Linuxha.net
Multi-purpose Back Office Server Cluster
Test Results for Release 1.2.0

(RedHat Linux Enterprise 4.3 Clone Test Environment)

This document contains the official test results that were generated prior to releasing version 1.2.0 of Linuxha.net. The attempt is to cover many of the common component failure scenarios (both hardware and software) to validate the effectiveness of this software release.

This test set includes further tests covering software installation, cluster configuration and cluster and application reconfiguration - including supported dynamic reconfiguration scenarios.

Revision History

Version	Date	Author	Change Summary
1.0.0	20th April 2005	S. Edwards	Initial version
1.2.0	14th May 2005	S. Edwards	Updated for testing 1.2.0 release

Table of Contents

1 Preface

1.1 Introduction

The purpose of this document is to document the testing regime for which Linuxha.net version 1.2.0 has been subjected to. This helps identify remaining issues and to validate existing functionality. This document covers release 1.2.0 only. A similar document (with yet more tests) will be produced for any subsequent major releases (such as 1.4.0 or 2.0.0).

The current testing configuration consists of a production like network configuration with the cluster running several "back office" applications - include "Apache", "Samba" and "OpenLDAP" - common targets for Linuxha.net Clusters. Many of the tests involve applications running simultaneously in a variety of configurations to attempt to ensure multi-application clusters are tested throughly.

The testing took place over several days - mainly due to lack of time - typically a full run through of the tests here on a typical environment configuration would probably take less than a single working day.

This version of software and any later revisions can be found at the web site below. This web site also contains documentation not distribution as part of the software download (such as this document!).

http://www.linuxha.net/

1.2 Document Organization

This document is broken down into the following sections:

Part 1 – *Document overview* – contains information on the purpose of this document, the intended audience, why it should be read and conventions the document attempts to follow.

Part 2 – *Sample Hardware / Software Configuration* – summarizes the operating environment that was used to perform the tests on. This is important since it should give some indication of the "low-end" servers that Linuxha.net is designed to run on. Further the timings generated for many of the tests can be considered in light of the likely hardware other administrators may wish to deploy - and thus set users expectations accordingly (in terms of fail-over times under certain conditions).

Part 3 – *Testing* - the main bulk of the document - consisting of descriptions of the tests, expected results, actual results and any comments regarding the results.

1.3 Intended Audience

This document is aimed at individuals with a reasonable knowledge of Linux or UNIX system administration. The document does not attempt to describe the installation and configuration of either the operating system or the Linuxha.net software. Documentation coverig the installation and configuration of Linuxha.net is available from the web site mentioned above.

1.4 Conventions

Unlike many other documents available for Linuxha.net this one does not make a distinction between commands and output in the test results - both will be shown in the following font.

```
# clstat
```

However a command is typically preceded by the standard machine prompt whilst the output is not - for example;

```
[root@rserver1]# whoami
root
```

If a point is of particular interest it will be shown as a note, highlighted as follows:

☞   This is a important consideration of which you should be aware.

If a point is considered critically important it will appear as follows:

❗   If you ignore this you might lose all data.

1.5 Request for Feedback

This documentation and the associated software is available for free under the GNU GPL software license. However it would be a great benefit to the author and other potential users if they have any comments regarding this or any other document, or the software in question to the following address:

simon.edwards@linuxha.net

All feedback is confidential and will be used purely to help improve the documentation and software.

1.6 Software Versions Covered

This document is based on experiences of using Linuxha.net version 1.2.0. All minor releases of the 1.2.x variety should be compatible with the testing here. Later major versions may introduce changes in behaviour and functionality and thus may not produce the same results as containing in this test plan.

1.7 Understanding Linuxha.net Releases

Stuff about releases goes here.

2 Sample Hardware / Software Configuration

2.1 Hardware

The sample Linuxha.net test environment considers of two identical servers with the following hardware configuration;

Memory	512 Mb
CPU	1.6Ghz AMD Athlon
Network	eth0 - 100Mb/sec unused
	eth1 - 100Mb/sec - Host application IP addresses
	eth2 - 100Mb/sec - host application IP addresses
	eth3 - 54Mb/sec - wireless connection (heartbeat)
	eth4 - 1000Mb/sec - unused for this test plan
Graphics	Generic SVGA

2.2 IP Addresses

Server 1	Server 2
eth0 - 192.100.0.1	eth0 - 192.100.0.2
eth1 - 192.120.0.1	eth1 - 192.120.0.2
eth2 - standby	eth2 - standby
eth3 - 192.168.1.180	eth3 - 192.168.1.181

2.3 Software

Both servers where originally running CentOS 4.2 but that was upgraded to Centos 4.3 prior to testing taking place. The testing was based on the Redhat kernel version "2.6.9-34". The actual installation of the Linuxha.net software is based on the following document;

Linuxha.net Basic Configuration Guide

The versions of Linuxha.net packages used for this configuration are;

linuxha   1.1.05 [this was the pre-release package for 1.2.0]

3 Testing

3.1 Software Installation

The native RPM packages were used to install the version of Linuxha.net, simply by running the following commands when the relevant package was stored in "/tmp":

```
# cd /tmp
# rpm -Uvh linuxha12
```

The above commands were repeated on both nodes.

On the hardware test platform (see specifications earlier in the document), the installation command took just under 30 seconds - most of the time taken by the DRBD module and tools compilation and installation. Once completed the file "/root/postinstall-linuxha12-1.1.05.stdout" was checked on both nodes to ensure no failures were at the summary section at the end of the file;

```
##########################################
#### BUILD DRBD 0.7.18 CONFIGURATION ####
##########################################

Current environment already has 0.7.18 of DRBD
so no work needs to be performed for DRBD.

Installation Summary

Machine reset (dusp)    : OK
MII fallback binary     : OK
Send ARP fallback binary: OK
```

Prior to the tests the cluster was undefined and no applications were configured - as determined by the following command/result:

```
[root@centos42s1 ~]# clstat
ERROR 14/05/2006 22:14:34 It does not appear that the cluster has yet been built
ERROR 14/05/2006 22:14:34 Please run the clbuild command first.
```

3.2 Test Classifications

The tests have been broken down into several different sections;

- *Software and Application Configuration* - the tests here cover basis software installation, (including installation of the sample packages), checking DRBD and Perl sources are built correctly for the target environment. Tests also include off-line removal of applications and rebuilds of existing applications with additional resources.
- *Basic Application Tests* – this covers starting and starting the application on both nodes, and also killing off the monitored process to access the application restart and software fail over functionality.
- *Network Failure Tests* – Covers the loss of each network card, and actions undertaken. Also includes the recovery actions when the network used for DRBD becomes available again.

- *Node Failure Tests* – covers the loss of the standby and active nodes and the affect on the application. Also includes what happens when the failed node rejoins the cluster.
- *Dynamic Reconfiguration Tests* - covers tests that change the cluster or application configuration in some way, including cluster parameter changes, application resource changes and (if supported) file system addition, removal and resizing tests.

3.3 Software and Application Configuration Tests

Prior to starting any of the tests here the following conditions should apply;

- The "linuxha12" package version 1.2.0 should be installed
- The "linuxha_samba" and "linuxha_apache" should have been had the volumes built and the "appconf.xml" files configured, but not configured for the cluster.

Test Description	Expected Result
Build Cluster; `clbuild -F -V`	Builds the cluster allocating resources.

Test Description	Expected Result
Results	

```
# clbuild -V -F
INFO   14/05/2006 22:16:17 Checking for required global entries
INFO   14/05/2006 22:16:17 Optional dataprotocol setting validated.
INFO   14/05/2006 22:16:17 Checking global Port Pool details
INFO   14/05/2006 22:16:17 Validated settings for 'port','clport','clhbdport' and 'clnetdport'.
INFO   14/05/2006 22:16:17 Checking global Maximum block devices
INFO   14/05/2006 22:16:17 Checking configuration file version information
INFO   14/05/2006 22:16:17 Checking data detail value (and dependent required values)
INFO   14/05/2006 22:16:17 Checking type of data required
INFO   14/05/2006 22:16:17 Global section configuration validation complete
INFO   14/05/2006 22:16:17 Checking cluster timing details
INFO   14/05/2006 22:16:17 Checking node section details
INFO   14/05/2006 22:16:17 Checking IP address resolution
INFO   14/05/2006 22:16:17 Checking ssh cabability between Primary IP addresses (node names).
INFO   14/05/2006 22:16:17 Networks defined for centos42s1: a,b
INFO   14/05/2006 22:16:17 Networks defined for centos42s1: a,b
INFO   14/05/2006 22:16:18 Validated network IP for a on centos42s1: eth0 - 192.100.0.1
INFO   14/05/2006 22:16:18 Validated network IP for b on centos42s1: eth1 - 192.120.0.1
INFO   14/05/2006 22:16:18 Validated network IP for a on centos42s2: eth0 - 192.100.0.2
INFO   14/05/2006 22:16:18 Validated network IP for b on centos42s2: eth1 - 192.120.0.2
INFO   14/05/2006 22:16:18 Validated unique network/interfaces for centos42s1:
INFO   14/05/2006 22:16:18 Interface eth0 is on network 192.100.0.0
INFO   14/05/2006 22:16:18 Interface eth1 is on network 192.120.0.0
INFO   14/05/2006 22:16:18 Interface eth3 is on network 192.168.1.0
INFO   14/05/2006 22:16:19 Validated unique network/interfaces for centos42s2:
INFO   14/05/2006 22:16:19 Interface eth0 is on network 192.100.0.0
INFO   14/05/2006 22:16:19 Interface eth1 is on network 192.120.0.0
INFO   14/05/2006 22:16:19 Interface eth3 is on network 192.168.1.0
INFO   14/05/2006 22:16:19 A <net_known_connections> element found with 2 entries.
INFO   14/05/2006 22:16:19 Testing ICMP response for www.bbc.co.uk..
INFO   14/05/2006 22:16:19 Testing ICMP response for www.demon.net..
INFO   14/05/2006 22:16:19 Successfully copied network configuration to centos42s2.
INFO   14/05/2006 22:16:19 Validated data replication network is ok (a).
INFO   14/05/2006 22:16:19 Able to send ping to DRBD Ip address 192.100.0.1 for centos42s1
INFO   14/05/2006 22:16:19 Able to send ping to DRBD Ip address 192.100.0.2 for centos42s2
INFO   14/05/2006 22:16:19 Node centos42s1 is not running a cldaemon process (good)
INFO   14/05/2006 22:16:20 node centos42s2 is not running a cldaemon process (good)
INFO   14/05/2006 22:16:20 DRBD administration tools found on centos42s1.
INFO   14/05/2006 22:16:20 DRBD administration tools found on centos42s1.
INFO   14/05/2006 22:16:20 Found LVM v2 on centos42s1
INFO   14/05/2006 22:16:20 Found LVM v2 on centos42s2
INFO   14/05/2006 22:16:20 LVM v2 command set appears to be installed on centos42s1
INFO   14/05/2006 22:16:21 LVM v2 command set appears to be installed on centos42s2
INFO   14/05/2006 22:16:21 Physical network check library miitoollib found on centos42s1.
INFO   14/05/2006 22:16:21 Physical network check library miitoollib found on centos42s2.
INFO   14/05/2006 22:16:21 Creating DRBD devices on centos42s1...
INFO   14/05/2006 22:16:21 Device entries added to /etc/udev/devices (udev /dev detected).
INFO   14/05/2006 22:16:21 Creating DRBD devices on centos42s2...
INFO   14/05/2006 22:16:21 Device entries added to /etc/udev/devices (udev /dev detected).
INFO   14/05/2006 22:16:22 Created Port Resources directory on centos42s1
INFO   14/05/2006 22:16:22 Created 99 port allocation files on centos42s1
INFO   14/05/2006 22:16:22 Created Port Resources directory on centos42s2
INFO   14/05/2006 22:16:43 Created 99 port allocation files on centos42s2
INFO   14/05/2006 22:16:43 Created DRBD Resources directory on centos42s1
INFO   14/05/2006 22:16:43 Created 50 DRBD allocation files on centos42s1
INFO   14/05/2006 22:16:43 Created DRBD Resources directory on centos42s2
INFO   14/05/2006 22:16:54 Created 50 DRBD allocation files on centos42s2
INFO   14/05/2006 22:16:54 Transferring cluster build checksum to centos42s2
INFO   14/05/2006 22:16:55 Successfully copied clconf.xml to centos42s2
INFO   14/05/2006 22:16:55
INFO   14/05/2006 22:16:55 Clbuild has completed without errors or warnings
INFO   14/05/2006 22:16:55
```

| **Comments** | |

Worked as expected.

Test Description	Expected Result
Build the apache application; `clbuildapp -A apache -keeplogs`	Checks the configuration of the application successfully.
Notes:	Prior to running this command the VG "apachevg" had the "lv01" mounted on "/apache", and the /etc/cluster/apache directory on centos42s1 was populated with "appconf.xml", "httpd.xml" and "lems.local.xml" files.

