Session 80
Upgrading to VIOS 3.1

Nigel Griffiths v10
Advanced Technology Support, Europe

Power Systems
Virtual User Group (VUG)
Organiser → Jyoti Dodhia

http://tinyurl.com/PowerSystemsTechnicalWebinars

Thanks to the following for content & feedback:
Mallesh Lepakshaiah - VIOS Development Leader
Gareth Coates - ATS
Bob Kovacs - Mr VIOS

nag@uk.ibm.com
@mr_nmon
https://www.youtube.com/user/nigelargriffiths
http://tinyurl.com/AIXpert

Latest News on VIOS 3.1

IBM PowerVM package includes the Virtual I/O Server
• VIOS 3.1 official Announce Oct 9th
• VIOS 3.1 Generally Available Nov 9th

Withdraw from marketing PowerVM 2 = VIOS 2.x.x.x
• Now announced for 30th Sept 2020
• Support continues till 2021
VIOS 3.1 - New Functions

See Bob G Kovacs session on VIOS 3.1
POWER/AIX VUG October 25th for the full details

Mr VIOS
POWER Virtual I/O Architect and Designer

VIOS 3.1 feature overview

Security & Resiliency
- General clean-up
  - Remove old packages & solutions
- Storage multi-pathing enhancements
- Improved RAS features for SSP from CAA

Cloud ready!
- iSCSI over vSCSI (network storage) virtualisation

Modernisation
- Code base: AIX 7.2 TL3
- Better I/O & accelerator enablement
- Smaller footprint

Performance boost
- Native compatibility mode (POWER8, POWER9)
- XIVE interrupt model (later on)

Internal: database Solid to Postgres
- Removed: IVM, Hibernation
For the record I have found VIOS 3.1 Rock Solid – I have no concerns recommending it

Normal for the VIOS versions over the years
- Moving to AIX 7.2 is not a big deal
- iSCSI, faster device drivers, removing old fluff, . . .
  are not massive functional changes

For the record:
There is no public performance test results
For sure, it is not going to be slower 😊
Upgrading to VIOS 3.1

1st Strategy – **Just don’t do it!**
Just Don’t upgrade VIOS 2.x to VIOS 3.1!

1. New POWER9 server?
   – Start on VIOS 3.1 & set-up as normal

2. Zero risk upgrade plan
   – Evacuate the Server → no LPARs = no risk
   – Install a fresh VIOS 3.1 then set-up as normal
   – Migrate LPARs back
Just Don’t upgrade VIOS 2.x to VIOS 3.1!

1. New POWER9 server?
   – Start on VIOS 3.1 & set-up as normal

2. Zero risk upgrade plan
   – Evacuate the Server → no LPARs = no risk
   – Install a fresh VIOS 3.1 then set-up as normal
   – Migrate LPARs back

3. Shared Storage Pool
   – LPM SSP LPARs from a server, remove server from SSP
   – then fresh install VIOS 3.1 then set-up as normal
   – add server to SSP, then LPM LPARs back
   – TESTED A VIOS 3.1 can join a VIOS 2.2.6.32 SSP

Just Don’t Do it !!!

• If installing VIOS 3.1 base level

• Please, make sure you quickly install all VIOS 3.1 service packs in the first 6 months

• Already at 3.1.0.10

• This is regular VIOS Best Practice
So you have VIOS 2.something & you can’t face evacuation and fresh install

VIOS Upgrading to 3.1 = the hard stuff

This hands-on warts and all hands on deck based on

- Beta versions of VIOS 3.1 (until recently)
- Testing on POWER8 and POWER9 Servers
- HMC 920 software on Model Type 7063-CR1 (POWER8 based HMC)
  - Makes no difference at all
- Starting from VIOS 2.2.6.21
- With the Shared Storage Pool (SSP) and some testing without SSP

- In December, I will put updated information on my AIXpert Blog:
  http://tinyurl.com/AIXpert

- Directly
  https://www.ibm.com/developerworks/community/blogs/aixpert/entry/Upgrading_to_VIOS_3_1
VIOS 3.1 pre-reqs

Hardware supported: POWER9, POWER8, POWER7+

**Minimum** resource requirements: Same as VIOS 2.2.x
- IMHO from memory: 1 CPU, 8 GB RAM (16 GB for SSP), 30 GB of disk → 100 GB is better

The whole point of Dual VIOS is to allow live upgrades:
- Please do this at quieter times
- Only do one half at a time!!
- After upgrading each half – confirm your LPARs are back to dual paths
- For AIX that is automatic after a while (I give it an hour!) but do check (lspath)

POWER7+ → the “D” models arrived in 2013

1. IBM Power 710 Express 8231-E1D and 8268-E1D
2. IBM Power 730 Express 8231-E2D
3. IBM Power 720 Express 8202-E4D
4. IBM Power 740 Express 8205-E6D
5. IBM Power 750 Express 8408-E8D
6. IBM Power 760 9109-RMD
7. IBM Power 770 9117-MMD
8. IBM Power 780 9179-MHD
9. Flex System p260, p270, some p460

Question:
What if my Server is POWER7 (POWER7 Models A, B or C)?

Answer:
Should run OK but not supported
= At YOUR OWN RISK
No check is made

Not the following:
1. IBM Power 795 9119-FHB (was only ever POWER7)
2. BladeCenter blades
Officially, for older hardware

- POWER5, POWER6, POWER7 (not a POWER7+)
- Upgrade to VIOS 2.2.6.32 and stop there
- It will be supported for 2 more years [Nigel’s guess]
- Your server will then be at least 7 years old!

