Server Operating Systems

Lecture 7
Linux Desktops

Open Source Software

Linux software is written by groups of volunteers, collaborating over the internet.

Some companies, such as Suse, Red Hat and IBM have started to employ people to work on Linux software, but it is still mainly done by volunteers.

There are a variety of licenses which cover the distribution of Open Source Software (OSS), but the most widespread one is the GNU General Public License (GPL) which was created by Richard Stallman.

GNU GENERAL PUBLIC LICENSE
Version 3, 29 June 2007

From the Preamble:

When we speak of free software, we are referring to freedom, not price. Our General Public Licenses are designed to make sure that you have the freedom to distribute copies of free software (and charge for them if you wish), that you receive source code or can get it if you want it, that you can change the software or use pieces of it in new free programs, and that you know you can do these things.

To protect your rights, we need to prevent others from denying you these rights or asking you to surrender the rights. Therefore, you have certain responsibilities if you distribute copies of the software, or if you modify it: responsibilities to respect the freedom of others.

For example, if you distribute copies of such a program, whether gratis or for a fee, you must pass on to the recipients the same freedoms that you received.

You must make sure that they, too, receive or can get the source code. And you must show them these terms so they know their rights.

http://www.gnu.org/copyleft/gpl.html

Forking Software

This means that:

If you don't like a particular piece of software, you can download the source code, and change it - as long as you make your changed version freely available as well.

Let's say that the team working on a new word-processor package have a disagreement over whether to make it compatible with Microsoft office files.

What can happen?

The project will 'fork'.

There will be two versions of the software.

It is normal to give one of them a new name, to avoid confusion.

The one that most people want to work on - and use - will be the one that survives.

Why are there so many?

Because of this, there are many word-processor applications out there.

Some are very good. Some are not.

Some have a large team of programmers working on them.

Some were just started by one person who lost interest.

It is possible to take someone elses program - which hasn't been updated for years - and use it as a starting point for your improvements.

It is considered good manners to ask the original owner if they mind you taking over the project - although they can't stop you, under the terms of the license.

Case Study: The X Window System

1984 The original idea of X emerged at MIT in 1984 as a collaboration between Jim Gettys (of Project Athena) and Bob Scheifler (of the MIT Laboratory for Computer Science).

Scheifler needed a usable display environment for debugging the Argus system.

Project Athena (a joint project between DEC, MIT and IBM to provide easy access to computing resources for all students) needed a platform-independent graphics system to link together its heterogeneous multiple-vendor systems;

Based on http://en.wikipedia.org/wiki/X_Window_System

Case Study: The X Window System

1987 With the success of X11 becoming apparent, MIT wished to relinquish the stewardship of X, but at a June 1987 meeting with nine vendors, the vendors told MIT that they believed in the need for a neutral party to keep X from fragmenting in the marketplace.

1988 MIT X Consortium formed as a non-profit vendor group, with Scheifler as director, to direct the future development of X in a neutral atmosphere inclusive of commercial and educational interests.

Case Study: The X Window System

Over the next ten years, various versions of X Window system were released: X2, X3 etc.

1993 The X Consortium, Inc. (a non-profit corporation) formed as the successor to the MIT X Consortium.

It released X11R6 on May 16, 1994.

1995 It took on the development of the Motif toolkit and of the Common Desktop Environment for Unix systems.

1992 X Window system is ported to IBM PC microcomputer. Called XFree86.

XFree86 evolved over time from just being one port of X, to the leading and most popular implementation and the de facto steward of X's development.

Case Study: The X Window System

1999 The official body, the X Consortium had more or less ground to a halt – all significant innovation had been happening in the XFree86 project. The X.Org organisation is formed to replace it.

In 1999, the XFree86 team joined X.Org as an honorary (non-paying) member, encouraged by various hardware companies interested in using XFree86 with Linux and in its status as the most popular version of X.

2003 While the popularity of Linux (and hence the installed base of X) surged, X.Org remained inactive, and active development kept taking place largely within XFree86.

