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a109920 (Chris's) Best Practices for AIX Live Update

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2019 IBM Systems Technical University
Oct 15-17th 2019 | Sydney, Australia

TechU Sydney, Oct 2019

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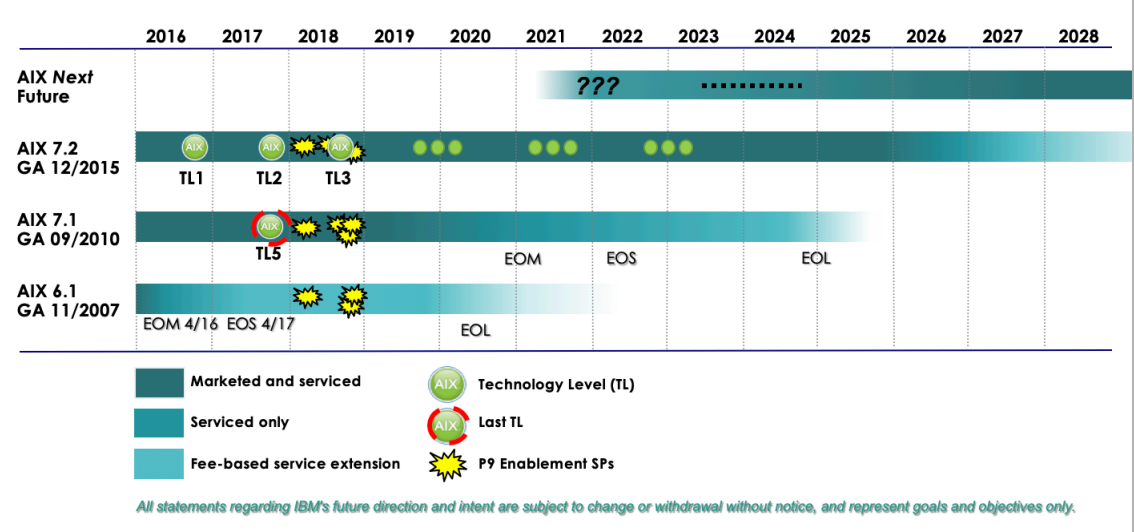
IBM Redbooks: NIM A-Z, Exploiting WPARs and AIX 7.1 Differences Guide.

@cgibbo Twitter – All things AIX and POWER

AIX Strategy & Roadmap

AIX Roadmap



AIX Purchasing Options / Considerations

- **AIX Std. Ed.** continues to be marketed as is
  - perpetual and in form of AIX Monthly options
- **AIX EE** continues to be marketed as is for now
  - set of bundled products won't be extended / changed
- **AIX Cloud Edition** (Enterprise Cloud Edition with AIX)
  - A 3rd option how to purchase AIX
    – in this case in from of a compelling SW bundle
  - might supersede AIX EE at some point in time

AIX EOS / EOL & Upgrade Considerations

AIX 5.3 End of Life April 2019

AIX 6.1 (TL9) End of Service: 30 April 2017
- Extended support until April 2020 (add. fee)

AIX 7.1 Service Pack Support
- AIX 7.1 TL4 EoSPS– Dec 31, 2019
- AIX 7.1 TL5 EoSPS – April 30, 2022

AIX 7.2 Service Pack Support
- AIX 7.2 TL0 EoSPS – Dec 31, 2018
- AIX 7.2 TL1 EoSPS – Nov 30, 2019
- AIX 7.2 TL2 EoSPS – Oct 31, 2020

2019 is end of service for POWER5, POWER6, and POWER7 !

AIX Support Matrix

Power Platform	AIX 5.3	AIX 6.1	AIX 7.1	AIX 7.2
POWER4				
POWER5				
POWER6				
POWER7				
POWER8				
POWER9				

Support expired
Not Supported
Supported in P6 Mode
Supported in P7 Mode
Supported in P8 Mode
Supported in Native Mode

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AIX 7.2 Enhancements

New Levels of Workload Scalability

- SMT 8 default mode for P9
- 1536 threads in a single LPAR
- 32 TB RAM in a single LPAR
- DSO support for P9
- Power 3.0B ISA extensions

New Levels of OS Security

- AIX Secure Boot
- Trusted Install and Update
- Option to restrict AIX kernel trace to only privileged users
- Hardware random number generation

Faster mobility and improved security & compliance by coupling compression and encryption of LPM data

Enhanced Automation & Ressource Management for AIX Live Update

- LPM automation to manage live update on a different server
- Reduction of overall frame required CPU for a live update operation

New I/O features

- PCIe U.2 NVMe SSD
- PCIe4 2-port 100Gb RoCE EN100Gb adapter

MPIO Enhancements

- MPIO enhancements to support disk storage attached through the AIX iSCSI software initiator
- Enhancements for MPIO storage resiliency

JFS2 file space reclaim

- JFS2 file space reclaim for enhanced efficiency with thin provisioned storage solutions

Enhanced support for alt_disk_mksysb installs

- allows customized boot images to be copied during alternate disk maintenance

RFA: https://www-01.ibm.com/common/ssi/cgi-bin/ssialias?htmlfid=897/ENUS218-381&infotype=AN&subtype=CA

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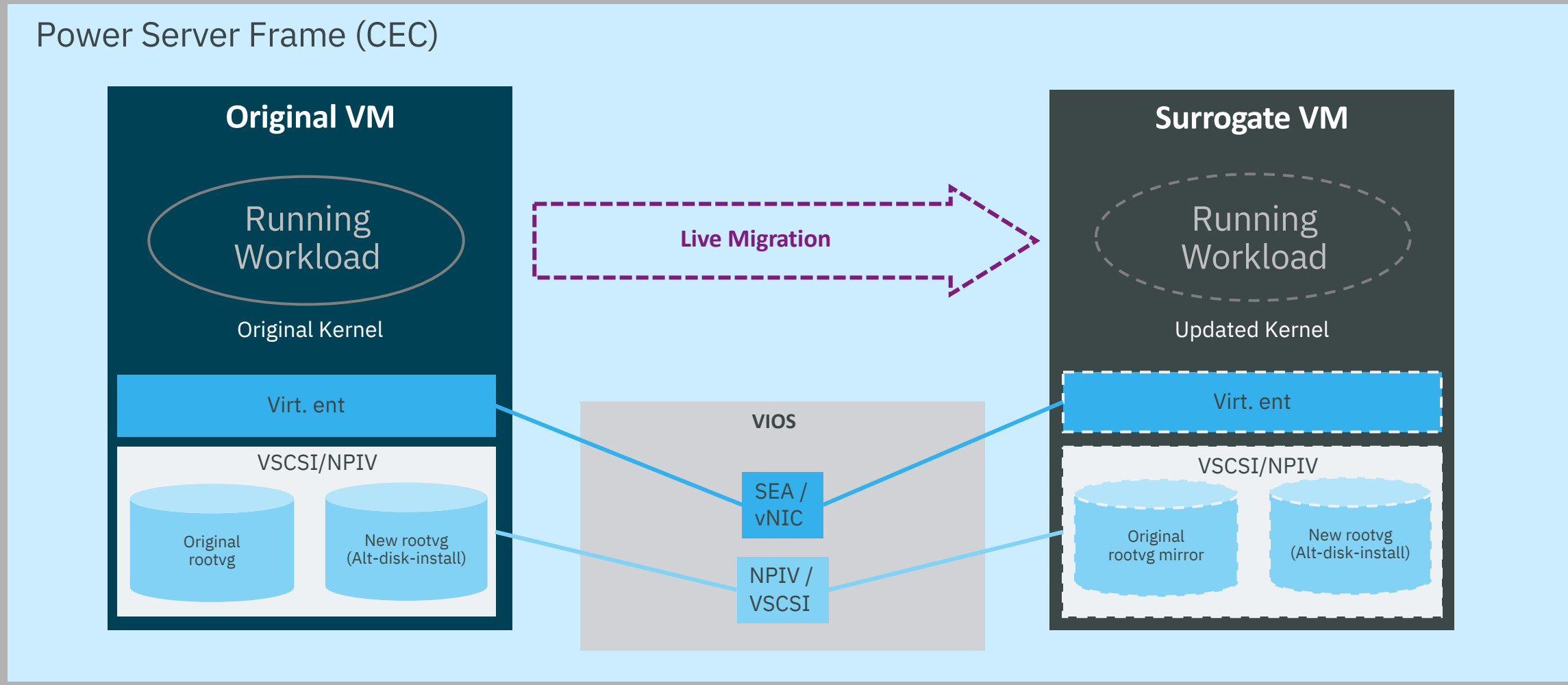
AIX 7.2 Live Update – Overview



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AIX Live Update Evolution

AIX 7.2 TL 0: Introduction of AIX Live Update

- Apply an i-fix without having to reboot

AIX 7.2 TL1: Live update for any Update

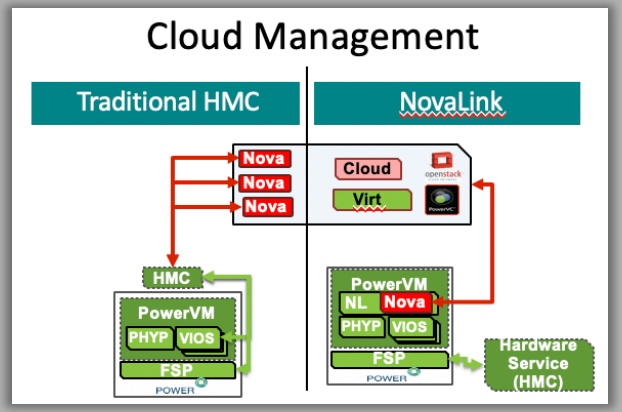
- i-fixes
- PTFs
- SPs
- TLs

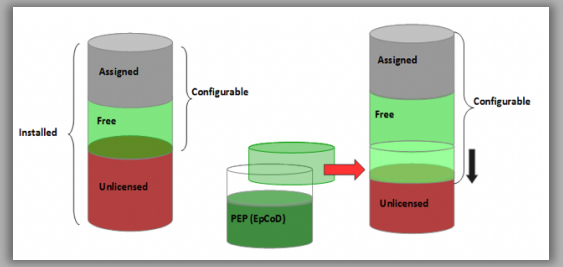
AIX 7.2 TL2: Simplification / Extended Scope Enhancements

