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ONTAP UPGRADE PROCEDURE

INDEX:

1. Overview of upgrade process

This document gives an overview of upgrading the ONTAP versions specific to our current environment. This document also helps to familiarizing yourself with requirements and issues before you upgrade(ONTAP/Shelf/disks)

2. Upgrade Options

There are two types of upgrade method available and this are named as per the availability of the client service during the Ontap upgrade process.

2. a. **Disruptive upgrade:**

When storage services are disrupted during takeover/giveback operations:

- State information is lost
- User/application must restart the operation,

it is named as Disruptive Upgrade.

Upgrades might be disruptive if any of the following conditions are true:

- If storage systems actively serving CIFS to clients.
  Because CIFS is session-oriented, sessions must be terminated before upgrade procedures to prevent data loss and client must reestablish the sessions.

- IF storage systems actively serving File Transfer Protocol (FTP) or Network Data Management Protocol (NDMP) clients that cannot be postponed. State is lost, client must retry operations

- Backups and Restores – State is lost, client must retry operations
- **AT-FCX FW 36 and prior versions:**
    - Any update of these versions of FW, on either of the AT-FCX modules installed, is disruptive and will result in a minimum 70 second outage and could be substantially more, depending on system configuration.
    - This rule applies even with Data ONTAP 7.3.1 and Multi-Path cabling in place
    - Disk firmware updates automatically take disks in RAID4 aggregates offline until the update is complete.
    - Services and data are unavailable until they are back online.(but in RAID_DP it is non-disruptive).It is always recommended to convert the Raid4 to Raid_DP before upgrading the Ontap version.
- If the application/client doesn't have the timeout value which met the upgrade time period

2. b. Non-disruptive upgrade (NDU)

System NDU is a mechanism that takes advantage of active/active controller technology to minimize client disruption during a rolling upgrade of Data ONTAP or controller firmware. This procedure allows each node of active/active controllers to be upgraded individually to a newer version of Data ONTAP or firmware. Minor release NDU was first supported in Data ONTAP 6.5.1. Major release NDU is now supported from Data ONTAP 7.0.6 and 7.1.2 to 7.2.3 and higher.

Major NDU Components:

- **System NDU**
    - End-user-performable process that takes advantage of Active/Active takeover and giveback operations
    - Maintains data service availability during upgrade reboots
- **Disk firmware NDU**
    - Utilizes momentary disk offline technology
    - Supported for volumes and aggregates employing RAID-DP or SyncMirror® software
- **Shelf firmware NDU**
    - Dependent on LRC or ESH-based shelves:
    - Not supported for AT-FC or AT-FC2
- **AT-FCX module and SAS enclosure FW upgrades**
    - AT-FCX incurs two 70-sec pauses in I/O
    - SAS incurs two 40-sec pauses in I/O

  Both are sustainable by many NFS or iSCSI-attached applications.

Types of system NDUs: major and minor:

- A **major version system NDU** is an upgrade from one major release of Data ONTAP to another. For major release NDU, the NVRAM and file system layout can change. Consequently, controller takeover functionality is disabled while the 2 nodes are on different major releases

For example, an upgrade from Data
ONTAP 7.2.x to Data ONTAP 7.3.x is considered a major system NDU.

A **minor version system NDU** is an upgrade within the same release family. For example, an upgrade from Data ONTAP 7.3.1 to Data ONTAP 7.3.2 is considered a minor system NDU. The following are things that constitute a minor version system NDU:

* No version number change to RAID, WAFL®, NVLOG, FM, or SANOWN
* No change to NVRAM format
* No change to on-disk format
* Automatic takeover must be possible while the two controllers of the HA pair are running different versions within the same release Family.

For additional information, see the Data ONTAP Release Model available on NOW (NetApp on the Web).

Hardware requirements for NDU:

System NDU is supported on any NetApp FAS series.
Systems must be cabled and configured in an HA pair controller configuration.

This includes all InfiniBand interconnect cables, proper NVRAM slot assignments, and appropriate controller-to-shelf cabling, including (as applicable) multipath high-availability storage.

Software Requirements for NDU:

Predictable takeover and giveback performance is essential to a successful NDU.

It is important not to exceed Data ONTAP configuration limits. Flexvol limits per storage controller can be found from,

https://now.netapp.com/NOW/knowledge/docs/ontap/ontap_index.shtml (select the Ontap version)

Under that search for "Storage Management Guide" → this has all the flexvol limitations.

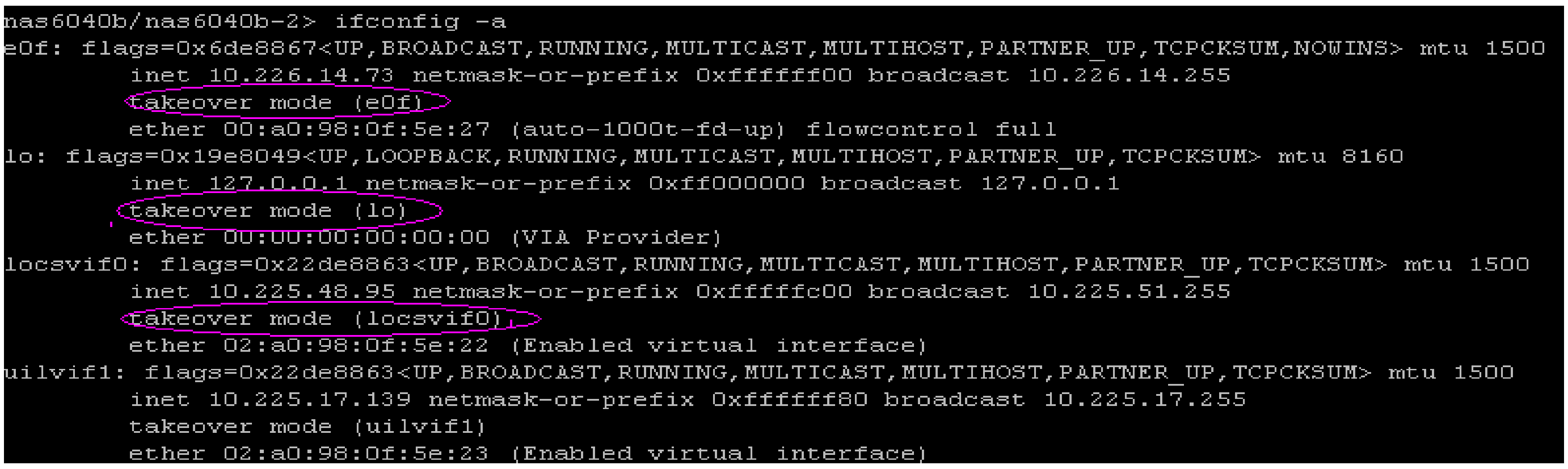
3. Pre-steps before performing upgrade

Following checks are required before performing a major or minor system NDU.All the below methods/tools helps to find/fix the issue prior to the actual upgrade process,

a. Using Upgrade Advisory
b. HA Configuration Checker and netapp rc_check
c. Remove all failed disks
d. Verify system load
e. Synchronize date and time
f. Verify the connectivity to the storage controller
g. DR/Data Production consideration
h. Upgrade shelf and disk firmware
i. Exports entry check for VM volumes

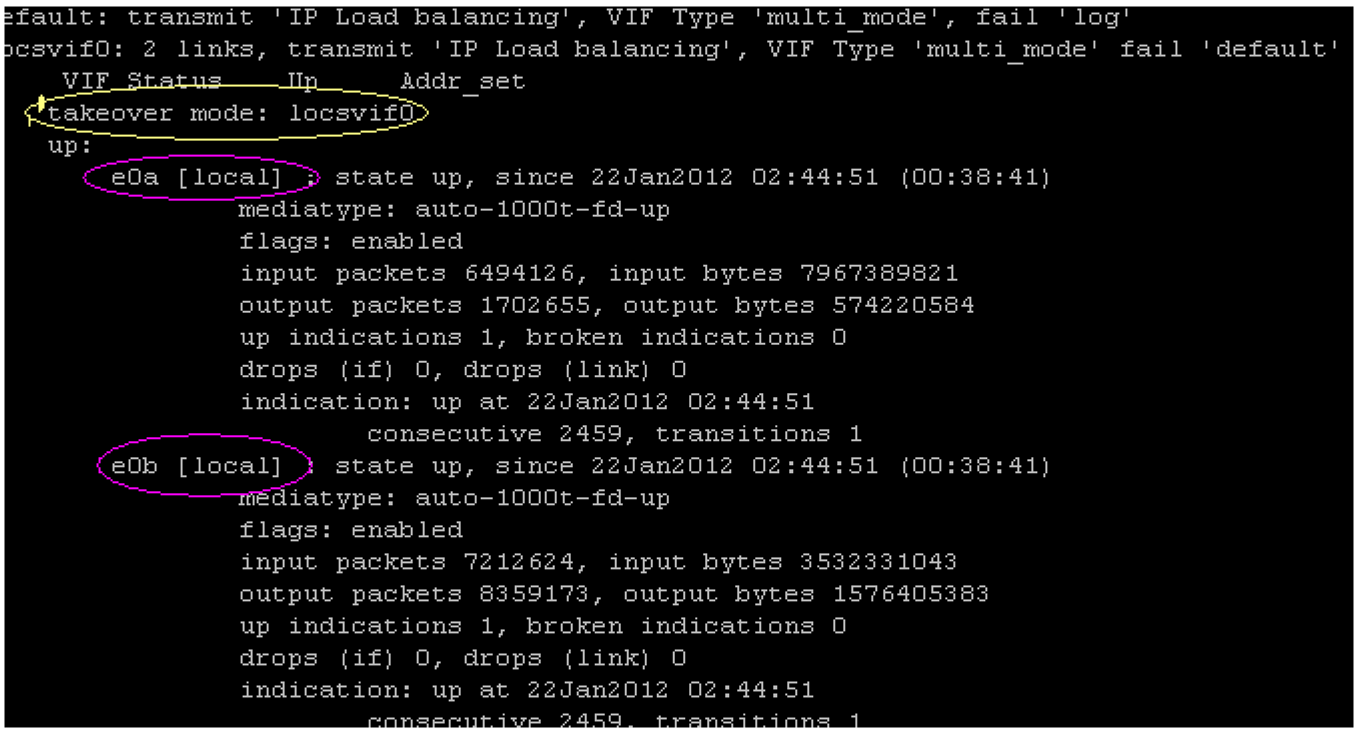
Note: Please complete the following pre-checks before performing the Giveback during the upgrade or any maintenance activity(Flowcontrol changes).

a. Check the filer interface status (Use the following commands and look for few areas to confirm the status of the interfaces,
   Commands : go to 'partner' and type "ifconfig –a " and check for the interfaces status (up /down)



```
nas6040b/nas6040b-2> ifconfig -a
e0f: flags=0x6de8867<UP,BROADCAST,RUNNING,MULTICAST,MULTIHOST,PARTNER_UP,TCPCKSUM,NOWINS> mtu 1500
        inet 10.226.14.73 netmask-or-prefix 0xffffff00 broadcast 10.226.14.255
        takeover mode (e0f)
        ether 00:a0:98:0f:5e:27 (auto-1000t-fd-up) flowcontrol full
lo: flags=0x19e8049<UP,LOOPBACK,RUNNING,MULTICAST,MULTIHOST,PARTNER_UP,TCPCKSUM> mtu 8160
        inet 127.0.0.1 netmask-or-prefix 0xff000000 broadcast 127.0.0.1
        takeover mode (lo)
        ether 00:00:00:00:00:00 (VIA Provider)
locsvif0: flags=0x22de8863<UP,BROADCAST,RUNNING,MULTICAST,MULTIHOST,PARTNER_UP,TCPCKSUM> mtu 1500
        inet 10.225.48.95 netmask-or-prefix 0xfffffc00 broadcast 10.225.51.255
        takeover mode (locsvif0)
        ether 02:a0:98:0f:5e:22 (Enabled virtual interface)
uilvif1: flags=0x22de8863<UP,BROADCAST,RUNNING,MULTICAST,MULTIHOST,PARTNER_UP,TCPCKSUM> mtu 1500
        inet 10.225.17.139 netmask-or-prefix 0xffffff80 broadcast 10.225.17.255
        takeover mode (uilvif1)
        ether 02:a0:98:0f:5e:23 (Enabled virtual interface)
```

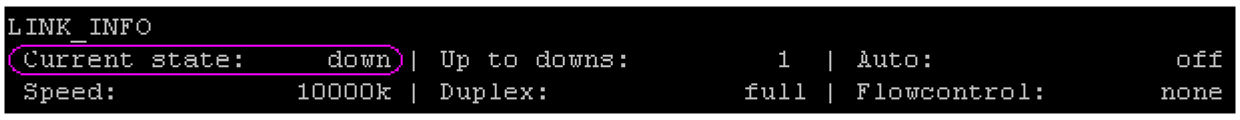
Please note : only the interfaces which are up will be show up and the interfaces which are down will not be visible here.Need to reconfirm with another command : "VIF status" to find the exact status of the interfaces,



```
efault: transmit 'IP Load balancing', VIF Type 'multi_mode', fail 'log'
ocsvif0: 2 links, transmit 'IP Load balancing', VIF Type 'multi_mode' fail 'default'
    VIF Status     Up      Addr_set
  takeover mode: locsvif0
  up:
     e0a [local] : state up, since 22Jan2012 02:44:51 (00:38:41)
               mediatype: auto-1000t-fd-up
               flags: enabled
               input packets 6494126, input bytes 7967389821
               output packets 1702655, output bytes 574220584
               up indications 1, broken indications 0
               drops (if) 0, drops (link) 0
               indication: up at 22Jan2012 02:44:51
                       consecutive 2459, transitions 1
     e0b [local] : state up, since 22Jan2012 02:44:51 (00:38:41)
               mediatype: auto-1000t-fd-up
               flags: enabled
               input packets 7212624, input bytes 3532331043
               output packets 8359173, output bytes 1576405383
               up indications 1, broken indications 0
               drops (if) 0, drops (link) 0
               indication: up at 22Jan2012 02:44:51
                       consecutive 2459, transitions 1
```

It should be showing as Takeovermode and the interface name.(Yello)

Commands : ifstat –a (check for the current status of the port in the below portion of the command output,



```
LINK_INFO
 Current state:      down | Up to downs:         1  | Auto:             off
 Speed:            10000k | Duplex:           full  | Flowcontrol:     none
```

Above status should be “up” and also if this is part of the flowcontrol check for the flowcontrol status in the same output.

3. a. Using Upgrade Advisory (UA):

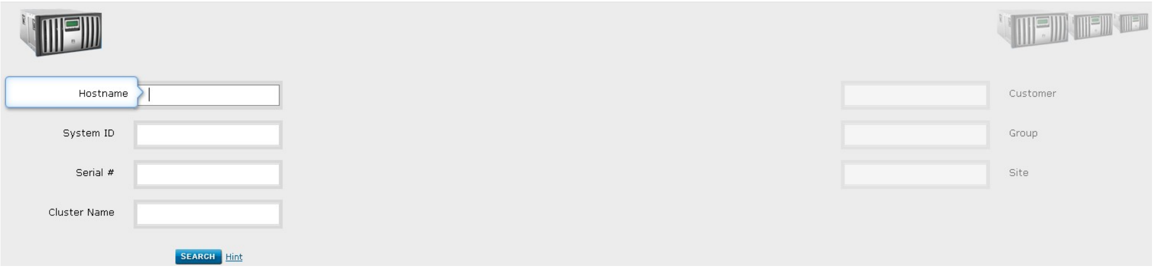
The **My AutoSupport Upgrade Advisor** validates each individual controller to identify any issues before upgrading, and it also provides the ability to create detailed upgrade test procedure documents as well as backout plans. Please find the details with screenshot below,

To generate the basic overview and the step by step commands to perform the upgrade. Using specific filer system ID or serial number we can generate the upgrade plan from UA. This also provides a few warning messages with respect to the specific serial/system to be fixed before going for the Ontap upgrade.