Next a History lesson
### Rate yourself/you company

#### Just for fun!

**What VIOS are you running in production?**

- **VIOS 2.2.6.32** Genius  It’s only just out!
- **VIOS 2.2.6.20+** Talented  Well done
- **VIOS 2.2.5** Good  One year of support left.  Can plan to jump straight to 3.1 (one outage)
- **VIOS 2.2.4** Mediocre  Support ends soon.  Cancel Xmas/winter break now - you will be working straight through Dec.
- **VIOS 2.2.3** Terrible  A year out of support – Clean up you act or get sacked!
- **VIOS 2.2.2** Idiotic  Embarrassingly, 3 years out – Think about a different career  Famous Support call at Sequent: “Please step away from the keyboard, you are not qualified to use this device.”
- **Older** Moronic  4+ years.  You are a dangerous liability to your company  Please take the bus home as we suspect you car is not safe either, due to a lack of maintenance
Before we start: terminology

By the way

• “Update” is a minor improvement 2.2.5 to 2.2.6
• “Upgrade” is a major improvement 2.2.6 to 3.1

• VIOS 2.x.x.x based on AIX 6.1
  – For example: VIOS 2.2.6.31 = AIX 6.1 TL5 sp9 + VIOS packages
• VIOS 3.1 based on AIX 7.2 TL3 sp2

• We all know: AIX 6.1 to AIX 7.2 upgrade means a complete disk reformat and overwrite install, it’s the same for VIOS 2 to 3
Non-VIOS software on the VIOS!

VIOS Recognised Additions Applications / Solutions:

- List of supports VIOS software:
- 26 tools for performance monitoring, backup, security & FC SAN device drivers
- These will need to be reinstalled by you by hand after the upgrade (code + data)
  - No other software is approved for VIOS use – YOU HAVE BEEN WARNED!
  - Note: This upgrade allows you to get back in control of a clean VIOS

Before we start: “Traditional” Upgrade - the high level process

All VIOS upgrades (VIOS 2 to VIOS 3) involve

1. Backup the VIOS meta-data / configuration
   - save the backup remotely

2. Install from VIOS 3.1 mksysb → remakes rootvg + file systems
   - Possibly on an alternative disk

3. Get the VIOS backup & restore the meta-data / configuration

4. If the VIOS is using the SSP additional steps are required
Before we start: “Traditional” Upgrade - the high level process

All VIOS upgrades (VIOS 2 to VIOS 3) involve

1. Backup the VIOS meta-data / configuration
   – save the backup remotely
2. Backup any non-VIOS application data - save to a remote place
   – That are in rootvg
3. Install from VIOS 3.1 mksysb → remakes rootvg + file systems
   – Possibly on an alternative disk
4. Get the VIOS backup & restore the meta-data / configuration
5. Reinstall any non-VIOS application code and data
6. If the VIOS is using the SSP additional steps are required

Note: various VIOS or NIM commands will automate the green bits
Reminder viosbr Basics

To backup
$ viosbr -backup -file Oct9th_redvios2
Backup of this node successful ← simple VIOS about 3 seconds
$ viosbr -backup -file redvios2 -frequency daily -numfiles 10
→ Does one immediately then daily up to 10 generations then removes the oldest

$ ls -ltr cfgbackups
total 32
-rw-r--r-- 1 padmin staff 6319 Oct 08 17:00 autoviosbr_redvios2.tar.gz
-rw-r--r-- 1 padmin staff 6104 Oct 09 12:12 Oct9th_redvios2.tar.gz
→ Contains two XML files of the config and ARTEX rules

To Restore
viosbr -view -list
viosbr -restore -file FileName [-validate | -inter] [-type devType]
→ read the manual fore these options

Before we start: Plan on using NIM to install VIOS 3.1

Using NIM to install VIOS 3.1 ?
• Preparation: NIM server must be at AIX 7.2 TL3 sp2+

Two New command(s) to help us upgrade
• viosupgrade command – there’s two of them !!!
  – On NIM server (AIX 7.2 TL3 sp1+)
  – On VIOS (VIOS 2.2.6.32+)
  – Each has a different syntax – doh!

• Not the same as the updateios command – it’s for minor updates !!
Warning: KnowledgeCenter docs on VIOS 3.1 upgrades

• “not my particular favourite” – special family code phrase
  – Any reference to 2.2.6.30 today means 2.2.6.32
  – Any reference to 2.2.x.x means 2.2.4.x

• Recognised issue & actively being improved [by mid December]
  – Some bits vague and not consistent
  – Too many assumptions
  – Some vital facts missing

• If you get confused – it may not be you!! ☺
  – Hopefully, I will steer you right with this presentation

Documentation on VIOS 3.1 upgrading is to be found here

• Top Level KnowledgeCenter page
  - Vague Intro to methods
  - Non-SSP (Shared Storage Pool)
  - SSP (Shared Storage Pool)
  - Mis-leading levels
  - https://www.ibm.com/support/knowledgecenter/POWER9/p9hb1/p9hb1_vios_migrate_supported_levels.htm
  - Miscellaneous
  - Unsupported
Documentation on VIOS 3.1 upgrading is to be found here

- What's new in Virtual I/O Server commands

- Virtual I/O Server release notes – include USB Memory/Flash key install
    - USB Memory/Flash key install
    - Duff minimum size for a VIOS

- VIOS viosupgrade command in VIOS 2.2.6.32

- NIM viosupgrade command on the NIM AIX 7.2 TL3 + sp
    - That one is hard to find – it is in the AIX commands reference for AIX Commands of AIX 7.2

Docs

Documentation on VIOS 3.1 support for iSCSI

- iSCSI intro manual pages
    - Configuring iSCSI software initiator
    - Configuring the iSCSI software target
    - iSCSI software initiator considerations
    - iSCSI software target considerations

- iSCSI hints look at these manual pages
  - lsiscsi
  - mkiscsi
  - chiscsi
  - rmiscsi

- And I just found out my old V7000’s support iSCSI
  - I never looked before, it was a shock! 😊
Getting the VIOS software

• For years we get the VIOS update packages from FixCentral
• But this is not an update

• Upgrade (Install) images come from ESS &
  you have to prove entitlement = PowerVM license/support
• ESS = Entitled Systems Support
• IBM ESS at https://www.ibm.com/servers/eserver/ess/index.wss

When you get there you will find these . . .

