtual definitions every day and keep the last 7 copies in /home/padmin/cfgbackups
You only need to run it once

```
viosbr -backup -file viobkup -frequency daily numfiles 7
```

You can view the backups taken using viosbr -view (next slide)

You can list what is in a backup using:
viosbr -view -file viosname.01.tar.gz

```
#crontab -l
0 3 1 * * /usr/local/bin/viobackup.sh >/usr/local/logs/viobackup.txt >2&1
0 3 15 * * /usr/local/bin/viobackup0.sh >/usr/local/logs/viobackup0.txt >2&1
0 0 * * * (/usr/ios/cli/ioscli viosbr -backup -file viosname -frequency daily -numfiles 7)
```

The above runs my VIO backup on the 1st and 15th and it runs the virtual definitions backup daily

NOTE you can restore a viosbr backup to a lower level VIOS

I had to regress a system from 3.1.3.21 to 3.1.2.60 and was able to restore the 3.1.3.21 viosbr backup successfully after re-installing the VIO server

Hopefully, you will never have to do this

Do not forget to do a viosbr backup and save it on another server as restoring a mkysb does not include the virtuals

VIO Backup

Updates to backupios

<https://www.ibm.com/docs/en/power10?topic=commands-backupios-command>

There are 3 flags that are particularly useful:

- a. `-mksysb` – create a mksysb with no NIMOL resource. This can then be used to restore the VIO server from your NIM server using a standard mksysb restore. A backup that is created with a NIMOL resource (which is a tar file) can be used to restore the VIO server from the HMC.
`backupios -file /home/padmin/<FileName> -mksysb`
- a. `-nomedialib` – tells the system not to backup the media library (`/var/vio/VMLibrary`). This can significantly reduce the size of the mksysb and the time the backup takes if the media library is in rootvg.
`backupios -file /home/padmin/<FileName> -nomedialib`
- a. `-nosvg` – prevents the volume groups structure of user defined volume groups from being saved as part of the backupios process.
`backupios -file /home/padmin/<FileName> -nosvg`

VIO Backup to HMC

With newer versions of the HMC you can now backup your VIO server virtuals and the VIO server itself to the HMC. You can restore from there as well.

You can also import or export those backups to and from an external server using NFS or SFTP.

You can use the GUI to do these backups, or there are several new HMC CLI commands to backup and manage and restore VIO servers.

A backup that is created without the NIMOL Resource (normal mksysb image) can be transferred to the NIM server and a standard mksysb system installation can be used to restore the VIOS.

The backup that is created with the NIMOL Resource (the .tar file) can be used to restore the VIOS from HMC using the Network Installation Management (NIM) on Linux facility and the **installios** command.

HMC Backup CLI with HMC v10 or v11 for VIO

- These are for backups of the VIO taken to the HMC
- lsviosbk :
 - List various VIOS backup stored in HMC.
 - Filter option to get granular information.
- mkviosbk :
 - Create VIOS IO Config/SSP config backup.
 - Create VIOS backup with various config options.
- chviosbk :
 - Rename VIOS backup file from HMC.
- cpviosbk :
 - Import/Export VIOS backups to external NFS/SFTP server.
- rstviosbk :
 - Restore VIOS IO Config/SSP config.
 - Option to reboot the VIOS if required.
- chhwres with -so
 - Switch over all virtual NIC backing devices on VIOS partition to other VIOS partitions

VIO Server Install Images on the HMC

- List the VIOS installation images on this HMC:

```
lsviosimg
```

- List just the named VIOS installation images on this HMC:

```
lsviosimg -F name
```

```
vios31420
```

- Change the name of VIOS installation image vios3 to vios3.1:

```
chviosimg -n vios3 -a "new_name=vios3.1"
```

- Remove VIOS installation images from the HMC:

```
rmviosimg -n vios3.1,vios3.1flash
```

- Import a standard VIOS installation image from a remote SFTP server using SSH keys for authentication:

```
cpviosimg -r sftp -n vios31321 -h hostname -u jaqui -f
```

```
/software/powervm31/Virtual_IO_Server_Base_Install_3.1.3.21_Flash_052022_LCD8250310.iso
```

- List the VIOS installation images on this HMC:

```
lsviosimg
```

```
name=vios31321,image_files=Virtual_IO_Server_Base_Install_3.1.3.21_Flash_052022_LCD8250310.iso,size=4731.32
```

```
OR
```

```
name=vios31420,image_files=dvdimage.v1.iso,size=4753.85
```