UA link: http://now.netapp.com/NOW/asuphome/   (or) GO TO **now.netapp.com** then **‘MY Support’** then **‘MY Autosupport’**

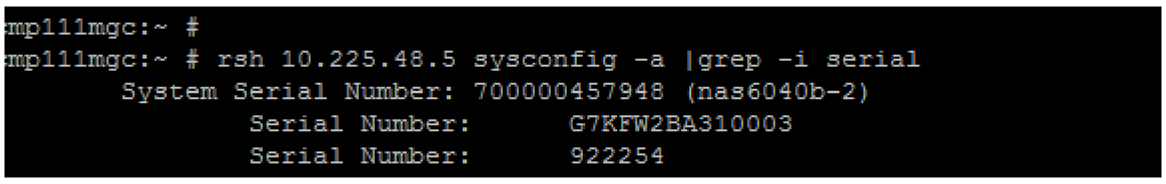
Then, click “**Launch My Autosupport** “link

This will take to the MYASUP page,



* Pulling the serial number/hostname from filer end.

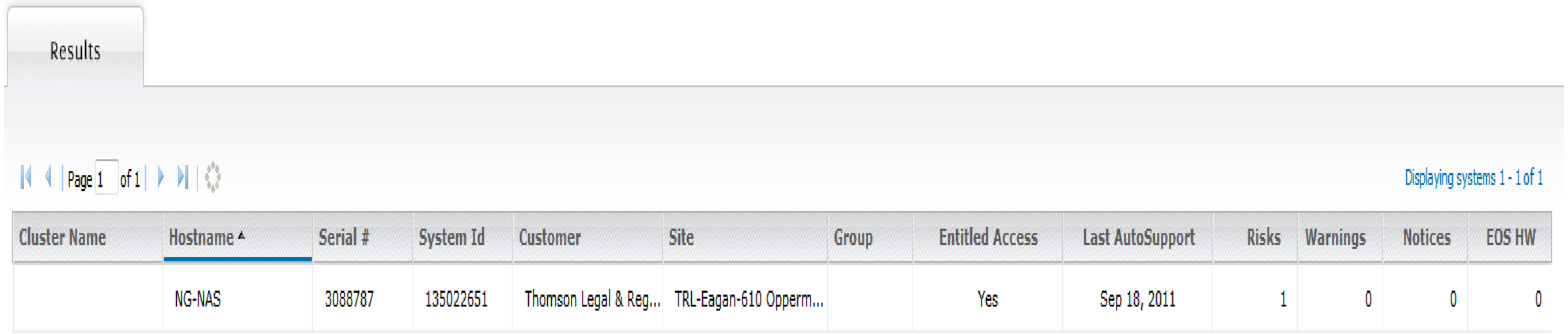
From the command line of any DFM/Adminbox (unix) which has RSH/SSH access to the filer,



```
mp111mgc:~ #
mp111mgc:~ # rsh 10.225.48.5 sysconfig -a |grep -i serial
        System Serial Number: 700000457948 (nas6040b-2)
                 Serial Number:      G7KFW2BA310003
                 Serial Number:      922254
```

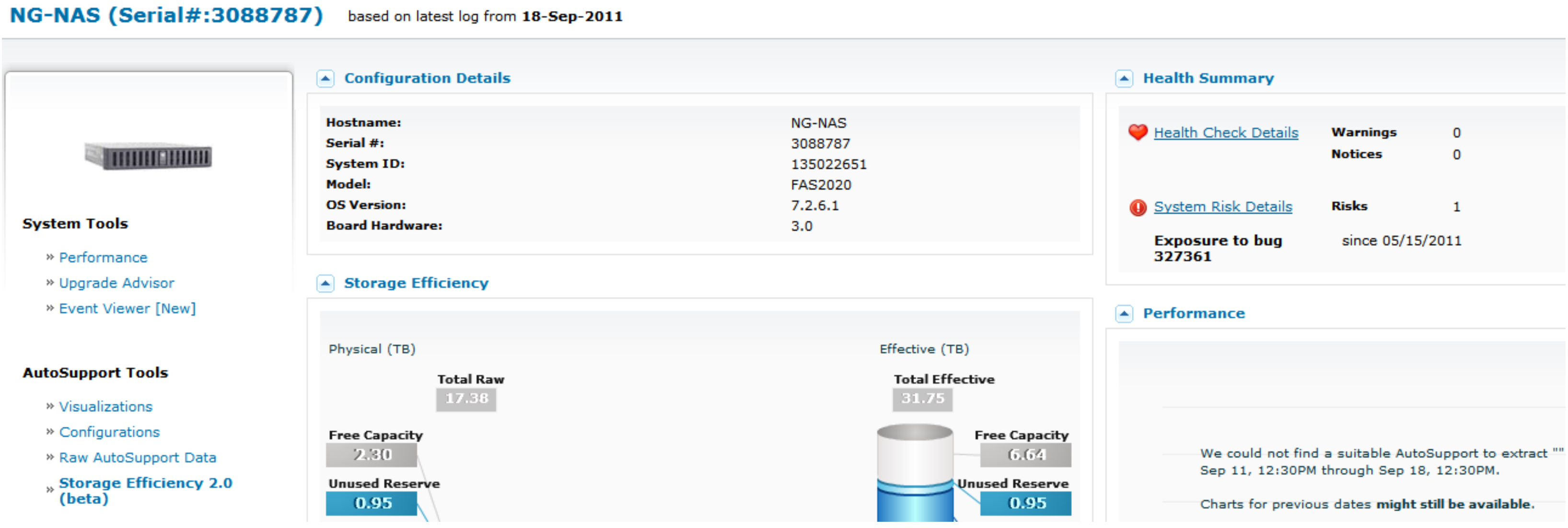
From the above command we get both serial no and filername.

Use either hostname or System ID or serial or the clustername to pull the specific information. Once the serial number is specified the page opens like this:



Cluster Name	Hostname ▲	Serial #	System Id	Customer	Site	Group	Entitled Access	Last AutoSupport	Risks	Warnings	Notices	EOS HW
	NG-NAS	3088787	135022651	Thomson Legal & Reg...	TRL-Eagan-610 Opperm...		Yes	Sep 18, 2011	1	0	0	0

When the highlighted item is selected, this will take to the main page.



NG-NAS (Serial#:3088787)   based on latest log from **18-Sep-2011**

Configuration Details

Hostname:	NG-NAS
Serial #:	3088787
System ID:	135022651
Model:	FAS2020
OS Version:	7.2.6.1
Board Hardware:	3.0

Health Summary

Health Check Details	**Warnings**	0
	Notices	0
System Risk Details	**Risks**	1
Exposure to bug 327361	since 05/15/2011	

Storage Efficiency

Physical (TB)
Total Raw 17.38
Free Capacity 2.30
Unused Reserve 0.95

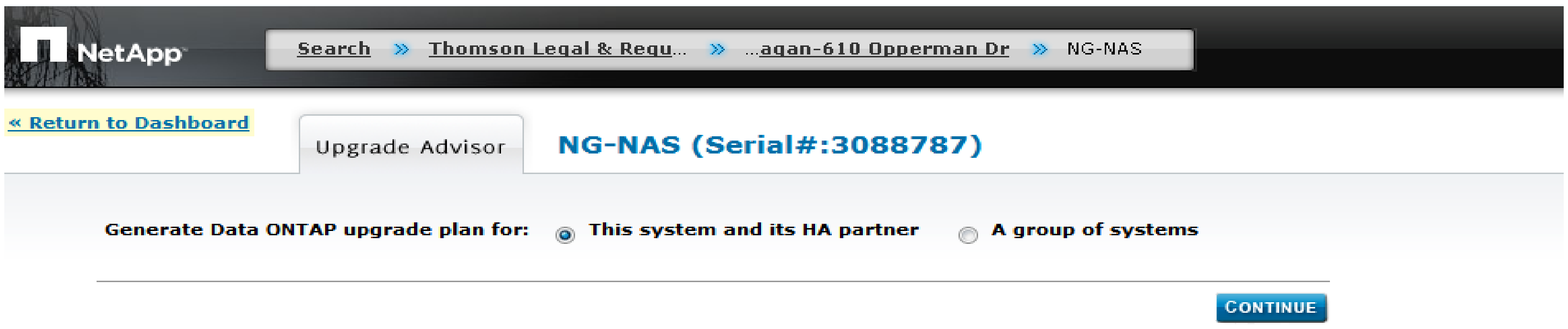
Effective (TB)
Total Effective 31.75
Free Capacity 6.64
Unused Reserve 0.95

Performance

We could not find a suitable AutoSupport to extract "" Sep 11, 12:30PM through Sep 18, 12:30PM.

Charts for previous dates **might still be available.**

On the left side we can see all the available options. Select “**Upgrade Advisor”**

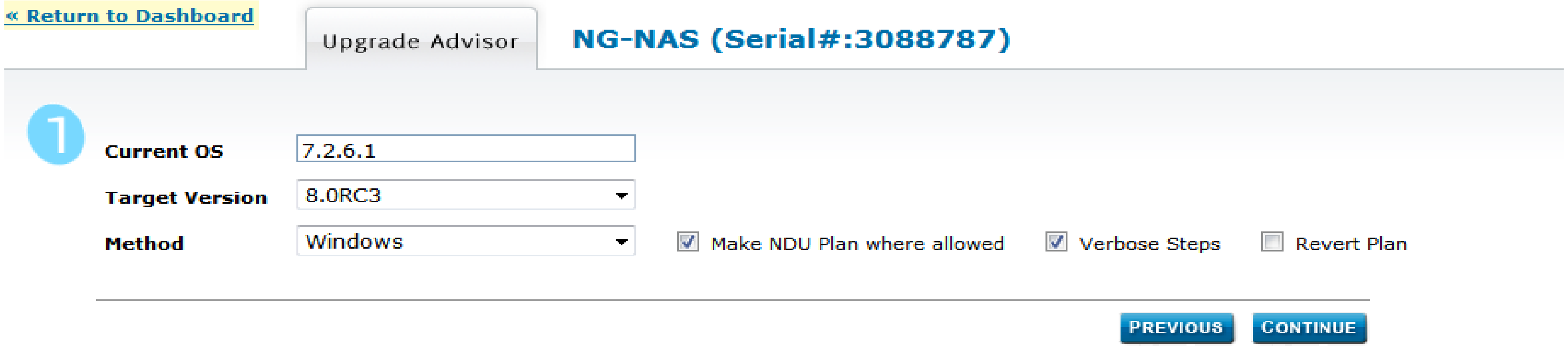


Generate Data ONTAP upgrade plan for: ● This system and its HA partner ○ A group of systems

Selecting the appropriate option depends on the requirements.If this is for single cluster select option 1(This system and its HA partner) and if this is for entire group/BU (eg : CIS/CPS/Markets etc)

In this case select option “This system and its HA partner” (this pulls the upgrade plan for both filers which are in part of Active/Active cluster).

Select **Next**,



Current OS 7.2.6.1

Target Version 8.0RC3

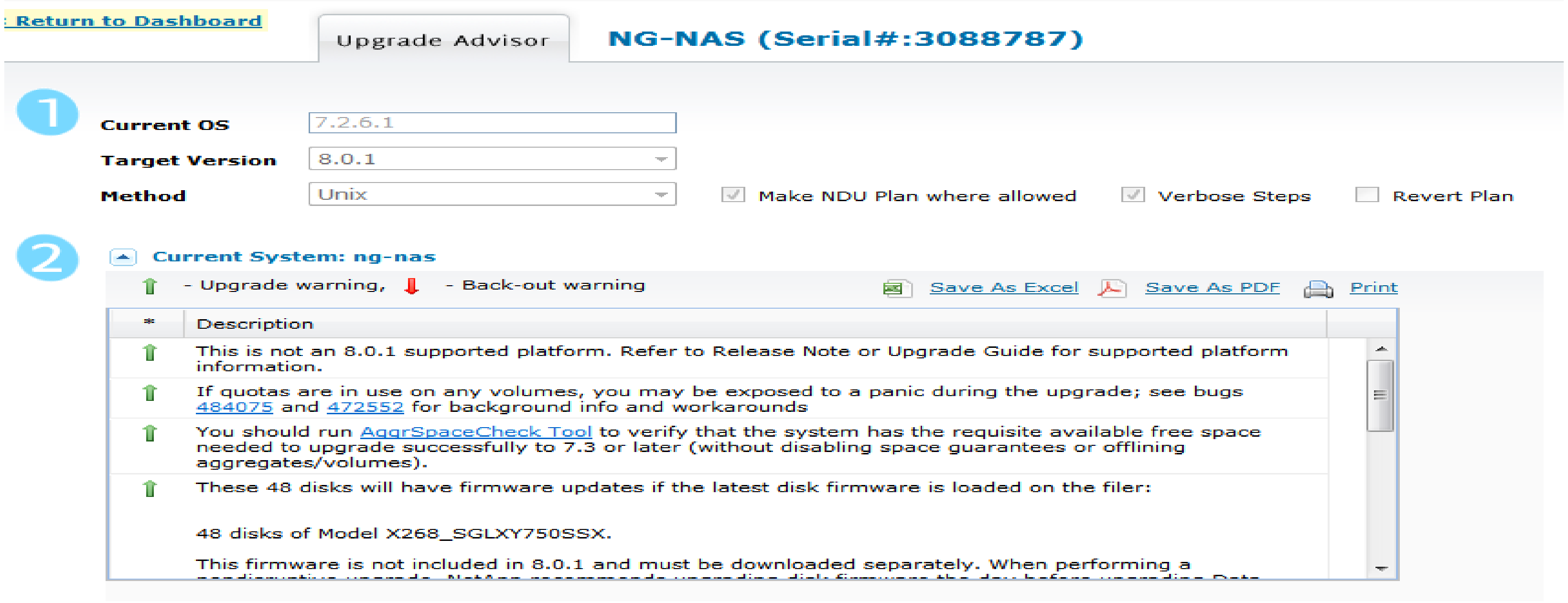
Method Windows ☑ Make NDU Plan where allowed ☑ Verbose Steps □ Revert Plan

a. Select the current Ontap version and the target version to which the filer needs to be upgraded.(For TR it is 7.3.X to 8.0RC3)
b. Select the method how the upgrade wants to be done(through Windows,Unix,HTTP).
→Select Unix (depends on the familiar method)
c. Enable all the options(make NDU plan ,Verbose Steps) and also some time there may be a chance where Ontap needs to be reverted(Revert plan is Optional and again depends on the requirements)

NEXT: Continue

This gives the overall steps by step to perform the ontap upgrade.

Also there is an option to save this report(report can be save as Excel sheet or as PDF format) as per the convenient.



Current OS 7.2.6.1

Target Version 8.0.1

Method Unix ☑ Make NDU Plan where allowed ☑ Verbose Steps □ Revert Plan

Current System: ng-nas

↑ - Upgrade warning, ↓ - Back-out warning

*	Description
↑	This is not an 8.0.1 supported platform. Refer to Release Note or Upgrade Guide for supported platform information.
↑	If quotas are in use on any volumes, you may be exposed to a panic during the upgrade; see bugs 484075 and 472552 for background info and workarounds
↑	You should run AggrSpaceCheck Tool to verify that the system has the requisite available free space needed to upgrade successfully to 7.3 or later (without disabling space guarantees or offlining aggregates/volumes).
↑	These 48 disks will have firmware updates if the latest disk firmware is loaded on the filer: 48 disks of Model X268_SGLXY750SSX. This firmware is not included in 8.0.1 and must be downloaded separately. When performing a

In the first section UA gives the warning(s), this is needs to be addressed before performing the Ontap upgrade.

3. b. HA Configuration Checker

The HA Configuration Checker is a Perl script that detects errors in the configuration of a pair of NetApp HA (active-active) storage controllers. It will run as a command from a Unix shell or Windows prompt, but also doubles as a CGI script that can be executed by a Unix web server. The script uses rsh or ssh to communicate with the storage controllers you're checking, so you'll need to have the appropriate permissions for rsh to run on both storage controllers in the HA pair.

