Introduction to UNIX and Linux

CST 126 – LESSON 12

Communications – Messaging, E-mail, Networking.

Objectives

- To describe basic messaging services available with Unix/Linux systems.
- To describe basic e-mail concepts and their specific implementation on a UNIX system
- To illustrate the effective use of a line display e-mail system – the UNIX mail command
- To show further capabilities of a full-screen display text-based e-mail system with `pine`
- To understand some networking basics.

Interactive Chat

```
talk user [tty]
```

Purpose: to initiate interactive chat
              with 'use' who is logged in
         on a 'tty' terminal

```
$ talk bob

[Waiting for your party to respond]
Message from Talk_Daemon@upibm7.egr.up.edu at 13:36 ...
talk: connection requested by sarwar@upibm7.egr.up.edu.
talk: respond with: talk sarwar@upibm7.egr.up.edu

$ talk sarwar@upibm7
```

E-mail Protocols

- Simple Mail Transfer Protocol (SMTP)
  - This dictates the format of the message in terms of an envelope, a header and a body and facilitates the movement of the message between the components of a typical e-mail transfer.
- Post Office Protocol (POP) or Internet Message Access Protocol (IMAP)
  - Works best for offline e-mail reading from a single host computer that contains your e-mail.
- Multimedia Internet Mail Standard (MIME)
  - This dictates the format of multimedia files used as attachments to an e-mail message
- Domain Name System
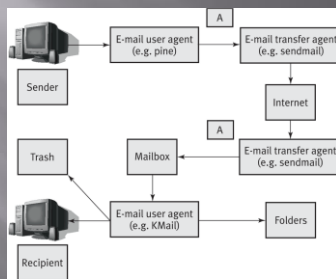 - This dictates the exact form of an e-mail address

E-mail Transfer Dialog

Figure 6.1 Typical e-mail transfer dialog

E-mail Features

- Important fields of the *message header:*
  - The To: field, which contains the e-mail address(es) of the recipient(s)
  - The From: field, which contains the e-mail address(es) of the originator of the message
  - The Cc: field, which contains the addess(es) of any additional recipient(s)
  - The Attch: field, which lists any attachments that might accompany the message, usually in the form of external files
  - The Subject: field, which indicates the subject or purpose of the message
- System mailbox file
  - /usr/mail or /usr/spool/mail

E-mail Features (Contd)

TABLE 6.1 E-mail Functions Common to UNIX E-mail Systems

Function	Description
aliases (addressbook)	Allows the user to define a list of frequent correspondents' e-mail addresses
attachments	Allows the sender to attach either text or multimedia files to a message
cc	Allows the sender to specify recipients of copies of a message
deleting	Allows the sender to dispose of messages by deleting them from the system mailbox
forwarding	Allows the sender to pass a received message to a new recipient quickly
reading	Allows the recipient to read incoming messages
replying	Allows the recipient to reply immediately to a current or disposed message
saving in folders	Allows the recipient to dispose of messages in a logical directory structure for e-mail
sending	Allows the user to send messages

---

pine– Another Full-Screen Display E-mail System

```
PINE 4.04    MAIN MENU                      Folder: INBOX  2 Messages

        ?      HELP            -  Get help using Pine

        C      COMPOSE MESSAGE -  Compose and send a message

        I      MESSAGE INDEX   -  View messages in current folder

        L      FOLDER LIST     -  Select a folder to view

        A      ADDRESS BOOK    -  Update address book

        S      SETUP           -  Configure Pine Options

        Q      QUIT            -  Leave the Pine program


   Copyright 1989-1998.  PINE is a trademark of the University of Washington.
                    [Folder "INBOX" opened with 2 messages]
? Help                    P PrevCmd                      R RelNotes
O OTHER CMDS > [ListFldrs] N NextCmd                     K KBLock
```

Figure 6.7 The pine Main Menu screen

Sending E-mail with pine

Practice Session 6.4

Step 1: At the shell prompt, type pine recipient, where recipient is a valid user-name on your UNIX system, or a valid Internet address, and then press <Enter>. The pine Compose Message screen appears on your display, with the To: field already filled in.

