

CIS241

System-Level Programming and Utilities

SSH

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Fall 2025

Based on material provided by Erin Carrier and
Austin Ferguson

First, Linux

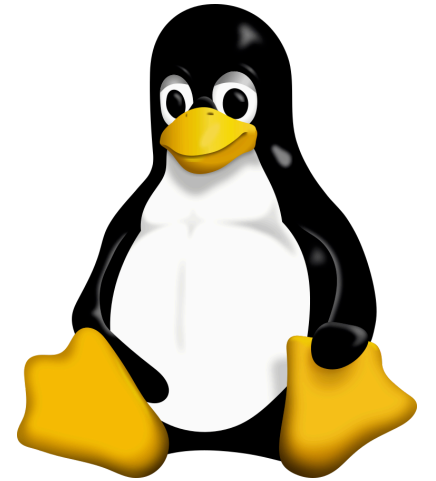
What is it?

- Often referred to as an operating system (OS)
 - Competing with Mac/Windows
- *Technically*, it is a kernel

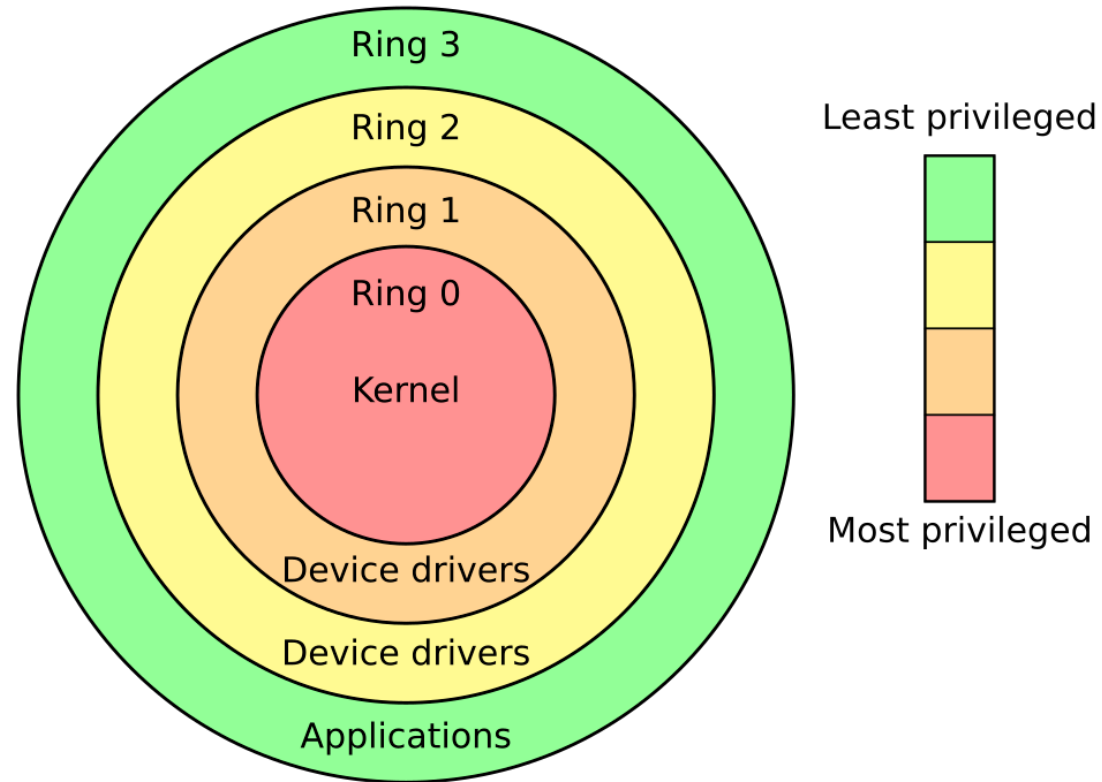
Many OSs use the Linux kernel

- Ubuntu (what is on EOS)
- Arch, Kali, Gentoo, Fedora, etc.

Isn't Mac Linux too?



Protection Rings



A bit of history

1970s: UNIX source code typically stripped from distribution

- Exorbitant amounts of money to acquire source

Linux first developed by Linus Torvalds to be a copy of UNIX

- Released it to Internet for suggestions on how to improve it
- Kernel only updated by core developers and from suggestions
- [Short history of Linux](#)



Unix?

