Beijing-Dublin International College

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. Under what conditions is scheduling done? What is the difference in scheduling between cooperative and preemptive multitasking? **(6)**

A precess finished or wait for I/O blocked. Cooperative scheduling take place when process leave memory voluntary. Preemptive scheduling is force a process in running to leave, in order to give another process.

2. Define *deadlock* and describe four conditions necessary for deadlock to occur **(10)**

A set of process in deadlock means every process blocked forever, waiting for availability of resources held by other process. At same time, no one hope to give up resources they held. 1. Mutual exclusion 2. no-preemptive 3. hold and wait 4. circle chain of request

3. What is paging? What is the fundamental problem that it solves? Explain the basic method of implementing paging. **(5)**

Paging is memory management scheme used in OS to manage and organize virtual memory size. To solve the fragmentation. Using scheduling algorithm: FIFO, RR, LRU. page table. Transilation

4. Give three advantages that *multiprocessor* systems have over *uniprocessor* systems **(6)**

Increase performance. Faulty tolerance and reliable. Portability.

5. What is a *process control block*? Describe the information it contains. Draw a diagram **(8)**

PCB is data structure used in store the information about process in running. Process state. Program counter. CPU register, Accounting information, memory limits, process number.

6. Page size determines internal fragmentation of a system. Give one advantage of small page sizes and give an advantage of large page sizes **(3)**

Reduce internal fragmentation.
Reduce external fragmentation

7. Describe the possible states that a *process* may be in. Draw a diagram showing the possible transitions between these states **(10)**

8. Events are usually signalled differently by hardware and software. How do hardware and software interrupt the CPU? **(4)**

9. The definition of an operating system changes depending on the point of view. Describe an operating system from the computer system's point of view. **(4)**

Interface between User and hardware. Control system.

10. What is meant by *protection* in operating systems? Describe two basic goals of protection. Also, give two basic principles used while implementing protection mechanism **(8)**

Protection involves controlling the access of program, process or user to the resource. Preventing malicious/intentional violation of access. Ensuring consistency with OS policies. Only allow to acccess the resource which has authority. Only allow to access the resources currently need to complete the task.

11. What is meant by a *distributed system*? Give four reasons for building distributed systems **(5)**

Distributed system means a common OS shared by a network of loosely independent computers.

12. List the responsibilities of a filesystem. Describe two ways of structuring directories in a filesystem. Give an advantage and disadvantage of each. **(8)**

file management, sharing and security, file integrity mechanism, access method. Single level: low performance but simple. Hierarchical: Need more storage, but faster and easier to manage.

13. With the *Least Recently Used* replacement policy, given four frames and eight pages, how many page faults will occur with the reference string: 76131724152323364240. Assume that the four frames are initially empty **(3)**

Total marks for the paper: 80