GRIFFITH COLLEGE DUBLIN

QUALITY AND QUALIFICATIONS IRELAND
EXAMINATION

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

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

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Date: May 2022 P2 **Time: ??.?5-??.?5**

THIS PAPER CONSISTS OF SIX QUESTIONS
FIVE QUESTIONS TO BE ATTEMPTED
ALL QUESTIONS CARRY EQUAL MARKS
THE USE OF NON-PROGRAMMABLE CALCLATORS IS PERMITTED

IN ALL CASES, CANDIDATES SHOULD *READ THE ENTIRE QUESTION,* BEFORE ANSWERING ANY PART

QUESTION 1 (Cloud Models and Cloud Construction)

(a) Compare and contrast all three models of Cloud Computing with respect to the development effort and flexibility both provide. Determine which model you would chose for maximum customisability and explain your reasons for this choice

(10 marks)

(b) Order network access, computation power, and storage in terms of their speed. Based on this evaluate what component you would upgrade to provide the largest speed gain for all applications. Summarise two techniques that can be used to reduce reliance on the slowest component you have identified

(10 marks)

Total (20 marks)

QUESTION 2 (Virtualisation and Containerization)

(a) With the aid of diagrams analyse which hypervisor is better from a performance standpoint: Bare-metal or Hybrid. Determine and explain which approach clouds will generally use.

(10 marks)

(b) Explain from a security perspective why Containerisation uses interprocess communication, packet filtering, capabilities and finegrained superuser permissions to restrict what a container can do. Analyse what would happen to a container if each of these features were missing.

(10 marks)

Total (20 marks)

QUESTION 3 (Deployment models and Energy Optimisation)

(a) A company is currently using a public cloud to run their applications and services however they are concerned about the threat of vendor lock in. However, they do not wish to use any model involving a private cloud. Is there another model they could use. If so analyse the potential issues that may arise when switching to such a model.

(10 marks)

(b) Contrast the load balancing and energy optimisation approaches and include in your answer a disadvantage of both approaches. Given 20 workloads of 0.2 each show how load balancing and energy optimisation would distribute this load over 5 nodes.

(10 marks)

Total (20 marks)

QUESTION 4 (Cloud Security and Programming Techniques)

(a) Imagine you are a PaaS provider with an API for clients to build their applications upon. Evaluate who is responsible for security in the PaaS environment and Explain two ways in which a PaaS API can become a security issue.

(10 marks)

(b) Explain the principle of the optimisation method Minimising Work with the aid of two examples.

(10 marks)

Total (20 marks)

QUESTION 5 (Cloud Storage and Reference Architecture)

(a) Summarise how a file write occurs in Google File System. Analyse the effects this system has on chunk consistency and file reads.

(10 marks)

(b) Certain situations require Cloud Consumers, Auditors, and Providers to interact with each other. Explain with the aid of a diagram how this interaction works and explain two such situations that would necessitate such interaction.

(10 marks)

Total (20 marks)

QUESTION 6 (Cloud Algorithms and Mathematics)

(a) State Amdhal's law and derive its proof

(12 marks)

(b) With the aid of a diagram containing at least two virtual machines and worked examples show how the cascading calculation of processor time for a single leaf node in start time fair queueing functions. Show how the calculation would change if you added in a VM with a weight of 1 and also if you remove a node from your diagram.

(8 marks)

Total (20 marks)