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Automate infrastructure viosupgrade in NIM environment with Chef

AIX VIOS upgrade with Chef

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Upgrading AIX VIOSes in a large scale infrastructure is now possible by using Chef framework.
The aix_viosupgrade chef resource allows upgrading NIM client VIOSes using a specific ios_mksysb image.

Introduction

This article details how to use Chef for **VIOS upgrade automation** on IBM® AIX® systems. In addition to this document, you may refer to:

"Chef Automate infrastructure updates in NIM environment" which describes the hardware configuration, the installation process and use cases to use Chef to automate AIX patch management.

"Chef Automate AIX VIOS updates in NIM environment" which describes how to use Chef to automate the update of AIX VIOSes.

Bases on the VIOSes update development for AIX Chef automation, this article explains the different steps to securely upgrade VIOS.

This operation is called "VIOS rolling upgrade" (similar operations of VIOS rolling update).

The steps to perform a VIOS rolling upgrade are:

a) Verify the state of the VIOSes to upgrade by performing a health check of the VIOSes.
b) Create an alternate disk copy for the rootvg of the VIOS for backup purpose in case of failure.
c) Perform the upgrade operation by using viosupgrade command through NIM environment by following these steps:
    - Backup: The virtual and logical configuration data is backed up to be restored after a new installation.
    - Installation: Performs a complete installation of the VIOS partition from the provided VIOS image (ios_mksysb)

- Restore: The virtual and logical configuration data of the VIOS partition is restored.

d) Cleanup to remove the alternate disk if necessary.

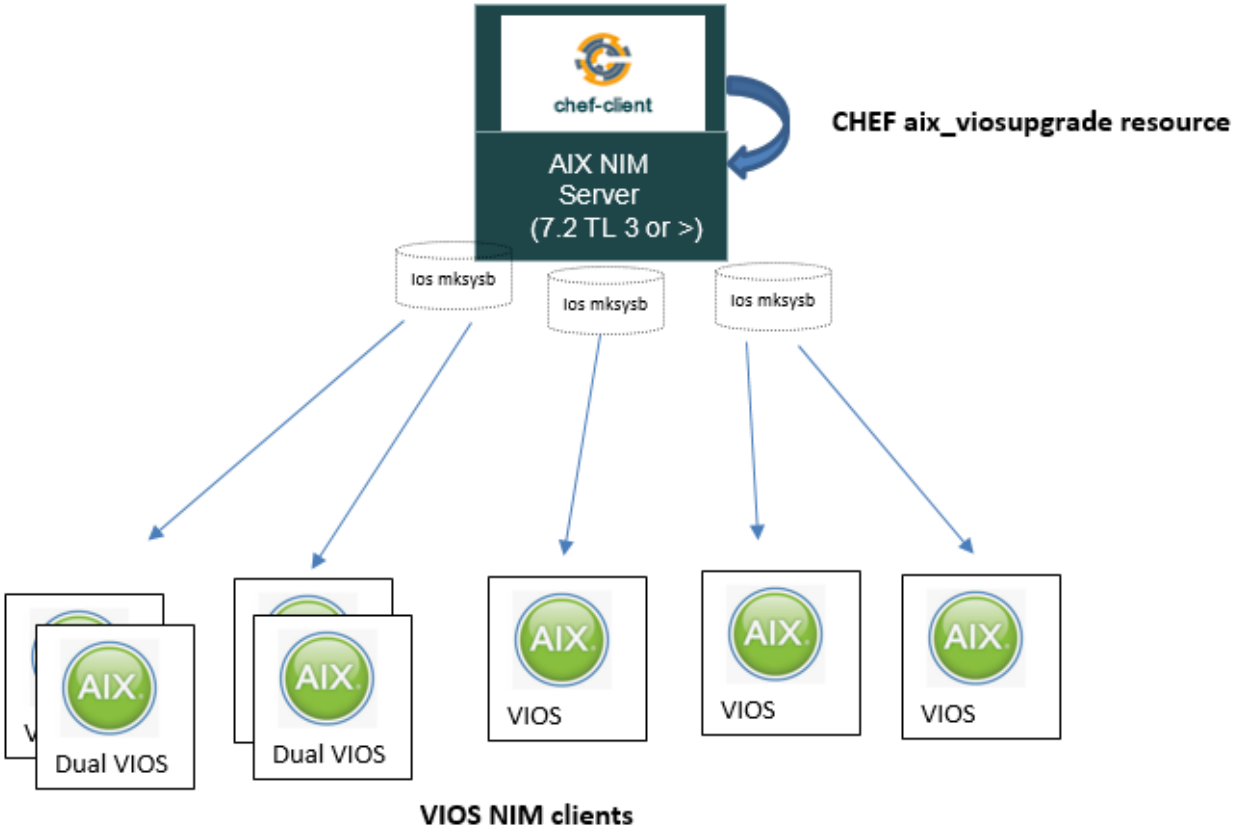
The Chef resource we use for these steps is named: **aix_viosupgrade**.
Our development supports a NIM (Network Installation Management) environment in **PUSH mode**. VIOS upgrade cookbooks and recipes are available on **AIXOSS aix-chef repository**.
The health check requires getting the vioshc.py Python script available on **AIXOSS vios-health-checker GitHub repository**. This script must be installed on the Chef Client machine (the NIM master) under /usr/sbin.
The **chef-cookbook repository** contains Open Source Software ported to AIX. It also contains scripts to use with Open Source software to perform specific AIX tasks.