Unix was an earlier operating system

- Linux and other systems are heavily influenced by Unix

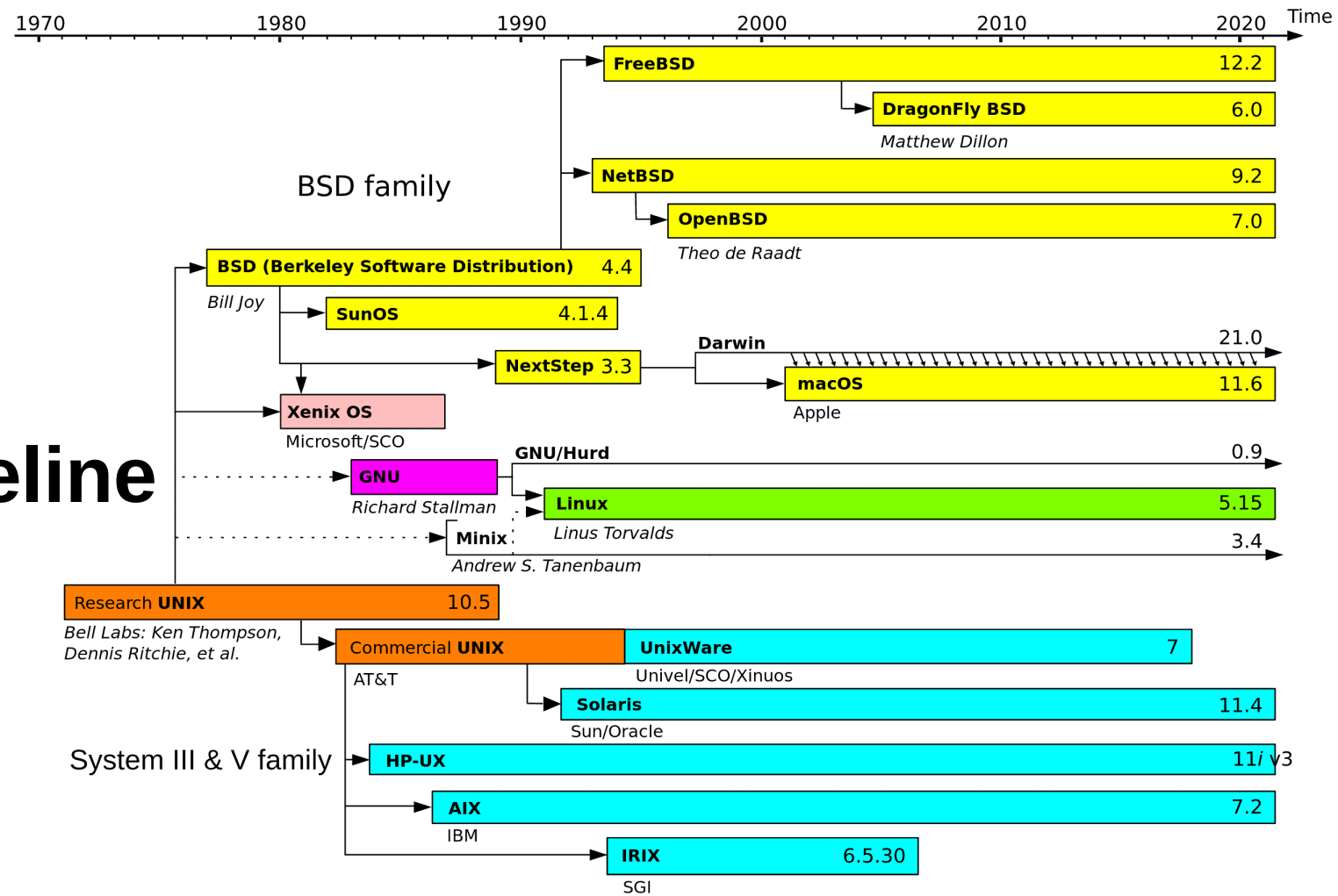
We now use “Unix-like” to describe systems

- They follow the same general ideas as Unix
- This means most things (commands, properties) carry over!

"Unix-like" systems:

- Linux
- macOS
- FreeBSD

Unix Timeline



Windows

Windows (today), is not Unix-like

- Can you do your homework on a Windows machine?
- Not by default


However, we have WSL! (🐧_🐧🌸)

- Windows Subsystem for Linux
- If you are on Windows, you must install WSL

<https://learn.microsoft.com/en-us/windows/wsl/install>

- Be very happy about this - I dreamed about just having the ability to SSH from the terminal when in industry

Terminal



```
erik@worktop: ~  
-----  
OS: Pop!_OS 22.04 LTS x86_64  
Host: Latitude 7400  
Kernel: Linux 6.12.10-76061203-generc  
Uptime: 2 days, 34 mins  
Packages: 4267 (dpkg), 7 (flatpak-us)  
Shell: bash 5.1.16  
Display (AU0243D): 1920x1080 @ 60 Hz]  
DE: GNOME 42.9  
WM: Mutter (X11)  
WM Theme: Pop-dark  
Theme: Pop-dark [GTK2/3/4]  
Icons: Pop [GTK2/3/4]  
Font: Fira Sans (10pt, SemiLight) [G]  
Cursor: Pop (24px)  
Terminal: GNOME Terminal 3.44.0  
Terminal Font: Fira Mono (12pt)  
CPU: Intel(R) Core(TM) i7-8665U (8) z  
GPU: Intel UHD Graphics 620 @ 1.15 G]  
Memory: 15.70 GiB / 31.16 GiB (50%)  
Swap: 0 B / 20.00 GiB (0%)  
Disk (/): 421.50 GiB / 928.94 GiB (44  
Disk (/recovery): 2.84 GiB / 3.99 GiB  
Local IP (wlo1): 192.168.1.46/24  
Battery (DELL 5VC2M85): 100% [AC Con]  
Locale: en_US.UTF-8  
  
erik@worktop: ~$
```

The terminal window displays system information on the right and a large ASCII art heart on the left. The heart is composed of the characters '7', '6', and '7' in a cyan color. The system information includes details about the OS (Pop!_OS 22.04 LTS), hardware (Latitude 7400, Intel Core i7-8665U, Intel UHD Graphics 620), and software (GNOME 42.9, Mutter WM, Pop-dark theme). The terminal font is Fira Mono, and the cursor is Pop (24px). The battery level is 100% and the locale is en_US.UTF-8.