<table>
<thead>
<tr>
<th>03.01.00</th>
<th>packages</th>
<th>2346: IBM PowerVM V3 / VIOS v03.01.00,ENU,DVD</th>
<th>9862</th>
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<tr>
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<td>ISO, Virtual I/O Server v3.1.0.10 Flash (1/1/2018)</td>
<td>4611</td>
</tr>
</tbody>
</table>

• Thanks to: Chris Gibson, Australia IBM Lab Servers for the picture.

Software

Regular two part DVD install images (.iso) at 3.1.0.0

New one part “Flash” install image (.iso) at 3.1.0.10

Flash ➔ USB memory/flash key or thumb drive or USB stick !!

Bits like Kerberos
Getting the VIOS software ready for NIM

• If using NIM you will know getting the mksysb is a pain!
  – You need to extract the mksysb image from the .iso
  – Just to make life interesting its in 2 parts one on each of the DVD’s
  – Then “cat” them together
  – End up with 3.1.0.0 → have manually add the service pack 3.1.0.10

• Flash image is already 3.1.0.10 (includes .10 = first sp 😊)
  – I could not extract the mksysb by loopmounting the .iso on AIX
  – Errors: “can’t open the readable file!”
  – But I could extract on a Linux loop-mount (Ubuntu 18.04 on Power)

For reference only

```bash
# Assuming the DVDs are in this directory
DVD1=/tmp/dvdimage.v1.iso
DVD2=/tmp/dvdimage.v2.iso
mkdir /mnt1
mkdir /mnt2
df # to show they got mounted OK

# Watch out for those double quotes and “-“ characters
loopmount -i $DVD1 -o "V cdrfs -o ro" -m /mnt1
loopmount -i $DVD2 -o "V cdrfs -o ro" -m /mnt2

DIR=/usr/sys/inst.images
ls -l /mnt1/$DIR/mksysb* /mnt2/$DIR/mksysb* # display the files
cat /mnt1/$DIR/mksysb* /mnt2/$DIR/mksysb* >VIOS31_mksysb_image

umount /mnt1
umount /mnt2
```
OK done our home work
Got the HW and SW ready

Four Pathways to VIOS 3.1
non-SSP
with-SSP
Four paths / methods to Upgrade to VIOS 3.1

- **Backup config, halts VIOS, NIM remote install VIOS3.1, recovers config. Installs on the current disk.**
- **With VIOS running: backs up VIOS config, install VIOS3.1 to new disk, recovers VIOS config, set boot list & reboot to new disk.**
- **Manual only. Backup VIOS config, You install VIOS3.1: NIM, HMC, DVD or USB. You recover VIOS config.**
- **Obvious network re-setup (catch 22) tasks here to get the old VIOS config on the new VIOS.**
- **Running VIOS, local config backup, builds VIOS3.1 on new disk, migrates config, sets boot list + Reboot.**

- **Green** means the command does this for you

---

NOT a paths / methods to Upgrade to VIOS 3.1

- **VIOS updateios**
- Don’t get those confused with the long term available updatevi os command
- Used for minor updates
**VIOS updateios with SSP**  
<table>
<thead>
<tr>
<th>VIOS 2.2.6.31:</th>
<th>VIOS viosupgrade command = different</th>
</tr>
</thead>
<tbody>
<tr>
<td>Has no viosupgrade -g option</td>
<td></td>
</tr>
<tr>
<td>Upgrade to 2.2.6.32:</td>
<td></td>
</tr>
<tr>
<td>= 195 MB with ~38 packages</td>
<td></td>
</tr>
<tr>
<td>$ cstartstop -m $(hostname) -stop</td>
<td></td>
</tr>
<tr>
<td>$ updateios -dev vios22632 -install -accept</td>
<td></td>
</tr>
<tr>
<td>$ shutdown -restart . . .</td>
<td></td>
</tr>
<tr>
<td>$ cstartstop -m $(hostname) -start</td>
<td></td>
</tr>
<tr>
<td>Brown bits for SSP only</td>
<td></td>
</tr>
</tbody>
</table>

$ viosupgrade -h  
Usage:  
viosupgrade -i -i image_file -a alt_disk [-c] [-g filename]  
viosupgrade -i -q  
Flags:  
-1 Specifies local Node Installation.  
-1 Specifies image file for the alternate disk installation.  
-a Specifies alternate disk to install the provided image.  
-c Specify if the node is part of the cluster.  
-g Specifies the filename having the list of files to be copied to newly installed rootvg.  
-q Queries the status of VIOS restore operation after booting the VIOS with newly installed image.

