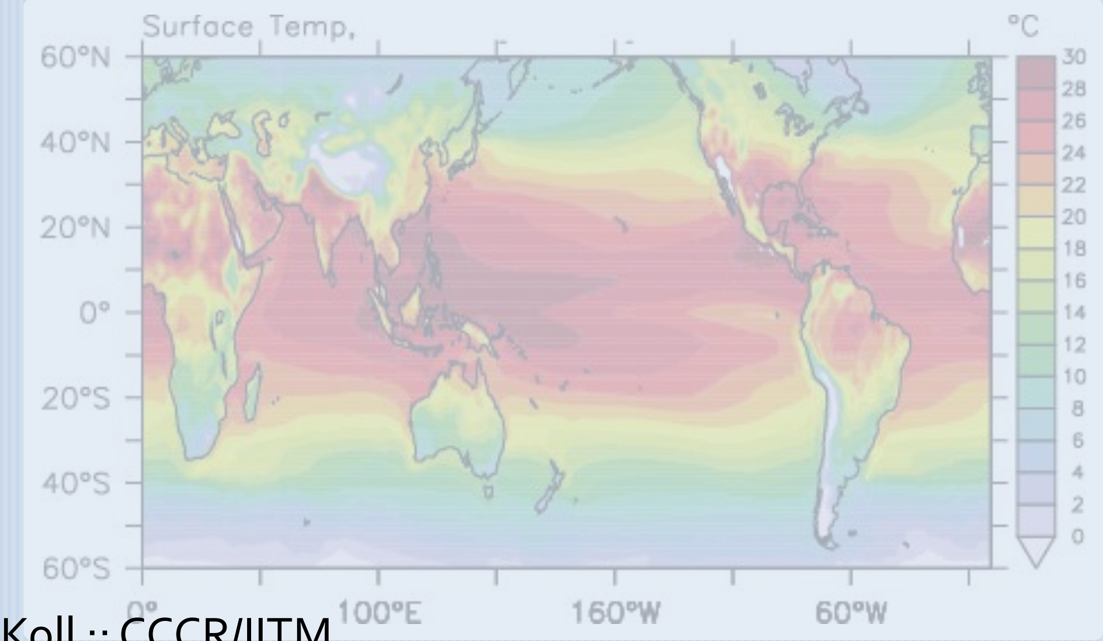
==== Unix/Linux in Climate Research ====

```
247.21 244.83 242.70 240.88 239.51 238.76
238.52 238.58 238.68 238.82 238.99 239.18
239.17 238.95 238.78 238.42 238.04 237.71
237.43 237.33 237.53 238.16 239.29 240.95
243.37 245.92 248.69 251.52 252.06 257.99
260.38 262.42 263.97 265.29 265.57 266.06
265.64 264.20 263.74 263.20 262.42 261.77
261.32 260.99 260.78 260.71 260.72 261.14
261.53 261.57 263.04 263.72 264.30 265.09
265.23 264.64 264.52 263.75 261.33 259.16
257.07 255.06 252.64 249.88 245.79 244.97
244.23 243.53 242.89 242.34 241.87 241.45
241.12 240.87 240.69 240.56 240.47 240.42
240.41 240.45 240.55 240.71 240.96 241.32
241.75 242.28 242.88 243.58 244.34 245.15
```

CDO

```
J >
  243.53 242.89 242.34 241.87 241.45
J >
  264.64 264.52 263.75 261.33 259.16
A >
  264.20 263.74 263.20 262.42 261.77
S >
  237.33 237.53 238.16 239.29 240.95
```