However, considerable dissent developed within XFree86. The XFree86 project suffered from a perception of a far too centralised development model; developers could not get CVS commit access and vendors had to maintain extensive patch sets.

Case Study: The X Window System

In March 2003 the XFree86 organization expelled Keith Packard, who had joined XFree86 after the end of the original MIT X Consortium, with considerable ill-feeling.

X.Org and XFree86 began discussing a reorganisation suited to properly nurturing the development of X. Jim Gettys had been pushing strongly for an open development model since at least 2000. Gettys, Packard and several others began discussing in detail the requirements for the effective governance of X with open development.

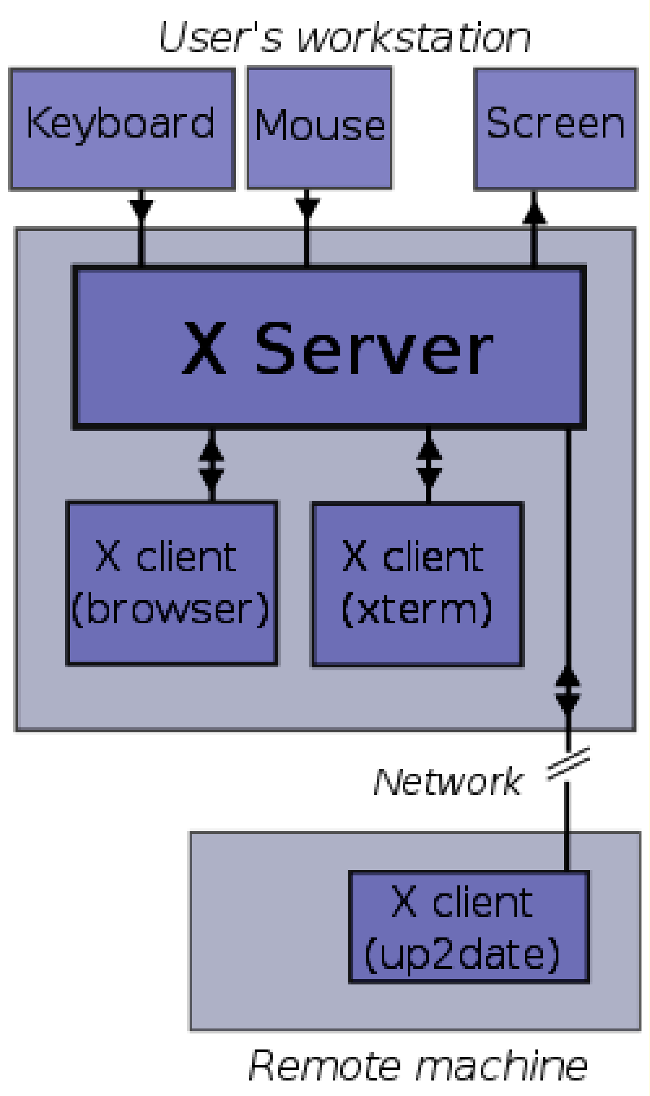
Case Study: The X Window System

2004 Various people from X.Org and freedesktop.org formed the X.Org Foundation, and the Open Group gave it control of the x.org domain name.

This marked a radical change in the governance of X. Whereas the stewards of X since 1988 (including the previous X.Org) had been vendor organizations, the Foundation was led by software developers and used community development based on a decentralised model, which relies on outside involvement.

Membership was opened to individuals, with corporate membership being in the form of sponsorship. Several major corporations such as Hewlett-Packard and Sun Microsystems currently support the X.Org Foundation.

Linux Graphics Architecture



The X Server is running on the machine that the user is actually sat in front of.

It receives messages from the applications and drives the monitor.

It also sends messages from the keyboard and mouse back to the applications.

X is network transparent – the clients do not have to be on the same machine as the server.

Software Hierarchy

In our case, the X Server and the applications are both running on the same computer.