You will find a library including the Chef scripts necessary for patch management with Chef, and typical recipes. These recipes can be used as templates for your own purposes.

For ease of use, Chef will be used in **local (or standalone) mode** on the NIM master. But, it may also be configured with a Linux Chef server.

Configuration

The diagram below describes the configuration for the test use cases.



Functional considerations

✓ As VIOS upgrade in AIX Chef Automation is a restricted encapsulation of viosupgrade command, you may refer to the command documentation:
https://www.ibm.com/support/knowledgecenter/ssw_aix_72/com.ibm.aix.cmds6/viosupgrade.htm

✓ Two types of upgrade are proposed:

- **bosinst** installation type: New installation on the current rootvg disk.
- **altdisk** installation type: New installation on the alternative disk. The provided disks are used to install the provided image, the current rootvg disk on the VIOS partition is not impacted during the installation process. The VIOS partition remains in the running state during the installation of the alternative disk.

For the both type of installation, at the end of the installation, the system will reboot on the new system (with altdisk type, the old rootvg is saved as old_rootvg)

✓ The image used for the upgrade installation must be a NIM resource ios_mksysb already built with the corresponding spot image (the spot image is only used for a bosinst installation).
No need to specify the spot image, it is automatically set from ios_mksysb NIM object.

✓ If the VIOS is part of a cluster: AIX chef Automation detects automatically the cluster configuration and passes the cluster option to viosupgrade command.

Requisites

✓ The viosupgrade command on NIM server is supported from IBM® AIX® 7.2 with Technology Level 3, or later.

✓ The level of the target ios_mksysb image must be at 3.1.0.00 level, or later.

✓ The target ios_mksysb image level must be higher than the current VIOS `rootvg` level.

✓ For the NIM *bosinst* method of installation, the following are the current VIOS levels that are supported:
  - 2.2.6.30, or later for a Shared Storage Pool Cluster environment

- 2.2.x.x, or later for a non-Shared Storage Pool Cluster environment

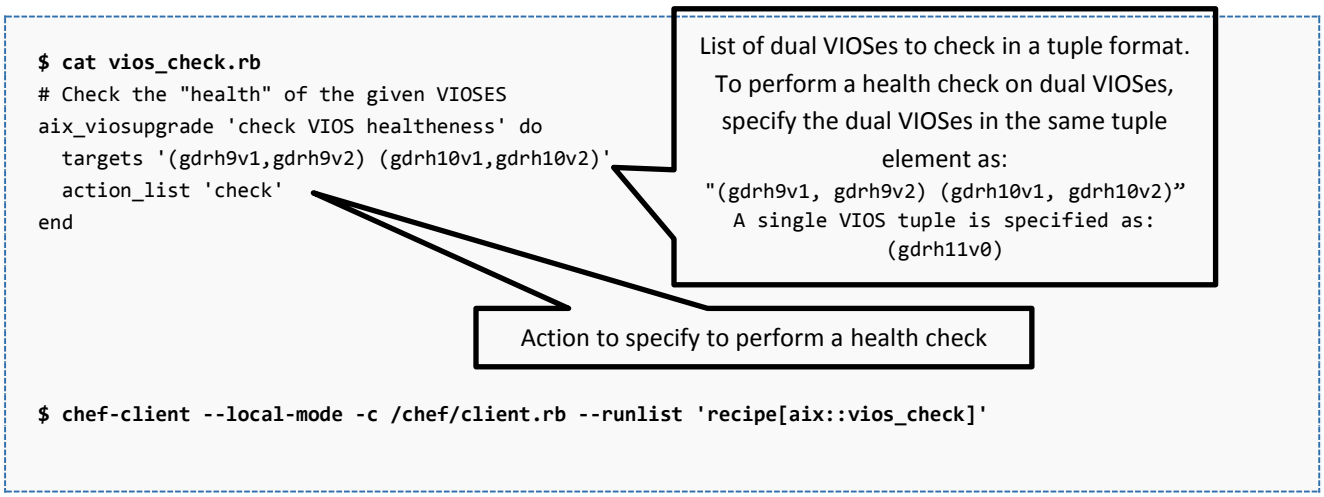
Limitations

- ✓ For the type ***bosinst*** installation, if there is no copy of the current rootvg => the upgrade stops.
- ✓ For the type ***bosinst*** installation, the new installation will be always on the current rootvg disk.
- ✓ Only one ios_mksysb image is set for all the VIOSes.
- ✓ For each VIOS, the duration limit of the installation is fixed for 1 hour, if after this limit the installation is not completed, the installation stopes with ERROR.
- ✓ **:** In case of a a couple of VIOS, if one of the VIOS is a node of an active Shared Storage Pool (SSP), the other VIOS must also be part of the same SSP. In addition, both must be in the same SSP state = "OK", In case of a single VIOS, if this VIOS is part of a SSP, the upgrade operation stops.