Results

```
[root@centos42s1 apache]# clbuildapp --application apache --keeplogs
INFO  14/05/2006 22:36:30 Backups directory defaulted to /clbackup
INFO  14/05/2006 22:36:30
INFO  14/05/2006 22:36:30 Validation of Application 'apache' started.
INFO  14/05/2006 22:36:30   ['/var/log/cluster/build/apache-check-300605142236.log']
INFO  14/05/2006 22:36:31 Initial Validation of Application successful.
INFO  14/05/2006 22:36:32
INFO  14/05/2006 22:36:32 NOTE: Build of new application is being performed.
INFO  14/05/2006 22:36:32
INFO  14/05/2006 22:36:32 Host Environment Validation started.
INFO  14/05/2006 22:36:32   ['/var/log/cluster/build/apache-envcheck-300605142236.log']
INFO  14/05/2006 22:36:34 Host Environment Validation successful.
INFO  14/05/2006 22:36:34
INFO  14/05/2006 22:36:34 Cluster state    : RUNNING
INFO  14/05/2006 22:36:34 Application state: UNDEFINED
INFO  14/05/2006 22:36:34
INFO  14/05/2006 22:36:34 Volume Group Configuration started.
INFO  14/05/2006 22:36:34   ['/var/log/cluster/build/apache-lvm-300605142236.log']
INFO  14/05/2006 22:36:41 Volume Group Configuration successful.
INFO  14/05/2006 22:36:41
INFO  14/05/2006 22:36:41 Application Resource Allocation started.
INFO  14/05/2006 22:36:41   ['/var/log/cluster/build/apache-build-300605142236.log']
INFO  14/05/2006 22:36:52 Application Resource Allocation successful.
INFO  14/05/2006 22:36:52
```

Comments

Worked as expected - completed in 22 seconds.

Test Description	Expected Result
Form the newly built cluster using "clform".	Cluster forms as expected.

Test Description	Expected Result
Results	

```
[root@centos42s1 apache]# clform
INFO  14/05/2006 22:27:42 Validated checksum for cluster configuration
INFO  14/05/2006 22:27:42 SSH communication to centos42s2 will be:
INFO  14/05/2006 22:27:42   192.100.0.2 ("a" network)
INFO  14/05/2006 22:27:42 Checking that the cluster is not already running...
INFO  14/05/2006 22:27:42 *** ATTEMPTING TO FORM CLUSTER cluster1 ***
INFO  14/05/2006 22:27:42 Starting cldaemon on centos42s1...
INFO  14/05/2006 22:27:42 Starting cldaemon on centos42s2...
INFO  14/05/2006 22:27:43 Waiting for cluster to form...
INFO  14/05/2006 22:27:49 Cluster cluster1 started successfully.

[root@centos42s1 apache]# clstat --net
Cluster: cluster1 - UP

     Node      Status
centos42s1        UP
centos42s2        UP

 Application       Node       State  Started  Monitor  Stale  Fail-over?
    apache         N/A        DOWN     N/A      N/A     N/A       Yes

 Network status for centos42s1

    Network   Status  Link Check?   Interface  Monitor?    R Kb/S    W Kb/S
       a      alive         yes        eth0      yes         N/A       N/A
       b      alive         yes        eth1      yes         N/A       N/A

 Network status for centos42s2

    Network   Status  Link Check?   Interface  Monitor?    R Kb/S    W Kb/S
       a      alive         yes        eth0      yes         N/A       N/A
       b      alive         yes        eth1      yes         N/A       N/A
```

Comments

Works as expected.

Test Description	Expected Result
Perform a sync of apache application date; `clbuildapp -A apache -V --keepdetaillogs`	Application data synchronization occurs as expected (though see notes below.)
Notes	Since the cluster has been previously built the following command was used to destroy previous meta-data for DRBD [on each node]: `dd if=/dev/zero of=/dev/apachevg/lv01_meta bs=1024k count=128`

Test Description	Expected Result

Results

```
[root@centos42s1 apache]# clbuildapp -A apache --keeplogs --sync
INFO  14/05/2006 22:41:40 Backups directory defaulted to /clbackup
INFO  14/05/2006 22:41:40
INFO  14/05/2006 22:41:40 Validation of Application 'apache' started.
INFO  14/05/2006 22:41:40   ['/var/log/cluster/build/apache-check-300605142241.log']
INFO  14/05/2006 22:41:42 Initial Validation of Application successful.
INFO  14/05/2006 22:41:42
INFO  14/05/2006 22:41:42 NOTE: Application previously defined - being reconfigured.
INFO  14/05/2006 22:41:42
INFO  14/05/2006 22:41:42 Host Environment Validation started.
INFO  14/05/2006 22:41:42   ['/var/log/cluster/build/apache-envcheck-300605142241.log']
INFO  14/05/2006 22:41:44 Host Environment Validation successful.
INFO  14/05/2006 22:41:44
INFO  14/05/2006 22:41:44 Cluster state    : RUNNING
INFO  14/05/2006 22:41:44 Application state: DOWN
INFO  14/05/2006 22:41:44
INFO  14/05/2006 22:41:44 Volume Group Configuration started.
INFO  14/05/2006 22:41:44   ['/var/log/cluster/build/apache-lvm-300605142241.log']
INFO  14/05/2006 22:41:49 Volume Group Configuration successful.
INFO  14/05/2006 22:41:49
INFO  14/05/2006 22:41:49 Application Resource Allocation started.
INFO  14/05/2006 22:41:49   ['/var/log/cluster/build/apache-build-300605142241.log']
INFO  14/05/2006 22:41:58 Application Resource Allocation successful.
INFO  14/05/2006 22:41:58
INFO  14/05/2006 22:41:58 Application Data Synchronisation started.
INFO  14/05/2006 22:41:58   ['/var/log/cluster/build/apache-syncdata-300605142241.log']
Storage Syncing:        0Mb/        0Mb [99.9 % Complete]INFO  14/05/2006 22:50:37 Application
Data Synchronisation successful.
INFO  14/05/2006 22:50:37
```

Comments

Worked as expected - though more slowly than expected. It appeared that the drbd
configuration was routing via my wireless connection!I then changed my drbd network in
"/etc/cluster/clconf.xml" to network "b" instead of the "live" network.

Now that the cluster is active build the "samba" environment;

- check configuration file and alter on server1 as required
- mount /samba file systems on server1
- remove file systems on server2
- overwrite meta data on server1

server2:

```
[root@rserver2 ~]# lvremove /dev/vg02/cfg
Do you really want to remove active logical volume "cfg"? [y/n]: y
  Logical volume "cfg" successfully removed
[root@rserver2 ~]# lvremove /dev/vg02/cfg_meta
Do you really want to remove active logical volume "cfg_meta"? [y/n]: y
  Logical volume "cfg_meta" successfully removed
[root@rserver2 ~]# lvremove /dev/vg02/shares
Do you really want to remove active logical volume "shares"? [y/n]: y
  Logical volume "shares" successfully removed
[root@rserver2 ~]# lvremove /dev/vg02/shares_meta
Do you really want to remove active logical volume "shares_meta"? [y/n]: y
  Logical volume "shares_meta" successfully removed
[root@rserver2 ~]# lvremove /dev/vg02/logs
Do you really want to remove active logical volume "logs"? [y/n]: y
  Logical volume "logs" successfully removed
[root@rserver2 ~]# lvremove /dev/vg02/logs_meta
Do you really want to remove active logical volume "logs_meta"? [y/n]: y
  Logical volume "logs_meta" successfully removed
```

server1:

```
[root@rserver1 samba]# mount /dev/vg02/logs /samba/logs/
[root@rserver1 samba]# mount /dev/vg02/cfg /samba/cfg
[root@rserver1 samba]# mount /dev/vg02/shares /samba/shares/
```

```
[root@rserver1 samba]# dd if=/dev/zero of=/dev/vg02/cfg_meta bs=1024k
dd: writing `/dev/vg02/cfg_meta': No space left on device
129+0 records in
128+0 records out
[root@rserver1 samba]# dd if=/dev/zero of=/dev/vg02/logs_meta bs=1024k
dd: writing `/dev/vg02/logs_meta': No space left on device
129+0 records in
128+0 records out
[root@rserver1 samba]# dd if=/dev/zero of=/dev/vg02/shares_meta bs=1024k
dd: writing `/dev/vg02/shares_meta': No space left on device
129+0 records in
128+0 records out
```

Test Description	Expected Result
vgbuild the samba application; `clbuildapp -A samba -- keeplogs --sync`	All logical volumes on rserver2 are created as required.

Results

```
[root@centos42s1 ~]# clbuildapp -A samba --keeplogs --sync
INFO  14/05/2006 23:14:58 Backups directory defaulted to /clbackup
INFO  14/05/2006 23:14:58
INFO  14/05/2006 23:14:58 Validation of Application 'samba' started.
INFO  14/05/2006 23:14:58   ['/var/log/cluster/build/samba-check-300605142314.log']
INFO  14/05/2006 23:14:59 Initial Validation of Application successful.
INFO  14/05/2006 23:14:59
INFO  14/05/2006 23:14:59 NOTE: Build of new application is being performed.
INFO  14/05/2006 23:14:59
INFO  14/05/2006 23:14:59 Host Environment Validation started.
INFO  14/05/2006 23:14:59   ['/var/log/cluster/build/samba-envcheck-300605142314.log']
INFO  14/05/2006 23:15:01 Host Environment Validation successful.
INFO  14/05/2006 23:15:01
INFO  14/05/2006 23:15:01 Cluster state     : RUNNING
INFO  14/05/2006 23:15:01 Application state: UNDEFINED
INFO  14/05/2006 23:15:01
INFO  14/05/2006 23:15:01 Volume Group Configuration started.
INFO  14/05/2006 23:15:01   ['/var/log/cluster/build/samba-lvm-300605142314.log']
INFO  14/05/2006 23:15:08 Volume Group Configuration successful.
INFO  14/05/2006 23:15:08
INFO  14/05/2006 23:15:08 Application Resource Allocation started.
INFO  14/05/2006 23:15:08   ['/var/log/cluster/build/samba-build-300605142314.log']
INFO  14/05/2006 23:15:22 Application Resource Allocation successful.
INFO  14/05/2006 23:15:22
INFO  14/05/2006 23:15:22 Application Data Synchronisation started.
INFO  14/05/2006 23:15:22   ['/var/log/cluster/build/samba-syncdata-300605142314.log']
Storage Syncing:        0Mb/        0Mb [100 % Complete]]
INFO  14/05/2006 23:26:36 Application Data Synchronisation successful.
INFO  14/05/2006 23:26:36
```

Comments

Worked as expected - though the large sync size took some time on only 100Mbit/sec
connections!

Halt the cluster - Ready to perform application tests.

server2:

```
[root@centos42s2 drbd]# clhalt
INFO  15/05/2006 22:33:21 Validated checksum for cluster configuration.
INFO  15/05/2006 22:33:21 Attempting to halt cluster cluster1...
INFO  15/05/2006 22:33:21 Attempting to contact a cluster daemon...
INFO  15/05/2006 22:33:21 Connecting to cluster daemon via host centos42s2
INFO  15/05/2006 22:33:21 Asking cluster daemons to abort...
INFO  15/05/2006 22:33:24 Cluster daemons aborted - cluster cluster1 is DOWN.
[root@centos42s2 drbd]# clstat
Cluster: cluster1 - DOWN

      Node      Status
centos42s1       DOWN
centos42s2       DOWN

 Application      Node     State  Started  Monitor  Stale  Fail-over?
      samba       N/A      DOWN      N/A      N/A    N/A        N/A
      apache      N/A      DOWN      N/A      N/A    N/A        N/A
```

3.4 Basic Application Tests

Prior to starting these tests ensure that the time on each node is with 5 seconds of one another.

Test Description	Expected Result
Form cluster using; `clform`	Forms the cluster in under 10 seconds.
Results	

<pre>[root@centos42s1 perl]# time clform
INFO 15/05/2006 22:33:35 Validated checksum for cluster configuration
INFO 15/05/2006 22:33:35 SSH communication to centos42s2 will be:
INFO 15/05/2006 22:33:35   192.100.0.2 ("a" network)
INFO 15/05/2006 22:33:35 Checking that the cluster is not already running...
INFO 15/05/2006 22:33:35 *** ATTEMPTING TO FORM CLUSTER cluster1 ***
INFO 15/05/2006 22:33:35 Starting cldaemon on centos42s1...
INFO 15/05/2006 22:33:35 Starting cldaemon on centos42s2...
INFO 15/05/2006 22:33:36 Waiting for cluster to form...
INFO 15/05/2006 22:33:41 Cluster cluster1 started successfully.
 	
real   0m6.559s
user   0m0.690s
sys 0m0.115s</pre>	

Comments	
Worked as expected - same performance as 1.0.0 even though additional checks and daemons are started.	

Test Description	Expected Result
Check all cluster daemons are running; `ps -ef	grep cluster1`	All cluster daemons should be running.
Results	
<pre>[root@centos42s1 perl]# ps -ef	grep cluster1 root 5793 1 0 22:33 ? 00:00:00 cldaemon-cluster1 root 5796 1 0 22:33 ? 00:00:00 cllockd-cluster1 root 5800 1 0 22:33 ? 00:00:00 clnetd-cluster1 root 5803 1 0 22:33 ? 00:00:00 clhbd-cluster1 root 5804 5803 0 22:33 ? 00:00:00 clhbd2-cluster1</pre>	
Comments	
Worked as expected - same performance as 1.0.0 even though additional checks and daemons are started.	

Step Description	Expected Result
Halt cluster using; `clhalt`	Halts the cluster in under 5 seconds

Results

```
[root@centos42s1 perl]# time clhalt
INFO  15/05/2006 22:57:33 Validated checksum for cluster configuration.
INFO  15/05/2006 22:57:33 Attempting to halt cluster cluster1...
INFO  15/05/2006 22:57:33 Attempting to contact a cluster daemon...
INFO  15/05/2006 22:57:33 Connecting to cluster daemon via host centos42s1
INFO  15/05/2006 22:57:33 Asking cluster daemons to abort...
INFO  15/05/2006 22:57:33 Cluster daemons aborted - cluster cluster1 is DOWN.

real    0m0.423s
user    0m0.278s
sys     0m0.031s
You have new mail in /var/spool/mail/root
[root@centos42s1 perl]# ps -ef | grep cluster1
root      6246  3184  0 22:57 pts/0    00:00:00 grep cluster1
```

Comments

Worked as expected - much faster than the pre-release 1.0.0 that was last tested here - that took 2.5 seconds longer to halt the cluster.

