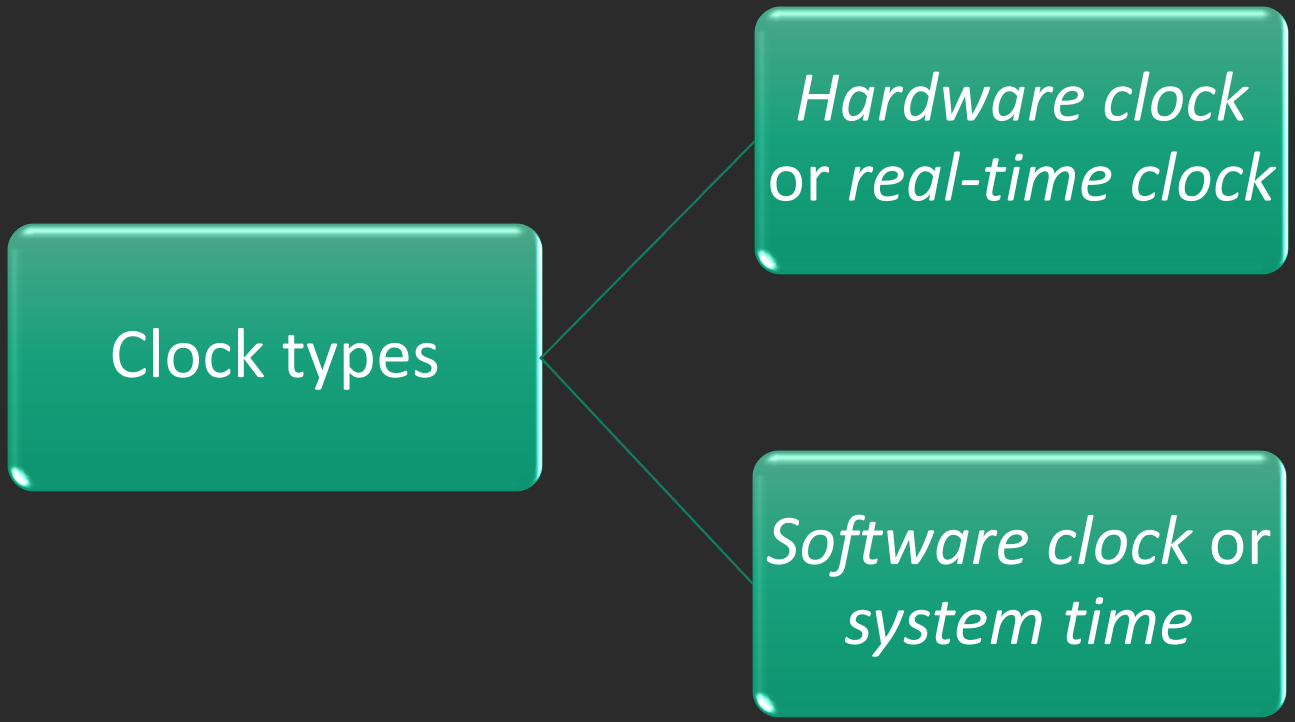
Lesson 8: Administering the System

Objectives covered

- 107.1 Manage user and group accounts and related system files (weight: 5)
- 108.2 System logging (weight: 4)
- 108.1 Maintain system time (weight: 3)
- 108.3 Mail Transfer Agent (MTA) basics (weight: 3)

Maintain system time

Linux time


Clock types
Hardware clock or real-time clock
Software clock or system time

Managing hardware clock

Hwclock [Option]

Short option	Long option	Description
N/A	*--localtime*	Sets the hardware clock to use the localtime standard
-r	*--show*	Displays the current hardware clock time
-s	*--hctosys*	Reads the current hardware clock time, and sets the software clock to that time
-u	*--utc*	Sets the hardware clock to use the UTC standard
-w	*--systohc*	Reads the current software clock time, and sets the hardware clock to that time

Managing system time with date

date [-u|--utc|--universal] [MMDDhhmm[[CC]YY][.ss]]