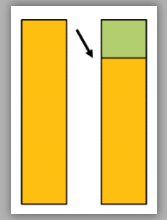
- Live Update support for PowerVC
- Live Update Integration with Power Enterprise Pools

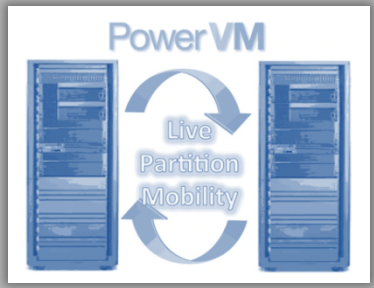
AIX 7.2 TL3: Simplification / Extended Scope Enhancements

- Live Update Integration with LPM
- Live Update CPU Reduction









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Chris's Best Practices for AIX Live Update

The official IBM AIX Live Update Best Practices are well documented here:

Best practices for the Live Update function
https://www.ibm.com/support/knowledgecenter/ssw_aix_72/com.ibm.aix.install/lvupdate_best_practice.htm

Please refer to these when planning a Live Update implementation in your environment.

I have written about my experiences with Live Update numerous times.

AIX Live Updates
https://www.ibm.com/developerworks/community/blogs/cgaix/resource/AIXLiveUpdateblog.pdf

How to Live Update Your AIX System Without Rebooting the Server
https://www.ibm.com/developerworks/community/blogs/cgaix/entry/How_to_live_update_your_AIX_system_without_rebooting_the_server

AIX Live Update in a PowerVC Managed Cloud
http://ibmsystemsmag.com/aix/trends/cloud-computing/live-update-powervc/

I've been testing and working with Live Updates over the last couple of years (since 2015). What follows are some of my "best practices", based on my experiences using this tool in the field. **They are not official IBM best practices and should be treated as such.** These are merely guidelines, based on anecdotal data I have collected whilst using the tool. I hope you find them useful. I'll update this information as I discover new items to add (or remove from) this list.

Chris’s Best Practices for AIX Live Update

1. Always take a **mksysb**. Always create an **alt_disk_copy** of rootvg BEFORE you start a Live Update operation. Please ensure you have a way to back out cleanly.

2. Install your TL, SPs and ifixes then run Live Update. As per the slide below (from my 2018 LKU presentation).

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AIX 7.2 Live Update in a Nutshell

- **Chris’s recommended BEST PRACTICE for Live update – install all your updates (including ifixes), just as you always have, then immediately start Live Update.**

- **PRIOR TO LIVE UPDATE:**
  - Spare disks available & configured (unless using PowerVC)
  - Configure **/var/adm/ras/liveupdate/lvupdate.data** (unless using PowerVC)
  - Run: **alt_disk_copy**
  - Run: **hmcauth (or pvcauth)**
  - Run: **geninstall -k –p** (verify LU environment is OK/ready)
  - Run: **smitty update_all** (update system now, if desired)
  - Run: **emgr** (install ifixes now, if desired)

- **PERFORM LIVE UPDATE:**
- Run one command: **geninstall –k**
- **You are done!**

- **Live Update restrictions (PLEASE READ THIS!!)**

https://www.ibm.com/support/knowledgecenter/ssw_aix_72/com.ibm.aix.install/lvupdate_detail_restrict.htm

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Chris's Best Practices for AIX Live Update

2. continued……

It may not be well known but you can use Live Update (**geninstall –k**) after you've installed AIX fixes. You don't have to include them in the Live Update process. You can patch the OS, and then kick off the LU process when you're done. The AIX knowledge center states:

*"**Note:** You can install any updates and interim fixes by using your preferred methods, and then perform a Live Update operation instead of restarting the system by running the following command:*
 # geninstall –k"

https://www.ibm.com/support/knowledgecenter/en/ssw_aix_72/com.ibm.aix.install/live_update_geninstall.htm

Note

You can install any updates and interim fixes by using your preferred methods, and then perform a Live Update operation instead of restarting the system by running the following command:

```
# geninstall -k
```

Chris's Best Practices for AIX Live Update

2. continued……

Here is an example of how you could perform a Live Update operation, immediately after you've patched your AIX OS. This example is taken from a PowerVC managed environment.

We start with an AIX system running AIX 7.2 TL2 SP1. We would like to update it to SP2 and install ifix IJ04268s2a.180403.AIX72TL02SP02.epkg.Z. We'd like the new SP and ifix to take effect without a reboot, using Live Update.

a) Create clone (backup) of current rootvg.

```
root@lkutest / # alt_disk_copy -Bd hdisk1
```

b) Check current kernel build version. Check OS level prior to installing SP.

```
 root@lkutest / # cat /proc/version
Sep 25 2017
13:39:27
1739A_72F
@(#) _kdb_buildinfo unix_64 Sep 25 2017 13:39:27 1739A_72F

root@lkutest # oslevel -s
7200-02-01-1731
```

Chris's Best Practices for AIX Live Update

2. continued……

c) Authenticate with the PowerVC management server (or HMC if you're not using PowerVC).

```
root@lkutest / # pvcauth -u pvcadmin -p passw0rd -a cgpvc
root@lkutest / # pvcauth -l
Address  : 10.2.55.232
User name: pvcadmin
Project  : ibm-default
Port     : 5000
TTL      : 5:59:58
```

d) Install SP now. Install bos.rte.install first.

```
root@lkutest / # mount sydnim:/nim/cg/aix/aix72tl2sp2 /mnt
root@lkutest / # cd /mnt
root@lkutest /mnt # installp -d . bos.rte.install
```

e) Install SP2 now using update_all. Confirm that SP2 has been installed. Do NOT reboot.

```
root@lkutest /mnt # update_all -Y -c -v -d .
root@lkutest /mnt # oslevel -s
7200-02-02-1810
```

Chris's Best Practices for AIX Live Update

2. continued……

f) Install the desired ifix now. Commit all applied filesets. Do NOT reboot.

```
root@lkutest /tmp/cg # emgr -e IJ04268s2a.180403.AIX72TL02SP02.epkg.Z

root@lkutest /tmp/cg # emgr -l
ID  STATE LABEL      INSTALL TIME      UPDATED BY ABSTRACT
=== ===== ========== ================= ========== ================================
1    S    IJ04268s2a 10/11/18 08:48:24            efix for IJ04268

root@lkutest /tmp/cg # oslevel -s
7200-02-02-1810

root@lkutest / # installp -c ALL
```

g) Perform Live Update now.

```
root@lkutest /tmp/cg # geninstall -k
```

Chris’s Best Practices for AIX Live Update

2. continued……

```
root@lkutest /tmp/cg # geninstall -k
Validating live update input data.

Computing the estimated time for the liveupdate operation:
-------------------------------------------------------
LPAR: lkutest
Blackout time (in seconds): 12
Total operation time (in seconds): 1344

Checking mirror vg device size:
---------------------------------------
Required device size: 20448 MB
PASSED: The disks specified for the mirrored rootvg resulted in a valid volume group factor.

Checking new root vg device size:
---------------------------------------
Required device size: 20448 MB

Checking temporary storage size for the original LPAR:
---------------------------------------
Required device size: 0 or Undetermined MB

Checking temporary storage size for the surrogate LPAR:
---------------------------------------
Required device size: 0 or Undetermined MB
Checking lpar minimal memory size:
---------------------------------------
Required memory size: 2048 MB
```

Chris’s Best Practices for AIX Live Update

2. continued……

```
…
Checking other requirements:
-----------------------------------------
PASSED: sufficient space available in /var.
PASSED: sufficient space available in /.
PASSED: no existing altinst_rvgLvup.
PASSED: rootvg is not part of a snapshot.
PASSED: pkcs11 is not installed.
PASSED: DoD/DoDv2 profile is not applied.
PASSED: Advanced Accounting is not on.
PASSED: Virtual Trusted Platform Module is not on.
PASSED: multiple semid lists is not on.
PASSED: sufficient file system space for interim fix(es) is available.
PASSED: The trustchk Trusted Execution Policy is not on.
PASSED: The trustchk Trusted Library Policy is not on.
PASSED: The trustchk TSD_FILES_LOCK policy is not on.
PASSED: the boot disk is set to the current rootvg.
PASSED: the mirrorvg name is available.
PASSED: the rootvg is uniformly mirrored.
PASSED: the rootvg does not have the maximum number of mirror copies.
PASSED: the rootvg does not have stale logical volumes.
PASSED: all of the mounted file systems are of a supported type.
PASSED: this AIX instance is not diskless.
PASSED: no Kerberos configured for NFS mounts.
PASSED: multibos environment not present.
PASSED: Trusted Computing Base not defined.
PASSED: no local tape devices found.
PASSED: live update not executed from console.
PASSED: the execution environment is valid.
PASSED: enough available space for /var to dump Component Trace buffers.
PASSED: enough available space for /var to dump Light weight memory Trace buffers.
PASSED: all devices are virtual devices.
PASSED: No active workload partition found.
PASSED: nfs configuration supported.
PASSED: RSCT services are active.
PASSED: no Kerberos configuration.
PASSED: no virtual log device configured.
PASSED: PowerVC token is valid.
PASSED: PowerVC is at a supported level.
PASSED: User has PowerVC permissions for Live Update processing.
PASSED: Host is not in maintenance mode.
PASSED: PowerVC token expiration date is valid.
PASSED: PowerVC network devices match those present on partition.
PASSED: PowerVC volumes match hdisks present on partition.
PASSED: All rootvg volumes are boot volumes in PowerVC.
PASSED: Capacity check on SRIOV ports of target host.
PASSED: Sufficient processing units available on target host.
PASSED: Sufficient memory available on target host.
```

