NJIT New Jersey's Science & Technology University

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SEP 26, 2019
EXAM 1 (50MIN)

CS332-005
FALL 2019
100 POINTS

Name: .....

ID Number (last 4 digits): ..... **Exam Type:** ...A... **Exam Number:** .....

Grade: 1: ... 2: ... 3: ... 4: ... Total: .....

THERE ARE 3 (THREE) PAGES THIS PAGE INCLUDED IN THIS EXAMPAPER

Solve all the problems in 50min in the space provided in this exampaper

Read the Instructions and Problems carefully; do not complain later

Make sure you sign the exam before you turn it in

Unsigned exams are marked with grade 0 (zero).

Signature .....

List of useful formulae

NOTE: This exam is closed everything. Only pens/pencils and this exampaper are allowed on the table. For scratch paper, use the rear side of the exam.

WARNING: MOBILE PHONES OR DEVICES PER HANDOUT 1 (SYLLABUS) MUST BE POWERED DOWN AND IN BACKPACK/BAG. OTHERWISE SCREEN FACING THE FLOOR AND ON THE FLOOR.

Problem 1. (40 POINTS)

Answer briefly or as specified the following questions.

(1) Give two alternative (alternate) names of (for) the CPU.

(2) Circle which of the three unsigned integers has the largest magnitude (value)?
(a) binary 10101010 , (b) hexadecimal 0x3a, (c) denary 200.

(3) Four different measures of memory are listed below. Order the measures by writing the numbers 1 through 4 next to them, with 1 representing the smallest and 5 representing the largest measure. (If a measure's unit is nonsense, ignore it.)

- 1200KiB
- 1MiB
- 15B
- 100bit

(4) Convert hexadecimal integers 0x25 and 0x1a into decimal. Then in decimal add them together and calculate the total. Finally convert the total into binary and give the answer. Then convert the binary into hexadecimal and give the (second) answer as well. For the latter case make sure you precede the results with the appropriate symbols.

(5) State two resources that an Operating System manages.

(6) Programs and data are stored in the same one memory. What architecture is it? Circle the answer.

Harvard or von-Neumann?

(7) Which of the four numbers is more appropriate to be the size of an L1 cache of a general purpose CPU nowadays. Circle the correct answer:

1MiB , 32 , 32KiB, 32MiB.

(8) What do we call a signal or message to the CPU (microprocessor) from some device to indicate that some event has occurred (i.e. the device is seeking to attract the attention of the processor)?

(9) What are three key characteristics of memory ?

(10) Why do we need buffers ?

Problem 2. (20 POINTS)
We have an SMP system with two processors. There are three programs P_1, P_2, P_3 to be executed. All of them are CPU-bound (i.e. no I/O and only minimal non-interfering memory interaction). They have runtimes of 5, 15, and 20 sec respectively. Explore possible scheduling scenarios by stating the possible and different elapsed times. For example in one scenario, P_1, P_3 run one one processor one after the other and P_2 on the other one. The elapsed time would be 25. (No need for two scenarios or scenaria if processor 0 gets P_2 or 1 get P_2.)

Problem 3. (20 POINTS)
Multiple jobs can run serially as described in class. Suppose that two jobs, each needing 20 minutes of CPU time, start simultaneously at time 0. How long will the last one take to complete (i.e. what is its elapsed time) if they run serially? Assume that 50% of total execution time of a job is I/O wait. (Be very very careful.)

Problem 4. (20 POINTS)
Consider a memory system with a cache and main memory. It takes 10ns to access the cache, and 100ns to access the main memory. If the effective (memory) access time is 10% greater that the cache access time, what is the hit ration H?