

CMSC412 DISCUSSION

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

Review

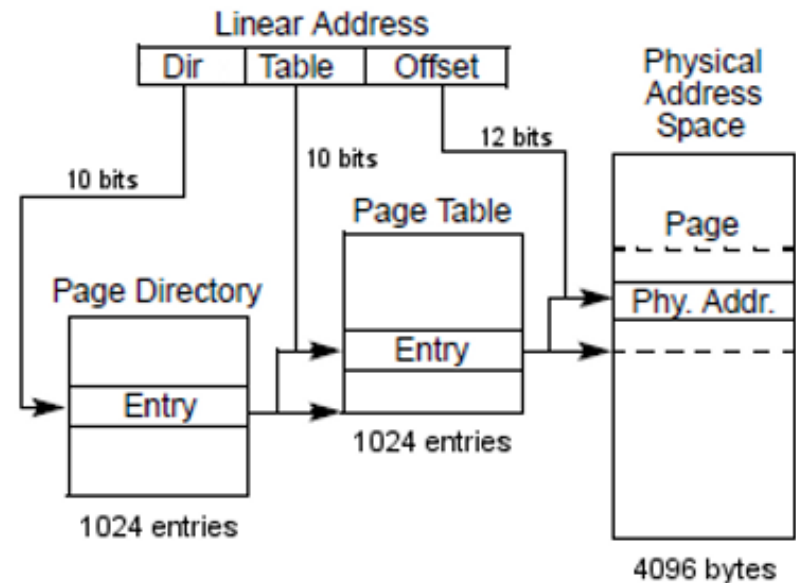
- Questions about Project 3

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 ($0x1407000 \gg 22$) = 5
 - Second 10 bits ($(0x1407000 \gg 12) \& 0x3FF$) = 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