LCI workshop
on high performance clustered computing

Linux Clusters Institute: Node Health Check (NHC)

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What is NHC?

- NHC is a tool for determining the health status of a node.
  - Node misconfiguration
  - Failure situations
  - Hardware failures
- NHC can mark “unhealthy” nodes offline so jobs don’t fail
- NHC helps to increase the reliability and throughput of jobs run on a cluster
- NHC has one function, to verify that a node is healthy to run a new job!
  - We don’t want any dazed and confused nodes that appear to still be working

Why NHC?

- NHC provides a framework for node monitoring
  - Get away from home grown scripts, which are not always portable or reliable.
  - Administration issues
- There are a large number of built-in checks. (check the website for them: https://github.com/mej/nhc#built-in-checks)
- Lawrence Berkeley National Laboratory (LBNL) Design Goals
  - Reliable
  - Flexible
  - Extensible
  - Should be fast
  - Code should be reusable and easy to port

Using NHC?

- Using NHC
  - From the command line
  - As an addition to the job scheduler, i.e. Slurm, PbsPro, LSF
  - As a cron job on a node
- Checks are based on node name
  - Matching checks are run
  - If a check fails, NHC exits
    - Prints a message with information about which check failed and why
    - If run from a job scheduler, can mark the node offline
  - Can log failure(s) to syslog

Installing NHC on a node

- You can download RPM's from the hosting Github site
  - NHC is installed into the OS standard paths
    - /usr/sbin/nhc (the NHC command)
    - /etc/nhc
    - /usr/libexec/nhc
  - Default configuration files will be installed in /etc/nhc
- You can also download the source and build the code locally
  - ./configure --prefix=/usr --sysconfdir=/etc --libexecdir=/usr/libexec
  - make test
  - make install

Testing NHC

- If you install from source, you can run a verification test suite
  - Run “make test”
  - Once you make changes to the config files it’s best to run the health checks
    - Run “/usr/sbin/nhc”
  - When you are satisfied with the results you can add it to your job scheduler

Configuring NHC

- NHC uses a configuration file “/etc/nhc/nhc.conf”
- Simple configuration
  - Default configuration file has multiple sections, broken down by
    - Configuration variables
    - Hardware checks
    - filesystems checks
    - Process checks
    - Scheduler checks
    - Other check, i.e. none of the above areas
- In the default configuration file most of the checks are commented out
- NHC uses scripts to handle failure check functions found in “/etc/nhc/scripts”
- Users can add their own checks to NHC (not covered here, but checkout the website)
- User can auto generate the config file using “/etc/nhc-genconf” command

Configuration Example

```
#########################################################################
###
### Filesystem checks
###
# All nodes should have their root filesystem mounted read/write.
  * || check_fs_mount_rw -f /

# Assert that /tmp is a mounted filesystem of type "tmpfs."
#   * || check_fs_mount_rw -t tmpfs -f /tmp

# Controlling TTYs are a good thing!
#   * || check_fs_mount_rw -t devpts -s '/(none|devpts)/' -f /dev/pts

# Make sure the root filesystem doesn't get too full.
#   * || check_fs_free / 3%

# Free inodes are also important.
#   * || check_fs_ifree / 1k

# The following illustrates how to assert an NFSv3 mount (or any other specific mount option).
#   * || check_fs_mount -s bluearc0:/home -t nfs -o '/(^|,)vers=3(,|$)/' -f /home
```

Intregration with Job schedulers

- Torque
  - Add the following lines to your pbs_mom config files
    $node_check_script /usr/sbin/nhc
    $node_check_interval 5,jobstart,jobend
    $down_on_error 1

    This will run NHC every five minutes and at job start and job end, makring the node offline if NHC fails a check
  - You will need to enable “operator” access on each node
    qmgr –c “set server operators += root@*”
  - NHC will add a note indicating the failure. Once the failure has been corrected the note will be remove.

References

- NHC software site
  - https://github.com/mej/nhcAdministration issues
- RPM's location
  - https://github.com/mej/nhc/releases/