Document

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October 2022

1 Design Concept

1. Implemented the **static init_paging()** function:

   static init_paging() function is used to initiate some static private data members in class, Such as **kernel_mem_pool**,**process_mem_pool** and **shared_size**.

2. Implemented the constructor **PageTable()** function:

   The constructor function first get one frame from the kernel pool to store the **page directory**. Then it get another frame from the kernel pool to store one **page table**. To make first 4MB directly mapped, this function fills the 1024 PTE(whole table) in created page table. at the same time, the frame number of the created page table also needs to be filled into the first PDE in created page directory. By the way, other 1023 PDE needs to be marked as invalid.

3. Implemented the **load()** function:

   This function passes the address of its owner(page table object) to static private data member ***current_page_table**. At the same time, it writes to register **CR3** the address of one page directory. By doing that, the operating system makes the given page table the current table. This must be done once during system startup and whenever the address space is switched.

4. Implemented the **static enable_paging()** function:

   Before enabling paging, this function makes sure page directory already load into register **CR3**, then this function set the static private data member to **paging_enabled** to be 1 and writes to register **CR0**.

5. Implemented the **handle_fault** function:

This function reads the exception error code and prints the readable information. Then it decides whether the exception is a page fault (page referred does not presented in page table). If this is a page fault, it reads the virtual address from register **CR2** and decides whether the PTE is valid for that virtual address. If not, this function gets one frame from kernel pool to store a new page table, uses the address of new page table to fill the PTE and makes that PTE to be valid. Finally, this function gets one frame from precess pool to store one page, uses the address of new page to fill the PTE.

2 Files Modified

1. **cont_frame_pool.H**(using implemented one in mp2)
2. **cont_frame_pool.C**(using implemented one in mp2)
3. **page_table.H**
4. **page_table.C**

3 Testing Results