Step 2: Use the <down arrow> key to place the cursor in the Cc: field.

Step 3: Type your_username, where your_username is your username on the UNIX system you are now logged on to, and then press <Enter>.

Step 4: Use the <down arrow> key to place the cursor in the Subject: field.

Step 5: Type My 2nd pine e-mail!! and then press <Enter>. The cursor is now in the Message Text area of the Compose Message screen.

Step 6: Type Pine is a really neat and easy-to-use e-mail program. and then press <Enter>. Your screen display should now look something like that shown in Figure 6.9.

Step 7: Press <Ctrl-X>. The prompt Send message? appears.

Step 8: Type <y> to send your message, exit pine, and return to the shell prompt.

Using pine to Send E-mail with Attachment

Example: pine System

Step 1: At the shell prompt, type pine and then press <Enter>.

Step 2: The pine Main Menu screen, similar to the one shown in Figure 6.7, appears. The highlighted menu choice is L Folder List – Select a folder to view.

Step 3: Type C to compose a message. The pine Compose Message screen, similar to the one shown in Figure 6.8, appears.

Step 4: In the To: field, type your login name and then press <Enter>.

Step 5: Use the <down arrow> key to move the cursor to the Attchmnt: field.

Step 6: Type vi_doc.txt and then press <Enter>. This file should be in your main directory.

Step 7: Use the <down arrow> to move the cursor to the Subject: field.   *(continued)*

Using pine to Send E-mail with Attachment

Example: pine System *(continued)*

Step 8: Type Attachments.

Step 9: Use the <down arrow> to move the cursor to the Message Text area of the screen display.

Step 10: Type This e-mail message contains an attached text file I created with vi.

Step 11: Press <Ctrl-X>; pine asks for confirmation.

Step 12: Typing <y> sends your e-mail message and returns you to the pine Main Menu display.

Step 13: Type <Q> and then <Y> to return to the shell prompt.

Reading E-mail with pine

Practice Session 6.5

Step 1: At the shell prompt, type pine and then press <Enter>. The pine Main Menu screen appears on your display, similar to the one shown in Figure 6.7, with the Folder List menu choice highlighted.

Step 2: Press <Enter>. The Folder List screen appears on your display, with the Inbox folder highlighted.

Step 3: Press <Enter>. The Message Index screen appears on your display.

Step 4: If the message from Practice Session 6.4 is *not* highlighted, use the <up> or <down arrow> key to highlight that message in this list. If it is *not* in the list, go back to Practice Session 6.4 and redo those steps.

Step 5: Press <Enter> when the Practice Session 6.4 message is highlighted. The Message Text screen appears on your display.

Step 6: When you have read the message text, press the <O> key on the keyboard, which gives you access to other commands. Another menu of keystroke commands appears at the bottom of the Message Text screen.

Step 7: Type <M> The pine Main Menu screen appears on your display.

Step 8: Type <Q>, and pine prompts Really quit pine?

Step 9: Type <Y> to exit pine and go back to the shell prompt.

Composing E-mail with pine

```
PINE 4.04   COMPOSE MESSAGE                Folder: (CLOSED)  No Messages

To      : <bobk@localhost.localdomain>
Cc      :
Attchmnt:
Subject : My 2nd pine email!1
---- Message Text ----
Pine is a really neat and easy to use email program.




^G Get Help  ^X Send      ^R Read File ^Y Prev Pg  ^K Cut Text  ^O Postpone
^C Cancel    ^J Justify   ^W Where is  ^V Next Pg  ^U UnCut Text^T To Spell
```

Figure 6.9 Compose Message screen showing My 2nd pine e-mail

A Summary of pine Addressbook Commands

■ **TABLE 6.3** The pine Address Book Menu Choices

Menu Choice		Action
?	Help	Gives screen displays of Help on the Address Book
<	Main Menu	Returns the user to the Main Menu screen
P	PrevEntry	Goes to the previous entry in the Address Book
–	PrevPage	Goes to the previous page of the Address Book
@	AddNew	Adds a new Address Book entry
C	ComposeTo	Composes a new e-mail message supplying the current Address Book entry in To: field
O	Other CMDS	Allows the user to apply additional mail commands, such as Index, Print, Save, Forward, List Folders, and Quit pine
>	[View/Update]	Edits a selected entry in the Address Book (e.g., to change e-mail addresses)
N	NextEntry	Goes to the next entry in the Address Book
SpaceBar	NextPage	Goes to the next page of the Address Book
D	Delete	Deletes an entry in the Address Book
W	Whereis	Searches for a word or name in the Address Book