Use cases

Verify the state of the VIOS

The following recipe shows how to perform a health check of VIOS in order to upgrade them.



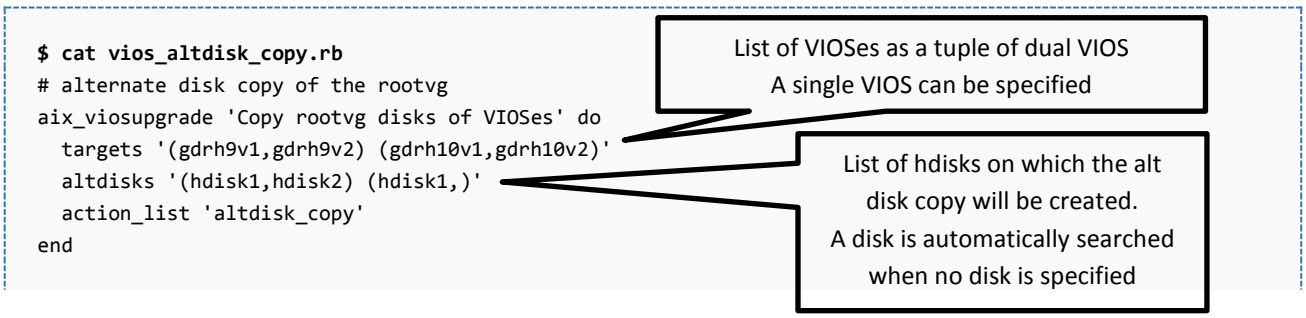
The “check” action is used to control that the VIOSes in a pair manage the same objects.

The “check” action is completely inherited from aix_nimupdate resource.

For viosupgrade operation, the check action is not mandatory, but it is recommended. The viosupgrade command has its own validation process.

Perform an alternate disk copy

Saving your VIOS rootvg allows you to restore it, in case of problems during the upgrade.




```
$ chef-client --local-mode -c /chef/client.rb --runlist 'recipe[aix::vios_altdisk_copy]'
….
```

When a disk is not specified for a VIOS in the “altdisks” property list, a free disk (if one exists) is automatically selected. By default, the selected disk is the “nearest” in size with the VIOS rootvg. This policy could be modified with the “disk_size_policy” property. When the “altdisks” property is set to “auto”, the automatic disk selection is used for each VIOS.

Note: If the volume group rootvg is mirrored, it will be unmirrored, before creating the alternate disk copy. It will then be mirrored to restore its state.
As a consequence, make sure that all the logical volume included in rootvg are mirrored.
In case of error during the alt_disk_copy operation, the mirroring of rootvg may need to be redone manually by the user.

The “`altdisk_copy`” action is completely inherited from aix_nimupdate resource.

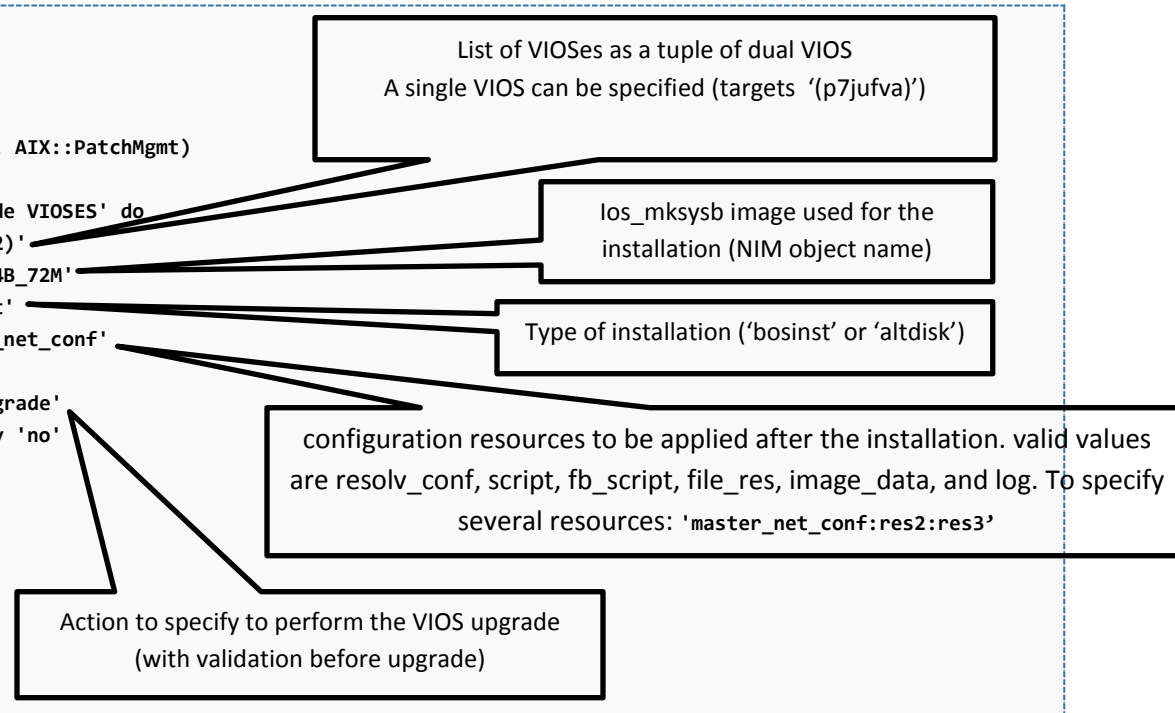
Perform a VIOS upgrade bosinst installation

