



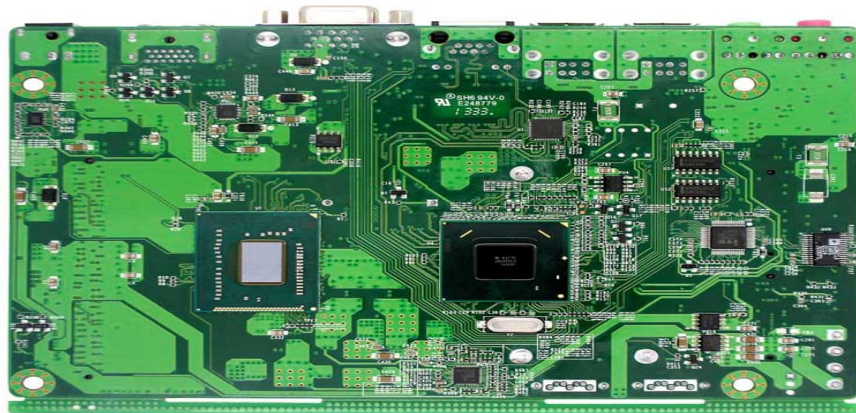
CMPU1022

Introduction to Operating Systems

Lecturer Paul Kelly



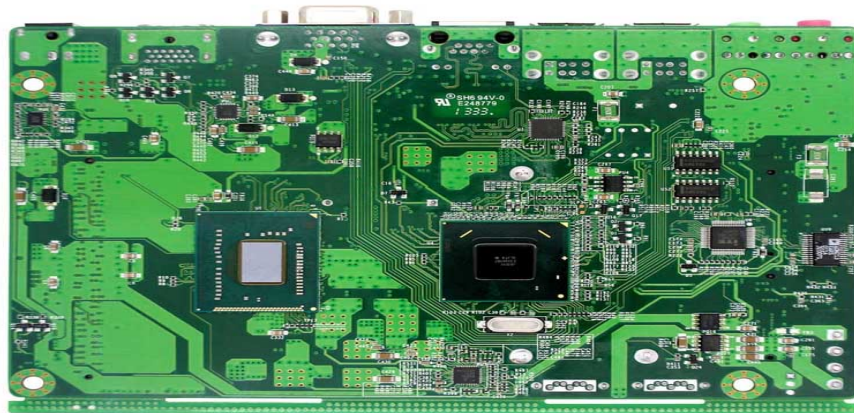
Computer
Hardware



Software Applications



Computer Hardware

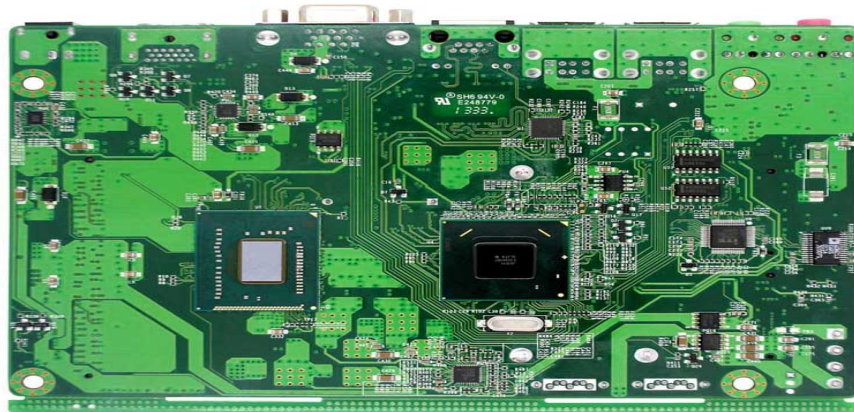


Software
Applications

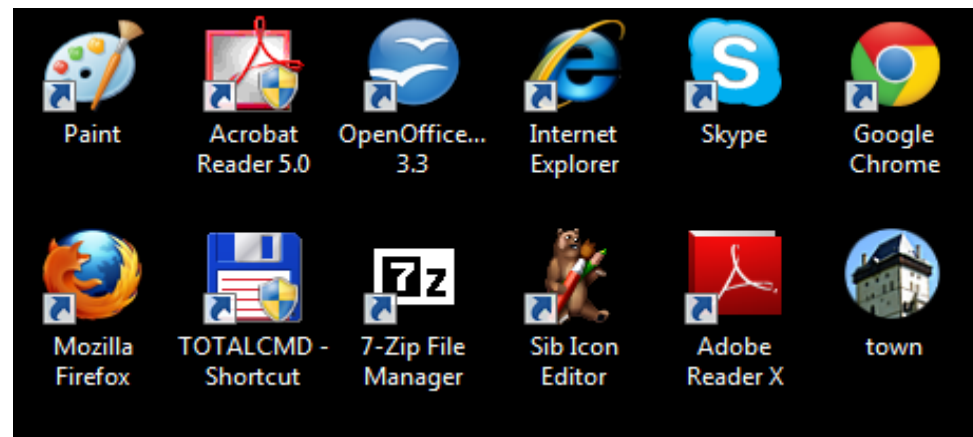


OPERATING SYSTEM

Computer
Hardware

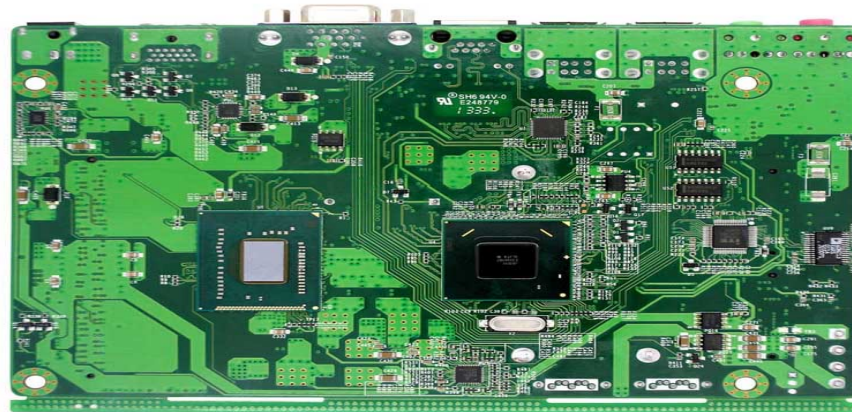


Software
Applications



UNIX

Computer
Hardware



Two Types of Interfaces