Requirements

The tool is a Perl script. To run in a UNIX environment, Perl must be installed on the system.In all of our DFM servers Perl is installed already and is available under (/usr/bin/perl). Additionally, the client that runs the script must have rsh or ssh access to the filers in the HA configuration. This is how the script gathers the information. If rsh is used, the script can be run with OR without a /etc/hosts.equiv entry on the node. If no /etc/hosts.equiv entry exists, then the username and password must be provided to the script. If ssh is to be used, a trusted public key must be set up on the nodes in the HA configuration.

This tool can be downloaded from NOW.netapp.com using below link,

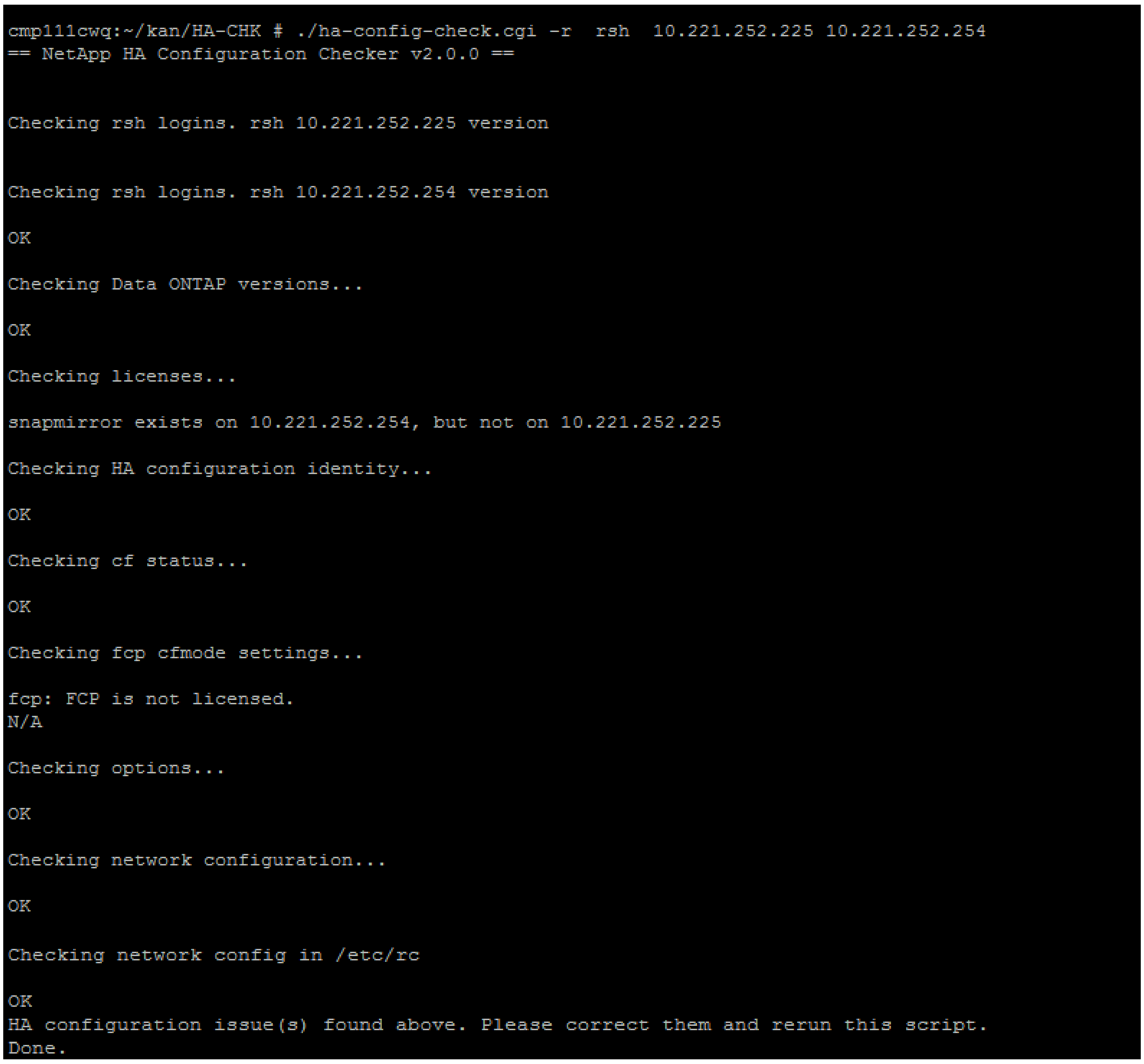
http://now.netapp.com/NOW/download/tools/cf_config_check/

Command to run the Ha-configuration checker :

```
ha-config.check.cgi   [-s] [r shell] [-l] <name/IP_of_node_1> <name/IP_of_node_2>
```

Since our setup allows RSH by default we can use the same method to run this script,

Example : using filers (eg-nasapp-a05.westlan.com -10.221.252.225) and (eg-nasapp-a06.westlan.com - 10.221.252.254)



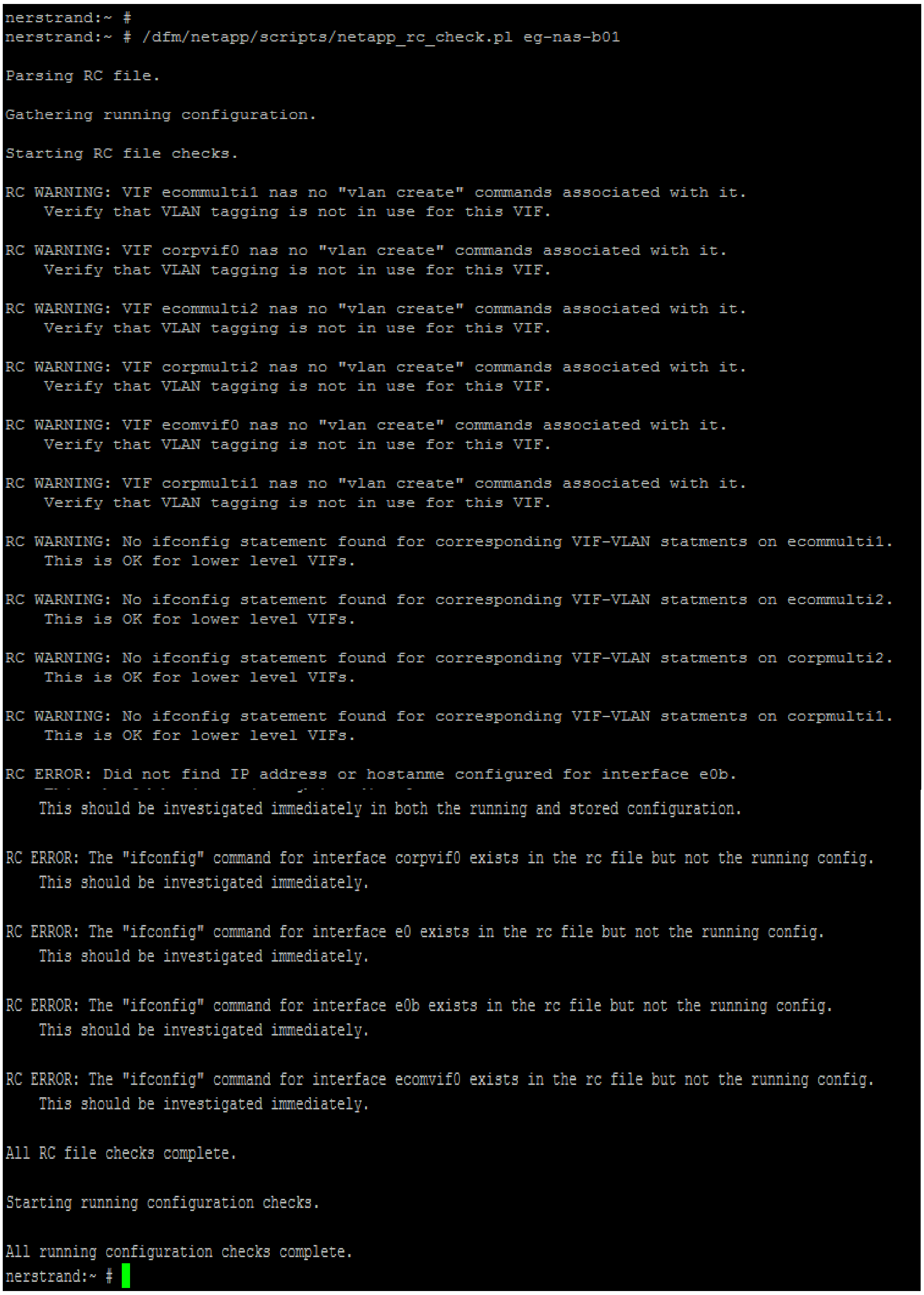
```
cmp111cwq:~/kan/HA-CHK # ./ha-config-check.cgi -r  rsh  10.221.252.225 10.221.252.254
== NetApp HA Configuration Checker v2.0.0 ==


Checking rsh logins. rsh 10.221.252.225 version


Checking rsh logins. rsh 10.221.252.254 version

OK

Checking Data ONTAP versions...

OK

Checking licenses...

snapmirror exists on 10.221.252.254, but not on 10.221.252.225

Checking HA configuration identity...

OK

Checking cf status...

OK

Checking fcp cfmode settings...

fcp: FCP is not licensed.
N/A

Checking options...

OK

Checking network configuration...

OK

Checking network config in /etc/rc

OK
HA configuration issue(s) found above. Please correct them and rerun this script.
Done.
```

This HA script checks the following things,

i) Data ONTAP versions mismatch
ii) Licenses mismatch
iii) High Availability(HA) configuration check
iv) Cluster status(cf status)
v) fcp cfmode settings –Incase of using FCP service
vi) Options mismatch
vii) network configuration (Network interfaces configured wrong (clients will disconnect during takeover)
viii) /etc/rc mismatch   (Checks ***/etc/rc*** on each storage controller to see that all interfaces have a failover set)

RC filer check : `/dfm/netapp/scripts/netapp_rc_check.pl`

Command : /dfm/netapp/scripts/netapp_rc_check.pl <filename>



```
nerstrand:~ #
nerstrand:~ # /dfm/netapp/scripts/netapp_rc_check.pl eg-nas-b01

Parsing RC file.

Gathering running configuration.

Starting RC file checks.

RC WARNING: VIF ecommulti1 nas no "vlan create" commands associated with it.
    Verify that VLAN tagging is not in use for this VIF.

RC WARNING: VIF corpvif0 nas no "vlan create" commands associated with it.
    Verify that VLAN tagging is not in use for this VIF.

RC WARNING: VIF ecommulti2 nas no "vlan create" commands associated with it.
    Verify that VLAN tagging is not in use for this VIF.

RC WARNING: VIF corpmulti2 nas no "vlan create" commands associated with it.
    Verify that VLAN tagging is not in use for this VIF.

RC WARNING: VIF ecomvif0 nas no "vlan create" commands associated with it.
    Verify that VLAN tagging is not in use for this VIF.

RC WARNING: VIF corpmulti1 nas no "vlan create" commands associated with it.
    Verify that VLAN tagging is not in use for this VIF.

RC WARNING: No ifconfig statement found for corresponding VIF-VLAN statments on ecommulti1.
    This is OK for lower level VIFs.

RC WARNING: No ifconfig statement found for corresponding VIF-VLAN statments on ecommulti2.
    This is OK for lower level VIFs.

RC WARNING: No ifconfig statement found for corresponding VIF-VLAN statments on corpmulti2.
    This is OK for lower level VIFs.

RC WARNING: No ifconfig statement found for corresponding VIF-VLAN statments on corpmulti1.
    This is OK for lower level VIFs.

RC ERROR: Did not find IP address or hostanme configured for interface e0b.
    This should be investigated immediately in both the running and stored configuration.

RC ERROR: The "ifconfig" command for interface corpvif0 exists in the rc file but not the running config.
    This should be investigated immediately.

RC ERROR: The "ifconfig" command for interface e0 exists in the rc file but not the running config.
    This should be investigated immediately.

RC ERROR: The "ifconfig" command for interface e0b exists in the rc file but not the running config.
    This should be investigated immediately.

RC ERROR: The "ifconfig" command for interface ecomvif0 exists in the rc file but not the running config.
    This should be investigated immediately.

All RC file checks complete.

Starting running configuration checks.

All running configuration checks complete.
nerstrand:~ #
```

Above netapp_rc check perform:

1. The rc file has a valid hostname command.
2. The rc file has vlan creation statements that match the VIF and ifconfig related statemetns with vlan tagging.
3. The rc file has ifconfig lines for all VIF and vlan tagged VIFs that are created by the rc file.
4. Each ifconfig line in the rc file has an IP address assigned to it.
5. Each ifconfig line in the rc file has a valid partner argument.
6. Each ifconfig line in the rc file has a mtusize setting.

7. Each ifconfig line in the rc file has a netmask setting.

8. All ifconfig aliases in the rc file have the same netmask for aliases using the same interface.

9. All vlan create/add statements in the rc file have a corresponding vlan in the running config.

10. All vif create statements in the rc file have a corresponding vif in the running config.

11. All ifconfig statements in the rc file have a corresponding interface in the running config.

12. The vif create statement for each VIF in the running config is present in the rc file with a matching VIF type.

13. The vlan create/add statement for each VLAN in the running config is in the rc file.

14. Each interface used in the running config has a valid partner argument.

15. The netmask found in the running config matches the netmask found in the rc file.

16. The mtusize found in the running config matches the mtusize found in the rc file.

17. Each vsip vfiler in the running config has a default route line in /etc/rc.

Check for the RC file entry Order: It is always recommended to check the RC file entry order before performing any takeover/giveback. Order should be always like this,

Ifconfig entry
Route IP entry
Vfiler (vfiler route etc)

I. **Check for all Vfiler status :** Check the Vfiler status regularly after the following steps,

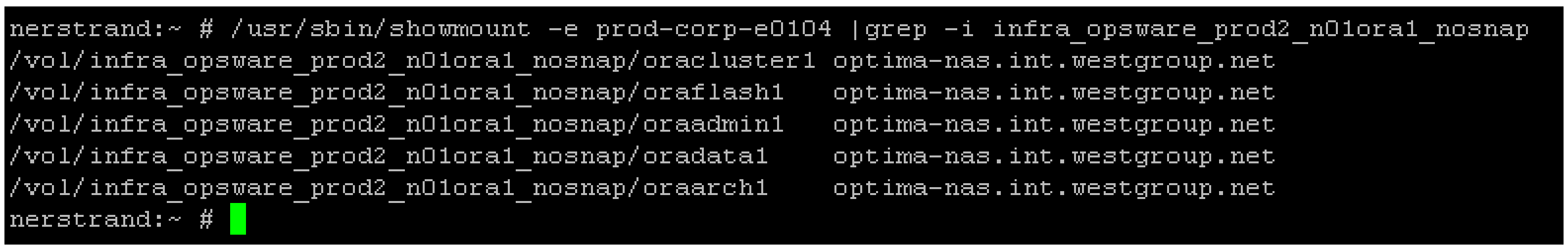
a. After first Takeover and giveback is done
b. After partner filer Takeover and giveback is completed

J. Exports entry check for VM volumes

Check for any VM related volumes exist on the filer (example : infra etc) ,if so please make sure to check the exports entry for all the volumes .If there is no exports entry or no specific client machines are specified, please reach out to the VM team and ask for the specific hosts details which are accessing the volume. Add those hosts to the exports entry and this will avoid any VM inaccessible issues.

Eg : command : rsh eg-naslowc-e03 vfiler status -a |egrep -i "infra|runn"

```
prod-corp-e0104                running
Path: /vol/infra_opsware_prod2_n01ora1_nosnap
Path: /vol/infra_opsware_prod2_s01ora1_snap
```



```
nerstrand:~ # /usr/sbin/showmount -e prod-corp-e0104 |grep -i infra_opsware_prod2_n01ora1_nosnap
/vol/infra_opsware_prod2_n01ora1_nosnap/oracluster1 optima-nas.int.westgroup.net
/vol/infra_opsware_prod2_n01ora1_nosnap/oraflash1   optima-nas.int.westgroup.net
/vol/infra_opsware_prod2_n01ora1_nosnap/oraadmin1   optima-nas.int.westgroup.net
/vol/infra_opsware_prod2_n01ora1_nosnap/oradata1    optima-nas.int.westgroup.net
/vol/infra_opsware_prod2_n01ora1_nosnap/oraarch1    optima-nas.int.westgroup.net
nerstrand:~ #
```

3. c. Remove all failed disks

Follow the following steps to remove the failed disks from the filer.