Chris’s Best Practices for AIX Live Update

2. continued……

```
…
PASSED: PowerVC virtual machine health status is 'OK'.
PASSED: the disk configuration is supported.
PASSED: no Generic Routing Encapsulation (GRE) tunnel configured.
PASSED: Firmware level is supported.
PASSED: Consolidated system trace buffers size is within the limit of 64 MB.
PASSED: SMT number is valid.
PASSED: No process attached to vty0.
PASSED: No active ipsec configured.
PASSED: Audit is not enabled in stream mode.
PASSED: No exclusive rsets (sysxrset) found.
INFO: Any system dumps present in the current dump logical volumes will not be available after live update is complete.
Non-interruptable live update operation begins in 10 seconds.
Broadcast message from root@lkutest (pts/0) at 11:21:48 ...

Live AIX update in progress.

Initializing live update on original LPAR.

Validating original LPAR environment.

Beginning live update operation on original LPAR.

Requesting resources required for live update.
........
Notifying applications of impending live update.
....
Creating rootvg for boot of surrogate.
.....................................
Starting the surrogate LPAR.
.............................................................................................
Creating mirror of original LPAR's rootvg.
.....................................................................................................................................................................
Moving workload to surrogate LPAR.
.................
        Blackout Time started.

        Blackout Time end.

Workload is running on surrogate LPAR.
...............................................................................
Shutting down the Original LPAR.
.....................................The live update operation succeeded.

Broadcast message from root@lkutest (pts/0) at 11:47:00 ...

Live AIX update completed.
```

Chris's Best Practices for AIX Live Update

2. continued……

h) Verify kernel build version is updated and now active.

```
 root@lkutest / # cat /proc/version
Mar  2 2018
13:02:46
1809C_72H
@(#) _kdb_buildinfo unix_64 Mar  2 2018 13:02:46 1809C_72H
```

3. If you plan to use the Live Update function on a partition that is managed by PowerVC, you should set the **network_allocate_retries** property to a minimum value of 10 on the PowerVC. This property is specified in the **/etc/nova/nova.conf** file on the PowerVC.

This prevents the following messages from appearing, after a Live Update operation:

"Failed to delete a virtual Ethernet adapter on the virtual machine. Check that the RMC is active for the virtual machine. Refer to the logs for more information"

and/or

"Cannot delete a virtual Ethernet adapter on the virtual machine because the HMC operation for delete failed with an HTTP error. Refer to the logs for more information and ensure that the virtual Ethernet adapter is manually removed after you attempt to delete it from the UI".

Chris's Best Practices for AIX Live Update

3. continued……

PowerVC logs will show error similar to this:

*"2018-05-15 11:17:44.998 4643 ERROR powervc_nova.virt.ibmpowervm.hmc.driver [req-00a02a9c-61de-4d19-b809-d5e46ed08b99 80c16094b1b02ff4c709847903305 25b64197707fe536f86cbea82d730304161c3e51c6d67654131bcfaa77b8c4491ba - bf689afa9471460c876fadb2ae838f17 bf689afa9471460c876fadb2ae838f17] **Failed to delete a virtual Ethernet adapter on the virtual machine lkutest-548002b8-00000022.** Check that the RMC is active for the virtual machine. Refer to the logs for more information.: K2HttpError: HTTP error for GET /rest/api/uom/LogicalPartition/1A088741-D22D-4444-A446-76E58D092761/ClientNetworkAdapter/a5293f04-b636-39db-8e2f-8110921f386f: 404 (Not Found)"*

Add this property as a new line as shown in the following example:

network_allocate_retries = 10

You must restart PowerVC for the change to take effect. e.g.

```
# head -2 /etc/nova/nova.conf
[DEFAULT]
network_allocate_retries = 10
```

Chris’s Best Practices for AIX Live Update

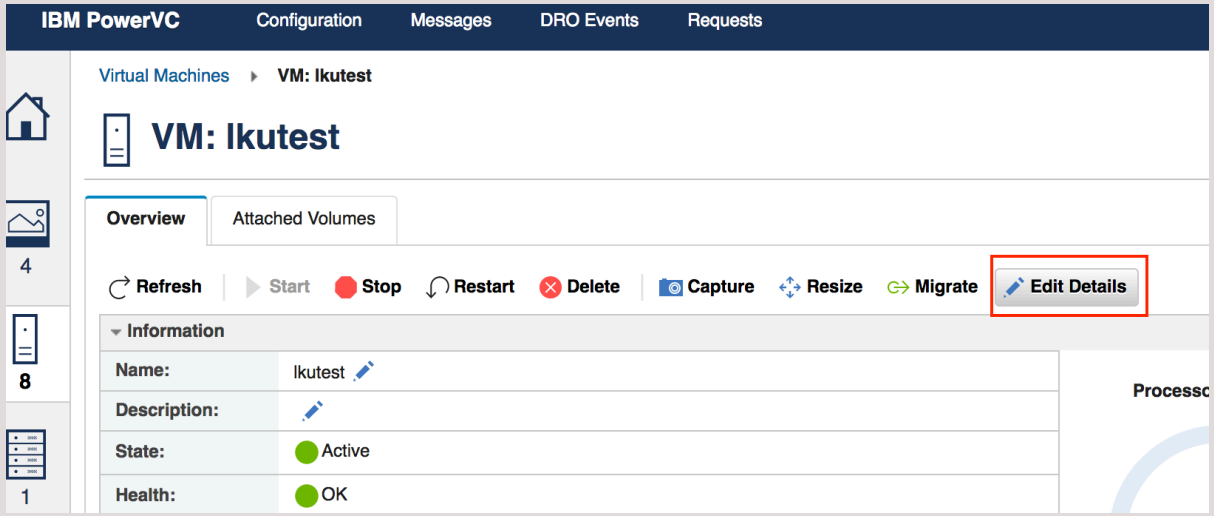
4. Use the **alog** command to check the actual blackout period during the *Blackout Time*, whilst the workload is moved from the Original to the Surrogate partition. e.g.

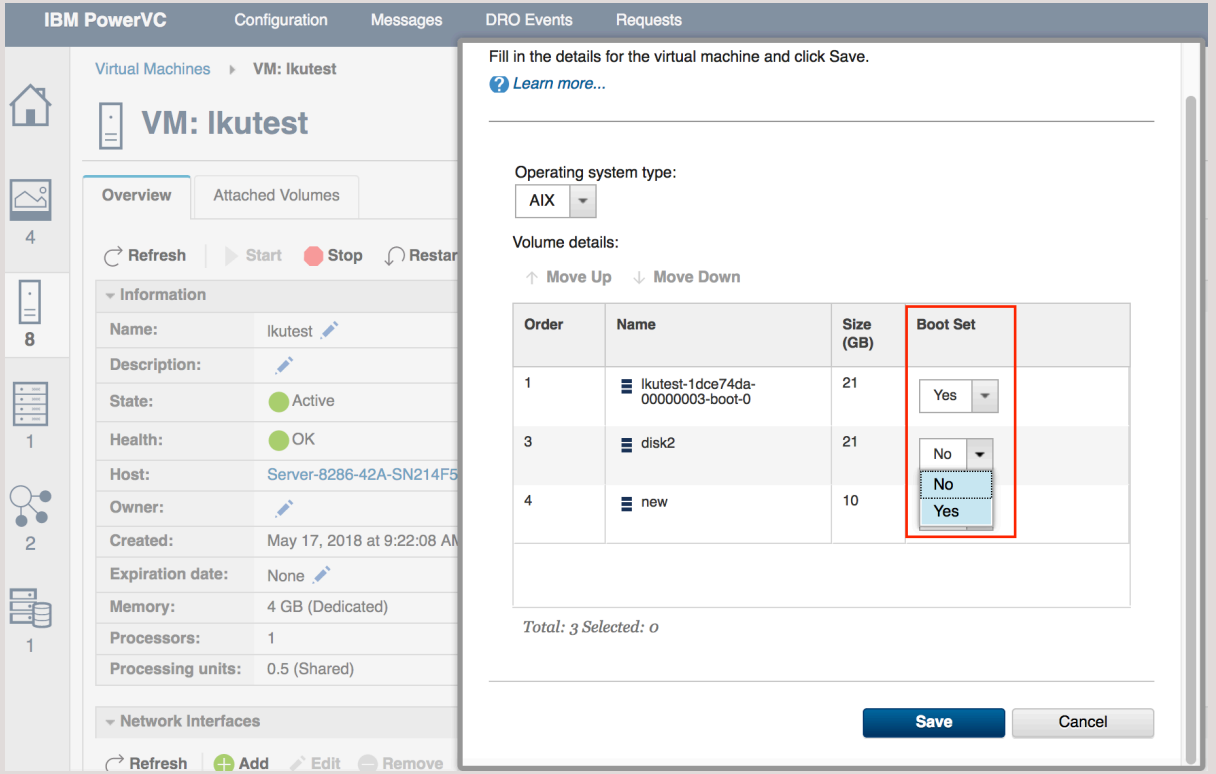
```
root@lkutest / # alog -t mobte -o
time=051418:11:05:02 pid=1857763193074483 3 type=Global dep_mfreq=4572472429Hz
dep_sfreq=4572472429Hz dep_cont=100 bw=60000000B/s dep_iorbw=571837866B/s
dep_iowbw=366226530B/s dep_pipebw=273906256B/s dep_rvgsz=20448MB dep_lulvsz=4542MB
dep_cpuavail=10000 dep_flags=0x0 arr_mfreq=4572472429Hz arr_sfreq=4572472429Hz
arr_cont=100 arr_iorbw=571837866B/s arr_iowbw=366226530B/s arr_pipebw=273906256B/s
arr_rvgsz=20448MB arr_lulvsz=4542MB arr_cpuavail=10000 arr_flags=0x0 files=87
procs=44 threads=140 datasz=931088B socks=40 mempg=15077 nmqs=3 nmsgs=0 nqbs=0
nsems=7 shmsz=0 mmapsz=30677 flags=0x0 stdl_blackout=12.000000s
stdl_global=1218.000000s blackout=11.417990s global=1642.088501s
….
```