CLI (Command-Line Interface)

GUI (Graphical User Interface)

Two Types of Interfaces

CLI (Command-Line Interface)

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Loading CPM.SYS...

CP/M-86 for the IBM PC/XT/AT, Vers. 1.1 (Patched)
Copyright (C) 1983, Digital Research

Hardware Supported :

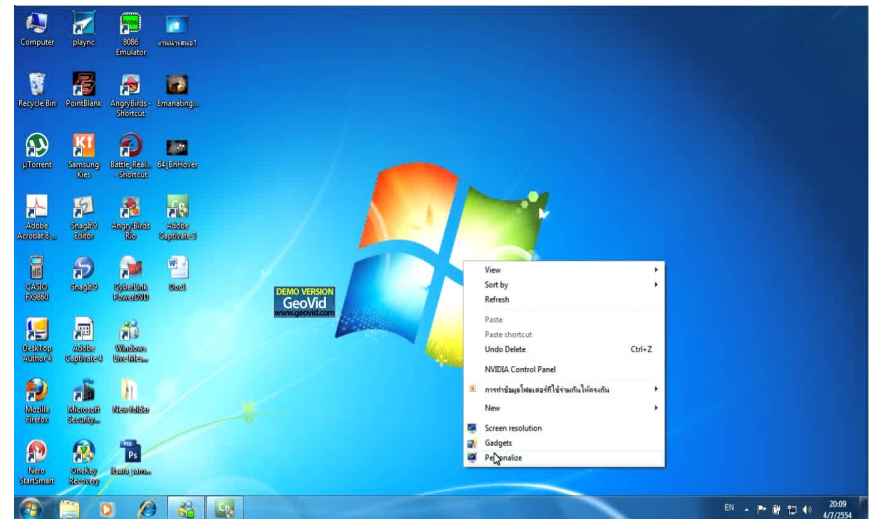
    Diskette Drive(s) : 3
    Hard Disk Drive(s) : 1
    Parallel Printer(s) : 1
    Serial Port(s) : 1
    Memory (Kb) : 640

