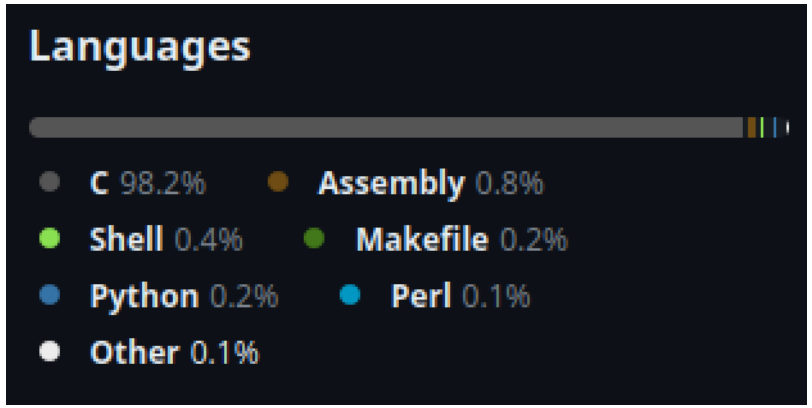
Linux Kernel

What?

- Kernel: core of the operating system
- Main functions:
  - Abstract hardware details
  - Manage hardware and resources

Linux Kernel

- Created by Linus Torvalds in 1991 (32 years old)
- FOSS (free and open source) from the beginning
- ~2000 developers contribute to every release
- Patches submitted through mailing list
  - Example
- Written in C



In the wild

- Webservers (~70% Linux) 
- Android 
- SteamDeck 
- Raspberry Pi 
- Mars Helicopter 

Companies engagement

Most active 6.5 employers

By changesets			By lines changed		
Intel	1503	11.1%	Intel	66098	10.7%
AMD	1233	9.1%	AMD	65508	10.6%
Linaro	1174	8.7%	Google	46208	7.4%
Google	922	6.8%	Linaro	41969	6.8%
(Unknown)	838	6.2%	Realtek	34719	5.6%
Red Hat	777	5.7%	(Unknown)	31602	5.1%
(None)	623	4.6%	Red Hat	26304	4.2%
NVIDIA	381	2.8%	Qualcomm	23527	3.8%
SUSE	366	2.7%	Meta	22721	3.7%
Huawei Technologies	347	2.6%	Arm	18813	3.0%
Pengutronix	326	2.4%	Collabora	16801	2.7%
Qualcomm	303	2.2%	(None)	16168	2.6%
Oracle	293	2.2%	SUSE	15021	2.4%
Meta	265	2.0%	NVIDIA	12800	2.1%
(Consultant)	261	1.9%	Texas Instruments	11308	1.8%
IBM	236	1.7%	Oracle	8627	1.4%
Texas Instruments	193	1.4%	Huawei Technologies	7908	1.3%
Arm	180	1.3%	IBM	7311	1.2%
Renesas Electronics	151	1.1%	(Consultant)	6897	1.1%
Collabora	147	1.1%	MediaTek	6562	1.1%

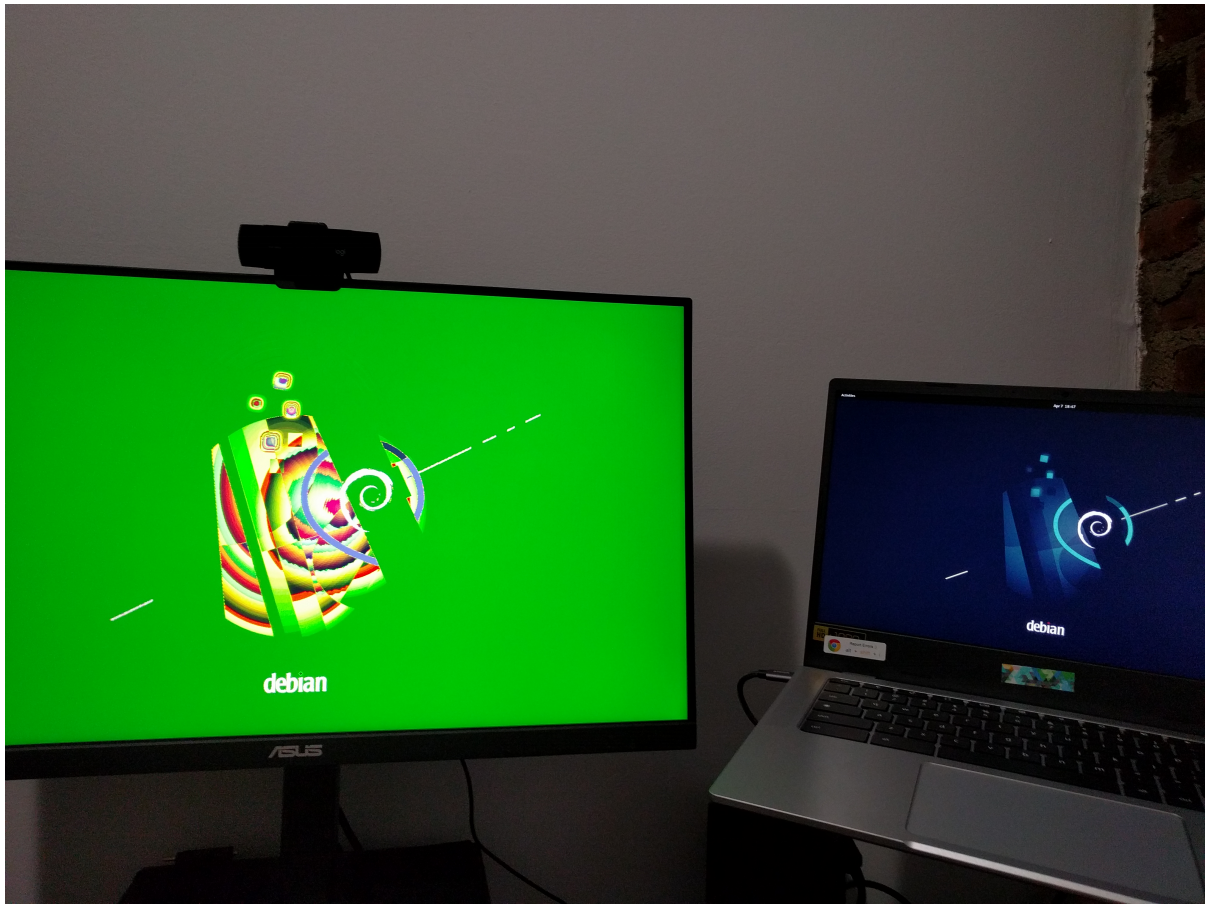
Communicating with the kernel

- User program writes desired values to processor registers
- And executes specific instruction
- Example (on x86-64, Linux):
  - To exit your program:
    - Write 60 to `rax` register
    - Write error code to `rdi` register
    - Execute `syscall` instruction

Controlling devices

- Devices are represented by the kernel through files
- So do the same thing, but to a specific file
- Example: `echo 1 > /sys/class/leds/input3\:\:capslock/brightness`

Kernel fun



- Fix

Thanks!

Questions?