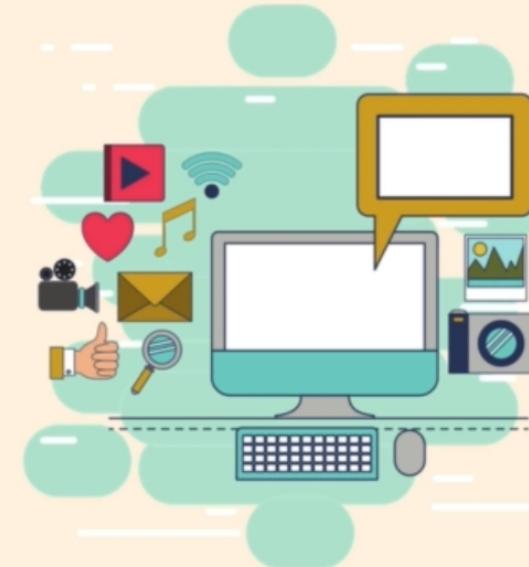


The World Of Operating Systems

Most operating systems can be grouped into two families:

- The Microsoft NT descendants including Windows, Xbox OS, and Windows Phone/Mobile
- Pretty much everything else has lineage going back to Unix, including Mac OS X, Linux, Android, Chrome OS, and even the PS4 OS



So What Is Unix?

Unix was an operating system developed at Bell Labs in the mid 1960s. Many of the innovations and design choices the original Unix team have lived on 50+ years later, including the idea of multi-user operating systems and hierarchical file systems.

Unix is the "grandfather" of many modern operating systems that we frequently use today.



