Beijing-Dublin International College

SEMESTER 1 FINAL EXAMINATION - (2018/2019)

School of Computer Science

COMP2006J Operating Systems

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Time Allowed: 120 minutes

Instructions for Candidates:

Answer succinctly and to the point

BJUT Student ID:—————————   **UCD Student ID:**—————————

I have read and clearly understand the Examination Rules of both Beijing University of Technology and University College Dublin. I am aware of the Punishment for Violating the Rules of Beijing University of Technology and/or University College Dublin. I hereby promise to abide by the relevant rules and regulations by not giving or receiving any help during the exam. If caught violating the rules, I accept the punishment thereof.

Honesty Pledge:————————————————————————— **(Signature)**

Instructions for Invigilators

No rough-work paper is to be provided for candidates.

1. Consider a primary memory with four frames, how many page faults will occur with the following page replacement algorithms and corresponding reference strings:

    (a) 76131724152323364240 — *Optimal Replacement Policy*
    (b) 6613152000243607 — *Least Recently Used Policy*
    (c) 2476152337253723 — *Clock Policy*

    Assume that in each case, the four frames are initially empty. Show your working for each policy.   **(10)**

2. Explain the difference between a *distributed OS* and a *parallel OS*.   **(4)**
   Distributed OS: A common OS shared by a network of loosely coupled independent computers.
   Parallel OS: run and manage parallel application efficiently on tightly coupled parallel computers.

3. What is the main difference between a *program* and a *process*?   **(2)**
   Process is a program in execution. A program becomes process when it is loaded in memory.

4. What is meant by a context switch? Why do operating systems perform a context switch? Give one disadvantage of context switching too rapidly   **(5)**
   Context switch save and load the state of process using the information stored in PCB. It allows process switched easily. Loss perfomence due to overhead. When a context switch happening, the system is not do any work.

5. On unix-like systems, the system-call `fork` is used to create a new process. Explain the two return values of `fork`   **(4)**
   For parent process, it returns PID of child process. For child process, it returns 0.

6. Under what conditions is scheduling done? What is the difference in scheduling between cooperative and preemptive multitasking?   **(6)**
   when process finished or waited the I/O block. Scheduling take place the when a process leave processor voluntary.
   Preemptive is when a process is forced to leave processor in running, in order to give another process.

7. Define *deadlock* and describe four conditions necessary for deadlock to occur   **(6)**
   a set of process is in deadlock state when every process is blocked forever to wait for availability of resources held by other. No process want to give up the resources they held. Mutual exclusion, no preemptive, hold and wait, circular chain of request.

8. What is paging? What is the fundamental problem that it solves? Explain the basic method of implementing paging.   **(5)**
   Paging is a memory management scheme used in OS to manage and organize the virtual memory size. To solve the fragmentation. Using the page replacement algorithms.

9. What is a *process control block*? Describe the information it contains. Draw a diagram   **(8)**
   PCB is a data structure used by OS to store information about running process. Process state, program counter, process number, cpu register, memory limits, accounting information.

10. Describe the possible states that a *process* may be in. Draw a diagram showing the possible transitions between these states   **(10)**
    new, termination, ready, run,wait

11. What is a *semaphore*? What is it used for? Give pseudo code describing the permissible operations on a semaphore   **(10)**
    semaphore is a protected value S with an associated queue of waiting process. It is used for mutual exclusion.

12. Briefly describe five Scheduling Algorithms   **(10)**

    1. FCFS: First come first served
    2. short job first: first execute the process who has shortest burst time
    3. Round Robin: process are dispatched FIFO but only given a limited amount of time silence
    4. Priority scheduling: schedule the most important process first.
    5. Lottery scheduling: Each process owns some ticket. On each time silence, a ticket is randomly picked. **Total marks for the paper: 80**