D>a:
A>dir
A: PIP          CMD : STAT          CMD : SUBMIT      CMD : ASM86      CMD
A: GENCMD      CMD : DDT86         CMD : TOD        CMD : ED          CMD
A: HELP        CMD : HELP          HLP : SYS        CMD : ASSIGN     CMD
A: FORMAT      CMD : CLDIR         CMD : WRTLDL      CMD : BOOTPCDS  SYS
A: BOOTWIN     SYS : CPM           H86 : WINSTALL  SUB : PD      CMD
A: WCPM        SYS : DISKUTIL      CMD

A>_
    User 0          0:00:11          Jan. 1, 2000

```

GUI (Graphical User Interface)

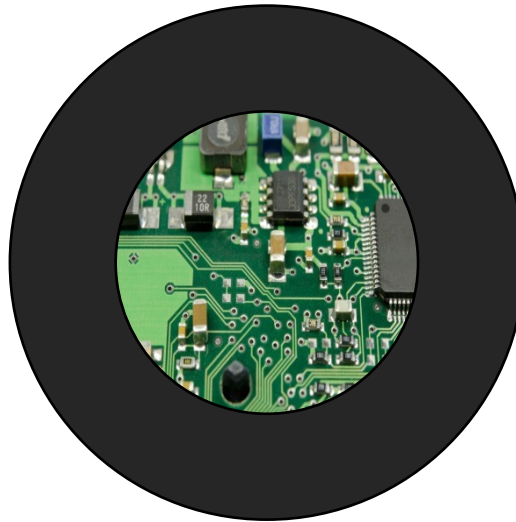


Typical OS Architecture



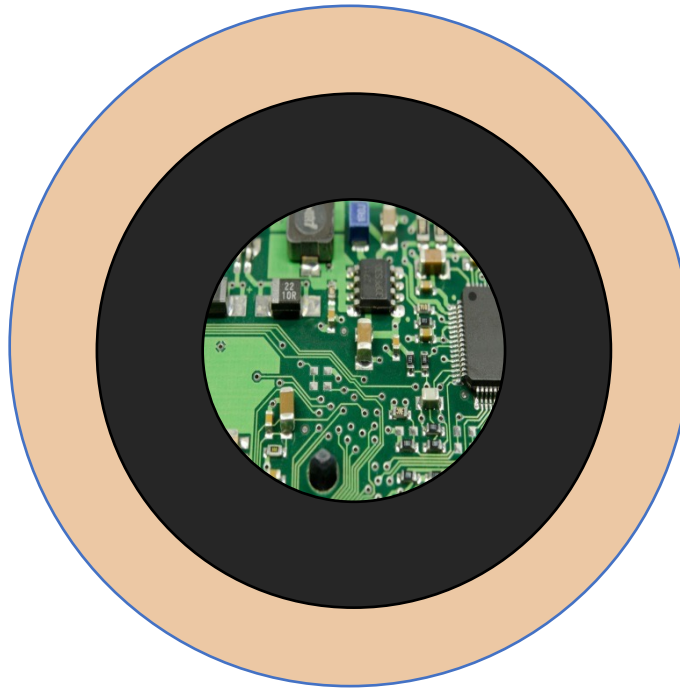
Hardware

Typical OS Architecture



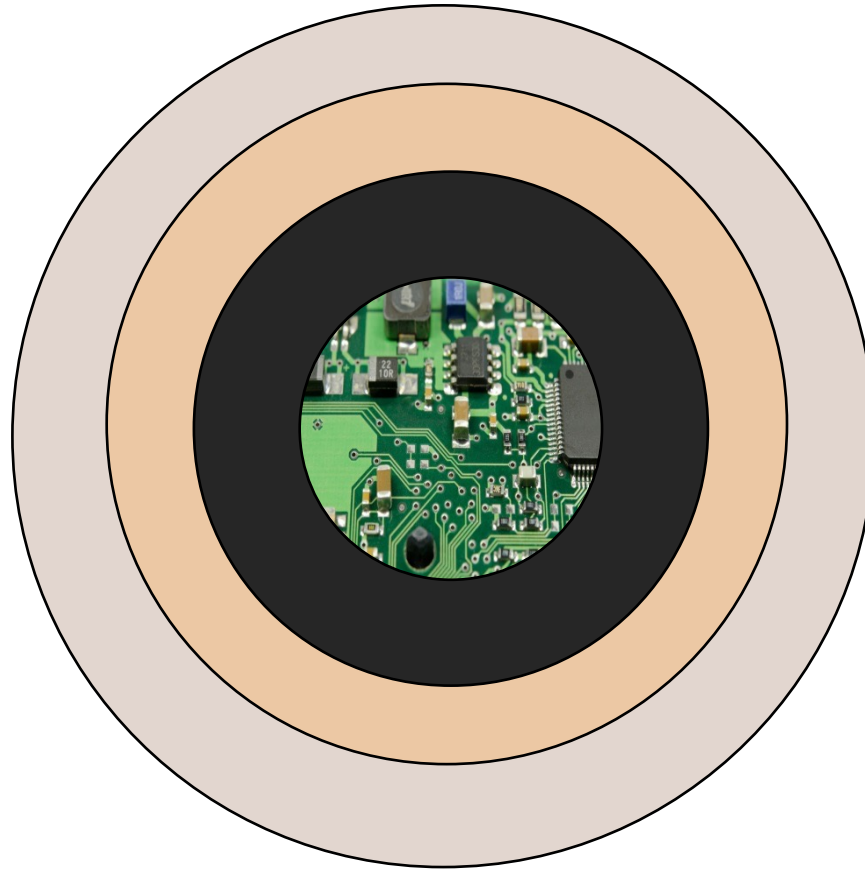
Kernel

Typical OS Architecture



Shell

Typical OS Architecture



User
Applications

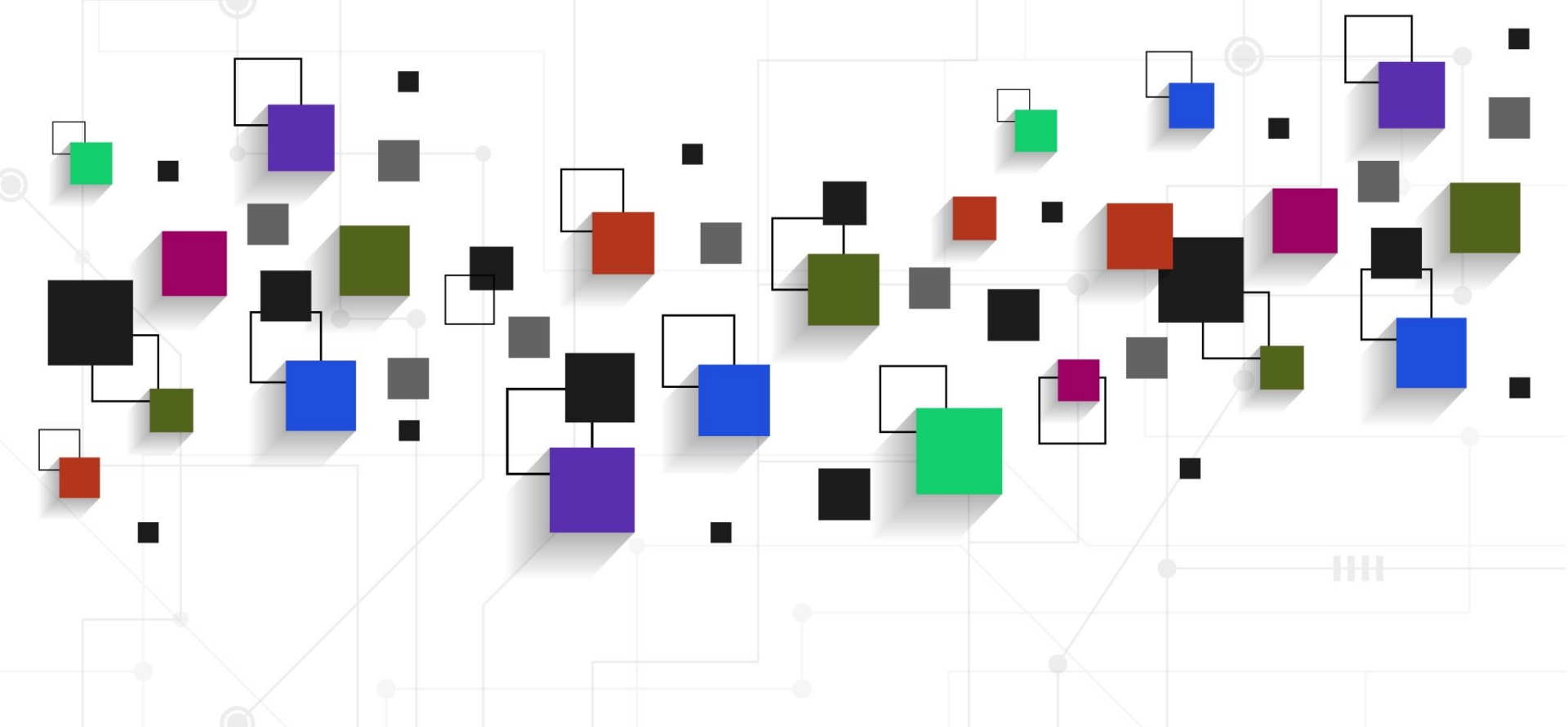
Terminology

Hardware is the physical elements of a computer system. It is the physical parts of a computer, such as the monitor, mouse, keyboard, computer data storage, hard disk drive (HDD), graphic cards, sound cards, memory, motherboard, and so on.

The **Kernel** is a computer program that manages input/output requests from software and translates them into data processing instructions for the central processing unit and other electronic components of a computer.

