Beijing-Dublin International College

SEMESTER I FINAL EXAMINATION - 2016/2017

School of Computer Science & Informatics

COMP3008J Distributed Systems

HEAD OF SCHOOL NAME: Prof. Pádraig Cunningham

MODULE COORDINATOR NAME*: Dr. Anca D. Jurcut

Time Allowed: 80 minutes

Instructions for Candidates

The distribution of marks in the right margin shown as a percentage gives an indication of the relative importance of each part of the question.

Full marks will be awarded for complete answer to **Question 1** and complete answers **to any TWO other Questions** (Question 2, Question 3, and Question 4).

BJUT Student ID: _____ **UCD Student ID:** _____

I have read and clearly understand the Examination Rules of both Beijing University of Technology and University College Dublin. I am aware of the Punishment for Violating the Rules of Beijing University of Technology and/or University College Dublin. I hereby promise to abide by the relevant rules and regulations by not giving or receiving any help during the exam. If caught violating the rules, I accept the punishment thereof.

Honesty Pledge： _____ **(Signature)**

Instructions for Invigilators

Non-programmable calculators are permitted.

No rough-work paper is to be provided for candidates.

Obtained score

Question 1:

a) What is a Distributed System? Give examples of distributed systems.

[5 marks]

b) Discuss the *cache - consistency problem*. What are the benefits of using a *cache*?

[5 marks]

c) What is a *distributed file system*? List the main components that make up a distributed file system.

[10 marks]

d) Briefly describe how *reliable multicast communication* works in a distributed system

[10 marks]

e) Briefly describe the *ring algorithm* used for voting in a distributed system.

[10 marks]

a) What *is grid computing*? Why is scalability a big issue in the design of Grid Systems?

[5 marks]

f) What is a *digital signature*?

[5 marks]

[Total 50 marks]

Obtained score

Question 2:

a) What is a *replication system*? What are the key components that normally make up a replication system?

[**5 marks]**

b) Describe and compare a *stateless file service* versus a *stateful file service*. Provide an example of each.

[8 marks]

c) Describe in detail the *Network File System*. Explain how this works.

[12 marks]

[Total 25 marks]

Obtained score

Question 3:

a) What is a *digital signature*? How can this be implemented using *public key encryption*?

[10 marks]

b) Explain the difference between *symmetric* and *asymmetric encryption.*

[10 marks]

c) Briefly describe the Kerberos architecture. In your answer discuss the role of the ticket, the

authentication token and the session key.

[5 marks]

[Total 25 marks]

Obtained score

Question 4:

a) Explain why it is important to have a *global clock* in a distributed system.

[5 marks]

b) What is *mutual exclusion*? Discuss how mutual exclusion may be implemented in distributed systems. Your answer should describe the three approaches discussed in this course, namely: *centralised*, *distributed*, and *token ring*.

[10 marks]

c) Describe the Global Snapshot algorithm for saving state information in a distributed system.

[10 marks]

[Total: 25 marks]