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SEMESTER I FINAL EXAMINATION - 2021/2022

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School of Computer Science
COMP3008J Distributed Systems

HEAD OF SCHOOL NAME: Assoc Prof. Chris Bleakley

MODULE COORDINATOR NAME*: Dr. Anca D. Jurcut

Time Allowed: 120 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.
No rough-work paper is to be provided for candidates.

Obtained score

Question 1:

Explain why are distributed systems vulnerable to security attacks? List and define the main types of attack faced by distributed systems. Give an example of each type of attack.

[14 marks]

Obtained score

Question 2:

Name 2 techniques to aid scalability of distributed systems. Provide an example for each.

[10 marks]

Obtained score

Question 3:

Name and describe 3 types of possible transparency in distributed system.

[6 marks]

Obtained score

Question 4:

With a P2P file sharing, what are the advantages for a query flooding system like Gnutella over a centralized query system like Napster?

[10 marks]

Obtained score

Question 5:

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.

[7 marks]

b) What are the main differences between Symmetric and Asymmetric Encryption algorithms? Briefly explain each of these differences.

[8 marks]

[Total 15 marks]

Obtained score

Question 6:

Name two algorithms that are used to synchronize physical time in a distributed system? Discuss and explain how each of the two algorithms works.

[10 marks]

Obtained score

Question 7:

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

[5 marks]

Obtained score

Question 8:

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

[10 marks]

Obtained score

Question 9:

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.

[10 marks]

Obtained score

Question 10:

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]