The **Shell** is an interface for access to an operating system's services. In general, operating system shells use either a command-line interface (CLI) or graphical user interface (GUI).

User Applications are computers program designed to perform a group of coordinated functions, tasks, or activities for the benefit of the user.



Introduction to common Operating Systems



Unix

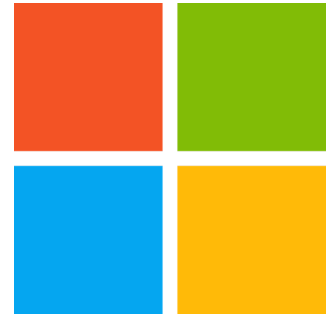
Developed by Ken Thompson and Dennis Ritchie

Unix was launched in 1969

It is a CLI (Command-Line Interface)

Written in the C programming language

Led to a variety of academic and commercial variants, e.g.
University of California, Berkeley (BSD), Microsoft (Xenix), IBM
(AIX) and Sun Microsystems (Solaris)



Windows

Developed by Microsoft - Bill Gates & Paul Allen

Windows was launched in 1985

Built on DOS (Disk Operating System), which is a CLI (Command-Line Interface)

Has two modes User Mode (the user cannot directly access the hardware) and Kernel Mode (the user can access the hardware)

Runs on Computers, Tablets (Surface), and integration with Xbox



Apple MacOS (later OS X)

Developed by Apple - Steve Wozniak & Steve Jobs

