**How to set up the NTP service.**

Note: This is an [RHCSA 7 exam objective](https://www.certdepot.net/rhel7-rhcsa-exam-objectives/) and an [RHCE 7 exam objective](https://www.certdepot.net/rhel7-rhce-exam-objectives/).

**Presentation**

**NTP** (**N**etwork **T**ime **P**rotocol) is a protocol to keep servers time synchronized: one or several master servers provide time to client servers that can themselves provide time to other client servers (notion of stratus).

This tutorial deals with client side configuration, even though server configuration is not entirely different.

Two main packages are used in **RHEL 7** to set up the client side:

* **ntp**: this is the classic package, already existing in **RHEL 6**, **RHEL 5**, etc. It can be used both as a **NTP** client or server.
* **chrony**: this is a new solution better suited for portable PC or machines with network connection problems (time synchronization is quicker). It is mainly used as a **NTP** client. **chrony** is the default package in **RHEL 7** (a [recent security audit](https://wiki.mozilla.org/images/e/e4/Chrony-report.pdf) has showed that **chrony** is pretty well written and secure).

**Caution**: **ntpd** and **chronyd** shouldn’t run at the same time. Choose one and only one of them! There are reports from **RHCE** candidates noting that one of them is purposely already running at the beginning of the exam.

**Prerequisites**

Before anything else, you need to assign the correct time zone.  
To get the current configuration, type:

# **timedatectl**

Local time: Sat 2015-11-07 08:17:33 EST

Universal time: Sat 2015-11-07 13:17:33 UTC

RTC time: Sat 2015-11-07 13:17:33

Timezone: **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 2015-11-01 01:59:59 EDT

Sun 2015-11-01 01:00:00 EST

Next DST change: DST begins (the clock jumps one hour forward) at

Sun 2016-03-13 01:59:59 EST

Sun 2016-03-13 03:00:00 EDT

To get the list of all the available time zones, type:

# **timedatectl list-timezones**

Africa/Abidjan

Africa/Accra

Africa/Addis\_Ababa

...

America/La\_Paz

America/Lima

America/Los\_Angeles

...

Asia/Seoul

Asia/Shanghai

Asia/Singapore

...

Pacific/Tongatapu

Pacific/Wake

Pacific/Wallis

Finally, to set a specific time zone (here **America/Los\_Angeles**), type:

# **timedatectl set-timezone America/Los\_Angeles**

Then, to check your new configuration, type:

# **timedatectl**

Local time: Sat 2015-11-07 05:32:43 PST

Universal time: Sat 2015-11-07 13:32:43 UTC

RTC time: Sat 2015-11-07 13:32:43

Timezone: **America/Los\_Angeles (PST, -0800)**

NTP enabled: yes

NTP synchronized: yes

RTC in local TZ: no

DST active: no

Last DST change: DST ended at

Sun 2015-11-01 01:59:59 PDT

Sun 2015-11-01 01:00:00 PST

Next DST change: DST begins (the clock jumps one hour forward) at

Sun 2016-03-13 01:59:59 PST

Sun 2016-03-13 03:00:00 PDT

**The NTP Package**

Install the **NTP** package:

# **yum install -y ntp**

Activate the **NTP** service at boot:

# **systemctl enable ntpd**

Start the **NTP** service:

# **systemctl start ntpd**

The **NTP** configuration is in the **/etc/ntp.conf** file:

# For more information about this file, see the man pages

# ntp.conf(5), ntp\_acc(5), ntp\_auth(5), ntp\_clock(5), ntp\_misc(5), ntp\_mon(5).

driftfile /var/lib/ntp/drift

# Permit time synchronization with our time source, but do not

# permit the source to query or modify the service on this system.

restrict default nomodify notrap nopeer noquery

# Permit all access over the loopback interface. This could

# be tightened as well, but to do so would effect some of

# the administrative functions.

restrict 127.0.0.1

restrict ::1

# Use public servers from the pool.ntp.org project.

# Please consider joining the pool (http://www.pool.ntp.org/join.html).

**server 0.centos.pool.ntp.org iburst**

**server 1.centos.pool.ntp.org iburst**

**server 2.centos.pool.ntp.org iburst**

**server 3.centos.pool.ntp.org iburst**

includefile /etc/ntp/crypto/pw

# Key file containing the keys and key identifiers used when operating

# with symmetric key cryptography.

keys /etc/ntp/keys

Note: For basic configuration purpose, only the **server** directives could need a change to point at a different set of master time servers than the defaults specified.