4. Other

VIO Resources
Sample Tunables
Monitoring the VIO
Storage Zoning and Mapping
NTP



Your vio servers are your most loved ones

- Give them the highest weight (I like 254)
- Make sure you give them plenty of entitlement (more than they need on average)
 - Recently I have been running them as dedicated
- Memory – v3 and v4 need at least 6-8GB – I give mine 10GB with a max of 16GB but increase if lots of clients or adapters
- Tune the virtual buffers
- Tune the HBA settings (num_cmd_elems and max_xfer_size)
- Monitor with nmon, viostat and part

Sample /etc/tunables/rc-tunevio.sh

```
#!/bin/ksh
#
# First we set the network tuneables
# NOTE YOUR VALUES MAY DIFFER
#
/usr/sbin/no -p -o rfc1323=1
/usr/sbin/no -p -o tcp_sendspace=262144
/usr/sbin/no -p -o tcp_recvspace=262144
/usr/sbin/no -p -o udp_sendspace=65536
/usr/sbin/no -p -o udp_recvspace=655360
#
#Run ifconfig -a and check the en values - (assuming IP is on en5):
#chdev -l en5 -a tcp_recvspace=262144 -P
#chdev -l en5 -a tcp_sendspace=262144 -P
#chdev -l en5 -a rfc1323=1 -P
#
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
chdev -l fcs2 -a max_xfer_size=0x200000 -a num_cmd_elems=1024 -P
chdev -l fcs3 -a max_xfer_size=0x200000 -a num_cmd_elems=1024 -P
```

NOTE TEST FIRST AS YOUR MILEAGE MAY VARY

Check with your disk vendor about higher values – reboot is needed after tunables are set



Sample /etc/tunables/rc-tunebufs.sh

This tunes buffer settings for the two virtual adapters – assumes ent4, ent5 are virtuals

lsdev -C | grep ent will show the adapters so you can pick the right ones

```
#!/bin/ksh
#
chdev -l ent4 -a max_buf_tiny=4096 -P
chdev -l ent4 -a max_buf_small=4096 -P
chdev -l ent4 -a max_buf_medium=512 -P
chdev -l ent5 -a max_buf_tiny=4096 -P
chdev -l ent5 -a max_buf_small=4096 -P
chdev -l ent5 -a max_buf_medium=512 -P
```

NOTE TEST FIRST AS YOUR MILEAGE MAY VARY

I also like to use:

```
chdev -l ent4 -a buf_mode=min -P
chdev -l ent5 -a buf_mode=min -P
```

IBM prefers you leave buf_mode at the default
Changes to buffers also require a reboot

Or you can use VIO rules

```
$ rules -o add -t adapter/vdevice/IBM,l-lan -a min_buf_medium=2048
$ rules -o add -t adapter/vdevice/IBM,l-lan -a max_buf_medium=2048
$ rules -o add -t adapter/vdevice/IBM,l-lan -a min_buf_large=256
$ rules -o add -t adapter/vdevice/IBM,l-lan -a max_buf_large=256
$ rules -o add -t adapter/vdevice/IBM,l-lan -a min_buf_huge=128
$ rules -o add -t adapter/vdevice/IBM,l-lan -a max_buf_huge=128
```

To deploy the rules on VIOS:

```
$ rules -o deploy
```

From IBM POWER Best Practices

<https://ibm.ent.box.com/v/powerbestpractice>

Article on VIOS Rules

<https://techchannel.com/systems-management/rules-command-vio-servers/>

HBA Tuning

- Make the same tuning changes you would make on AIX, but VIO must be set at least as high as clients
- 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**
- **VIO must be rebooted to at least the client value prior to client change.**
- 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
- BUT the client setting MUST NOT be larger than what is set in the VIO server

HBA max_xfer_size

The default is

```
0x100000          /* Default io_dma of 16MB */
```

After that, 0x200000,0x400000,0x800000 gets you 128MB

After that 0x1000000 checks for bus type, and you may get 256MB, or 128MB

There are also some adapters that support very large max_xfer sizes which can possibly allocate 512MB

VFC adapters inherit this from the physical adapter (generally)

Unless you are driving really large IO's, then max_xfer_size on the HBA is rarely changed beyond 0x200000 which provides a 128MB DMA

Client setting cannot be higher than the VIOs were booted with

Monitoring

- Can use regular AIX commands like vmstat, iostat etc
- Command to product performance data in an xml file
 - part command
- New viostat command
- <https://www.ibm.com/docs/en/power8?topic=commands-viostat-command>

viostat command

Purpose

Reports Central Processing Unit (CPU) statistics, asynchronous input/output (AIO) and input/output statistics for the entire system, adapters, tty devices, disks and CD-ROMs.

