
Lab Objectives:

Learn to set and maintain system time, configure the hardware clock, set the timezone, and configure NTP synchronization on a recent Rocky Linux system.

Lab Requirements:

- Login as `rocky` (on Rocky Linux) or `debian` (on Debian).
- Perform all tasks in your home directory unless otherwise specified.

Pre-requisites

- Access to a Rocky Linux system (as root or with sudo privileges)
- Terminal access

1. Check Current System and Hardware Time

Display the current **system** time:

```
$ date
```

Display the hardware clock time:

```
$ hwclock
```

```
hwclock: Cannot access the Hardware Clock via any known method.  
hwclock: Use the --verbose option to see the details of our search  
for an access method.
```

```
[rocky@rocky ~]$ hwclock --verbose  
hwclock from util-linux 2.37.4  
System Time: 1749140156.751754  
Trying to open: /dev/rtc0  
hwclock: cannot open /dev/rtc0: Permission denied  
No usable clock interface found.  
hwclock: Cannot access the Hardware Clock via any known method.
```

→ the virtualized environment does now offer the hardware rtc.

2. Set the System Date and Time

Set the system date and time to June 5, 2025, 18:12:

```
$ sudo date --set="2025-06-05 18:12"
```

Verify the change:

```
$ date
```

3. Set the Hardware Clock

- Sync the hardware clock with the current system time:

```
$ sudo hwclock --systohc
```

4. Configure the Timezone

List available timezones:

```
$ timedatectl list-timezones | grep Europe
```

Set the timezone (example: Europe/Berlin):

```
$ sudo timedatectl set-timezone Europe/Berlin
```

Verify:

```
$ timedatectl
Local time: Thu 2025-06-05 18:16:33 CEST
Universal time: Thu 2025-06-05 16:16:33 UTC
RTC time: Thu 2025-06-05 16:16:33
Time zone: Europe/Berlin (CEST, +0200)
System clock synchronized: no
NTP service: active
RTC in local TZ: no
```

5. Enable and Configure NTP Synchronization

Enable NTP synchronization, even if it already was active:

```
$ sudo timedatectl set-ntp true
```

Confirm NTP is active:

```
$ timedatectl status
Local time: Thu 2025-06-05 18:20:33 CEST
Universal time: Thu 2025-06-05 16:20:33 UTC
RTC time: Thu 2025-06-05 16:20:33
Time zone: Europe/Berlin (CEST, +0200)
System clock synchronized: no
NTP service: active
RTC in local TZ: no
```

6. (Optional) Explore NTP with Chrony on Rocky

Check if chrony is installed:

```
$ rpm -q chrony
```

If not installed, install chrony:

```
$ sudo dnf install chrony
```

Explore the configuration (optional):

```
$ sudo nano /etc/chrony.conf
```

Ensure a pool line exists, e.g.:

```
pool pool.ntp.org iburst
```

Start and enable chrony:

```
$ sudo systemctl enable --now chronyd
```

Check synchronization:

```
$ chronyc tracking
```

```
Reference ID      : 00000000 ()
Stratum          : 0
Ref time (UTC)   : Thu Jan 01 00:00:00 1970
System time      : 0.000000000 seconds fast of NTP time
Last offset      : +0.000000000 seconds
RMS offset       : 0.000000000 seconds
Frequency        : 0.000 ppm slow
Residual freq    : +0.000 ppm
Skew             : 0.000 ppm
Root delay       : 1.000000000 seconds
Root dispersion  : 1.000000000 seconds
Update interval  : 0.0 seconds
Leap status      : Not synchronized
```

In the example above the accuracy is exceptional as the NTP server is located on the local LAN.

```
$ chronyc sources
```

MS Name/IP address	Stratum	Poll	Reach	LastRx	Last sample
^? 192.168.100.254	0	7	0	-	+0ns [+0ns] +/- 0ns

The number in square brackets (e.g. can be [+0.000456s]) is the actual time offset (positive means your system is behind the server, negative means it's ahead).

The number outside the brackets (e.g., +0.000123s) is the residual offset — after Chrony has already corrected your clock.

Note: on systems with ntpd, the command "ntpq -p" can be used.

6. (Optional) Explore NTP with Chrony in Debian

Check if chrony is installed:

```
$ dpkg -l | grep chrony
```

If not installed, install chrony:

```
$ sudo apt install -y chrony
```

Explore the configuration (optional):

```
$ sudo nano /etc/chrony.conf
```

Ensure a pool line exists, e.g.:

```
pool pool.ntp.org iburst
```

Start and enable chrony:

```
$ sudo systemctl enable --now chrony
```

Check synchronization:

```
$ chronyc tracking
```

```
Reference ID      : 00000000 ()
Stratum          : 0
Ref time (UTC)   : Thu Jan 01 00:00:00 1970
System time      : 0.000000000 seconds fast of NTP time
Last offset      : +0.000000000 seconds
RMS offset       : 0.000000000 seconds
Frequency        : 0.000 ppm slow
Residual freq    : +0.000 ppm
Skew             : 0.000 ppm
Root delay       : 1.000000000 seconds
Root dispersion  : 1.000000000 seconds
Update interval  : 0.0 seconds
Leap status      : Not synchronized
```

In the example above the accuracy is exceptional as the NTP server is located on the local LAN.

\$ chronyc sources

```
MS Name/IP address      Stratum Poll Reach LastRx Last sample
=====
^? 192.168.100.254      0    7    0    -    +0ns[ +0ns] +/-    0ns
```

The number in square brackets (e.g. can be [+0.000456s]) is the actual time offset (positive means your system is behind the server, negative means it's ahead).

The number outside the brackets (e.g., +0.000123s) is the residual offset — after Chrony has already corrected your clock.

Note: on systems with `ntpd`, the command "`ntpq -p`" can be used.

7. Questions for Review

- What is the difference between the system clock and the hardware clock?
- How do you ensure the hardware clock is set to UTC?
- How can you verify if NTP synchronization is working?