What Is An Operating System?

Phil Bass 2025-07-25

Introduction

This presentation will be in two parts:

1. What is an Operating System?
2. Popular Operating Systems

An Operating System is ...

"… the conductor that ensures all the parts of the computer work harmoniously together."

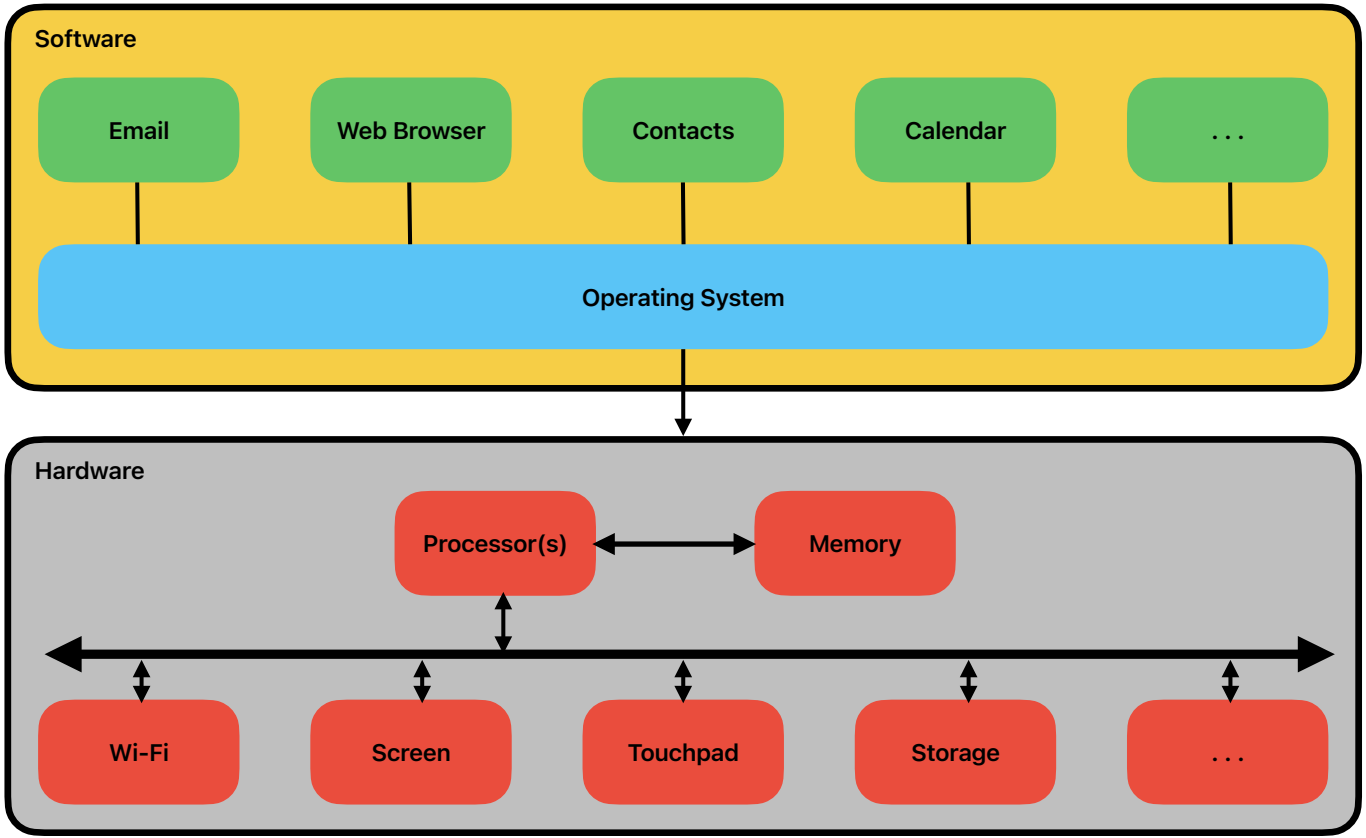
It’s The Filling in the Sandwich

Think of this as 3 layers:

Apps on top
OS in the middle
Hardware on the bottom

The apps drive the OS and the OS drives the hardware.

