CS300 Couchbase NoSQL Server Administration

Lab 7.1 Exercise Manual

Release: 6.5.1

Revised: June 22nd, 2020

Couchbase

Lab #7.1: Installation and configuration of a chronyd and setup of NTP based conflict resolution for active/active XDCR

Objective: This 1-hour lab will walk you through Installation and configuration of a chronyd and setup of NTP based conflict resolution for active/active XDCR

Warning: Do not copy + paste commands from this lab into your PuTTY/Terminal session. Some commands, especially multi-line commands will not paste properly and the ASCII symbols from the PDF will not appear the same in the SSH session. A multi-line command will break into 2 lines when you copy it as the PDF will insert a /n character after the first line. This will cause the line to be split incorrectly when you paste it into the terminal window. Instead, please type each command individually into the SSH session!

Overview: The following high-level steps are involved in this lab:

Install latest version of chronyd
Configure chronyd and associated files
Create a bucket with “Timestamp” based conflict resolution
Test configuration

Using chronyd:

The chrony daemon, chronyd, running in user space, makes adjustments to the system clock which is running in the kernel. It does this by consulting external time sources, using the NTP protocol, when ever network access allows it to do so. When external references are not available, chronyd will use the last calculated drift stored in the drift file. It can also be commanded manually to make corrections, by chronyc.

The chrony daemon, chronyd, can be controlled by the command line utility chronyc. This utility provides a command prompt which allows entering of a number of commands to make changes to chronyd. The default configuration is for chronyd to only accept commands from a local instance of chronyc, but chronyc can be used to alter the configuration so that chronyd will allow external control. chronyc can be run remotely after first configuring chronyd to accept remote connections. The IP addresses allowed to connect to chronyd should be tightly controlled.

Note: the following procedures need to be implemented across all nodes in Clusters 1 & 2

Check your system for the presence of chrony

```
[root@RH73-1 ~]# rpm -qa | grep chrony

chrony-2.1.1-3.el7.x86_64
```

Update to the latest version of chronyd

```
[root@RH73-1 ~]# yum update chrony
Loaded plugins: amazon-id, rhui-lb, search-disabled-repos
Resolving Dependencies
--> Running transaction check
---> Package chrony.x86_64 0:2.1.1-3.el7 will be updated
---> Package chrony.x86_64 0:2.1.1-4.el7_3 will be an update
--> Finished Dependency Resolution

Dependencies Resolved

================================================================================
 Package       Arch          Version              Repository                 Size
================================================================================
Updating:
 chrony        x86_64        2.1.1-4.el7_3        rhui-REGION-rhel-server-releases  281 k

Transaction Summary
================================================================================
Upgrade  1 Package

Total download size: 281 k
Is this ok [y/d/N]: y
Downloading packages:
Delta RPMs disabled because /usr/bin/applydeltarpm not installed.
chrony-2.1.1-4.el7_3.x86_64.rpm                          | 281 kB  00:00:00
Running transaction check
Running transaction test
Transaction test succeeded
```

```
Running transaction
Warning: RPMDB altered outside of yum.
  Updating   : chrony-2.1.1-4.el7_3.x86_64                          1/2
  Cleanup    : chrony-2.1.1-3.el7.x86_64                            2/2
  Verifying  : chrony-2.1.1-4.el7_3.x86_64                          1/2
  Verifying  : chrony-2.1.1-3.el7.x86_64                            2/2

Updated:
  chrony.x86_64 0:2.1.1-4.el7_3

Complete!
```