Test Description	Expected Result
Start cluster and then applications on centos42s1 using "clform" and "clstartapp".	Applications starts in under 15 seconds on centos42s1; (command run locally).

Results

```
[root@centos42s1 perl]# time clform
INFO  15/05/2006 22:59:28 Validated checksum for cluster configuration
INFO  15/05/2006 22:59:28 SSH communication to centos42s2 will be:
INFO  15/05/2006 22:59:28   192.100.0.2 ("a" network)
INFO  15/05/2006 22:59:28 Checking that the cluster is not already running...
INFO  15/05/2006 22:59:28 *** ATTEMPTING TO FORM CLUSTER cluster1 ***
INFO  15/05/2006 22:59:28 Starting cldaemon on centos42s1...
INFO  15/05/2006 22:59:29 Starting cldaemon on centos42s2...
INFO  15/05/2006 22:59:29 Waiting for cluster to form...
INFO  15/05/2006 22:59:35 Cluster cluster1 started successfully.

real    0m7.288s
user    0m0.693s
sys     0m0.105s
[root@centos42s1 perl]# time clstartapp -A samba
Application samba started successfully

real    0m11.415s
user    0m1.103s
sys     0m0.244s
[root@centos42s1 perl]# time clstartapp -A apache
Application apache started successfully

real    0m12.950s
user    0m1.777s
sys     0m0.280s
[root@centos42s1 perl]# time clstartapp -A samba
Application samba started successfully

real    0m10.716s
user    0m1.115s
sys     0m0.225s
[root@centos42s1 perl]# clstat
Cluster: cluster1 - UP

     Node      Status
centos42s1        UP
centos42s2        UP

 Application      Node      State  Started  Monitor  Stale  Fail-over?
     apache centos42s1    STARTED  0:00:02  Running     0        Yes
      samba centos42s1    STARTED  0:00:00  Running     0        Yes

[root@rserver1 samba]# df
Filesystem          1K-blocks     Used Available Use% Mounted on
/dev/hda1            10080488  1600792   7967628  17% /
none                   257904        0    257904   0% /dev/shm
/dev/drbd0            2088692    12812   2075880   1% /apache
/dev/drbd11            129840      428    129412   1% /samba/logs
/dev/drbd10            129840      220    129620   1% /samba/cfg
/dev/drbd1            5099160      776   5098384   1% /samba/shares
```

Comments

This worked exactly as expected - taking 10-12 seconds to start each applications. If the DRBD kernel modules had not been loaded it would have taken a few seconds longer. The additional increase in time appears to be due to the newer DRBD.7.18 modules.

Test Description	Expected Result
Stop the applications using "clhaltapp".	The applications should halt in under 10 seconds each.

Results

```
[root@centos42s1 perl]# time clhaltapp -A apache
Application apache shutdown successfully.

real    0m7.132s
user    0m0.718s
sys     0m0.099s
[root@centos42s1 perl]# time clhaltapp -A samba
Application samba shutdown successfully.

real    0m5.858s
user    0m0.700s
sys     0m0.145s
[root@centos42s1 perl]# clstat
Cluster: cluster1 - UP

     Node      Status
centos42s1        UP
centos42s2        UP

 Application      Node      State  Started  Monitor  Stale  Fail-over?
     apache       N/A       DOWN     N/A      N/A     N/A       Yes
      samba       N/A       DOWN     N/A      N/A     N/A       Yes
```

Comments

Works as expected.

Test Description	Expected Result
Start the application on "centos42s2" by using the "clrunapp" command on "centos42s1".	The command works as expected – validate using "clstat". Start-up takes less than 15 seconds.

Results

```
[root@centos42s1 perl]# time clrunapp -A apache --node centos42s2
INFO  15/05/2006 23:08:20 Validated cluster configuration.
INFO  15/05/2006 23:08:20 Validated application configuration.
INFO  15/05/2006 23:08:20 Validated that centos42s2 is a valid node for apache.
INFO  15/05/2006 23:08:20 Successfully connected to cluster cluster1.
INFO  15/05/2006 23:08:20 Verified that application apache is registered.
INFO  15/05/2006 23:08:20 Current application state : DOWN
INFO  15/05/2006 23:08:20 Application apache depends on: <NONE>
INFO  15/05/2006 23:08:20 Application apache will be started on node centos42s2
INFO  15/05/2006 23:08:20 Starting apache using command:
INFO  15/05/2006 23:08:20 /sbin/cluster/clstartapp --application apache --maxdelay 30 --verbose
INFO  15/05/2006 23:08:20 SSH communication to centos42s2 will be:
INFO  15/05/2006 23:08:20   192.100.0.2 ("a" network)
INFO  15/05/2006 23:08:31 Application apache started after 11 seconds.

real    0m11.198s
user    0m0.336s
sys     0m0.051s
```

Comments

Worked as expected; clstat validation from "centos42s1" is;

```
[root@centos42s1 perl]# clstat -A apache
Cluster: cluster1 - UP

 Application      Node      State  Runnnig  Monitor  Stale  Fail-over?
      apache centos42s2    STARTED  0:00:00  Running     0        Yes

 File Systems

 Mount Point             Valid   Type      State  % Complete  Completion
 /apache                 both    drbd      Sync

 Process Monitors

      Name    Status  Restarts   Current        Reset at
     httpd   Running      3         0              N/A

 General Monitors

         Type           Name    Status
     Flag Check    flag_check   Running
     FS Monitor      fsmonitor  Running
```

Test Description	Expected Result
With "apache" running on "centos42s2", kill off the primary "httpd" process.	The process should be restarted – and the number of restarts registered against the application in "clstat" should be set at "1".

Results

```
[root@centos42s2 drbd]# clstat -A apache
Cluster: cluster1 - UP

 Application      Node      State  Runnnig  Monitor  Stale  Fail-over?
     apache centos42s2    STARTED  0:00:01  Running     0        Yes

 File Systems

Mount Point              Valid   Type      State   % Complete  Completion
/apache                   both   drbd       Sync

Process Monitors

     Name    Status  Restarts   Current         Reset at
     httpd   Running        3         1  16/05/2006-00:10

General Monitors

         Type          Name    Status
    Flag Check    flag_check   Running
    FS Monitor     fsmonitor   Running
```

Comments

Instance was restarted as expected.

Test Description	Expected Result
Repeat the process of killing the "httpd" process twice more.	After the next two re-starts the application should fail-over to "centos42s1". Confirm by using "clstat".

Results

```
[root@centos42s2 drbd]# clstat
Cluster: cluster1 - UP

     Node      Status
centos42s1        UP
centos42s2        UP

 Application      Node      State  Started  Monitor  Stale  Fail-over?
     apache centos42s1    STARTED  0:00:00  Running     0         No
      samba       N/A       DOWN      N/A      N/A    N/A        Yes
```

Comments

Application failed over to the other node as expected – also set the "Fail-over?" value to "No" to indicate a software failure occurred on the remote node.

The actual time before it started on the remote node was over 10 seconds - perhaps this can be reduced for future versions?

Test Description	Expected Result
Kill the "httpd" on "centos42s1".	The process should be restarted, and "clstat" show the restart count as "1".

Results

```
[root@centos42s1 perl]# clstat -A apache
Cluster: cluster1 - UP

 Application      Node       State  Runnnig  Monitor  Stale  Fail-over?
     apache centos42s1    STARTED  0:00:01  Running      0         No

 File Systems

 Mount Point              Valid   Type      State   % Complete  Completion
 /apache                  both    drbd       Sync

 Process Monitors

      Name    Status  Restarts   Current        Reset at
     httpd   Running        3         1  16/05/2006-00:12

 General Monitors

        Type         Name    Status
   Flag Check   flag_check   Running
   FS Monitor    fsmonitor   Running
```

Comments

The application was restarted as expected.

Test Description	Expected Result
Repeat the process of killing the "httpd" process twice more.	After the next two re-starts the application should halt – since "centos42s2" is also not considered a valid node for this application. Confirm with "clstat".

Results

```
# clstat
Cluster: cluster1 - UP

     Node       Status
 rserver1         UP
 rserver2         UP

 Application      Node      State  Started  Monitor  Stale  Fail-over?
     apache      N/A       DOWN      N/A      N/A    N/A          No
      samba  rserver1   STARTED  0:00:02  Running      0         Yes
```

Comments

Application did not restart – as required.

Test Description	Expected Result
Attempt to start the application on "rserver1" using "clstartapp".	Application should fail to start since this node is not valid for this application presently by cluster daemons.

Results

```
[root@centos42s1 cluster]# clstartapp -A apache -V
INFO  15/05/2006 23:21:36 Validated checksum for cluster configuration
INFO  15/05/2006 23:21:36 TIMESTAMP: 2006.05.15 23:21:36
INFO  15/05/2006 23:21:36 Checked that node names resolve to IP addresses
INFO  15/05/2006 23:21:36 Validated Build run has completed against this configuration.
INFO  15/05/2006 23:21:36 Maximum start-up time for application: 20
INFO  15/05/2006 23:21:36 drbd kernel module loaded already on centos42s1
INFO  15/05/2006 23:21:36 drbd kernel module loaded already on 192.100.0.2
INFO  15/05/2006 23:21:38 Local DRBD devices started successfully.
INFO  15/05/2006 23:21:38 Ssh communication to centos42s2 via 192.100.0.2.
INFO  15/05/2006 23:21:38 DRBD: Skipping ENBD decisioning and relying on meta data...
INFO  15/05/2006 23:21:38 Attempting to start DRBD services on centos42s2.
INFO  15/05/2006 23:21:39 DRBD devices started successfully on centos42s2.
INFO  15/05/2006 23:21:39 Validated consistency of available data for DRBD.
INFO  15/05/2006 23:21:39 Both data copies believed good.
INFO  15/05/2006 23:21:39 Locking will be attempted via port 9849
INFO  15/05/2006 23:21:39 Successfully connected to lock server.
INFO  15/05/2006 23:21:39 Attempting to register application apache as starting...
ERROR 15/05/2006 23:21:39 Node centos42s1 is not valid for this application.
```

Comments

Result as expected.

Test Description	Expected Result
Attempt to start the application on "rserver2" using "clstartapp".	Application should fail to start since this node is not valid for this application presently by cluster daemons.

Results

```
[root@centos42s2 ~]# time clstartapp -A apache -V
INFO  15/05/2006 23:32:48 Validated checksum for cluster configuration
INFO  15/05/2006 23:32:48 TIMESTAMP: 2006.05.15 23:32:48
INFO  15/05/2006 23:32:48 Checked that node names resolve to IP addresses
INFO  15/05/2006 23:32:48 Validated Build run has completed against this configuration.
INFO  15/05/2006 23:32:48 Maximum start-up time for application: 20
INFO  15/05/2006 23:32:48 drbd kernel module loaded already on centos42s2
INFO  15/05/2006 23:32:49 drbd kernel module loaded already on 192.100.0.1
INFO  15/05/2006 23:32:49 Attempting to register application apache as starting...
ERROR 15/05/2006 23:32:49 Node centos42s2 is not valid for this application.

real    0m0.713s
user    0m0.377s
sys     0m0.054s
```

Comments

Result was as expected - much quicker than 1.0.0 and did not start or leave the DRBD devices up which 1.0.x versions do!

Test Description	Expected Result
Start application using "clrunapp" to run the application on "centos42s1" - making use of the "--reset" option.	Application starts as expected on "rserver1".

Results

```
[root@centos42s1 cluster]# clrunapp -A apache --reset
INFO  15/05/2006 23:34:44 Validated cluster configuration.
INFO  15/05/2006 23:34:44 Validated application configuration.
INFO  15/05/2006 23:34:44 Reset list of valid nodes for apache.
INFO  15/05/2006 23:34:44 Successfully connected to cluster cluster1.
INFO  15/05/2006 23:34:44 Verified that application apache is registered.
INFO  15/05/2006 23:34:44 Current application state : DOWN
INFO  15/05/2006 23:34:44 Application apache depends on: <NONE>
INFO  15/05/2006 23:34:44 Application apache will be started on node centos42s1
INFO  15/05/2006 23:34:44 Starting apache using command:
INFO  15/05/2006 23:34:44 /sbin/cluster/clstartapp --application apache --maxdelay 30 --verbose
INFO  15/05/2006 23:34:55 Application apache started after 11 seconds.
```

Comments

Application restarted as expected.

Test Description	Expected Result
Halt application on "centos42s1" and try to start on "centos42s2".	Application starts as expected on "centos42s2" - indicating the reset information was sent to both nodes in the previous test.