Ferret



Roxy Mathew Koll :: CCCR/IITM

IITM-CAT, Sep 2013

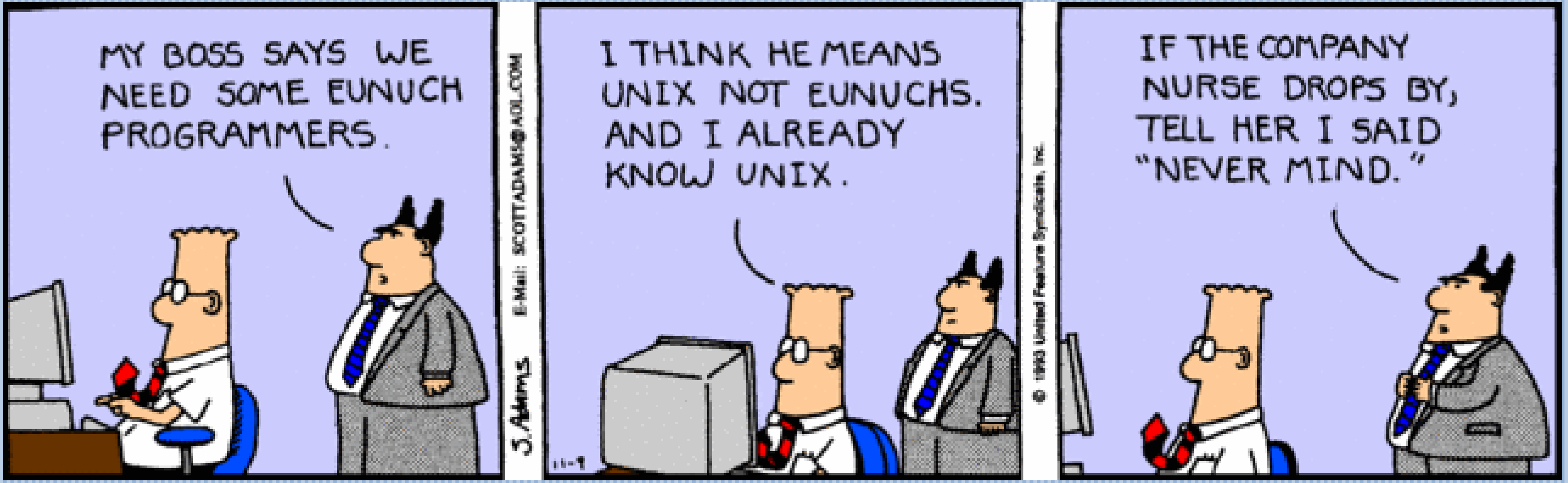
History/Attributes of Unix

- Originally developed in 1969 by a group of AT&T employees at Bell Labs, including Ken Thompson, Dennis Ritchie, Douglas McIlroy, Joe Ossanna.

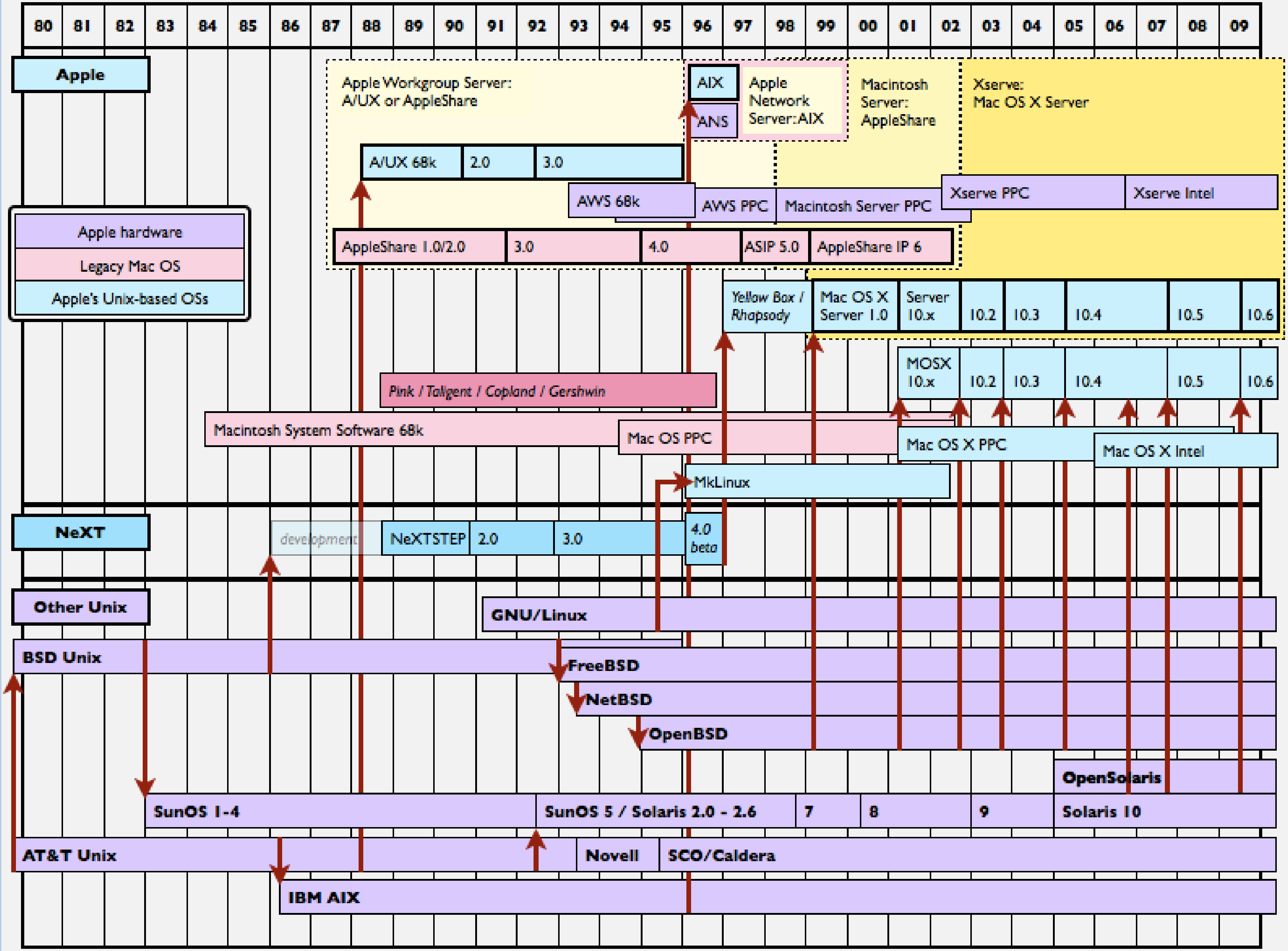
- There are various Unix variants available in the market.
  Solaris Unix, AIX, HP Unix and BSD are few examples.

- Linux is the most popular flavor of Unix which is freely available.
  - written 1991 by Linus Torvalds and global unix community

- multi-user, multi-tasking system


MY BOSS SAYS WE NEED SOME EUNUCH PROGRAMMERS.
E-Mail: SCOTTADAMS@AOL.COM
S. Adams
11-9
I THINK HE MEANS UNIX NOT EUNUCHS. AND I ALREADY KNOW UNIX.
© 1993 United Feature Syndicate, Inc.
IF THE COMPANY NURSE DROPS BY, TELL HER I SAID "NEVER MIND."