Using the pine Address Book

```
PINE 4.04   ADDRESS BOOK (Add)             Folder: INBOX  2 Messages

Nickname  :
Fullname  :
Fcc       :
Comment   :
Addresses :

Fill in the fields just like you would in the composer.
To form a list, just enter multiple comma-separated addresses.
It is ok to leave fields blank. Press "^X" to save the entry, "^C" to cancel.
If you want to use quotation marks inside the Fullname field, it is best
to use single quotation marks; for example: George 'Husky' Washington.




^G Get Help  ^X eXit/Save  ^R RichView  ^Y PrvPg/Top  ^K Cut Line
^C Cancel    ^D Del Char               ^V NxtPg/End  ^U UnDel Line^T To AddrBk
```

Figure 6.10 The pine Address Book screen display

A Summary of pine Message Disposition Commands

■ **TABLE 6.4** Message Disposition Commands

Command	Description
<D>	Deletes the current message
<E>	Saves the current message as a plain text file in the default folder
<F>	Forwards the current message
<R>	Replies to the current message
<S>	Saves the current message in a folder
<U>	Undeletes the current message
<Y>	Prints the current message with a default print command

A Summary of pine Message Composition Commands

■ **TABLE 6.5** General Message Composition Commands

Command	Description
<Ctrl-C>	Cancels the message being composed and writes it to dead.letter
<Ctrl-G>	Gets online help that is context-sensitive
<Ctrl-L>	Refreshes the screen contents
<Ctrl-O>	Postpones sending the message being composed
<Ctrl-T>	Invokes the spell checker
<Ctrl-X>	Sends the message being composed

A Summary of General Commands in pine

■ **TABLE 6.6** General pine Commands

Command	Description
<?>	Shows the Help screen for this screen menu
<C>	Composes a new message using the Compose Message screen display
<L>	Goes to the Folder List screen display
<M>	Returns to the Main Menu screen display
<O>	Shows all other available commands for this screen menu
<Q>	Quits pine, allowing disposal of deleted messages

A Summary of Folder Index Screen Commands in `pine`

■ **TABLE 6.7** Folder Index Screen Commands

Command	Description
<F>	Forward the currently selected message
<J>	Jump to a specific message addressbook
<N>	Move to the next message
<P>	Move to the previous message
<Space>	Show the next screen full of messages
<W>	Whereis – search for a specific folder

A Summary of Addressbook Commands in `pine`

■ **TABLE 6.8** Addressbook Commands

Command	Description
<->	Move to the previous page of the current addressbook
<A>	Add a new entry into the current entry in this addressbook
<C>	Compose a message to the current entry in this addressbook
<D>	Delete selected entry in the current addressbook
<N>	Move to the next address
<P>	Move to the previous address
<Space>	Move to the next page of the current addressbook
<T>	Take address to another addressbook
<V>	View/edit the selected entry in the current addressbook
<X>	Export the current entry to a file
<Y>	Print the current addressbook

A Summary of Addressbook Commands in `pine`

■ **TABLE 6.9** Addressbook Commands

Parameter	What you enter, either a string of characters or place an X or *
fcc-name-rule	Place an X in the by recipient box to save an fcc to folder with recipient's name
personal-name	Your own personal first and last name, like Jill Stevens
quit-without-confirm	Place an X in this box so that pine does not ask for confirmation on exit
user-domain	Your Internet domain name, like egr.up.edu

Network Commands - Displaying the Host Name

```
$ hostname
yamsrv1.ece.gatech.edu
$ uname -n
yamsrv1.ece.gatech.edu
$ uname -a
SunOS yamsrv1.ece.gatech.edu 5.8
Generic_108528-22 sun4u sparc SUNW,Ultra-250
$
```

