Project 8: Designing a Virtual Memory Manager

Name: 韩冰

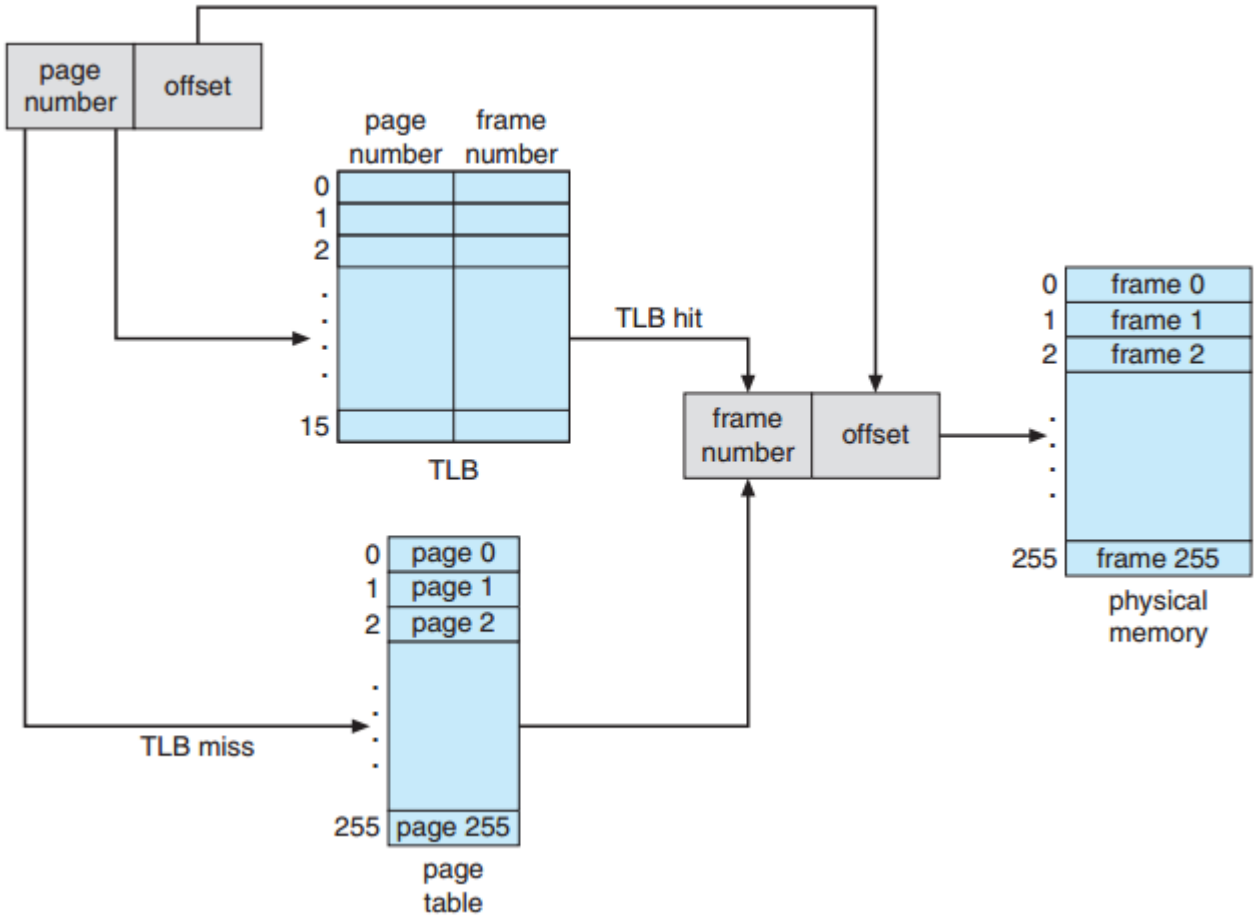
Number: 516030910523

This project consists of writing a program that translates logical to physical addresses for a virtual address space of size 216 = 65,536 bytes. Your program will read from a fle containing logical addresses and, using a TLB and a page table, will translate each logical address to its corresponding physical address and output the value of the byte stored at the translated physical address. Your learning goal is to use simulation to understand the steps involved in translating logical to physical addresses. This will include resolving page faults using demand paging, managing a TLB, and implementing a page-replacement algorithm.