Unix Distributions



80 81 82 83 84 85 86 87 88 89 90 91 92 93 94 95 96 97 98 99 00 01 02 03 04 05 06 07 08 09

Apple

Apple Workgroup Server:
A/UX or AppleShare

AIX

ANS

Apple
Network
Server:AIX

Macintosh
Server:
AppleShare

Xserve:
Mac OS X Server

A/UX 68k | 2.0 | 3.0

AWS 68k | AWS PPC | Macintosh Server PPC

Xserve PPC | Xserve Intel

AppleShare 1.0/2.0 | 3.0 | 4.0 | ASIP 5.0 | AppleShare IP 6

Apple hardware

Legacy Mac OS

Apple's Unix-based OSs

Yellow Box /
Rhapsody

Mac OS X
Server 1.0

Server
10.x

10.2 | 10.3 | 10.4 | 10.5 | 10.6

MOSX
10.x

10.2 | 10.3 | 10.4 | 10.5 | 10.6

Pink / Taligent / Copland / Gershwin

Macintosh System Software 68k

Mac OS PPC

Mac OS X PPC

Mac OS X Intel

MkLinux

NeXT

development

NeXTSTEP | 2.0 | 3.0

*4.0
beta*

Other Unix

GNU/Linux

BSD Unix

FreeBSD

NetBSD

OpenBSD

OpenSolaris

SunOS 1-4 | SunOS 5 / Solaris 2.0 - 2.6 | 7 | 8 | 9 | Solaris 10

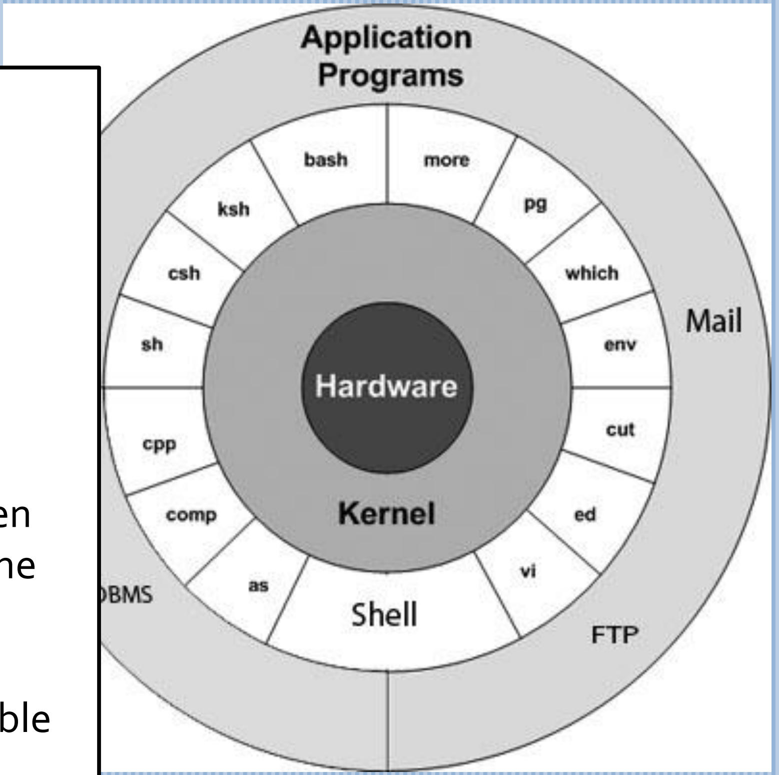
AT&T Unix | Novell | SCO/Caldera

IBM AIX

Linux Distributions

Powered by:
archlinux
Powered by:
debian
Powered by:
fedora
Powered by:
foresight linux
Powered by:
gentoo linux™
Powered by:
Mandriva
Powered by:
Linux Mint
Powered by:
kubuntu
Powered by:
openSUSE
Powered by:
PCLinuxOS
PCLinuxOS
Powered by:
redhat.
Powered by:
sabayon
linux
Powered by:
slackware
linux
Powered by:
slax
Powered by:
ubuntu
Powered by:
xubuntu

A popular Linux Variant?



Unix Structure

Kernel: The kernel is the heart of the operating system. It interacts with hardware - major functionality includes process management, memory management, thread management, scheduling, I/O management, file management and power management.