Testing a Network Connection

```
ping [options] hostname
```
Purpose: Send an IP datagram to 'hostname' to test whether it is on the network (or Internet); if the host is alive it simply echoes the received datagram

Output: Message(s) indicating whether the machine is alive

Commonly used options/features:

`-c count` Send and receive 'count' packets

`-f` Send 100 packets per second or as many as can be handled by the network; only the superuser can use this option

`-s packetsize` Send 'packetsize' packets; the default is 56 bytes (plus an 8 byte header)

Testing a Network Connection (contd.)

```
$ ping cse.ogi.edu
cse.ogi.edu is alive
$ ping -c 3 cse.ogi.edu
PING cse.ogi.edu: (129.95.20.2): 56 data bytes
64 bytes from 129.95.20.2: icmp_seq=0 ttl=245 time=13 ms
64 bytes from 129.95.20.2: icmp_seq=1 ttl=245 time=12 ms
64 bytes from 129.95.20.2: icmp_seq=2 ttl=245 time=15 ms
—cse.ogi.edu PING Statistics—
4 packets transmitted, 4 packets received, 0% packet loss
round-trip min/avg/max 5 12/13/15 ms
$ ping -c 3 -s 2040 cse.ogi.edu
PING cse.ogi.edu: (129.95.20.2): 2040 data bytes
2048 bytes from 129.95.20.2: icmp_seq=0 ttl=245 time=55 ms
2048 bytes from 129.95.20.2: icmp_seq=1 ttl=245 time=56 ms
2048 bytes from 129.95.20.2: icmp_seq=2 ttl=245 time=58 ms
—cse.ogi.edu PING Statistics—
3 packets transmitted, 3 packets received, 0% packet loss
round-trip min/avg/max 5 55/56/58 ms
$
```

Displaying Information About Users

```
finger [options] [user_list]
```

Purpose:	Display information about the users in the 'user_list'; without a 'user_list', the command displays a short status report about all the users currently logged on to the specified hosts
Output:	User information extracted from the ~/.project and ~/.plan files

Commonly used options/features:

-m	Match 'user_list' to login names only
-s	Display output in a short format

Displaying Information About Users

```
$ finger Birch
Login name: btree                    In real life: Birch Tree
Directory: /users/faculty/tree    Shell: /bin/ksh
On since Dec 29 05:55:32 on pts/0 from upibm7.egr.up.edu
No unread mail
Project: Hacking UNIX for its sake ...
Plan: To turn from a Windows lizard to a UNIX wizard ...
$
$ finger -s Birch
Login         Name         TTY         Idle    When
birch         Birch Tree   pts/0               Fri 16:16
$ finger -m Birch
Login name:    Birch       In real life: ???
$
```

Displaying Information About Users

```
$ finger christopher@mit.edu
[mit.edu]
Student data loaded as of Jan 11, Staff data loaded as of Jan 11.
Notify Personnel or use WebSIS as appropriate to change your information.
Our on-line help system describes
     How to change data, how the directory works, where to get more info.
     For a listing of help topics, enter finger help@mit.edu. Try finger
help_about@mit.edu to read about how the directory works.
     Directory bluepages may be found at http://mit.edu/communications/bp.
There was 1 match to your request.
name: Christopher, Jason W
        email: jasc@MIT.EDU
        phone: (617) 123-4567
      address: Simmons Hall # 779
   department: Electrical Eng & Computer Sci
       school: School Of Engineering
         year: 3
        alias: J-christopher
$
```

Remote Login

- The **telnet** protocol is designed to allow you to connect to a remote computer over a network

```
telnet [options] [host[port]]
```

Purpose To connect to a remote system 'host' via a network; the 'host' can be specified by its name or IP address in dotted decimal notation

Commonly used options/features:

-a	Attempt automatic login
-l	Specify a user for login

The rlogin Command

- The **rlogin** command allows you to log on to a host on your local network

```
rlogin [options] hosts
```

Purpose:	To connect to a remote UNIX 'host' via a network ; the 'host' can be specified by its name or IP address in the dotted decimal notation

