Beijing-Dublin International College

SEMESTER I FINAL EXAMINATION - 2018/2019

School of Computer Science
COMP3008J Distributed Systems

HEAD OF SCHOOL NAME: Prof. Pádraig Cunningham

MODULE COORDINATOR NAME*: Dr. Anca D. Jurcut

Time Allowed: 90 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.

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.

Obtained score

Question 1:

a) In terms of a distributed system what is the meaning of *middleware*?

[5 marks]

b) Compare and contrast *active* versus *passive replication*.

[5 marks]

c) Explain why it is important to have a *global clock* in a distributed system. Provide two examples to justify your answer.

[5 marks]

d) What is a *digital signature*? How can this be implemented using *shared key encryption*? List the main benefits, drawbacks and improvements and give an example of application implementing the shared key digital signature.

[10 marks]

e) When using a *cache* in a distributed system, what policies can be used to decide when a cache should be updated?

[5 marks]

f) What is a *Replication System*? List the 5 main steps in handling a request to perform an operation on a logical object.

[10 marks]

g) In a peer-to-peer system, what is a *routing overlay*? Describe how the Pastry peer-to-peer middleware implements routing.

[10 marks]

[Total 50 marks]

Obtained score

Question 2:

a) What is a *Distributed File System* (DFS)? Give examples of DFS and list the main components of a DFS.

[**7 marks]**

b) Compare and describe a *stateless file service* versus a *stateful file service*. Provide examples of each.

[8 marks]

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

[10 marks]

[Total 25 marks]

Obtained score

Question 3:

a) What is *cryptography* and what are the main *3 uses of cryptography* presented in this course? Briefly present each use (of the 3 main uses of cryptography) and provide a relevant example for each of these uses.

[8 marks]

b) What is *public* key *encryption?* In your answer provide a detailed example of a public key/asymmetric algorithm.

[8 marks]

c) In a distributed system, what is an *Election Algorithm* and what it is used for? Briefly present the two election algorithms considered in this course.

[9 marks]

[Total: 25 marks]