MacOS was launched in 1984

MacOS is a native GUI (Graphical User Interface)

MacOS evolved into OS X, which combined technologies from MacOS, Unix, and NeXT

Runs on Computers and other devices.

Linux



Developed by Linus Benedict Torvalds

Linux was launched in 1992

Linux is a CLI (Command-Line Interface)

Torvalds made the code of Linux freely available to everyone on the internet, and therefore lots of people created their own versions of Linux, e.g. Debian, RedHat, SUSE, SlackWare, Gentoo, Ubuntu



Android

Developed by Andy Rubin, Rich Miner, Nick Sears, and Chris White

Android was launched in 2003

Based on the Linux kernel

Android is a GUI designed primarily for touchscreen mobile devices such as smartphones and tablets

iOS



Developed by Steve Jobs and Scott Forstall

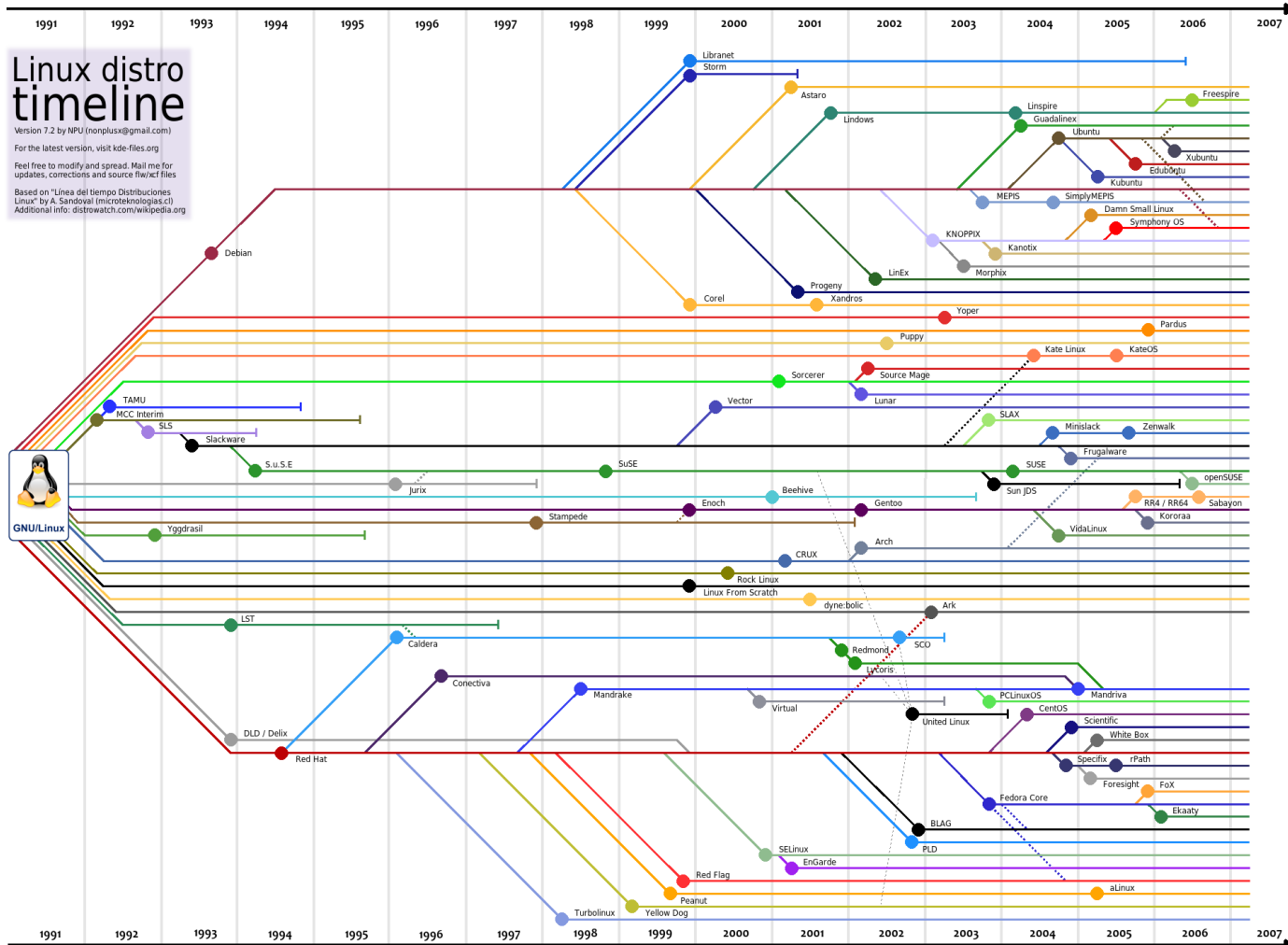
iOS was launched in 2007

Based on the MacOS

iOS is a GUI designed primarily for touchscreen mobile devices such as iPhones, iPods, iPads, and AppleTV.

A few more notes on Linux

Linux



Linux

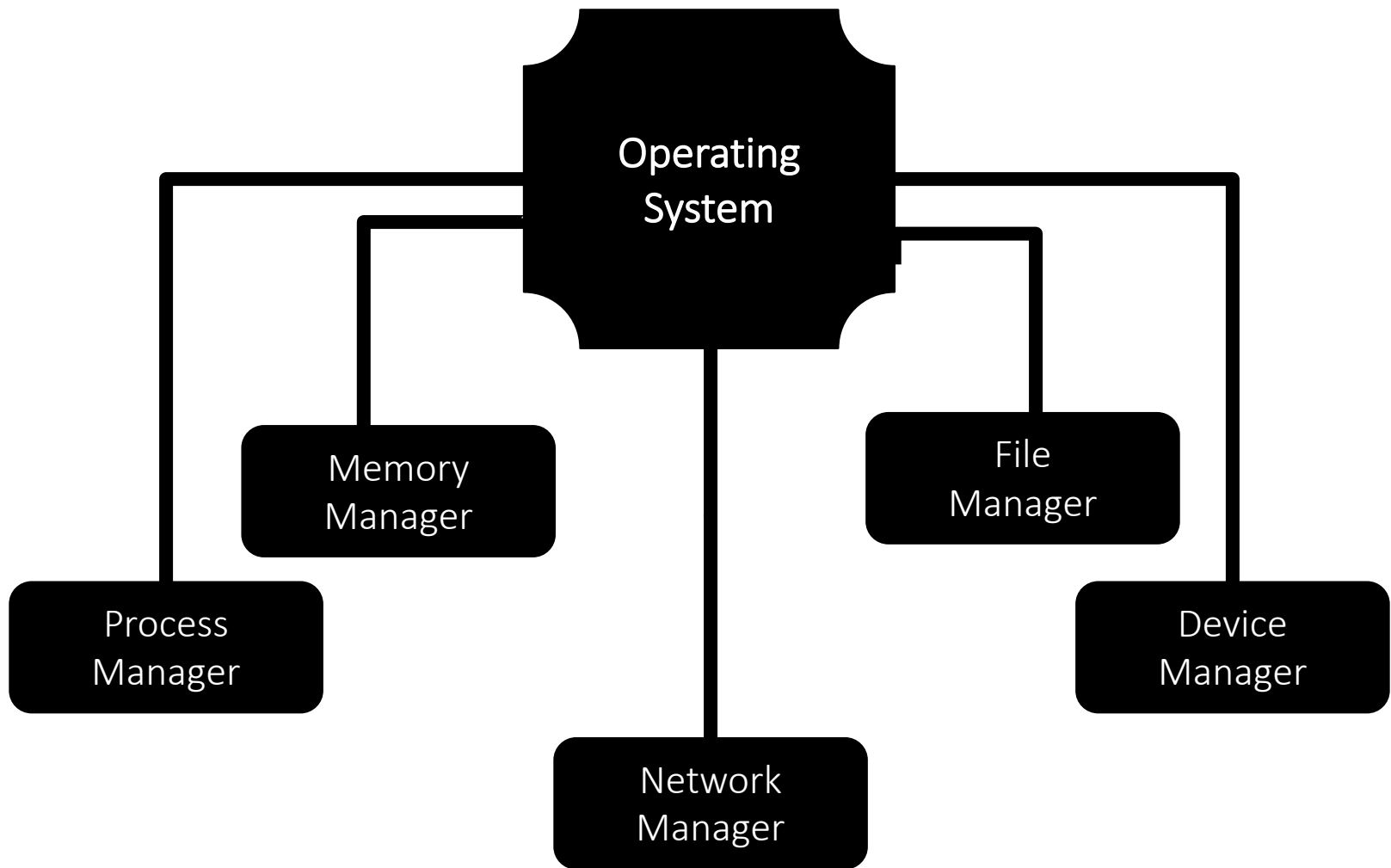


A Linux distribution (often called a distro for short) is an operating system made from a software collection, which is based upon the Linux kernel and, often, a package management system.