**Paths to VIOS 3.1**  
(non-Shared Storage Pool)

![Diagram showing paths from various VIOS versions to VIOS 3.1](image)
Paths to VIOS 3.1 (with Shared Storage Pool)

Nigel’s upgrading to VIOS 3.1
(Always read the README first)

Non-SSP notes: Getting to VIOS 2.2.6.32
a) Use what I know: Update to 2.2.6.32 using the regular updateios (I use NFS to provide the files)
b) Check paths before doing 2nd VIOS(s)

SSP notes: Getting to VIOS 2.2.6.32
a) Stop the VIOS using SSP during upgrades
clistartstop -stop -m $(hostname)
b) updateios -dev /mnt -install -accept (plus reboot)
c)clistartstop -start -m (hostname)
d) Check paths before doing 2nd VIOS(s)
e) Make sure all VIOS are now “ON_LEVEL” at 2.2.6.32

Non-SSP notes: Getting to VIOS 3.1
a) VIOS viosupgrade always use an alternative disk so we can back out quickly
b) viosupgrade -l -i /tmp/VIOS31.mksysb -a hdiskXXX (hints: -l=local -i mksysb -a altdisk)
c) Check paths before doing 2nd VIOS(s)

SSP notes: Getting to VIOS 3.1
a) Always use alternative disk method
b) lspv -free # checks the alternative-disk hdiskXXX is free
c) viosupgrade -l -i /tmp/VIOS31.mksysb -a hdiskXXX -c (hint -l=local -i mksysb -a altdisk -c SSP cluster)
d) Check paths before doing 2nd VIOS(s)
Two more VIOS to updateios to 2.2.6.32 then cluster will notice & make them all ON_LEVEL at 2.2.6.32

Alternative is: `cluster-status -verbose` and sort through 100’s of lines of output

But I don’t have extra disks in the VIOS to alt-disk install !!

- Organise a charity fun run & raise the funds to purchase the disks
- If mirrored disk – break them & use the new spare (remirror later)
  or
- Overwrite the VIOS rootvg disk
- Before you start:
  - Backup the VIOS rootvg and check the backup with a reinstall
  - Backup those VIOS configs
- Nigel’s preferred way: take a mksysb to a simple NIM server
- You may have other backup technology via tape or disk cloning
- But it may take many hours to recover from an upgrade issue
  = never good in production
But I want to try one of the NIM method ways?

I (Nigel) can set-up NIM using easy-setup option in smitty
I can NIM install AIX bosinst and VIOS mksysb

But I can’t claim any more expertise:
  I don’t install update / upgrades
  I don’t user post install scripts (first boot)
  I don’t make customised resource

A working VIOS is very complicated environment
  multiple physical, virtual and SEA networks
  100’s of disks: LV, file backed, vSCSI, NPIV, SSP, ….

But I want to try one of the NIM method ways?

Not recommended for NIM newbies – only for NIM experts
1. Have to install NIM server AIX 7.2 TL3 sp2 & set it up
2. Create VIOS 3.1 mksysb from the two DVD’s & a spot
3. Create a Special vios resource on NIM see later
4. Make sure the VIOS network adapters(s) are NIM capable
5. Gotcha: VIOS IP address on the SEA? = can’t use NIM viosupgrade -bosinst
6. Complex VIOS networks add complications with the NIM
7. More complex to debug failures: Is it NIM issue, network issue or a bug!

But worth the investment of your time, if you have 100’s of VIOS and a guru

Hint: In the short term use: NIM viosupgrade -bosinst method
A few comments

Alt-Disk install **HIGHLY RECOMMENDED** for a fast back-out option
If not then FULLY backup the disk and config **twice** – if you forget, you are doomed

- NIM options for NIM experts. There are obvious network re-setup issues.
- OK a bit mechanical = takes man-power. Well used for years. SOLID!
- Use command updateios to get to VIOS 2.2.6.32

1 Traditional – fresh install & restore that VIOS backup

DONE = standard VIOS recovery
2 VIOS viosupgrade

VIOS viosupgrade command

Read the manual page - KnowledgeCenter
Mandatory: an unused disk and VIOS 2.2.6.32+

```
$ viosupgrade -l -i image_file -a mksysb_install_disk [-c] [-g filename]
```

First parameter is a lowercase L for “local”

For humans:

- **Non-SSP**: `viosupgrade -l -i /tmp/vios31.mksysb -a hdisk33 -g /tmp/filelist`
- **With SSP**: `viosupgrade -l -i /tmp/vios31.mksysb -a hdisk33 -g /tmp/filelist -c`
  - -g file of filenames that will get copied for you to the new disk = really neat!

Also list the state of the upgrade with: `viosupgrade -l -q`
VIOS viosupgrade – example error: vg exists

$ viosupgrade -l -i /tmp/VIOS31.mksysb -a hdisk3
Welcome to viosupgrade tool.
Operation triggered for given node(s).
Please wait for completion..

altinst_rootvg already exist, rename it and retry.

$ lspv | head
NAME           PVID                                VG               STATUS
hdisk0         00c049304a97c9ba                     rootvg           active
hdisk1         00c049303eda4b5c                     altinst_rootvg   
hdisk2         00c049303f183ab1                     None
hdisk3         none                                 None

$ lspv -size | head
NAME           PVID                                SIZE(megabytes)
hdisk0         00c049304a4d549a                    369984
hdisk1         00c049303ac72972                    544792
hdisk2         00c049303081f60b                    544792
hdisk3         00c049305e9bd83c                    369984

On the target VIOS – removing the “altinst_rootvg” or similar

$ lspv | head
NAME           PVID                                VG               STATUS
hdisk0         00c049304a97c9ba                     rootvg           active
hdisk1         00c049303eda4b5c                     rootvgcopy       
hdisk2         00c049303f183ab1                     altinst_rootvg   
hdisk3         00c0493058bdd6f0                     None