Syntax

```
viostat  
viostat [ -sys ] [ -adapter ] [ -tty | -disk |  
-extdisk ] [ -path ] [ -time ] [ PhysicalVolume ...  
] [ Interval [ Count ] ]
```

```
viostat -time -sys 30 2
```

```
viostat -time -path 30 2
```

```
viostat -time -adapter 30 2
```

viostat -sys

```
$ viostat -sys
```

```
System configuration: lcpu=8 drives=3 ent=0.30 paths=12 vdisks=24
```

```
tty:   tin      tout  avg-cpu: % user % sys %   idle % iowait physc % entc
        0.0      0.0           0.1  35.2  64.7  0.0  0.5  159.7
```

```
System: gandalf.com
```

```
          Kbps   tps  Kb_read  Kb_wrtn
Physical    8.0   1.2 1190894 50165856
```

```
Disks:   % tm_act  Kbps   tps  Kb_read  Kb_wrtn
hdisk2   0.0       0.0   0.0    15      0
hdisk1   0.0       0.0   0.0     0      0
hdisk0   0.0       8.0   1.2 1190879 50165856
```

viostat -adapter Part 1

```
$ viostat -adapter
```

```
System configuration: lcpu=8 drives=3 ent=0.30 paths=12 vdisks=24 tapes=0
```

```
tty:  tin      tout  avg-cpu: % user % sys % idle % iowait physc % entc
      0.0      0.0          0.1  35.2  64.7  0.0   0.5  159.7
```

```
Adapter:          Kbps   tps  Kb_read  Kb_wrtn
fcs4             8.0    1.3  1244569  50165868
```

```
Disks:  % tm_act  Kbps   tps  Kb_read  Kb_wrtn
hdisk2   0.0     0.0   0.0   26996    0
hdisk1   0.0     0.0   0.0   26657    0
hdisk0   0.0     8.0   1.2  1190916  50165868
```

```
Adapter:          Kbps   tps  Kb_read  Kb_wrtn
fcs7             0.0    0.0   48356    0
```

```
Disks:  % tm_act  Kbps   tps  Kb_read  Kb_wrtn
hdisk2   0.0     0.0   0.0   21683    0
hdisk1   0.0     0.0   0.0   21328    0
hdisk0   0.0     0.0   0.0   5345     0
```

viostat –adapter Part 2

Vadapter: vfchost23	Kbps 0.0	tps 0.0	bkread 0.0	bkwrtn 0.0
Vadapter: vfchost13	Kbps 0.0	tps 0.0	bkread 0.0	bkwrtn 0.0
Vadapter: vfchost20	Kbps 0.0	tps 0.0	bkread 0.0	bkwrtn 0.0
Vadapter: vfchost2	Kbps 0.0	tps 0.0	bkread 0.0	bkwrtn 0.0
Vadapter: vfchost18	Kbps 0.0	tps 0.0	bkread 0.0	bkwrtn 0.0
Vadapter: vfchost26	Kbps 0.0	tps 0.0	bkread 0.0	bkwrtn 0.0
Vadapter: vfchost5	Kbps 0.0	tps 0.0	bkread 0.0	bkwrtn 0.0
Vadapter: vfchost25	Kbps 0.0	tps 0.0	bkread 0.0	bkwrtn 0.0
Vadapter: vfchost19	Kbps 0.0	tps 0.0	bkread 0.0	bkwrtn 0.0
Vadapter: vfchost0	Kbps 0.0	tps 0.0	bkread 0.0	bkwrtn 0.0
Vadapter: vfchost22	Kbps 0.0	tps 0.0	bkread 0.0	bkwrtn 0.0
Vadapter: vfchost24	Kbps 0.0	tps 0.0	bkread 0.0	bkwrtn 0.0
Vadapter: vfchost17	Kbps 0.0	tps 0.0	bkread 0.0	bkwrtn 0.0
Vadapter: vfchost1	Kbps 0.0	tps 0.0	bkread 0.0	bkwrtn 0.0
Vadapter: vfchost15	Kbps 0.0	tps 0.0	bkread 0.0	bkwrtn 0.0
Vadapter: vfchost21	Kbps 0.0	tps 0.0	bkread 0.0	bkwrtn 0.0
Vadapter: vfchost10	Kbps 0.0	tps 0.0	bkread 0.0	bkwrtn 0.0
Vadapter: vfchost9	Kbps 0.0	tps 0.0	bkread 0.0	bkwrtn 0.0
Vadapter: vfchost12	Kbps 0.0	tps 0.0	bkread 0.0	bkwrtn 0.0
Vadapter: vfchost16	Kbps 0.0	tps 0.0	bkread 0.0	bkwrtn 0.0
Vadapter: vfchost11	Kbps 0.0	tps 0.0	bkread 0.0	bkwrtn 0.0
Vadapter: vfchost14	Kbps 0.0	tps 0.0	bkread 0.0	bkwrtn 0.0
Vadapter: vhost0	Kbps 0.0	tps 0.3	bkread 0.0	bkwrtn 0.0
Vtargets/Disks: /var/vio/VMLibrary/S		tps 0.0	bread 0.0	bwtrn 0.0