Results

```
[root@centos42s1 cluster]# time clhaltapp -A apache
Application apache shutdown successfully.

real    0m6.319s
user    0m0.708s
sys     0m0.101s
[root@centos42s2 ~]# time clstartapp -A apache -V
INFO  15/05/2006 23:37:34 Validated checksum for cluster configuration
INFO  15/05/2006 23:37:34 TIMESTAMP: 2006.05.15 23:37:34
INFO  15/05/2006 23:37:34 Checked that node names resolve to IP addresses
INFO  15/05/2006 23:37:34 Validated Build run has completed against this configuration.
INFO  15/05/2006 23:37:34 Maximum start-up time for application: 20
INFO  15/05/2006 23:37:34 drbd kernel module loaded already on centos42s2
INFO  15/05/2006 23:37:34 drbd kernel module loaded already on 192.100.0.1
INFO  15/05/2006 23:37:34 Attempting to register application apache as starting...
INFO  15/05/2006 23:37:34 Application registered successfully as starting.
INFO  15/05/2006 23:37:36 Local DRBD devices started successfully.
INFO  15/05/2006 23:37:36 Ssh communication to centos42s1 via 192.100.0.1.
INFO  15/05/2006 23:37:36 DRBD: Skipping ENBD decisioning and relying on meta data...
INFO  15/05/2006 23:37:36 Attempting to start DRBD services on centos42s1.
INFO  15/05/2006 23:37:37 DRBD devices started successfully on centos42s1.
INFO  15/05/2006 23:37:37 Validated consistency of available data for DRBD.
INFO  15/05/2006 23:37:37 Both data copies believed good.
INFO  15/05/2006 23:37:37 Locking will be attempted via port 9849
INFO  15/05/2006 23:37:37 Successfully connected to lock server.
INFO  15/05/2006 23:37:37 Checking for existing primary application IP addresses...
INFO  15/05/2006 23:37:39 No application primary IP addresses found.
INFO  15/05/2006 23:37:39 Attempt to get lock for NBD_CLIENT
INFO  15/05/2006 23:37:39 Attempting to make local DRBD devices primary...
INFO  15/05/2006 23:37:41 Attempt to release lock for NBD_CLIENT
INFO  15/05/2006 23:37:41 All local DRBD now primary.
INFO  15/05/2006 23:37:42 Running "/sbin/fsck -t ext3 -a /dev/drbd0"...
INFO  15/05/2006 23:37:42 Running "PATH=$PATH:/sbin:/bin:/usr/sbin; mount -t ext3 -o rw /dev/drbd0
/apache"...
INFO  15/05/2006 23:37:42 File systems mounted on DRBD devices.
INFO  15/05/2006 23:37:42 Attempt to get lock for NET
INFO  15/05/2006 23:37:42 Configuring 192.100.0.10: ifconfig eth0:1 inet 192.100.0.10
INFO  15/05/2006 23:37:42 Sending Builtin Gratuitous arp for eth0:1
INFO  15/05/2006 23:37:42 Attempt to release lock for NET
INFO  15/05/2006 23:37:43 Applications start completed successfully
Application apache started successfully

real    0m10.520s
user    0m1.933s
sys     0m0.208s
```

Comments

Application started as expected.

3.5 Autostart Functionality Tests

This small series of tests are aimed to check out the facilities that allow applications to be automatically started when the cluster forms. For this to function, the applications need to be rebuilt several times prior to performing the test. In each case ensure the applications have stopped first.

Test Description	Expected Result
Change the applications to both be "centos42s2" as the preferred node and autostart set to true and then form the cluster.	Once the cluster is formed both applications should start on "centos42s2".

Results

```
[root@centos42s1 cluster]# clform
INFO  18/05/2006 21:44:33 Validated checksum for cluster configuration
INFO  18/05/2006 21:44:33 SSH communication to centos42s2 will be:
INFO  18/05/2006 21:44:33   192.120.0.2 ("b" network)
INFO  18/05/2006 21:44:33 Checking that the cluster is not already running...
INFO  18/05/2006 21:44:33 *** ATTEMPTING TO FORM CLUSTER cluster1 ***
INFO  18/05/2006 21:44:33 Starting cldaemon on centos42s1...
INFO  18/05/2006 21:44:34 Starting cldaemon on centos42s2...
INFO  18/05/2006 21:44:36 Waiting for cluster to form...
INFO  18/05/2006 21:44:42 Cluster cluster1 started successfully.
INFO  18/05/2006 21:44:42 Attempting to start autostart application "apache"...
INFO  18/05/2006 21:44:42 Validated cluster configuration.
INFO  18/05/2006 21:44:42 Validated application configuration.
INFO  18/05/2006 21:44:42 Successfully connected to cluster cluster1.
INFO  18/05/2006 21:44:42 Verified that application apache is registered.
INFO  18/05/2006 21:44:42 Current application state : DOWN
INFO  18/05/2006 21:44:42 Application apache depends on: <NONE>
INFO  18/05/2006 21:44:42 Application apache will be started on node centos42s2
INFO  18/05/2006 21:44:42 Starting apache using command:
INFO  18/05/2006 21:44:42 /sbin/cluster/clstartapp --application apache --maxdelay 30 --verbose
INFO  18/05/2006 21:44:42 SSH communication to centos42s2 will be:
INFO  18/05/2006 21:44:42   192.120.0.2 ("b" network)
INFO  18/05/2006 21:44:55 Application apache started after 13 seconds.
INFO  18/05/2006 21:44:55 Attempting to start autostart application "samba"...
INFO  18/05/2006 21:44:55 Validated cluster configuration.
INFO  18/05/2006 21:44:55 Validated application configuration.
INFO  18/05/2006 21:44:55 Successfully connected to cluster cluster1.
INFO  18/05/2006 21:44:55 Verified that application samba is registered.
INFO  18/05/2006 21:44:55 Current application state : DOWN
INFO  18/05/2006 21:44:55 Application samba depends on: <NONE>
INFO  18/05/2006 21:44:55 Application samba will be started on node centos42s2
INFO  18/05/2006 21:44:55 Starting samba using command:
INFO  18/05/2006 21:44:55 /sbin/cluster/clstartapp --application samba --maxdelay 30 --verbose
INFO  18/05/2006 21:44:55 SSH communication to centos42s2 will be:
INFO  18/05/2006 21:44:55   192.120.0.2 ("b" network)
INFO  18/05/2006 21:45:07 Application samba started after 12 seconds.
INFO  18/05/2006 21:45:07 Successfully started 2 autostart applications
[root@centos42s1 cluster]# clstat
Cluster: cluster1 - UP

    Node      Status
centos42s1        UP
centos42s2        UP

 Application      Node      State  Started  Monitor  Stale  Fail-over?
     apache centos42s2    STARTED  0:00:00  Running      0        Yes
      samba centos42s2    STARTED  0:00:00  Running      0        Yes
```

Comments

Works exactly as expected.

Test Description	Expected Result
Change the applications to both be "LEAST_APP_LOAD" as the preferred node and autostart set to true and then form the cluster.	Once the cluster is formed one application should start on each node.

Results

```
[root@centos42s1 cluster]# clstat
Cluster: cluster1 - DOWN

     Node      Status
centos42s1       DOWN
centos42s2       DOWN

 Application      Node      State  Started  Monitor  Stale  Fail-over?
       samba      N/A       DOWN     N/A      N/A     N/A       N/A
      apache      N/A       DOWN     N/A      N/A     N/A       N/A
[root@centos42s1 cluster]# clform
INFO  23/05/2006 20:53:51 Validated checksum for cluster configuration
INFO  23/05/2006 20:53:51 SSH communication to centos42s2 will be:
INFO  23/05/2006 20:53:51   192.120.0.2 ("b" network)
INFO  23/05/2006 20:53:51 Checking that the cluster is not already running...
INFO  23/05/2006 20:53:51 *** ATTEMPTING TO FORM CLUSTER cluster1 ***
INFO  23/05/2006 20:53:51 Starting cldaemon on centos42s1...
INFO  23/05/2006 20:53:51 Starting cldaemon on centos42s2...
INFO  23/05/2006 20:53:53 Waiting for cluster to form...
INFO  23/05/2006 20:54:00 Cluster cluster1 started successfully.
INFO  23/05/2006 20:54:00 Attempting to start autostart application "apache"...
INFO  23/05/2006 20:54:00 Validated cluster configuration.
INFO  23/05/2006 20:54:00 Validated application configuration.
INFO  23/05/2006 20:54:00 Successfully connected to cluster cluster1.
INFO  23/05/2006 20:54:00 Verified that application apache is registered.
INFO  23/05/2006 20:54:00 Current application state : DOWN
INFO  23/05/2006 20:54:00 Application apache depends on: <NONE>
INFO  23/05/2006 20:54:00 Application apache will be started on node centos42s1
INFO  23/05/2006 20:54:00 Starting apache using command:
INFO  23/05/2006 20:54:00 /sbin/cluster/clstartapp --application apache --maxdelay 30 --verbose
INFO  23/05/2006 20:54:25 Application apache started after 25 seconds.
INFO  23/05/2006 20:54:25 Attempting to start autostart application "samba"...
INFO  23/05/2006 20:54:25 Validated cluster configuration.
INFO  23/05/2006 20:54:25 Validated application configuration.
INFO  23/05/2006 20:54:25 Successfully connected to cluster cluster1.
INFO  23/05/2006 20:54:25 Verified that application samba is registered.
INFO  23/05/2006 20:54:25 Current application state : DOWN
INFO  23/05/2006 20:54:25 Application samba depends on: <NONE>
INFO  23/05/2006 20:54:25 Application samba will be started on node centos42s2
INFO  23/05/2006 20:54:25 Starting samba using command:
INFO  23/05/2006 20:54:25 /sbin/cluster/clstartapp --application samba --maxdelay 30 --verbose
INFO  23/05/2006 20:54:25 SSH communication to centos42s2 will be:
INFO  23/05/2006 20:54:25   192.120.0.2 ("b" network)
INFO  23/05/2006 20:54:37 Application samba started after 12 seconds.
INFO  23/05/2006 20:54:37 Successfully started 2 autostart applications
[root@centos42s1 cluster]# clstat
Cluster: cluster1 - UP

     Node      Status
centos42s1        UP
centos42s2        UP

 Application      Node      State Started  Monitor  Stale  Fail-over?
      apache centos42s1   STARTED 0:00:00  Running    0        Yes
       samba centos42s2   STARTED 0:00:00  Running    0        Yes
```

Comments

Works exactly as expected.

Test Description	Expected Result
Change the applications to both be "LEAST_CPU_LOAD" as the preferred node and autostart set to true and then form the cluster, though prior to this run "while : ; do /bin/true; done" on "centos42s1"	Once the cluster is formed both applications should run on "centos42s2".

Results

```
[root@centos42s1 cluster]# clform
INFO  23/05/2006 20:58:24 Validated checksum for cluster configuration
INFO  23/05/2006 20:58:24 SSH communication to centos42s2 will be:
INFO  23/05/2006 20:58:24  192.120.0.2 ("b" network)
INFO  23/05/2006 20:58:24 Checking that the cluster is not already running...
INFO  23/05/2006 20:58:24 *** ATTEMPTING TO FORM CLUSTER cluster1 ***
INFO  23/05/2006 20:58:24 Starting cldaemon on centos42s1...
INFO  23/05/2006 20:58:25 Starting cldaemon on centos42s2...
INFO  23/05/2006 20:58:25 Waiting for cluster to form...
INFO  23/05/2006 20:58:31 Cluster cluster1 started successfully.
INFO  23/05/2006 20:58:31 Attempting to start autostart application "apache"...
INFO  23/05/2006 20:58:31 Validated cluster configuration.
INFO  23/05/2006 20:58:31 Validated application configuration.
INFO  23/05/2006 20:58:31 Successfully connected to cluster cluster1.
INFO  23/05/2006 20:58:31 Verified that application apache is registered.
INFO  23/05/2006 20:58:31 Current application state : DOWN
INFO  23/05/2006 20:58:31 Application apache depends on: <NONE>
INFO  23/05/2006 20:58:31 Application apache will be started on node centos42s2
INFO  23/05/2006 20:58:31 Starting apache using command:
INFO  23/05/2006 20:58:31 /sbin/cluster/clstartapp --application apache --maxdelay 30 --verbose
INFO  23/05/2006 20:58:31 SSH communication to centos42s2 will be:
INFO  23/05/2006 20:58:31  192.120.0.2 ("b" network)
INFO  23/05/2006 20:58:44 Application apache started after 13 seconds.
INFO  23/05/2006 20:58:44 Attempting to start autostart application "samba"...
INFO  23/05/2006 20:58:44 Validated cluster configuration.
INFO  23/05/2006 20:58:44 Validated application configuration.
INFO  23/05/2006 20:58:44 Successfully connected to cluster cluster1.
INFO  23/05/2006 20:58:44 Verified that application samba is registered.
INFO  23/05/2006 20:58:44 Current application state : DOWN
INFO  23/05/2006 20:58:44 Application samba depends on: <NONE>
INFO  23/05/2006 20:58:44 Application samba will be started on node centos42s2
INFO  23/05/2006 20:58:44 Starting samba using command:
INFO  23/05/2006 20:58:44 /sbin/cluster/clstartapp --application samba --maxdelay 30 --verbose
INFO  23/05/2006 20:58:44 SSH communication to centos42s2 will be:
INFO  23/05/2006 20:58:44  192.120.0.2 ("b" network)
INFO  23/05/2006 20:58:56 Application samba started after 12 seconds.
INFO  23/05/2006 20:58:56 Successfully started 2 autostart applications
[root@centos42s1 cluster]# clstat
Cluster: cluster1 - UP

     Node       Status
centos42s1        UP
centos42s2        UP

 Application       Node      State  Started  Monitor  Stale  Fail-over?
     apache centos42s2    STARTED  0:00:00  Running      0       Yes
      samba centos42s2    STARTED  0:00:00  Running      0       Yes
```

Comments

Works exactly as expected.

3.6 General Cluster Maintenance Tests

Test Description	Expected Result
Halt the cluster. Remove the kernel drbd.ko module from "centos42s1" and remove the file from the file system. Form the cluster.	When "centos42s1" does not find the kernel module for the running kernel it should automatically recompile it as part of the cluster formation process.

