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Corrective Action Report

Case Number: **00019261**	**Customer Name: Revenue Science**	**Date: July 12, 2008**
Case Title: *After upgrade from 4.2 to 4.3, SATA01_T1 file system shows unformatted.*		

Current Status: **Closed**

Section A: Description

After upgrade of Storage & Titan Code -- from **Titan Ver 4.2.944d to 4.3.996j** the file system SATA01_T1 showed a state of "unformatted" after bringing up the system.

Section B: Analysis of Root Cause

An upgrade was performed from **4.2.944d to 4.3.996j**. The changing of this Filesystem version required that all filesystems cleanly unmount before the upgrade, this was not accomplished on the filesystem SATA01_T1

----------Timeline----------

7/122008 -7/12/2008 6:59 AM tracking case opened

A supported method of reboot was issued after the firmware was uploaded.

2008-07-12 13:29:18.865 (UTC-07:00) NIM bluearc:$ reboot
2008-07-12 13:29:21.335 (UTC-07:00) NIM Executing command 'reboot'
2008-07-12 13:29:21.336 (UTC-07:00) NIM Are you sure you want to reboot the server? (Y/N)[N]:
2008-07-12 13:29:22.549 (UTC-07:00) NIM y
2008-07-12 13:29:22.842 (UTC-07:00) NIM Done

The Titan began to unmount the filesystems.

2008-07-12 13:29:35.734 (UTC-07:00) NIM bluearc:$ Information: File System: file system unmounted (FC01_T1)
2008-07-12 13:29:36.753 (UTC-07:00) NIM Information: Cluster: Node ID 1 has taken EVS (ID=2) offline.
2008-07-12 13:29:36.784 (UTC-07:00) NIM Information: Cluster: Node ID 1 has taken EVS (ID=0) offline.

Before all filesystems were unmounted cleanly, we issued a command that forced the last filesystem offline before it's cache was flushed consequently, the final fs, SATA01_T1, was not cleanly unmounted.

2008-07-12 13:29:36.808 (UTC-07:00) NIM BS::vnode_mgr::deinit: done
2008-07-12 13:29:36.922 (UTC-07:00) NIM Stopping NIS client.
2008-07-12 13:29:37.896 (UTC-07:00) NIM reboot now
2008-07-12 13:29:40.636 (UTC-07:00) NIM Executing command 'reboot now'

And here we have the upgrade versions.

1035 Information 2008-07-12 13:31:50 Software version changed. Previous version: 4.2.944d -- Current version: 4.3.996j

7/12/2008 4:42 PM :
Called in to TAC, Case problem initiated, Diags sent -
Looking through Santricity storage mgmt I/f Found that 2 SD's were not online as presented LUNS (SD's) from SATA RACK #**.** The decision was made to reboot storage rack using TACS ordered procedure. Prior to reboot the associated file system showed a state of "Unformatted" and Titan listing of SD's showed SD 50 & 52 as "failed". After power cycle of rack, SD's returned to an available state, but Titan reported the file system associated with those SD's as "unformatted".

7/12/2008 approx 6:00 PM
Diags sent and analyzed by Escalations –
SD's for pool SATA01_T1_SP all ok, after reboot of array file system now shows state of "needs recovery" an recover without force (still needed recovery) Ran recover with force (still needs recovery). Escalation recommends rebooting titan. FC file system already mounted and in use, has to wait for customer to stop processes accessing it.

7/12/2008 approx 6:15 PM
Rebooted titan-
File system still comes up needing recovery, another message found in console & logs from reboot cycle.
6822 Severe 2008-07-12 17:23:10 File System:
file system (SATA01_T1) will not be recovered automatically.
The NVRAM contains operations for an older file system version.
Investigation into past events of similar type, yields nvpages from previous code version 4.2.xx must be released.

7/12/2008 approx 7:00 PM
Escalations determined course of action-
Recommended running the following command to release nvpages
"nvpages list"
"nvpages free -f "identifier from list" – confirm"
Cmd run, and diags requested again, sent same, analyzed.

7/12/2008 approx 8:02 PM
Asked to select evs (evssel) for filesystem and run checkfs
Ran for 39 mins (15%) of a 32TB filesystem

7/12/2008 approx 8:37 PM
Told to Abort checkfs and diags sent, again.analyzed
Asked to run recover –f
Ran same and filesystem comes to "formatted ready to mount " state
Diags requested, determining if it needs to be mounted (to make sure it can mount then unmount and run checkfs –sanity)
---------- **And the root cause** ----------
6822 Severe File System: file system (SATA01_T1) will not be recovered automatically. The NVRAM contains operations for an older file system version.

7/12/2008 approx 9:10 PM
Ok to mount and release is given, Filesystem is mounted and at this point asked customer to verify basic access with processes. This process to verify access took about 1:40 mins. Left site at approx 10:55pm.

Section C: Remediation

There were many parts of the system being upgraded in a set period of time. Some SD errors occurred related to the storage upgrades that were resolved fairly quick, and some time was taken for discovery and analysis.

The root cause of the issue was the executing of the "reboot now", prior to the SATA01_T1 filesystem being gracefully unmounted. This is not normally an issue, but for upgrades where the filesystem version changes it is imperative. Also note that it is very infrequent that we will change the Filesystem version. But as the RSI system was pre –Razor, the version would change during this upgrade.

Sadly we were caught by this. The PSE that was on-site is now aware of this issue, and will not un-knowingly force unmounts. This warning is now part of every upgrade procedure. We now have a better process in place initiated by the CEO to help expedite solutions to problems such as these and to help streamline our support process overall.