

# Chapter 1: An Introduction to Linux

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# Chapter 1 Outline

- In this chapter we will learn about:
  - ✓ Some of the key events in the history of Linux
  - ✓ The major components of a linux distribution
  - ✓ How linux is licensed
  - ✓ How Linux differs from Windows and Netware
  - ✓ The SuSE Product Line

# Some key events in the history of linux

1969 - the dawn of time. Ken Thompson and Dennis Ritchie write the first version of UNIX

1987 -- Andrew Tanenbaum writes Minix, a UNIX-like O/S that runs on PCs, mainly as a teaching aid

1991 - Linus Torvalds starts development of Linux as a project to exploit the Intel 386 architecture. Design is heavily influenced by Minix and UNIX

1970

1980

1990

2000

1984 - Free Software Foundation start work on the GNU project which results in a C compiler (gcc) and editor (emacs) and lots of command line tools that mimic or improve on their traditional UNIX counterparts

1994-ish: Explosive growth of the Internet fosters widespread growth of linux and the open source movement.



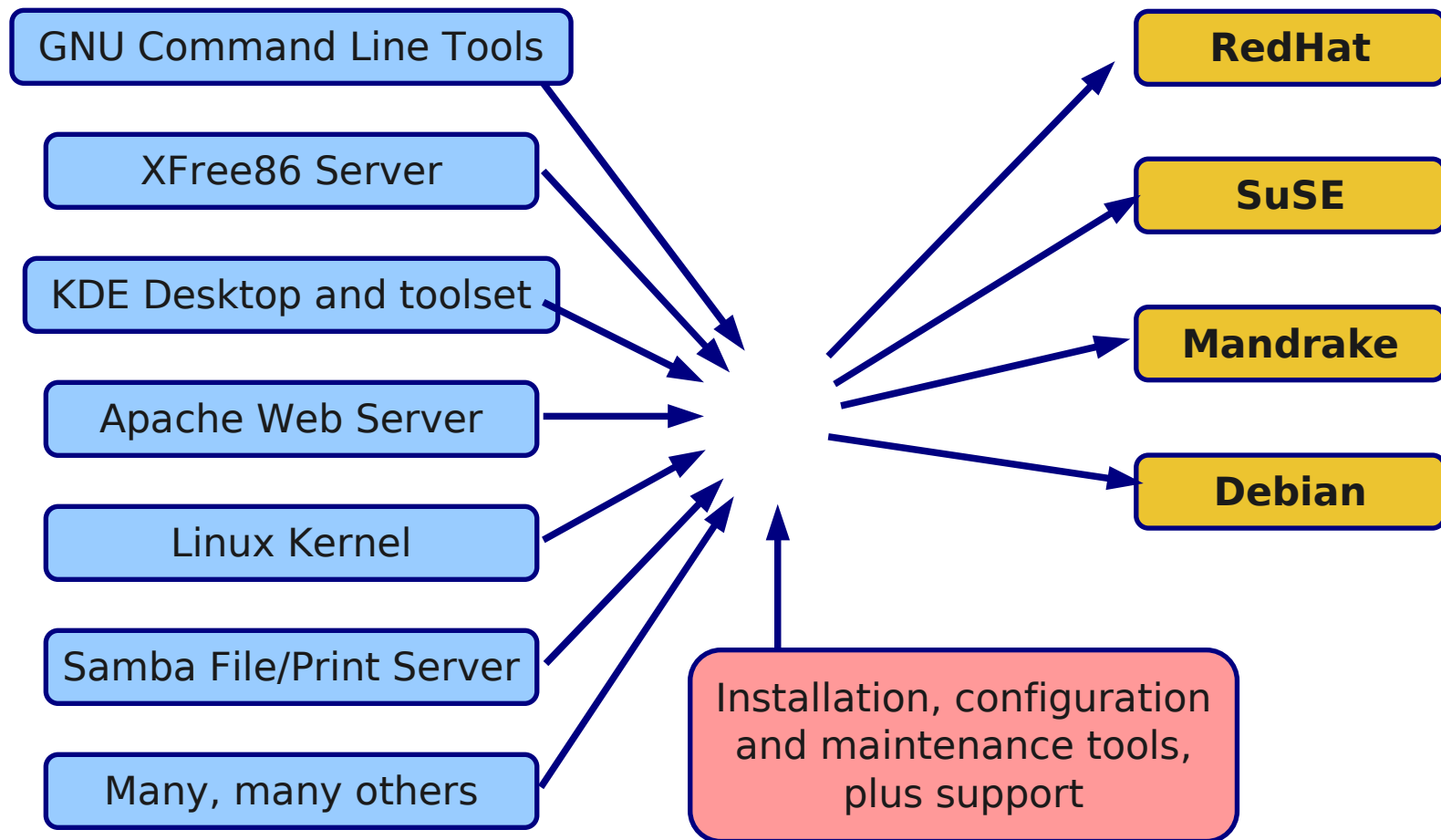
# The history of Linux (continued)