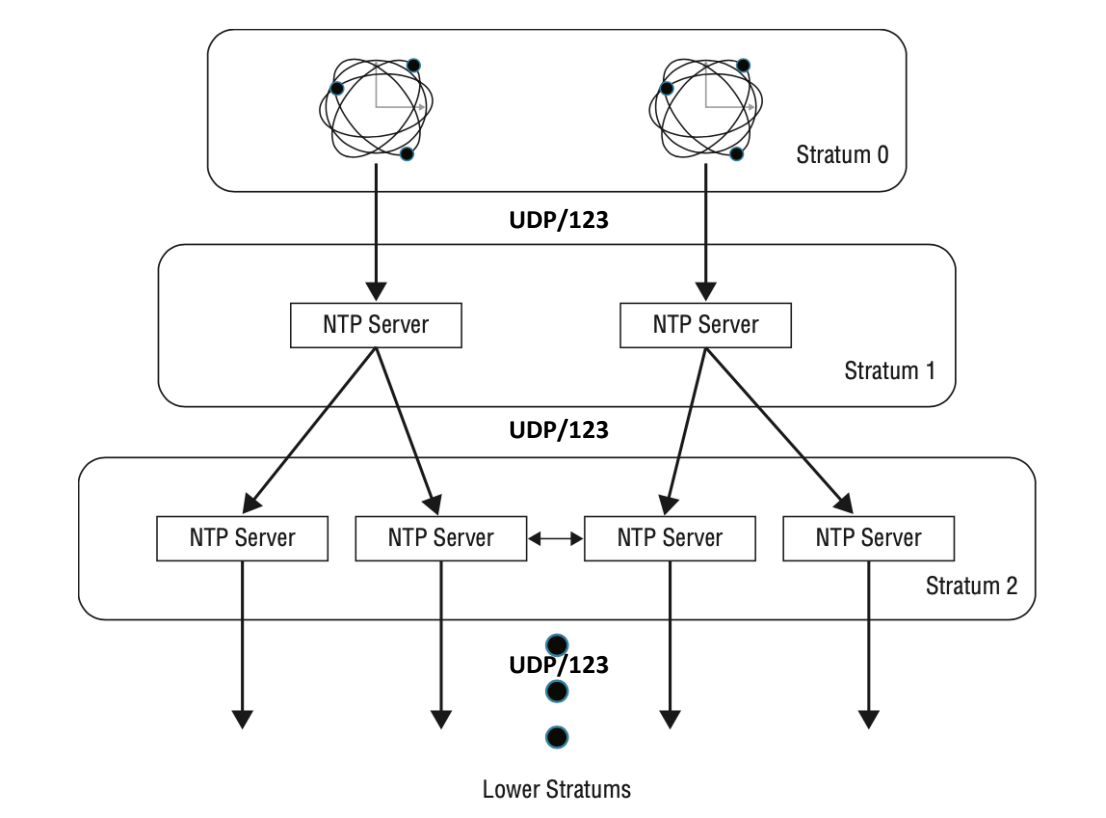
```
# date
Fri May 31 14:26:48 EDT 2019
#
# date 05301430
Thu May 30 14:30:00 EDT 2019
#
# date
Thu May 30 14:30:02 EDT 2019
#
```

Managing system time with timedatectl

timedatectl set-time "YYYY-MM-DD HH:MM:SS"

```
$ timedatectl
                      Local time: Fri 2019-05-31 15:25:13 EDT
                  Universal time: Fri 2019-05-31 19:25:13 UTC
                        RTC time: Fri 2019-05-31 19:25:14
                       Time zone: America/Indiana/Indianapolis (EDT, -0400)
       System clock synchronized: yes
systemd-timesyncd.service active: yes
                 RTC in local TZ: no
# date
Fri May 31 15:59:13 EDT 2019
#
# timedatectl set-time "2019-05-31 16:15:00"
Failed to set time: Automatic time synchronization is enabled
#
# timedatectl set-ntp 0
#
# timedatectl set-time "2019-05-31 16:15:00"
#
# date
Fri May 31 16:15:04 EDT 2019
```

Network time protocol (NTP)