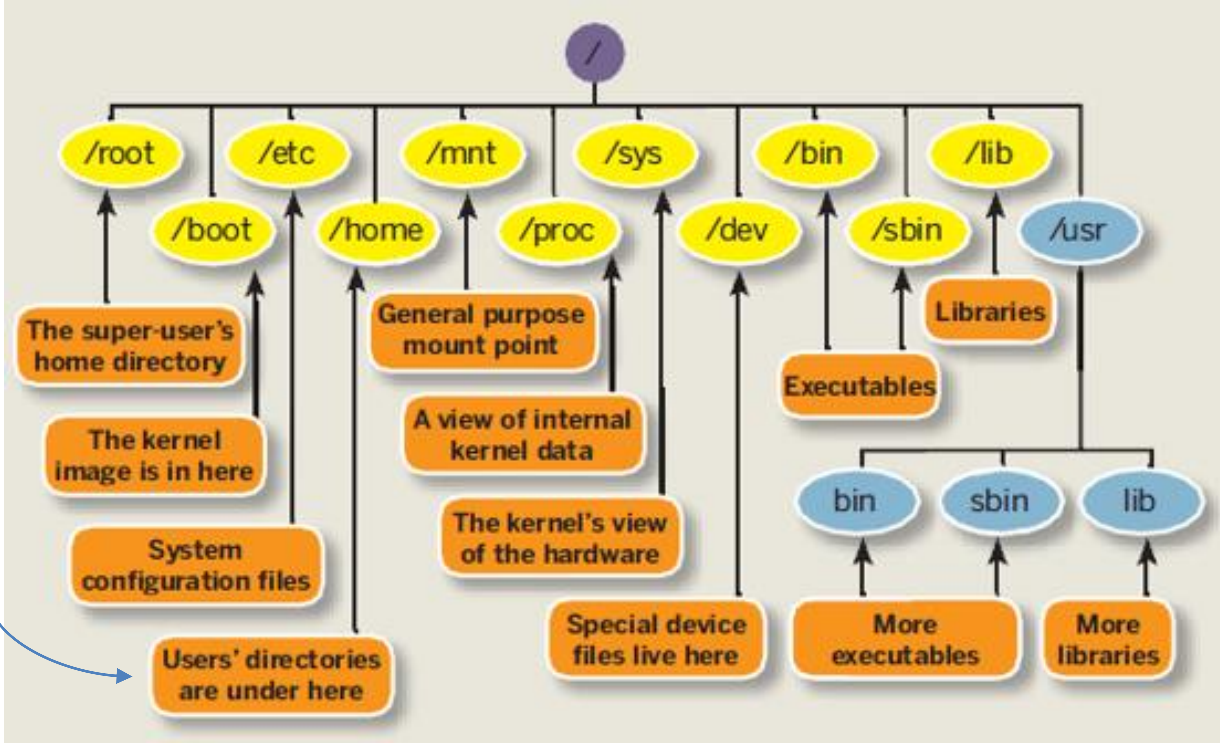
Shell: The shell is the utility that processes your requests. When you type in a command at your terminal, the shell interprets the command and calls the program that you want. The shell uses standard syntax for all commands. C Shell (**csh**), Bourne Shell (**bash**) and Korn Shell are most famous shells which are available with most of the Unix variants.

Commands and Utilities: There are various command and utilities which you would use in your day to day activities. **cp, mv, cat** and **grep** etc. are few examples of commands and utilities. There are over 250 standard commands plus numerous others provided through 3rd party software. All the commands come along with various optional options.

Files and Directories: All data in UNIX is organized into files. All files are organized into directories. These directories are organized into a tree-like structure called the **filesystem**.