- Linux began life in 1991
  - Linus Torvalds wrote the original Linux operating system as a hobbyist exercise in exploiting the new Intel 386 memory architecture
  - Influenced by Minix, an operating system written by Torvald's professor Andy Tanenbaum as a teaching aid, which was in turn based on UNIX
  - Not derived from UNIX source code but deliberately UNIX-compatible
- Contributions come from many other developers
  - Free Software Foundation wrote bash shell, gcc compiler, many other command line tools, distributed under the GNU 'brand name'
- Like UNIX before it, linux was not originally conceived as a 'product'

# Linux distributions

- Strictly speaking, 'linux' refers only to the operating system kernel
  - In practice, linux distributions include hundreds of additional items of software from dozens of development teams
- In theory, all the pieces can be downloaded from the internet free of charge and assembled into a working system
  - In practice this is hard work
- Most users purchase a pre-built distribution
  - Snapshot of compatible versions of all components
- Vendors such as RedHat and SuSE add value in several ways:
  - Installation and configuration tools
  - Supported ports of Linux to non-PC architectures (eg IBM mainframes)
  - Retail products include printed manuals and limited installation support
  - Enterprise products provide full support agreements and pro-active upgrade mechanisms

# The components of a linux distribution



# How does linux differ from windows?

Linux	Windows
Free, open-source software	Proprietary
Window System is optional and has a client/server architecture	Window system is not optional and is tightly integrated
Runs on a wide variety of hardware	Runs on PCs only
Supports multiple, simultaneous interactive users	Intended to support one interactive user

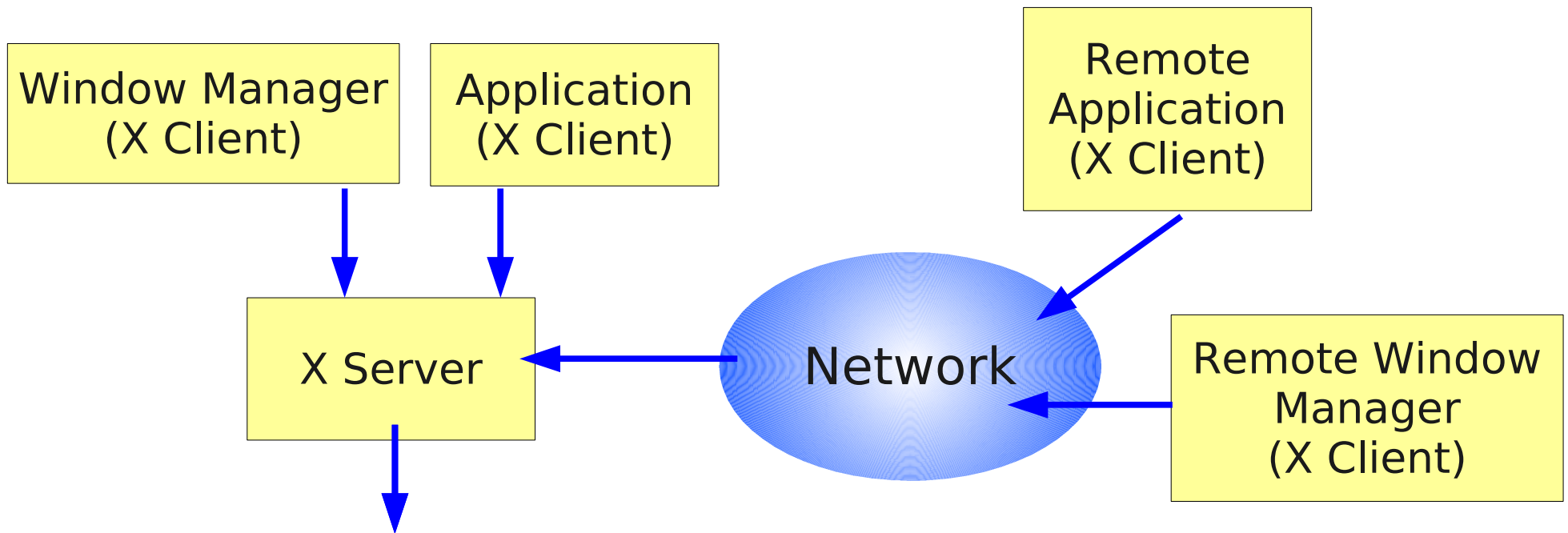
# Linux licensing and what 'Free Software' means

