– General Linux 2 –

Maintain system time [3]

(Linux Professional Institute Certification)

a


```
   .~.
   /V\          geoffrey robertson
  // \\         geoffrey@zip.com.au
  @._.@
```

List of Slides

(2.2) Administrative Tasks [21]

2.111.1 Manage users and group accounts and related system files [4]

2.111.2 Tune the user environment and system environment variables [3]

2.111.3 Configure and use system log files to meet administrative and security needs [3]

2.111.4 Automate system administration tasks by scheduling jobs to run in the future [4]

2.111.5 Maintain an effective data backup strategy [3]

2.111.6 **Maintain system time [4]**

Maintain system time [4]

Objective

Candidate should be able to properly maintain the system time and synchronise the clock over NTP.

Tasks include:

- Setting the system date and time
- Setting the BIOS clock to the correct time in UTC
- Configuring the correct timezone for the system
- Configuring the system to correct clock drift to match NTP clock.

Maintain system time [4]

Key files, terms, and utilities

```
date
hwclock
ntpd
ntpdate
/usr/share/zoneinfo
/etc/timezone
/etc/localtime
/etc/ntp.conf
/etc/ntp.drift
```

Maintain system time [4]

Resources of interest

web `http://www.ntp.org`

Debian ntp-doc `/usr/share/doc/ntp-doc/index.html` on sarg.

LPI Linux Certification in a Nutshell :

`by Jeffrey Dean`

O'Reilly

LPIC 1 Certification Bible :

Angie Nash and Jason Nash

Hungry Minds

date

Display or Set System Date & Time

The date command without any options will print the current date and time. The date will be relative to any timezone set for the machine.

```
$ date ↩
Tue May 21 09:57:51 EST 2002
```

date

Options to the Date command

-I Output an ISO-8601 compliant date (YYYY-MM-DD)

```
$ date -I ↩
2002-05-21
```

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```
$ date -I ↩
2002-05-21
```

-R Output an RFC-822 compliant date (Local time + GMT 0ffset)

```
$ date -R ↩
Tue, 21 May 2002 10:14:09 +1000
```

date

Options to the Date command

-I Output an ISO-8601 compliant date (YYYY-MM-DD)

```
$ date -I ↩
2002-05-21
```

-R Output an RFC-822 compliant date (Local time + GMT 0ffset)

```
$ date -R ↩
Tue, 21 May 2002 10:14:09 +1000
```

-r <**file**> Display the last modification time of file

```
$ date -r ~/ivr/va/src/va.c ↩
Mon May 20 12:55:48 EST 2002
```

date

Options to the Date command

-d <**STRING**> Display date described by string instead of now

```
$ date -d "last Monday 4 years ago" ↩
Mon May 18 00:00:00 EST 1998
```

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Options to the Date command

-d <**STRING**> Display date described by string instead of now

```
$ date -d "last Monday 4 years ago" ↩
Mon May 18 00:00:00 EST 1998
```

-u Display UTC time & date instead of localtime

```
$ date ↩
Tue May 21 10:55:34 EST 2002
$ date -u ↩
Tue May 21 00:55:34 UTC 2002
```

date

Options to the Date command

-s <**date**> Set the system time (must be superuser)

```
# date -s "Tue May 21 10:03:06 EST 2002" ↩
Tue May 21 10:03:06 EST 2002
```

date

Options to the Date command

-s <**date**> Set the system time (must be superuser)

```
# date -s "Tue May 21 10:03:06 EST 2002" ↩
Tue May 21 10:03:06 EST 2002
```

+FORMAT Display date in user defined format

```
$ date +"Today is %A, %d %B, %Y" ↩
Today is Tuesday, 21 May, 2002
```

RTC vs. System Clock

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The *system clock*

This is maintained in the Linux kernel and is used while the system is running.

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- Show the time/date held by the RTC
- Adjust the RTC to account for clock drift

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- To display the contents of the RTC, use this option:

```
hwclock -r  (or hwclock --show)
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```
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```

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- To set the system time from the RTC, use the following option to hwclock:

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- To adjust the RTC for clock drift, use this option:

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```

Note that the file `/etc/adjtime` is used to hold information about the extent to which (and direction) your RTC drifts

NTP - Network Time Protocol

NTP is a time protocol used to synchronise a systems clock to master time source. For example, the CSIRO maintains a nationwide time source with atomic clock accuracy. As a user I can synchronise my system to that time source by sending a request to the CSIRO's ntp server.