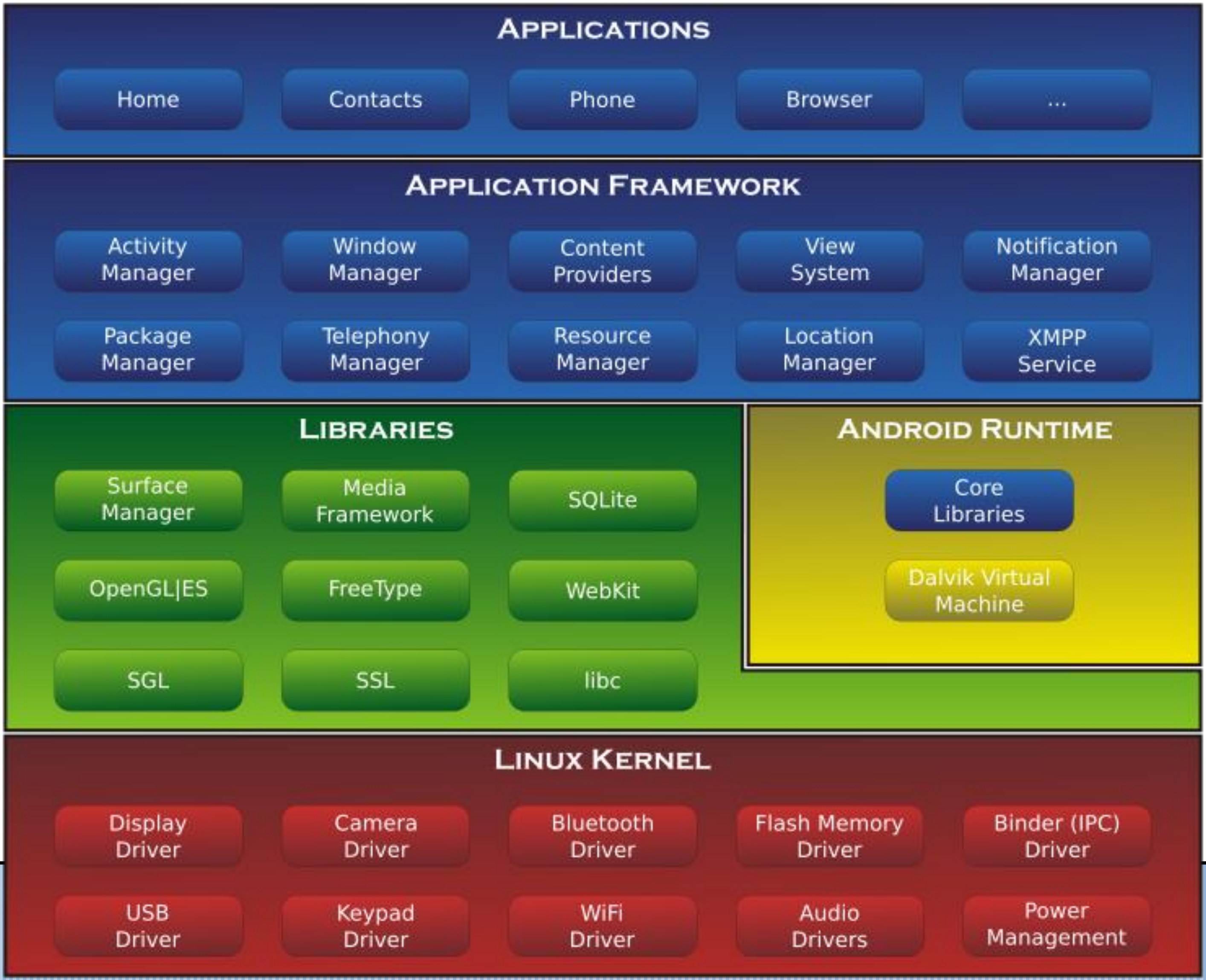
Unix Filesystem

/	The ancestor of all directories on the system.
/bin	Essential tools and other programs (or binaries).
/dev	Files representing the system's various hardware devices. eg: /dev/cdrom
/etc	Miscellaneous system configuration files, startup files, etc.
/lib	Essential system library files used by tools in /bin
/home	user home directories


/
/root
/etc
/mnt
/sys
/bin
/lib
/boot
/home
/proc
/dev
/sbin
/usr
The super-user's home directory
The kernel image is in here
System configuration files
Users' directories are under here
General purpose mount point
A view of internal kernel data
The kernel's view of the hardware
Special device files live here
Executables
Libraries
bin
sbin
lib
More executables
More libraries

most of your activities will be here !

