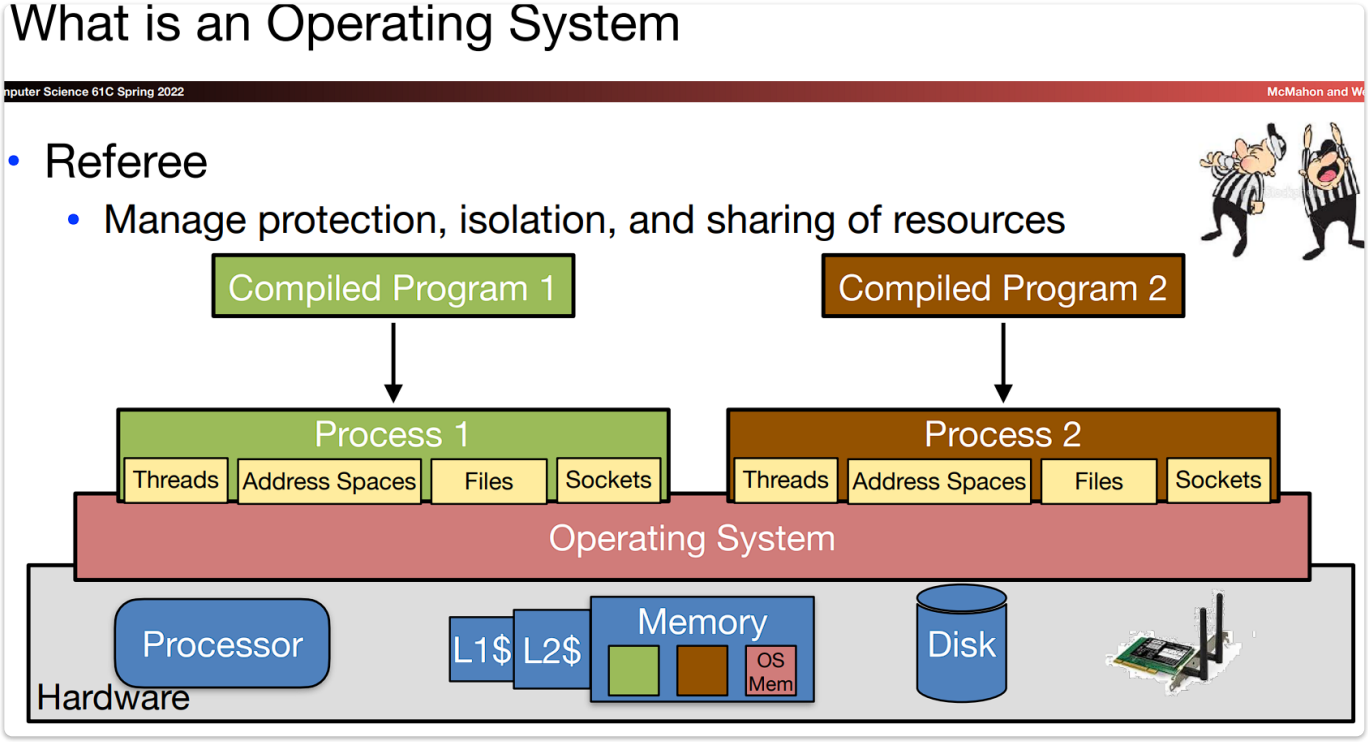
Operating System



Isolation

Context Switch

- Switching from running one program to another.
- Allows multiple processes to run in the same processor

- The OS determinates when to context switch.

What happens on a context switch?

1. The OS takes control of the CPU from the current process
2. The OS saves the state of the current process
3. The OS loads the state of the next process
4. The OS hands over the CPU to the next process

Protection

Dual Mode Operation

- Hardware provides at least two modes:
  1. Kernel Mode (or “supervisor” mode)
  2. User Mode
- Certain operations are prohibited when running in user mode
  - interacting directly w/ hardware, writing to kernel memory
- OS mostly runs in user mode
- Switching between user mode and kernel mode
  - System calls, interrupts, exceptions

Boot

1. The BIOS (Basic Input/Output System) runs
   - Power-on-self-test (POST)
   - The BIOS finds and executes the bootloader
2. The bootloader loads in part of the operating system
3. The operating system initializes services, drivers, etc
4. Launch a process that waits for an input in a loop

Bootstrapping: A chain of stages, in which at each stage, a smaller, simpler program loads and then executes the larger, more complicated program of the next stage (Wikipedia)

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How to begin executing a program

- Loader: responsible for loading programs into memory

1. The loader loads program into memory
2. The loader sets `argc` and `argv`
3. The OS jumps to `main` and transfers control to the process