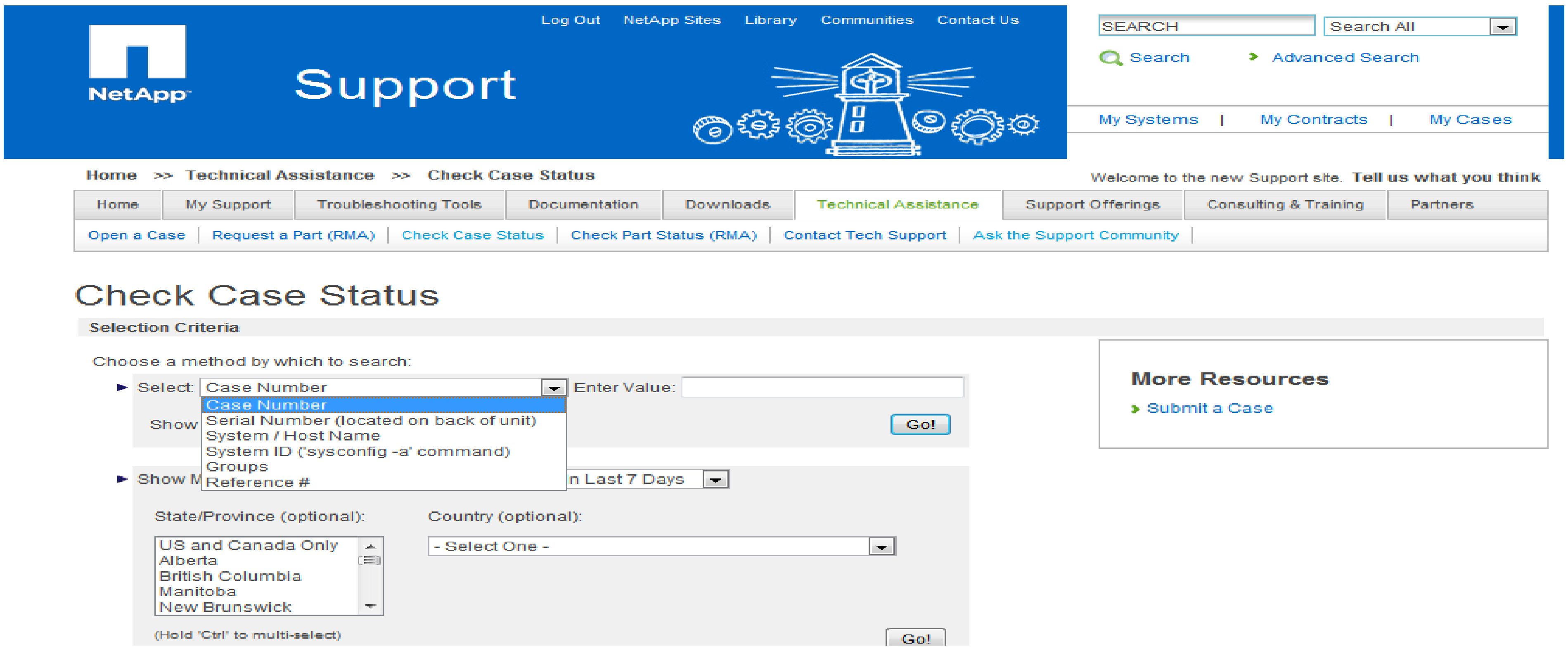
Use commands: eg : **rsh <filername> vol status –f**

vol status –f (this will show the broken/failed disks in the filer) or
sysconfig –a (check for any BYP – bypassed disks)
fcadmin device_map (check for any BYP symbol in any of the channels)

Once identified the failed disk , check for any open case for this issue or raise a case with netapp to replace the failed disk.

How to confirm whether this filer has already generated a case or not :

Go to Now.netapp.com → Click "Technical Assistance" → check case status → then,
Use serial number or system ID or hostname to search (please see below screen shot),


Log Out
NetApp Sites
Library
Communities
Contact Us
NetApp
Support
SEARCH
Search All
Search
Advanced Search
My Systems | My Contracts | My Cases
Home >> Technical Assistance >> Check Case Status
Welcome to the new Support site. Tell us what you think
Home
My Support
Troubleshooting Tools
Documentation
Downloads
Technical Assistance
Support Offerings
Consulting & Training
Partners
Open a Case | Request a Part (RMA) | Check Case Status | Check Part Status (RMA) | Contact Tech Support | Ask the Support Community |
More Resources
Submit a Case
Go!
Go!

Check Case Status

Selection Criteria

Choose a method by which to search:

► Select: Case Number Enter Value:

Case Number
Serial Number (located on back of unit)
System / Host Name
System ID ('sysconfig -a' command)
Groups
Reference #

Show

► Show M n Last 7 Days

State/Province (optional): US and Canada Only, Alberta, British Columbia, Manitoba, New Brunswick

Country (optional): - Select One -

(Hold 'Ctrl' to multi-select)

Provide the serial number/system ID or hostname ,if this doesn't create a case. Please call the support center or use the same link (left side → "open a case" to open a new case.

Support center call details :

- 888.4.NETAPP (US and Canada)
- 00.800.44.NETAPP (EMEA/Europe)
- +800.800.80.800 (Asia/Pacific)

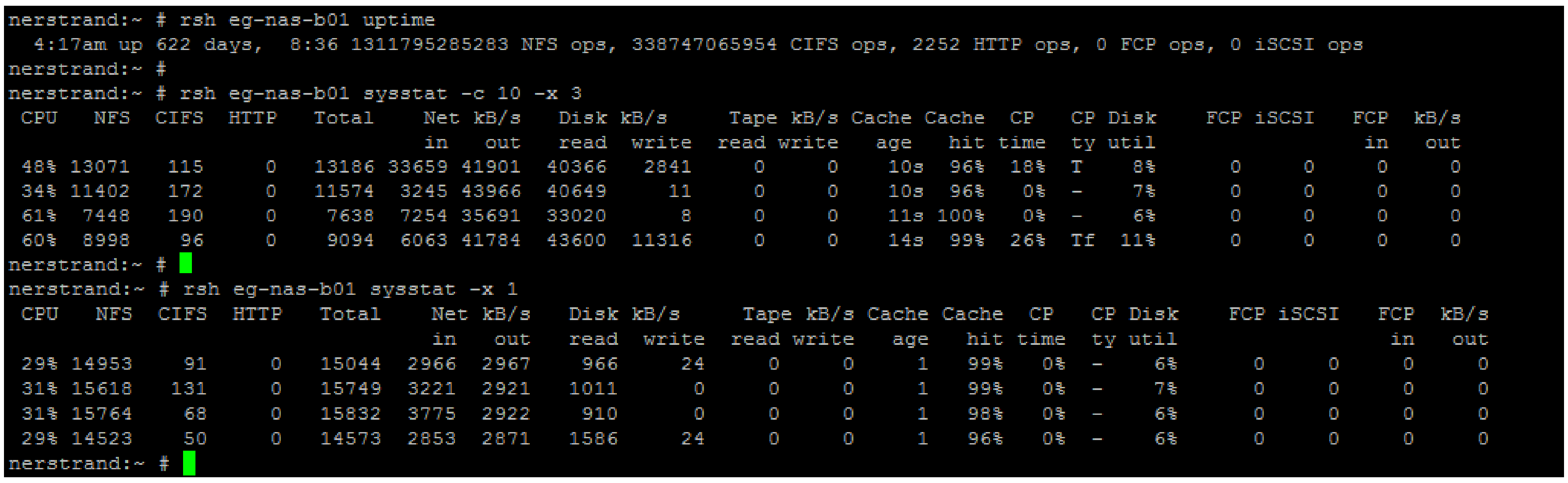
All the above action helps to remove/replace the failed disks out of the filer.

3. d. Verify system load

Perform NDUs only when CPU and disk activity are as low as possible. The upgrade process requires one controller to assume the load normally handled by both controllers. By minimizing system load, you reduce the risk of host I/O requests being delayed or timing out.

Before initiating a Data ONTAP NDU, monitor CPU and disk utilization for 30 seconds by entering the following command at the console of each storage system controller:

Command: sysstat -c 10 -x 3 (or) sysstat –x 1
Please find the screen shot for example:



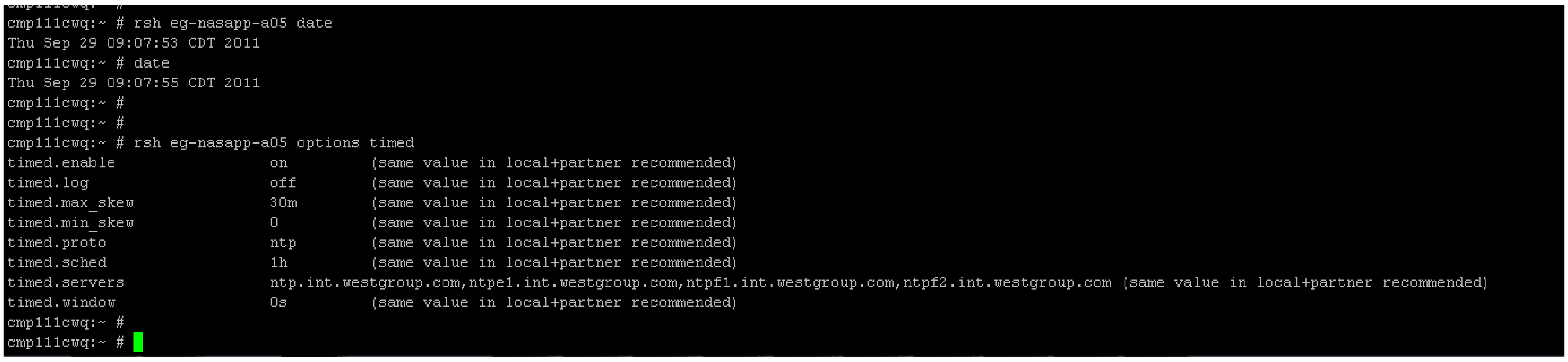
```
nerstrand:~ # rsh eg-nas-b01 uptime
  4:17am up 622 days,  8:36 1311795285283 NFS ops, 338747065954 CIFS ops, 2252 HTTP ops, 0 FCP ops, 0 iSCSI ops
nerstrand:~ #
nerstrand:~ # rsh eg-nas-b01 sysstat -c 10 -x 3
 CPU    NFS   CIFS   HTTP    Total     Net  kB/s    Disk  kB/s     Tape  kB/s Cache Cache   CP    CP Disk     FCP iSCSI    FCP   kB/s
                                        in    out    read   write   read write   age   hit  time   ty util                     in    out
 48% 13071    115      0    13186 33659 41901   40366    2841      0     0    10s   96%   18%   T     8%      0     0      0      0
 34% 11402    172      0    11574  3245 43966   40649      11      0     0    10s   96%    0%   -     7%      0     0      0      0
 61%  7448    190      0     7638  7254 35691   33020       8      0     0    11s  100%    0%   -     6%      0     0      0      0
 60%  8998     96      0     9094  6063 41784   43600   11316      0     0    14s   99%   26%   Tf   11%      0     0      0      0
nerstrand:~ # 
nerstrand:~ # rsh eg-nas-b01 sysstat -x 1
 CPU    NFS   CIFS   HTTP    Total     Net  kB/s    Disk  kB/s     Tape  kB/s Cache Cache   CP    CP Disk     FCP iSCSI    FCP   kB/s
                                        in    out    read   write   read write   age   hit  time   ty util                     in    out
 29% 14953     91      0    15044  2966  2967     966      24      0     0      1   99%    0%   -     6%      0     0      0      0
 31% 15618    131      0    15749  3221  2921    1011       0      0     0      1   99%    0%   -     7%      0     0      0      0
 31% 15764     68      0    15832  3775  2922     910       0      0     0      1   98%    0%   -     6%      0     0      0      0
 29% 14523     50      0    14573  2853  2871    1586      24      0     0      1   96%    0%   -     6%      0     0      0      0
nerstrand:~ # 
```

Recommended values in the CPU and Disk Util columns should not be above 50% for all 10 measurements reported. Make sure that no additional load is added to the storage system until the upgrade completes.

3. e. Synchronize date and time:

Make sure that the date and time are synchronized between the two controllers. Although synchronized time is not required for the update to complete, it is important in case an issue arises that requires examining time- and date-based logs from both controllers.

Since we got a NTP server time will be synced and to make sure the filer is running with correct timings, follow the below steps, In a cluster, all timed options values on both filers must be configured the same. Run date commands on both the filer and the dfm server this gives the time difference. By default this schedule updates every hour, on the hour. Also make sure all this below options are in place,



```
cmp111cwq:~ # rsh eg-nasapp-a05 date
Thu Sep 29 09:07:53 CDT 2011
cmp111cwq:~ # date
Thu Sep 29 09:07:55 CDT 2011
cmp111cwq:~ #
cmp111cwq:~ #
cmp111cwq:~ # rsh eg-nasapp-a05 options timed
timed.enable                on          (same value in local+partner recommended)
timed.log                   off         (same value in local+partner recommended)
timed.max_skew              30m         (same value in local+partner recommended)
timed.min_skew              0           (same value in local+partner recommended)
timed.proto                 ntp         (same value in local+partner recommended)
timed.sched                 1h          (same value in local+partner recommended)
timed.servers               ntp.int.westgroup.com,ntpe1.int.westgroup.com,ntpf1.int.westgroup.com,ntpf2.int.westgroup.com (same value in local+partner recommended)
timed.window                0s          (same value in local+partner recommended)
cmp111cwq:~ #
cmp111cwq:~ #
```

3. f. Verify the connectivity to the storage controller:

I) **HOW TO CONNECT TO THE STORAGE CONTROLLERS:**

Using serial cables, a console server, and the system's remote LAN module (RLM) or a baseboard management controller (BMC), open a terminal session to the console port of the two storage controllers. Network connections to the controllers are lost during takeover and giveback operations. Therefore telnet, SSH, and FilerView® sessions do not work for the NDU process.
Connect to RLM through user: **naroot** and **password** (as root password).(Hope all knows the root password ☺)

SSH <RLM IP> ,

Login : naroot
Passwd :

RLM> system console

This will get to the system and login through default password.

