UNIX OS

IO and Filters

Terminal Files

Terminal

Keyboard and Display

Terminal Operations

Output goes to Display

Input from keyboard

Terminal file allocated on login

/dev/tt1

/dev/pts/4

Terminal file refered to as “tty”

Terminal I/O

$ cat > f1

Hello

World

Ctrl-d

$ tty

<YOUR\_tty>

$ cp f1 <YOUR\_tty>

$ cp <YOUR\_tty> f1

Working with files..

char buf1[256], buf2[256];

int retval;

int fd = open(“f1”, O\_RDWR);

retval = read(fd, buf1, 40);

retval = write(fd, buf2, 50);

retval = read(fd, buf1, 50);

close(fd);

File Descriptors

Std I/O

echo Hello world

Writes to Stdout

cat f1

Reads from f1

Writes to Stdout

ls –l

Writes to Stdout

Std I/O

who

Writes to Stdout

ls –l f1 NoFile

Details of f1 to Stdout

Error message to Stderr

Shell I/O Redirection

Stdout Redirection

Stdout redirection

Implemented by Shell

ls –l > outfile

Truncate outfile

Create outfile if not present

Arrange Stdout to outfile

Delete ‘> outfile’

Execute ls –l

Stdout redirection

Stdout redirection

$ echo hello > outfile world

$ cat f1 f2 > outfile

$ cat outfile

$ cat f1 > outfile f2

$ cat outfile

Stdout redirection

$ cat outfile > outfile

$ cat outfile

$ ls –l outfile #file size?

$ > outfile ps

$ cat outfile

$ > outfile

$ cat outfile

Stderr redirection

ls -l f1 NoFile f2 > outfile

ls -l f1 NoFile f2 2> errors

ls -l f1 NoFile f2 2 > outfile

ls -l f1 NoFile > out 2> errors

ls -l f1 NoFile > out 2> out

Files..

$ cat > data

Hello world file for filters.

Every first program should be

hello world one. Fate of

programs not beginning with

hello world is not known.

Ctrl-d

$ touch f1 f2

Filters

cat data

Reads from data

Writes to Stdout

cat

Reads from Stdin

writes to Stdout

Filters

$ sort data

$ sort

$ cat data

$ grep world data

$ grep world

Filters

$ wc data

$ wc –c data

$ wc –w data

$ wc –l data

$ wc

Filters

UNIX text processing commands

Command line argument(s) provide names of files to be processed

Text from Stdin is processed if no file name argument

Result is written to Stdout

Source file not modified

Filters

cat

cut

grep, egrep and fgrep

less

more

sort

tr

wc

awk

perl

python

sed

Non Filters

$ ls data

$ ls

$ rm data

$ rm

$ cp f1 f2

$ cp

$ ps

Count logged in users

Print the count of logged in users.

Count logged in users

Print the count of logged in users.

$ who

$ who > users\_file

$ wc –l users\_file

$ rm users\_file

Pipes

Command1 | Command2

Pipe Lines

$ who

$ who | wc -l

$ who | grep YourID

$ who | grep YourID | wc -l

$ ls –ld f\*

$ ls –ld f\* | wc -l

Pipe Lines

Print the string length of UNIX

Pipe Lines

Print the string length of UNIX

$ wc –c UNIX

$ echo UNIX | wc –c

$ echo -n UNIX | wc –c

Stderr piped?

$ ls –l f1 NoFile f2

$ ls –l f1 NoFile f2 | wc

Wrong usage of pipes

No output from first command

$ cp data data\_copy | wc

$ rm data\_copy | wc

Non Filters

$ ls | ps

$ ps | ls

Filters with arguments

$ who | wc data

$ who | wc

Pipe Lines

$ who | grep YourID | wc -l

Command1 | Command2 | Command3

Command1 should write to Stdout

From Command2 onwards

Should be filters

Shouldn’t have filename argument

Transliteration

$ tr abc PQR

$ tr –d abc

$ tr –d ‘ ‘

$ tr –s abc

$ tr –s ‘ ‘

Transliteration

With Stdin redirection

$ tr ‘a-z’ ‘A-Z’ < data

$ tr –s ‘ ‘ < data

With Pipe

$ cat data | tr ‘a-z’ ‘A-Z’

$ cat data | tr –s ‘ ‘

emp file

cat > emp

M285:Raghu:mrktng:sales:12000

I024:Vasu:software:testing:9000

I392:John:software:design:15000

M352:Shenoy:mrktng:adv:11000

I004:Bhanu S:software:design:8000

M046:Bharath:mrktng:adv:9000

I020:Sam:software:testing:12000

M004:Hari:mrktng:sales:9000

Ctrl-d

Head and tail

$ head /etc/passwd

First 10 lines

$ head -3 emp

$ tail /etc/passwd

Last 10 lines

$ tail -3 emp

$ cat emp

$ tail +3 emp

From emp file

Display first 5 lines

Display 3rd to 5th lines

Display last 4 lines

Display 4th to 7th lines

Cutting chars

$ cut –c 1 emp

$ cut –c 1,4 emp

$ cut –c 1-4 emp

$ cut –c 5-10 emp

$ cut –c 5- emp

$ cut –c 1,3-5 emp

Cutting fields

$ cut –d : -f 2,4 emp

$ cut –d : -f 2,4,5 emp

$ cut -d : -f 2-4 emp

Cutting fields

Display Id, Name and Dept

Display Id, Name, and Salary

Hide the group field

Display File sizes and names in home dir.

The 5th and 9th fields from ls

Reduce ‘ ‘ with tr –s ‘ ‘

Use cut

Cutting fields

Display Name and Id

Save only Name field to file t1

Save only Id field to file t2

What is result of

cat t1 t2

Use paste command

paste t1 t2

paste t1 t2 -d :

Sorting

Sort file1 file2 file3..

Options

n Numeric

r Reverse

u Unique

o output\_file

t field seprator

k filednum1,fieldnum2

Sorting

$ sort -t : -k 2,2 emp

$ sort -t : -k 3,3 emp

$ sort -t : -k 5,5 emp

$ sort -t : -k 5,5n emp

$ sort –t : -k 5,5nr emp

Sorting

$ sort -t : -k 3,3 emp

$ sort -t : -k 3,4 emp

$ sort -t : -k 4,4 emp

$ sort -t : -k 3,3 emp

$ sort -t : -k 3,3 -k5,5n emp

$ sort -t : -k 3,3r -k5,5n emp

$ sort -t : -k 3,3r -k5,5nr emp

Sorting

Display the list of files from home directory in increasing sizes

Use ls –l

Reduce spaces using tr –s ‘ ‘

Numeric sort on 5th field

Display filename and size of the largest file in home directory