Peter Hamer, [CC BY-SA 2.0](#) via Wikimedia Commons

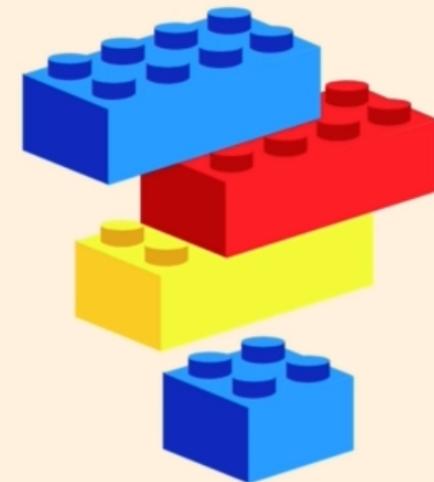


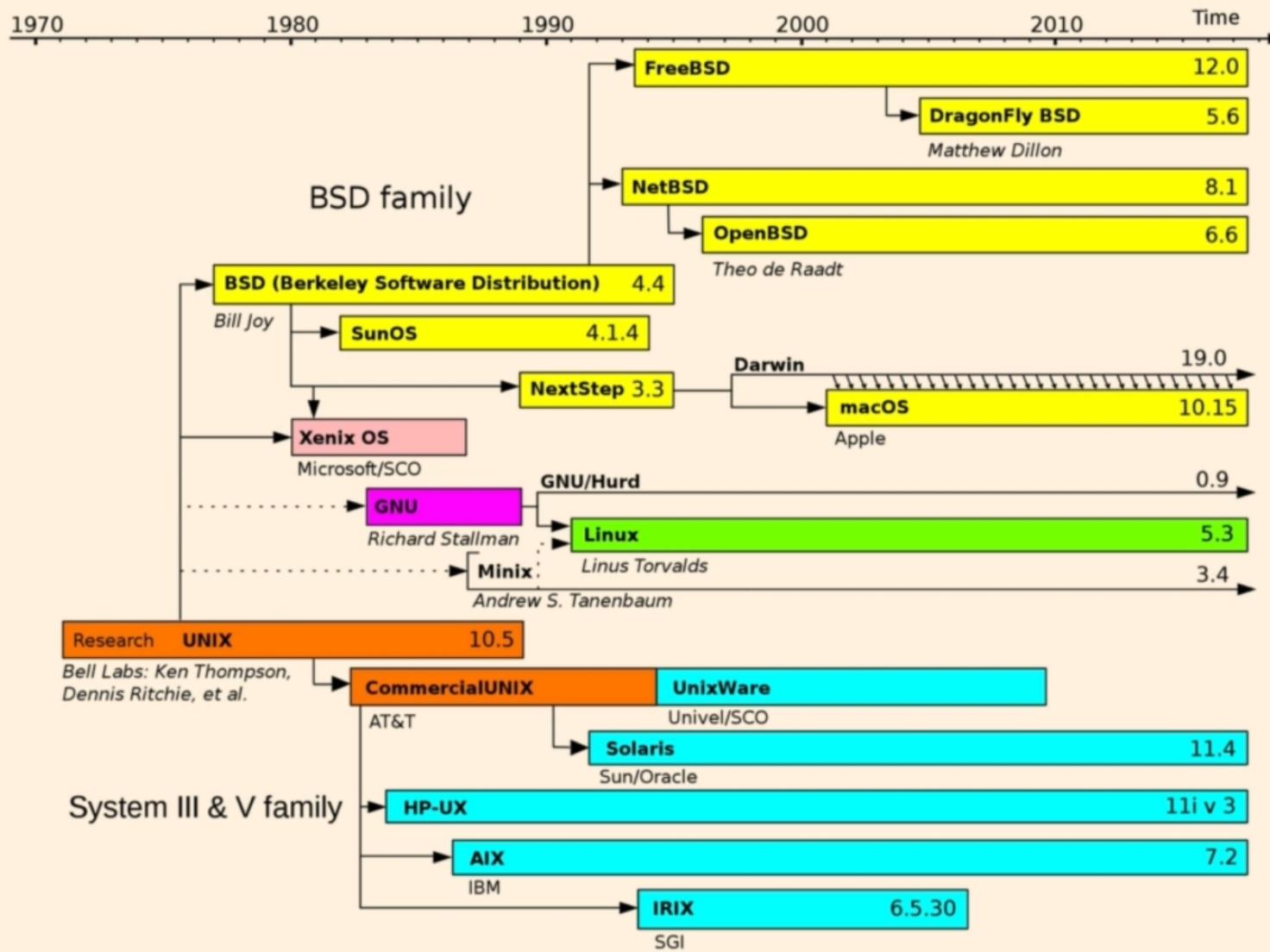
The Unix Philosophy

In the early days of computers, operating systems were tightly tied to specific hardware. Unix decoupled the two and was easily portable to other hardware.

Unix philosophy emphasizes modular software design and the creation of small individual programs that can be combined to perform complex tasks.

- Write programs that do one thing and do it well.
- Write programs to work together.
- Write programs to handle text streams, because that is a universal interface.





True UNIX

Today the name "UNIX" is a trademark of a global consortium called The Open Group. They maintain a set of standards called the Single UNIX Specification, which describes the core commands, features, interfaces, utilities, and more that define a UNIX operating system.

The Open Group will certify an operating system as fully UNIX compliant if it passes conformance tests. Companies must pay to be tested and must further pay to use the UNIX trademark.

