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 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?

5. 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

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

7. Suppose that a disk drive has 6,000 cylinders, numbered 0 to 5999. The drive is currently serving a request at cylinder 2150, and the previous request was at cylinder 1805. The queue of pending requests, in FIFO order, is: 2069, 1212, 2296, 2800, 544, 1618, 356, 1523, 4965, 3681 Starting from the current head position, what is the total distance (in cylinders) that the disk armmoves to satisfy all the pending requests for each of the following disk-scheduling algorithms?
   a. FCFS
   b. SSTF
   c. SCAN
   d. LOOK
   e. C-SCAN
   f. C-LOOK

8. Consider a file system similar to the one used by UNIX with indexed allocation, and assume that every file uses only one block. How many disk I/O operations might be required to read the contents of a small local file at */a/b/c* in the following two cases? Should provide the detailed workflow.
   a. Assume that none of the disk blocks and inodes is currently being cached.
   b. Assume that none of the disk blocks is currently being cached but all inodes are in memory.

9. What is the difference between hard link and symbolic link?

10. What are the differences between data journaling and metadata journaling? Explain the operation sequence for each of the two journaling methods.