Precept 1: Bootloader / PMM

COS 318: Fall 2017

Logistics: Office Hours

- Tuesday, 2:30 - 4:30pm (Qizhe)
- Thursday, 5 - 7pm (Lance)
- Friday, 1 - 3 pm (Perry)
- Saturday, 2 - 4 pm (Felix)
- Sunday, 3 - 5 pm (Leila)

Project 1 Schedule

- Design Review: Monday 9/25
  - Finished!
- Precept: Monday 9/25, 7:30pm
- Due: Sunday, 10/01, 11:55pm

Overview

- QEMU + GDB
- Bootloader
- Physical Memory Management

Running QEMU GDB

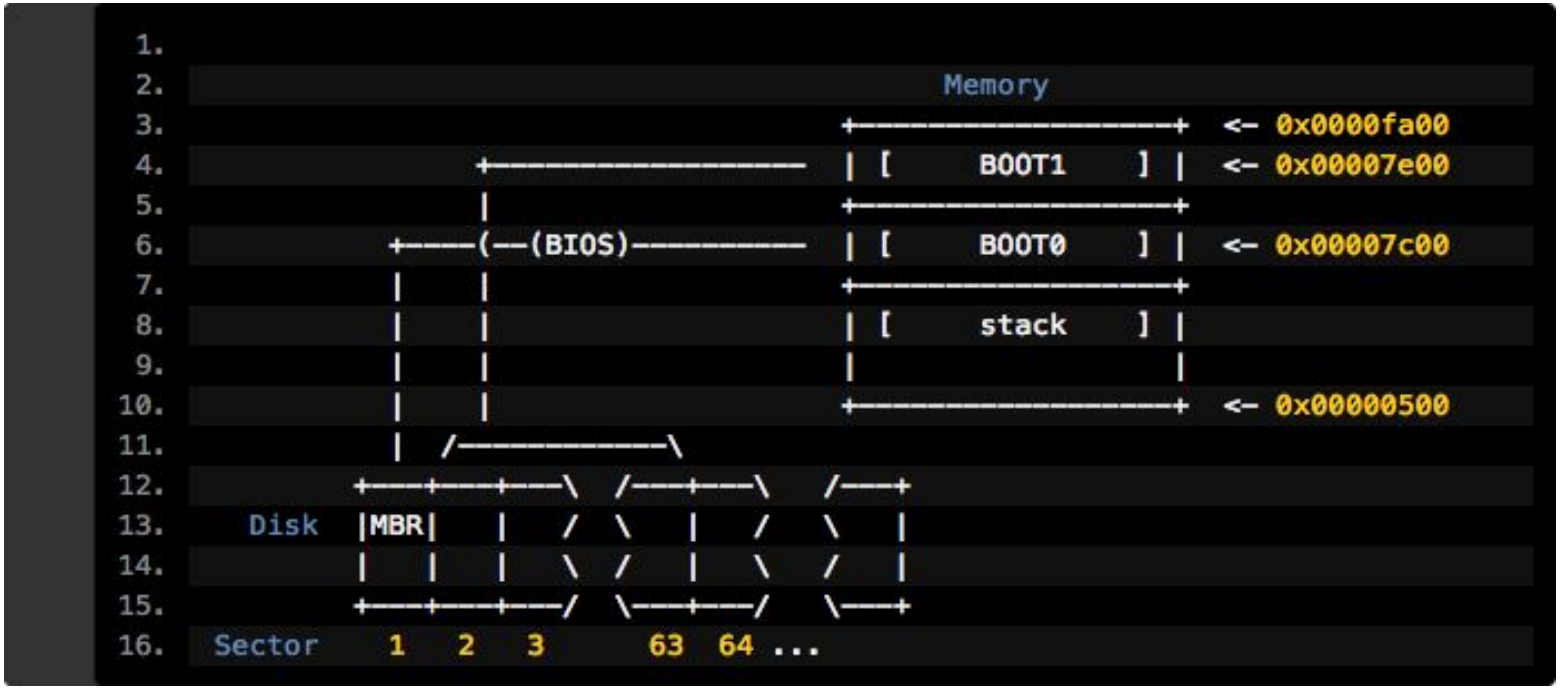
- Run `make qemu-gdb` from lab1 directory
- In 2nd terminal: run `gdb` from lab1 directory
- Make sure you are on the same machine!
  - Check with `hostname`
  - `ssh <netid>@courselab0[1|2].cs.princeton.edu`

GDB Demo!

Bootloader: Main Jobs

- Job: Load kernel into memory + prepare for its execution
  - Reads ‘e820’ memory map table
  - Switches from Real to Protected mode
  - Finds and jumps to kernel entry point

Bootloader: Where is everything?



Bootloader: ELF Files

- ELF = Executable and Linking Format
  - Binary output of the linker
- Essentially a metadata header, followed by the program sections
- Load Address: `ph->p_pa`, Entry Point: `e_entry`

PMM: MATIntro Layer

- AT array:
  - has 2 ^ 20 entries;
  - Each entry => One page
    - perm (0 => BIOS, 1=> Kernel; 2=> Normal)
    - allocated (0 => unallocated; >0 => allocated)

PMM: MATIntro Layer

Four functions to implement: Very simple

- `at_is_norm`
- `at_set_perm`
- `at_is_allocated`
- `at_set_allocated`

PMM: MATInit Layer

- Initialize AT array by utilizing info from memory map table:
  - look at import.h file:
    - get_mms
    - get_mml
    - is_usable

PMM: MATOp Layer

- palloc
- pfree (very simple)

PMM: MATOp Layer

- palloc: choose a free page from AT array
  - Do you have to start searching from AT[0]?
  - Hint: what is the address space reserved for kernel?

PMM: MATOp Layer

- palloc: choose a free page from AT array
  - at_is_norm
  - at_is_allocated
  - at_set_allocated

Questions?