Get rid of annoying FCS errors on 10/1Gb cards

- The 4 port 10Gb/1Gb cards can act as network cards or can be used for San. Most people use them as network cards and then see lots of FCS errors.
- You can stop this from happening as follows:

```
#lsdev -C | grep fcs
```

Look for the 10Gb cards - in my case they showed as fcs4 and fcs5

```
# lsdev -C | grep fcs
fcs0      Available 00-00      8Gb PCI Express Dual Port FC Adapter (df1000f114108a03)
fcs1      Available 00-01      8Gb PCI Express Dual Port FC Adapter (df1000f114108a03)
fcs2      Available 01-00      PCIe3 2-Port 16Gb FC Adapter (df1000e21410f103)
fcs3      Available 01-01      PCIe3 2-Port 16Gb FC Adapter (df1000e21410f103)
fcs4      Available 02-04      PCIe3 10Gb 4-Port FCoE Adapter (df1060e214101004)
fcs5      Available 02-05      PCIe3 10Gb 4-Port FCoE Adapter (df1060e214101004)
```

Check for the converged cards

```
# lsdev -C | grep Converged
ent0      Available 02-00      PCIe3 10GbE SFP+ SR 4-port Converged Network Adapter (df1020e214100f04)
ent1      Available 02-01      PCIe3 10GbE SFP+ SR 4-port Converged Network Adapter (df1020e214100f04)
ent2      Available 02-02      PCIe3 100/1000 Base-TX 4-port Converged Network Adapter (df1020e214103c04)
ent3      Available 02-03      PCIe3 100/1000 Base-TX 4-port Converged Network Adapter (df1020e214103c04)
```

Get rid of annoying FCS errors on 10/1Gb cards

As padmin:

```
$rmdev -dev fcs4 -recursive -ucfg
```

```
$rmdev -dev fcs5 -recursive -ucfg
```

```
$chdev -dev fcs4 -attr autoconfig=defined
```

```
$chdev -dev fcs5 -attr autoconfig=defined
```

After you should see:

```
# lsdev -C | grep fcs4
fcs40      Available 00-00-01    FC SCSI I/O Controller Protocol Device
fcs41      Available 00-01-01    FC SCSI I/O Controller Protocol Device
fcs42      Available 01-00-01    FC SCSI I/O Controller Protocol Device
fcs43      Available 01-01-01    FC SCSI I/O Controller Protocol Device
fcs44      Defined   02-04-01    FC SCSI I/O Controller Protocol Device
fcs45      Defined   02-05-01    FC SCSI I/O Controller Protocol Device
#
```

As root:

Note I have a log filesystem called /usr/local/logs – change this to wherever you want to save these files

```
#errpt >/usr/local/logs/errpt-aug152025.txt
```

```
#errpt -a >/usr/local/logs/errpta-aug152025.txt
```

```
#errclear 00
```

```
#cfgmgr
```

```
#errpt
```

Setup and use NTP

```
#vi /etc/ntp.conf
```

Comment out broadcast and add:

```
server 0.pool.ntp.org  
server 1.pool.ntp.org
```

```
#vi /home/padmin/config/ntp.conf
```