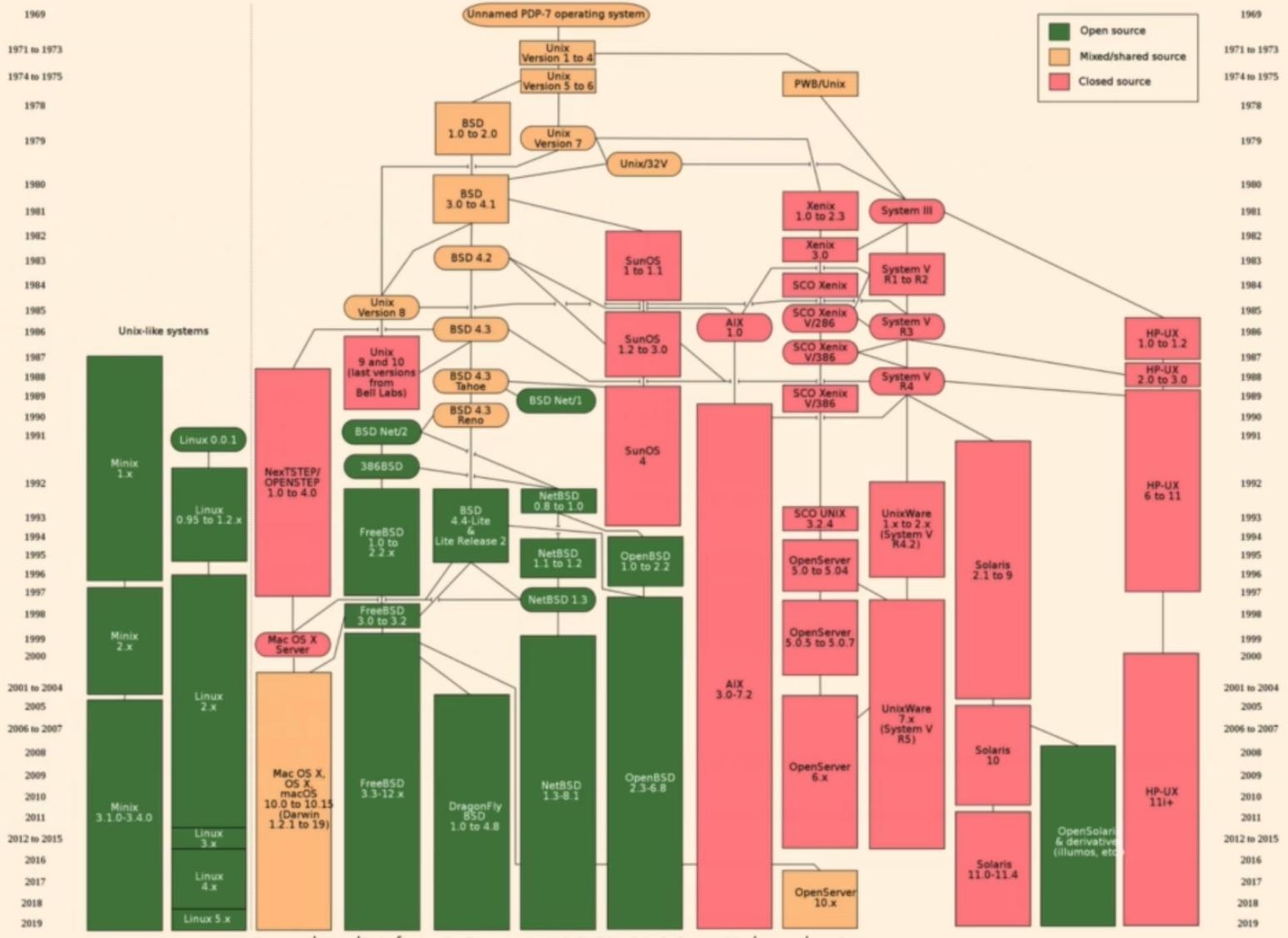


Unix-Like??

Many operating systems are based on the original UNIX operating systems and are compatible with the UNIX standards, but are NOT considered UNIX because they have not been certified by The Open Group. Often this is because of financial considerations or ethical objections.

We call these operating systems Unix-like. They fully or mostly meet the specification but cannot legally use the UNIX name.







Free Software

The Free Software movement came about in the 1980s as a response to the proliferation of proprietary and restricted software. Think of "free speech" rather than "free as in zero price"

The movement's philosophy is that the computers and software should not prevent cooperation between users, and instead should have the goal of liberating everyone in cyberspace.

According to the movement's leader, Richard Stallman, "Users should have the freedom to run, copy, distribute, study, change, and improve the software"



GNU

Richard Stallman was a leader in the group of developers who aimed to create Free Software alternatives to Unix.

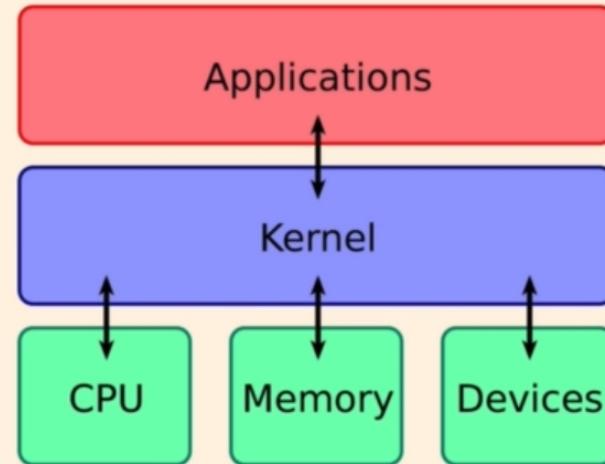
In 1984 he began work on the GNU Project, with the goal of creating an operating system that included "everything useful that normally comes with a Unix system so that one could get along without any software that is not Free"



The Linux Kernel

Another developer, Linus Torvalds, was working on creating his own kernel known as Linux. The kernel is the part of an OS that facilitates interactions between hardware and software.

At the time, many GNU "pieces" were complete, but it lacked a kernel. Torvalds combined his kernel with the existing GNU components to create a full operating system.