This will login to system console as like this "**netapp>**"

For example :

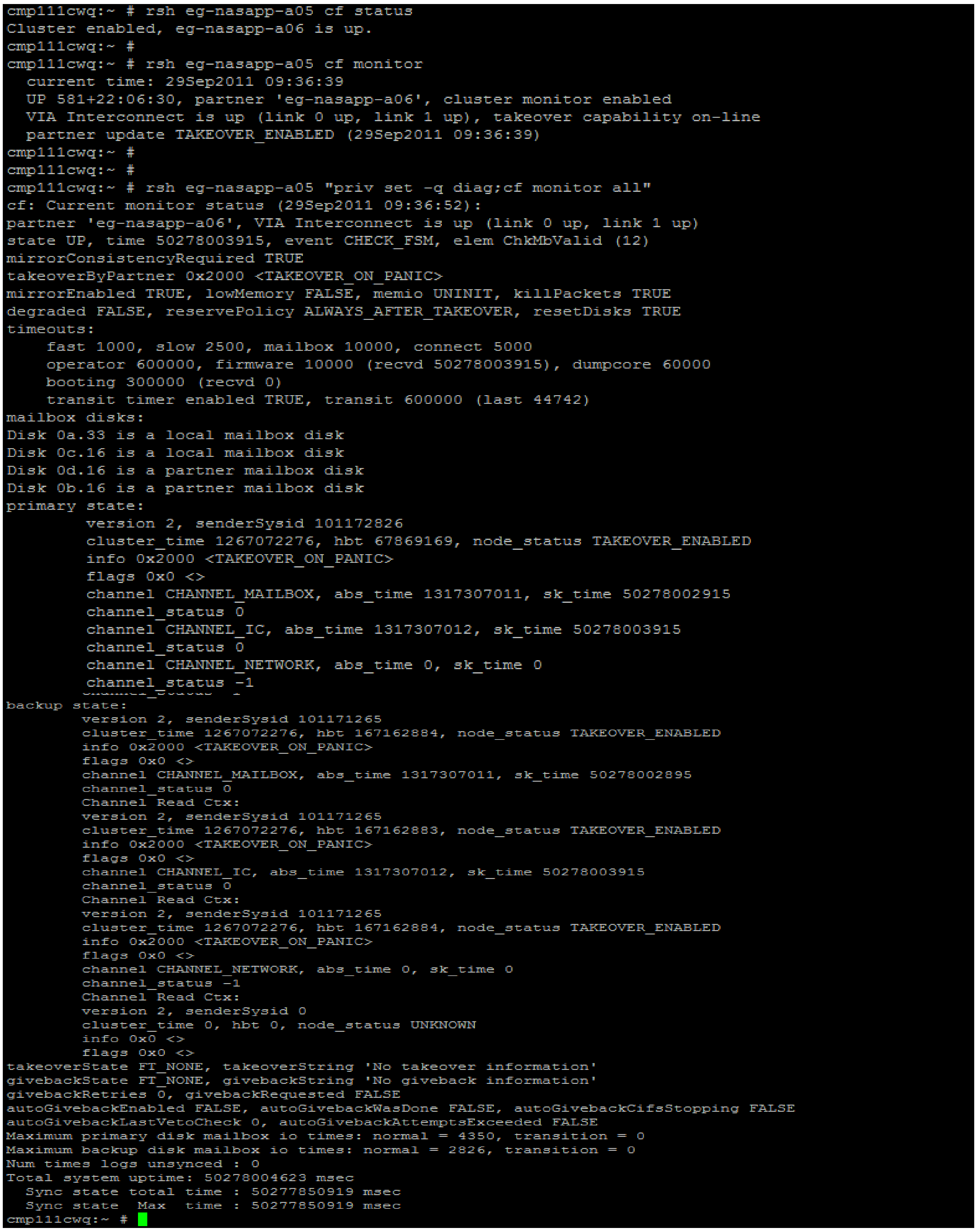
login as: naroot
naroot@10.224.128.63's password:
Last login: Fri Feb 6 07:15:33 2009 from 141.147.33.108
RLM netapp>
RLM netapp> system
system console - connect to the system console
system core - dump the system core and reset
system log - print system console logs
system power - commands controlling system power
system reset - reset the system using the selected firmware

RLM netapp> system console
Type Ctrl-D to exit.

Data ONTAP (netapp.Thomson.com)
login: root
passwd : <root passwd>
netapp>

II) Verify the connectivity between the cluster nodes using few commands like,
Cf status
Cf monitor (this shows the interconnect link status, takeover capability etc)
"priv set –q diag;Cf monitor all" (check for the mailbox disks status)

Eg :



```
cmp111cwq:~ # rsh eg-nasapp-a05 cf status
Cluster enabled, eg-nasapp-a06 is up.
cmp111cwq:~ #
cmp111cwq:~ # rsh eg-nasapp-a05 cf monitor
  current time: 29Sep2011 09:36:39
  UP 581+22:06:30, partner 'eg-nasapp-a06', cluster monitor enabled
  VIA Interconnect is up (link 0 up, link 1 up), takeover capability on-line
  partner update TAKEOVER_ENABLED (29Sep2011 09:36:39)
cmp111cwq:~ #
cmp111cwq:~ #
cmp111cwq:~ # rsh eg-nasapp-a05 "priv set -q diag;cf monitor all"
cf: Current monitor status (29Sep2011 09:36:52):
partner 'eg-nasapp-a06', VIA Interconnect is up (link 0 up, link 1 up)
state UP, time 50278003915, event CHECK_FSM, elem ChkMbValid (12)
mirrorConsistencyRequired TRUE
takeoverByPartner 0x2000 <TAKEOVER_ON_PANIC>
mirrorEnabled TRUE, lowMemory FALSE, memio UNINIT, killPackets TRUE
degraded FALSE, reservePolicy ALWAYS_AFTER_TAKEOVER, resetDisks TRUE
timeouts:
    fast 1000, slow 2500, mailbox 10000, connect 5000
    operator 600000, firmware 10000 (recvd 50278003915), dumpcore 60000
    booting 300000 (recvd 0)
    transit timer enabled TRUE, transit 600000 (last 44742)
mailbox disks:
Disk 0a.33 is a local mailbox disk
Disk 0c.16 is a local mailbox disk
Disk 0d.16 is a partner mailbox disk
Disk 0b.16 is a partner mailbox disk
primary state:
        version 2, senderSysid 101172826
        cluster_time 1267072276, hbt 67869169, node_status TAKEOVER_ENABLED
        info 0x2000 <TAKEOVER_ON_PANIC>
        flags 0x0 <>
        channel CHANNEL_MAILBOX, abs_time 1317307011, sk_time 50278002915
        channel_status 0
        channel CHANNEL_IC, abs_time 1317307012, sk_time 50278003915
        channel_status 0
        channel CHANNEL_NETWORK, abs_time 0, sk_time 0
        channel_status -1
backup state:
        version 2, senderSysid 101171265
        cluster_time 1267072276, hbt 167162884, node_status TAKEOVER_ENABLED
        info 0x2000 <TAKEOVER_ON_PANIC>
        flags 0x0 <>
        channel CHANNEL_MAILBOX, abs_time 1317307011, sk_time 50278002895
        channel_status 0
        Channel Read Ctx:
        version 2, senderSysid 101171265
        cluster_time 1267072276, hbt 167162883, node_status TAKEOVER_ENABLED
        info 0x2000 <TAKEOVER_ON_PANIC>
        flags 0x0 <>
        channel CHANNEL_IC, abs_time 1317307012, sk_time 50278003915
        channel_status 0
        Channel Read Ctx:
        version 2, senderSysid 101171265
        cluster_time 1267072276, hbt 167162884, node_status TAKEOVER_ENABLED
        info 0x2000 <TAKEOVER_ON_PANIC>
        flags 0x0 <>
        channel CHANNEL_NETWORK, abs_time 0, sk_time 0
        channel_status -1
        Channel Read Ctx:
        version 2, senderSysid 0
        cluster_time 0, hbt 0, node_status UNKNOWN
        info 0x0 <>
        flags 0x0 <>
takeoverState FT_NONE, takeoverString 'No takeover information'
givebackState FT_NONE, givebackString 'No giveback information'
givebackRetries 0, givebackRequested FALSE
autoGivebackEnabled FALSE, autoGivebackWasDone FALSE, autoGivebackCifsStopping FALSE
autoGivebackLastVetoCheck 0, autoGivebackAttemptsExceeded FALSE
Maximum primary disk mailbox io times: normal = 4350, transition = 0
Maximum backup disk mailbox io times: normal = 2826, transition = 0
Num times logs unsynced : 0
Total system uptime: 50278004623 msec
  Sync state total time : 50277850919 msec
  Sync state  Max  time : 50277850919 msec
cmp111cwq:~ #
```

From the above commands should be able to view all the connectivity details and mailbox details. Until all of these details are visible it will not allow the cluster to failover to the partner filer.

3. g. DR/Data Production consideration:

It is always recommended to upgrade the target filer first and then the source filer when there is any snapmirror/snapvault relationship exists.

When you upgrade Data ONTAP on storage systems that have a mirrored relationship with each other using SnapMirror, the order in which you upgrade the storage systems is critical. If you do not upgrade in the correct order, you can cause a lapse in SnapMirror replication coverage.

A SnapMirror transfer is possible only when the destination storage system can read a Snapshot copy of data on the source system. Therefore, the destination system must be upgraded first, so that it can read the Snapshot copies of the earlier release. If the source system is upgraded first, the destination system cannot read the source system's file system, so SnapMirror does not work.

Command : <primary> snapmirror status |grep –I <target filername> or IP address

Primary > `snapmirror destinations`

3. h. Determining latest Firmware and upgrading Disks/Shelves.

Shelf firmware upgrades must be completed before performing Data ONTAP NDU.
NetApp disk shelves incorporate controller modules that support firmware upgrades as a means of providing greater stability or functionality. Because of the need for uninterrupted data I/O access by clients, these firmware updates can, depending on the model of module involved, be performed non-disruptively.

All shelf modules which has LRC/ESH/ESH2/ESH4 supports NON-DISTRUPTIVE UPGRADES.

AT-FCX Also supports NDU. If all below the criteria are met,

- If both the system AT-FCX modules are at FW37 (or above)
- Data ONTAP 7.3.2 or higher is being run on the system
- The system is correctly cabled for MPHA

3.H.I. SHELF UPGRADE:

HOW DOES SHELF FIRMWARE UPGRADE OCCUR?

The following subsections address how shelf controller module firmware upgrades can occur.

What happens during shelf firmware upgrade? (Below applies only if the Current FW is less than 37)

For systems incorporating AT-FC, AT-FC2, or AT-FCx shelf modules, including mixed environments with LRC or ESHx modules, shelf firmware upgrades occur in two steps—first to all A shelf modules and then to all B shelf modules.

The storage download shelf process **requires 5 minutes to download** the code to **all A shelf modules**.

During this time, I/O is allowed to occur. When the download completes, all A shelf modules are rebooted, which incurs up to a **70-second disruption in I/O** for the shelf on both controller modules (when running a firmware version prior to version 37). This affects data access to the shelves regardless of whether multipath is configured. When the upgrade of the A shelf modules completes, the **process repeats for all B modules**. It takes 5 minutes to download the code (nondisruptively), followed by up to a 70-second disruption in I/O. The entire operation incurs two separate pauses of up to **70 seconds in I/O** to all attached storage, including FC if present in the system. Systems employing multipath HA are also affected. The storage download shelf command is issued only once to perform both A and B shelf module upgrades.

AT-FCX – Disruptive(If FW < 37): If in case upgrading shelf firmware is missed before the ONTAP upgrade this will lead to disruptive upgrade. Shelf firmware upgrade occurs automatically during the boot process when the system is halted and rebooted. System boot is delayed until the shelf firmware upgrade process completes. **This will lead to delay in upgrade and can bring down** the application. Upgrading all shelf modules entails two downloads of 5 minutes PLUS two reboot cycles of up to 70 seconds each.
This must be completed before the system is allowed to boot and results in a total delay in the boot process of approximately 12 minutes. Upgrading shelf firmware during reboot suspends I/O for the entire 12-minute period for all storage attached to the system, including the partner node in HA pair configurations.

MANUAL FIRMWARE UPGRADE:
A manual shelf firmware upgrade prior to the Data ONTAP NDU operations is the preferred method.

Download the most recent firmware from the NOW site to the controller's /etc/shelf_fw directory and issue the "storage download shelf" command.

Shelf FW can be downloaded from https://now.netapp.com/NOW/download/tools/diskshelf/

Download the software
Place under filer (/etc/shelf_fw) folder
During the upgrade period issue command: **"Storage download shelf"**

Steps in details:

1. Get the firmware from the NOW site.
2. Use a web browser to connect to http://now.netapp.com/
3. Select the `"Log In"` button on the right side.
4. Enter your username and password.
5. Hover over `"Downloads"` on the gray bar, and then select `"Disk Shelf Firmware"`
6. Select the link `"all current Disk Shelf & I/O Module Firmware"`
7. Read over the instruction page.
8. Select `"Download tar"` at the bottom of the page. Save the file `"all_shelf_fw.tar"` to your local hard drive.
9. Close the web browser.
10. Determine the appropriate DFM server for the storage controller to have the firmware update applied.
11. Transfer `"all_shelf_fw.tar"` to your account on the DFM server using WINSCP or a similar program.

12. Log into the DFM server.
13. Change directory to the location you saved "`all_shelf_fw.tar`"
14. Extract the updated firmware with the following command:

    ```
    tar xvf all_shelf_fw.tar
    ```

15. Gain root privileges with "`sudo bash`".
16. Change directory into the extracted shelf_fw.
17. Look at the contents of the directory with the unix command "`ls`".
18. Look at the contents of the destination directory on the filer with the following command Replace "eg-nasbkp-e01" with the name of the storage controller you are updating the firmware on.

    ```
    ls /filers/eg-nasbkp-e01/shelf_fw
    ```

19. Copy the contents of the shelf_fw directory to the target NetApp storage controller with the following command. Be sure to replace "eg-nasbkp-e01" with the name of the storage controller you are updating,

    ```
    cp * /filers/eg-nasbkp-e01/shelf_fw
    ```

20. Change directory into the extracted acpp_fw.
21. Look at the contents of the directory with the unix command "`ls`".
22. Look at the contents of the destination directory on the filer with the following command Replace "eg-nasbkp-e01" with the name of the storage controller you are updating the firmware on.

    ```
    ls /filers/eg-nasbkp-e01/acpp_fw
    ```

23. If the directory acpp_fw doesn't exist on the NetApp storage controller, then you don't need to install the ACPP firmware. Jump ahead to step number 25. You will need to remember this decision later in step number 28.
24. Copy the contents of the acpp_fw directory to the target NetApp storage controller with the following command. Be sure to replace "eg-nasbkp-e01" with the name of the storage controller you are updating,

    ```
    cp * /filers/eg-nasbkp-e01/acpp_fw
    ```

25. Stop having root privileges with "`exit`".

    Log into the targeted NetApp storage controller with username "`root`".

26. Validate the current versions:

    ```
    sysconfig -v
    ```

27. Update the disk shelf firmware as follows:

    ```
    priv set advanced
    storage download shelf
    ```

28. If you copied the ACPP firmware to the NetApp storage controller in step number 24, you also need to update the ACPP firmware as follows:

    ```
    storage download acp
    ```

29. Type "`y`" when asked if you want to continue.
30. The download can be verified as follows:

    ```
    sysconfig -v
    ```

    This will show the latest version of the shelf.

AUTOMATIC FIRMWARE UPGRADE:
For disruptive (non-NDU) Data ONTAP upgrades, shelf firmware is updated automatically on reboot while upgrading Data ONTAP only if the firmware on the shelf controller modules is older than the version bundled with the Data ONTAP system files.

UPGRADING INDIVIDUAL SHELF MODULES:

Follow steps 1 to 21 to save the latest downloaded Firmware to filers /etc/shelf_fw folder. This below steps shows how to upgrade the individual shelf modules.
By default, all shelf modules are upgraded. For LRC, ESH, ESH2, and ESH4 series modules it is possible to upgrade a single shelf module or the shelf modules attached to a specific adapter by using the following command:

Command: storage download shelf [adapter_number|adapter_number.shelf_number]

Eg: netapp> storage download shelf 2a.1

For downloading the software please follow the above link in (manual firmware upgrade)

The above command informs the user if the upgrade will disrupt client I/O and offers an option to cancel the operation. Systems using only LRC, ESH, ESH2, or ESH4 shelf modules (in any combination) do not incur disruption during the upgrade process, regardless of whether the upgrade is performed manually or during storage controller reboot.

3.II) DISK FIRMWARE NDU:

Depending on the configuration, NetApp provides the ability to conduct disk firmware upgrades nondisruptively (without affecting client I/O). Disk firmware NDU upgrades target one disk at a time, which reduces performance impact and results in zero downtime.

a) BACKGROUND DISK FIRMWARE NDU :

Beginning with Data ONTAP 7.0.1, nondisruptive disk firmware upgrades take place automatically in the background.

By enabling the option "**raid.background_disk_fw_update.enable"**,all the disks can be upgraded in the background.

This step has to be carried out before the actual ONTAP upgrade to avoid any delay in overall upgrade process.