Chris’s Best Practices for AIX Live Update

5. If you encounter the message below, when performing a Live Update with PowerVC, ensure that the boot disks are set correctly in PowerVC and try again. You can change the “**Boot Set**” to **Yes** for a VM by selecting it in PowerVC and editing its details.

```
1430-207 FAILED: Not all rootvg volumes are boot volumes in PowerVC.
```





Chris's Best Practices for AIX Live Update

6. ***Please read the Live Update restrictions and limitations resources BEFORE you attempt to use the tool***. There are currently many restrictions and limitations that exist with Live Update. Make sure you are aware of the current constraints and evaluate if they will impact your environment or not.

Live Update restrictions
https://www.ibm.com/support/knowledgecenter/ssw_aix_72/com.ibm.aix.install/lvupdate_detail_restrict.htm

LPAR requirements for Live Update
https://www.ibm.com/support/knowledgecenter/ssw_aix_72/com.ibm.aix.install/lvupdate_limitations.htm

7. Try Live Updates without applying updates! AIX Live Update is designed to be transparent to the running applications. With AIX 7.2.1, there is an easy way to try it out with your own workload, without having to apply an update.

Simply try **geninstall –k –p** (**preview**) to make sure that everything is okay with your configuration, and then use **geninstall –k** to perform the Live Update operation without applying an update.

Chris's Best Practices for AIX Live Update

8. Ensure that the following filesets are installed on your AIX system. Fileset requisites for **bos.liveupdate.rte** are:

```
artex.base.rte
rsct.basic.rte
```

There is a known issue where the bos.liveupdate.rte update fileset is missing the check for several requisites that are necessary for the live update operation. Fixed in TL3.

IV99459: FIX REQUISITES FOR BOS.LIVEUPDATE.RTE UPDATE FILESET
http://www-01.ibm.com/support/docview.wss?uid=isg1IV99459

I've encountered the following error when the **rsct.basic** fileset is not installed. You will observe the following in the **/var/ct/lvupd/ctlvupd.log** file:

```
Wed Nov 15 09:10:06 PST 2017 (12452188) : phase_check_on_original: CHECK phase on
ORIGINAL exiting with return code, 5
Wed Nov 15 09:11:12 PST 2017 (11469192) : rsct.basic fileset is not installed.
```

Chris’s Best Practices for AIX Live Update

9. The **/usr/sbin/clvupdate** utility is a command that can be used when troubleshooting or resolving issues with AIX Live Update. It is included with the bos.liveupdate.rte fileset. The clvupdate command is now a supported command. You can refer to the documentation for more information on the available options and usage (https://www.ibm.com/support/knowledgecenter/ssw_aix_72/com.ibm.aix.cmds1/clvupdate.htm). If necessary, please seek advice and guidance from IBM support before using this tool in a Live Update environment.

```
# lslpp -w /usr/sbin/clvupdate
  File                                        Fileset               Type
  ----------------------------------------------------------------------------
  /usr/sbin/clvupdate                         bos.liveupdate.rte    File


Usage:
    Attempt to clean up partition after a failed Live Update operation:
            clvupdate [-e] [-o] [-u]
            clvupdate [-e] [-n] [-u]
            clvupdate -d
            clvupdate -l
            clvupdate -r
            clvupdate -v

Flags:
    -d Remove surrogate boot disks only
    -e Ignore Live Update state
    -l Unlock Live Update lock only
    -n Run LVUP_ERROR phase scripts
    -o Force original shutdown
    -r Reset Live Update state and status only
    -u Ignore Live Update status
    -v Remove volume group from previous Live Update
```

Chris's Best Practices for AIX Live Update

10. Please refer to the **/var/adm/ras/liveupdate/logs/lvupdlog** log file for debugging information when troubleshooting a Live Update issue. This log file can provide very useful information if you are trying to determine why Live Update is not behaving as you would expect. The IBM support team will also use this log file to assist them with problem determination. They may ask you to collect additional information. Please refer to the **Live Kernel Update Must Gather Technote** for the additional steps.

```
# grep –w ERROR /var/adm/ras/liveupdate/logs/lvupdlog
```

Live Kernel Update Must Gather
https://www-01.ibm.com/support/docview.wss?uid=isg3T1023961

```
root@lkutest / # grep -w ERROR /var/adm/ras/liveupdate/logs/lvupdlog
LVUPD 10/10/2019-11:00:09.489 ERROR lvupdate.c - 2846 - liveUpdate: The live update operation completed with warnings ...
SLVUPD 10/10/2019-11:00:09.867 ERROR slvupdate.c - 3180 - lvup_remove_old_disk_entries: Cannot remove missing paths
SLVUPD 10/10/2019-11:00:09.867 ERROR slvupdate.c - 2365 - slvupdate: Could not remove old disk entries
```

Chris’s Best Practices for AIX Live Update

11. In a PowerVC managed environment, use the **clvupdate –v** command to remove the **lvup_rootvg** volume, post a Live Update operation and a reboot.

Removal of original LPAR and cleanup of resources after Live Update. If you wish to remove the Live Update surrogate boot disk (lvup_rootvg, after a reboot), you can use the clvupdate command. This command will contact the PowerVC management server (requires a pvcauth token) and will automatically remove the volume group and disk from the LPAR, as shown below.

```
; reboot LPAR
root@orion / # uptime
04:42AM   up 1 mins,  1 user,  load average: 1.08, 0.40, 0.15

root@orion / # lspv
hdisk0          00f94f587d8b0203                    rootvg          active
hdisk1          00f94f584f60b1c1                    lvup_rootvg

root@orion / # pvcauth -u pvcadmin -p maxpeck123 -a cgpvc
root@orion / # pvcauth -l
Address  : 10.1.50.232
User name: pvcadmin
Project  : ibm-default
Port     : 5000
TTL      : 5:59:53
```

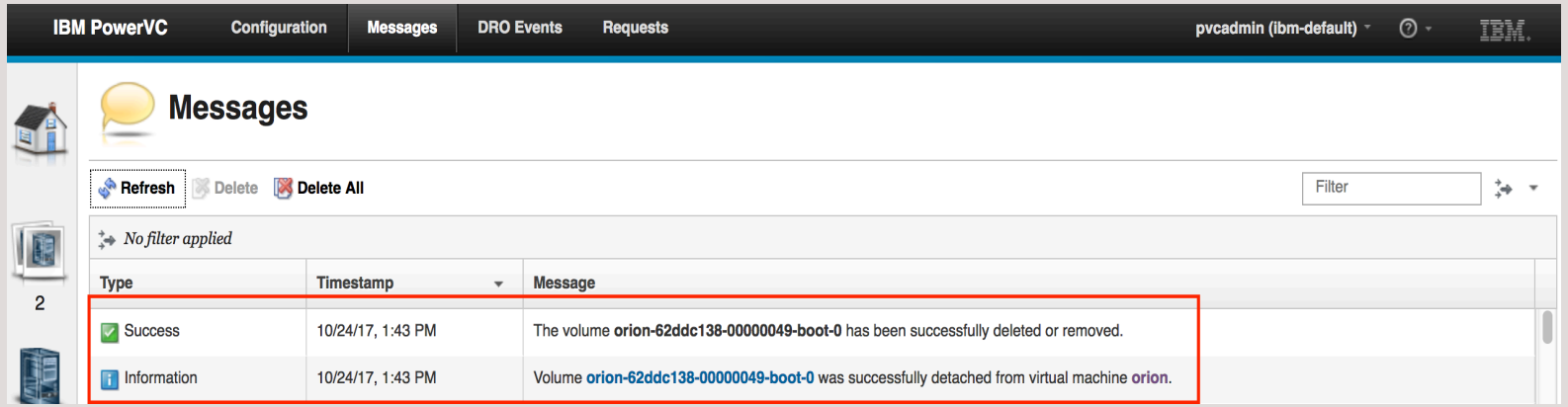
Chris's Best Practices for AIX Live Update

11. continued…

```
root@orion / # clvupdate -v
The temporary Live Update storage was successfully removed.
Cleanup action succeeded.

root@orion / # lspv
hdisk0          00f94f587d8b0203                    rootvg          active
```

A message will appear in the PowerVC UI, indicating that the volume has been detached from the VM and deleted.



Chris’s Best Practices for AIX Live Update

12. Can I perform a rollback or backout “online” or “live” i.e. without a reboot? i.e. is there a non-disruptive rollback option?