Each app request generates multiple hardware operations.



Device Independence

The OS provides the applications with a single interface for all kinds of hardware.

The app developer doesn’t need to know which chips are in your phone, tablet, laptop or desktop computer.

The OS chooses the right device drivers for your machine.

Resource Management

The OS shares the CPU, memory, storage space, etc. between the apps.

When an app needs to do a calculation, the OS allocates it some CPU time.

When an app needs some memory to store its data, the OS allocates space in memory.

Resource Management

When you run more apps than there are CPU cores, the OS gives little slices of CPU to each app in turn.

In this way, all apps appear to be running simultaneously.

It’s like watching a video: you don’t notice the individual frames.

Security

When an app wants to read from or write to a file, the OS enforces the access restrictions.

When a user tries to change the system software, the OS checks they have the necessary permissions.

Some Well-known Operating Systems

- Microsoft Windows
- Apple macOS and iOS
- Google ChromeOS and Android
- GNU/Linux

The Apple, Google and Linux OS's are all descendents of Unix.

Microsoft Windows

Windows is the most widely used OS on home computers.

First released in 1985, early versions were unreliable and had security holes.

The graphical user interface was tightly bound to the OS kernel. Bugs in the display code would cause the machine to crash.

Its popularity and vulnerability rapidly became a honeypot for hackers.

Microsoft Windows

Windows contains code for everything a typical user could ever want. It is the heavy-weight of the PC operating systems. Consequently, it needs somewhat more powerful hardware than its competitors.

Microsoft ignored international standards when it suited them. Consequently, apps developed for Windows tend not to work as well on other, more compliant OS’s.

Apple macOS and iOS

MacOS was released in 2001.

It is only available for Apple laptops and desktops.

Because of this, it is highly stable and makes efficient use of the hardware.

iOS is a trimmed down version of macOS for mobile devices (iPhones and iPads).

MacOS and iOS work together seamlessly.

Apple macOS and iOS

Some software is only available for Windows. This applies particularly to computer games.

GNU/Linux

Linux is not owned by any one organisation.

It is open source software.

It is free both in the sense that you don't have to pay for it, and in the sense that you are allowed to change your copy of it in any way you want.

The only things you can't do are to charge for it or place restrictions on its use.

GNU/Linux

‘Linux’ comes in many different varieties.

They all have the Linux kernel that sits at the heart of the OS, but they come with a different set of apps.

To install Linux on a PC you download a big bundle of files known as a distribution. That contains both the kernel and a starter set of apps.

GNU/Linux

Linux is the free version of the Unix OS.

Unix itself was developed in the late 1960s, long before the IBM PC was conceived. It embodies the ‘keep it simple’ philosophy.

Linux was written by the Finnish software engineer, Linus Torvalds, and released in 1991.

GNU/Linux

Thanks to its modular nature, Linux runs on an enormously wide range of hardware, from tiny embedded devices, through PCs, and on up to super-computers.

And its keep-it-simple design means that it is both secure and efficient.

Because of these characteristics, the great majority of Internet servers are running Linux.

GNU/Linux

Modern Linux distributions look very much like Windows or macOS. In the past, however, most Linux users were software developers who were comfortable with command line tools. And their legacy lives on in the Linux support groups.

If you have a problem with Linux, there will be lots of help online, but most of it will be unintelligible to the ordinary computer user.

Google ChromeOS and Android

ChromeOS is the new kid on the block.

It is based on Linux and was first released in 2011.

It is preinstalled on Chromebooks, which are designed for browsing the World Wide Web and other cloud computing applications.

It runs well on cheaper hardware than you would need for Windows or macOS. That makes Chromebooks a good choice for individuals and organisations with a limited budget.

Google ChromeOS and Android

Android is Google’s OS for mobile devices.

More smartphones run Android than any other operating system.

There are innumerable apps for Android devices. But caveat emptor. Google doesn’t check them for reliability or security.

Some Further Information

What Is An Operating System?

- A simple introductory video
- A short, but useful video
- A more advanced video.

Popular Operating Systems

- An informarive, but rather dull video

Phil Bass 2025-07-25

That’s All, Folks!

Phil Bass <date>