Desktop Environment	A collection of applications, with a menu system, help files and configuration utilities.
Applications	Programs which run inside the windows.
Windows Managers	Software which provides resizable windows.
GUI Libraries (Widget Toolkit)	QT, GTX+, Motif - libraries to provide buttons, scroll bars.
Xlib	Libraries to handle communications with X Server

By separating the software in this way, the applications programmers can concentrate on getting the program to work, without having to worry about the details of:

Controlling the windows	(handled by the window manager)
Painting the buttons, scrollbars etc	(handled by the GUI Libraries)
Communicating with the user	(handled by the X Server)

Window Managers

AfterStep	
Blackbox	(minimalist)
evilwm	
Enlightenment	
Fluxbox	(lightweight, based on Blackbox)
FVWM	(a virtual window manager, derived from twm)
IceWM	
Ion	(designed with keyboard users in mind)
KWin	(originally called KWM, default for KDE)
Metacity	(the current default for the GNOME desktop environment)
MWM	(Motif Window Manager)
Openbox	
Sawfish	(a past default for GNOME, originally called Sawmill)
twm	(default for the X Window System since version X11R4)
Window Maker	
Xfwm4	(a window manager for the Xfce desktop environment)

TWM

twm (Tab Window Manager) is the standard window manager for the X Window System, version X11R4 onwards.

It provides title bars, shaped windows and icon management, and is extensively configurable.

twm was a breakthrough achievement in its time, but has been largely superseded by other window managers and is no longer maintained.

Despite being obsolete, it made a strong impact on the development of X window managers.

Although it is now generally regarded as the window manager of last resort, a small but dedicated minority of users favor twm for its simplicity, customizability, and light weight — partly due to being written in C directly against Xlib rather than based on a widget toolkit.

Some versions of Linux will resort to twm if the computer it is running on lacks the RAM for a more sophisticated window manager.

FVWM

In 1993, irritated with the limitations of the universally used twm window manager, Robert Nation began to study the source code to find out why it used so much memory, and to add support for virtual desktops.

Already well known for his popular rxvt terminal emulator, Nation worked on reducing the memory consumption of his new window manager.

Deciding to test FVWM's reception, on June 1, 1993 he bundled it with an rxvt release.

Many developers have based their own projects on FVWM in order to benefit from the years of refinement and development.

Many of the popular window managers in use today are related to FVWM: Afterstep, Xfce, Enlightenment, Metisse and many more.

Originally, FVWM was the Feeble Virtual Window Manager, but at some point the meaning of the F was lost. When Google published the old news group archives acquired from DejaNews, the original meaning was re-discovered, however the FVWM developers decided they prefer the "Mysterious F" interpretation and it has stuck to this day.

In late 1998 the job of FVWM maintainer was abolished and further development has been conducted by a group of volunteers.

Desktop Environments

CDE	XFce	KDE	GNOME

EDE: The Equinox Desktop Environment

FVWM-Crystal: A desktop environment built around the FVWM window manager,

Athene Desktop: A commerical desktop with its own graphics server, although it can also display X11 applications for compatibility.

Metisse: An experimental X desktop which uses a virtual X server, a special version of Fvwm, and OpenGL support to implement various window effects, including rotation, scaling, and blending.

JD4X: The Java Desktop for X aims to provide a Java based desktop that can run both Java and native applications. It is initially only availabe for Linux x86 platforms.

3D-Desktop: An OpenGL program for switching virtual desktops in a seamless 3-dimensional manner on Linux.

XD640: A simple graphical desktop environment for X designed for small screens and slow processors.