A non-disruptive rollback is possible today with ifixes, but not Service Packs or Technology Levels. For an ifix you can remove the ifix, and instead of a reboot, do another Live Update with no other updates (**geninstall –kp**, then, **geninstall -k**).

Use the alternate rootvg, created prior to the live update, to boot on the previous TL/SP level of AIX if necessary.

Chris's Best Practices for AIX Live Update

13. Remove any missing disk paths using the rmpath command. Missing paths do not typically present any functional issues to a running AIX system. However, if not resolved, they can introduce errors with live update, that can be difficult to troubleshoot.

```
root@AIXmig / # lspath
Enabled hdisk5 vscsi1
Enabled hdisk3 vscsi1
Enabled hdisk4 vscsi1
Enabled hdisk0 vscsi1
Enabled hdisk1 vscsi1
Enabled hdisk2 vscsi1
Missing hdisk5 vscsi2
Enabled hdisk3 vscsi2
Missing hdisk4 vscsi2
Missing hdisk0 vscsi2
Enabled hdisk1 vscsi2
Missing hdisk2 vscsi2
Enabled hdisk6 vscsi1
Missing hdisk6 vscsi2
Enabled hdisk6 vscsi2
Enabled hdisk0 vscsi2
Enabled hdisk2 vscsi2
Enabled hdisk4 vscsi2

root@AIXmig / # rmpath -dl hdisk0 -p vscsi2
paths Deleted
root@AIXmig / # rmpath -dl hdisk2 -p vscsi2
paths Deleted
root@AIXmig / # rmpath -dl hdisk4 -p vscsi2
paths Deleted
root@AIXmig / # rmpath -dl hdisk5 -p vscsi2
paths Deleted
root@AIXmig / # rmpath -dl hdisk6 -p vscsi2
paths Deleted
```

https://www.ibm.com/support/knowledgecenter/ssw_aix_72/com.ibm.aix.install/lvupdate_best_practice.htm

Chris's Best Practices for AIX Live Update

Other Considerations

What is the typical blackout time for AIX Live Update?

"15 second time frame is about right for a lab environment but in real world I have seen times closer to 30-45 second range. This was an oracle workload and it actually recovers fine. The other systems were able to connect back to it with no issues. I tell people that if your application works well in a PowerHA active/passive environment it will work well with Live Update."

AIX Live Update with CPU Reduction

https://www.ibm.com/developerworks/community/blogs/cgaix/entry/AIX_Live_Update_with_CPU_Reduction?lang=en

AIX Live Update Across Frames

https://www.ibm.com/developerworks/community/blogs/liveupdate/entry/AIX_Live_Update_Across_Frames_using_PowerVC_in_case_of_Insufficient_System_Resource_Availability?lang=en

https://www.ibm.com/developerworks/community/blogs/cgaix/entry/Testing_AIX_Live_Update_Across_Power_Systems_Frames?lang=en

Chris's Best Practices for AIX Live Update

Known Issues - IJ17505: LKU FAILED FOR SP TO SP UPDATE

https://www-01.ibm.com/support/docview.wss?uid=isg1IJ17505

http://www14.software.ibm.com/webapp/set2/subscriptions/onvdq?mode=18&ID=6511&myns=aix&mynp=OCSG11S&mync=E&cm_sp=aix-_-OCSG11S-_-E

ifix available.

Attempting to use Live Update to move from 7200-03-02-1846 to 7200-03-03-1914. Operation fails with errors shown below.

```
Moving workload to surrogate LPAR.
.............
        Blackout Time started.
1020-026 Can't send message (32).  [03.155.0041]
1020-026 Can't send message (32).  [03.155.0050]
1020-026 Can't send message (32).  [03.155.0041]
1020-026 Can't send message (32).  [03.156.0132]

        1020-089 Internal error detected. [02.335.0458]
........1430-030 An error occurred while moving the workload.
1430-045 The live update operation failed. Cleanup action is started.
..................................................
```

```
# grep -w ERROR /var/adm/ras/liveupdate/logs/lvupdlog
OLVUPD 08/14/2019-10:51:38.864 ERROR olvupdate.c - 1112 - omcr_monitor: mcr exited in error with status 37
OLVUPD 08/14/2019-10:51:38.865 ERROR olvupdate.c - 3200 - olvupdate: mcr exited unexpectedly
OLVUPD 08/14/2019-10:51:39.937 ERROR olvupdate.c - 3276 - olvupdate: ERROR during mobility
14025110/30998981 1565743894.236 ERROR    mcr_messaging - 1020-026 Can't send message (32).  [03.155.0041]
6029768/11927935 1565743894.240 ERROR    mcr_messaging - 1020-026 Can't send message (32).  [03.155.0050]
15794486/28967313 1565743894.242 ERROR    mcr_messaging - 1020-026 Can't send message (32).  [03.155.0041]
4260138/8782261 1565743894.244 ERROR    common_spl - 1020-026 Can't send message (32).  [03.156.0132]
      OLVUPDMCR 1565743894.246 ERROR    mcr_sync - Action LU_DUMP4 failed in mcrp with status 37.
      OLVUPDMCR 1565743896.568 ERROR    mcr_ipc_srm_helper - 1020-089 Internal error detected. [02.335.0458]
SLVUPD 08/14/2019-10:51:34.264 ERROR slvupdate.c - 789 - smcr_monitor: Unexpected event 'MCR EXIT' received from mcr
SLVUPD 08/14/2019-10:51:34.265 ERROR slvupdate.c - 1734 - slvupdate: ERROR starting mobility
SLVUPD 08/14/2019-10:51:34.266 ERROR lvuplpvc.c - 2622 - lvup_pvc_reset_server_state: Failed to get PowerVC context
10027332/14746065 1565743894.236 ERROR    mcr_fd_prm - 1020-007 System call fdinfo error (22).  [03.573.1724]
14025110/30998981 1565743894.236 ERROR    mcr_fd_prm - 1020-007 System call fdinfo error (22).  [03.573.1724]
6029768/11927935 1565743894.242 ERROR    mcr_fd_prm - 1020-007 System call fdinfo error (22).  [03.573.1724]
8323390/28639615 1565743894.243 ERROR    mcr_fd_prm - 1020-007 System call fdinfo error (22).  [03.573.1724]
15794486/28967313 1565743894.245 ERROR    mcr_fd_prm - 1020-007 System call fdinfo error (22).  [03.573.1724]
4850130/9306413 1565743894.246 ERROR    mcr_fd_prm - 1020-007 System call fdinfo error (22).  [03.573.1724]
4260138/8782261 1565743894.247 ERROR    mcr_fd_prm - 1020-007 System call fdinfo error (22).  [03.573.1724]
7078386/15139291 1565743894.247 ERROR    mcr_fd_prm - 1020-007 System call fdinfo error (22).  [03.573.1724]
    mcr-restart 1565743894.249 ERROR    mcr_sync - Action LU_RESTORE2 failed in mcrp with status 4.
```

```
# emgr -l
ID   STATE LABEL      INSTALL TIME      UPDATED BY ABSTRACT
=== ===== ========== ================= ========== ====================================
1    S     IJ08674s2b 10/11/18 08:48:24            efix for IJ08674
2    S     dbg_98386  08/14/19 15:06:59            LKU failed for SP to SP update
```

Chris's Best Practices for AIX Live Update

Other Resources and Reference Material

AIX 7.2 Knowledge Center – Live Update
http://www-01.ibm.com/support/knowledgecenter/ssw_aix_72/com.ibm.aix.install/live_update_install.htm

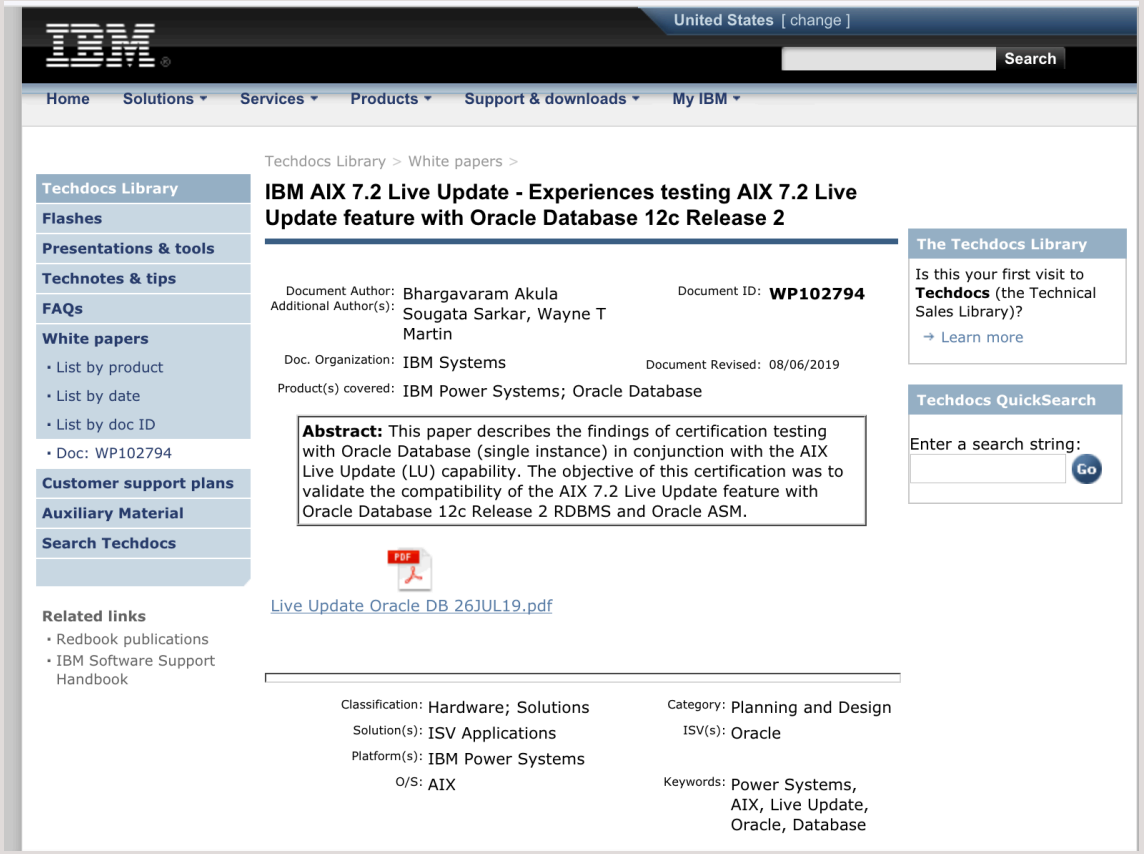
2018 IBM Systems Technical University April 30th – May 4th, Orlando, Florida
a100000 - Update your AIX system without a reboot!
https://www.ibm.com/developerworks/community/blogs/cgaix/resource/AIX_7.2_Live_Update_a100000.pdf

