

**GRIFFITH COLLEGE DUBLIN**  
**QUALITY AND QUALIFICATIONS IRELAND**  
**EXAMINATION**

**POSTGRADUATE DIPLOMA IN SCIENCE IN BIG DATA MANAGEMENT  
AND ANALYTICS**

**CLOUD PLATFORMS AND APPLICATIONS**  
**Module code: PGDBD-CPA**

**POSTGRADUATE DIPLOMA IN SCIENCE IN COMPUTING**  
**CLOUD PLATFORMS & APPLICATIONS**  
**Module code: PGDC-CPA**

**MASTER OF SCIENCE IN BIG DATA MANAGEMENT AND ANALYTICS**  
**CLOUD PLATFORMS AND APPLICATIONS**  
**Module code: MSCBD-CPA**

**MASTER OF SCIENCE IN COMPUTING**  
**CLOUD PLATFORMS & APPLICATIONS**  
**Module code: MSCC-CPA**

**Lecturer(s):**

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**External Examiner(s):**

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**Date: 11<sup>th</sup> August 2023**

**Time: 2.15-5.15**

**THIS PAPER CONSISTS OF SIX QUESTIONS  
FIVE QUESTIONS TO BE ATTEMPTED  
ALL QUESTIONS CARRY EQUAL MARKS  
IN ALL CASES CANDIDATES SHOULD READ THE ENTIRE QUESTION BEFORE  
ANSWERING ANY PART**

## **QUESTION 1**

**Answer both (a) and (b).**

- (a) Define all three models of cloud computing. Evaluate which models would give you the most and least control over making changes to an application.

**(10 marks)**

- (b) In terms of network bandwidth explain which is easier to predict the performance of: homogeneous or heterogeneous. A cloud design would normally favour a heterogeneous network. Analyse how this would be structured and the reasons why.

**(10 marks)**

**Total (20 marks)**

## **QUESTION 2**

**Answer both (a) and (b).**

- (a) A requirement of effective virtualisation is Performance Isolation. Define Performance Isolation, evaluate two ways it can be achieved, and explain an advantage of each approach.

**(10 marks)**

- (b) Explain the main difference between containers and virtual machines. Compare how this difference affects containers in relation to virtual machines. Make sure to reference application compatibility, number of containers, and transfers in your answer.

**(10 marks)**

**Total (20 marks)**

## **QUESTION 3**

**Answer both (a) and (b).**

- (a) A company already has access to a private or community cloud however they would like to augment these resources with the public cloud. Outline what deployment model they need to use and summarise the main steps needed to get this model up and running. Identify and explain what load balancing technique can be used in this model.

**(10 marks)**

- (b) Often a cloud vendor will try and predict in advance how much income will be generated at any time from a mapping of virtual machines to physical hosts. Illustrate this by providing a sample formula for this and explain what all the components in the equation are measuring.

**(10 marks)**

**Total (20 marks)**

## **QUESTION 4**

**Answer both (a) and (b).**

- (a) For security purposes in the Cloud reliable extensive logging is required. Justify this statement and in the context of an audit of a security breach evaluate what information would be missing if all four aspects of logging were not present.

**(10 marks)**

- (b) While inspecting the code of a cloud application you notice that there is a lot of slowdown around the use of a shared counter. Explain why this is the case and a solution to this problem. Evaluate a performance disadvantage to your approach.

**(10 marks)**

**Total (20 marks)**

## **QUESTION 5**

**Answer both (a) and (b).**

- (a) Contrast cell storage and journal storage. Analyse why cloud storage systems are based on journal storage. In your answer make reference to data recovery in both systems in the event of a power failure.

**(10 marks)**

- (b) Draw a diagram showing the NIST reference cloud architecture. Explain the role of all actors in this model.

**(10 marks)**

**Total (20 marks)**

## **QUESTION 6**

**Answer both (a) and (b).**

- (a) State Gustaffson's law and derive its proof

**(12 marks)**

- (b) As a cloud is a heavily concurrent system identify and explain the four Coffman conditions required for a deadlock to occur.

**(8 marks)**

**Total (20 marks)**