Android Structure



APPLICATIONS

Home

Contacts

Phone

Browser

…

APPLICATION FRAMEWORK

Activity Manager

Window Manager

Content Providers

View System

Notification Manager

Package Manager

Telephony Manager

Resource Manager

Location Manager

XMPP Service

LIBRARIES

Surface Manager

Media Framework

SQLite

OpenGL|ES

FreeType

WebKit

SGL

SSL

libc

ANDROID RUNTIME

Core Libraries

Dalvik Virtual Machine

LINUX KERNEL

Display Driver

Camera Driver

Bluetooth Driver

Flash Memory Driver

Binder (IPC) Driver

USB Driver

Keypad Driver

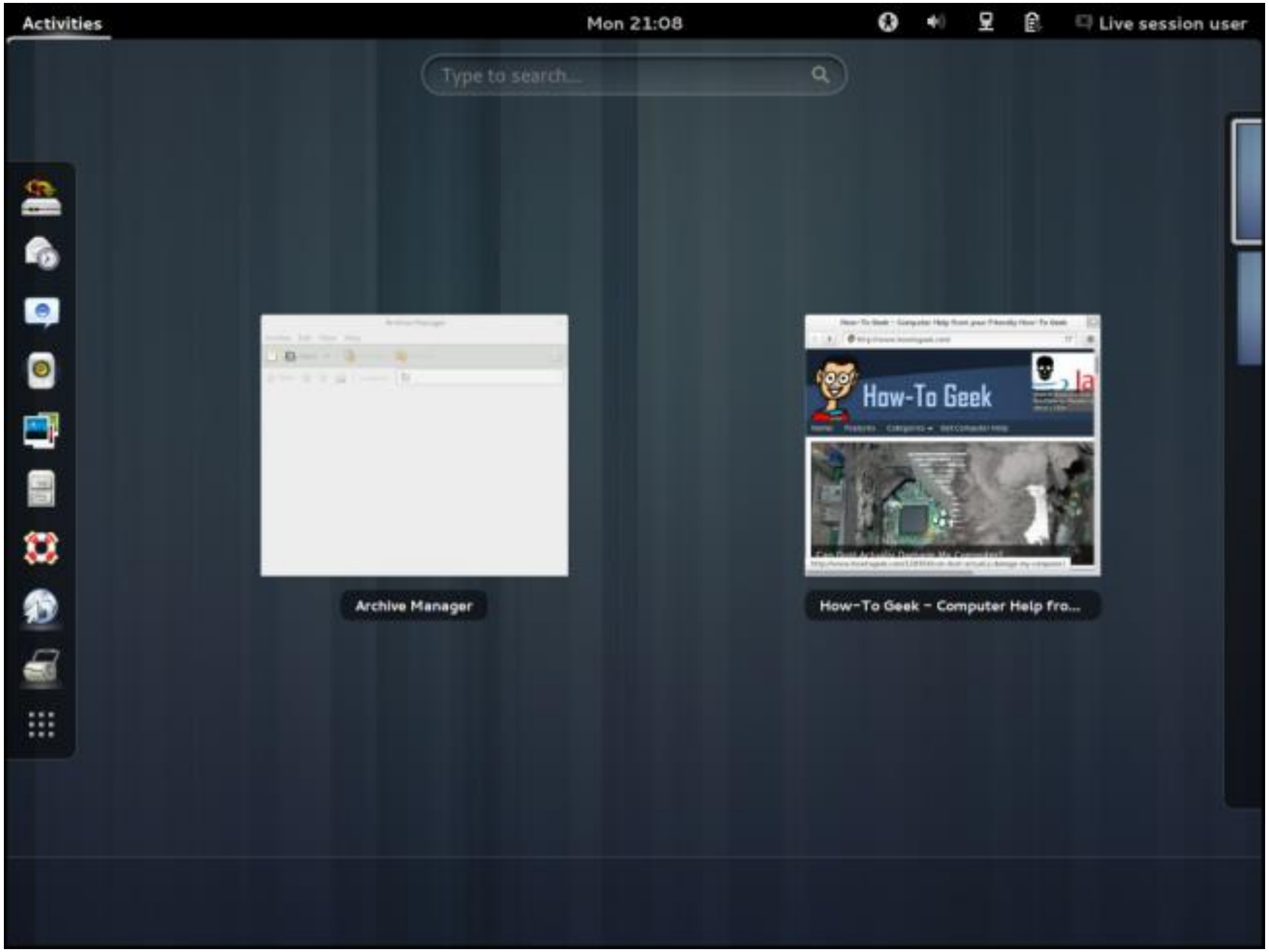
WiFi Driver

Audio Drivers

Power Management

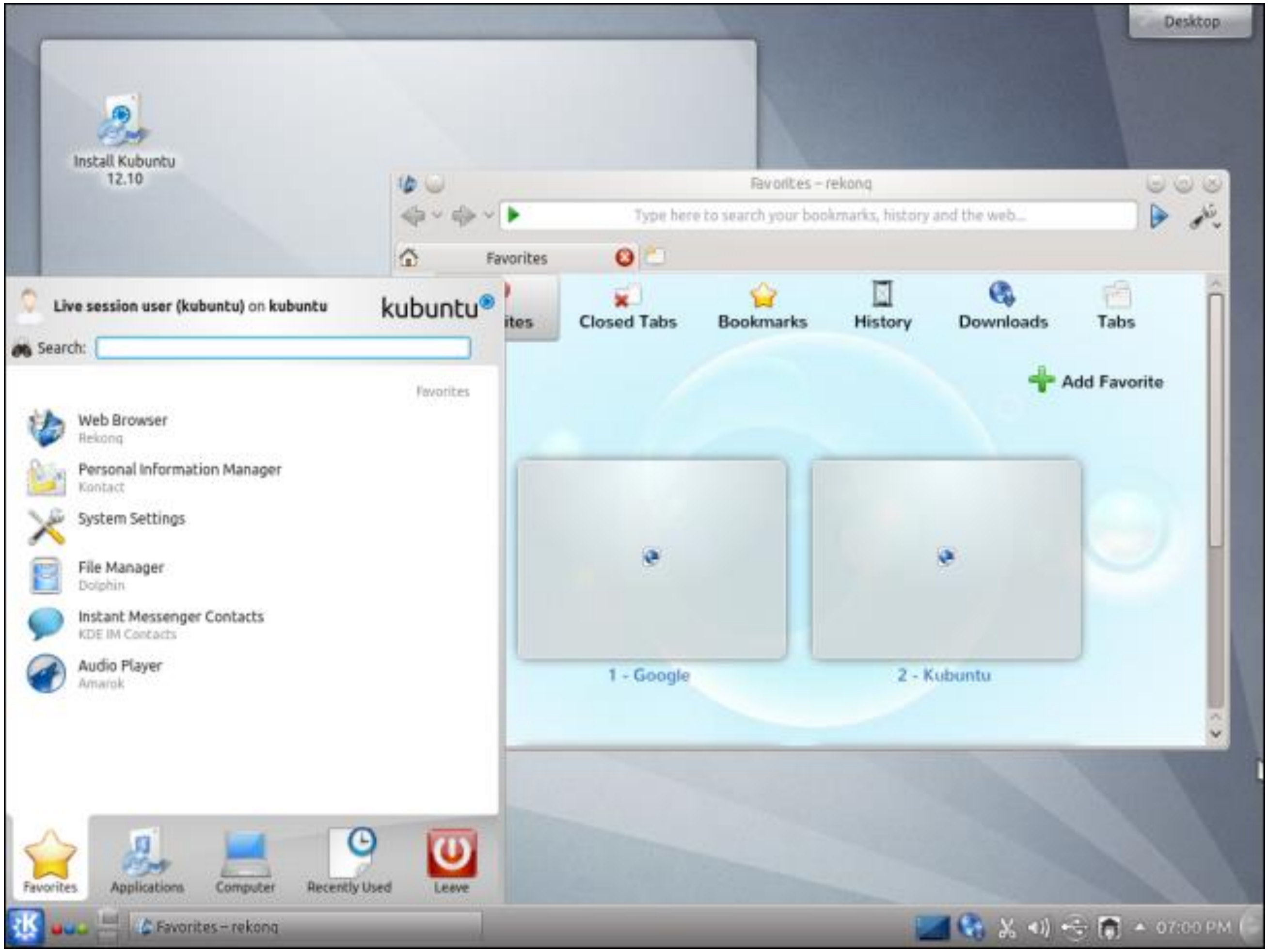
Desktop Environments: Gnome 3

The Visual Interface



Desktop Environments: KDE

The Visual Interface



Listing the contents of a directory

ls is used to list the contents of a directory.