# oem_setup_env
# alt_rootvg_op -X altinst_rootvg
Bootlist is set to the boot disk: hdisk0 blv=hd5

$ lspv | head
hdisk0         00c049304a97c9ba                     rootvg           active
hdisk1         00c049303eda4b5c                     rootvgcopy       
hdisk2         00c049303f183ab1                     None
hdisk3         00c0493058bdd6f0                     None
Can’t have vgnamed **altinst_rootvg** as viosupgrade uses that name?

```bash
$ lspv | head
NAME        PVID                        VG              STATUS
hdisk0      00c049304a97c9ba            rootvg          active
hdisk1      00c049303eda4b5c            altinst_rootvg
hdisk2      00c049303f183ab1            None            None
hdisk3      none                         None            None
$ exportvg altinst_rootvg
$ importvg -vg rootvgcopy hdisk1
$ lspv | head
NAME        PVID                        VG              STATUS
hdisk0      00c049304a97c9ba            rootvg          active
hdisk1      00c049303eda4b5c            rootvgcopy
hdisk2      00c049303f183ab1            None            None
hdisk3      none                         None            None
```

If getting “disk in use” or “disk in pool use” ERRORs

**BE VERY CAREFUL → IT MIGHT BE TRUE !!**

If you have a Shared Storage Pool – be especially careful

List the disks in the SSP (CLUSDISK) & repository disk (REPDISK)

On the VIOS

```bash
$ lscluster -d
```

### hdisk5:
- **State**: UP
- **uDid**: 3321360050768028084236000000000002A04214503IBMfcp
- **uUid**: 559a2834-3c26-6dde-57cb-9e51db46992c
- **Site uUid**: d52ecbe4-f2de-11e6-8004-f6fc444b70
- **Type**: CLUSDISK

### hdisk28:
- **State**: UP
- **uDid**: 3321360050768028084236000000000000A604214503IBMfcp
- **uUid**: 19d7024f-5696-9fb2-2246-2696dcf1f53b
- **Site uUid**: d52ecbe4-f2de-11e6-8004-f6fc444b70
- **Type**: REPDISK . . .
If getting “disk in use” or “disk in pool use” ERRORS

BE VERY CAREFUL → IT MIGHT BE TRUE

List the disks that are definitely not in use.

$ lspv -free

ODM might be tracking their previous use or the disk header is indicating its use
If you have POWER NVME also try

$ lspv -unused

Options are (as root) zap the front of the disk (safer than dd !!!).

# cleandisk -?

Read and you decide how to screw up your disks!

Also worth knowing about

# chpv -C hdisk3
   -C option: Clears the owning volume manager from a disk. This flag is only valid when running as the root user. This command will fail to clear LVM as the owning volume manager if the disk is part of an imported LVM volume group.

Example:  VIOS viosupgrade with SSP

Standby, for a very quick eye test . . .
$ viosupgrade -l -i vios31_1844B.mksysb -a hdisk2 -c -g files
Welcome to viosupgrade tool.
Operation triggered for given node(s).

Please wait for completion...
Initiating VIOS configuration backup..
VIOS configuration backup successful.
Initiating installation on alternate disk(s)..
Installation on alternate disk(s) successful.
Copying files to altinst_rootvg.
Waking up altinst_rootvg successful.
Putting volume group altinst_rootvg to sleep ...
forced unmount of /alt_inst/var/adm/ras/livedump
forced unmount of /alt_inst/var/adm/ras/livedump
forced unmount of /alt_inst/var
forced unmount of /alt_inst/var
forced unmount of /alt_inst/usr
forced unmount of /alt_inst/usr
forced unmount of /alt_inst/tmp
forced unmount of /alt_inst/tmp
forced unmount of /alt_inst/opt
forced unmount of /alt_inst/opt
forced unmount of /alt_inst/home
forced unmount of /alt_inst/home

固定LV控制块...
Fixing file system superblocks...
VIOS will be rebooted after '60' seconds to boot from the newly installed disk.

Press contr1+c to terminate.

**Stops for 60 seconds here**

VIOS metadata restore (viosbr -restore) will be automatically resumed after the reboot.
VIOS may be rebooted once during this restore process. Refrain from making any changes to the VIOS virtual configurations during the restore process.
You can verify the restore status using 'viosupgrade -l -q' command and resume your operation after the completion of the restore process.

Rebooting . . .
Every one that is logged in - get a warning as it starts

Broadcast message from root@redvios1 (vty0) at 09:43:23 ...

WARNING!!! VIOS Upgrade operation is in progress.
Kindly Refrain from making any configuration changes...

VIOS viosupgrade – booting VIOS 3.1 on the alternative disk

Welcome to the Virtual I/O Server.
boot image timestamp: 16:27:47 11/13/2018
The current time and date: 16:34:12 11/13/2018
processor count: 2; memory size: 8192MB; kernel size: 45168845
boot device: /pci@80000002000001d/pci1014,034A@0/sas/disk@8074ac5d00:2

Saving Base Customize Data to boot disk
Starting the sync daemon
Starting the error daemon
System initialization completed.
TE=OFF
CHKEXEC=OFF
CHKSHLIB=OFF
CHKSCRIPT=OFF
CHKKERNEXT=OFF
STOP_INTRUSTD=OFF
STOP_ON_CHKFAIL=OFF
LOCK_KERN_POLICIES=OFF
TSD_FILES_LOCK=OFF
TSD_LOCK=OFF
TEP=OFF
TLP=OFF
Successfully updated the Kernel Authorization Table.
Successfully updated the Kernel Role Table.
Successfully updated the Kernel Command Table.
Successfully updated the Kernel Device Table.
Successfully updated the Kernel Object Domain Table.
Successfully updated the Kernel Domains Table.
Successfully updated the Kernel RBAC log level.
Successfully updated the Kernel RBAC log level.
OPERATIONAL MODE Security Flags
ROOT :   ENABLED
TRACEAUTH :  DISABLED
System runtime mode is now OPERATIONAL MODE.
Setting tunable parameters...complete
Starting Multi-user Initialization
Performing auto-varyon of Volume Groups

Activating all paging spaces
0517-075 swapon: Paging device /dev/hd6 is already active.

The current volume is: /dev/hd1
Primary superblock is valid.

