2006 Operating System Midterm (CLD)

1. Explain following terms:
   1. Starvation
   2. **Spinlock**
   3. **Locality model**
   4. Fragmentation
2. Describe the four necessary conditions for a deadlock situation to arise.
3. Consider a four level paging scheme. Given that each level is stored as a separate table in memory, and the associative registers searching time and the memory access time are 10 and 80 nanosecond separately. What is the effective access time if the cache hit rate is 80%?
4. Given memory partitions of, , , , and (in order), how would each of the first-fit, best-fit and worst-fit algorithms place processes of , , , and (in order)? Which algorithm makes the most efficient use of memory?
5. **Assume that you have a page-reference string for a process with frames (initially all empty). The page-reference string has length ; distinct page numbers occur in it. Answer these questions for any page-replacement algorithms:**
   1. **What is a lower bound on the number of page faults?**
   2. **What is an upper bound on the number of page faults?**
6. Consider the following page-reference string:

How many page faults would occur for the following replacement algorithms, assuming three, four, or five frames? Remember that all frames are initially empty, so your first unique pages will all cost one page fault each.

* 1. LRU replacement
  2. FIFO replacement
  3. Optimal replacement

1. Describe the process to perform DMA transfer.
2. Suppose that a disk drive has cylinders, numbered to . The drive is currently serving a request at cylinder , and the previous request was at cylinder . The queue of pending requests, in FIFO order, is . Draw the head movement in following scheduling algorithms:
   1. FCFS
   2. SSTF
   3. SCAN
   4. C-SCAN
   5. LOOK
3. Please describe four methods to evaluate the CPU scheduling algorithm.
4. What are the three main purposes of an operating system?
5. What is a system call?

# Answers

* 1. (2015 Final)
  2. Process執行時，對於所存取的 memory 區域並非均勻，而是具有某種局部 / 集中區域存取的特型，分為temporal 和 spatial locality。
  3. 最好的情況是只遇到那 個的 page fault，因為初始的 個 frames 是空的，而 page-reference string 只有 種 page number，所以 page table 一定會裝滿到 次 page faults。
  4. 最糟的情況是 個全是 page fault。