If the command **ls** is written with parameter **–l** then the command lists contents of the working directory with details.

```
$       ls -l                   list contents with details

$       ls -lrt                 list, sort with time in reverse

$       ls -ld                  list details of current directory

$       ls -R                   list details of all sub-directories
```

List as a tree

tree is a recursive directory listing command

```
$       tree
```

Moving in and out of directories

cd is used to go to a specific directory.

```
$      cd /home/roxy/work          go to the sub-directory work

$      cd ..                       go to parent directory

$      cd                          return to home directory

$      pwd                         tells you the current dir.
```

Making and Removing directories

mkdir is used to create a directory.
rmdir is used to remove a directory.

```
$      mkdir <dirname>        make a subdirectory with given name

$      rmdir <dirname>        remove/delete the directory
```

Copying and Moving files

recursive

cp is used to copy files.

mv is used to move files.

```
$       cp <file1> <file2>                makes a copy of the file

$       cp –r <dir1> <dir2>               copy the directory

$       mv <file1> <file2>                renames the file

$       mv <file1> </path/file2>          moves the file to another dir
```

Removing files and directories

rm is used to remove files and directories.

```
$       rm <filename>             remove a file

$       rm -r <dirname>           remove/delete a directory
```

Wild card characters!!

Holders for searching a particular name

***** matches all characters

? matches one character

```
$       ls d*                   list files starting with d

$       ls d??                  starts with d, 2 chars follow

$       rm *                    removes all files!!

$       rm *.log                removes files with .log extension
```

Careful, you might end up deleting all your important files!

Finding files

find

$	find . –name “*data*”	find files with name
$	find . –type f –ctime -1 -ls	will find any regular files with the criteria “-type f”, and those modified 1 day ago

Finding within files

grep is used to search text in the given file for lines containing a match to the given strings or words.

$	grep “word” <filename>	search a word in a file
$	grep “word” <*.txt>	find word in all text files

Basic Unix/Linux Commands

Commands	Description
ls	list contents of present directory
cd <*file*>	change directory to a directory called “*file*"
cd ..	change directory up the directory tree
cd	change to your home directory
pwd	show the name if the present working directory
mkdir <*dirname*>	make a directory called “*dirname*”
cp <*file1*> <*file2*>	copy file *file1* to *file2*
cp <*file1*> *.*	copy file1 to this directory
cp -r <*dir1*> <*dir2*>	copy directory (and all of its contents) *dir1* to *dir2*
mv <*file1*> <*file2*>	move (rename) *file1* to *file2*
man *command*	show the manual page about a command (e.g., man ls)
rm <*file*>	remove *file*
rmdir <*dirname*>	remove a directory
CONTROL-C	terminate whatever command was issued.

Editing & Viewing text files

Commands	Description
cat <*file*>	Dump content of file *file* to the screen.
less <*file*>	Show one page full of text from file *file*. Hit space to advance. q to quit.
tail –f <*file*>	Display last few lines of a file
vi <*file*>	Open *file* with vi editor
gedit <*file*>	Open *file* with gedit

→ visual editor

Basic **vi** editor commands

Commands	Description
:q	Quit vi
:w	Save the file
i	Insert/edit mode
<esc>	Leave the edit mode and enter command mode
r	Replace a character
x	Delete a character
d	Delete a line

Zip/Unzip files and directories

Commands	Description
gzip	Zip file/directories to a .gz file
gunzip	Unzip a .gz file
tar	Zip/tar or unzip/untar file/directories

Some other commands

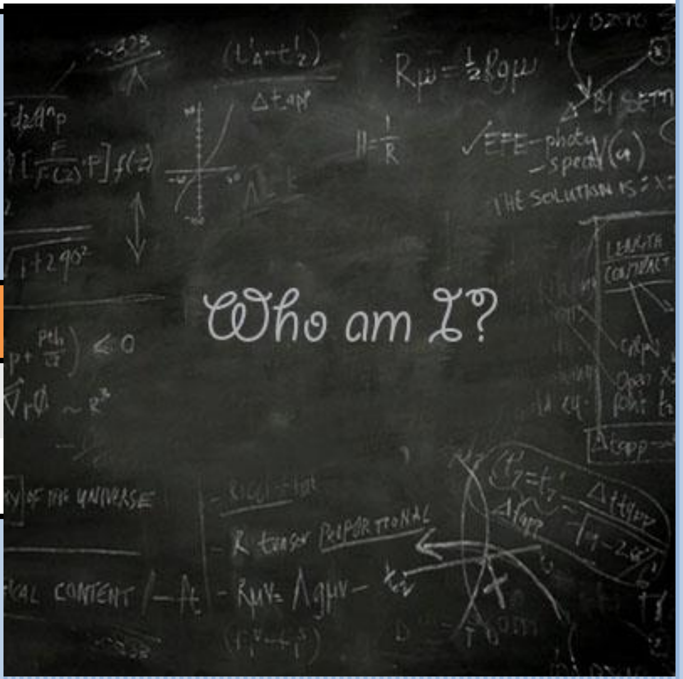
Commands	Description
diff	Shows the difference between two files
echo	Display text on the screen
clear	Clear the screen
grep	Find all files with given expression

Finding out what the computer is doing

Commands	Description
whoami	The ultimate question!??
who / w	show who is logged on
finger *username*	find out about a particular user
top	show what programs are running. q to quit.
df -h	Show how much disk space is free/used (-h means "human readable")
du -h *file or dir*	disk space used by particular file/dir.

