Operating Systems
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Exercise sheet 4

1. Why is it difficult to protect a system in which users are allowed to do their own I/O?

2. Consider a department responsible for software development, distributed over several sites. Assume all the programmers have their own laptops, which they want to connect to the company network when they arrive at any of the sites.

   Define protocols which you would use for the laptops to find existing servers, eg print servers and file servers, on the company network. You also should present algorithms which select alternative servers if the current one fails. Your solution must not use any pre-defined servers. Also, your solution must minimise the number of broadcast messages.

3. 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?

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

   (ii) Consider the following schema for ensuring atomic transactions in a network:

   - Elect a coordinator via the bully algorithm
   - As coordinator for permission to do transaction
   - Do transaction
   - Notify coordinator that transaction has happened.

   Assume that the coordinator has a way of ensuring that it gives permission to only one host at a time. Does this schema ensure that transactions are atomic? Justify your answer.