Add to end:

```
server 0.pool.ntp.org  
server 1.pool.ntp.org
```

```
#ntpdate 0.pool.ntp.org
```

Update rc.tcpip to start ntp at boot (remove comment)

Now start NTP

```
#startsrc -a "-c /home/padmin/config/ntp.conf" -s xntpd
```

You can substitute your own NTP servers for the ones above if you have them



Storage zoning and mapping



Zoning and Mapping

- **Zoning**
 - This is when the switch is configured to allow the switch port to talk to the storage and the WWPN for the LPAR or server
- **Mapping (masking)**
 - This is when the storage (disk or tape library) is updated to allow the host (LPAR or server) WWPNs access to the specific LUNs provisioned
- LUNs must be provisioned at the storage, then mapped and zoned before they can be used in an LPAR
- VTL tape drives also need to be mapped and zoned
- For direct attach we zone and map the WWNs for the real adapters, for NPIV we use the WWPNs on the virtual adapters
- WWNs tend to start with 10 or 20
- WWPNs (NPIV) start with C0
- These can be found in an HMCScanner report or by logging onto the LPAR or VIO or from the HMC
- Check the VIO connection to the switch is NPIV enabled:

```
$ lsnports
name                physloc                fabric tports aports swwpns  awwpns
fcs0                U78C9.001.WZS0234-P1-C12-T1  1      64     63    2048   2046
fcs1                U78C9.001.WZS0234-P1-C12-T2  1      64     63    2048   2046
fcs2                U78C9.001.WZS0234-P1-C6-T1   1      64     56    3088   3062
fcs3                U78C9.001.WZS0234-P1-C6-T2   1      64     56    3088   3062
```

LPM Zoning and mapping - NPIV

- **Do not confuse zoning with mapping (masking)**
- Regular and LPM WWPNs must be zoned at the switch and mapped at the storage
- Each virtual fibre adapter for an LPAR has 2 x WWPNs
 - The first is the default one that is used
 - The second is used by LPM – it normally does not login unless LPM has been used
 - Both WWPNs must be zoned and mapped
- If they are not mapped at the storage and you do an LPM you will damage your boot image
 - You can avoid this problem after 2.2.4 by setting 2 parameters on vioslpm0 on all VIO LPARs
- You should also do your zoning by zoning all WWPNs for the LPAR to both switches. Keep zoning simple and have a zone that is LPARname and all the WWPNs. This will avoid problems during LPM when you allocate fiber ports to each VIO for dual VIO systems.

LPM's use of the two WWPNs

- Each virtual fibre adapter for an LPAR has 2 x WWPNs
 - The first is the default one that is used
 - The second is used by LPM – it normally does not login unless LPM has been used
- Prior to an LPM the default WWPN is used
- After the LPM the second WWPN is used
- After the next LPM it goes back to the default WWPN
- i.e. it flip flops between them
- EXCEPT
 - If you perform an inactive LPM then it stays with whatever the WWPNs were that it used last

Thank you for your time



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

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

Copy of presentation at:
<http://www.circle4.com/ptechu/viostoptips-oct2025.pdf>

POWER Systems Virtual User Group
<https://www.ibm.com/support/pages/node/1120377>

My articles on VIO upgrades, HMC and many more
<https://techchannel.com/contributor/jaqui-lynch/>

PowerVM 4.1.0.21

GA 4.1.0.21 – 6/7/2024

4.1.0.21 New Features

VIOS 4.1.0.21 adds the following new features:

Security enhancements

- Supports Trusted Execution, Trusted Update and Secure Boot.
- Supports new stronger default password (SSHA-256) and out of the box long password support (255 character limit)
- Data protection with LVM encryption for rootvg and dump devices.
- Services that are not secure like rexec, rsh are removed. Telnet / ftp service are disabled. Users can enable telnet / ftp service if required.
- ksh93 is used as the default ksh in VIOS commands and scripts

viosupgrade enhancements

The major enhancements done in viosupgrade in this release are as follows.

- Added new option -F devname to preserve the device names for vfchost adapter devices, fcvmme, nvme, fscsi, iSCSI devices and network adapter devices.
- The new options "-k" and "-o rerun" is added which is specific to pre-restore script execution.

viosbr enhancements

Restore of all the PV backed VTDs if the same PV is mapped to multiple vhosts.