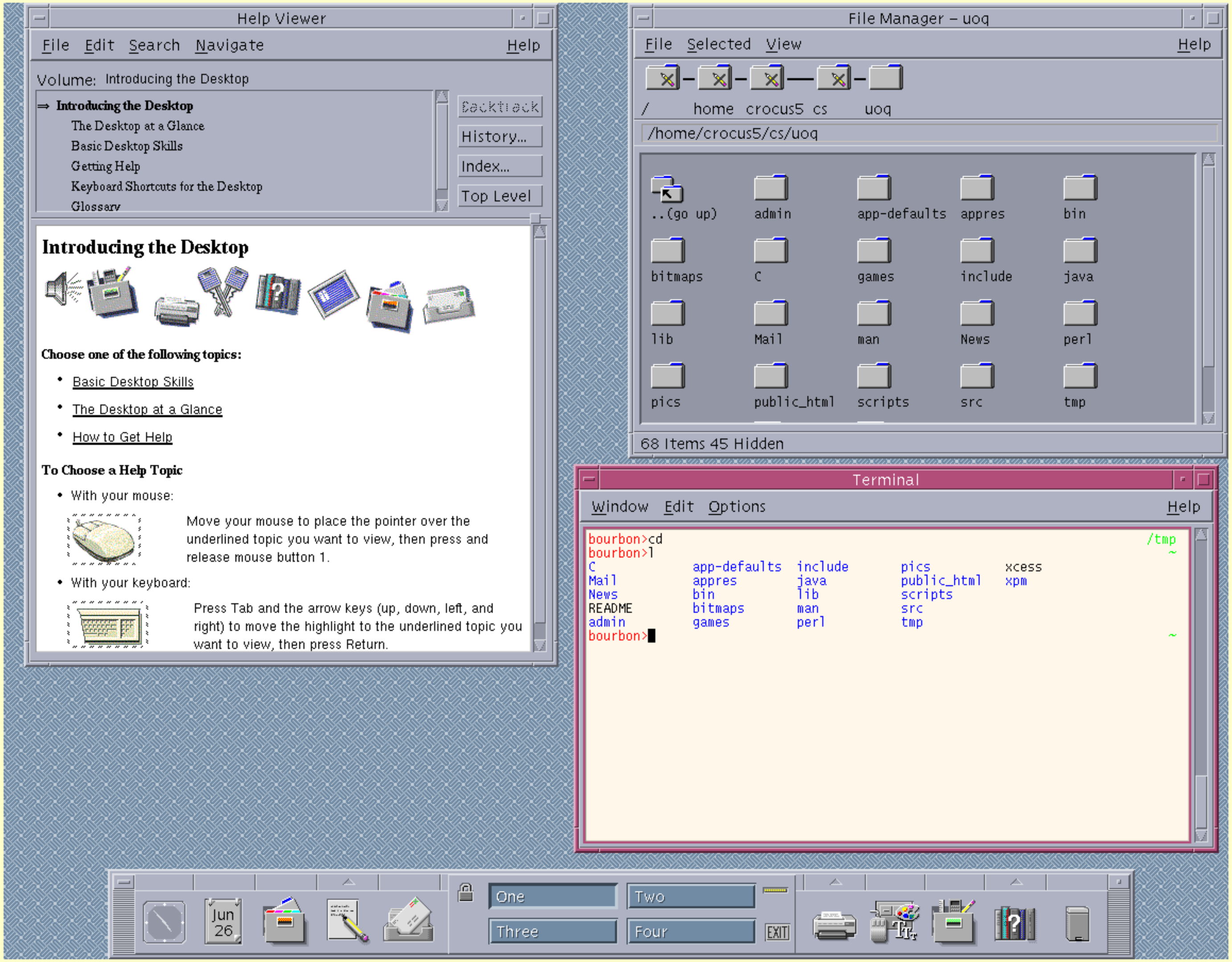
CDE

The Common Desktop Environment (CDE) is a commercial graphical user interface for UNIX in its various flavors (AIX, Digital UNIX, HP/UX, Solaris, UnixWare, etc.).

The desktop has been jointly developed by Hewlett-Packard, IBM, Novell and Sun Microsystems. It has been adopted as a standard operating environment by these companies and many others in the UNIX workstation market.

The CDE incorporates the dtwm window manager. This is a Motif-compliant, virtual window manager and is similar to the HP/UX program vue.