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- Uses Port 123 plus one other unpriveledged port (1024:65535)
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- There are 3 versions of the protocol (ntp1, ntp2 & ntp3)
- Available for Unix & Windows machines.

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- `ntp-genkeys` - generate public and private keys

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That's all there is to it! The hardest part is deciding which public time servers to use.

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Usage: `ntpdate [options] server ...`

```
# ntpdate ntp.nml.csiro.au
21 May 14:01:13 ntpdate[4002]: adjust time server 10.27.1.10
offset -0.000804 sec
```

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```
# ntpdate ntp.nml.csiro.au
21 May 14:01:13 ntpdate[4002]: adjust time server 10.27.1.10
offset -0.000804 sec
```

This will set the local machines system time using server `ntp.nml.csiro.au`

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- For Windows machines, automachron is available.

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- NTPD is a better way to maintain the system time on a permanent basis.
- NTPD acts as both a client & server (Linux only).
- In server mode, other machines on the local network can use the server to set their own system clocks
- For Windows machines, automachron is available.
- NTPD also keeps track of RTC drift.

The NTP daemon is normally started up by the system initialisation scripts.

Debian :`$ /etc/init.d/ntp {start|stop|restart|force-reload}` ↩

RedHat : `$ service ntp start` ↩

`ntpd` usage & configuration

Usage: `ntpd [options] &`

(normally done in the `/etc/init.d` scripts)

NTPD is configured using these files:

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- `/etc/ntp.conf` - Configuration file
- `/etc/ntp.drift` - RTC drift file

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NTPD is configured using these files:

- `/etc/ntp.conf` - Configuration file
- `/etc/ntp.drift` - RTC drift file
- `/etc/ntp.keys` - Key file (for authentication mode)

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- `/etc/ntp.conf` - Configuration file
- `/etc/ntp.drift` - RTC drift file
- `/etc/ntp.keys` - Key file (for authentication mode)

The only file of concern to the user is ntp.conf. The other files are all written to and read by the ntp applications.

Sample `ntp.conf` file

```
# Disable authentication mode
disable auth
restrict default ignore          # ignore all requests by default
server  ntp.cs.mu.OZ.AU          # 128.250.36.2
server  apphys16.mst.csiro.au    # 138.194.21.154
server  ntp.nml.csiro.au         # 130.155.98.1
server  127.0.0.1                # localhost
# Lift restrictions on time servers
restrict 128.250.36.2 nomodify  # time service only, no rt mods
restrict 138.194.21.154 nomodify
restrict 130.155.98.1 nomodify
# All local addresses are unrestricted
restrict 127.0.0.1
restrict 10.27.1.0 mask 255.255.255.0
# Set the default drift file
driftfile /etc/ntp/drift
```

Public Time Servers

A (partial) list of public time servers is shown below. When using these servers, it is considered polite to advise the administrator of the service that you intend on using it.

Primary NTP Time Servers

- ntp.cs.mu.OZ.AU (128.250.36.2)
- apphys16.mst.csiro.au (138.194.21.154)
- ntp.nml.csiro.au (130.155.98.1)

Secondary NTP Time Servers

- ntp.saard.net (203.21.37.18)
- ntp.iprolink.co.nz (36.50.59.6)

NTP - Network Time Protocol

Testing NTP

Once you have the NTP daemon up & running, the easiest way of testing it is to use the ntpq utility.

```
# ntpq

ntpq> pe

     remote           refid      ...        delay   offset  jitter
==============================================================================
 localhost.local 0.0.0.0    ...          0.000    0.000 4000.00
xmurgon.cs.mu.OZ .GPS.      ...        526.202  -206.43 208.270
+apphys16.mst.cs .ATOM.     ...        169.956   -5.576  87.828
*tictoc.tip.CSIR .ATOM.     ...        149.988  -24.328   6.761
ntpq> q
#
```

The End