OLLSCOIL NA hÉIREANN
THE NATIONAL UNIVERSITY OF IRELAND

COLÁISTE NA hOLLSCOILE, CORCAIGH
UNIVERSITY COLLEGE CORK

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Semester 2 - Summer 2017

CS2506 - Operating Systems II

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Time 1.5 Hours

Answer All Questions
Total Marks 80

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Question 1: Process Management [25 marks]

A process can be defined as an instance of a running program. The lifecycle of a process consists of several states.

a. Explain the differences between a process managed by a general-purpose operating system such as Linux and a task managed by a sensor operating system such as Tiny OS, in terms of memory image, states of the life cycle and how the scheduler selects the process/task that takes control of the CPU. You may use diagrams to illustrate your answers.

[10 marks]

b. Consider an 8-core system. Define the concept of domain scheduling and illustrate it using a diagram of the 8-core system. Discuss how different policies associated with domains can reduce the execution time of processes and save energy.

[10 marks]

c. Explain the reasons for which the priority of a process and the quantum duration change between queues in a multiple feedback queue system.

[5 marks]

Question 2: Memory Management [25 marks]

Virtual addresses of a program are translated by the Memory Management Unit into physical addresses issued by the CPU.

a. Why is the OS required to manage free memory space and what solutions can be used? Explain the free bitmap solution.

[5 marks]

b. Present and analyse the buddy memory allocation algorithm, stressing its benefits. Use an example to illustrate your assertions.

[10 marks]

c. Define the working set strategy for memory replacement. What criterion is used to set the values of the two thresholds? Discuss how Win NT implemented this strategy.

[10 marks]

Question 3: I/O Devices Management [20 marks]

Mobile devices are equipped with a number of sensors, managed by the operating system.

a. Draw the Android sensor subsystem. Explain the role of the application framework and its operation.

[10 marks]

b. Explain what an Android sensor event is and how the sensor value is communicated. Describe the Android event report modes.

[10 marks]

Question 4: File System [10 marks]

RAID is a recent addition to computer systems hardware configuration that increases both the storage space and its reliability and reduces the access time to files.

a. Explain the RAID concept and the architectural solution that leads to faster access time to files and increased reliability.

[5 marks]

b. Compare RAID level 1 with RAID level 2.

[5 marks]