Bobbo, [CC BY-SA 3.0](#), via Wikimedia Commons

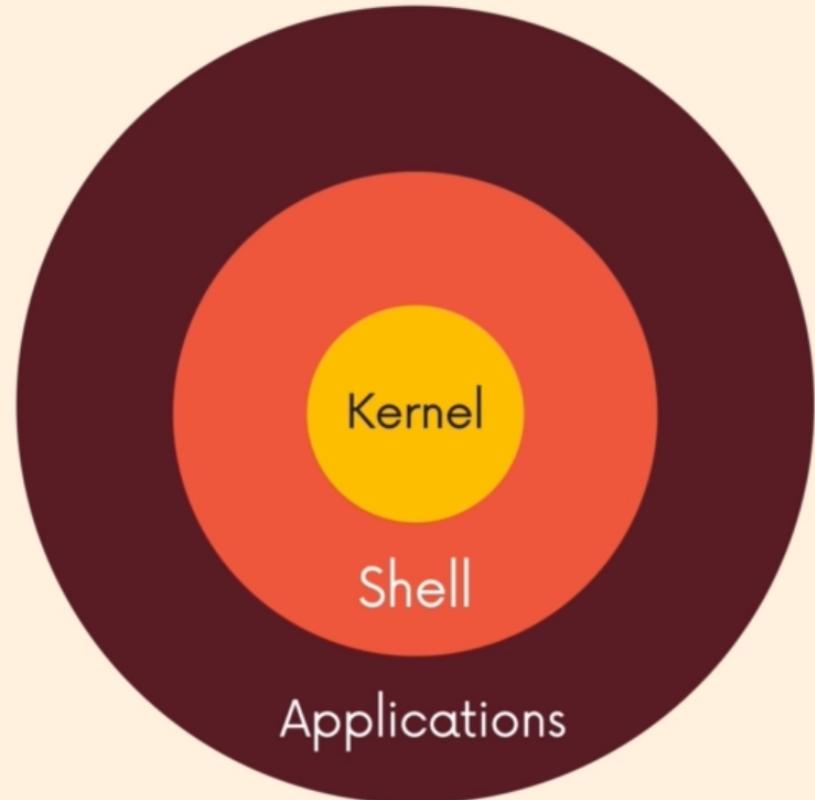


Kernel??

A kernel is a computer program that forms the core of an operating system and manages critical tasks like:

- memory management
- task scheduling
- managing hardware

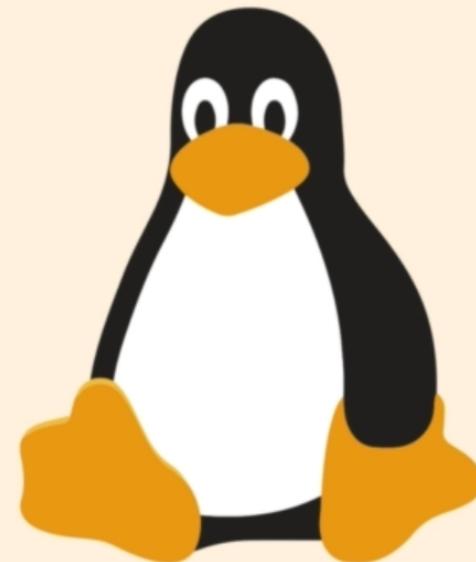
While a kernel is a critical piece, it is NOT the same as an operating system. An engine is the essential "core" of a car, but you can't drive an engine on its own!



Linux

Today, the term "Linux" refers both to the kernel created by Linus Torvalds AND all the software that is part of the Linux ecosystem.

Some users feel strongly that the name GNU/Linux should be used instead, as it properly reflects the GNU Project's contributions.



Linux Distributions

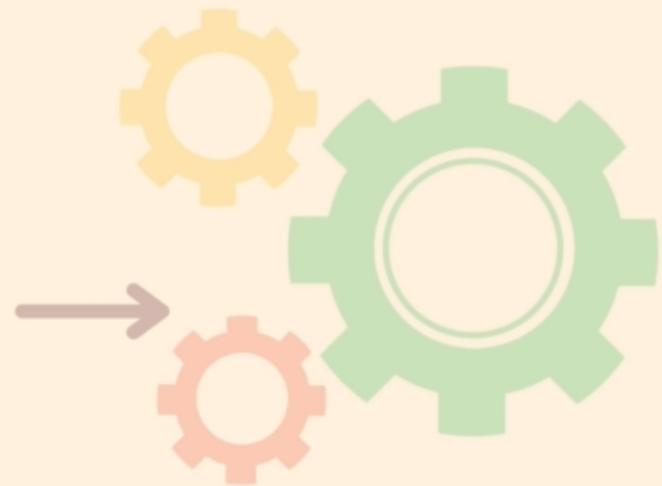
The Linux Kernel itself is not a full-blown operating system. When people talk about a Linux-based operating system, they are referring to Linux distributions.