Configure NTP daemon

```
$ grep ^server /etc/ntp.conf
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
```

```
ntpdate 0.pool.ntp.org
```

```
systemctl start ntpd
```

Managing NTP service

```
$ ntpstat
synchronised to NTP server (74.6.168.73) at stratum 3
   time correct to within 70 ms
   polling server every 128 s
```

```
$ ntpq -p
     remote           refid      st t when poll reach   delay   offset  jitter
==============================================================================
+vps5.ctyme.com  216.218.254.202  2 u  260  128  376   70.606   17.175  14.527
*t2.time.gq1.yah 208.71.46.33     2 u   40  128  377   74.892   17.062   7.880
 dfw1.ntp5.mattn .STEP.          16 u    - 1024    0    0.000    0.000   0.000
+helium.constant 128.59.0.245     2 u   10  128  377   42.163   18.043   9.173
```

Configure Chrony Daemon

```
$ grep ^pool /etc/chrony/chrony.conf
pool ntp.ubuntu.com        iburst maxsources 4
pool 0.ubuntu.pool.ntp.org iburst maxsources 1
pool 1.ubuntu.pool.ntp.org iburst maxsources 1
pool 2.ubuntu.pool.ntp.org iburst maxsources 2
```

`systemctl start chronyd` **or** `systemctl restart chronyd`

Managing Chrony Daemon with chronyc

```
$ chronyc sources -v
210 Number of sources = 8

  .-- 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
===============================================================================
^+ alphyn.canonical.com           2  10   377   413   -461us[ -418us] +/-  101ms
^+ golem.canonical.com            2  10   337   142    +30us[  +30us] +/-   95ms
^+ chilipepper.canonical.com      2  10   377   918   -797us[ -760us] +/-   81ms
^+ pugot.canonical.com            2  10   377    21  -2184us[-2184us] +/-   87ms
^* 4.53.160.75                    2  10   377   229   -327us[ -281us] +/-   50ms
^+ vps3.cobryce.com               2  10   377   416  +4806us[+4850us] +/-   70ms
^+ B1-66ER.matrix.gs              2  10   377   21m   -315us[ -363us] +/-   60ms
^+ 2.time.dbsinet.com             2   9   175   601  -3138us[-3097us] +/-   93ms
```