Nondisruptive upgrades are performed by downloading the most recent firmware from the NOW site (http://now.netapp.com/NOW/download/tools/diskfw/) and place the software under,

/etc/disk_fw directory(/filer/etc/disk_fw)

Updates start automatically for any disk **drives that are eligible for an update**.
Data **ONTAP polls approximately** once per **minute to detect new** firmware in the /etc/disk_fw directory.

Firmware must be downloaded to each node in an HA pair configuration because, during an automatic download, the firmware is not downloaded to an HA pair partner's disks.

Background disk firmware updates do not occur if either of the following conditions is encountered:

- Degraded volumes exist on the storage system.
- Disk drives that need a firmware update are present in a volume or plex that is in an offline state.

b) Manually upgrading disk firmware :

1. Get the firmware from the NOW site.
2. Use a web browser to connect to http://now.netapp.com/
3. Select the "`Log In`" button on the right side.
4. Enter your usrname and password.
5. Hover over "`Downloads`" on the gray bar, and then select "`Disk Drive & Firmware Matrix`"
6. Select the link "`all current Disk Firmware`"
7. Read over the instruction page.
8. Select "`Download gz`" at the bottom of the page. Save the file "`all.gz`" to your local hard drive.
9. Close the web browser.
10. Determine the appropriate DFM server for the storage controller to have the firmware update applied.
11. Transfer "`all.gz`" to your account on the DFM server using WINSCP or a similar program.
12. Log into the DFM server.
13. Change directory to the location you saved "`all.gz`"
14. Extract the updated firmware with the following command:

```
gzip -cd all.gz | tar xvf -
```

15. Change directory into the extracted etc/disk_fw.
16. Look at the contents of the directory with the unix command "`ls`".
17. Gain root privladges with "`sudo bash`".
18. Look at the contents of the destination directory on the filer with the following command Replace "eg-nasbkp-e01" with the name of the storage controller you are updating the firmware on.

```
ls /filers/eg-nasbkp-e01/disk_fw
```

19. Copy the contents of the current directory to the target NetApp storage controller with the following command. Be sure to replace "eg-nasbkp-e01" with the name of the storage controller you are updating,

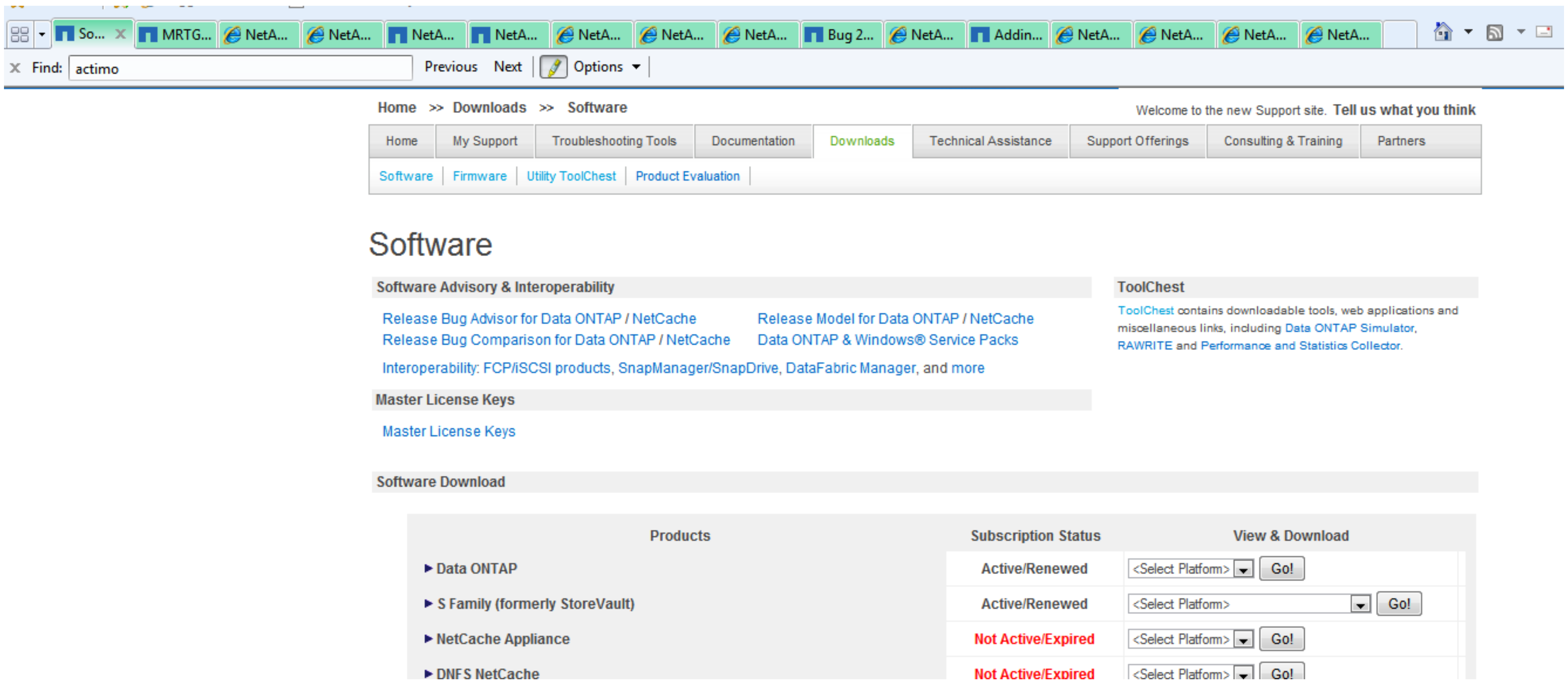
```
cp * /filers/eg-nasbkp-e01/disk_fw
```

20. Stop having root privileges with "`exit`".
21. Log into the targeted NetApp storage controller with username "`root`"
22. Execute command : disk_fw_update to upgrade the disk firmware manually.

On systems configured with software disk ownership, the firmware upgrade must be performed separately on each node individually in sequence, meaning that you must wait for the first node to complete before starting the second.

4. Obtaining the ONTAP version from Now.netapp.com

Latest Ontap software can be downloaded from now.netapp.com. Basically Ontap versions can be downloaded based on the platforms. Please follow the below steps to download the software,



Software

Software Advisory & Interoperability

Release Bug Advisor for Data ONTAP / NetCache
Release Bug Comparison for Data ONTAP / NetCache
Release Model for Data ONTAP / NetCache
Data ONTAP & Windows® Service Packs
Interoperability: FCP/iSCSI products, SnapManager/SnapDrive, DataFabric Manager, and more

ToolChest

ToolChest contains downloadable tools, web applications and miscellaneous links, including Data ONTAP Simulator, RAWRITE and Performance and Statistics Collector.

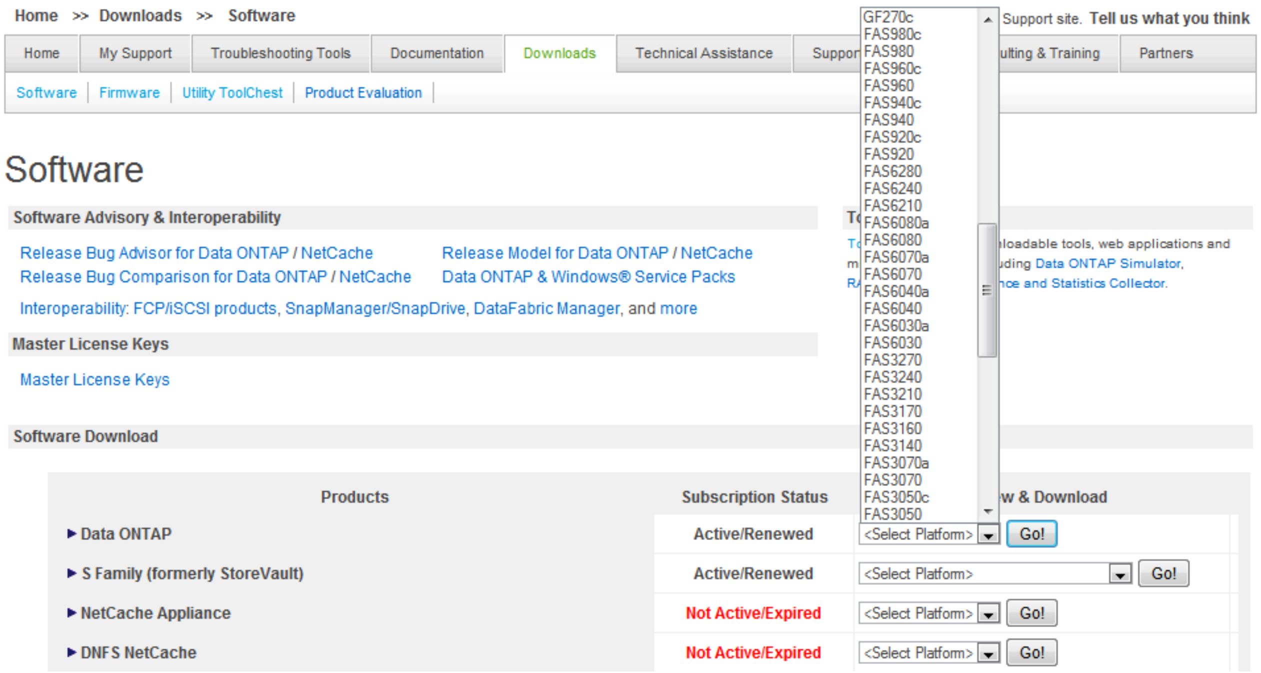
Master License Keys

Master License Keys

Software Download

Products	Subscription Status	View & Download
▸ Data ONTAP	Active/Renewed	<Select Platform> Go!
▸ S Family (formerly StoreVault)	Active/Renewed	<Select Platform> Go!
▸ NetCache Appliance	Not Active/Expired	<Select Platform> Go!
▸ DNFS NetCache	Not Active/Expired	<Select Platform> Go!

Go to Now.netapp.com → downloads→ software ,then select the filer hardware model to download the Ontap software



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uding Data ONTAP Simulator,
ce and Statistics Collector.

Master License Keys

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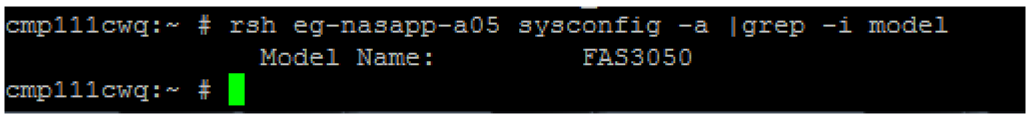
Software Download

Products	Subscription Status	w & Download
▸ Data ONTAP	Active/Renewed	<Select Platform> Go!
▸ S Family (formerly StoreVault)	Active/Renewed	<Select Platform> Go!
▸ NetCache Appliance	Not Active/Expired	<Select Platform> Go!
▸ DNFS NetCache	Not Active/Expired	<Select Platform> Go!

How to find the hardware model ?

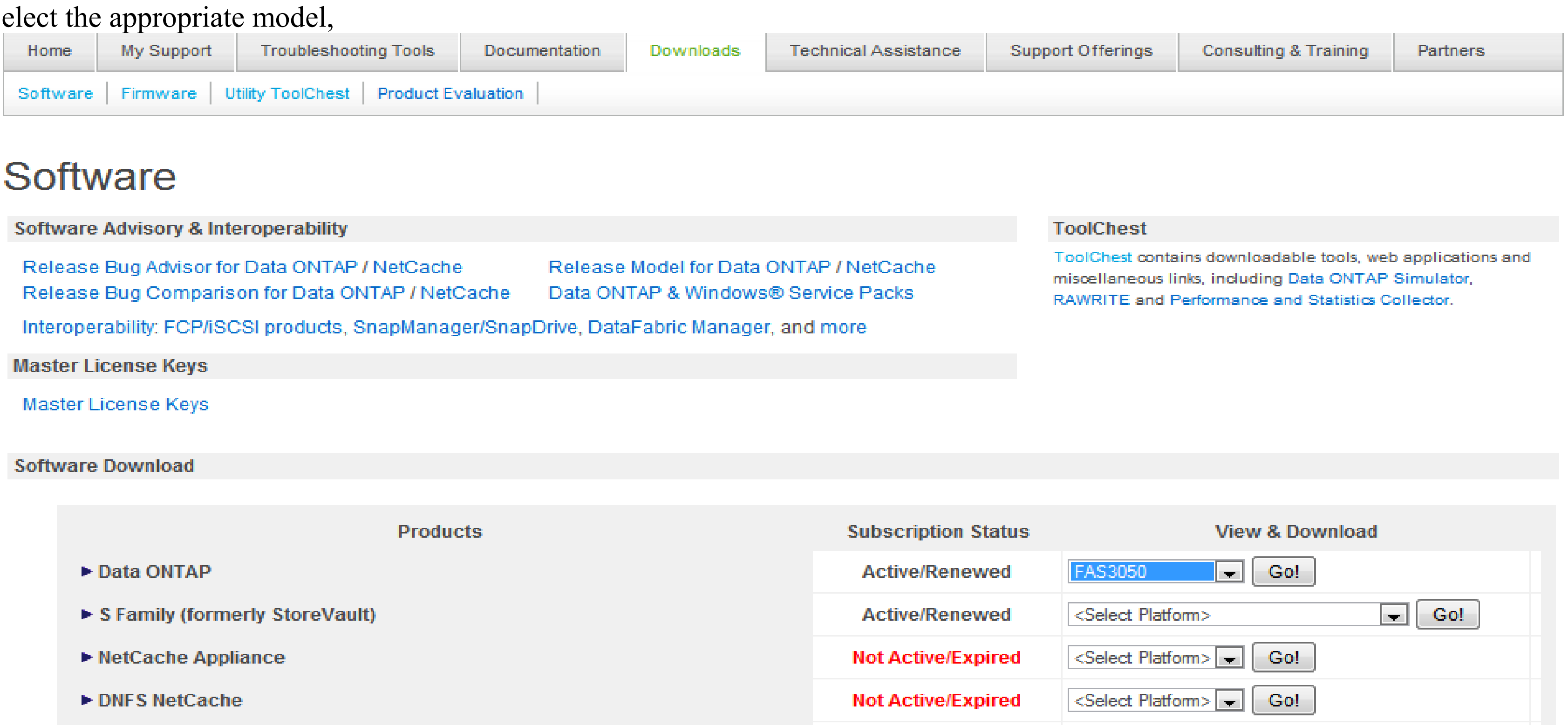
Use command: rsh <filername> sysconfig –a |grep –i model

Above command will gives the filer model.



```
cmp111cwq:~ # rsh eg-nasapp-a05 sysconfig -a |grep -i model
        Model Name:          FAS3050
cmp111cwq:~ #
```

Select the appropriate model,



Software

Software Advisory & Interoperability

Release Bug Advisor for Data ONTAP / NetCache
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Interoperability: FCP/iSCSI products, SnapManager/SnapDrive, DataFabric Manager, and more