System shutdown

Commands	Description
shutdown	Shuts down the system
reboot	Reboots the system



Shell Scripts

The basic concept of a shell script is a list of commands, which are listed in the order of execution.

```
vi test.sh
```

```
#!/bin/bash
pwd
echo "What is your name?"
read name
echo "Hello, $name"
```

```
sh test.sh
```

Shell Scripts

The basic concept of a shell script is a list of commands, which are listed in the order of execution.

```
vi diskinfo.sh
```

```
#!/bin/bash
echo “Disk usage summary of $USER on `date`"
echo “These are my files”
ls –lrt
echo “Disk space usage”
du -sm
```

```
sh diskinfo.sh
```

Shell Arithmetic

```
vi salary.sh
```

```
#!/bin/bash
echo "What is your monthly salary?"
read salary
let ann_sal=$salary*12
clear
echo “Your annual salary is:”
echo $ann_sal
```

```
sh salary.sh
```

SSH [Secure Shell]

For secure data communication, remote command-line login and execution.
Eg: connecting to HPC or another computer from your PC.

```
ssh –X <ip address>
```

invoke the graphical capability [x-window]

FTP [File Transfer Protocol]

For transferring files to/from remote server/pc.

```
ftp <ip address>
```

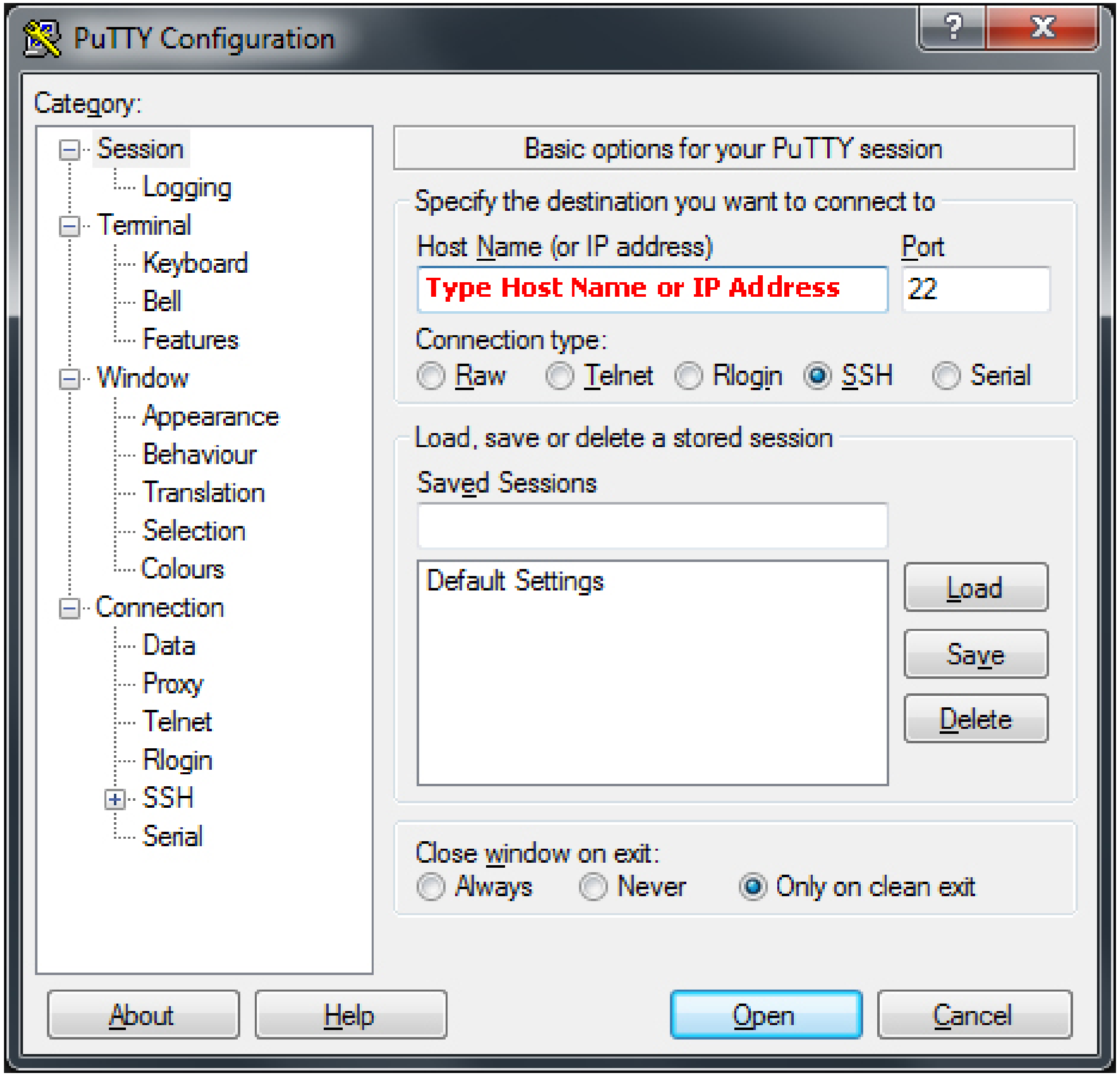
```
ftp> put <filename>
```

```
ftp> get <filename>
```

```
ftp> quit
```

SSH Client for Windows/Linux

Putty:



Host Name (or IP address): Type Host Name or IP Address

Port: 22

Connection type: ○ Raw ○ Telnet ○ Rlogin ● SSH ○ Serial

Saved Sessions:

Default Settings

Close window on exit: ○ Always ○ Never ● Only on clean exit

It's a UNIX system, I know this!
JURASSIC
Clever girl!
URASSIC PARK
Diploma
UNIX
Systems