Plan

• Introduction to Unix/Linux
• Basic Utilities and Commands
• Programming in Unix/Linux
• Text formatting
Why another tutorial on Linux?

- To give you brief and quick introduction
- Motivations for new Linux users
- Something which is more specific to our department and labs
- Not a detailed description of commands, you have to rely on “man” pages
- Can be served as a quick reference material
Introduction to Unix/Linux as OS

• Kernel and shell
  – Kernel is one who all the job and shell is one with whom you interface. Better known as 'Command Line Interface'

• Multi-user
  – Each shell is a user for linux
  – You can open a shell from any other computer also – remote login
Introduction to Unix/Linux as OS

• Multi-tasking

• Linux directory structure
  » \ - Root directory
  » \home - Home directory
  » \usr\bin - Most commonly used binaries
  » \usr\local - Tools those are installed specifically in the machines,
  » better to have a look to see what is there in machine on which you are sitting

• Versions of linux
  – Fedora Core 2.0 – One of the stable linux
  – Fedora Core 7.0 – One of the latest version
  – Latest version doesn't means better!
Basic Commands and Utilities

• File Commands
• Home settings
• Network logins
• Backups
• Internet
• Miscellaneous
File Commands

- Unix directory structure revisited
  - 'cd ~' change directory to your home
  - 'cd ~sonali' change directory to sonali's home
  - 'cd ..' change directory to upper directory
  - 'cd /' change directory to root
  - Use tabs to complete the file name (write partial file name and then use tab)
File Commands

• Some other general commands
  - ls, list the files,
    - '-a' option means 'list all', will show hidden files as well
    - all filenames starting with . are hidden file
    - Other options you can try is '-l', '--color'
  - mkdir, making new directories
  - rm, removing a file
    - BEWARE!! There is no recycle bin in Unix
    - 'rm -i' will ask “are you sure that you want to delete”
    - 'rm -r' will do everything recursively, '-f' force
  - rmdir, remove directory
  - 'cp', means copy  'mv', means rename or move
File Commands

• Permissions – important for sharing your files and restricting access on your work
  – 'chmod 755' => rwx rwx rwx (user group all)
  – 'chmod a+r' => (u/g/a) (+/-) (r/w/x)

• ‘file’ utility tells type of file like text, word or pdf
  • Helpful when extension is not given

• Important filters- (Best way to learn is use commands)
  – 'grep word path/filename', grep find a word in a file
  – pipes '|' : redirect output of one command to other command
  – 'more' or 'less' shows files pagewise

• ‘find’ and ‘locate’ utility help to find a file by filename
  – ‘find –r path –name filename’ will find the location of file in given path. Useful command as we can use wild card pattern
Setting your home

- Different shells – sh, csh, bash, tcsh, ksh
  - ‘csh’ more programmer friendly- default in Philips lab
- Different desktops – gnome, kde, windows-maker
  - Gnome or Kde more user friendly
  - Windows-maker – fast and simple
- Setting environment variables
  - alias, alias any command
  - setenv, sets the variable name
  - PATH, is a environment variable that is searched when you type a command.
  - MAN PATH
  - LD_LIBRARY_PATH, library search path
  - umask, default set the permissions of a new created file by you
- Your cshrc/bashrc – these files are executed when you open a new shell
  - For Philips Lab users: Copy ~neeraj/.cshrc to your home.
- Disk space limitation – quota, du
  - ‘quota –v username’ will tell your status of quota
  - ‘du –sh filename’ tells disk usage of a file
Using Network

- Unix to Unix- ssh, telnet
  - ‘ssh’ is a secure shell, X-settings are default
  - “ssh login@machine.cse.iitd.ernet.in”
  - ‘su username’ switch user command used for switching user on same machine

- Unix to Windows- rdesktop
  - Rdesktop enables you to use windows terminal sitting on your linux system

- Windows to Unix – Xmanager, putty
  - Tools like Xmanager help you to easily access linux from your hostel PCs

- Using ftp and ncftp
  - ‘ftp machine’ then use ‘get’ or ‘put’ to get the file from machine or put the file one machine
  - ‘ncftp –u user machine’ more interactive

- Using startx for new X terminal
  - Cntrl + alt + (f1/f2/f3/f4), for new window in text mode
  - For GUI desktop mode use ‘startx -- : 2’ (any number instead of 2)
  - Cntrl + alt + f7 for previous locked window

- ‘wine’ and cygwin,
  - wine is used for executing windows command on linux terminal and cygwin is a software windows software to execute most common linux commands on windows terminal
Backups

• Zip and Tar, gzip, gunzip
• Various extensions – Z, bz2, zip, gzip, tgz, tar.gz
• Tar options c,x,z,v,f
  • ‘c’ for compress, ‘x’ for expend, ‘z’ for zip, ‘v’ for verbose, ‘f’ force
  • For compression ‘tar –czvf file.tar.gz ./dirname
  • For Decompression ‘tar –xzvf file.tar.gz’
Internet

- **Tools-** netscape, mozilla, firefox
  - Use tabs in mozilla
  - Proxy settings
    - Edit -> preference -> advance -> proxy
    - OR Tools -> Options -> Connection Settings
      - Server name: pushpa(10.20.5.2), port: 8080
- **Use pine for mails: fast and easy for local mails**
  - Configuring pine,
    - copy ~neeraj/.pinerc to your home and change to your login name replacing ‘neeraj’ in .pinerc file
  - In pine, all commands are given on bottom of editor
- [http://poorvi.cse.iitd.ernet.in/help/userGuide.html](http://poorvi.cse.iitd.ernet.in/help/userGuide.html)
Miscellaneous

