CSCE-611: Operating Systems Machine Problem 3

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Files modified/added:

1. page_table.C
2. page_table.H
3. kernel.C
4. makefile
5. simple_frame_pool.C
6. simple_frame_pool.H

Using cont_frame_pool.C resulted in an infinite loop, I tried debugging but had no luck. Hence, I followed the recommendation from piazza and used simple_frame_pool.C

The total amount of memory in the machine is 32MB. The First 4MB is reserved for the kernel – code and kernel data. Memory within the first 4MB will be directed-mapped to physical memory. Beyond 4MB is allocated for the process memory pool. For the current mp we only have one process. The following are the functions used in PageTable:

1. init_paging
    a. Set the global parameters for the paging subsystem
    b. Shared size needed for management, kernel_mem_pool and process_mem_pool

2. PageTable::PageTable
    a. Requests a frame to create a page directory, following this initialize the page directory.

3. init_page_directory
    a. create a page table for the memory map of the first 4MB, following this initialize all entries of created page table to point to corresponding frames.

4. Load
    a. Set static page_directory with the register CR3

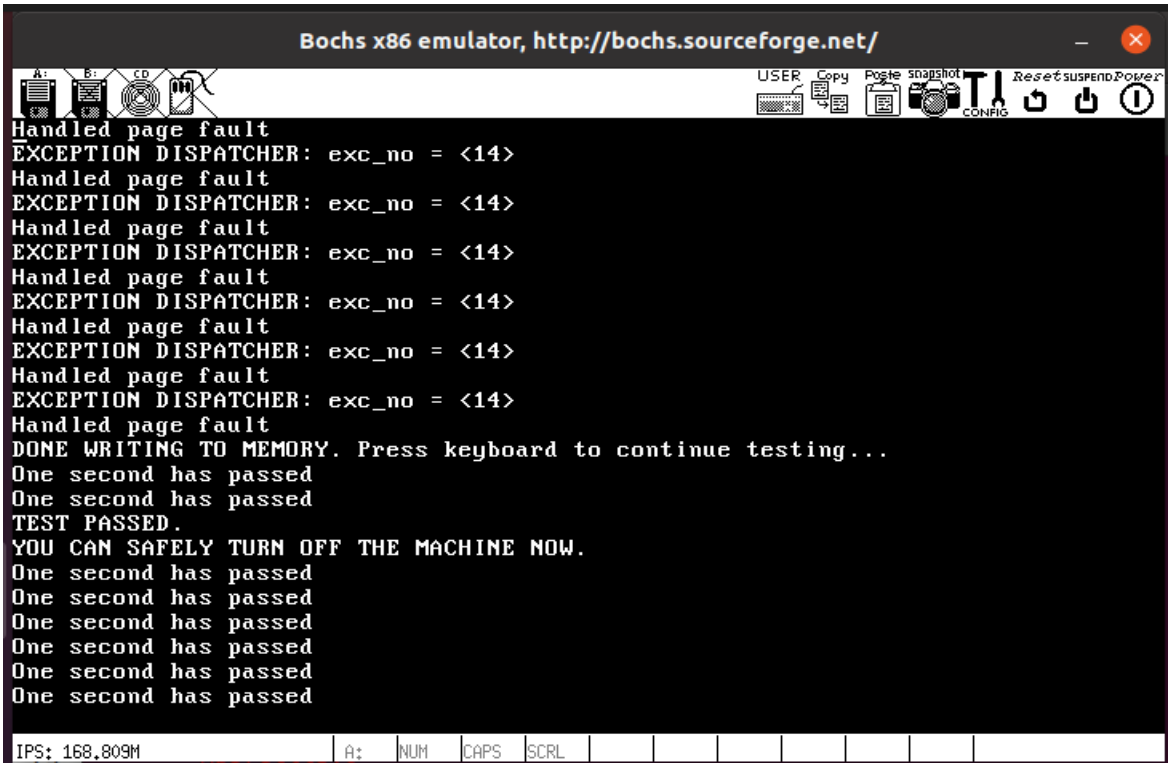
5. Enable_paging
    a. The first bit of the register CR0 is set to enable paging.

6. Handle_fault
    a. Once the page fault is triggered, get the error code using the last 3 bits and the address that caused the fault.

b. If the page is not available invoke the helper Handle_page_not_present. Get the address for the directory and page table using the masks.
    i. Following this, if the frame corresponding to the page directory is not available, create a page and update the page directory.
    ii. Then if the frame corresponding to the page table is not available, allocate memory and return the address. Update the page table with the address.

7. Create_page_table
    a. Get a frame and initialize all entries to not present.

Results:



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csce410@csce410-VirtualBox: ~/Documents/VamsiTallam_CSCE611/mp3
Please choose one: [6] 6
00000000000i[      ] installing x module as the Bochs GUI
00000000000i[      ] using log file bochsout.txt
Installing handler in IDT position 0
Installing handler in IDT position 1
Installing handler in IDT position 2
Installing handler in IDT position 3
Installing handler in IDT position 4
Installing handler in IDT position 5
Installing handler in IDT position 6
Installing handler in IDT position 7
Installing handler in IDT position 8
Installing handler in IDT position 9
Installing handler in IDT position 10
Installing handler in IDT position 11
Installing handler in IDT position 12
Installing handler in IDT position 13
Installing handler in IDT position 14
Installing handler in IDT position 15
Installing handler in IDT position 16
Installing handler in IDT position 17
Installing handler in IDT position 18
Installing handler in IDT position 19
Installing handler in IDT position 20
Installing handler in IDT position 21
Installing handler in IDT position 22
Installing handler in IDT position 23
Installing handler in IDT position 24
Installing handler in IDT position 25
Installing handler in IDT position 26
Installing handler in IDT position 27
Installing handler in IDT position 28
Installing handler in IDT position 29
Installing handler in IDT position 30
Installing handler in IDT position 31
Installing handler in IDT position 32
Installing handler in IDT position 33
Installing handler in IDT position 34
Installing handler in IDT position 35
Installing handler in IDT position 36
Installing handler in IDT position 37
Installing handler in IDT position 38
Installing handler in IDT position 39
Installing handler in IDT position 40
Installing handler in IDT position 41
Installing handler in IDT position 42
Installing handler in IDT position 43
Installing handler in IDT position 44
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csce410@csce410-VirtualBox: ~/Documents/VamsiTallam_CSCE611/mp3
Installing handler in IDT position 40
Installing handler in IDT position 41
Installing handler in IDT position 42
Installing handler in IDT position 43
Installing handler in IDT position 44
Installing handler in IDT position 45
Installing handler in IDT position 46
Installing handler in IDT position 47
Installed exception handler at ISR <0>
Installed interrupt handler at IRQ <0>
Installed interrupt handler at IRQ <1>
Frame Pool initialized
Frame Pool initialized
Installed exception handler at ISR <14>
Initialized Paging System
Constructed Page Table object
Loaded page table
Enabled paging
WE TURNED ON PAGING!
If we see this message, the page tables have been
set up mostly correctly.
Hello World!
EXCEPTION DISPATCHER: exc_no = <14>
Handled page fault
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Handled page fault
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csce410@csce410-VirtualBox: ~/Documents/VamsiTallam_CSCE611/mp3

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Handled page fault
DONE WRITING TO MEMORY. Press keyboard to continue testing...
One second has passed
One second has passed
One second has passed
One second has passed
TEST PASSED.
YOU CAN SAFELY TURN OFF THE MACHINE NOW.
One second has passed
One second has passed
One second has passed
One second has passed
One second has passed
```