Results

```
[root@centos42s1 cluster]# uname -r
2.6.9-34.EL
[root@centos42s1 cluster]# rm /lib/modules/
2.6.9-22.0.1.EL/ 2.6.9-22.0.2.EL/ 2.6.9-22.EL/    2.6.9-34.EL/    kabi-4.0-0/
[root@centos42s1 cluster]# rm /lib/modules/2.6.9-34.EL/kernel/drivers/block/drbd.ko
rm: remove regular file `/lib/modules/2.6.9-34.EL/kernel/drivers/block/drbd.ko'? Y
[root@centos42s1 tmp]# clform --noapps
INFO  23/05/2006 21:08:24 Validated checksum for cluster configuration
INFO  23/05/2006 21:08:24 SSH communication to centos42s2 will be:
INFO  23/05/2006 21:08:24   192.120.0.2 ("b" network)
INFO  23/05/2006 21:08:24 Checking that the cluster is not already running...
INFO  23/05/2006 21:08:25 *** ATTEMPTING TO FORM CLUSTER cluster1 ***
INFO  23/05/2006 21:08:26 Starting cldaemon on centos42s1...
INFO  23/05/2006 21:08:26 Starting cldaemon on centos42s2...
INFO  23/05/2006 21:08:27 Waiting for cluster to form...
INFO  23/05/2006 21:08:32 Cluster cluster1 started successfully.
[root@centos42s1 tmp]# ls -l /lib/modules/$(uname -r)/kernel/drivers/block/drbd.ko
-rw-r--r--  1 root root 1287097 May 23 21:08 /lib/modules/2.6.9-34.EL/kernel/drivers/block/drbd.ko
[root@centos42s1 tmp]# date
Tue May 23 21:08:58 BST 2006
```

Comments

Worked as expected - though perhaps should issue some output?

Test Description	Expected Result
Halt the cluster. For an installation of 0.7.13 drbd and ensure 0.7.18 .tar.gz is in place and then form the cluster [on centos42s2].	When "centos42s2" finds a newer .tar.gz it should automatically compile, install and load that kernel module as part of the cluster formation process.

Results

```
[root@centos42s2 tmp]# modprobe drbd
[root@centos42s2 tmp]# head -5 /proc/drbd
version: 0.7.13 (api:77/proto:74)
SVN Revision: 1942 build by root@centos42s2, 2006-05-23 21:11:59
 0: cs:Unconfigured
 1: cs:Unconfigured
[root@centos42s2 tmp]# mv drbd-0.7.18.tar.gz /usr/src/cluster
[root@centos42s1 tools]# clform --noapps
INFO  23/05/2006 21:31:14 Validated checksum for cluster configuration
INFO  23/05/2006 21:31:14 SSH communication to centos42s2 will be:
INFO  23/05/2006 21:31:14   192.120.0.2 ("b" network)
INFO  23/05/2006 21:31:14 Checking that the cluster is not already running...
INFO  23/05/2006 21:31:14 *** ATTEMPTING TO FORM CLUSTER cluster1 ***
INFO  23/05/2006 21:32:01 Attempting DRBD update from 'drbd-0.7.18.tar.gz'.
INFO  23/05/2006 21:32:01 Uncompressing DRBD sources...
INFO  23/05/2006 21:32:01 Changed directory to /usr/src/cluster/drbd-0.7.18/drbd - running make...
INFO  23/05/2006 21:32:12 Changed directory to /usr/src/cluster/drbd-0.7.18/user - running make...
INFO  23/05/2006 21:32:16 Changed directory to /usr/src/cluster/drbd-0.7.18 - running make install...
INFO  23/05/2006 21:32:17 DRBD 'drbd-0.7.18' built and installed successfully.
INFO  23/05/2006 21:31:31 Starting cldaemon on centos42s1...
INFO  23/05/2006 21:31:32 Starting cldaemon on centos42s2...
INFO  23/05/2006 21:31:32 Waiting for cluster to form...
INFO  23/05/2006 21:31:37 Cluster cluster1 started successfully.
```

Comments

Worked as expected.

3.7 Network Failure Tests

Since linuxha 1.2 intends to provide improved network functionality the configuration of the test network has been changed to take advantage of this. This can be seen from the Ethernet configuration:

Network Card	Network	Switch	
eth0	a	1	
eth1	b	2	
eth2	a	1	[standby]

The switches have an uplink cable between them for cross-switch communication.

Previous versions of linuxha.net would require that all interfaces in the same network be housed on the same switch otherwise the fail-over might not work due to arp problems.

On both servers the routing table is as follows;

```
Destination     Gateway         Genmask         Flags   MSS Window  irtt Iface
192.120.0.0     0.0.0.0         255.255.255.0   U         0 0          0 eth1
192.100.0.0     0.0.0.0         255.255.255.0   U         0 0          0 eth0
192.168.1.0     0.0.0.0         255.255.255.0   U         0 0          0 eth3
169.254.0.0     0.0.0.0         255.255.0.0     U         0 0          0 eth3
0.0.0.0         192.168.1.1     0.0.0.0         UG        0 0          0 eth3
```

Note: Eth3 is the wireless connection via which I connect to the servers. I've not configured that as part of the cluster configuration since I want to be able to test heart beats just on the other two networks.

Prior to running these tests the following conditions are expected;

● both nodes are running in the cluster
● "apache" running on "centos42s2" and samba running on "centos42s1"
● The file system data for both applications is synchronized

```
[root@centos42s1 ~]# clstat
Cluster: cluster1 - UP

     Node        Status
centos42s1         UP
centos42s2         UP

 Application       Node      State  Started  Monitor  Stale  Fail-over?
     apache centos42s2    STARTED  0:00:00  Running      0         Yes
      samba centos42s1    STARTED  0:00:00  Running      0         Yes
```

The "a" and "b" links will be tested for physical connectivity checks via "centos42s1". It is expected that multiple failures of "b" (on "centos42s1") will do nothing (apart from disable data synchronization), whilst the same tests on "a" will result in fail-over of the "samba" to "centos42s2" eventually after several IP-failovers.

IP level testing will be performed via "rserver1" - "samba" has an IP level checking for a single IP address on the "production" network. Logical IP failure will be tested via downing the interface via "ifconfig". NOT PERFORMED FOR THIS TEST SUITE (NOT CORE MODULE ANYMORE)

☞ These tests may need to be run from the console of the server in question rather than via a network connection for obvious reasons. An alternative is to use a wireless connection or a nother Ethernet network not configured as part of the cluster.

IP level testing not performed for 1.2.0 base configuration

Test Description	Expected Result
Simulate an IP level failure on rserver1 by downing interface eth1.	Lems failure for IP Monitor triggers clnetd to switch connection.
Results	
# ifconfig eth1 down **lems log:** WARN 26/04/2005 23:03:57 Ping failure on network production (percent=0) INFO 26/04/2005 23:03:57 Clnetd response to MIGRATE: OK eth2 **clnetd log:** INFO 26/04/2005 23:03:57 production: Will choose between following cards: eth2 INFO 26/04/2005 23:03:57 production: eth2 never used – so use it. INFO 26/04/2005 23:03:57 production: Chosen eth2 @ 1114553037.92457.	
Comments	
The code worked as expected.	

Test Description	Expected Result
Disconnect "eth0" from "centos42s1".	The IP address should successfully move to "eth2". Examine Clnet log output on "centos42s1".
Results	
WARN 17/05/2006 23:10:38 Link failure detected on a eth0 – migrating. WARN 17/05/2006 23:10:38 Failure result info was: 0 INFO 17/05/2006 23:10:38 a: Will choose between following cards: eth2 INFO 17/05/2006 23:10:38 a: eth2 never used – so use it. INFO 17/05/2006 23:10:38 a: Chosen eth2 @ 1147903838.9924. INFO 17/05/2006 23:10:39 a: Link beat supported on interface eth2 (ETHTOOLLIB)	
Comments	
Application failed-back the interface as expected.	

Test Description	Expected Result
Ensure routing table and IP interface details have been updated as required.	The IP address should should be on eth2, whilst the routing table should have not eth0 entries in, but eth2 ones in its place.

Results

```
eth2      Link encap:Ethernet  HWaddr 00:03:CE:88:67:F3
          inet addr:192.100.0.1  Bcast:192.100.0.255  Mask:255.255.255.0
          inet6 addr: fe80::203:ceff:fe88:67f3/64 Scope:Link
          UP BROADCAST RUNNING MULTICAST  MTU:1500  Metric:1
          RX packets:471 errors:0 dropped:0 overruns:0 frame:0
          TX packets:480 errors:0 dropped:0 overruns:0 carrier:0
          collisions:0 txqueuelen:1000
          RX bytes:37880 (36.9 KiB)  TX bytes:38242 (37.3 KiB)
          Interrupt:12 Base address:0xe400

eth2:1    Link encap:Ethernet  HWaddr 00:03:CE:88:67:F3
          inet addr:192.100.0.110  Bcast:255.255.255.255  Mask:255.255.255.0
          UP BROADCAST RUNNING MULTICAST  MTU:1500  Metric:1
          Interrupt:12 Base address:0xe400


[root@centos42s1 cluster]# netstat -nr
Kernel IP routing table
Destination     Gateway         Genmask         Flags   MSS Window  irtt Iface
192.120.0.0     0.0.0.0         255.255.255.0   U         0 0          0 eth1
192.100.0.0     0.0.0.0         255.255.255.0   U         0 0          0 eth2
192.168.1.0     0.0.0.0         255.255.255.0   U         0 0          0 eth3
169.254.0.0     0.0.0.0         255.255.0.0     U         0 0          0 eth3
0.0.0.0         192.168.1.1     0.0.0.0         UG        0 0          0 eth3
```

Comments

Results are as expected.

Test Description	Expected Result
Also disconnect "eth2" from "centos42s1"	Since both Ethernet cards in "centos42s1" designated for "apache" are no longer available a fail-over of the application to "centos42s2" will be performed. [This also tests that the cluster heartbeat on "eth1" continue to ensure both nodes continue to function as expected.

Results

Network Daemon log:

```
WARN  17/05/2006 23:16:51 Link failure detected on a eth2 - migrating.
WARN  17/05/2006 23:16:51 Failure result info was: 0
INFO  17/05/2006 23:16:51 a: Will choose between following cards: eth0
INFO  17/05/2006 23:16:51 a: eth0 never used - so use it.
INFO  17/05/2006 23:16:51 a: Chosen eth0 @ 1147904211.97765.
WARN  17/05/2006 23:16:52 Link failure detected on a eth0 - migrating.
WARN  17/05/2006 23:16:52 Failure result info was: 0
INFO  17/05/2006 23:16:52 a: Will choose between following cards: eth2
INFO  17/05/2006 23:16:52 a: Checking eth2 @ 1147903839.01871
INFO  17/05/2006 23:16:52 a: Chosen eth2 @ 1147903839.01871.
WARN  17/05/2006 23:16:52 Link failure detected on a eth2 - migrating.
WARN  17/05/2006 23:16:52 Failure result info was: 0
INFO  17/05/2006 23:16:52 a: Will choose between following cards: eth0
INFO  17/05/2006 23:16:52 a: Checking eth0 @ 1147904212.0019
INFO  17/05/2006 23:16:54 Sent Cluster Daemon "NO_NET NET=a HOST=centos42s1 FORWARD=yes" message.
```

After 15 seconds

```
[root@centos42s1 cluster]# clstat
Cluster: cluster1 - UP

      Node        Status
centos42s1         UP
centos42s2         UP

 Application       Node      State  Started  Monitor  Stale  Fail-over?
     apache centos42s2    STARTED  0:00:12  Running      0        Yes
      samba centos42s2    STARTED  0:00:00  Running      0        Yes
```

Cluster log:

<No information added to log - though connectivity appeared to remain unaffected>

Comments

Application failed over to the alternative node as expected.

Test Description	Expected Result
Check network "a" on "centos42s1" shows as "dead" in clstat. Then reconnect cables.	Should initially show dead and after the 30 second as alive again.

Results

```
[root@centos42s1 cluster]# clstat --net
Cluster: cluster1 - UP

. . .

    Network    Status  Link Check?    Interface  Monitor?     R Kb/S      W Kb/S
        a       dead           yes         eth2        no        0.0         0.0
        b      alive           yes         eth1       yes        0.5         0.3
```

Later..
```
[root@centos42s1 cluster]# clstat --net
Cluster: cluster1 - UP

. . .

 Network status for centos42s1

    Network    Status  Link Check?    Interface  Monitor?     R Kb/S      W Kb/S
        a      alive           yes         eth2       yes        0.2         0.2
        b      alive           yes         eth1       yes        0.3         0.3
```

Comments

Works as expected - though this is expected to be automatic for later 1.2 releases.

Test Description	Expected Result
Disconnect "eth1" cable on "centos42s2".	The DRBD devices should go stale - especially if data is written. However the cluster should continue to function as expected.

Results

```
[root@centos42s2 cluster]# time ps -ef > /samba/logs/test.log

real    0m0.026s
user    0m0.004s
sys     0m0.007s
[root@centos42s2 cluster]# clstat
Cluster: cluster1 - UP

     Node       Status
centos42s1         UP
centos42s2         UP

 Application      Node      State   Started  Monitor  Stale  Fail-over?
       apache centos42s2   STARTED  0:00:27  Running    1        Yes
        samba centos42s2   STARTED  0:00:14  Running    3        Yes
```

Comments

Works as expected - goes stale but cluster functions as expected.

Test Description	Expected Result
Reconnect "eth1" cable on "centos42s2".	The DRBD devices should automatically resync very quickly [no full sync performed].

Results

```
[root@centos42s2 cluster]# clstat
Cluster: cluster1 - UP

     Node       Status
centos42s1         UP
centos42s2         UP

 Application      Node      State   Started  Monitor  Stale  Fail-over?
       apache centos42s2   STARTED  0:00:29  Running    0        Yes
        samba centos42s2   STARTED  0:00:16  Running    0        Yes
```

Comments

Works as expected.