Almost six hundred Linux distributions exist, with close to five hundred out of those in active development, constantly being revised and improved.

There are commercially backed distributions, such as Fedora (Red Hat), openSUSE (SUSE) and Ubuntu (Canonical Ltd.), and entirely community-driven distributions, such as Debian, Slackware, Gentoo and Arch Linux.

Main features of an Operating System



Process Manager

The OS must allocate resources to processes, enable processes to share and exchange information, protect the resources of each process from other processes and enable synchronisation among processes.

To meet these requirements, the OS must maintain a data structure for each process, which describes the state and resource ownership of that process, and which enables the OS to exert control over each process.

Memory Manager

The memory management function keeps track of the status of each memory location, either allocated or free.



It determines how memory is allocated among competing processes, deciding which gets memory, when they receive it, and how much they are allowed.



When memory is allocated, it determines which memory locations will be assigned. It tracks when memory is freed or unallocated and updates the status.

File Manager

A file manager or file browser is a computer program that provides a user interface to manage files and folders.

The most common operations performed on files or groups of files include creating, opening (e.g. viewing, playing, editing or printing), renaming, moving or copying, deleting and searching for files, as well as modifying file attributes, properties and file permissions.

Folders and files may be displayed in a hierarchical tree based on their directory structure.

Device Manager

The device manager is responsible for detecting and managing devices, performing power management, and exposing devices to user space.

Device drivers allow user applications to communicate with a system's devices.

They provide a high-level abstraction of the hardware to user applications while handling the low-level device-specific I/O and interrupts.

Network Manager

The network manager manages the relationship between the operating system and the network(s) that it is connected to.

This means that the user can be unaware of issues like connectivity, and network speed.

Recap

Who remembers what the Kernel of an OS is?



Q+A

Any questions on what we covered?