Checking the Status of chronyd

To check the status of chronyd, issue the following command:

```
[root@RH73-1 ~]# systemctl status chronyd
chronyd.service - NTP client/server
   Loaded: loaded (/usr/lib/systemd/system/chronyd.service; enabled; vendor preset: enabled)
   Active: active (running) since Wed 2017-01-25 14:26:24 EST; 4min 36s ago
  Process: 6402 ExecStartPost=/usr/libexec/chrony-helper update-daemon (code=exited,
status=0/SUCCESS)
  Process: 6398 ExecStart=/usr/sbin/chronyd $OPTIONS (code=exited, status=0/SUCCESS)
 Main PID: 6400 (chronyd)
   CGroup: /system.slice/chronyd.service
           └─6400 /usr/sbin/chronyd

Jan 25 14:26:24 RH73-1 chronyd[6400]: chronyd version 2.1.1 starting (+CMDMON +NTP +REFCLOCK +RTC
+PR...HASH)
Jan 25 14:26:24 RH73-1 systemd[1]: Starting NTP client/server...
Jan 25 14:26:24 RH73-1 chronyd[6400]: Frequency -13.214 +/- 0.044 ppm read from
/var/lib/chrony/drift
Jan 25 14:26:24 RH73-1 systemd[1]: Started NTP client/server.
Jan 25 14:26:29 RH73-1 chronyd[6400]: Selected source 104.131.53.252
Hint: Some lines were ellipsized, use -l to show in full.

[root@RH73-1 ~]#
```

Checking chrony Tracking

```
[root@RH73-1 ~]# chronyc tracking

Reference ID    : 104.131.53.252 (104.131.53.252)
Stratum         : 3
Ref time (UTC)  : Wed Jan 25 19:34:04 2017
System time     : 0.000376487 seconds fast of NTP time
Last offset     : -0.000031977 seconds
RMS offset      : 0.000982537 seconds
Frequency       : 12.888 ppm slow
Residual freq   : +0.053 ppm
Skew            : 0.679 ppm
```

```
Root delay      : 0.014095 seconds
Root dispersion : 0.021393 seconds
Update interval : 65.1 seconds
Leap status     : Normal
[root@RH73-1 ~]#
```

The fields are as follows:

Reference ID

This is the reference ID and name (or IP address) if available, of the server to which the computer is currently synchronized. If this is 127.127.1.1 it means the computer is not synchronized to any external source and that you have the "local" mode operating (via the local command in chronyc, or the local directive in the /etc/chrony.conf file (see section local)).

Stratum

The stratum indicates how many hops away from a computer with an attached reference clock we are. Such a computer is a stratum-1 computer, so the computer in the example is two hops away (that is to say, a.b.c is a stratum-2 and is synchronized from a stratum-1).

Ref time

This is the time (UTC) at which the last measurement from the reference source was processed.

System time

In normal operation, chronyd never steps the system clock, because any jump in the timescale can have adverse consequences for certain application programs. Instead, any error in the system clock is corrected by slightly speeding up or slowing down the system clock until the error has been removed, and then returning to the system clock's normal speed. A consequence of this is that there will be a period when the system clock (as read by other programs using the gettimeofday() system call, or by the date command in the shell) will be different from chronyd's estimate of the current true time (which it reports to NTP clients when it is operating in server mode). The value reported on this line is the difference due to this effect.

Last offset

This is the estimated local offset on the last clock update.

RMS offset

This is a long-term average of the offset value.

Frequency

The "frequency" is the rate by which the system's clock would be wrong if chronyd was not correcting it. It is expressed in ppm (parts per million). For example, a value of 1ppm would mean that when the system's clock thinks it has advanced 1 second, it has actually advanced by 1.000001 seconds relative to true time.

Residual freq

This shows the "residual frequency" for the currently selected reference source. This reflects any difference between what the measurements from the reference source indicate the frequency should be and the frequency

currently being used. The reason this is not always zero is that a smoothing procedure is applied to the frequency. Each time a measurement from the reference source is obtained and a new residual frequency computed, the estimated accuracy of this residual is compared with the estimated accuracy (see skew next) of the existing frequency value. A weighted average is computed for the new frequency, with weights depending on these accuracies. If the measurements from the reference source follow a consistent trend, the residual will be driven to zero over time.

Skew

This is the estimated error bound on the frequency.