CDE Screenshot



Volume: Introducing the Desktop

⇒ Introducing the Desktop
The Desktop at a Glance
Basic Desktop Skills
Getting Help
Keyboard Shortcuts for the Desktop
Glossary

Introducing the Desktop

Choose one of the following topics:

- Basic Desktop Skills
- The Desktop at a Glance
- How to Get Help

To Choose a Help Topic

- With your mouse:

Move your mouse to place the pointer over the underlined topic you want to view, then press and release mouse button 1.

- With your keyboard:

Press Tab and the arrow keys (up, down, left, and right) to move the highlight to the underlined topic you want to view, then press Return.

/home/crocus5/cs/uoq

68 Items 45 Hidden

```
bourbon>cd                                                          /tmp
bourbon>l                                                              ~
C          app-defaults  include    pics         xcess
Mail       appres        java       public_html  xpm
News       bin           lib        scripts
README     bitmaps       man        src
admin      games         perl       tmp
bourbon>                                                               ~
```

http://xwinman.org/screenshots/dtwm.gif

XFce

Xfce is a lightweight desktop environment for UNIX platforms. It is similar to the commercial CDE, and is now based on the GTK+ toolkit.

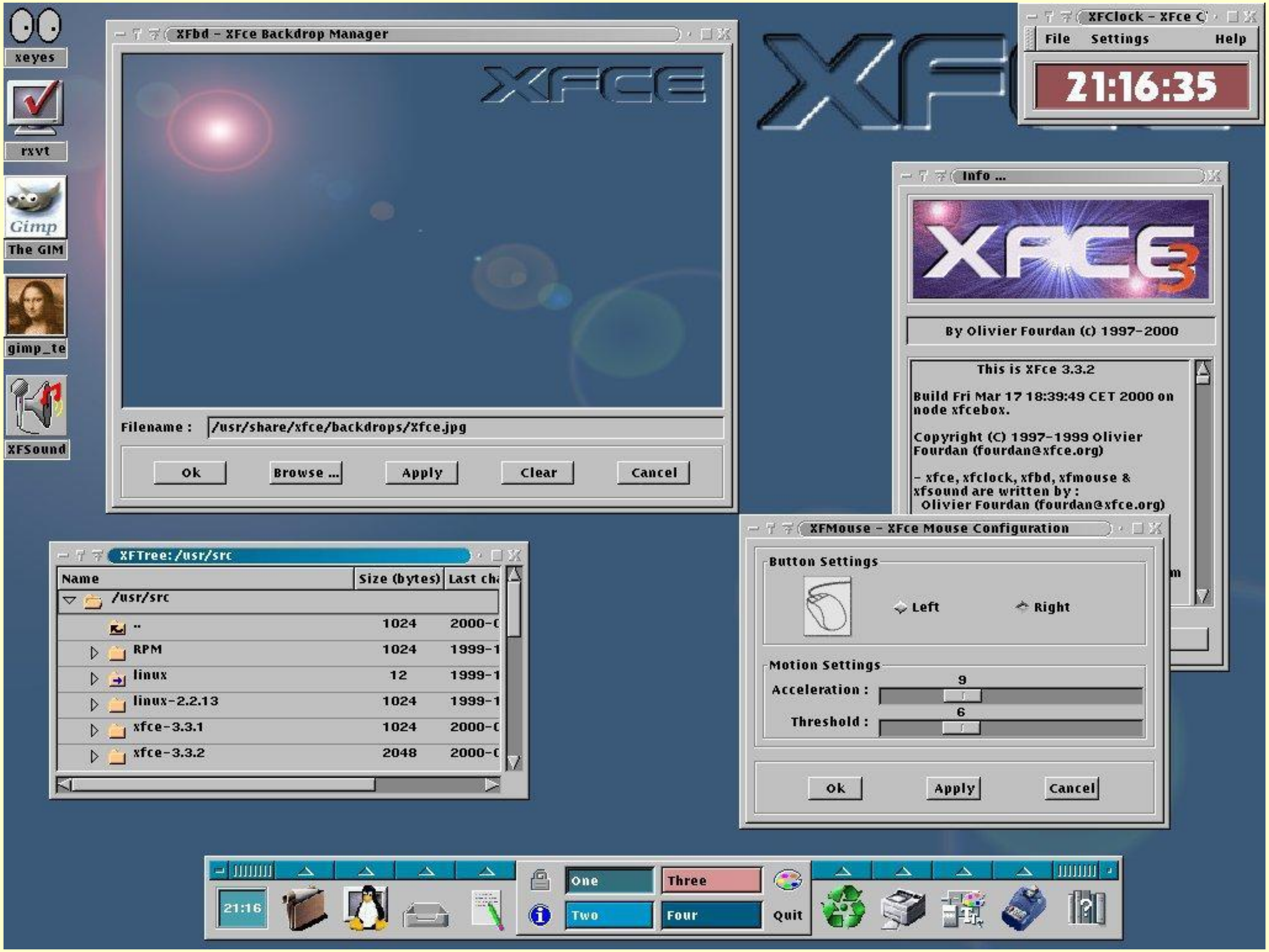
A strong point of Xfce is its ease of configuration - it is driven entirely by the mouse.

