**Operating System - Quiz**

**Part I (40%)**

1. Using dynamically linked library, which of the following is(are) true?

A) Each process has its own copy of the library code in memory

B) Allow unused routines to stay out of main memory

C) Better disk space utilization than using a statically linked library

D) Better memory space utilization than using a statically linked library

Ans: CD

2. What kind of address binding scheme is needed to support for swapping?

A) interrupt time B) load time C) assembly time D) execution time

Ans: D

1. Which of the following is ***not*** a reason explaining why mobile devices generally do not support swapping?

A) Limited space constraints of flash memory.

B) Small size of mobile applications do not require use of swap space.

C) flash memory can only tolerate a limited number of writes

D) Poor throughput between main memory and flash memory.

Ans: B

1. For continuous memory allocation algorithm, (a) which of following allocation scheme will result in the smallest leftover hole in memory? (b) which will result in the largest leftover hole?

A) First fit B) Best fit C) Worst fit D) None of the above

Ans: (a) B (b) C

1. For fragmentation, which of followings are true?

A) External fragmentation states that the free memory is broken up into small chunks that are too small to be useful.

B) Internal fragmentation problem can be solved by memory compaction.

C) Both first-fit and best-fit strategies for contiguous allocation suffer from external fragmentation.

D) Fragmentation does not occur in a paging system

Ans: A, C

1. Which of following statements are correct for using inverted page tables?

A) It is indexed by logical page number.

B) It has one page entry for each real page (or frame) of physical memory.

C) It requires that each process has its own table.

D) Without using a cache and TLB, for each memory reference it requires two memory- access operations: one for the table and the other for actual data.

Ans: B

7. Which of following statements are true for Belady’s anomaly?

A) It states that a process spends more time in paging than in execution.

B) It states that, for some page replacement algorithms, the page fault rates may increase as the number of allocated frames increases.

C) Stack algorithms can suffer from Belady’s anomaly.

D) Both LRU and Optimal page replacement algorithms are stack algorithms.

Ans: BD

8. Which of the following statements are true for allocating kernel memory?

A) With buddy systems, adjacent segments can be combined into one larger segment.

B) There is no memory fragmentation problem in a buddy system.

C) The slab allocator allows memory requests to be satisfied very quickly.

D) In Slab allocation, memory is allocated using a simple power-of-2 allocator.

Ans: AC

9. For a demand paging system, which of following statements are true?

A) High page-fault rate indicates that the process may have too many frames.

B) A process never suffers from page faults if it has sufficient frames

C) High page-fault rates may decrease CPU utilization.

D) When a process moves to a new working set, the page fault rate will increase.

Ans: CD

1. What size segment will be allocated for a 29 KB request on a system using the Buddy system for kernel memory allocation?

A) 29 KB B) 32 KB C) 64 KB D) None of the above

Ans: B

**Part II (60%)**

1. (10%) Given the logical address 0xAEF9 (in hexadecimal) with a page size of 1K bytes, what is the page number? What is the page offset?

**Ans: 1010112=0x2B , 10111110012=0x2F9**

1. (20%) Consider a 32-bit logical address for a two-level paging system with an 8 KB page size, where the outer page table has 1024 entries.
   1. How many bits are used to index the second-level page table?
   2. Given 4-byte page entry, what’s the total size (in bits) of the entire page table including the outer and the 2nd-level page tables?

**Ans: 32-13-10=9**

**(If page entry is 4 bytes: total size of the entire page table including the outer and the 2nd-level page table: 21032 + 2102932 = (note: there are 210  2nd-level tables, each has 29 entries.)**

1. (10%) An operating system has a 21-bit virtual address and a 2-KB page size. The system supports up to 64KB of physical memory. How many entries are there in each of the following?

a). A conventional, single-level page table b). An inverted page table

**Ans: a. 2(21-11)=210 b. 216-11=25**

1. (20%) Suppose we have the following page accesses: 1 2 3 4 2 3 4 1 2 1 1 3 1 4 and that there are three frames within our system. For each of page replacement algorithms below, what is the ***number of page faults*** for the given reference string and what will be the ***final configuration of the three frames*** right after the execution of the given reference string? (a) FIFO (b) LRU

Ans:

1. FIFO: FFFF HHH FF HH F H F 🡪 8 faults final configure: 342
2. LRU: FFFF HHH FF HH F H F🡪 8 faults, final: 314