THE BRITISH COMPUTER SOCIETY

THE BCS PROFESSIONAL EXAMINATION
Professional Graduate Diploma

DISTRIBUTED & PARALLEL SYSTEMS

18th April 2005, 2.30 p.m.-5.30 p.m.
Answer THREE questions out of FIVE. All questions carry equal marks.
Time: THREE hours.

*The marks given in brackets are **indicative** of the weight given to each part of the question.*

1. *a)* What are the advantages of distributing objects in a client-server environment? Explain the basic concepts that govern a distributed object model. You may use a diagram to illustrate aspects of the model. **(7 marks)**

b) Consider an application in which a set of results are available from a client program for a file object located in a remote database server in a three-tier client server architecture. Explain with the help of a functional diagram how a static remote method invocation (RMI) is implemented for this application. For the purpose of discussion you may assume a single-language RMI system. **(12 marks)**

c) How does a typical middleware architecture implement the RMI for the above application? **(6 marks)**

2. *a)* List and explain the security requirements for a typical on-line application running in a distributed system environment. **(7 marks)**

b) Discuss the features of the secure socket layer technology (SSL). Explain clearly how a protocol based on SSL helps to transfer data securely from a client process to a process in a remote server for the application in *a)* above. **(11 marks)**

c) Explain in what ways middleware can ensure secure RMI. **(7 marks)**

3. *a)* How is a "cluster"of computers distinct from:

- a distributed system
- a parallel system
- a network of workstations **(15 marks)**

b) Given that a single system image creates the illusion that a collection of computer elements is a single resource, discuss how well the concept of "cluster" fits the notion of a single system image. Make reference to application and sub-system levels as appropriate. **(10 marks)**

4. *a)* Three desirable attributes of parallel algorithms and software are:

- concurrency
- locality
- modularity

What is meant by these terms? **(8 marks)**

b) Summarise three forms of basic model used to describe parallel algorithms and indicate current trends. **(8 marks)**

c) Give an example of any parallel algorithm (such as finite difference, pairwise interactions, sorting or 2D grid) or any other of your choice, using both text and a diagram to aid in its description **(9 marks)**

5. You have agreed to talk for 30 minutes at the next meeting of your local branch. The title of your talk is "System Performance: how it is measured and improved".

Sketch out approximately eight presentation slides, with associated notes, that you would use for your talk. **(25 marks)**