Commonly used options/features:

-ec	Set the escape character to 'c'(the default is '~')
-l user	User 'user' as the login name on the remote host

Remote Command Execution

```
rsh [options] host [command]
```

Purpose:	To execute a command on a remote machine , 'host', on the same network; the **rlogin** command is executed if no 'command' is specified

Commonly used options/features:

-l user   Use 'user' as the login name on the remote host

Remote Command Execution (contd.)

```
$ rsh upsun29 ps
   PID  TTY    TIME  CMD
  6525  pts/0  0:02  -ksh
  6565  pts/0  0:00  -ksh
  6566  pts/0  0:00  sort data | uniq > sorted_data
$
```
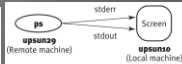

Figure 14.8 The semantics of the rsh upsun29 ps command

```
$ rsh upsun29 sort students > sorted_students
$
```
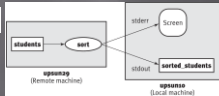

Figure 14.9 The semantics of the rsh upsun29 sort students > sorted_students command

---

File Transfer

`ftp [options] [host]`

Purpose: To transfer files from or to a remote 'host'

Commonly used options/features

`-d`   Enable debugging

`-i`   Disable prompting during transfers of multiple files

`-v`   Show all remote responses

File Transfer

TABLE 14.5 A Summary of Useful ftp Commands

Command	Meaning
! [cmd]	Runs 'cmd' on the local machine; without the 'cmd' argument, invokes an interactive shell
Help [cmd]	Displays a summary of 'cmd'; without the 'cmd' argument, displays a summary of all ftp commands
ascii	Puts the ftp channel into ASCII mode; used for transferring ASCII-type files such as text files
binary	Puts the ftp channel into binary mode; used for transferring non-ASCII files such as files containing executable codes or pictures
cd	Changes directory; similar to the UNIX cd command
close	Closes the ftp connection with the remote host, but stays inside ftp
dir remotedir localfile	Saves the listing of 'remotedir' into 'localfile' on the local host; useful for long directory listings, as pipes cannot be used with the ftp commands
get remotefile [localfile]	Transfer 'remotefile' to 'localfile' in the present working directory on the local machine; if 'localfile' is not specified, 'remotefile' is used as the name of the local file
ls [dname]	Shows contents of the designated directory; 'dname', current directory if none specified
mget remotefiles	Transfers multiple files from the remote host to the local host
mput localfiles	Transfers multiple files from the local host to the remote host
open [hostname]	Attempts to open a connection with the remote host; prompts if hostname not specified as parameter
put localfile [remotefile]	Transfers 'localfile' to 'remotefile' on the remote host; if 'remotefile' is not specified, use 'localfile' as name of remote file
quit	Terminates the ftp session
user [login_name]	If unable to log on, log on as a user on the remote host by specifying the 'user_name' as the command argument; prompt appears if 'user_name' is not specified

---

Remote Copy

`rcp[options] [host:]sfile [host:]dfile`
`rcp [options][host:]sfile [host:]dir`

Purpose: To copy 'sfile' to 'dfile'

Commonly used options/features

`-p`   Attempt to preserve file modify and access times; without this option the command uses the current value of unmask to create file permissions

`-r`   Recursively copy files at 'sfiles' to 'dir'

Other Basic Network Commands

- **netstat** - Display connections, routing tables, stats etc
  - List externally connected processes: netstat -punta
  - List all connected processes: netstat -nap
  - Show network statistics: netstat -s
  - Kernel interface table info: netstat -a -I eth0
- **ping** - send ICMP ECHO_REQUEST packets to network hosts. Use Cntl-C to stop ping.
- **traceroute** - print the route packets take to network host
  - traceroute *IP-address-of-server*
  - traceroute *domain-name-of-server*
- **whois** - Lookup a domain name in the internic whois database.
- **host** - Give a host name and the command will return IP address. Unlike nslookup, the host command will use both /etc/hosts as well as DNS. Example: host *domain-name-of-server*
- **nslookup** - Give a host name and the command will return IP address. Note that nslookup does not use the /etc/hosts file.