The following recipe shows how to perform a **bosinst** viosupgrade installation on each VIOS.

```
:>cat vios_upgrade.rb
# viosupgrade

Chef::Recipe.send(:include, AIX::PatchMgmt)

aix_viosupgrade 'viosupgrade VIOSES' do
  targets '(p7jufv1,p7jufv2)'
  ios_mksysb_name 'ios_1844B_72M'
  viosupgrade_type 'bosinst'
  common_resources 'master_net_conf'
  preview 'no'
  action_list 'validate,upgrade'
  viosupgrade_alt_disk_copy 'no'
end
```




```
#HOWTO RUN
$ :>chef-client --local-mode -c /home/chef/client.rb --runlist 'recipe[aix::vios_upgrade]' -L /tmp/viosup_fvt.log
-l debug


#viosupgrade command associed for this upgrade operation
INFO: CMD= '/usr/sbin/viosupgrade  -t bosinst -m ios_1844B_72M -p spot_ios_1844B_72M -e master_net_conf -c -s -n
p7jufv1'
INFO: CMD= '/usr/sbin/viosupgrade  -t bosinst -m ios_1844B_72M -p spot_ios_1844B_72M -e master_net_conf -c -s -n
p7jufv2'
```

Note: In case of a tuple in “targets” specifying a couple of VIOS, if one of the VIOS is a node of an active Shared Storage Pool (SSP), the other VIOS must also be part of the same SSP. In addition, both must be in the same SSP state = “OK”
In case of a tuple in “targets” specifying a single VIOS, if this VIOS is part of a SSP, upgrade operation stop.

In the case of SSP started before the operation, AIX Chef automation will waiting the restart of the cluster before switch to the next VIOS.

Whatever the actions order specified in the “action_list” property, they are always run in the following order: check, altdisk_copy, validate, upgrade and altdisk_cleanup.

When multiple VIOSes tuples are specified with the “targets” property, all the actions in the list are executed for each VIOS in the tuple before going to the next tuple.

After the installation the **altinst_rootvg** volume group of the initial system is renamed **old_altinst_1**.

Perform a VIOS upgrade altdisk installation

The following recipe shows how to perform a **altdisk** viosupgrade installation on each VIOS.

```
:>cat vios_upgrade.rb
# viosupgrade

Chef::Recipe.send(:include, AIX::PatchMgmt)

aix_viosupgrade 'viosupgrade VIOSES' do
  targets '(p7jufv1,p7jufv2)'
  ios_mksysb_name 'ios_1844B_72M'
  viosupgrade_type 'altdisk'
  common_resources 'master_net_conf'
  installdisks '(hdisk2,hdisk2)'
  preview 'no'
  action_list 'validate,upgrade'
end
```

List of VIOSes as a tuple of dual VIOS
A single VIOS can be specified (targets '(p7jufva)')

Ios_mksysb image used for the installation (NIM object name)

Type of installation ('bosinst' or 'altdisk')

configuration resources to be applied after the installation. valid values are resolv_conf, script, fb_script, file_res, image_data, and log. To specify several resources: `'master_net_conf:res2:res3'`

List of hdisks on which the altdisk installation will be done. On the same format as the VIOSes list. (if several disks par vios use ":" to separate each disk: '(hdisk1:hdisk2,hdiskx:hdisky)'

```
#HOWTO RUN
$ :>chef-client --local-mode -c /home/chef/client.rb --runlist 'recipe[aix::vios_upgrade]' -L /tmp/viosup_fvt.log
-l debug


#viosupgrade command associed for this upgrade operation
INFO: CMD= '/usr/sbin/viosupgrade  -t altdisk -m ios_1844B_72M -a hdisk2 -e master_net_conf -c -n p7jufv1'
INFO: CMD= '/usr/sbin/viosupgrade  -t altdisk -m ios_1844B_72M -a hdisk2 -e master_net_conf -c -n p7jufv2'

#On the console
```

```
  * aix_viosupgrade[viosupgrade VIOSES] action upgrade

INFO: viosupgrade for VIOS tuple: p7jufv1,p7jufv2
INFO: Start viosupgrade - validate operation - for vios 'p7jufv1'.
INFO: CMD= '/usr/sbin/viosupgrade  -t altdisk -m ios_1844B_72M -a hdisk2 -e master_net_conf -c -v -n p7jufv1'.
INFO: Start upgrading vios 'p7jufv1' with viosupgrade.
INFO: validate operation.
INFO: Start viosupgrade - validate operation - for vios 'p7jufv2'.
INFO: CMD= '/usr/sbin/viosupgrade  -t altdisk -m ios_1844B_72M -a hdisk2 -e master_net_conf -c -v -n p7jufv2'.
INFO: Start upgrading vios 'p7jufv2' with viosupgrade.
INFO: validate operation.
INFO: Validate status for p7jufv1-p7jufv2: SUCCESS-VALIDATE
INFO: viosupgrade for VIOS tuple: p7jufv1,p7jufv2
INFO: VIOS UPGRADE - type=altdisk
INFO: VIOS UPGRADE - mksysb resource=ios_1844B_72M
INFO: Start viosupgrade for vios 'p7jufv1'.
INFO: CMD= '/usr/sbin/viosupgrade  -t altdisk -m ios_1844B_72M -a hdisk2 -e master_net_conf -c -n p7jufv1'.
INFO: Start upgrading vios 'p7jufv1' with viosupgrade.
INFO: Starting viosupgrade operation for vios 'p7jufv1'.
Waiting VIOSUPGRADE on p7jufv1... duration: 20 minute(s)INFO: [p7jufv1] VIOS Upgrade succeeded

    -
     nim: perform NIM viosupgrade for vios 'p7jufv1'
INFO: Start viosupgrade for vios 'p7jufv2'.
INFO: CMD= '/usr/sbin/viosupgrade  -t altdisk -m ios_1844B_72M -a hdisk2 -e master_net_conf -c -n p7jufv2'.
INFO: Start upgrading vios 'p7jufv2' with viosupgrade.
INFO: Starting viosupgrade operation for vios 'p7jufv2'.
Waiting VIOSUPGRADE on p7jufv2... duration: 14 minute(s)INFO: [p7jufv2] VIOS Upgrade succeeded
    -
     nim: perform NIM viosupgrade for vios 'p7jufv2'
INFO: Upgrade status for vios 'p7jufv1-p7jufv2': SUCCESS-UPGRADE.
INFO: Status synthesis for viosupgrade operation:
INFO: Status  for :p7jufv1-p7jufv2 => SUCCESS-UPGRADE
```