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Master License Keys

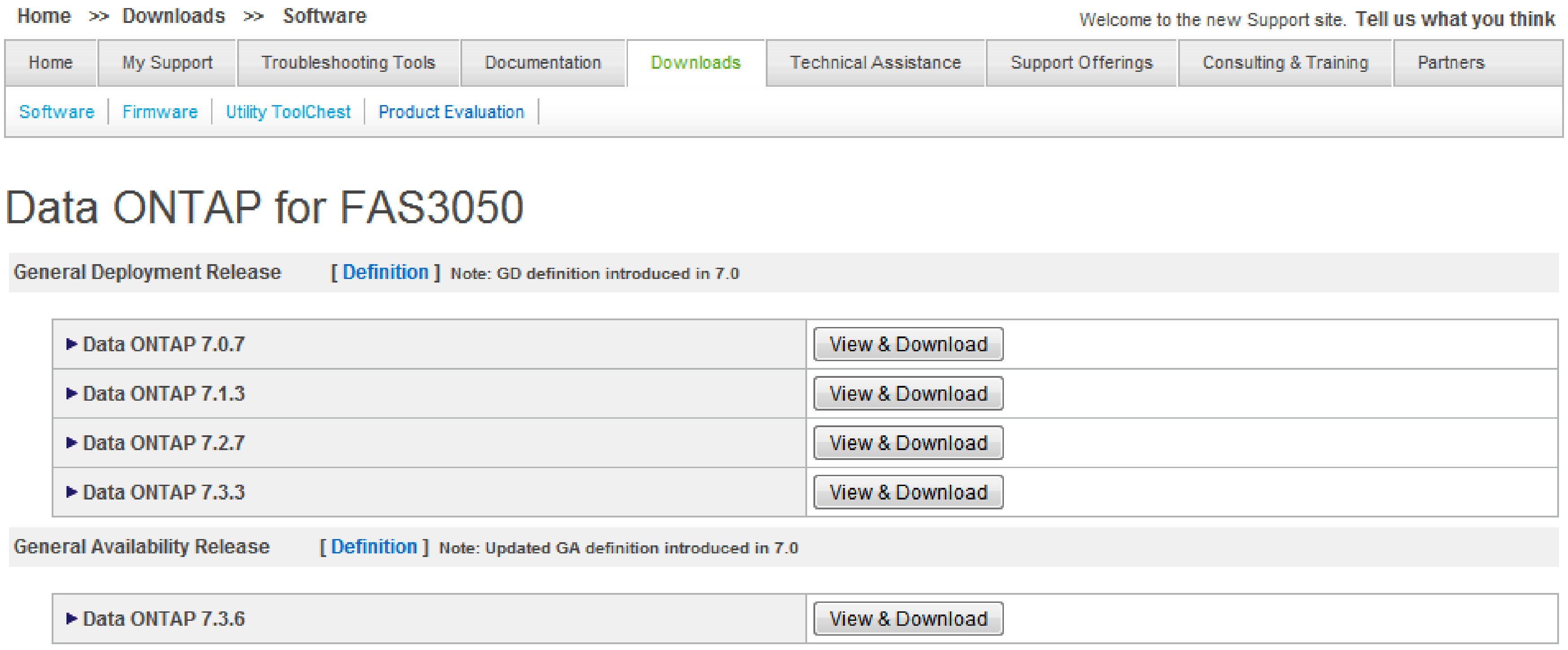
Master License Keys

Software Download

Products	Subscription Status	View & Download
▸ Data ONTAP	Active/Renewed	FAS3050 Go!
▸ S Family (formerly StoreVault)	Active/Renewed	<Select Platform> Go!
▸ NetCache Appliance	Not Active/Expired	<Select Platform> Go!
▸ DNFS NetCache	Not Active/Expired	<Select Platform> Go!

Then → GO!

This will show the available ontap versions for that filer model,



Data ONTAP for FAS3050

General Deployment Release [Definition] Note: GD definition introduced in 7.0

▸ Data ONTAP 7.0.7	View & Download
▸ Data ONTAP 7.1.3	View & Download
▸ Data ONTAP 7.2.7	View & Download
▸ Data ONTAP 7.3.3	View & Download

General Availability Release [Definition] Note: Updated GA definition introduced in 7.0

▸ Data ONTAP 7.3.6	View & Download

Note : Most of the latest hardware filers support all the versions(3000/6000 series support until 7.3.X).

Download the Ontap version to local desktop and later using SCP software we can copy it to DFM servers. Follow the below steps,

Copy the Ontap version from dfm server to filer software folder

DFM# CP 7311P2_setup_q.exe /filer/etc/software

4a. MINOR VERSION NDU

1. Create an AutoSupport notification by entering the options autosupport.doit starting_NDU command at the console of each storage system controller. This creates a record of the system status just before upgrade and saves useful troubleshooting information in case there is a problem during the upgrade process.

   Command: rsh <filername> options autosupport.doit starting_NDU

2. Verify that controller failover is enabled on the HA pair partners by issuing the command cf status. If the command output lists Cluster disabled, determine the cause, address it, and then enable controller failover by issuing the cf enable command.

   Command : *rsh <filername> cf status*

(if this shows as disabled),also need to verify why cluster was disabled. This could be due to interconnect issue, mailbox sync issue etc..

Command : *rsh <filername> cf enable*

3. Determine whether automatic giveback is active by executing the command options cf.giveback.auto.enable. If enabled, disable it with the command options cf.giveback.auto.enable off.

   Command : *rsh <filername> options cf.giveback.auto.enable*

4. Verify that CPU utilization and disk utilization are both below 50%.
   a. Enter the command sysstat -c 10 -x 3 on each controller in the HA pair.
   b. Confirm that the values in the CPU and Disk Util columns remain below 50% for all 10 measurements reported.
   c. Make sure that no additional load is added to the system throughout the NDU process.

   Command : *rsh <filername> sysstat –c 10 –x 3* or *sysstat –x 5*

   5. Perform the software installation operation of the new version of Data ONTAP on both storage controllers.

5. Issue the download command on both controllers to update the compact flash boot media.
   a. You can also use the software update -r command instead of software install followed by the download command, but you must include the -r flag to control when the controller reboot occurs.

   Commands : rsh <filername> *software list* → this will list the uploaded latest software

   Rsh <filername> *software update –r* → this will extract and update the Ontap software on compact flash card.
   (Or)
   Rsh <filername> *software install* (this also does the same extraction)(above command is highly recommended)

Then ,

Rsh <filername> download or do *ssh <filername>* and perform *"download"*

6. Confirm that controller failover is enabled and that CPU utilization and disk I/O do not exceed 50% per controller.

EG:

```
Netapp09> software update 7311P2_setup_q.exe -r
software: You can cancel this operation by hitting Ctrl-C in the next 6 seconds.
software: Depending on system load, it may take many minutes
software: to complete this operation. Until it finishes, you will
software: not be able to use the console.
software: installing software, this could take a few minutes...
software: Data ONTAP Package Manager Verifier 1
software: Validating metadata entries in /etc/boot/NPM_METADATA.txt
software: Checking sha1 checksum of file checksum file: /etc/boot/NPM_FCSUM-x86-64.sha1.asc
software: Checking sha1 file checksums in /etc/boot/NPM_FCSUM-x86-64.sha1.asc
software: installation of 7311P2_setup_q.exe completed.
Fri Oct 23 22:42:18 CDT [adc15ntap09: rc:info]: software: installation of 7311P2_setup_q.exe completed.
```

Once Ontap is installed this will gives a message as " software install completed successfully"

7. Choose the following option that describes your configuration.

If CIFS... Then...

Is not in use in system B Go to the next step.

Is in use in system B Enter the following command:

cifs terminate -t nn

nn is a notification period (in minutes) appropriate for your clients after which CIFS services are terminated. After that period of time, proceed to the next step.

At the console of system A, enter the following command.

Issue the *cf takeover* command on controller A (do not use the -f parameter).
Controller B shuts down cleanly and reboots.

Perform command : cf takeover (on primary)

8. When controller B displays Waiting for giveback, issue the cf giveback command on controller A to return controller B's data service.

Command : Primary > cf status this should show as ("waiting for Giveback" status")

Primary > cf giveback

9. Controller B is now running the new version of Data ONTAP and controller A the old version.

10. Issue the **cf takeover** command on controller B.

Automatic BIOS system firmware updates

Beginning with the Data ONTAP 7.3 release, the minimum BIOS release required to support Data ONTAP also enables automatic BIOS updates.After the minimum version is running, subsequent updates take place automatically during the boot sequence whenever Data ONTAP detects that a version resident on the boot device is more recent than the running version.

However, to update firmware from an earlier version to the latest version available, you must run the **update_flash** command manually from the boot prompt on the system being upgraded. Subsequent system firmware updates are automatic.

The following are the minimum BIOS system firmware versions required to support Data ONTAP.

Note: For upgrading BIOS manually please refer steps at **7.0**

11. When controller A displays the message —Waiting for giveback,‖ issue the **cf giveback** command on controller B.

12. Verify that controller failover is enabled with the cf status command. Both controllers are now running the new version of Data ONTAP.

Command : rsh <filername> version –b → to verify the latest Ontap version is upgraded or not.It should show like this,

```
netapp> version -b
1:/x86_64/kernel/primary.krn: OS 7.3.1.1P2          → This is the latest version just upgraded.
1:/backup/x86_64/kernel/primary.krn: OS 7.2.4P7
1:/x86_64/diag/diag.krn:  5.3.6
1:/x86_64/firmware/excelsio/firmware.img: Firmware 1.6.0
```

1:/x86_64/firmware/DrWho/firmware.img: Firmware 2.2.0
1:/boot/loader: Loader 1.6
Also check for the cluster status using **command : cf status**

13.Create another AutoSupport notification by entering the command options autosupport.doit finishing_NDU at the console of each storage system controller. This creates a record of the system status after upgrading. It saves useful troubleshooting information in case problems are being or have been encountered.

Command: rsh <filername> options autosupport.doit After_NDU

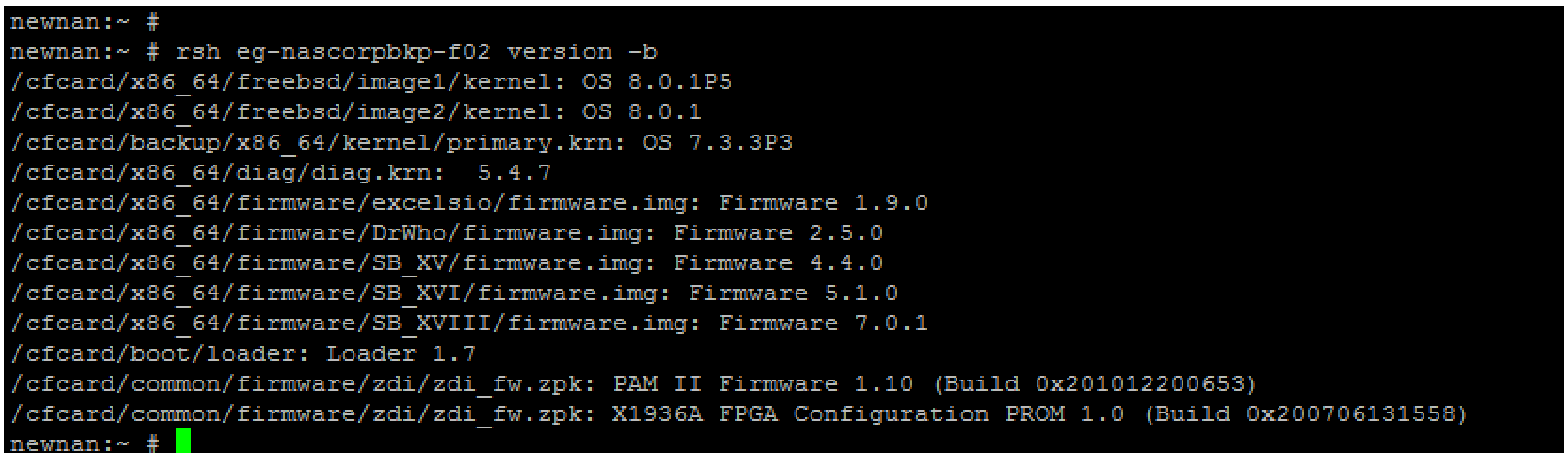
14. Verify that all hosts previously connected to the storage controllers have not experienced I/O errors.

Monitor the filer's log for any critical/warning messages(tail –f /<filer>/etc/messages).

If any critical/warning message is been reported, please feel free to escalate to support team.

15.Verify the latest Ontap version by,

Command : rsh <filername> version –b
Eg :



```
newnan:~ #
newnan:~ # rsh eg-nascorpbkp-f02 version -b
/cfcard/x86_64/freebsd/image1/kernel: OS 8.0.1P5
/cfcard/x86_64/freebsd/image2/kernel: OS 8.0.1
/cfcard/backup/x86_64/kernel/primary.krn: OS 7.3.3P3
/cfcard/x86_64/diag/diag.krn:  5.4.7
/cfcard/x86_64/firmware/excelsio/firmware.img: Firmware 1.9.0
/cfcard/x86_64/firmware/DrWho/firmware.img: Firmware 2.5.0
/cfcard/x86_64/firmware/SB_XV/firmware.img: Firmware 4.4.0
/cfcard/x86_64/firmware/SB_XVI/firmware.img: Firmware 5.1.0
/cfcard/x86_64/firmware/SB_XVIII/firmware.img: Firmware 7.0.1
/cfcard/boot/loader: Loader 1.7
/cfcard/common/firmware/zdi/zdi_fw.zpk: PAM II Firmware 1.10 (Build 0x201012200653)
/cfcard/common/firmware/zdi/zdi_fw.zpk: X1936A FPGA Configuration PROM 1.0 (Build 0x200706131558)
newnan:~ #
```

4b. **MAJOR VERSION NDU**

After downloading Ontap software from now.netapp.com (Refer section 5.0)

1. Create an AutoSupport notification by entering the options autosupport.doit starting_NDU command at the console of each storage system controller. This creates a record of the system status just before upgrade and saves useful troubleshooting information in case there is a problem during the upgrade process.

   Command: rsh <filername> options autosupport.doit starting_NDU

2. Verify that controller failover is enabled on the HA pair partners by issuing the command cf status. If the command output lists Cluster disabled, determine the cause, address it, and then enable controller failover by issuing the cf enable command.

   Command : *rsh <filername> cf status*

(if this shows as disabled),also need to verify why cluster was disabled. This could be due to interconnect issue, mailbox sync issue etc..

Command : *rsh <filername> cf enable*

3. Determine whether automatic giveback is active by executing the command options cf.giveback.auto.enable.
   If enabled, disable it with the command options cf.giveback.auto.enable off.

   Command : *rsh <filername> options cf.giveback.auto.enable*

4. Verify that CPU utilization and disk utilization are both below 50%.
   a. Enter the command sysstat -c 10 -x 3 on each controller in the HA pair.
   b. Confirm that the values in the CPU and Disk Util columns remain below 50% for all 10 measurements reported.
   c. Make sure that no additional load is added to the system throughout the NDU process.

   Command : *rsh <filername> sysstat –c 10 –x 3* or *sysstat –x 5*

   5. Perform the software installation operation of the new version of Data ONTAP on both storage controllers.

5. Issue the download command on both controllers to update the compact flash boot media.
   a. You can also use the software update -r command instead of software install followed by the download command, but you must include the -r flag to control when the controller reboot occurs.

Commands : rsh <filename> *software list* → this will list the uploaded latest software

Rsh <filename> *software update -r* → this will extract and update the Ontap software on compact flash card.
(Or)
Rsh <filename> *software install* (this also does the same extraction)(above command is highly recommended)

Then ,

Rsh <filename> download or do *ssh <filename>* and perform *"download"*

6. Confirm that controller failover is enabled and that CPU utilization and disk I/O do not exceed 50% per controller.

7. Issue the *cf takeover* command on controller A (do not use the -f parameter).
Controller B shuts down cleanly and reboots.

Once Ontap is installed this will gives a message as " software install completed successfully"

EG:

```
Netapp09> software update 7311P2_setup_q.exe -r
software: You can cancel this operation by hitting Ctrl-C in the next 6 seconds.
software: Depending on system load, it may take many minutes
software: to complete this operation. Until it finishes, you will
software: not be able to use the console.
software: installing software, this could take a few minutes...
software: Data ONTAP Package Manager Verifier 1
software: Validating metadata entries in /etc/boot/NPM_METADATA.txt
software: Checking sha1 checksum of file checksum file: /etc/boot/NPM_FCSUM-x86-64.sha1.asc
software: Checking sha1 file checksums in /etc/boot/NPM_FCSUM-x86-64.sha1.asc
software: installation of 7311P2_setup_q.exe completed.
Fri Oct 23 22:42:18 CDT [adc15ntap09: rc:info]: software: installation of 7311P2_setup_q.exe completed.
```

When you use the software update command without the -d option, the download command

Then

6. At the console of system B, enter the following command:

cf takeover

This command causes system A to shut down gracefully and leaves system B in takeover mode.

