CMSC412 DISCUSSION

Project 4a [Due Wednesday, October 31 @ 6:00pm]
Review

- Questions about Project 3
Project 4a Requirements

• Enable paging (identity mapped addresses)
  • Init_VM
  • Enable_Paging

• Install page fault handler
  • Install_Interrupt_Handler
X86 Paging Overview

• Linear (or “virtual”) addresses are translated into physical addresses.

• First 10 bits give index (from 0 to 1023) to page directory entry in page directory.

• Next 10 bits give index (from 0 to 1023) to page table entry in page table at address in page directory entry.
Identity Paging Example

- We would like address at 0x1407000 to map to 0x1407000
  - First 10 bits (0x1407000 >> 22) = 5
  - Second 10 bits ((0x1407000 >> 12) & 0x3FF) = 7
- So the 5th page directory entry (PDE_T) should be marked present with the correct privileges and point to a page table that…
- …has a 7th page table entry (PTE_T) that points to memory address 0x1407000 and is marked present (plus has the correct privileges such as VM_WRITE)
Enable Paging and Install Handler

• In /src/geekos/paging.c:
  • Implement `Init_VM()`
    • Allocate a global page directory (via `Alloc_Page`)
    • Identity map all of physical memory (`bootinfo->memSizeKB` provides you with the amount of memory detected)
    • For the purposes of Project 4a, all memory should have VM_USER privileges.
    • Call `Install_Interrupt_Handler()`
    • Call `Enable_Paging()`

• In /src/geekos/main.c:
  • Add `Init_VM()` call