Chris's AIX Live Update Best Practices for 2019!
https://www.ibm.com/developerworks/community/blogs/cgaix/entry/Chris_s_AIX_Live_Update_Best_Practices?lang=en

IBM AIX 7.2 Live Update - Experiences testing AIX 7.2 Live Update feature with Oracle Database 12c Release 2
https://www-03.ibm.com/support/techdocs/atsmastr.nsf/WebIndex/WP102794

Oracle and AIX LKU now Certified!

- This includes 12c, 18c, and 19c.
- Oracle now views Live Update as part of Base AIX
- Therefore will not require a separate certification for Live Update in the future.
- Finally, it's important to note that Oracle did not have to change anything in their code to get this working!
- http://www-03.ibm.com/support/techdocs/atsmastr.nsf/WebIndex/WP102794

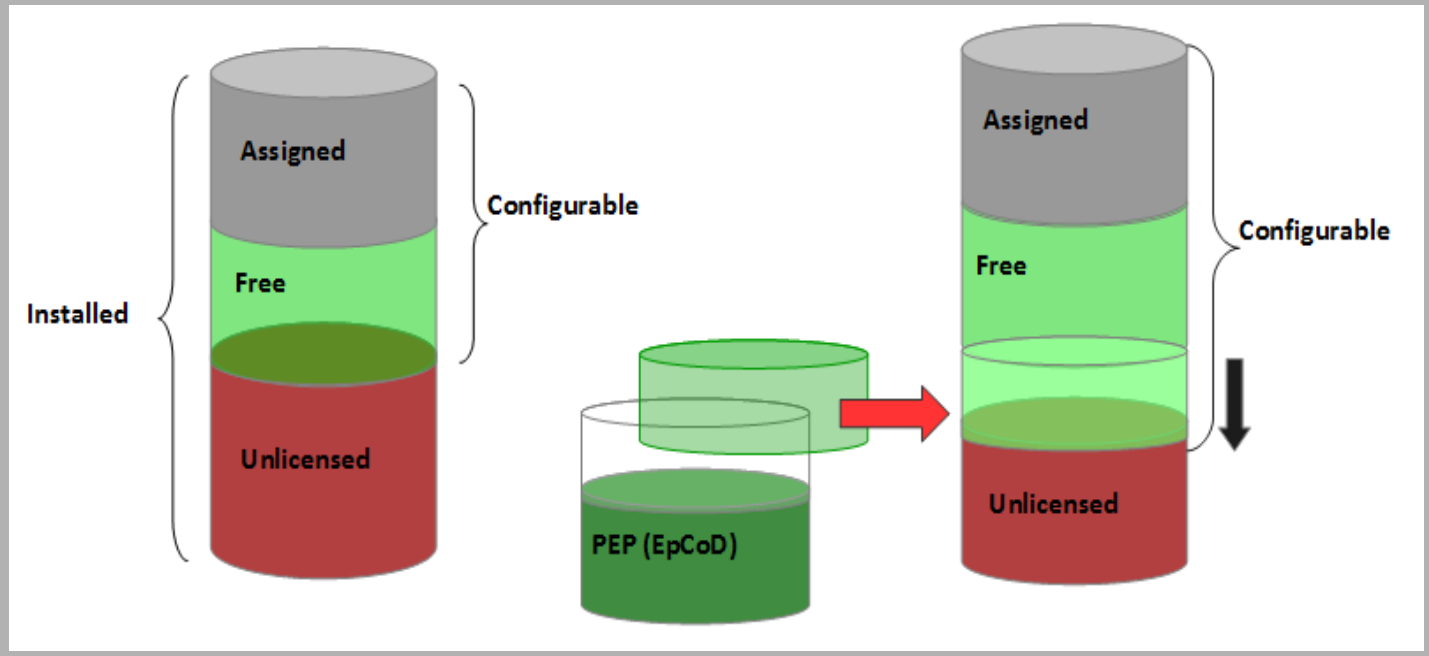


Live Update with Power Enterprise Pools

7.2 TL2 Oct 2017

What it means

If part of a PEP, automatically use unlicensed cores or memory to create the surrogate VM for Live Update
(and return them when done)



Benefits

Live Update now possible for partitions that were limited by CPU or memory

No additional admin steps

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Live Update in a PowerVC Managed Cloud

7.2 TL2 Oct 2017

What it means

Live Update (whether cmd-line or NIM) will use PowerVC instead of HMC to create surrogate VM, etc

Works with or without NovaLink

Benefits

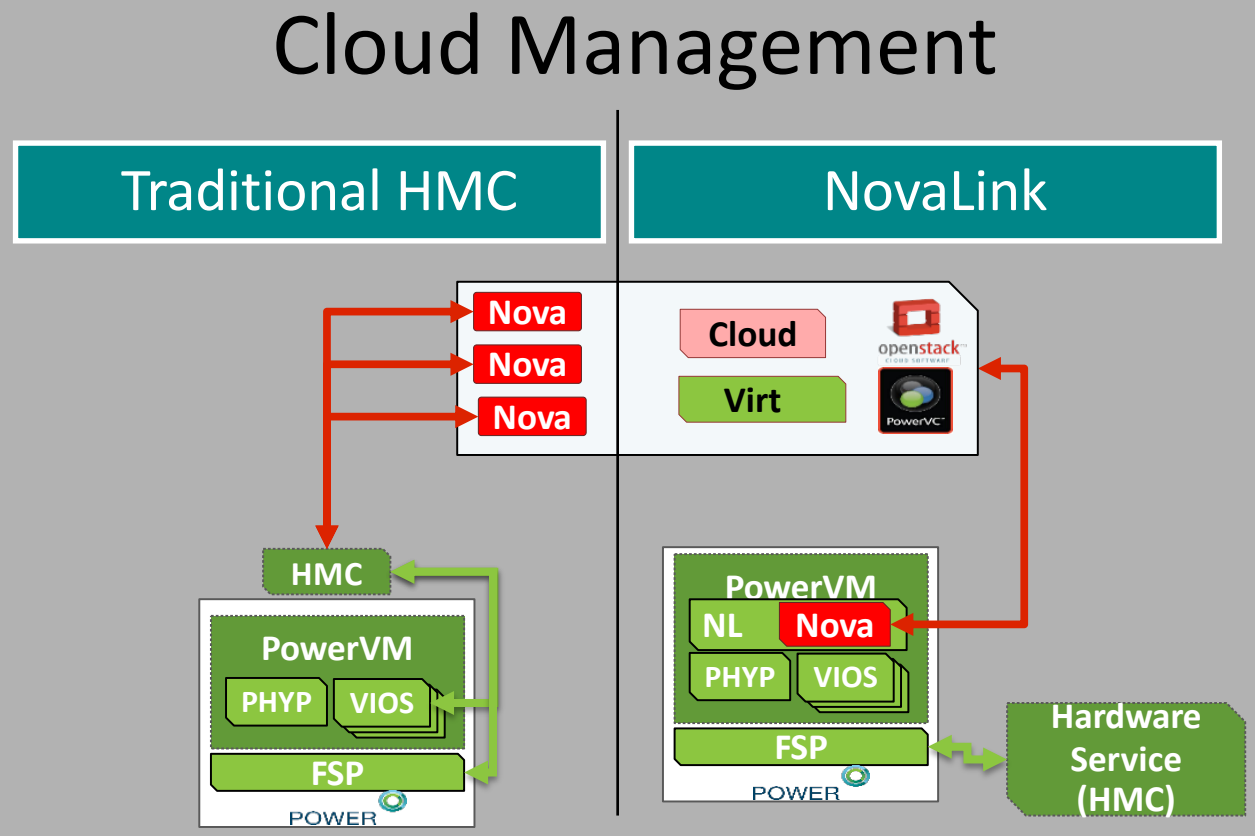
More environments that can support Live Update

Simplified admin

– Storage provisioned by PowerVC

– No lvupdate.data file required

Positioning for Live with LPM



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Live Update Integration with LPM

7.2 TL3 Oct 2018

What it means

Live Update can use LPM prior to the update if the necessary CPU and/or Memory resources are available on a different frame

Only supported on a PowerVC-managed LPAR

Benefits

Live Update even for a resource-constrained frame

Simple admin

- LPM to destination and return is all automated with the Live Update
- Option in the lvupdate.data file
  - Can specify the destination or let PowerVC choose