7. To display the LOADER boot prompt at the system A console, press Ctrl-C at the system A console when instructed after the boot sequence starts.
You can also display the LOADER prompt by pressing **Ctrl-C** at the system A console when the **"Waiting for giveback"** message appears at the console of system A. When prompted to halt the node rather than wait,

enter **y.**

8. After halting the node, check the Boot Loader messages for a warning similar to the following:

> Warning: The CompactFlash contains newer firmware image (1.6.0). Please run '**update_flash**' at Loader prompt to update your system firmware (1.5X3).

If you... Then ...
Do not see this warning. BIOS firmware is updated automatically if needed; go to Step 12.
See this warning. You must update BIOS firmware manually; go to the next step.

After the new BIOS system firmware is installed, future system firmware updates take place automatically.

Attention: The version of BIOS system firmware that ships with Data ONTAP 8.0 and higher is the minimum requirement for running this Data ONTAP release. If your system is running a lower level of system firmware, you cannot boot Data ONTAP 8.0 and the upgrade fails.

9. At the boot prompt, enter the following command to reset the system:

bye

10. Display the LOADER boot prompt again at the system A console by repeating Step 7.

11. Enter the following command:
update_flash

The system updates the firmware, displays several status messages, and displays the boot prompt.

12. Enter the following command to reboot the system using the new firmware and software:

bye

13. Choose the option that describes your configuration.

Then when the "Waiting for giveback" message appears on the console of system A...

Attention: The `cf giveback` command can fail because of open client sessions (such as CIFS sessions), long-running operations, or operations that cannot be restarted (such as tape backup or SyncMirror resynchronization). Use force method,

`cf giveback -f`

Note: At this point in the upgrade procedure—system A is running the new Data ONTAP version and system B is running an earlier Data ONTAP release family—the systems are in a state of "version mismatch." This means that normal high-availability functions such as NVRAM mirroring and automatic takeover are not in effect. You might see error messages indicating version mismatch and mailbox format problems. This is expected behavior; it represents a temporary state in a major nondisruptive upgrade and is not harmful. You should complete the upgrade procedure as quickly as possible; do not allow the two systems to remain in a state of version mismatch longer than necessary.

14. Choose the following option that describes your configuration.

If CIFS... Then...

Is not in use in system B Go to the next step.
Is in use in system B Enter the following command:

```
cifs terminate -t nn
```

nn is a notification period (in minutes) appropriate for your clients after which CIFS services are terminated. After that period of time, proceed to the next step.

15. At the console of system A, enter the following command:

```
cf takeover -n
```

This command causes system B to shut down cleanly, flushing file-system information in memory to disk.

Note: The `-n` flag of the `cf takeover` command should only be used for major nondisruptive upgrades. If run during a minor nondisruptive upgrade or a non-upgrade takeover, it generates an error and the command terminates.

16. After the node halts, check the Boot Loader messages for a warning similar to the following:

> Warning: The CompactFlash contains newer firmware image (1.6.0). Please run '**update_flash'** at Loader prompt to update your system firmware (1.5X3).

If... Then...

You do not see this warning BIOS firmware is updated automatically if needed; go to Step 20.
You see this warning You must update BIOS firmware manually; go to the next step.
After the new BIOS system firmware is installed, future system firmware updates take place automatically.

17. At the boot prompt, enter the following command to reset the system:

```
bye
```

18. To display the LOADER boot prompt at the system B console, press Ctrl-C at the system B console when instructed after the boot sequence starts.You can also display the LOADER prompt by pressing Ctrl-C at the system A console when the **"Waiting for giveback"** message appears at the console of system B. When prompted to halt the node rather than wait,

enter **y**.

19. Enter the following command:

```
update_flash
```

The system updates the firmware, displays several status messages, and displays the boot prompt.

20. At the console of system B, enter the following command to reboot the system using the new system firmware (if it was installed) and software:

```
bye
```

21. Choose the option that describes your configuration.

Then when the "Waiting for giveback" message appears on the console of system B...
Is not in use in system B Enter the following command at the console of system A:

```
cf giveback
```

22. Verify that controller failover is enabled with the cf status command. Both controllers are now running the new version of Data ONTAP.

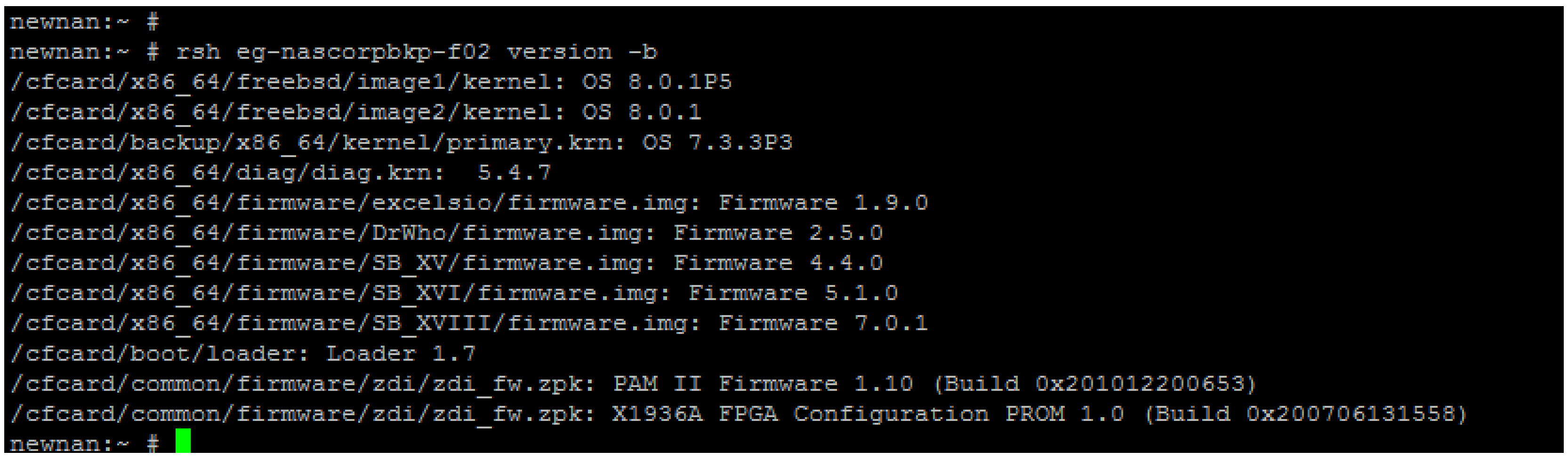
Command : rsh <filename> version –b → to verify the latest Ontap version is upgraded or not.It should show like this,

```
netapp> version -b
1:/x86_64/kernel/primary.krn: OS 7.3.1.1P2          → This is the latest version just upgraded.
1:/backup/x86_64/kernel/primary.krn: OS 7.2.4P7
1:/x86_64/diag/diag.krn:  5.3.6
1:/x86_64/firmware/excelsio/firmware.img: Firmware 1.6.0
1:/x86_64/firmware/DrWho/firmware.img: Firmware 2.2.0
1:/boot/loader: Loader 1.6
```

Also check for the cluster status using **command : cf status**

23.Verify the latest Ontap version by,

Command : rsh <filename> version –b
Eg :



```
newnan:~ #
newnan:~ # rsh eg-nascorpbkp-f02 version -b
/cfcard/x86_64/freebsd/image1/kernel: OS 8.0.1P5
/cfcard/x86_64/freebsd/image2/kernel: OS 8.0.1
/cfcard/backup/x86_64/kernel/primary.krn: OS 7.3.3P3
/cfcard/x86_64/diag/diag.krn:  5.4.7
/cfcard/x86_64/firmware/excelsio/firmware.img: Firmware 1.9.0
/cfcard/x86_64/firmware/DrWho/firmware.img: Firmware 2.5.0
/cfcard/x86_64/firmware/SB_XV/firmware.img: Firmware 4.4.0
/cfcard/x86_64/firmware/SB_XVI/firmware.img: Firmware 5.1.0
/cfcard/x86_64/firmware/SB_XVIII/firmware.img: Firmware 7.0.1
/cfcard/boot/loader: Loader 1.7
/cfcard/common/firmware/zdi/zdi_fw.zpk: PAM II Firmware 1.10 (Build 0x201012200653)
/cfcard/common/firmware/zdi/zdi_fw.zpk: X1936A FPGA Configuration PROM 1.0 (Build 0x200706131558)
newnan:~ #
```

24.Create another AutoSupport notification by entering the command options autosupport.doit finishing_NDU at the console of each storage system controller. This creates a record of the system status after upgrading. It saves useful troubleshooting information in case problems are being or have been encountered.

Command: rsh <filername> options autosupport.doit After_MajorNDU

25. Verify that all hosts previously connected to the storage controllers have not experienced I/O errors.

Monitor the filer's log for any critical/warning messages(tail –f /<filer>/etc/messages).

If any critical/warning message is been reported, please feel free to escalate to support team.

5.0 Upgrading system BIOS manually:

Note: (This step is needed only when upgrading RLM/BMC/system BIOS Firmware) (step 12) if not continue to step 14,

Eg : Upgrading System BIOS

Go to Option 10 on Ontap Upgrade step, then follow below

```
Phoenix TrustedCore(tm) Server
Copyright 1985-2004 Phoenix Technologies Ltd.
All Rights Reserved
BIOS version: 2.2.0
Portions Copyright (c) 2006 Network Appliance, Inc. All Rights Reserved
CPU= Dual Core AMD Opteron(tm) Processor 265 X 2
Testing RAM
512MB RAM tested
8192MB RAM installed
Fixed Disk 0: NACF1GBJU-B11

System Configuration Data updated
Boot Loader version 1.6
Copyright (C) 2000-2003 Broadcom Corporation.
Portions Copyright (C) 2002-2008 NetApp

CPU Type: Dual Core AMD Opteron(tm) Processor 265

Starting AUTOBOOT press Ctrl-C to abort...              -→ Press Ctrl+C
```

Netapp > halt -f

```
Sat Sep 12 00:35:56 CDT [netapp: kern.shutdown:notice]: System shut down because : "halt".
Sat Sep 12 00:36:00 CDT [netapp: pvif.allLinksDown:CRITICAL]: vifc-11: all links down
Sat Sep 12 00:36:01 CDT [netapp: pvif.allLinksDown:CRITICAL]: vifa-11: all links down
Sat Sep 12 00:36:01 CDT [netapp: pvif.allLinksDown:CRITICAL]: vifb-11: all links down
Sat Sep 12 00:36:05 CDT [netapp: cf.fsm.firmwareStatus:info]: Cluster monitor: partner halted

Phoenix TrustedCore(tm) Server
Copyright 1985-2004 Phoenix Technologies Ltd.
All Rights Reserved
BIOS version: 2.1.0
Portions Copyright (c) 2006 Network Appliance, Inc. All Rights Reserved
CPU= Dual Core AMD Opteron(tm) Processor 265 X 2
Testing RAM
512MB RAM tested
8192MB RAM installed
Fixed Disk 0: NACF1GBJU-B11
```

```
Boot Loader version 1.2.3
Copyright (C) 2000,2001,2002,2003 Broadcom Corporation.
Portions Copyright (C) 2002-2006 Network Appliance Inc.

CPU Type: Dual Core AMD Opteron(tm) Processor 265

Warning: The CompactFlash contains newer firmware image (2.2.0).
Please run 'update_flash' at Loader prompt to update your
system firmware (2.1.0).

LOADER> update_flash        → this will land in LOADER prompt and then use command: update_flash
New BIOS Version: 2.2.0
New Loader Version: 1.6
Saving Primary Image to Secondary
Programming .+.+.+.+.+.+.+.+.+.+.+.+.+.+.+.+.+.+.+.+.+.+.+.+.+.+.+.+.+.+.+.+ done. 2097152 bytes written
Updating Primary Boot Flash
Programming .+.+.+.+.+.+.+.+.+.+.+.+.+.+ done. 917504 bytes written
LOADER> bye                 → This is to quit the loader prompt
```

11. Issue the halt command on controller A to shut it down cleanly.
 When controller B detects that controller A is shut down cleanly, it initiates a takeover.
 System BIOS, RLM, or BMC firmware can be upgraded while controller A is down.
 You can also use this opportunity to perform hardware maintenance or upgrades, if necessary.
 (follow Option 11 steps to upgrade FW)

12. When takeover and any additional maintenance operations are completed, issue the **boot_ontap or bye** command on controller A.

Next go to **Option: 11 (ontap upgrade steps)**

The –n (cf takeover –n) parameter applies only to major version NDU operations. The following message appears: ―Waiting for partner to be cleanly shutdown using the 'halt' command. **Press Ctrl-C** to abort wait...‖.

Extra if RLM upgrade is needed.

6.0 RLM upgrade :

There are two ways to install RLM FW upgrades,

a.Using the Data ONTAP™ Command Line Interface (CLI)
b.Using the Remote LAN Module (RLM) Command Line Interface (CLI)

Procedure using method (a) :: Which is the easy way of doing.

Installation prerequisites

- * You need to have access to a web server on a network accessible to your appliance
  OR
  You need to mount the root volume of the appliance as an NFS volume or CIFS share
- * You need to have access to the Data ONTAP CLI
- * You must use the Data ONTAP console or RLM "system console" session to update RLM firmware

Downloading and installing the firmware using the Data ONTAP CLI
Attention: Do not use a Data ONTAP telnet/rsh session to upgrade RLM firmware.

Step 1: At the Data ONTAP CLI, enter the following command to verify that the current RLM firmware version is older than the one you are planning to download and install:

Attention: Do not use a Data ONTAP telnet/rsh session to upgrade RLM firmware.

```
appliance_name> rlm status
```

Where appliance_name is the name you assigned to your appliance.

You will see the following system messages:

```
Remote LAN Module
Status: Online
Part Number: xxx-xxxxx
Revision: xx
Serial Number: xxxxxx
Firmware Version: x.x.x
```

If the RLM firmware version is older than what we are going to install then,

Step 2 : Click on link **http://now.netapp.com/NOW/download/tools/rlm_fw/**

The above link gives the list of available versions select the appropriate version ,it takes to next screen <accept> ,it goes to the below link (if version 3.1,it take to the below link)(**http://now.netapp.com/NOW/download/tools/rlm_fw/3.1.0/ontap_cli.shtml**)

from above link on step 2,it gives the link to download the **RLM_FW.zip** option.Click on RLM_FW.zip to download the file from this NOW site

Step 3 : Copy the downloaded **RLM_FW.zip** file to the root volume's **/etc/software** directory.

Step 4 : At the filer console, enter the following command to list the available install packages:

appliance_name> software list

This should list the RLM_FW.zip file just copied to the /etc/software directory:

```
appliance_name> software list
allzones.zip
RLM_FW.zip
71_setup_i.exe
```

Step 5 : At the filer console, enter the following command to install the copied firmware file, ensuring that the file name is exactly as it was listed in the output from the preceding step:

appliance_name> software install RLM_FW.zip

You will see the following system messages:

```
software: installing software, this could take a few minutes...
software: installation of RLM_FW.zip completed.
```

Step 6 : Enter the following command to update the RLM with the new firmware:

appliance_name> rlm update

You will see the following system messages:

```
Updating the RLM firmware.
DO NOT reset this system during this process.
New RLM version : x.x.x
Sending files to RLM...
Current RLM version : x.x.x
Installing package on RLM...
RLM: Firmware updated successfully!
```

Step 7 : When the system prompts you to reboot the RLM, enter y to continue.
Note: Wait for 60 seconds to allow the RLM to reboot.

Step 8 : At the filer console, enter the following command to verify that the RLM has been updated with the new firmware:

appliance_name> rlm status

You will see the following system messages:

```
Remote LAN Module
Status: Online
Part Number: xxx-xxxxx
Revision: xx
Serial Number: xxxxxx
Firmware Version: x.x.x
```

The firmware update process is complete.

7. Post upgrade step (CIFS options change)

Once the upgrade is completed , we should set the following options on all the Vfilers.

```
vfiler run * options cifs.rpcfd_timeout -1
```