System Administration

Time

Why is good timekeeping important?

- Logfiles - timestamps
- File creation/modification times
- Programs which need absolute time - astronomical ephemerides
- Security programs which have timeouts - Kerberos
- Cluster of computers needing to have the same time

System Administration

Time

Two types of time:

- Hardware time

  Kept on the motherboard, settable in BIOS.

- System time

  Kept by kernel, used by the system

System Administration

Time

Ways to set time:

- Manually – entered at the keyboard
- Querying the hardware clock
- Syncing to a time source
  - Network
  - Directly connected hardware (e.g. radio, GPS)

System Administration

Manually Setting Time

date

The **date** command returns the current system time when given no arguments.

A formatting template can be specified to print date/time different ways – useful for log files

If arguments are given, the **date** command will set the system time

date [MMDDhhmm[[CC]YY][.ss]]

Example:

date 020413542003

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Manually Setting Time

date

Exercises

Set the date on your system based on the reading on your watch:

/bin/date 021014232004.00

Print out the month, date and year as ddmmmyyyy

/bin/date +'%d%b%Y'

System Administration

Manually Setting Time

hwclock

The **hwclock** command returns the current hardware time when given no arguments.

Hwclock can set both the system clock and the hardware clock:

hwclock - -hctosys

hwclock - -systohc

hwclock - -set date=*date string*

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Manually Setting Time

hwclock

hwclock is often run on boot-up and shutdown

/etc/rc.d/rc.sysinit

/etc/rc.d/init.d/halt

System Administration

Manually Setting Time

hwclock

Exercise

Use hwclock to set the system time from the hardware time:

```
# /bin/date 02101043
# /bin/date
# /sbin/hwclock  --hctosys
```

System Administration

Syncing Time

ntp

NTP, the Network Time Protocol, allows time *clients* to sync their clocks with time *servers*.

NTP allows for automating the setting of your clock

NTP provides much more accurate time stamps

NTP servers are layered by *strata*. Stratum 1 servers are connected to hardware time sources. Stratum 2 servers sync with these and so on...

System Administration

Syncing Time

ntp

You can configure your computer to be a client or a *peer*

Simplest configuration:

Add the following to */etc/ntp.conf*

server tick.iastate.edu
server tock.iastate.edu
server chime.iastate.edu

This instructs the **ntp** daemon to act as a client and use these three machines as servers

System Administration

Syncing Time

ntpdate

Create the file /etc/ntp/step-tickers with the entry

time.iastate.edu

When **ntp** is started on boot-up, the **ntpdate** command will use this file to give the clock an initial value.

If this isn't done, and the time difference is too great, **ntp** will exit

System Administration

Syncing Time

ntpdate

If you do not need up-to-the-second time synchronization, you can use the command **ntpdate** as a *one-shot* to set the time once.

ntpdate -u time.iastate.edu

You can also add **ntpdate** to your crontab file to periodically sync the time

0 8,18 * * * /usr/sbin/ntpdate -u time.iastate.edu

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Time Zones

- What time it is depends on where your server is physically located.
- System clock stores time in seconds since the *epoch* (1970) and this may be in Universal Time Coordinates (UTC)
- Your system needs a way to convert this to something humans can understand

System Administration

Time Zones

- The **date** command depends on the *time* and *localtime* C functions to convert the seconds since the epoch to date, hours, minutes and seconds
- *localtime* depends on time zone information
- Information for all time zones is stored in /usr/share/zoneinfo
- A copy of the zone data for the machine is in /etc/localtime

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Time Zones

- The command **zdump** can be used to determine when a system believes DST begins and ends

/usr/sbin/zdump -v etc/localtime | grep 2008

- When time zone info changes, Red Hat will update the *tzdata* package

- For other systems, you may have to download the zoneinfo files and “compile” them with the command **zic**