Typically, a Linux distribution bundles together the Linux kernel, GNU tools, documentation, a package manager, a window system, and desktop environment.

There are nearly 1000 Linux distros available. Some of the more popular ones includes Fedora, Ubunutu, Debian, and Slackware.



```
●●●  
› touch group-{a..e}.txt
```



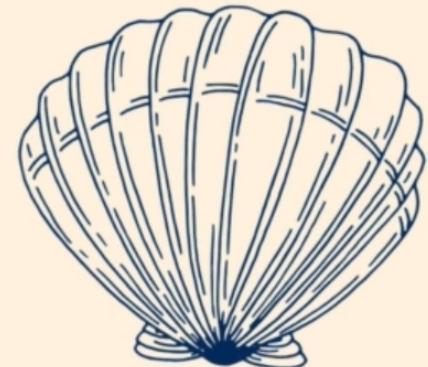
Terminal Shell OS

A terminal is a program that runs a shell.
Originally, terminals were physical devices,
but these days we work with software terminals.

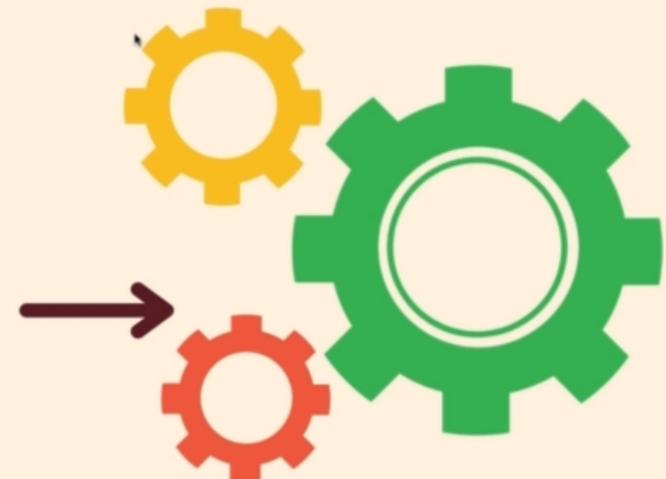
A shell is a computer interface to an operating system.
Shells expose the OS's services to human users or other programs.

The shell takes our commands and gives them to the operating system to perform.

It's named a shell because it is the outer layer around the OS, like the shell around an oyster!

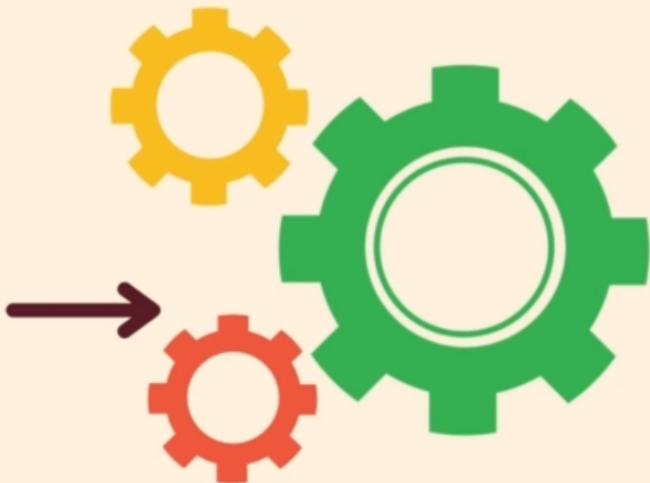


Shell



OS

```
● ● ●  
❯ touch group-{a..e}.txt
```



Terminal

Shell

OS

bash

On most Linux-based systems, the default shell program is **Bash**. There are many other shells, but Bash is currently the most popular.

The name "Bash" is an acronym for "Bourne-Again SHell", a punny reference to Stephen Bourne, the creator of Bash's direct ancestor shell, **sh**.

Bash runs on pretty much every version of Unix and Unix-like systems.