The current volume is: /dev/hd10opt
Primary superblock is valid.
Performing all automatic mounts
Multi-user initialization completed
Checking for srcmstr active...complete
Starting tcpip daemons:
0513-059 The syslogd Subsystem has been started. Subsystem PID is 5439956.
0513-059 The portmap Subsystem has been started. Subsystem PID is 6029768.
0513-059 The inetd Subsystem has been started. Subsystem PID is 6160834.
Finished starting tcpip daemons.
Starting NFS services:
0513-059 The biod Subsystem has been started. Subsystem PID is 7143908.
[STOP] Virtual I/O server detected, ASO will exit.0513-059 The rpc.statd Subsystem has been started. Subsystem PID is 8192256.
VIOS viosupgrade – booting VIOS 3.1 done

0513-059 The rpc.lockd Subsystem has been started. Subsystem PID is 8061438.
Completed NFS services.
0513-059 The llrdpd Subsystem has been started. Subsystem PID is 7536954.
0513-059 The ecpvdpd Subsystem has been started. Subsystem PID is 8716562.
IBM Virtual I/O Server

login: padmin

[compat]: 3004-610 You are required to change your password.
Please choose a new one.

padmin's New password:
Enter the new password again:
1 unsuccessful login attempt since last login.
Last unsuccessful login: Tue Nov 13 10:32:25 CST 2018 on ssh from 9.83.65.67

Indicate by selecting the appropriate response below whether you accept or decline the software maintenance terms and conditions.
Accept (a) | Decline (d) | View Terms (v) > a

So what happened?
Welcome to viosupgrade tool.
Getting status of node(s):

viosupgrade COMPLETED
Please see the viosupgrade status:
====================================
Tue Nov 13 16:16:23 2018|STARTED
Tue Nov 13 16:23:09 2018|TRIGGERED
Tue Nov 13 10:31:25 2018|RESTORE
Tue Nov 13 10:35:24 2018|RESTORE
Tue Nov 13 10:36:26 2018|COMPLETED

Please see the viosbr restore status:
====================================
Viosbr restore timestamp:
Tue Nov 13 10:31:24 CST 2018
License acceptance is successful

Restoring the backup..
Restoring the backup...

RULES: The restored device settings do not match the recommended factory default settings
Restoration of hardware devices is complete.
Please reboot the VIOS system before restoring logical/virtual devices
After reboot, rerun viosbr to complete restoration.

Restore summary on redvios2:
Backedup Devices that are unable to restore/change
DEPLOYED or CHANGED devices:
Dev name during BACKUP                  Dev name after RESTORE
---------------------------------------
ct_node_id 1a26f852ccda85e1               ct_node_id 1a26f852ccda85e1
fcs0                      fcs0
fcs1                      fcs1
ent5                      ent5
en5 (IPV4-STATIC)         en5

The command's response was not recognized. This may or may not indicate a problem.
vsosbr restore requires reboot.
Rebooting...

Viosbr restore timestamp:
Tue Nov 13 10:35:24 CST 2018
License acceptance is successful
Restoring the backup...
RULES: The restored device settings do not match the recommended factory default settings
vtzcs1 in backup does not have a matching VTD on the system
vtzcs0 in backup does not have a matching VTD on the system
vtzcs0 in backup does not have a matching VTD on the system

Restore summary on redvios2:
Backed up Devices that are unable to restore/change
DEPLOYED or CHANGED devices:
Dev name during BACKUP                  Dev name after RESTORE
---------------------------------------
ct_node_id 1a26f852ccda85e1               ct_node_id 1a26f852ccda85e1
fcs0                      fcs0
fcs1                      fcs1
ent5                      ent5
en5 (IPV4-STATIC)         en5
VIOS viosupgrade after final reboot and login

DEPLOYED or CHANGED devices:

<table>
<thead>
<tr>
<th>Dev name during BACKUP</th>
<th>Dev name after RESTORE</th>
</tr>
</thead>
<tbody>
<tr>
<td>'ArtexRules'</td>
<td></td>
</tr>
</tbody>
</table>

'ArtexRules' are restored successfully
******************************************************************************
The command's response was not recognized. This may or may not indicate a problem.
******************************************************************************

Restore is successful..

Cluster restarted after viosbr restore..
Inittab entry is removed..
$ 

Regression Test – Are the virtual networks & virtual disks OK?

$ ioslevel
3.1.0.00
$ lsmap -all
. . .
$ lspv | head

<table>
<thead>
<tr>
<th>NAME</th>
<th>PVID</th>
<th>VG</th>
<th>STATUS</th>
</tr>
</thead>
<tbody>
<tr>
<td>hdisk0</td>
<td>00c049304a97c9ba</td>
<td>old_rootvg</td>
<td></td>
</tr>
<tr>
<td>hdisk1</td>
<td>00c049303eda4b5c</td>
<td>rootvgcopy</td>
<td></td>
</tr>
<tr>
<td>hdisk2</td>
<td>00c049303f183ab1</td>
<td>None</td>
<td></td>
</tr>
<tr>
<td>hdisk3</td>
<td>00c0493058bdd6f0</td>
<td>rootvg</td>
<td>active</td>
</tr>
</tbody>
</table>

# ifconfig -a ...

Now run regression tests to prove all the VIOS resources
are online and LPARs are connected!

Hmmm! Should have captured the command outputs
BEFORE the upgrade and then compare

← Hint pre-plan your retest
Where do you think the -g files go ???