3.8 Node Failure Tests

The final set of tests handle the "catastrophic" case of losing a node – and checking that the cluster recovers in the manner expected. In the tests here loss of the backup and active nodes are tested – including ensuring data synchronization automatically recovers when the failed node rejoins the cluster.

Also covered in this section are some tests of running standard cluster commands when the cluster is running in a "degraded" state. For example;

- starting the cluster with only wireless connectivity
- connecting all networks and trigger configure re-read.
- starting an application when DRBD connectivity is not available
- adding DRBD connectivity and checking synchronization starts automatically

Prior to starting these series of tests the cluster is expected to be in the following state;

- both nodes are running in the cluster
- "samba" and "apache" are running on "centos2"
- The file system data is synchronized
- All network connections are functioning
- Both nodes are valid to accept the "apache" and "samba" applications

Test Description	Expected Result
Power off "centos42s1" - wait 30 seconds and check test web-site and "clstat".	The application should continue to run on "rserver1" with "clstat" showing "rserver2" as down. May also indicate file system is not synchronized. Also check heart beat log to ensure network partitioning has been checked and discounted.

Results

```
[root@centos42s2 cluster]# clstat
Cluster: cluster1 - UP

      Node      Status
centos42s1       DOWN
centos42s2         UP

 Application      Node     State  Started  Monitor  Stale  Fail-over?
      apache centos42s2   STARTED  0:00:33  Running     1         No
       samba centos42s2   STARTED  0:00:20  Running     3         No

```

Log file entries
```
INFO  17/05/2006 23:03:07 Started hbd listener server on port 9848
INFO  17/05/2006 23:03:07 Port: 9848, INET 192.120.0.1 created.
WARN  17/05/2006 23:38:09 No response for 9 seconds!
WARN  17/05/2006 23:38:18 Attempting partitioning with IPs: www.bbc.co.uk,www.demon.net
WARN  17/05/2006 23:38:18 In built success threshold is 50%!
INFO  17/05/2006 23:38:18 Pinged addresses: 2 [failed=0]
INFO  17/05/2006 23:38:18 Threshold not passed - assume remote node down!
ERROR 17/05/2006 23:38:18 No response received for 12 seconds!
ERROR 17/05/2006 23:38:18 Remote server appears to have died!
WARN  17/05/2006 23:38:18 No cldaemon response to SWAP_APPS!
```

Test Description	Expected Result
Comments	
Results as expected.	

Test Description	Expected Result
Copy the contents of "/etc" to a temporary directory under "/apache/logs".	Data is copied as expected. /proc/drbd shows stale data for remote node.

Results

```
[root@centos42s2 cluster]# mkdir /apache/logs/testdir
[root@centos42s2 cluster]# cp /etc/* /apache/logs/testdir
```

DRBD for /apache/logs [3] - shows 1 entry in bitmap:

```
 3: cs:WFConnection st:Primary/Unknown ld:Consistent
    ns:85 nr:0 dw:69 dr:290 al:0 bm:1 lo:0 pe:0 ua:0 ap:0
```

Comments

The Connection status is "WFConnection" and "bm" is (I believe the number of bitmap blocks outdated). No delay when writing data – so failure of backup node to application users is transparent.

Test Description	Expected Result
Start "centos42s1" and use "clform" for it to join the cluster.	Once it joins the cluster the Lems "fsmon" monitor for "apache" and "samba" should notice and start the DRBD services and resynchronization of the data should occur.

Results

```
[root@centos42s2 cluster]# clform --join
INFO  18/05/2006 00:00:43 Validated checksum for cluster configuration
INFO  18/05/2006 00:00:44 SSH communication to centos42s1 will be:
INFO  18/05/2006 00:00:44   192.100.0.1 ("a" network)
INFO  18/05/2006 00:00:44 Checking cluster status...
INFO  18/05/2006 00:00:44 centos42s2 is running - centos42s1 will attempt to join cluster.
INFO  18/05/2006 00:00:44 Starting cldaemon on centos42s1...
INFO  18/05/2006 00:00:46 Waiting for centos42s1 to join the cluster...
INFO  18/05/2006 00:00:52 Node centos42s1 successfully joined cluster.
[root@centos42s2 cluster]# clstat
Cluster: cluster1 - UP

    Node       Status
centos42s1        UP
centos42s2        UP

 Application       Node      State  Started  Monitor  Stale  Fail-over?
     apache centos42s2    STARTED  0:00:55  Running     1        Yes
      samba centos42s2    STARTED  0:00:42  Running     3        Yes
```

30 seconds later:

```
[root@centos42s2 cluster]# clstat
Cluster: cluster1 - UP

    Node       Status
centos42s1        UP
centos42s2        UP

 Application       Node      State  Started  Monitor  Stale  Fail-over?
     apache centos42s2    STARTED  0:00:56  Running     0        Yes
      samba centos42s2    STARTED  0:00:43  Running     0        Yes
```

Comments

Worked as expected.

Test Description	Expected Result
Kill "cldaemon" process on "centos42s1".	"centos42s2" will not notice a problem, but "centos42s1" will show the cluster as down. Rejoining the cluster should pick up the status of the running applications correctly again.

Results

```
[root@centos42s1 tools]# clstat
Cluster: cluster1 - DOWN

     Node      Status
centos42s1      DOWN
centos42s2      DOWN

 Application      Node      State  Started  Monitor  Stale  Fail-over?
     samba        N/A       DOWN    N/A      N/A     N/A       N/A
     apache       N/A       DOWN    N/A      N/A     N/A       N/A

[root@centos42s2 tmp]# clstat
Cluster: cluster1 - UP

     Node      Status
centos42s1       UP
centos42s2       UP

 Application      Node      State  Started  Monitor  Stale  Fail-over?
     apache centos42s2    STARTED  0:00:02  Running    0        Yes
      samba centos42s2    STARTED  0:00:02  Running    0        Yes
[root@centos42s1 tools]# clform --join
INFO  23/05/2006 21:40:24 Validated checksum for cluster configuration
INFO  23/05/2006 21:40:24 SSH communication to centos42s2 will be:
INFO  23/05/2006 21:40:24   192.120.0.2 ("b" network)
INFO  23/05/2006 21:40:24 Checking cluster status...
INFO  23/05/2006 21:40:24 centos42s2 is running - centos42s1 will attempt to join cluster.
INFO  23/05/2006 21:40:24 Starting cldaemon on centos42s1...
INFO  23/05/2006 21:40:24 Waiting for centos42s1 to join the cluster...
INFO  23/05/2006 21:40:25 Node centos42s1 successfully joined cluster.
[root@centos42s1 tools]# clstat
Cluster: cluster1 - UP

     Node      Status
centos42s1       UP
centos42s2       UP

 Application      Node      State  Started  Monitor  Stale  Fail-over?
     apache centos42s2    STARTED  0:00:02  Running    0        Yes
      samba centos42s2    STARTED  0:00:02  Running    0        Yes
```

Comments

Worked as expected – though things could be better.

Note: May implement 'watchdog' behavior into clhbd to keep an eye on other daemons and restart them if they fail [attempt a certain number of times].

Test Description	Expected Result
With both nodes running in the cluster, and application on "centos42s1", power off "centos42s1".	Application should start on "centos42s2" once that cluster daemon recognizes "centos42s1" is down.

Results

Heartbeat daemon log file on "centos42s2"

```
WARN  23/05/2006 21:47:40 No response for 9 seconds!
WARN  23/05/2006 21:47:49 Attempting partitioning with IPs: www.bbc.co.uk,www.demon.net
WARN  23/05/2006 21:47:49 In built success threshold is 50%!
INFO  23/05/2006 21:47:49 Pinged addresses: 2 [failed=0]
INFO  23/05/2006 21:47:49 Threshold not passed - assume remote node down!
ERROR 23/05/2006 21:47:49 No response received for 12 seconds!
ERROR 23/05/2006 21:47:49 Remote server appears to have died!
WARN  23/05/2006 21:47:49 No cldaemon response to SWAP_APPS!

[root@centos42s2 tmp]# clstat
Cluster: cluster1 - UP

      Node      Status
centos42s1       DOWN
centos42s2        UP

 Application      Node     State   Started  Monitor  Stale  Fail-over?
     apache centos42s2    STARTED  0:00:00  Running     1       No
      samba centos42s2    STARTED  0:00:00  Running     3       No
```

Comments

Worked as expected – took around 1 minute for both applications to become available again..

Test Description	Expected Result
Create temporary 60Mb file as "/apache/tmpfile" on "centos42s2".	Simply works – no errors or delays present when writing data.

Results

```
# cd /apache
# rm -f tmpfile
[root@centos42s2 apache]# dd if=/dev/zero of=tmpfile bs=1024k count=60
60+0 records in
60+0 records out
```

Comments

Worked as expected.

Test Description	Expected Result
Power on "centos42s2" and then use "clform --join".	Shortly after joining the cluster the "fsmon" Lems monitor will start re-synchronization - though of how much data.

Results

/proc/drbd output

```
version: 0.7.18 (api:78/proto:74)
SVN Revision: 2176 build by root@centos42s2, 2006-05-23 21:32:01
 0: cs:SyncSource st:Primary/Secondary ld:Consistent
    ns:26580 nr:0 dw:545732 dr:27682 al:57 bm:1 lo:0 pe:27 ua:145 ap:0
        [==>................] sync'ed: 11.5% (221652/248128)K
        finish: 0:00:16 speed: 13,236 (13,236) K/sec
 1: cs:Connected st:Primary/Secondary ld:Consistent
    ns:68 nr:0 dw:76 dr:753 al:7 bm:8 lo:0 pe:0 ua:0 ap:0
 2: cs:Connected st:Primary/Secondary ld:Consistent
    ns:12304 nr:0 dw:58 dr:12726 al:4 bm:6 lo:0 pe:0 ua:0 ap:0
 3: cs:Connected st:Primary/Secondary ld:Consistent
    ns:16400 nr:0 dw:121 dr:16873 al:4 bm:5 lo:0 pe:0 ua:0 ap:0
```

clstat output - too little time to capture it! :

Comments

Worked as expected - synced all 4 file systems.

Test Description	Expected Result
Kill lems daemon for "apache" on "centos42s2".	After a minute the software should notice the daemon is not running and should restart it.

Results

```
[root@centos42s2 apache]# ps -ef | grep lems
root     13768     1  0 21:48 ?        00:00:03 lems-apache
root     13851     1  0 21:48 ?        00:00:01 lems-samba
root      3472  3173  0 22:07 pts/0    00:00:00 grep lems
[root@centos42s2 apache]# kill 13768
```

Cluster daemon log output on "rserver2:

```
WARN  23/05/2006 22:07:28 No response from lems session for apache - signal restart.
INFO  23/05/2006 22:07:28 Lems session for apache restarted
```

Indication that daemon has re-started:

```
[root@centos42s2 apache]# ps -ef | grep lems
root     13851     1  0 21:48 ?        00:00:01 lems-samba
root      3477     1  7 22:07 ?        00:00:00 lems-apache
```

Comments

Worked as expected.

3.9 File System Management Testing

The purpose of these tests are to ensure it is possible to add, remove and alter file systems whilst the cluster is up and running.

Test Description	Expected Result
With Apache running on "centos42s2" - alter the size of the logical volume by increasing it by 500Mb and run "clbuildapp".	May take some time to complete - since it must grow and sync the file system, but once complete check the size on both nodes of the logical volume and "df" output on "centos42s2".

Results

```
[root@centos42s2 apache]# df|grep apache
/dev/drbd0              253871    74347    166417  31% /apache
[root@centos42s2 apache]# lvextend -L 750 /dev/apachevg/lv01
  Rounding up size to full physical extent 752.00 MB
  Extending logical volume lv01 to 752.00 MB
  Logical volume lv01 successfully resized
[root@centos42s2 cluster]# clbuildapp -A apache --keeplogs
INFO  23/05/2006 22:18:21 Backups directory defaulted to /clbackup
INFO  23/05/2006 22:18:21
INFO  23/05/2006 22:18:21 Validation of Application 'apache' started.
INFO  23/05/2006 22:18:21   ['/var/log/cluster/build/apache-check-300605232218.log']
INFO  23/05/2006 22:18:22 Initial Validation of Application successful.
INFO  23/05/2006 22:18:22
INFO  23/05/2006 22:18:22 NOTE: Application previously defined - being reconfigured.
INFO  23/05/2006 22:18:22
INFO  23/05/2006 22:18:22 Host Environment Validation started.
INFO  23/05/2006 22:18:22   ['/var/log/cluster/build/apache-envcheck-300605232218.log']
INFO  23/05/2006 22:18:23 Host Environment Validation successful.
INFO  23/05/2006 22:18:23
INFO  23/05/2006 22:18:23 Cluster state     : RUNNING
INFO  23/05/2006 22:18:23 Application state: RUNNING
INFO  23/05/2006 22:18:23
INFO  23/05/2006 22:18:23 Volume Group Configuration started.
INFO  23/05/2006 22:18:23   ['/var/log/cluster/build/apache-lvm-300605232218.log']
INFO  23/05/2006 22:19:31 Volume Group Configuration successful.
INFO  23/05/2006 22:19:31
INFO  23/05/2006 22:19:31 Application Resource Allocation started.
INFO  23/05/2006 22:19:31   ['/var/log/cluster/build/apache-build-300605232218.log']
INFO  23/05/2006 22:19:40 Application Resource Allocation successful.
INFO  23/05/2006 22:19:40
```

On other node at the time:

```
[root@centos42s1 ~]# head /proc/drbd
version: 0.7.18 (api:78/proto:74)
SVN Revision: 2176 build by root@centos42s1, 2006-05-23 21:07:50
 0: cs:SyncTarget st:Secondary/Primary ld:Inconsistent
    ns:0 nr:387388 dw:387388 dr:0 al:0 bm:76 lo:40 pe:220 ua:40 ap:0
        [=====>..............] sync'ed: 28.0% (368804/507904)K
        finish: 0:00:37 speed: 9,844 (9,932) K/sec
 1: cs:Connected st:Secondary/Primary ld:Consistent
    ns:0 nr:68 dw:68 dr:0 al:0 bm:8 lo:0 pe:0 ua:0 ap:0
 2: cs:Connected st:Secondary/Primary ld:Consistent
    ns:0 nr:12304 dw:12304 dr:0 al:0 bm:9 lo:0 pe:0 ua:0 ap:0

[root@centos42s1 ~]# clstat -A apache
Cluster: cluster1 - UP

 Application       Node      State  Runnnig   Monitor   Stale  Fail-over?
     apache centos42s2    STARTED  0:00:30   Running      1        Yes

 File Systems

 Mount Point             Valid   Type     State   % Complete  Completion
 /apache                 local   drbd   Syncing        7 %    0:15:12:00

 Process Monitors

      Name   Status  Restarts   Current        Reset at
     httpd  Running        3         0             N/A

 General Monitors

          Type         Name    Status
    Flag Check    flag_check   Running
    FS Monitor      fsmonitor  Running

[root@centos42s2 cluster]# df|grep apache
/dev/drbd0              745755    74839    632451  11% /apache
```

Comments

Worked as expected.