Others

Enhancement in alt_root_vg command, to run it in phases. This enhancement allows the **alt_root_vg** command to separate the cloning phase from the update phase.

Equivalent of AIX 7300-02-02
Use viosupgrade tool and flash image from ESS to go from v3.1.* to 4.1.0.21

To avoid issues with padmin login after the update see:

<https://www.ibm.com/support/pages/node/7145269>

Readme at:

<https://www.ibm.com/support/pages/node/7155270>

PowerVM 4.1.0.10

GA 4.1.0.10 - 11/10/2023

4.1.0.10 New Features

VIOS 4.1.0.10 adds the following new features:

Security enhancements

- Supports Trusted Execution, Trusted Update and Secure Boot.
- Supports new stronger default password (SSHA-256) and out of the box long password support (255 character limit)
- Data protection with LVM encryption for rootvg and dump devices.
- Services that are not secure like rexec, rsh are removed. Telnet / ftp service are disabled. Users can enable telnet / ftp service if required.
- ksh93 is used as the default ksh in VIOS commands and scripts

viosupgrade enhancements

The major enhancements done in viosupgrade in this release are as follows.

- Added new option -F devname to preserve the device names for vfchost adapter devices, fcnvme, nvme, fscsi, iSCSI devices and network adapter devices.
- The new options "-k" and "-o rerun" is added which is specific to pre-restore script execution.

viosbr enhancements

Restore of all the PV backed VTDs if the same PV is mapped to multiple vhosts.

Equivalent of AIX 7300-02-01
Use viosupgrade tool and flash image from ESS to go from v3.1.* to 4.1.0.10

To avoid issues with padmin login after the update see:

<https://www.ibm.com/support/pages/node/7145269>

Readme at:

<https://www.ibm.com/support/pages/node/7065507>

Documentation on VIOS 4.1 upgrades

- What's new in Virtual I/O Server commands
- <https://www.ibm.com/docs/en/power10?topic=server-whats-new-in-virtual-io>
- <https://www.ibm.com/docs/en/power11/9856-22H?topic=server-whats-new-in-virtual-io-commands>

- Virtual I/O Server 4.1.0.10 release notes – include USB Memory/Flash key install
- <https://www.ibm.com/docs/en/power11/9856-42H?topic=notes-vios-best-practice-recommendations>
- USB Memory/Flash key install
 - Minimum size for a VIOS
- Getting flash image onto a USB
- <https://www.ibm.com/support/pages/node/715609>

- **VIOS `viosupgrade`** command
- <https://www.ibm.com/docs/en/power10/9080-HEX?topic=commands-viosupgrade-command>

- **NIM `viosupgrade`** command on the NIM AIX 7.3
- <https://www.ibm.com/docs/en/aix/7.3?topic=v-viosupgrade-command>

Useful Links

- Jaqui Lynch Articles
 - <http://www.circle4.com/jaqui/eserver.html>
- Jaqui Lynch TechChannel Articles
 - <https://techchannel.com/Authors/jaqui-lynch>
- Jaqui Lynch Youtube
 - <http://www.youtube.com/@jaquilynch>
- Jaqui's Movie Replays
 - <http://www.circle4.com/movies>
- Nigel Griffiths AIXpert Blog
 - <https://www.ibm.com/support/pages/aixpert-blog-nigel-griffiths-mrnmon>
- Nigel Griffiths YouTube
 - <https://www.youtube.com/nigelargriffiths>
- Gareth Coates – Tricks of the POWER Masters
 - <https://www.ibm.com/support/pages/node/1116939>
- IBM US Virtual User Group
 - <https://www.ibm.com/support/pages/node/1120377>