• Unix process – ps, fg, bg, kill, &
  • ‘ps’ gives the list of processes
  • ‘kill’ can kill a process, you have to write pid given by ps
  • Writing ‘&’ in and of a command will force process to run in background
  • ‘ctrl z’ for suspending a process, ‘ctrl c’ to kill a process
  • ‘bg’ running a process in background
  • ‘fg’ bringing a process in foreground

• Finger, who, rwho
  • ‘finger’ gives list of user on a machine
  • ‘finger username’ will give some details about user – name shell etc
  • ‘finger user@desh’ will tell when user has last checked his mails
  • ‘who’ gives all users on a machine
  • ‘rwho’ gives all users on all the machines
Miscellaneous

• Use man and man –k
  • Help for using any command

• Change password- ‘passwd’, ‘yppasswd’, ‘kpasswd’

• ‘talk username@machine’ Try this when one of your friend is login on another machine. This you will feel better than yahoo or msn messenger

• Printing- lp, lpr
  • ‘lpq’ for checking request queue on printer

• ‘ruptime’ gives list of all the machines and their load and number of users on each
  • Help you in selecting machine on which you should login
LDAP, NIS, NFS

- **NIS and LDAP**
  - All user accounts are created and maintained on one machine (NIS server), other machines use this info.
    - By creating account on NIS server you can login anywhere

- **NFS**
  - All HOME’s are on NFS server, all other machines “mount” it from there.
    - Wherever you login, you see same files

- **Know your servers**
  - Intel Lab cluster servers: LDAP: bhairav, NFS: hpnas
  - Philips Lab cluster server: NIS and NFS: virat
Important Utilities

• **ooffice**: OpenOffice, for word, presentation, spreadsheets
• **xfig**, for drawing figures.
  • Can be exported to eps, jpeg, gif or any format
• **gimp** - Viewing and editing images
• **eog** – (Eye of Gnome) for viewing images
• **acroread** – Acrobat reader for PDF files
• **gnumeric** - Spreadsheet viewer and editor in Linux
• Editors: vi, emacs, pico, gedit
Vi Editor

• Why vi, fast and easy
• Basic modes- edit and command,
  • ‘esc’ for command mode
  • ‘i, a’ for edit mode (insert or append mode)
• Other commands using colon- :q,:w,:q!,:e
  • :q for quit, :w for write, :q! quit without save
  • :e open another file for editing, :wq write and quit
• Searching using ‘/’
  • In command mode use ‘/’ then write the word you want to search
  • ‘n’ for forward search, ‘N’ for backward search
• Search and replace
  • :s/ram/mohan - will search string “ram” and replace with “mohan”
• Advanced vi – vim(vi improve) and gvim(gnu vim)
Programming in Unix

• Unix made by programmer for programming
• Gcc compiler – for ‘c’, g++ for ‘c++’
• Various options, -O,-c,-g,-I
  • ‘-O’ sets optimization level
  • ‘-c’ only compile not link
  • ‘-g’ for debug
  • ‘-I’ for pre-processing only
• Linking with –l
  • All the files are previously compiled and then linked by giving library information
• Debugger- gdb
  • Use ‘gdb a.out’ for debugging
Other tools for programmers

• Kdevelope, glade – gui based C/C++ programming environment (like VC++ development environment)
• ‘ddd’ debugger.
• Makefile
  • Makefile will have targets, prerequisite and commands
  • Left of colon is target, right of colon is prerequisite, line next to target line is command
  • Command line should be tabbed
  • ‘make’ will execute target given by ‘all’ or first target, else specify your target in command line
  • Make will resolve the dependencies recursively
    » All dependencies of a target should be resolved before executing its command
Example of a makefile

CC=gcc
COPTS= -g -Wall
TARGET=run.x
SRCS=hello.c junk.c
OBJS=$(SRCS:.c=.o)
all:$(OBJS)
    $(CC) $(COPTS) $(OBJS) -o $(TARGET)
clean:
    rm -f $(OBJS) core
%.o:%.c
    $(CC) $(COPTS) -c <$
Text formatting

• Using Latex
  – Text formatting in Linux
  – Advantage of latex
    • Automated formatting in standard form
    • Generation of index and cross-references
    • Figures and mathematical formulas
    • Bibliography
  – A latex template document given in my homepage:
    http://www.cse.iitd.ernet.in/~neeraj/doc
Lab rules

• Keys issues
  • If you have student keys of the lab then it must be returned next day in morning

• Lab timings
  • Lab is open for you most of the time. But due to one key you have to coordinate in yourself to keep lab opened

• Discipline in the lab
  • Don’t make noise in lab
  • No eating drinking
  • Labs are not for discussion in general that disturbs others

• No sharing of password, even with your project-mates

• Any mischief can lead to suspension of your account
Conclusion

• Self help is the best help!
  – The UNIX man pages “Manual sections”
  – Using man, whatis etc.
  – Experiment. You can never kill the system.

• Links
  – http://www.gnu.org, for GNU tools and manuals
  – http://karnali.cse.iitd.ernet.in, Philips Lab. internal page
  – http://poorvi.cse.iitd.ernet.in/local, Intel cluster archives

• Books
  – The UNIX programming environment, Kernighan & Pike