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CSCI 4210 — Operating Systems ⋈
Spring 2020 Quiz 8 (April 23, 2020)

- This is an open book, open notes quiz. Please do not use any other people as resources including your classmates.
- This quiz is designed to take 25 minutes; therefore, for 50% extra time accommodations, the expected time is 38 minutes and 100% extra time accommodations is 50 minutes (i.e., the end of class).
- Questions will not be answered except when there is a glaring mistake or ambiguity in a question. Please do your best to interpret and answer each question.
- Below is an honor code pledge for this course. By submitting this quiz for grading, you are asserting that you agree with and will abide by this pledge.

Honor Pledge: On my honor, I have neither given nor received any unauthorized aid on this quiz.

1. **(4 POINTS)** Which of the following require RELOCATABLE code?
   Circle the best answer.

   (a) All contiguous memory allocation schemes.
   (b) Contiguous memory schemes with fixed partitioning.
   (c) Contiguous memory schemes with dynamic partitioning.
   (d) Non-contiguous memory allocation schemes.
   (e) All of the above require RELOCATABLE code.
   (f) None of the above require RELOCATBLE code.

2. **(4 POINTS)** What is the key benefit that contiguous memory allocation has over non-contiguous memory allocation? Circle the best answer.

   (a) Contiguous memory uses a page table.
   (b) Contiguous memory allocation does not need defragmentation
   (c) Non-contiguous memory wastes more memory space
   (d) Contiguous memory allows for a more efficient LOGICAL to PHYSICAL address mapping
   (e) All of the above
   (f) None of the above

3. **(4 POINTS)** Consider a non-contiguous memory allocation scheme in which a logical memory address is represented using 16 bits (i.e., 16-bit memory addressing). Of these bits, the high-order 6 bits represent the page number; the remaining bits represent the page offset. What is the page size? Circle the best answer.

   (a) 2^{16} bits
   (b) 2^{16} bytes
   (c) 2^{10} bits
   (d) 2^{10} bytes
   (e) 2^{6} bits
   (f) 2^{6} bytes

4. **(4 POINTS)** Consider a non-contiguous memory allocation scheme in which a logical memory address is represented using 16 bits (i.e., 16-bit memory addressing). Of these bits, the high-order 6 bits represent the page number; the remaining bits represent the page offset. How many pages can be represented? Circle the best answer.

   (a) 2^{16} pages
   (b) 2^{12} pages
   (c) 2^{10} pages
   (d) 2^{8} pages
   (e) 2^{6} pages
   (f) 2^{4} pages

5. **(4 POINTS)** Consider a non-contiguous memory allocation scheme with a translation lookaside buffer (TLB). What is the effective memory access time (EMAT) if each memory access takes 75ns, each TLB access takes 8ns, and the TLB hit ratio is 92%? Circle the best answer.

   (a) 89ns
   (b) 153ns
   (c) 75ns
   (d) 160ns
   (e) 100ns
   (f) 93.1ns