Shells (local)

See the little dollar sign?

Shell!

What shell are we using?

echo \$0



The screenshot shows a terminal window titled "erik@worktop: ~". On the left side, there is a large ASCII art graphic of a heart shape composed of the characters "7", "6", and "7". On the right side, the terminal displays system information for a Pop!_OS 22.04 LTS x86_64 system. The information includes the host name "Latitude 7400", kernel version "Linux 6.12.10-76061203-generc", uptime of "2 days, 34 mins", 4267 packages, bash 5.1.16 shell, 1920x1080 @ 60 Hz display, GNOME 42.9 DE, Muttter (X11) WM, Pop-dark theme, Fira Mono terminal font, and various hardware specifications like CPU (Intel Core i7-8665U), GPU (Intel UHD Graphics 620), memory (15.70 GiB / 31.16 GiB), disk (421.50 GiB / 928.94 GiB), and battery (DELL 5VC2M85) at 100%.

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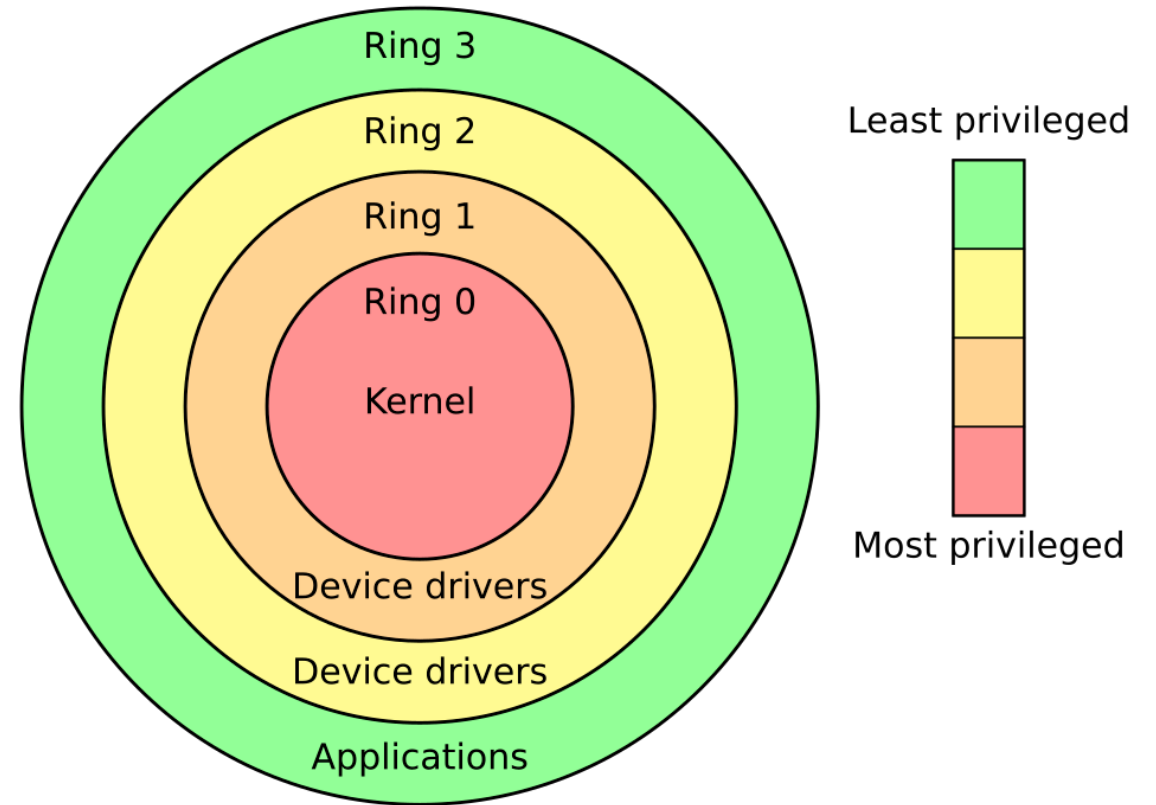
erik@worktop:~$
```

Shells (local)

Where is the shell here?

- Ring 3, typically!

How do we run in other rings?



You can use eos01.cis.gvsu.edu - eos30.cis.gvsu.edu !

Note - if you're off-campus you'll need a VPN!

Shells (remote)

Or, connecting to **another** machine

- Or or, **doing your homework** ☹_☹

ssh --> **Secure Shell**

Usage: ssh username@address

For example, connecting to EOS:

ssh username@eos1.cis.gvsu.edu

Lab fun

DO NOT

SHUT DOWN

THESE MACHINES