IBM Website Links

- ESS Website to download base software
 - <https://www.ibm.com/servers/eserver/ess/index.wss?lnk=msdDO-enss-usen>
- HMC Scanner
 - <https://www.ibm.com/support/pages/node/1117515>
 - <https://www.ibm.com/support/pages/system/files/inline-files/hmcScanner-0.11.55.zip>
 - VIOS Advisor
 - <https://www.ibm.com/docs/en/power9/9009-41A?topic=commands-part-command>
 - <https://www.ibm.com/docs/en/power10/9080-HEX?topic=managing-virtual-io-server-performance-advisor>
 - <https://www.ibm.com/docs/en/power10/9080-HEX?topic=advisor-virtual-io-server-performance-reports>
- IBM FLRTVC
 - <https://esupport.ibm.com/customercare/flrt/sas?page=../jsp/flrtvc.jsp>
 - Latest as of 9/3/2025 is 0.8.12
- IBM FLRT
 - <https://esupport.ibm.com/customercare/flrt/>
- IBM AIX Linux Toolbox and dnf
 - <https://www.ibm.com/support/pages/node/883796>
- IBM Website to download SSH, SSL, perl, smbc, etc
 - <https://www-01.ibm.com/marketing/iwm/iwm/web/pickUrxNew.do?source=aixbp>
- IBM Fix Central
 - <http://www-933.ibm.com/support/fixcentral/>

VIOS Specific References

- VIO Server Support
 - <https://www14.software.ibm.com/support/customer/sas/f/vios/home.html>
- 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 - 2013
 - <http://www.redbooks.ibm.com/redbooks/pdfs/sg247940.pdf>
- SG24-7590 – PowerVM Virtualization – Managing and Monitoring - 2013
 - <http://www.redbooks.ibm.com/redbooks/pdfs/sg247590.pdf>
- SG24-8080 – Power Systems Performance Guide – Implementing and Optimizing - 2013
 - <http://www.redbooks.ibm.com/redbooks/pdfs/sg248080.pdf>
- SG24-8062 – PowerVM Best Practices - 2012
 - <http://www.redbooks.ibm.com/redbooks/pdfs/sg248062.pdf>
- SEA Load Sharing
 - <https://www.ibm.com/support/pages/how-setup-sea-failover-load-sharing-configuration>
 - <https://www.ibm.com/support/pages/shared-ethernet-adapter-sea-fail-over-load-balancing>
- vNIC Functionality Guide
 - <https://www.ibm.com/support/pages/vnic-functionality-guide>
- Capturing Debug output for padmin
 - <http://www-01.ibm.com/support/docview.wss?uid=isg3T1012362>

Notes

- VIO efix/ifix using updateios
 - <https://www.ibm.com/support/pages/managing-ifix-vio-server>
- Turning off and on call home when doing HMC updates
 - chsacfg -t callhome -o disable -m hmc
 - # disable HMC Call Home before upgrade suppresses the auto call home during upgrade
 - chsacfg -t callhome -o enable -m hmc
 - # enable HMC Call Home after upgrade
- Blog on NVMe Support for VIOS
 - <https://community.ibm.com/community/user/power/blogs/ninad-palsule1/2020/07/25/nvme-device-support-in-virtual-io-server-vios?CommunityKey=71e6bb8a-5b34-44da-be8b-277834a183b0>
- NIM and VIO Updates
 - <https://www.ibm.com/docs/en/aix/7.2?topic=operations-using-nim-updateios-operation>
 - <https://www.ibm.com/support/pages/node/6524732>
- VIOS backup to HMC and HMC Maintenance validation for LPM
 - <https://community.ibm.com/community/user/power/blogs/manjunath-shanbhag1/2021/04/16/vios-maintenance-validation-and-backuprestore?CommunityKey=71e6bb8a-5b34-44da-be8b-277834a183b0&tab=recentcommunityblogsdashboard>

Notes

- viosmon command
 - <https://www.ibm.com/docs/en/power10/9105-22A?topic=commands-viosmon-command>
- viostat command
 - <https://www.ibm.com/docs/en/power10?topic=commands-viostat-command>
- Automating AIX and VIOS using ansible
 - <https://community.ibm.com/community/user/power/blogs/shreyansh-chamola/2023/04/27/automating-aix-and-vios-using-ansible>
- Github ansible for VIOS collection
 - <https://ibm.github.io/ansible-power-vios/index.html>
- Capturing, Importing, Exporting, and Restoring VIOS backups on the HMC
 - <https://www.ibm.com/support/pages/capturing-importing-exporting-and-restoring-vios-backups-hmc>
- 7063-CR2 Announcement
 - <https://www.ibm.com/docs/en/announcements/power-systems-delivers-new-hardware-management-console-power-technology-based-servers>
- Updating HMC v11
 - <https://www.ibm.com/support/pages/updates-hmc-v11r1m1110>
- Setting up dual VIO servers
 - https://www.ibm.com/docs/en/power-sys-solutions/0008-DEA?topic=P8DEA/p8eew/p8eew_set_dual_vios.html