Note:

After the installation the **rootvg** volume group of the initial system is renamed **old_rootvg**.

The system reboots automatically on the new installation on hdisk2.

The SSP configuration is restored.

```
$ lspv
NAME            PVID                                VG               STATUS
hdisk0          00f786af62aea248                    old_rootvg
hdisk1          00f88402445d8b27                    None
hdisk2          00f786af592914b5                    rootvg           active
hdisk3          00f786af3a46398f                    caavg_private    active
hdisk4          00f786af3a5bac74                    None
$ ioslevel
3.1.0.10
$ uname -a
AIX p7jufv2 2 7 00F786AF4C00
```

Follow the execution with the log file

```
#For the command:
:>chef-client --local-mode -c /home/chef/client.rb --runlist 'recipe[aix::vios_upgrade]' -L /tmp/viosup_fvt.log -l
debug

#check the log file to follow the vios upgrade status
:>tail -f viosup_fvt.log
```

Starting Resource for aix_viosupgrade

```
[2018-12-19T00:19:48-06:00] DEBUG: Resource for aix_viosupgrade is Custom resource aix_viosupgrade from cookbook aix
[2018-12-19T00:19:48-06:00] DEBUG: Converging node fattony01.aus.stglabs.ibm.com
[2018-12-19T00:19:48-06:00] INFO: Processing aix_viosupgrade[viosupgrade VIOSES] action upgrade (aix::vios_upgrade line 5)
[2018-12-19T00:19:48-06:00] INFO: VIOS UPGRADE - desc="viosupgrade VIOSES"
[2018-12-19T00:19:48-06:00] INFO: VIOS UPGRADE - action_list="validate,upgrade"
[2018-12-19T00:19:48-06:00] INFO: VIOS UPGRADE - targets=(p7jufv1,p7jufv2)
[2018-12-19T00:19:48-06:00] INFO: VIOS UPGRADE - targets=altdisk
[2018-12-19T00:19:48-06:00] INFO: Check NIM info is well configured
[2018-12-19T00:19:48-06:00] DEBUG: master oslevel is 7200-01-01-1642
```