The VM manager

Program file tree structure.

```
.
├── vm_manager.c   main function
├── BACKING_STORE.bin   backing store data
├── answer.txt     the result of the programer
└── addresses.txt  addresses for function to read
```

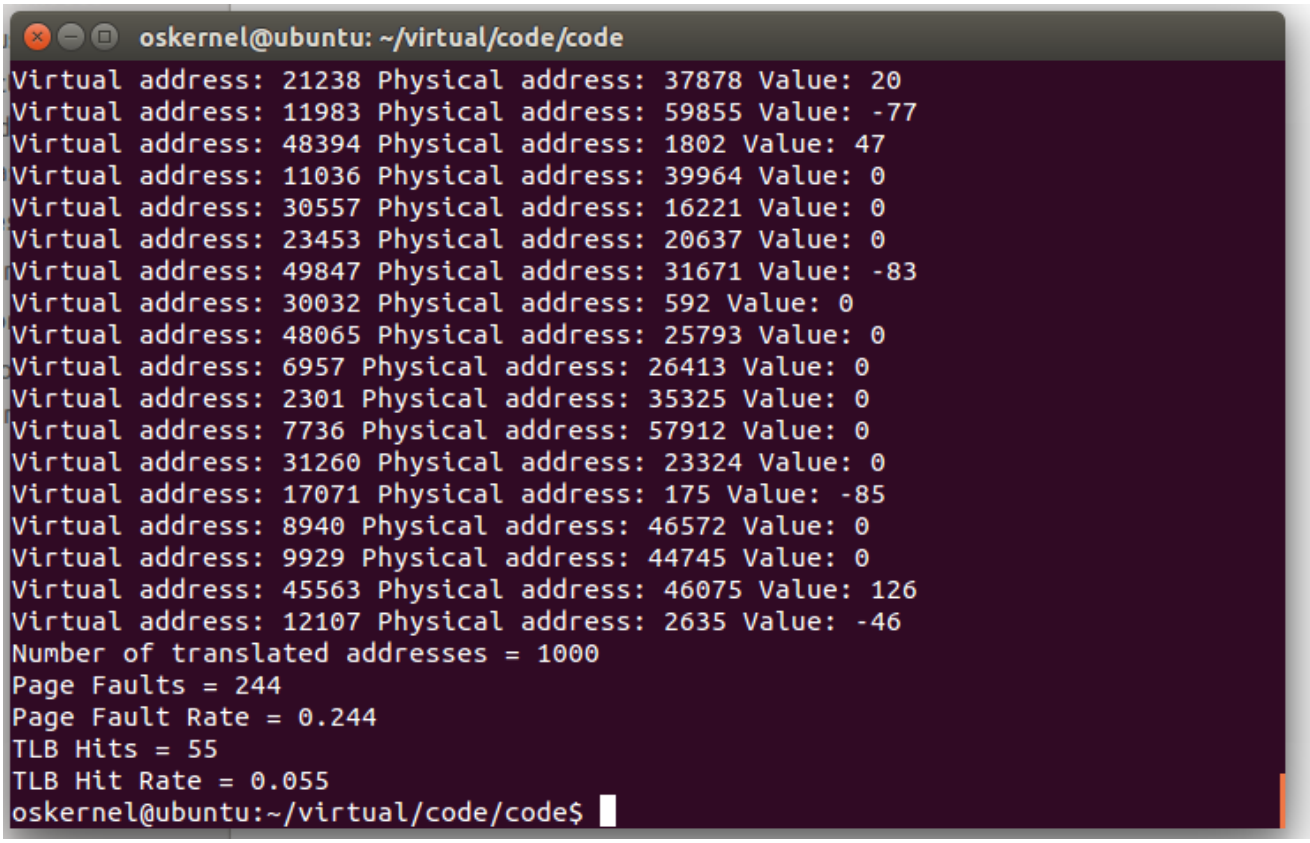


Solution:

1. Open the backing_store.bin and addresses.txt and read the file.
2. Initial the matrix for storing TLB and PageTable.
3. Read the address, split the address, then search the frame number in the TLB. If TLB miss, then search in the pageTable, if miss, to search for backing_store.bin
4. TLB use the algorithm FIFO
5. The detail can see the codes.

Screenshoot

Result


oskernel@ubuntu: ~/virtual/code/code
Virtual address: 21238 Physical address: 37878 Value: 20
Virtual address: 11983 Physical address: 59855 Value: -77
Virtual address: 48394 Physical address: 1802 Value: 47
Virtual address: 11036 Physical address: 39964 Value: 0
Virtual address: 30557 Physical address: 16221 Value: 0
Virtual address: 23453 Physical address: 20637 Value: 0
Virtual address: 49847 Physical address: 31671 Value: -83
Virtual address: 30032 Physical address: 592 Value: 0
Virtual address: 48065 Physical address: 25793 Value: 0
Virtual address: 6957 Physical address: 26413 Value: 0
Virtual address: 2301 Physical address: 35325 Value: 0
Virtual address: 7736 Physical address: 57912 Value: 0
Virtual address: 31260 Physical address: 23324 Value: 0
Virtual address: 17071 Physical address: 175 Value: -85
Virtual address: 8940 Physical address: 46572 Value: 0
Virtual address: 9929 Physical address: 44745 Value: 0
Virtual address: 45563 Physical address: 46075 Value: 126
Virtual address: 12107 Physical address: 2635 Value: -46
Number of translated addresses = 1000
Page Faults = 244
Page Fault Rate = 0.244
TLB Hits = 55
TLB Hit Rate = 0.055
oskernel@ubuntu:~/virtual/code/code$