



UNIVERSITY EXAMINATIONS

**EXAMINATION FOR THE AWARD OF DEGREE OF MASTER OF SCIENCE IN
COMPUTER SCIENCE**

COSC 822: DISTRIBUTED SYSTEMS ARCHITECTURES

STREAMS:

TIME:2 HOURS

DAY/DATE: THURSDAY 5/12/2019

2.30 P.M – 4.30 P.M

INSTRUCTIONS:

Instructions: Answer Question One and any other Two Questions.

QUESTION ONE (30 MARKS) COMPULSORY

- a) Define parallel processing (2 marks)
- b) Using suitable illustrations where necessary, differentiate the following distributed system service models: (6 marks)
 - i) Centralized model and Client-server model.
 - ii) Thin and Fat client model.
- c) Differentiate between single threaded and multi threaded systems. (4 marks)
- d) Explain the three levels of virtualization (6 marks)
- e) Using suitable illustrations, explain the meaning of the following terminologies: (6 marks)
 - i) SISD.
 - ii) SIMD.
 - iii) MIMD.
- f) What do UMA and NUMA stand for? Explain the major difference between NUMA machine and message-passing architecture. (6 marks)

QUESTION TWO (15 MARKS)

- a) Give a brief answer for each of the questions:
 - i) Define Speedup. (2 marks)
 - ii) What is the difference between fixed-size speed, fixed-time speedup?

(2 marks)

- b) Describe what is meant by a distributed storage system. You should mention the essential features or components of such a system. (5 marks)
- c) Explain the three advantages and three disadvantages of distributed systems compared with centralized systems. (6 marks)

QUESTION THREE (15 MARKS)

- a) Describe the relationship if any between parallel systems and distributed systems. (3 marks)
- b) Describe the Message Passing programming paradigm such as appears in MPI programs. What kinds of computer systems suit it? (4 marks)
- c) Using examples and illustrations briefly, describe the distinction between single processor systems and multi-processor systems. (4 marks)
- d) Describe the Shared Memory programming paradigm. What kinds of computer systems suit it? (4 marks)

QUESTION FOUR (15 MARKS)

- a) Differentiate between SPMD and MPMD parallel programming models. (3 marks)
- b) Explain the advantages and disadvantages of parallel systems compared with non-parallel systems. (4 marks)
- c) A design methodology for parallel programs consists of four stages, explain these stages (8 marks)

QUESTION FIVE (15 MARKS)

- a) Define the following terms as used in distributed systems: (4 marks)
 - i. Client
 - ii. Server
 - b) Explain the difference in functionality between a networked system and a distributed system. (4 marks)
 - c) Using a well illustrated diagram describe the three tiered model as applied in distributed networks, state two advantages of this model compared to two tier model. (5 marks)
 - d) Explain three benefits of server virtualization. (6 marks)
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