Starting the validation process and getting the cluster information

```
[2018-12-19T00:19:49-06:00] INFO: Working on target tuple: p7jufv1,p7jufv2
[2018-12-19T00:19:49-06:00] INFO: VIOS UPGRADE - action=validate
[2018-12-19T00:19:49-06:00] INFO: viosupgrade for VIOS tuple: p7jufv1,p7jufv2
[2018-12-19T00:19:49-06:00] INFO: VIOS UPGRADE - type=altdisk
[2018-12-19T00:19:49-06:00] INFO: VIOS UPGRADE - mksysb resource=ios_1844B_72M
[2018-12-19T00:19:49-06:00] INFO: VIOS UPGRADE - preview=no
[2018-12-19T00:19:49-06:00] INFO: get_ssp_name_id: '/usr/lpp/bos.sysmgt/nim/methods/c_rsh p7jufv1.aus.stglabs.ibm.com "/etc/lsattr -El viosclusterO "'
[2018-12-19T00:19:49-06:00] INFO: [STDOUT] cluster_id   5d9cc346f7b011e880045cf3fceb0c3e Cluster Identifier      False
[2018-12-19T00:19:49-06:00] INFO: [STDOUT] clustername  p7juf_cluster                    Cluster Name            False
[2018-12-19T00:19:49-06:00] INFO: [STDOUT] default_pool 0000000009034051000000005C0658A7 Default Pool Identifier False
[2018-12-19T00:19:49-06:00] INFO: [STDOUT] pool_label   p7juf_pool                       Default Pool Name       False
[2018-12-19T00:19:49-06:00] INFO: [STDOUT] sitename                                      Site Name               False
[2018-12-19T00:19:49-06:00] INFO: [VIOS CLUSTER ID] 5d9cc346f7b011e880045cf3fceb0c3e
[2018-12-19T00:19:49-06:00] DEBUG: ssp_status: '/usr/lpp/bos.sysmgt/nim/methods/c_rsh p7jufv1.aus.stglabs.ibm.com "/usr/ios/cli/ioscli cluster -status
-fmt :"'
[2018-12-19T00:19:57-06:00] DEBUG: [STDOUT] p7juf_cluster:OK:p7jufv1:8205-E6C020686AFR:1:OK:OK
[2018-12-19T00:19:57-06:00] DEBUG: [STDOUT] p7juf_cluster:OK:p7jufv2:8205-E6C020686AFR:7:OK:OK
[2018-12-19T00:19:57-06:00] INFO: [CMD] /usr/sbin/viosupgrade  -t altdisk
[2018-12-19T00:19:57-06:00] INFO: check_source_location: '/usr/sbin/lsnim -a location ios_1844B_72M'
[2018-12-19T00:19:57-06:00] INFO: [STDOUT] ios_1844B_72M:
[2018-12-19T00:19:57-06:00] INFO: [STDOUT]    location = /export/extra/vios/1844B_72M/ios_mksysb.img
[2018-12-19T00:19:57-06:00] INFO: [CMD] /usr/sbin/viosupgrade  -t altdisk -m ios_1844B_72M -a hdisk2
[2018-12-19T00:19:57-06:00] INFO: [CMD] /usr/sbin/viosupgrade  -t altdisk -m ios_1844B_72M -a hdisk2 -e master_net_conf
[2018-12-19T00:19:57-06:00] DEBUG: get_viosupgrade_cmd - return cmd: '/usr/sbin/viosupgrade  -t altdisk -m ios_1844B_72M -a hdisk2 -e master_net_conf
-c -v -n p7jufv1'
```

Running the validation: INFO: Validate status for p7jufv1-p7jufv2: SUCCESS-VALIDATE

```
[2018-12-19T00:19:59-06:00] INFO: [STDOUT] Welcome to viosupgrade tool.
[2018-12-19T00:19:59-06:00] INFO: [STDOUT] Triggered validation..
[2018-12-19T00:19:59-06:00] INFO: [STDOUT] Check log files for more information,
[2018-12-19T00:19:59-06:00] INFO: [STDOUT] Log file for 'p7jufv1' is: '/var/adm/ras/ioslogs/p7jufv1_10027500_Wed_Dec_19_00:19:59_2018.log'.
[2018-12-19T00:19:59-06:00] INFO: [STDOUT] Please wait for completion..
[2018-12-19T00:23:47-06:00] INFO: [STDOUT] ---------------------------------
[2018-12-19T00:23:47-06:00] INFO: [STDOUT] Validation successful for VIO Servers:
[2018-12-19T00:23:47-06:00] INFO: [STDOUT] p7jufv1
[2018-12-19T00:23:47-06:00] INFO: [STDOUT] ---------------------------------
[2018-12-19T00:23:48-06:00] INFO: [CMD] /usr/sbin/viosupgrade  -t altdisk
[2018-12-19T00:23:48-06:00] INFO: check_source_location: '/usr/sbin/lsnim -a location ios_1844B_72M'
[2018-12-19T00:23:48-06:00] INFO: [STDOUT] ios_1844B_72M:
[2018-12-19T00:23:48-06:00] INFO: [STDOUT]    location = /export/extra/vios/1844B_72M/ios_mksysb.img
[2018-12-19T00:23:48-06:00] INFO: [CMD] /usr/sbin/viosupgrade  -t altdisk -m ios_1844B_72M -a hdisk2
[2018-12-19T00:23:48-06:00] INFO: [CMD] /usr/sbin/viosupgrade  -t altdisk -m ios_1844B_72M -a hdisk2 -e master_net_conf
[2018-12-19T00:23:48-06:00] DEBUG: get_viosupgrade_cmd - return cmd: '/usr/sbin/viosupgrade  -t altdisk -m ios_1844B_72M -a hdisk2 -e master_net_conf
-c -v -n p7jufv2'
[2018-12-19T00:23:48-06:00] INFO: Start viosupgrade - validate operation - for vios 'p7jufv2'.
[2018-12-19T00:23:48-06:00] INFO: CMD= '/usr/sbin/viosupgrade  -t altdisk -m ios_1844B_72M -a hdisk2 -e master_net_conf -c -v -n p7jufv2'.
[2018-12-19T00:23:48-06:00] INFO: Start upgrading vios 'p7jufv2' with viosupgrade.
[2018-12-19T00:23:48-06:00] INFO: run_viosupgrade: '/usr/sbin/viosupgrade  -t altdisk -m ios_1844B_72M -a hdisk2 -e master_net_conf -c -v -n p7jufv2'
[2018-12-19T00:23:48-06:00] INFO: validate operation.
[2018-12-19T00:23:50-06:00] INFO: [STDOUT] Welcome to viosupgrade tool.
[2018-12-19T00:23:50-06:00] INFO: [STDOUT] Triggered validation..
[2018-12-19T00:23:50-06:00] INFO: [STDOUT] Check log files for more information,
[2018-12-19T00:23:50-06:00] INFO: [STDOUT] Log file for 'p7jufv2' is: '/var/adm/ras/ioslogs/p7jufv2_9765558_Wed_Dec_19_00:23:50_2018.log'.
[2018-12-19T00:23:50-06:00] INFO: [STDOUT] Please wait for completion..
[2018-12-19T00:27:20-06:00] INFO: [STDOUT] ---------------------------------
[2018-12-19T00:27:20-06:00] INFO: [STDOUT] Validation successful for VIO Servers:
[2018-12-19T00:27:20-06:00] INFO: [STDOUT] p7jufv2
[2018-12-19T00:27:20-06:00] INFO: [STDOUT] ---------------------------------
[2018-12-19T00:27:20-06:00] INFO: Validate status for p7jufv1-p7jufv2: SUCCESS-VALIDATE
```