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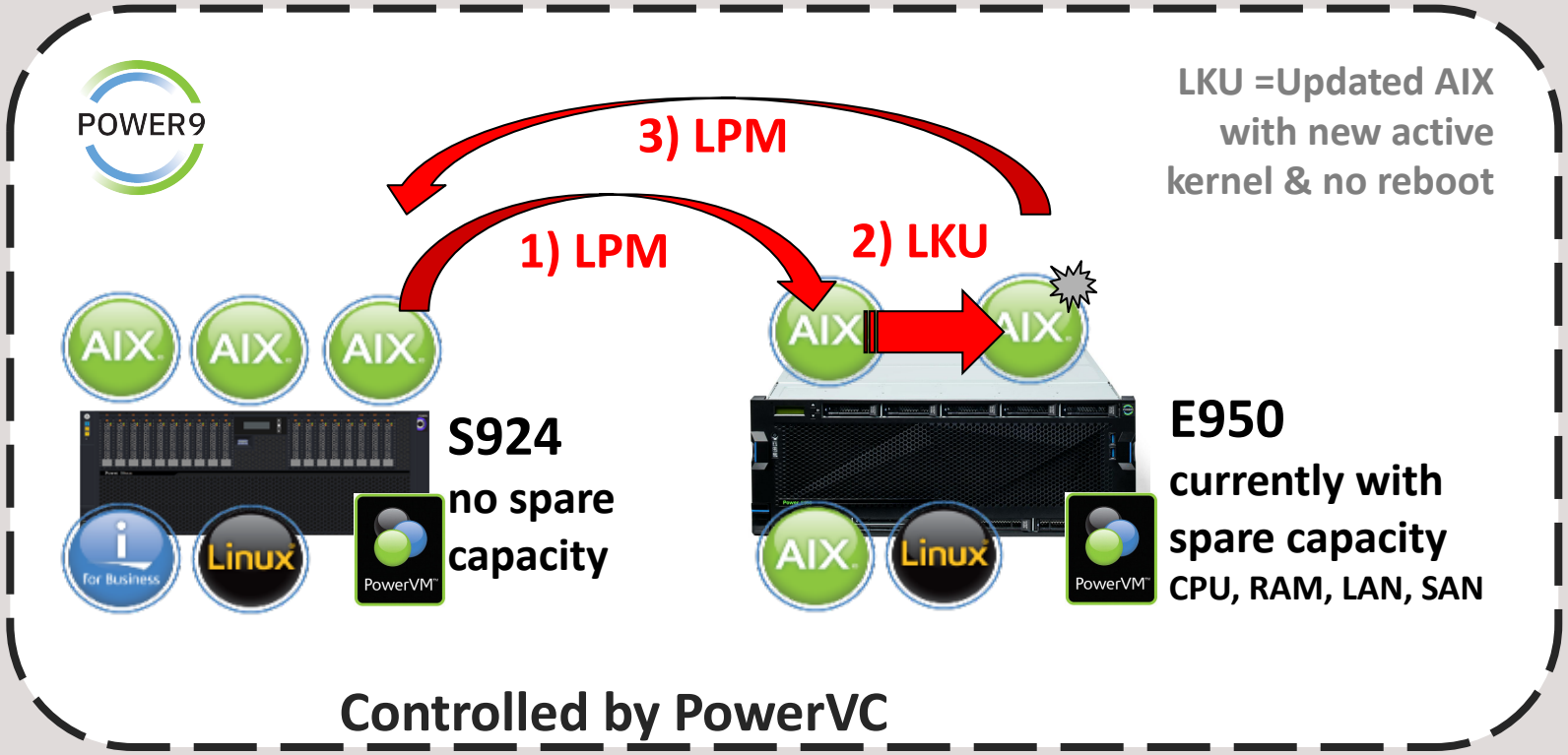
AIX 7.2 Live Kernel Update (LKU) using a “spare” compute server



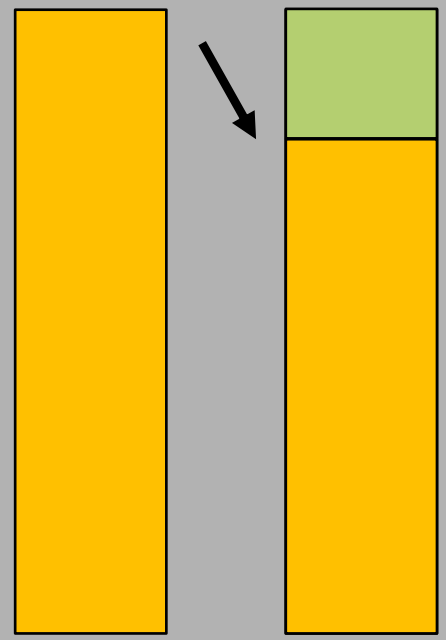
Live Update CPU Reduction

7.2 TL3 Oct 2018

What it means

Live Update can reduce the CPU used by the partition during the Live Update if there are not enough CPU resources available on the frame to do the Live Update

Supported on a PowerVC-managed or HMC-managed LPAR



Benefits

Live Update is possible even for a CPU-constrained frame

Simple admin

– Enabled with Yes/No option in lvupdate.data

Notes

Uses local or Enterprise Pool resources or LPM before reducing CPUs

Entitlement may be reduced as low as the partition “Minimum”

– Virtual CPU count will not be reduced

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Live Update near term Priorities

- Live Update support with AutoFS
- Live Update support with Kerberos
- Enhanced RAS Capabilities & improved Usability
- ISV certifications and statements of support

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Enhanced usability for AIX Live Update

- AIX 7.2 Technology Level 4 (TL4) delivers improved preview capabilities and error handling for live update.

```
root@lkutest /mnt # oslevel -s
7200-03-03-1914

root@lkutest /mnt # geninstall -kp
Validating live update input data.

Computing the estimated time for the live update operation:
----------------------------------------------------------
LPAR: lkutest
Blackout time(in seconds): 10
Total operation time(in seconds): 1110

Checking mirror vg device size:
-------------------------------------------
Required device size: 20448 MB
PASSED: The disks specified for the mirrored rootvg resulted in a valid volume group factor.

Checking new root vg device size:
-------------------------------------------
Required device size: 20448 MB

Checking temporary storage size for original LPAR:
-------------------------------------------
Required device size: 0 or Undetermined MB

Checking temporary storage size for surrogate LPAR:
-------------------------------------------
Required device size: 0 or Undetermined MB

Checking lpar minimal memory size:
-------------------------------------------
Required memory size: 2048 MB

Checking other requirements:
-------------------------------------------
PASSED: sufficient space available in /var.
PASSED: sufficient space available in /.
PASSED: no existing altinst_rvgLvup.
PASSED: rootvg is not part of a snapshot.
PASSED: pkcs11 is not installed.
PASSED: DoD/DoDv2 profile is not applied.
PASSED: Advanced Accounting is not on.
PASSED: Virtual Trusted Platform Module is not on.
PASSED: multiple semid lists is not on.
PASSED: sufficient file system space for interim fix(es) is available.
PASSED: The trustchk Trusted Execution Policy is not on.
PASSED: The trustchk Trusted Library Policy is not on.
PASSED: The trustchk TSD FILES_LOCK policy is not on.
PASSED: the boot disk is set to the current rootvg.
PASSED: the mirrorvg name is available.
PASSED: the rootvg is uniformly mirrored.
PASSED: the rootvg does not have the maximum number of mirror copies.
PASSED: the rootvg does not have stale logical volumes.
PASSED: all of the mounted file systems are of a supported type.
PASSED: this AIX instance is not diskless.
PASSED: no Kerberos configured for NFS mounts.
PASSED: multibos environment not present.
PASSED: Trusted Computing Base not defined.
PASSED: no local tape devices found.
PASSED: live update not executed from console.
PASSED: the execution environment is valid.
PASSED: enough available space for /var to dump Component Trace buffers.
PASSED: enough available space for /var to dump Light weight memory Trace buffers.
PASSED: all devices are virtual devices.
PASSED: No active workload partition found.
PASSED: nfs configuration supported.
PASSED: RSCT daemons are active.
PASSED: no Kerberos configuration.
PASSED: no virtual log device configured.
PASSED: PowerVC token is valid.
PASSED: PowerVC is at a supported level.
PASSED: User has PowerVC permissions for Live Update processing.
PASSED: Host is not in maintenance mode.
PASSED: PowerVC token expiration date is valid.
PASSED: PowerVC network devices match those present on partition.
PASSED: PowerVC volumes match hdisks present on partition.
PASSED: All rootvg volumes are boot volumes in PowerVC.
PASSED: Enough free space on storage provider.
PASSED: Sufficient processing units available on target host.
PASSED: Sufficient memory available on target host.
PASSED: Capacity check on SRIOV ports of target host.
PASSED: PowerVC virtual machine health status is 'OK'.
PASSED: the disk configuration is supported.
PASSED: no Generic Routing Encapsulation (GRE) tunnel configured.
PASSED: Firmware level is supported.
PASSED: Consolidated system trace buffers size is within the limit of 64 MB.
PASSED: SMT number is valid.
PASSED: No process attached to vty0.
PASSED: No active ipsec configuration found.
PASSED: Audit is not enabled in stream mode.
PASSED: No exclusive rsets (sysxrset) found.
INFO: Any system dumps present in the current dump logical volumes will not be available after live update is complete.
```

```
root@lkutest / # geninstall -kp

********************************************************************************
Live Update PREVIEW:  Live Update operation will not actually occur.
********************************************************************************

+------------------------------------------------------------------------------+
                    Pre-Live Update Verification...
+------------------------------------------------------------------------------+
Verifying environment...done
Verifying /var/adm/ras/liveupdate/lvupdate.data file...done
Computing the estimated time for the live update operation...
Results...

EXECUTION INFORMATION
---------------------
  LPAR: lkutest
  PowerVC: 10.2.55.232
  user: pvcadmin

  Blackout time(in seconds): 11
  Total operation time(in seconds): 1178

  << End of Information Section >>

+------------------------------------------------------------------------------+
                    Live Update Requirement Verification...
+------------------------------------------------------------------------------+

INFORMATION
-----------
INFO: Any system dumps present in the current dump logical volumes will not be
available after live update is complete.

  << End of Information Section >>

+------------------------------------------------------------------------------+
                    Live Update Preview Summary...
+------------------------------------------------------------------------------+
The live update preview succeeded.

********************************************************************************
End of Live Update PREVIEW:  No Live Update operation has actually occurred.
********************************************************************************
root@lkutest / #
```