- “files” file content:
  - /etc/motd
  - /etc/netsvc.conf
  - /etc/hosts
  - /home/padmin/ncluster
  - /home/padmin/nlu

- They end up in:
  - /home/padmin/backup_files/etc/motd
  - /home/padmin/backup_files/etc/netsvc.conf
  - /home/padmin/backup_files/etc/hosts
  - /home/padmin/backup_files/home/padmin/ncluster
  - /home/padmin/backup_files/home/padmin/nlu

Next time remember
/etc/environment → EDITOR=/usr/bin/vi

Warning: VIOS with SSP viosupgrade scenarios

While upgrading always keep a few VIOS running
- Example VIOS command: `viosupgrade -l -i mksysb -a disk42 -c`
- Upgrade a few VIOS at a time leaving more than two VIOS running so you have a cluster running all the time
- This means the rebooted VIOS at 3.1 joins a robust SSP cluster

- Four VIOS SSP cluster example:
  - Upgrade 1 or 2 VIOS at the same time keeping at least 2 VIOS active in the cluster.
  - After the successful upgraded check the LPAR dual paths
  - Then upgrade second set of VIOS(s)
Warning: VIOS with SSP viosupgrade scenarios

In the case of **two** VIOS in the SSP cluster
• upgrade one VIOS then the other

In the case of **one** VIOS in the cluster *(an oxymoron!)*
• **VIOS viosupgrade WILL NOT WORK**
Use one of the below:
1. You can use the Tradition manual process - or -
2. Add a VIOS to SSP cluster before upgrading i.e. making a two VIOS SSP

3 NIM viosupgrade -bosinst
4 NIM viosupgrade -altdisk
NIM viosupgrade – part 1 of 2

To perform the `bosinst` type of upgrade operation, use the following syntax:

```bash
viosupgrade -t bosinst -n hostname -m ios_mksysbname
-p spotname {-a RootVGCloneddisk: ... | -r RootVGInstallDisk: ...| -s}
[-b BackupFileResource] [-c] [-e resources: ...] [-v]
```

To perform the `altdisk` type of upgrade operation type the following command:

```bash
viosupgrade -t altdisk -n hostname -m ios_mksysbname
-a rootvgcloneddisk [-b BackupFileResource] [-c]
[-e resources: ...] [-v]
```

NIM viosupgrade – part 2 of 2

- `t bosinst` (overwrited the rootvg)
- `t altdisk` (make rootvg on a new alternative disk and leaves the rootvg untouched and called old_rootvg)
- `n redivios2`
- `m VIOS31_mksysb`
- `p VIOS31_spot`
  ```bash
  {-a RootVGCloneddisk: ... | -r RootVGInstallDisk: ...| -s}
  [-b BackupFileResource] [-c] [-e resources: ...] [-v]
  ```
- `c` This is a SSP VIOS
- `v` Validate the install parameters and VIOS state
NIM create a machine resource for the target VIOS, right!

**NO, THAT’S IS WRONG**

It will not be able to find redvios2

Example:
“redvios2: Host name resolution failed for VIOS ‘redvios2’"

I think: that nothing to do with networking & nothing to do with a redvios2 “NIM machine” but can’t find a redvios2 Managed Control object . . .

---

**NIM Managed Control Object**

```
NIM Managed Control Object
```

```
hmc cec vios
```
NIM Managed Objects: hmc and cec (server)

No idea what is a Password File:

When defining a cec you get a load more field than in the edit cec panel!

NIM Managed Objects: vios

When defining a VIOS you get a load more field than in the edit vios panel!
VIOS adopt a NIM Server for a NIM upgrade

To get a VIOS adopted but a NIM server, on the VIOS as padmin run:

```
remote_management [ -interface Interface ] Master
remote_management -disable
```

1. To enable `remote_management` using NIM master `nim32`, type:

```
$ remote_management -interface en0 nim32
nimsh:2:wait:/usr/bin/startsrc -g nimclient >/dev/console 2>&1
0513-059 The nimsh Subsystem has been started. Subsystem PID is 11337892.
```

2. To disable `remote_management`, type:

```
remote_management -disable
```

On the NIM server, `viosupgrade -v = validate`

```
# viosupgrade -v -t altdisk -n redvios2 -m vios31010_mksysb -a hdisk3 -c
Welcome to viosupgrade tool.
Triggered validation..
Check log files for more information,
Log file for 'redvios2' is: '/var/adm/ras/ioslogs/redvios2_10289506_Fri_Nov_16_10:29:13_2018.log'.
Please wait for completion..
----------------------------------
Validation successful for VIO Servers:
redvios2
----------------------------------
```

```
# viosupgrade -v -t bosinst -n redvios2 -m vios31010_mksysb -p vios31010_spot -a hdisk3 -c
Welcome to viosupgrade tool.
Triggered validation..
Check log files for more information,
Log file for 'redvios2' is: '/var/adm/ras/ioslogs/redvios2_10289514_Fri_Nov_16_10:41:06_2018.log'.
Please wait for completion..
----------------------------------
Validation successful for VIO Servers:
redvios2
----------------------------------
```
On the NIM viosupgrade -t bosinst with SSP

```bash
# viosupgrade -t bosinst -n redvios2 -m vios31010_mksyb -p vios31010_spot -a hdisk3 -c
Welcome to viosupgrade tool.
Operation triggered for given node(s).
Check log files for more information,
Log file for 'redvios2' is: '/var/adm/ras/ioslogs/redvios2_8454428_Fri_Nov_16_12:31:21_2018.log'.
Please wait for completion..
redvios2: Installation triggered for the node 'redvios2'. Check the status using 'viosupgrade' command.
Installation of VIOS may take 30 minutes or more. Please verify the installation status after the specified time.
-----------------------------------
Installation triggered for VIO Servers:
  redvios2
-----------------------------------
```

```
# viosupgrade -q -n redvios2
Welcome to viosupgrade tool.
Getting status of node(s):
  redvios2:
    Cstate = BOS installation has been enabled
    Mstate = not running
```

On the NIM viosupgrade -t bosinst
Watching the vtmenu console
And finally we are done!

