

2004 Paper 5 Question 4

Concurrent Systems and Applications

(a) Consider a simple client-server system implemented using Java Remote Method Invocation (RMI). Describe:

(i) how the interface between the client and the server is defined; [4 marks]

(ii) how a particular instance of the server is named. [4 marks]

(b) One operation provided by the server is to merge the contents of two hashtables, returning the result in a new hashtable. On a centralized system the operation's signature could be defined as follows:

```
Hashtable mergeTables(Hashtable a, Hashtable b)
```

Describe in detail the semantics with which parameters are passed and results are returned when this operation is implemented over RMI. [4 marks]

(c) The designer of a new RMI system proposes lazily copying the contents of objects that are passed between the client and the server. For instance, a large data item passed to `mergeTables` would have to be sent only if the server actually tries to access it. It is hoped that this scheme will make distributed systems faster because it will reduce the volume of data sent over the network.

(i) Describe a situation in which the new system is likely to be faster than traditional RMI and a separate situation in which it is likely to be slower. [2 marks each]

(ii) How would this new scheme change the semantics with which parameters are passed and results are returned? [4 marks]