- The linux kernel and most linux applications are distributed under Open Source licences
- A number of open source licences have been developed
  - GPL (GNU Public Licence) is the best known and is often adopted by software developers who do not have the skill or interest to develop their own licenses
  - LGPL (Lesser General Public Licence)
  - Many others ... see [www.gnu.org/licenses/license-list.html](http://www.gnu.org/licenses/license-list.html)
- Freedom of software refers to *liberty* not *price*
  - Freedom to run the program
  - Freedom to study the program and adapt it for your needs
  - Freedom to redistribute copies
  - Freedom to improve the program and release the improvements
  - See [www.opensource.org](http://www.opensource.org) for a more detailed definition

# X Window system

- The X window system (also called X11 or simply X) was developed in 1984 at MIT
  - Design goal was a platform- and hardware-independent window system
  - Structured as a client/server architecture
- The X server runs on the machine that the graphics display, keyboard and mouse is connected to
  - Accepts commands from clients to draw windows, text, graphics, etc
  - Also makes keyboard and mouse input available to clients
  - Provides “mechanism, not policy” (i.e. does not determine look-and-feel)
  - SuSE Linux uses an implementation called XFree86 version 4
- X clients (applications that require a graphical user interface) connect to an X server
  - Client may be on same machine as server, or on a different machine

# X Window system architecture



Screen, keyboard  
and mouse

It's not unusual to run an X server on a Microsoft Windows desktop (eg Hummingbird) to provide access to graphical desktops and applications running on Linux systems



# Window managers and desktops

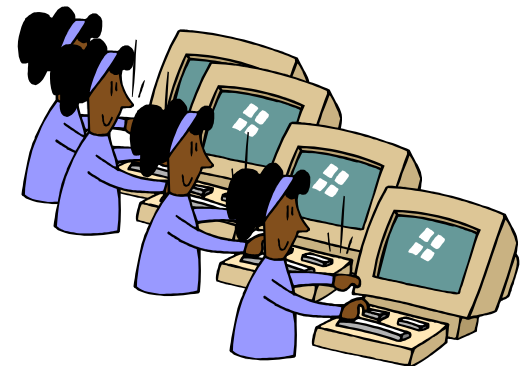
- A window manager is an important X client application, supporting:
  - Starting applications via menus, etc
  - Moving, resizing, opening, and closing windows
  - Some window managers support multiple virtual desktops
- The window manager is partly responsible for establishing a look and feel of the linux desktop
  - It is usually supplemented by a set of desktop tools, such as a launch bar, graphical file manager, web browser, clock, calculator, mail user agent, scheduler, etc.
- There are several window manager / desktop toolsets for Linux:
  - **KDE**            The standard desktop supported by SuSE linux
  - **Gnome**        Another modern, full featured desktop popular on linux
  - Others:        twm (part of the X distribution), mwm (motif window manager; used to be popular on Solaris), icewm, fvwm2, ...

# The X Window System is optional

- The X window system is not an integral part of the operating system
  - Linux can run with no windowing system or graphical applications
  - Many servers are run this way
    - Configured and administered entirely using command-line tools
  - Saves on disk space, memory and CPU cycles

# Linux is multi-user

- Like later versions of windows, linux supports a user login
  - Authenticated by a password
- Linux supports multiple simultaneous logins
  - One on the main console, possibly running a graphical desktop
  - Several via character terminals connected to serial ports
  - Many via network logins using telnet, rlogin, or ssh
- All users have full command line access
- Multiple graphical logins are also possible
  - Each user has an independent desktop
  - This capability is inherent in the client/server architecture of the X window system
- Underlying operating system supports *pre-emptive multi-tasking*



# Linux runs on a wide variety of hardware

- Embedded linux
  - Phones, set-top boxes, PDAs, PC104 and other single board computers
  - ARM, MIPS processors, etc.
  - Specialist market, commercial support from companies like Montavista
- Mainstream (32-bit and 64-bit)
  - Intel pentium, PowerPC, SPARC, Itanium, AMD64
- Big Iron
  - IBM z/series mainframe