

**OLLSCOIL NA hÉIREANN**  
THE NATIONAL UNIVERSITY OF IRELAND

COLÁISTE NA hOLLSCOILE, CORCAIGH  
UNIVERSITY COLLEGE, CORK

Summer Examinations 2012

**BSc (Single Honours) II**  
**Computer Science**  
**CS2506 Operating Systems II**

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**Answer all questions**

Time 1 1/2 Hours

1. Process scheduling is an important service of the operating system kernel.
  - a. Explain priority scheduling, pointing out how priority is allocated and managed during the process lifetime. What process has generally the lowest priority? [5 marks]
  - b. One possible implementation of dynamic priorities is by using multilevel feedback queues. How does this scheme work? Use an example to show how a process can go to different queues corresponding to lower or higher priorities and comment it. [5 marks]
  - c. In a multi-core system, one goal of the scheduler is to balance the cores' load such that there is no idle core while other cores are overloaded. What is domain scheduling and how does it work? [5 marks]
  
2. There are virtual and physical addresses in a computer system.
  - a. Explain the difference between a virtual address and a physical address. What is a memory page and how are pages managed? [5 marks]

b. Present the full set of PTE fields and how they are used. Give an example of an algorithm that uses the “dirty bit” (D), also known as the “modified bit” [10 marks]

c. Discuss the fragmentation process that might occur in memory. Give an example. [5marks]

3. The I/O subsystem is an important part of any computer.

a. Explain the structure of a block device driver. If process A starts a read operation, and then process B starts a write operation, what is the sequence of operations in the I/O subsystem? [10 marks]

b. Give two examples of I/O schedulers, discussing their role and execution. [5 marks]

c. How does RAID provide reliability and shorter data access time? Discuss RAID levels 0 and 1. [10 marks]

4. The files system is part of the data management in any computing system.

a. Explain the notion of file system metadata and how this is useful to the file system management. [5 marks]

b. How can the file system manage the free space? [5 marks]

c. What is disk scheduling? Analyse FCFS, SSTF and SCAN. [10 marks]