Root delay

This is the total of the network path delays to the stratum-1 computer from which the computer is ultimately synchronized. In certain extreme situations, this value can be negative. (This can arise in a symmetric peer arrangement where the computers' frequencies are not tracking each other and the network delay is very short relative to the turn-around time at each computer.)

Root dispersion

This is the total dispersion accumulated through all the computers back to the stratum-1 computer from which the computer is ultimately synchronized. Dispersion is due to system clock resolution, statistical measurement variations etc.

Leap status

This is the leap status, which can be Normal, Insert second, Delete second or Not synchronized

Checking chrony Sources

```
[root@RH73-1 ~]# chronyc sources -v
210 Number of sources = 4

  .-- Source mode  '^' = server, '=' = peer, '#' = local clock.
 / .- Source state '*' = current synced, '+' = combined , '-' = not combined,
| /   '?' = unreachable, 'x' = time may be in error, '~' = time too variable.
||                                                 .- xxxx [ yyyy ] +/- zzzz
||      Reachability register (octal) -.           |  xxxx = adjusted offset,
||      Log2(Polling interval) --.      |          |  yyyy = measured offset,
||                                \     |          |  zzzz = estimated error.
||                                 |    |           \
MS Name/IP address         Stratum Poll Reach LastRx Last sample
===============================================================================
^- 195.21.152.161                2   9   377     9  -1640us[-1640us] +/-  197ms
^+ PBX.cytranet.net              2   9   377     0  +1938us[+1938us] +/-   73ms
^* 104.131.53.252                2   9   377   517  -1049us[-1062us] +/-   34ms
^+ palpatine.steven-mcdonald     2   9   377   515  +1129us[+1129us] +/-   63ms
[root@RH73-1 ~]#
```

```
[root@RH73-1 ~]# chronyc sourcestats -v
210 Number of sources = 4
                             .- Number of sample points in measurement set.
                            /    .- Number of residual runs with same sign.
                           |    /    .- Length of measurement set (time).
                           |   |    /      .- Est. clock freq error (ppm).
                           |   |   |      /           .- Est. error in freq.
                           |   |   |     |           /         .- Est. offset.
                           |   |   |     |          |          |   On the -.
                           |   |   |     |          |          |   samples. \
```

```
                           |   |   |     |           |           |             |
Name/IP Address            NP  NR  Span  Frequency  Freq Skew  Offset  Std Dev
==============================================================================
195.21.152.161             23  10   48m     -0.231      0.161  -1866us   156us
PBX.cytranet.net           23  11   48m     -0.206      0.093  +1686us    92us
104.131.53.252             23   9   48m     +0.206      0.071   -780us    76us
palpatine.steven-mcdonald  23  13   48m     -0.255      0.340   +206us   309us
[root@RH73-1 ~]#
```

Using the timedatectl Command

```
[root@RH73-1 ~]# timedatectl
      Local time: Wed 2017-01-25 15:24:29 EST
  Universal time: Wed 2017-01-25 20:24:29 UTC
        RTC time: Wed 2017-01-25 20:24:28
       Time zone: America/New_York (EST, -0500)
     NTP enabled: yes
NTP synchronized: yes
 RTC in local TZ: no
      DST active: no
 Last DST change: DST ended at
                  Sun 2016-11-06 01:59:59 EDT
                  Sun 2016-11-06 01:00:00 EST
 Next DST change: DST begins (the clock jumps one hour forward) at
                  Sun 2017-03-12 01:59:59 EST
                  Sun 2017-03-12 03:00:00 EDT
[root@RH73-1 ~]#
```

Note: Important
Changes to the status of chrony or ntpd will not be immediately noticed by timedatectl. If changes to the configuration or status of these tools is made, enter the following command:

~]# systemctl restart chronyd

Edit the chrony.conf file on <u>all nodes</u> to reflect the peer statements for all couchbase cluster nodes.