Running the upgrade:

```
[2018-12-19T00:27:29-06:00] DEBUG: get_viosupgrade_cmd - return cmd: '/usr/sbin/viosupgrade  -t altdisk -m ios_1844B_72M -a hdisk2 -e master_net_conf
-c -n p7jufv1'
[2018-12-19T00:27:29-06:00] INFO: Start viosupgrade for vios 'p7jufv1'.
[2018-12-19T00:27:29-06:00] INFO: CMD= '/usr/sbin/viosupgrade  -t altdisk -m ios_1844B_72M -a hdisk2 -e master_net_conf -c -n p7jufv1'.
[2018-12-19T00:27:29-06:00] INFO: Start upgrading vios 'p7jufv1' with viosupgrade.
[2018-12-19T00:27:29-06:00] INFO: run_viosupgrade: '/usr/sbin/viosupgrade  -t altdisk -m ios_1844B_72M -a hdisk2 -e master_net_conf -c -n p7jufv1'
[2018-12-19T00:27:29-06:00] INFO: Starting viosupgrade operation for vios 'p7jufv1'.
[2018-12-19T00:27:31-06:00] INFO: [STDOUT] Welcome to viosupgrade tool.
[2018-12-19T00:27:31-06:00] INFO: [STDOUT] Operation triggered for given node(s).
[2018-12-19T00:27:31-06:00] INFO: [STDOUT] Check log files for more information,
[2018-12-19T00:27:31-06:00] INFO: [STDOUT] Log file for 'p7jufv1' is: '/var/adm/ras/ioslogs/p7jufv1_9896516_Wed_Dec_19_00:27:31_2018.log'.
[2018-12-19T00:27:31-06:00] INFO: [STDOUT] Please wait for completion..
[2018-12-19T00:34:52-06:00] INFO: [STDOUT] p7jufv1: Installation triggered for the node 'p7jufv1'. Check the status using 'viosupgrade' command.
[2018-12-19T00:34:52-06:00] INFO: [STDOUT] Installation of VIOS may take 30 minutes or more. Please verify the installation status after the specified
 time.
[2018-12-19T00:34:52-06:00] INFO: [STDOUT] ---------------------------------
[2018-12-19T00:34:52-06:00] INFO: [STDOUT] Installation triggered for VIO Servers:
[2018-12-19T00:34:52-06:00] INFO: [STDOUT] p7jufv1
```

Waitting the end of the installation by checking the status of NIM vios object:

```
2018-12-19T00:34:52-06:00] INFO: wait_viosupgrade for vios: 'p7jufv1'
2018-12-19T00:35:02-06:00] INFO: viosupgrade_query_status: '/usr/sbin/lsnim -l p7jufv1'
2018-12-19T00:35:02-06:00] INFO: [STDOUT] p7jufv1:
2018-12-19T00:35:02-06:00] INFO: [STDOUT]    class           = management
2018-12-19T00:35:02-06:00] INFO: [STDOUT]    type            = vios
2018-12-19T00:35:02-06:00] INFO: [STDOUT]    installed_image = ios_1844B_72M
2018-12-19T00:35:02-06:00] INFO: [STDOUT]    connect         = nimsh
2018-12-19T00:35:02-06:00] INFO: [STDOUT]    platform        = chrp
2018-12-19T00:35:02-06:00] INFO: [STDOUT]    netboot_kernel  = 64
2018-12-19T00:35:02-06:00] INFO: [STDOUT]    if1             = ent-Network3 p7jufv1.aus.stglabs.ibm.com 5CF3FCEB0C3E ent0
2018-12-19T00:35:02-06:00] INFO: [STDOUT]    cable_type1     = N/A
2018-12-19T00:35:02-06:00] INFO: [STDOUT]    mgmt_profile1   = oldhmc2 1 _0686AFR
2018-12-19T00:35:02-06:00] INFO: [STDOUT]    Cstate          = installation is being performed
2018-12-19T00:35:02-06:00] INFO: [STDOUT]    prev_state      = alt_disk_install operation is being performed
2018-12-19T00:35:02-06:00] INFO: [STDOUT]    Mstate          = currently running
2018-12-19T00:35:02-06:00] INFO: [STDOUT]    info            = Creating logical volume alt_hd8.
2018-12-19T00:35:02-06:00] INFO: [STDOUT]    ios_backup      = p7jufv1_backup
2018-12-19T00:35:02-06:00] INFO: [STDOUT]    ios_mksysb      = ios_1844B_72M
2018-12-19T00:35:02-06:00] INFO: [STDOUT]    resolv_conf     = master_net_conf
2018-12-19T00:35:02-06:00] INFO: [STDOUT]    cpuid           = 00F786AF4C00
2018-12-19T00:35:02-06:00] INFO: [STDOUT]    control         = master
2018-12-19T00:35:02-06:00] INFO: [STDOUT]    Cstate_result   = success
```

