Operating Systems
Semester 1, 2003
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Exercise sheet 4

Deadline: Tuesday, 27 April, 12 noon in pigeonhole

1. Derive an election algorithm for bidirectional rings that is more efficient than the one presented for unidirectional rings by sending messages in both directions. How many messages are needed for n processes?

2. Assume you have a large network with workstations constantly switched on or off and you have to ensure mutual exclusion for access to a shared resource, say a printer. Which schema would you choose, with central co-ordinator or without?

3. (i) Describe the bully algorithm for electing a new coordinator.

   (ii) Suppose that two processes detect the demise of the coordinator simultaneously, and both decide to hold an election using the bully algorithm. What happens?

4. (i) Describe the execution of a remote procedure call.

   (ii) Can DMA (Direct Memory Access) improve the response time of an RPC? Justify your answer.

   (iii) For each of the following applications, do you think at-least-once semantics or at-most-once semantics is better? Justify your answer.

   - Reading and writing files from a server.
   - Compiling a program.
   - Remote banking.