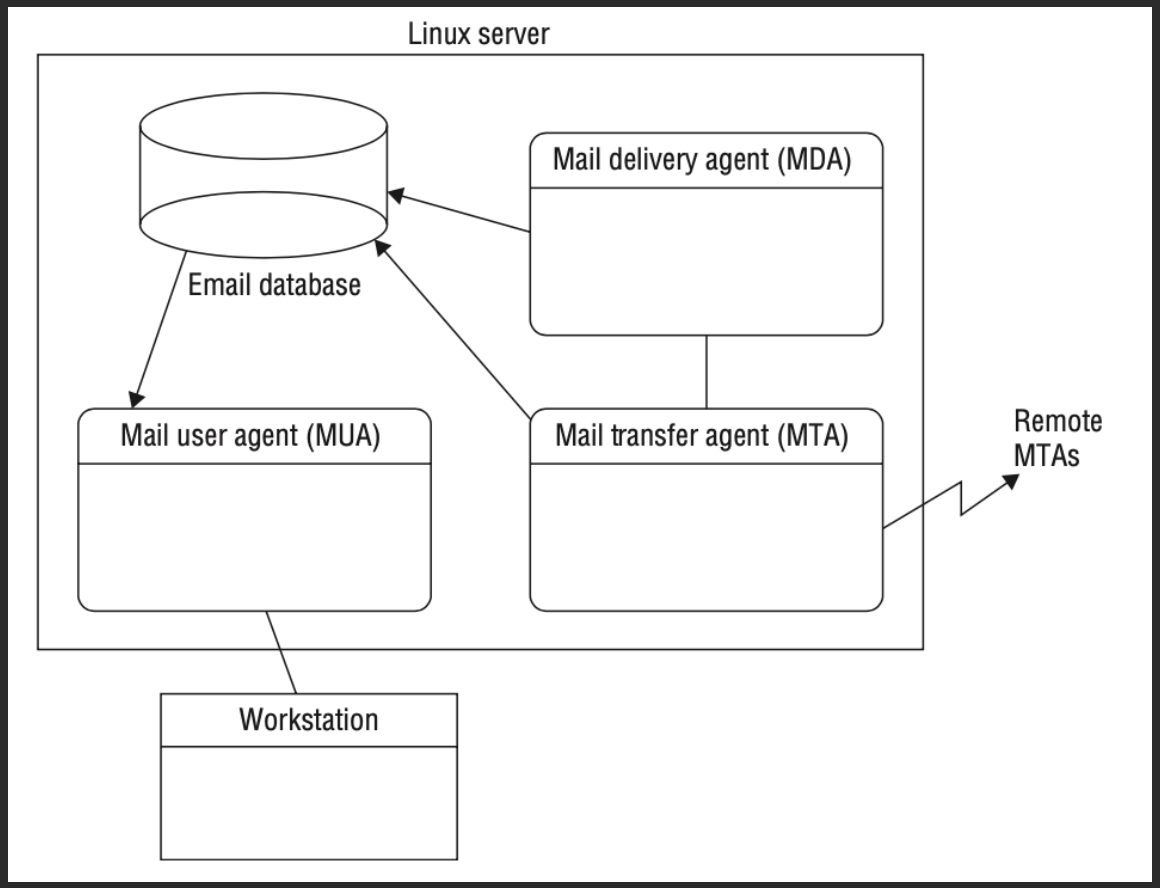
```
$ chronyc sourcestats
210 Number of sources = 8
Name/IP Address            NP  NR  Span  Frequency  Freq Skew  Offset  Std Dev
==============================================================================
alphyn.canonical.com       31  15   87m     +0.322      0.287   -180us   677us
golem.canonical.com        31  18   91m     -0.006      0.137   -470us   275us
chilipepper.canonical.com  31  14   96m     -0.044      0.163   -661us   383us
pugot.canonical.com        28  16   87m     -0.029      0.350   -637us   575us
4.53.160.75                31  20   90m     +0.003      0.166   -553us   370us
vps3.cobryce.com           30  14   87m     -0.195      0.531  +4453us   936us
B1-66ER.matrix.gs          30  13   72m     -0.095      0.351   +523us   635us
2.time.dbsinet.com         27  16   71m     +0.073      0.327  -2801us   431us
```

Managing Chrony Daemon with chronyc

```
$ chronyc tracking
Reference ID    : 0435A04B (4.53.160.75)
Stratum         : 3
Ref time (UTC)  : Sat Jun 01 19:22:01 2019
System time     : 0.000197749 seconds slow of NTP time
Last offset     : -0.000001978 seconds
RMS offset      : 0.001266906 seconds
Frequency       : 31.578 ppm fast
Residual freq   : +0.000 ppm
Skew            : 0.077 ppm
Root delay      : 0.034032539 seconds
Root dispersion : 0.022529230 seconds
Update interval : 1027.0 seconds
Leap status     : Normal
```

Mail Transfer Agent (MTA) basics

Understanding email service in Linux



Popular MTA systems

Sendmail

- The *Sendmail* MTA program was originally one of the most popular Linux MTA programs mainly due to its extreme versatility

Postfix

- Postfix is written as a modular program; it uses several different programs to implement the MTA functionality

Exim

- *Exim* MTA program was created for the University of Cambridge in 1995

Sending email

mail [option] receipient

-s *subject*: Adds a subject line to the email. If your *subject* contains spaces, you will need to encase it in quotation marks.

-cc *recipient*: Designates an email address or addresses to receive a copy of the message. All email *recipient*s can see this address or addresses.

-bc *recipient*: Designates an email address or addresses to receive a copy of the message. Only the sender can see this address or addresses.