To get some information about the time synchronization process, type:

# **ntpq -p**

remote refid st t when poll reach delay offset jitter

==============================================================================

\*y.ns.gin.ntt.ne 192.93.2.20 2 u 47 64 377 27.136 6.958 11.322

+ns1.univ-montp3 192.93.2.20 2 u 45 64 377 34.836 -0.009 11.463

+merlin.ensma.ne 193.204.114.232 2 u 48 64 377 34.586 4.443 11.370

+obsidian.ad-not 131.188.3.220 2 u 50 64 377 22.548 4.256 12.077

**Alternatively**, to get a basic report, type:

# **ntpstat**

synchronised to NTP server (129.250.35.251) at stratum 3

time correct to within 60 ms

polling server every 64 s

To quickly synchronize a server, type:

# **systemctl stop ntpd**

# **ntpdate pool.ntp.org**

5 Jul 10:36:58 ntpdate[2190]: adjust time server 95.81.173.74 offset -0.005354 sec

# **systemctl start ntpd**

**The Chrony Package**

**Alternatively**, you can install the new **Chrony** service that is quicker to synchronize clocks in mobile and virtual systems.

Install the **Chrony** service:

# **yum install -y chrony**

Activate the **Chrony** service at boot:

# **systemctl enable chronyd**

Start the **Chrony** service:

# **systemctl start chronyd**

The **Chrony** configuration is in the **/etc/chrony.conf** file:

# Use public servers from the pool.ntp.org project.

# Please consider joining the pool (http://www.pool.ntp.org/join.html).

**server 0.centos.pool.ntp.org iburst**

**server 1.centos.pool.ntp.org iburst**

**server 2.centos.pool.ntp.org iburst**

**server 3.centos.pool.ntp.org iburst**

# 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

# Listen for commands only on localhost.

bindcmdaddress 127.0.0.1

bindcmdaddress ::1

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

Note: For basic configuration purpose, only the **server** directives could need a change to point at a different set of master time servers than the defaults specified.

To get information about the main time reference, type:

# **chronyc tracking**

Reference ID : 94.23.44.157 (merzhin.deuza.net)

Stratum : 3

Ref time (UTC) : Thu Jul 3 22:26:27 2014

System time : 0.000265665 seconds fast of NTP time

Last offset : 0.000599796 seconds

RMS offset : 3619.895751953 seconds

Frequency : 0.070 ppm slow

Residual freq : 0.012 ppm

Skew : 0.164 ppm

Root delay : 0.030609 seconds

Root dispersion : 0.005556 seconds

Update interval : 1026.9 seconds

Leap status : Normal

To get equivalent information to the **ntpq** command, type:

# **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

||                                                /   xxxx = adjusted offset,

||         Log2(Polling interval) -.             |    yyyy = measured offset,

||                                  \            |    zzzz = estimated error.

||                                   |           |

MS Name/IP address         Stratum Poll Reach LastRx Last sample

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^+ merlin.ensma.fr               2   6    77    61   +295us[+1028us] +/-   69ms

^\* lafkor.de                     2   6    77    61  -1371us[ -638us] +/-   65ms

^+ kimsuflol.iroqwa.org          3   6    77    61   -240us[ -240us] +/-   92ms

^+ merzhin.deuza.net             2   6    77    61    +52us[  +52us] +/-   48ms

# **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

==============================================================================

merlin.ensma.fr             7   5   200      0.106      6.541   +381us   176us

lafkor.de                   7   4   199      0.143     10.145   -916us   290us

kimsuflol.iroqwa.org        7   7   200     -0.298      6.717    +69us   184us

merzhin.deuza.net           7   5   200      0.585     11.293   +675us   314us

To quickly synchronize a server, type:

# **ntpdate pool.ntp.org**

5 Jul 10:31:06 ntpdate[2135]: step time server 193.55.167.1 offset 121873.493146 sec

Note: You don’t need to stop the **Chrony** service to synchronize the server.