操作系统作业 4

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1. Explain the following terms：
   Segmentation fault
   TLB
   Page fault
   Demand paging

2. Introduce the concept of thrashing, and explain under what circumstance thrashing will happen.

3. Consider a paging system with the page table stored in memory.
   a. If a memory reference takes 50 nanoseconds, how long does a paged memory reference take?
   b. If we add TLBs, and 75 percent of all page-table references are found in the TLBs, what is the effective memory reference time? (Assume that finding a page-table entry in the TLBs takes 2 nanoseconds, if the entry is present.)

4. Assume a program has just referenced an address in virtual memory. Describe a scenario how each of the following can occur: (If a scenario cannot occur, explain why.)
   - TLB miss with no page fault
   - TLB miss and page fault
   - TLB hit and no page fault
   - TLB hit and page fault

5. Assume we have a demand-paged memory. The page table is held in registers. It takes 8 milliseconds to service a page fault if an empty page is available or the replaced page is not modified, and 20 milliseconds if the replaced page is modified. Memory access time is 100 nanoseconds. Assume that the page to be replaced is modified 70 percent of the time. What is the maximum acceptable page-fault rate for an effective access time of no more than 200 nanoseconds?

6. Consider the following page reference string: 7, 2, 3, 1, 2, 5, 3, 4, 6, 7, 7, 1, 0, 5, 4, 6, 2, 3, 0, 1. Assuming demand paging with three frames, how many page faults would occur for the following replacement algorithms?
   - LRU replacement
   - FIFO replacement
   - Optimal replacement

7. Explain what Belady's anomaly is, and what is the feature of stack algorithms which never exhibit Belady's anomaly?