-v: Displays delivery details for the email message

```
$ mail -s "LPIC-1 Book Progress" rich
Hi Rich,
I'm working on Chapter 7 right now.
How's Chapter 8 coming along?
Best regards,
Christine
EOT
$
```

Reading email

mail [-f] [path to mail]

```
$ mail
Heirloom Mail version 12.5 7/5/10.  Type ? for help.
"/var/spool/mail/rich": 1 message 1 new
>N  1 christine@localhost.  Wed May 22 13:04  23/721   "LPIC-1 Book Progress"
& 1
Message  1:
[…]
From: christine@localhost.localdomain
Status: R

Hi Rich,
I'm working on Chapter 7 right now.
How's Chapter 8 coming along?
Best regards,
Christine

& q
Held 1 message in /var/spool/mail/rich
You have mail in /var/spool/mail/rich
$
```

Reading email

mail [-f] [path to mail]

```
$ mail
Heirloom Mail version 12.5 7/5/10.  Type ? for help.
"/var/spool/mail/rich": 1 message 1 new
>N  1 christine@localhost.  Wed May 22 13:04  23/721   "LPIC-1 Book Progress"
& 1
Message  1:
[…]
From: christine@localhost.localdomain
Status: R

Hi Rich,
I'm working on Chapter 7 right now.
How's Chapter 8 coming along?
Best regards,
Christine

& q
Held 1 message in /var/spool/mail/rich
You have mail in /var/spool/mail/rich
$
```

Email alias

To configure alias

1. Add the alias to the */etc/aliases* file.

   ALIAS-NAME: RECIPIENT1[,*RECIPIENT2*[,…]]

2. Run the *newaliases* command to update the aliases database, */etc/aliases.db*.

```
# grep ^hostmaster /etc/aliases
hostmaster:     root
#
# nano /etc/aliases
#
# grep ^hostmaster /etc/aliases
hostmaster:     christine,rich
#
# newaliases
#
```

```
# mail -s "Test of Aliases" hostmaster
Testing the new hostmaster alias
EOT
#
# exit
[…]
$ whoami
christine
$
$ mail
[…]
>N  1 root                  Wed May 22 15:10  18/656   "Test of Aliases"
& 1
Message  1:
[…]
To: hostmaster@localhost.localdomain
Subject: Test of Aliases
[…]
From: root@localhost.localdomain (root)
Status: R

Testing the new hostmaster alias

&
```

Email forwarding

To setup forwarding

1. The user creates the *.forward* file in their `$HOME` directory and puts in the username who should be receiving the forwarded emails.
2. The `chmod` command is used on the `.forward` file to set the permissions to 644 (octal).

```
$ whoami
christine
$
$ pwd
/home/christine
$
$ echo rich > .forward
$
$ chmod 644 .forward
$
$ mail -s "Testing of Forward" christine
Testing my .forward file
EOT
$
```

```
$ mail
[…]
>   1 root                  Wed May 22 15:10  19/667   "Test of Aliases"
& q
Held 1 message in /var/spool/mail/christine
$
$ su - rich
Password:
[…]
$ mail
Heirloom Mail version 12.5 7/5/10.  Type ? for help.
"/var/spool/mail/rich": 3 messages 1 new 2 unread
    1 christine@localhost.  Wed May 22 13:04  24/732   "LPIC-1 Book Progress"
 U  2 root                  Wed May 22 15:10  19/666   "Test of Aliases"
>N  3 christine@localhost.  Wed May 22 15:39  21/799   "Testing of Forward"
& 3
Message  3:
[…]
Subject: Testing of Forward
[…]
Status: R

Testing my .forward file

& q
Held 3 messages in /var/spool/mail/rich
$
```

Troubleshooting email system

Check the mail queue

```
$ mail -s "Test of Mail Queue" bogususer@example.com
Testing mail queue
EOT
$
$ mailq
-Queue ID- --Size-- ----Arrival Time---- -Sender/Recipient-------
62D301CE55*     474 Wed May 22 14:03:20  christine@localhost.localdomain
                                         bogususer@example.com

-- 0 Kbytes in 1 Request.
$
$ sendmail -bp
-Queue ID- --Size-- ----Arrival Time---- -Sender/Recipient-------
62D301CE55*     474 Wed May 22 14:03:20  christine@localhost.localdomain
                                         bogususer@example.com

-- 0 Kbytes in 1 Request.
$
```

Review email' logs at */var/log/maillog*

Question...