If this is a SSP VIOS then leave it for some time (say 20 minutes) to join the SSP

The SSP like to see some stability before adopting a VIOS back, just in case there is a further reboot
Warning & Gotchas

NIM: man viosupgrade output includes Requirements

Warning: Some statements disagrees with the KnowledgeCenter info

Paraphrasing:

1. On NIM master, you must have VIOS defined with MAC address. If MAC or Network Adapter Logical Device Name, is not defined, you get a message that the network boot operation might be delayed or might fail.

2. NIM altdisk install: cannot be used for a VIOS having the SEA with IP address, if NIM uses that IP address for the VIOS.

3. NIM bosinst install: VIOS SEA with IP address, provide a real adapter capable of network boot as a fourth field of the VIOS definition (adapter device name).

4. If VIOS with SSP: the hostname must be resolvable during the metadata restore process. Use either a resolv.conf or -e option for a script to add an entry in /etc/hosts.
Reference: Log files

Log Files for debug purpose

On NIM server: viosupgrade command from NIM
- viosupgrade command logs: /var/adm/ras/ioslogs/*
- NIM Command Logs: /var/adm/ras/nim*

On VIOS: viosupgrade command from VIOS
- viosupgrade command logs: /var/adm/ras/ioslogs/*
- viosupgrade restore logs: /home/ios/logs/viosupg_restore.log
- viosupgrade restore logs: /home/ios/logs/viosupg_status.log
- viosbr backup logs: /home/ios/logs/backup_trace*
- viosbr restore logs: /home/ios/logs/restore_trace*

VIOS using a rootvg LV as a client virtual disk

Warning:
- These LV are NOT backed up by viosbr
- These are not copied over by VIOS viosupgrade

Options
- Move the LV from rootvg to other VGs prior to the upgrade
- Migrate an alternate disk thus preserving the LV in the previous rootvg
- Use LVM commands (cplv) to migrate these vscsi LVs as explained in this link: http://www-01.ibm.com/support/docview.wss?uid=isg3T1000167
Fifth method: Disruptive VIOS 3.1 upgrade with SSP

Alternative Whole SSP down method Highly Disruptive → Not for Production

1. Upgrade to VIOS 2.2.6.32
2. On each VIOS: viosbr -backup → Save off the VIOS
3. Stop ALL LPARs
4. Stop ALL VIOS in the entire pool
5. Then for each SSP VIOS in turn
   1. Upgrade VIOS with complete overwrite
   2. viosbr -recover → including SSP backup

Nigel’s Ultra Blunt Opinion

• In my humble opinion:
  Fresh install VIOS 3.1 for new servers – no brainer
  Do not upgrade your Production to VIOS 3.1 until mid Q1 2019
  to allow any bug + fixes to arrive.

• Why?
  Messing up your Production VIOS & its LPARs is extremely painful

• In the mean time run tests on:
  1. The upgrade process
  2. Prepare to backup / reinstall your non-VIOS applications & data
  3. New features of VIOS 3.1 – particularly iSCSI (if you like iSCSI)

• I am sure once at VIOS 3.1 that it will all work fine
VIOS Tuning Options

- Any AIX 6.1 tuning option will disappear during the install/upgrade
- This is a good thing

- AIX development reset the tuning defaults in AIX 7.1 & 7.2 for best performance
- AIX 7.2 tuning options are different and more of them
- AIX 6.1 tuning does NOT apply to AIX 7.2
- Do not just apply your old VIOS 2 tune-up script on VIOS 3

- You may:
  - Monitor performance for a week to double check
  - Run the VIOS advisor → “part command” to see what it suggests
  - If you have a problem:
    - Raise a PMR - have a VIOS snap and perfPMR ready
    - Don’t start randomly adding AIX 6 tuning

Summary: VIOS 3.1 Upgrade in practice – in general

1. New Features: AIX 7.2, RAS, performance + iSCSI LUN to vSCSI
   - Nice to have but not massive functional differences 2.2.6 to 3.1
   - Every thing will work the same as before
2. Clean slate: fresh overwrite install VIOS flushes out the “crufty”
3. It is your job to handle the extra applications (code & data)
4. You run Dual VIOS for RAS & to make upgrades simple
5. Don’t upgrade at peak loads
6. Think about a simple regression test before you start
   I will put a start pack of commands on my DeveloperWorks AIXpert Blog
   https://www.ibm.com/developerworks/community/blogs/aixpert/entry/Upgrading_to_VIOS_3_1
7. Backup, backup and backup → disk clone, mksysb, viosbr, altdisk
8. Practice before upgrading Production
Summary: VIOS 3.1 Upgrade in practice – on the day

1. Don’t do it – fresh install new servers or evacuate old servers first
2. Regardless of the method: viosbr -backup & save off the VIOS
3. Always install to an alternative disk
4. Don’t forget the non-VIOS apps (code and data) and rootvg vdisk/vDVD
5. Preferred methods → in Nigel’s opinion ←
   a) For SSP users always use b)
   b) updateios to 2.2.6.32, then NFS the 3.1 mksysb & run VIOS viosupdate
   c) Traditional Manual still a good method: backup, scratch install VIOS
      via DVD, USB Flash drive, HMC, NIM & recover meta-data
   d) NIM viosupdate -bosinst (for SSP get to 2.2.6.32 first)
   e) NIM viosupdate -altdisk → not tested successful by Nigel yet (out of time)
6. Run the regression test commands & compare with save output

VIOS 3.1 is Rock Solid as normal

Upgrading to VIOS 3.1:
decide your method, practice and enjoy

Questions? See separate document for Q&A from the Power Systems VUG wiki
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