Test Description	Expected Result
With Apache running on "centos42s2" - add new file system called /apache2 in the apache volume group and rebuild application.	The rebuild should un-mount the local copy and build it as a clustered file system and automatically sync it as well.

Results

```
[root@centos42s2 cluster]# lvcreate -n lv02 -L 500 apachevg
  Logical volume "lv02" created
[root@centos42s2 cluster]# mkfs -t ext3 /dev/apachevg/lv02
mke2fs 1.35 (28-Feb-2004)
Filesystem label=
OS type: Linux
Block size=1024 (log=0)
Fragment size=1024 (log=0)
128016 inodes, 512000 blocks
25600 blocks (5.00%) reserved for the super user
First data block=1
Maximum filesystem blocks=67633152
63 block groups
8192 blocks per group, 8192 fragments per group
2032 inodes per group
Superblock backups stored on blocks:
        8193, 24577, 40961, 57345, 73729, 204801, 221185, 401409

Writing inode tables: done
Creating journal (8192 blocks): done
Writing superblocks and filesystem accounting information: done

This filesystem will be automatically checked every 38 mounts or
180 days, whichever comes first.  Use tune2fs -c or -i to override.
[root@centos42s2 cluster]# mkdir /apache2
[root@centos42s2 cluster]# mount /dev/apachevg/lv02 /apache2
[root@centos42s2 cluster]# df|grep apache
/dev/drbd0              745755      74839     632451  11% /apache
/dev/mapper/apachevg-lv02
                        495844      10544     459700   3% /apache2
[root@centos42s2 cluster]# clbuildapp -A apache
INFO  23/05/2006 22:25:26 Backups directory defaulted to /clbackup
INFO  23/05/2006 22:25:26
INFO  23/05/2006 22:25:26 Validation of Application 'apache' started.
INFO  23/05/2006 22:25:26   ['/var/log/cluster/build/apache-check-300605232225.log']
INFO  23/05/2006 22:25:27 Initial Validation of Application successful.
INFO  23/05/2006 22:25:27
INFO  23/05/2006 22:25:27 NOTE: Application previously defined - being reconfigured.
INFO  23/05/2006 22:25:27
INFO  23/05/2006 22:25:27 Host Environment Validation started.
INFO  23/05/2006 22:25:27   ['/var/log/cluster/build/apache-envcheck-300605232225.log']
INFO  23/05/2006 22:25:28 Host Environment Validation successful.
INFO  23/05/2006 22:25:28
INFO  23/05/2006 22:25:28 Cluster state    : RUNNING
INFO  23/05/2006 22:25:28 Application state: RUNNING
INFO  23/05/2006 22:25:28
INFO  23/05/2006 22:25:28 Volume Group Configuration started.
INFO  23/05/2006 22:25:28   ['/var/log/cluster/build/apache-lvm-300605232225.log']
INFO  23/05/2006 22:25:39 Volume Group Configuration successful.
INFO  23/05/2006 22:25:39
INFO  23/05/2006 22:25:39 Application Resource Allocation started.
INFO  23/05/2006 22:25:39   ['/var/log/cluster/build/apache-build-300605232225.log']
INFO  23/05/2006 22:25:55 Application Resource Allocation successful.
INFO  23/05/2006 22:25:55
```

```
[root@centos42s2 cluster]# clstat -A apache
Cluster: cluster1 - UP

 Application       Node      State  Runnnig  Monitor  Stale  Fail-over?
     apache centos42s2    STARTED  0:00:37  Running      1        Yes

 File Systems

Mount Point               Valid   Type      State   % Complete  Completion
/apache                   both    drbd      Sync
/apache2                  local   drbd      Syncing      30 %  0:11:32:00

 Process Monitors

      Name    Status  Restarts   Current        Reset at
     httpd   Running        3         0             N/A

 General Monitors

         Type         Name    Status
    Flag Check    flag_check  Running
    FS Monitor     fsmonitor  Running

[root@centos42s2 cluster]# df|grep apache
/dev/drbd0             745755      74839     632451  11% /apache
/dev/drbd4             495844      10544     459700   3% /apache2
```

Comments
Worked as expected.

Test Description	Expected Result
Fail-over apache and ensure both file systems mount (create mount point first on "centos42s1")	Both file systems should mount on the other node as well.

Results

```
[root@centos42s1 ~]# mkdir /apache2
[root@centos42s1 ~]# clstat
Cluster: cluster1 - UP

      Node      Status
centos42s1         UP
centos42s2         UP

 Application      Node      State  Started  Monitor  Stale  Fail-over?
     apache       N/A       DOWN      N/A      N/A    N/A       Yes
        samba centos42s2  STARTED  0:00:40  Running     0       Yes
```

==When clstartapp was run DRBD panic occurred (so below is following reform/resync):==

```
[root@centos42s1 ~]# clstartapp -A apache -V
INFO  23/05/2006 22:39:20 Validated checksum for cluster configuration
INFO  23/05/2006 22:39:20 TIMESTAMP: 2006.05.23 22:39:20
INFO  23/05/2006 22:39:20 Checked that node names resolve to IP addresses
INFO  23/05/2006 22:39:20 Validated Build run has completed against this configuration.
INFO  23/05/2006 22:39:20 Maximum start-up time for application: 20
INFO  23/05/2006 22:39:20 drbd kernel module loaded already on centos42s1
INFO  23/05/2006 22:39:20 drbd kernel module loaded already on 192.120.0.2
INFO  23/05/2006 22:39:20 Attempting to register application apache as starting...
INFO  23/05/2006 22:39:20 Application registered successfully as starting.
INFO  23/05/2006 22:39:22 Local DRBD devices started successfully.
INFO  23/05/2006 22:39:22 Ssh communication to centos42s2 via 192.120.0.2.
INFO  23/05/2006 22:39:22 DRBD: Skipping ENBD decisioning and relying on meta data...
INFO  23/05/2006 22:39:22 Attempting to start DRBD services on centos42s2.
INFO  23/05/2006 22:39:23 DRBD devices started successfully on centos42s2.
INFO  23/05/2006 22:39:23 Validated consistency of available data for DRBD.
INFO  23/05/2006 22:39:23 Both data copies believed good.
INFO  23/05/2006 22:39:23 Locking will be attempted via port 9849
INFO  23/05/2006 22:39:23 Successfully connected to lock server.
INFO  23/05/2006 22:39:23 Checking for existing primary application IP addresses...
INFO  23/05/2006 22:39:25 No application primary IP addresses found.
INFO  23/05/2006 22:39:25 Attempt to get lock for NBD_CLIENT
INFO  23/05/2006 22:39:25 Attempting to make local DRBD devices primary...
INFO  23/05/2006 22:39:27 Attempt to release lock for NBD_CLIENT
INFO  23/05/2006 22:39:27 All local DRBD now primary.
INFO  23/05/2006 22:39:29 Running "/sbin/fsck -t ext3 -a /dev/drbd0"...
INFO  23/05/2006 22:39:29 Running "PATH=$PATH:/sbin:/bin:/usr/sbin; mount -t ext3 -o rw /dev/drbd0
/apache"...
INFO  23/05/2006 22:39:29 Running "/sbin/fsck -t ext3 -a /dev/drbd4"...
INFO  23/05/2006 22:39:29 Running "PATH=$PATH:/sbin:/bin:/usr/sbin; mount -t ext3 -o rw /dev/drbd4
/apache2"...
INFO  23/05/2006 22:39:29 File systems mounted on DRBD devices.
INFO  23/05/2006 22:39:29 Attempt to get lock for NET
INFO  23/05/2006 22:39:29 Configuring 192.100.0.10: ifconfig eth0:1 inet 192.100.0.10
INFO  23/05/2006 22:39:29 Sending Builtin Gratuitous arp for eth0:1
INFO  23/05/2006 22:39:29 Attempt to release lock for NET
INFO  23/05/2006 22:39:32 Applications start completed successfully
Application apache started successfully
Application apache started successfully
[root@centos42s1 ~]# df|grep apache
/dev/drbd0          745755    74841    632449  11% /apache
/dev/drbd4          495844    10544    459700   3% /apache2
```

Comments

Worked as expected - apart from DRBD panic - will send message to group.

Test Description	Expected Result
Umount "/apache2" and rebuild the application.	It should not be present in "clstat" or appear on fail-over.

Results

```
[root@centos42s1 ~]# umount /apache2
[root@centos42s1 ~]# df|grep apache
/dev/drbd0             745755     74841    632449  11% /apache
[root@centos42s1 ~]# clbuildapp -A apache
INFO  23/05/2006 22:44:42 Backups directory defaulted to /clbackup
INFO  23/05/2006 22:44:42
INFO  23/05/2006 22:44:42 Validation of Application 'apache' started.
INFO  23/05/2006 22:44:42   ['/var/log/cluster/build/apache-check-300605232244.log']
INFO  23/05/2006 22:44:43 Initial Validation of Application successful.
INFO  23/05/2006 22:44:43
INFO  23/05/2006 22:44:43 NOTE: Application previously defined - being reconfigured.
INFO  23/05/2006 22:44:43
INFO  23/05/2006 22:44:43 Host Environment Validation started.
INFO  23/05/2006 22:44:43   ['/var/log/cluster/build/apache-envcheck-300605232244.log']
INFO  23/05/2006 22:44:44 Host Environment Validation successful.
INFO  23/05/2006 22:44:44
INFO  23/05/2006 22:44:44 Cluster state    : RUNNING
INFO  23/05/2006 22:44:44 Application state: RUNNING
INFO  23/05/2006 22:44:44
INFO  23/05/2006 22:44:44 Volume Group Configuration started.
INFO  23/05/2006 22:44:44   ['/var/log/cluster/build/apache-lvm-300605232244.log']
INFO  23/05/2006 22:44:52 Volume Group Configuration successful.
INFO  23/05/2006 22:44:52
INFO  23/05/2006 22:44:52 Application Resource Allocation started.
INFO  23/05/2006 22:44:52   ['/var/log/cluster/build/apache-build-300605232244.log']
INFO  23/05/2006 22:45:04 Application Resource Allocation successful.
INFO  23/05/2006 22:45:04
[root@centos42s1 ~]# cat /etc/cluster/.resources/fsmap/apache
apachevg:lv01:/apache:ext3:rw:770048
```

After fail-over to "centos42s2":

```
[root@centos42s2 cluster]# clstartapp -A apache
Application apache started successfully
[root@centos42s2 cluster]# df|grep apa
/dev/drbd0             745755     74841    632449  11% /apache
```

Comments

Worked as expected.

3.10 Degraded Cluster Configuration Testing

All sections up to this point have covered checking the way Linuxha.net works when a temporary failure (software, network or hardware) occurs and how it can be used to recover from it. This last set of tests attempt to check the functionality of the software in many of the "worst case scenarios". For example, the tests in this section include:

Also covered in this section are some tests of running standard cluster commands when the cluster is running in a "degraded" state. For example;

- starting the cluster IP address associated with the host name of a node is not available.
- reconnection of primary IP connectivity and ensuring cluster can use it without having to restart.
- starting an application when the DRBD connectivity is not available.
- adding DRBD connectivity and checking synchronization starts automatically.
- starting the cluster with only wireless connectivity

Before starting any of the tests here the following status is expected of the cluster:
- All data is synchronized
- No cluster is running

Test Description	Expected Result
Form the cluster with all cables connected, noting network used. Then halt cluster and disconnect all cables associated with that network and attempt cluster formation again.	Cluster uses alternative network for communication and cluster formation works as expected.

