

THE BRITISH COMPUTER SOCIETY

THE BCS PROFESSIONAL EXAMINATION Professional Graduate Diploma

DISTRIBUTED & PARALLEL SYSTEMS

18th April 2001 – 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 are **indicative** of the weight given to each part of the question.*

1.
 - a) Describe the alternative methods by which security violations may be perpetrated in distributed systems. **(8 marks)**
 - b) Explain how public-key encryption can provide secure communication. **(8 marks)**
 - c) A public examination requires that examiners annually prepare a set of papers together with specimen answers and marking scheme. Discuss safeguards that would ensure secure Internet transmission of examination materials between examiners and a central office. **(7 marks)**

2.
 - a) How is a 'cluster' of computers distinct from:
 - i) a distributed system **(7 marks)**
 - ii) a parallel system **(6 marks)**
 - b) Given that a single system image is the illusion that a collection of computing elements is a single resource, discuss how well the concept of a 'cluster' fits the notion of a single system image. Make reference to application and sub-system levels as appropriate. **(12 marks)**

3. Sorting is one of the most common activities performed on serial computers.
 - a) Specify either formally or pragmatically a sorting algorithm that would be appropriate for a parallel or distributed architecture. Provide a detailed explanation of the specification technique used. In addition outline the target architecture. **(13 marks)**
 - b) Compare the theoretical performance of the specified algorithm on the target architecture and on a conventional architecture. Comment on the validity of the comparison. **(12 marks)**

4. Threaded programs may be executed on both single processor and multi-processor computers.
 - a) Identify a programming language that allows a user to define and use threads. Explain, with examples, how threads are defined and co-ordinated in this language. **(13 marks)**
 - b) Compare the execution of a threaded program on a single processor and on a multi-processor. Illustrate your answer with examples with which you are familiar. **(12 marks)**

[Turn over

5. You have agreed to talk for 30 minutes at the next meeting of your local BCS branch. The title of your talk is “Client Server Architectures – an Overview of their use”.

Sketch out approximately eight overhead slides, with associated notes, that you would use for your talk.

(25 marks)