Here is an example:

```
[root@RH73-1 etc]# cat /etc/chrony.conf
# Use public servers from the pool.ntp.org project.
# Please consider joining the pool (http://www.pool.ntp.org/join.html).
server 0.rhel.pool.ntp.org iburst
server 1.rhel.pool.ntp.org iburst
server 2.rhel.pool.ntp.org iburst
server 3.rhel.pool.ntp.org iburst
peer ec2-54-147-100-236.compute-1.amazonaws.com
peer ec2-54-161-128-223.compute-1.amazonaws.com
peer ec2-54-164-220-196.compute-1.amazonaws.com
peer ec2-54-174-66-150.compute-1.amazonaws.com
peer ec2-54-175-89-168.compute-1.amazonaws.com
peer ec2-54-237-247-153.compute-1.amazonaws.com
peer ec2-54-242-102-204.compute-1.amazonaws.com

# Ignore stratum in source selection.
stratumweight 0

# Record the rate at which the system clock gains/losses time.
driftfile /var/lib/chrony/drift

# Enable kernel RTC synchronization.
rtcsync

# In first three updates step the system clock instead of slew
# if the adjustment is larger than 10 seconds.
makestep 10 3

# Allow NTP client access from local network.
#allow 192.168/16

# Listen for commands only on localhost.
bindcmdaddress 127.0.0.1
bindcmdaddress ::1

# Serve time even if not synchronized to any NTP server.
#local stratum 10

keyfile /etc/chrony.keys

# Specify the key used as password for chronyc.
commandkey 1

# Generate command key if missing.
generatecommandkey

# Disable logging of client accesses.
```

```
noclientlog

# Send a message to syslog if a clock adjustment is larger than 0.5 seconds.
logchange 0.5

logdir /var/log/chrony
#log measurements statistics tracking
[root@RH73-1 etc]#
```

Note: Important
Changes to the status of chrony or ntpd will not be immediately noticed by timedatectl. If changes to the configuration or status of these tools is made, enter the following command:

[root@RH73-1 /]# systemctl restart chronyd

Verify that you have edited this file on ALL nodes in BOTH clusters and restarted the chonyd deamon on all nodes.

Check with the following command:

```
[root@RH73-1 etc]# chronyc sourcestats -v
210 Number of sources = 11
                             .- Number of sample points in measurement set.
                            /    .- Number of residual runs with same sign.
                           |    /    .- Length of measurement set (time).
                           |   |    /      .- Est. clock freq error (ppm).
                           |   |   |      /           .- Est. error in freq.
                           |   |   |     |           /         .- Est. offset.
                           |   |   |     |          |          |   On the -.
                           |   |   |     |          |          |   samples. \
                           |   |   |     |          |          |             |
Name/IP Address            NP  NR  Span  Frequency  Freq Skew  Offset  Std Dev
==============================================================================
biisoni.miuku.net           8   4  121m     -0.260      0.463  +3607us   488us
mdnworldwide.com           13   7  224m     -0.176      0.075   +830us   234us
ntp2.wiktel.com             6   3   85m     -0.353      0.578   -310us   313us
hadb2.smatwebdesign.com     9   5  138m     -0.345      0.228   +955us   350us
ip-172-31-0-43.ec2.intern   0   0    0      +0.000   2000.000     +0ns  4000ms
ip-172-31-9-155.ec2.inter   0   0    0      +0.000   2000.000     +0ns  4000ms
ip-172-31-5-64.ec2.intern   6   3  594m     +0.175      0.039  +2754us   186us
ip-172-31-1-188.ec2.inter   9   5   68m     +0.209      0.068  +3803us    59us
ip-172-31-11-79.ec2.inter   4   3  657      -4.504     37.627   -237ms   537us
ip-172-31-11-51.ec2.inter  15   5  156m     -0.116      0.026  -4477us    73us
ip-172-31-3-116.ec2.inter   8   3  120m     +0.333      0.060  +4809us    58us
[root@RH73-1 etc]#
```

See the new peer additions? They have the internal Amazon addresses of ip-172…..

There will only be 4 used even though you added 6. If 1 fails the other 2 may be used.

This concludes the setup portion of the NTP lab.