Enhanced usability for AIX Live Update Preview

```
root@lkutest / # geninstall -kp

********************************************************************************
Live Update PREVIEW:  Live Update operation will not actually occur.
********************************************************************************

+-------------------------------------------------------------------------------+
                    Pre-Live Update Verification...
+-------------------------------------------------------------------------------+
Verifying environment...done
Verifying /var/adm/ras/liveupdate/lvupdate.data file...done
Computing the estimated time for the live update operation...done
Results...

EXECUTION INFORMATION
---------------------
  LPAR: lkutest
  PowerVC: 10.2.55.232
  user: pvcadmin

  Blackout time(in seconds): 11
  Total operation time(in seconds): 1168

  << End of Information Section >>

+-------------------------------------------------------------------------------+
                    Live Update Requirement Verification...
+-------------------------------------------------------------------------------+

INFORMATION
-----------
INFO: Any system dumps present in the current dump logical volumes will not be available
after live update is complete.

  << End of Information Section >>

FAILURES
--------
1430-247 FAILED: No valid authentication with a PowerVC console.
     Use the 'pvcauth -l' command to check the PowerVC authentication.
     If needed, run 'pvcauth' command to authenticate with PowerVC.
     Check the attributes of 'pvc' stanza in the lvupdate.data match the pvcauth values.

  << End of Failure Section >>

+-------------------------------------------------------------------------------+
                    Live Update Preview Summary...
+-------------------------------------------------------------------------------+
1430-218 The live update preview failed.

********************************************************************************
End of Live Update PREVIEW:  No Live Update operation has actually occurred.
********************************************************************************
0503-125 geninstall:  The lvupdate call failed.
Please see /var/adm/ras/liveupdate/logs/lvupdlog for details.
root@lkutest / #
```


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AIX 7.2 Live Update – Useful Links

- **David Sheffield's Blog + Video: Introducing AIX 7.2.1 Live Update**
  - http://www.ibm.com/developerworks/aix/library/au-aix7.2.1-liveupdate-trs/index.html?ca=drs-&ce=ism0070&ct=is&cmp=ibmsocial&cm=h&cr=crossbrand&ccy=us

- **Chris Gibson's Blogs:**
  - How to live update your AIX system without rebooting the server
    - https://www.ibm.com/developerworks/community/blogs/cgaix/entry/How_to_live_update_your_AIX_system_without_rebooting_the_server?lang=en
  - Simplifying AIX Live Update with PowerVC
    - https://www.ibm.com/developerworks/community/blogs/cgaix/entry/Simplify_AIX_Live_Updates_with_PowerVC?lang=en
  - Chris's AIX Live Update Best Practices
    - https://www.ibm.com/developerworks/community/blogs/cgaix/entry/Chris_s_AIX_Live_Update_Best_Practices?lang=en

- **IBM Knowledge Center:**
  - Top-Level Article
    - https://www.ibm.com/support/knowledgecenter/en/ssw_aix_72/com.ibm.aix.install/live_update_install.htm
  - Prerequisites
    - https://www.ibm.com/support/knowledgecenter/en/ssw_aix_72/com.ibm.aix.install/lvupdate_requisite.htm
  - Restrictions
    - https://www.ibm.com/support/knowledgecenter/en/ssw_aix_72/com.ibm.aix.install/lvupdate_detail_restrict.htm

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AIX Live Update

Overview

Live update is a significant enhance to the AIX 7.2 Enterprise offering that allows customers to update a running kernel without shutting down an active workload.

Prior to AIX7.2TL1, major and minor releases of AIX required a reboot of the system for a new kernel to become active. This required application outages with the attached coordination issues. Even important updates got delayed causing issues that should never have occurred.

This offering covers concepts, implementation, configuration, monitoring, limitations as well as future direction of the Live Update technology. One objective of this engagement is to help focus ongoing development to meet actual customer's use cases and practices.

This offering provides a customer or business partner knowledge and hands-on experience to make an Intelligent decision when implementing Live Update technology over traditional migration strategies. This offering is a quick, cost effective method to integrate this new technology into an existing Power environment, training IT Staff and obtaining the best availability possible from IBM Power architecture.

Who benefits from this workshop?

* Customers and Business Partners considering Live Update over traditional migration strategies.

* Customers looking to quickly implement Live Updating into existing Power7 and Power8 environments and train their IT staff

* Business partners requiring the knowledge and skills necessary to assist customers evaluating workloads for Live Update

* Business partners and customers performing POC engagements to evaluate Live Update and integrate into exiting customer procedures and environments.

Duration:

* 3 – 4 day engagement. Customers and Business Partners preparing to implement AIX7.2 and achieve maximum application availability POC(Proof of Concept)

Delivery:

This is an onsite offering consisting of standup lectures. Presentation handouts are provided in PowerPoint format.
If the scope of this offering is to implement Live Update into an existing customer or POC environment, IBM will conduct a design and requirements review to insure successful updating of an AIX7.2TL1SP0 LPAR to a later service pack or TL.

Topics:

* Overview of traditional migration methodologies
* Introduction of Live Update concepts, design and comparison to traditional OS update technologies
* Introduction of Live Update requirements and Configuration options
* Configure AIX LPAR for Live Update and examining resource requirements

Terms and Conditions: Actual Tasks, Deliverables, Service Estimates, and travel requirements vary with each client's environment. When we have reached a final agreement on the scope of your initiative and our level of assistance, a formal document describing our proposed work effort, costs, etc, will be presented for your approval and signature.

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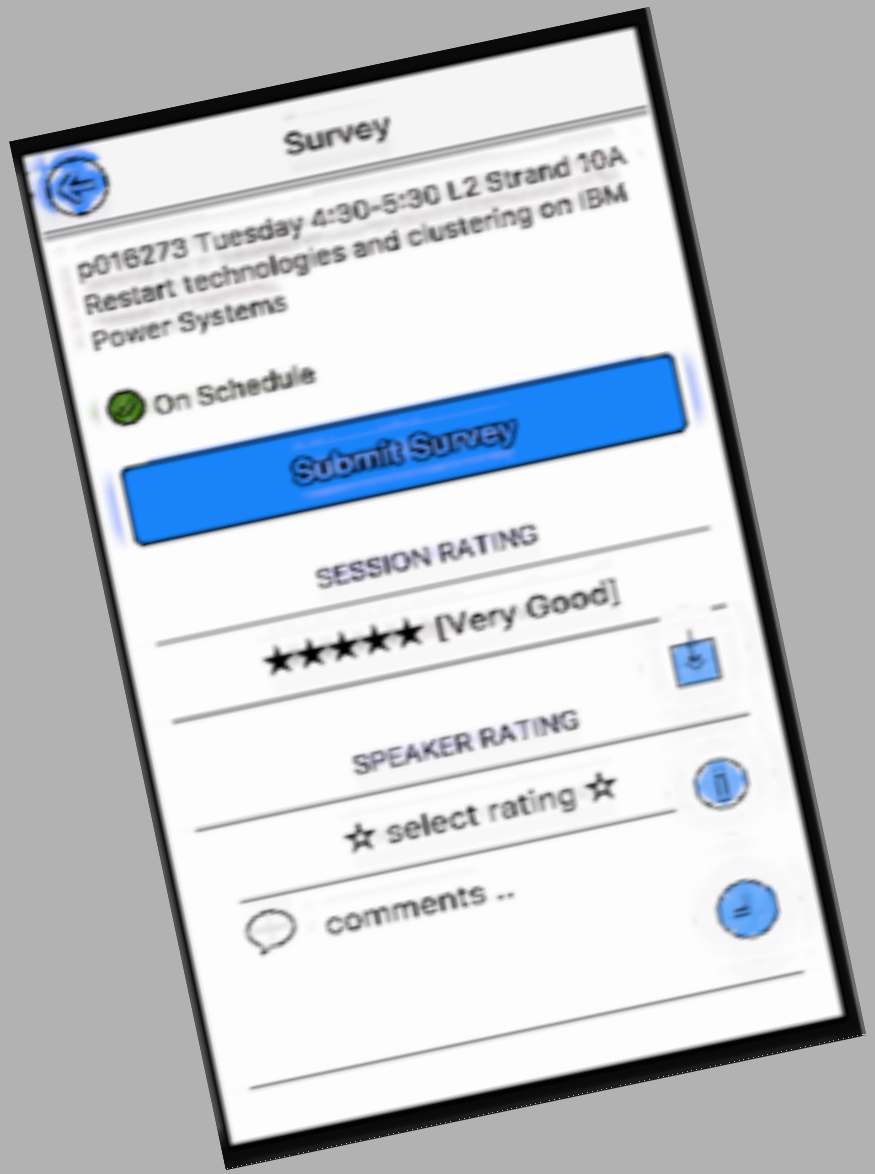
Thank you!



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Please complete the Session Evaluation!

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