

OLLSCOIL NA hÉIREANN
THE NATIONAL UNIVERSITY OF IRELAND, GALWAY

SEMESTER II EXAMINATIONS 1998/99

CT213 - Computer Systems and Organisation

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Time Allowed: Three Hours

Answer 5 questions

1. What is a computer operating system? Contrast the UNIX and Windows NT operating systems.

What are the main functions of the UNIX shell? Give some simple examples of UNIX shell commands to carry out the following operations - move a file between directories, rename files and finally delete all files that **contain** the string "Warning" from a particular directory. How would you delete all files called "core" from the whole UNIX file system.

2. What is a race condition? What software and hardware provisions can be made to overcome a race condition?

A simple database is being used to control the booking of airline seats. A Travel Agent will first look to see if a seat is available and if it is they will book a seat for the prospective passenger. Where is the possible race condition in this example? Show how you could overcome it.

3. A single processor computer has a number of processes running with different priorities. Describe how these can be scheduled to ensure that the highest priority jobs are executed first and that low priority jobs will not be locked out.
4. Describe the advantages of client-server computing over single stand-alone machines.

Is the Internet a Global Client-Server system? What problems will the Internet face in the future if it continues to grow at its current rate?

5. Describe the main threats to the security of a distributed system.

A Bank requires access to its central database from a number of classes of user.
Describe what security measures you would take for each class?

The users are

- i) Normal Customers - need access to their own account details, special bank promotions. They should be able to submit simple requests to the bank (e.g. statement requests)
- ii) Bank Employees within their branch - should have full access depending upon their status within the bank.
- iii) Bank employees who need to access the central database remotely whilst they are travelling around the country.

How would you ensure that these users gain the access they want and all other people are excluded?

6. The memory hierarchy plays a critical role in the functioning of a modern computer. Explain the reasoning behind this hierarchical organisation of the memory subsystem. Discuss the locality of reference concept, and illustrate your answer with reference to the various memory components, emphasising the trade-offs as regards their design & operation. Describe how interrupts from I/O devices are handled in both interrupt-driven and DMA schemes, in terms of both hardware and software.
7. Discuss both the issues involved in the number of address per instruction in a given instruction set and the various addressing modes used in instruction set design. How is instruction pipelining implemented in modern CPU architectures, and how is it limited? Discuss the impact of branching in this regard, and outline various ways used to minimise this problem.
8. What are the primary motivations that led to RISC architectures? What are the most noticeable differences between RISC and CISC architectures?