Introduction of Unix/Linux

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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 relay 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 whome 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 commanly 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 recursivily, '-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 shall, 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 Winodws- 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 extentions – Z, bz2, zip, gzip, tgz, tar.gz
- Tar oprtions 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

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 macine
  - '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