Waitting the end of the installation by checking the status of NIM vios object:

```
2018-12-19T00:55:24-06:00] INFO: viosupgrade succeded for vios: 'p7jufv1'
2018-12-19T00:57:24-06:00] DEBUG: --- Check if cluster ssp_id: '5d9cc346f7b011e880045cf3fceb0c3e'
2018-12-19T00:57:24-06:00] INFO: get_cluster_status: '/usr/lpp/bos.sysmgt/nim/methods/c_rsh p7jufv1.aus.stglabs.ibm.com "/usr/ios/cli/ioscli cluster
status -fmt :"'
2018-12-19T00:57:25-06:00] DEBUG: [STDOUT] p7juf_cluster:OK:p7jufv1:8205-E6C020686AFR:1:OK:OK
2018-12-19T00:57:25-06:00] DEBUG: [STDOUT] p7juf_cluster:OK:p7jufv2:8205-E6C020686AFR:7:OK:OK
2018-12-19T00:57:25-06:00] INFO: [p7jufv1] VIOS Upgrade succeeded
2018-12-19T00:57:25-06:00] INFO: [CMD] /usr/sbin/viosupgrade  -t altdisk
2018-12-19T00:57:25-06:00] INFO: check_source_location: '/usr/sbin/lsnim -a location ios_1844B_72M'
2018-12-19T00:57:25-06:00] INFO: [STDOUT] ios_1844B_72M:
2018-12-19T00:57:25-06:00] INFO: [STDOUT]    location = /export/extra/vios/1844B_72M/ios_mksysb.img
2018-12-19T00:57:25-06:00] INFO: [CMD] /usr/sbin/viosupgrade  -t altdisk -m ios_1844B_72M -a hdisk2
2018-12-19T00:57:25-06:00] INFO: [CMD] /usr/sbin/viosupgrade  -t altdisk -m ios_1844B_72M -a hdisk2 -e master_net_conf
2018-12-19T00:57:25-06:00] DEBUG: get_viosupgrade_cmd - return cmd: '/usr/sbin/viosupgrade  -t altdisk -m ios_1844B_72M -a hdisk2 -e master_net_conf
c -n p7jufv2'
2018-12-19T00:57:25-06:00] INFO: Start viosupgrade for vios 'p7jufv2'.
2018-12-19T00:57:25-06:00] INFO: CMD= '/usr/sbin/viosupgrade  -t altdisk -m ios_1844B_72M -a hdisk2 -e master_net_conf -c -n p7jufv2'.
```

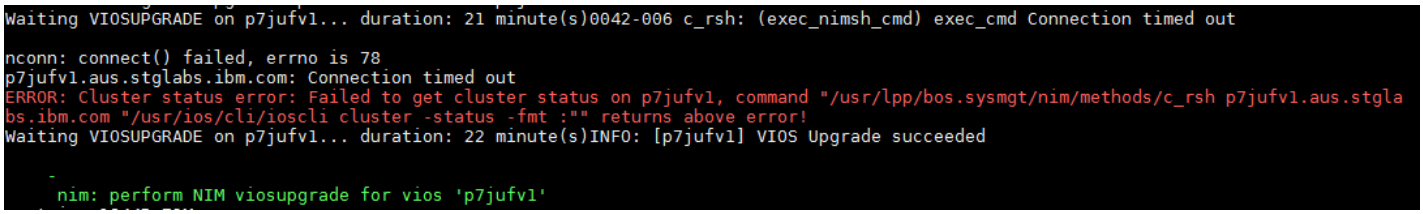
Installation succeeded for the tuple:

```
[2018-12-19T01:21:20-06:00] INFO: [p7jufv2] VIOS Upgrade succeeded
[2018-12-19T01:21:20-06:00] INFO: Upgrade status for vios 'p7jufv1-p7jufv2': SUCCESS-UPGRADE.
[2018-12-19T01:21:20-06:00] INFO: Status synthesis for viosupgrade operation:

[2018-12-19T01:21:20-06:00] INFO: Status  for :p7jufv1-p7jufv2 => SUCCESS-UPGRADE
```

Warning:

Do not be afraid if you got the following ERROR:



In cluster configuration, it is just the result of the checking function that waits the cluster starting.

This Error appears when the cluster is not yet started.