The latest version features drag and drop, session management, translations for numerous languages, including support for multi-byte character sets, and numerous other features.

The desktop environment includes:

- a window manager, called XFwm,
- a file manager,
- a backdrop manager,
- a sound manager,
- a calendar,
- a pager module, and
- a GNOME compliance module.

XFce Screenshot



Filename : /usr/share/xfce/backdrops/xfce.jpg

21:16:35

By Olivier Fourdan (c) 1997-2000

This is XFce 3.3.2

Build Fri Mar 17 18:39:49 CET 2000 on node xfcebox.

Copyright (C) 1997-1999 Olivier Fourdan (fourdan@xfce.org)

- xfce, xfclock, xfbd, xfmouse & xfsound are written by :
Olivier Fourdan (fourdan@xfce.org)

Name	Size (bytes)	Last cha
/usr/src		
..	1024	2000-0
RPM	1024	1999-1
linux	12	1999-1
linux-2.2.13	1024	1999-1
xfce-3.3.1	1024	2000-0
xfce-3.3.2	2048	2000-0

Acceleration : 9

Threshold : 6

http://xwinman.org/screenshots/xfce-default.jpg

KDE

KDE is a modern network transparent desktop environment which uses the Qt cross-platform GUI libraries.

It contains a base set of applications such as:

- a window manager (called kwm),
- web browser (Konqueror),
- instant messenger (Kopete),
- office applications (Koffice),

and integrated help system, all with a consistent look and feel, and translations for over 50 languages.

Also included is an application development framework to facilitate the creation of new applications.

Most of which start with the letter K.

GNOME

In 1996, the KDE project was started.

KDE relied on the then non-free Qt widget toolkit (GUI libraries).

Members of the GNU project were concerned with KDE's dependence on non-free software, as a result, the GNOME project was started in August 1997.

GNOME stands for "GNU Network Object Model Environment"

The initial project leaders for GNOME were Miguel de Icaza and Federico Mena.

In place of the Qt toolkit, GTK+ was chosen as the base of the GNOME desktop.

GNOME does not have it's own built-in Window Manager - it must run on top of one - the default since version 2.2 is Metacity

Installing Gnome

1. Login as ROOT
2. Start > System > YAST
3. Software tab
4. Click on 'Software Repositories'
5. Click on 'ADD'
6. Choose 'CD'
7. This should add the CD to the list of repositories
8. Return to 'Configure Software Repositories'
9. Disable old repository and enable the GNOME one.
10. Finish

11. Click on 'Software Management'
12. Choose Filter 'Patterns'
13. Select 'Gnome Base' and 'Gnome Desktop'.
14. Click 'Accept'.
15. Logout and End session.
16. Login using Gnome.