Results

Initial cluster formation:

```
INFO  29/05/2006 21:54:56 Validated checksum for cluster configuration
INFO  29/05/2006 21:54:56 SSH communication to centos42s1 will be:
INFO  29/05/2006 21:54:56   192.100.0.1 ("a" network)
INFO  29/05/2006 21:54:56 Checking that the cluster is not already running...
INFO  29/05/2006 21:54:56 *** ATTEMPTING TO FORM CLUSTER cluster1 ***
INFO  29/05/2006 21:54:58 Starting cldaemon on centos42s2...
INFO  29/05/2006 21:54:58 Starting cldaemon on centos42s1...
INFO  29/05/2006 21:54:59 Waiting for cluster to form...
INFO  29/05/2006 21:55:03 Cluster cluster1 started successfully.
WARN  29/05/2006 21:55:03 Cluster daemon sent invalid response to AUTOSTARTLIST request.
WARN  29/05/2006 21:55:03 No cluster applications will be automatically started.
```

Cluster halted and cables for "a" [eth0,eth2] on "centos42s1" disconnected:

```
[root@centos42s2 ~]# ping 192.100.0.1
PING 192.100.0.1 (192.100.0.1) 56(84) bytes of data.

--- 192.100.0.1 ping statistics ---
2 packets transmitted, 0 received, 100% packet loss, time 1009ms
```

Cluster Formation:

```
INFO  29/05/2006 21:59:00 Validated checksum for cluster configuration
INFO  29/05/2006 21:59:02 SSH communication to centos42s1 will be:
INFO  29/05/2006 21:59:02   192.120.0.1 ("?unknown?" network)
INFO  29/05/2006 21:59:02 Checking that the cluster is not already running...
INFO  29/05/2006 21:59:02 *** ATTEMPTING TO FORM CLUSTER cluster1 ***
INFO  29/05/2006 21:59:03 Starting cldaemon on centos42s2...
INFO  29/05/2006 21:59:03 Starting cldaemon on centos42s1...
INFO  29/05/2006 21:59:04 Waiting for cluster to form...
INFO  29/05/2006 21:59:09 Cluster cluster1 started successfully.
WARN  29/05/2006 21:59:09 Cluster daemon sent invalid response to AUTOSTARTLIST request.
WARN  29/05/2006 21:59:09 No cluster applications will be automatically started.
```

Cluster status using clstat:

```
[root@centos42s2 ~]# clstat --net
Cluster: cluster1 - UP

     Node       Status
centos42s1        UP
centos42s2        UP

 Application        Node        State  Started  Monitor  Stale  Fail-over?
     apache         N/A         DOWN     N/A      N/A     N/A       Yes
     samba          N/A         DOWN     N/A      N/A     N/A       Yes

 Network status for centos42s2

   Network   Status  Link Check?   Interface  Monitor?    R Kb/S    W Kb/S
      a      alive       yes         eth0       yes         0.0       0.0
      b      alive       yes         eth1       yes         0.2       0.2

 Network status for centos42s1

   Network   Status  Link Check?   Interface  Monitor?    R Kb/S    W Kb/S
      a      dead        yes         eth0        no         0.0       0.0
      b      alive       yes         eth1       yes         0.2       0.2
```

Comments
Works as expected.
Note: The clform commands when giving the IP address does not show the network name in brackets correctly. Raised bug 500 to fix in 1.2.x series.

Test Description	Expected Result
Reconnect the network cables that were removed.	After 30 seconds the status of the network in question on "centos42s1" should change back to "alive".

Results

```
[root@centos42s1 tmp]# clstat --net
Cluster: cluster1 - UP

     Node       Status
centos42s1        UP
centos42s2        UP

 Application      Node       State  Started  Monitor  Stale  Fail-over?
    apache        N/A        DOWN     N/A      N/A     N/A       Yes
     samba        N/A        DOWN     N/A      N/A     N/A       Yes

 Network status for centos42s1

   Network   Status  Link Check?   Interface  Monitor?    R Kb/S    W Kb/S
       a     alive          yes        eth0      yes       0.2       0.2
       b     alive          yes        eth1      yes       0.3       0.3

 Network status for centos42s2

   Network   Status  Link Check?   Interface  Monitor?    R Kb/S    W Kb/S
       a     alive          yes        eth0      yes       0.2       0.2
       b     alive          yes        eth1      yes       0.3       0.3
```

Comments

Works as expected.

Test Description	Expected Result
Remove "b" network connectivity "centos42s1"- and check cluster (without applications functions).	Should be noted, but not cause any failures.

Results

Network daemon log on "centos42s1":

```
WARN  30/05/2006 21:18:39 Link failure detected on b eth1 - migrating.
WARN  30/05/2006 21:18:39 Failure result info was: 0
INFO  30/05/2006 21:18:39 Sent Cluster Daemon "NO_NET NET=b HOST=centos42s1 FORWARD=yes" message.
```

Cluster daemon log on "centos42s1":
```
INFO  30/05/2006 21:19:23 Entered handle_nonet!
INFO  30/05/2006 21:19:23 Network b has failed locally - but no applications make use of it.
```

Comments

Works as expected.

Test Description	Expected Result
With cluster halted disconnect the "b" network connection on "centos42s1" and attempt to form cluster.	Should should form using alternative network.

Results

ping indicating network is unavailable:

```
PING centos42s2b (192.120.0.2) 56(84) bytes of data.
From 192.120.0.1 icmp_seq=0 Destination Host Unreachable
From 192.120.0.1 icmp_seq=1 Destination Host Unreachable

--- centos42s2b ping statistics ---
3 packets transmitted, 0 received, +2 errors, 100% packet loss, time 1999ms
```

Show cluster formation:

```
[root@rserver1 ~]# clform
INFO  30/05/2006 21:21:08 Validated checksum for cluster configuration
INFO  30/05/2006 21:21:10 SSH communication to centos42s2 will be:
INFO  30/05/2006 21:21:10   192.100.0.2 ("?unknown?" network)
INFO  30/05/2006 21:21:10 Checking that the cluster is not already running...
INFO  30/05/2006 21:21:10 *** ATTEMPTING TO FORM CLUSTER cluster1 ***
INFO  30/05/2006 21:21:12 Starting cldaemon on centos42s1...
INFO  30/05/2006 21:21:12 Starting cldaemon on centos42s2...
INFO  30/05/2006 21:21:12 Waiting for cluster to form...
INFO  30/05/2006 21:21:18 Cluster cluster1 started successfully.
```

Show cluster status:
```
[root@centos42s1 ~]# clstat
Cluster: cluster1 - UP

      Node       Status
centos42s1         UP
centos42s2         UP

 Application       Node      State  Started  Monitor  Stale  Fail-over?
     apache        N/A       DOWN     N/A      N/A     N/A       Yes
      samba        N/A       DOWN     N/A      N/A     N/A       Yes
```

Comments

Works as expected.

Test Description	Expected Result
With "b" network still disconnected start "samba" on "centos42s1", then "apache" on "centos42s2".	Should both start with stale data in clstat.

Results

Cluster status:

```
[root@centos42s2 ~]# clstat
Cluster: cluster1 - UP

     Node      Status
centos42s1        UP
centos42s2        UP

 Application      Node      State  Started  Monitor  Stale  Fail-over?
     apache centos42s2   STARTED  0:00:00  Running     1       Yes
      samba centos42s1   STARTED  0:00:01  Running     3       Yes
```

Comments

Worked as expected via "clstartapp" on each node.

Test Description	Expected Result
Reconnect "b" cable with applications running.	Should shortly start to automatically synchronize.

Results

Clstat output:

```
[root@centos42s1 ~]# clstat
Cluster: cluster1 - UP

      Node      Status
centos42s1        UP
centos42s2        UP

 Application      Node     State  Started  Monitor  Stale  Fail-over?
     apache centos42s2  STARTED  0:00:01  Running     0        Yes
      samba centos42s1  STARTED  0:00:05  Running     0        Yes
```

Sample Lems Output:

```
INFO   30/05/2006 21:30:04 [DRBD] Attempting to communicate to IP 192.120.0.2(icmp)
INFO   30/05/2006 21:30:04 [DRBD] Connected remote server via DRBD IP.
INFO   30/05/2006 21:30:14 [DRBD] Attempting to contact local cldaemon...
INFO   30/05/2006 21:30:14 [DRBD] Local cldaemon now started!
INFO   30/05/2006 21:30:24 [DRBD] Attempting to contact remote cldaemon...
INFO   30/05/2006 21:30:24 [DRBD] Contacted cldaemon via 192.100.0.2 for centos42s2
INFO   30/05/2006 21:30:34 [DRBD] Attempting to check DRBD devices locally...
INFO   30/05/2006 21:30:34 [DRBD] Response from CHECK_NBD on localhost was OK
INFO   30/05/2006 21:30:34 [DRBD] Attempting to check DRBD devices remotely...
INFO   30/05/2006 21:30:34 [DRBD] Response from CHECK_NBD on remote host was OK
INFO   30/05/2006 21:30:34 [DRBD] Nothing to do...
INFO   30/05/2006 21:30:34 Monitor fsmonitor returned: 1 => [PAUSE 30]
```

Comments

Worked as expected.

3.11 Network Partitioning and Network Resource Checks

At the start of these tests the cluster is running with Samba on "centos42s1" and Apache on "centos42s2". The configuration should provide two pingable remote connections, which in this case are:

```
<net_known_connections>
www.bbc.co.uk
www.demon.net
</net_known_connections>
```

Both networks should be alive on both hosts, and no data should be stale.

Test Description	Expected Result
Disconnect "a" cables on "centos42s1".	Samba should fail across to "centos42s2" since the network resource it relies on is not available on "centos42s1".
Results	

Clstat output:

```
[root@centos42s1 cldmodules]# clstat
Cluster: cluster1 - UP

     Node       Status
centos42s1        UP
centos42s2        UP

 Application      Node      State  Started  Monitor  Stale  Fail-over?
     apache centos42s2   STARTED  0:00:30  Running      0        Yes
      samba centos42s2   STARTED  0:00:03  Running      0        Yes
```

Cluster log Output:

```
INFO  30/05/2006 21:55:56 Entered handle_nonet [failed network is 'a'].
INFO  30/05/2006 21:55:56 Networks used bt 'samba' : a
INFO  30/05/2006 21:55:56   -> Application 'samba' must be failed over.
INFO  30/05/2006 21:55:56 Spawned process 7739 to stop applications: samba
```

Comments

Worked as expected.

Now reconnect the cables and ensure the networks are again alive on both machines, and that no data is stale before continuing, e.g. :

```
Cluster: cluster1 - UP

    Node       Status
centos42s1        UP
centos42s2        UP

 Application      Node      State  Started  Monitor  Stale  Fail-over?
     apache centos42s2   STARTED  0:00:37  Running     0        Yes
      samba centos42s2   STARTED  0:00:10  Running     0        Yes

Network status for centos42s1

   Network   Status  Link Check?   Interface  Monitor?   R Kb/S    W Kb/S
        a    alive         yes         eth2       yes       0.2       0.2
        b    alive         yes         eth1       yes       0.3       0.3

Network status for centos42s2

   Network   Status  Link Check?   Interface  Monitor?   R Kb/S    W Kb/S
        a    alive         yes         eth0       yes       0.2       0.2
        b    alive         yes         eth1       yes       0.3       0.3
```

With the applications on "centos42s1" also delete the default route:

```
[root@centos42s1 cluster]# route delete -net 0.0.0.0 gw 192.168.1.1
[root@centos42s1 cluster]# ping www.demon.net
connect: Network is unreachable
```

This will ensure that when the network cables ar removed from "centos42s1" it realises that in fact the remote node has not failed, instead it is partitioned from the network and take no action.

Test Description	Expected Result
Disconnect "a" cables and "b" cables from "centso42s1".	It should not attempt to take over the applications currently running on "centos42s2".

Results

Heart-beat daemon log:

```
WARN  30/05/2006 22:15:08 No response for 9 seconds!
WARN  30/05/2006 22:15:17 Attempting partitioning with IPs: www.bbc.co.uk,www.demon.net
WARN  30/05/2006 22:15:17 In built success threshold is 50%!
WARN  30/05/2006 22:15:23 Ping of www.bbc.co.uk failed!
WARN  30/05/2006 22:15:24 Ping of www.demon.net failed!
INFO  30/05/2006 22:15:24 Pinged addresses: 2 [failed=2]
INFO  30/05/2006 22:15:24 Threshold passed - assume local node is partitioned!
INFO  30/05/2006 22:15:24 Cldaemon response to PARTITIONED: OK
```

Clstat on "centso42s1" output:

```
Cluster: cluster1 - UP

      Node      Status
centos42s1 PARTITIONED
centos42s2        UP

 Application       Node     State  Started  Monitor  Stale  Fail-over?
     apache centos42s2    STARTED  0:00:46  Running      1        Yes
      samba centos42s2    STARTED  0:00:19  Running      3        Yes
```

Comments

Worked as expected.

Test Description	Expected Result
Reconnect "a" cables and "b" cables to "centso42s1".	Should resume OK status - with heartbeat daemon recovering situation.

Results

Heart-beat daemon log:

```
INFO  30/05/2006 22:18:52 Cldaemon response to UNPARTITIONED: OK
```

Clstat on "centso42s1" output:

```
[root@centos42s1 cluster]# clstat
Cluster: cluster1 - UP

     Node      Status
centos42s1        UP
centos42s2        UP

 Application      Node      State  Started  Monitor  Stale  Fail-over?
      apache centos42s2   STARTED  0:00:49  Running     0         Yes
       samba centos42s2   STARTED  0:00:22  Running     0         Yes
```

Clstat outputs on "centos42s2":
```
[root@centos42s2 ~]# clstat
Cluster: cluster1 - UP

     Node      Status
centos42s1      DOWN
centos42s2        UP

 Application      Node      State  Started  Monitor  Stale  Fail-over?
      apache centos42s2   STARTED  0:00:01  Running     1          No
       samba       N/A      DOWN      N/A      N/A    N/A          No
[root@centos42s2 ~]# clstat
Cluster: cluster1 - UP

     Node      Status
centos42s1        UP
centos42s2        UP

 Application      Node      State  Started  Monitor  Stale  Fail-over?
      apache centos42s2   STARTED  0:00:01  Running     0         Yes
       samba       N/A      DOWN      N/A      N/A    N/A         Yes
```

Comments

Worked as expected.

3.12 Conclusions

Few issues remain - these are expected to be fixed prior to version 1.0.0. One of the most important changes will be the caching of IP connectivity - this will allow the software to be more responsive when one or more networks fail.