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 & APPLICATIONS
Module code: MSCC-CPA

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Date: 17th May 2022   **Time: 2.15-5.15**

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)   Define the three modules of Cloud Computing. Compare and contrast who is responsible for security in all three models.

(10 marks)

(b)   During the design and development of a cloud you have a choice between using homogeneous or heterogeneous computation power. Justify why you would choose homogeneous computation power. Analyse if it is possible to have a fully homogeneous cloud even during cloud upgrades.

(10 marks)

Total (20 marks)

QUESTION 2 (Virtualisation and Containerization)

(a)   Virtualisation adheres to the three principles laid out by Popek and Goldberg. Explain the purpose of these conditions. Then define each one and analyse the consequences if virtualisation did not adhere to each condition.

(10 marks)

(b)   With the aid of diagrams show the difference between containerisation and virtualisation. Evaluate three advantages a container has over a virtual machine with this change in approach.

(10 marks)

Total (20 marks)

QUESTION 3 (Deployment models and Energy Optimisation)

(a)   In the construction private and hybrid clouds, resources are provisioned around two different workloads namely maximum and typical. Explain why this is the case by contrasting how both approaches handle a demand spike.

(10 marks)

(b)   A company is considering building a data centre to host their cloud. However, they realise that two of the largest ongoing costs will be power and cooling. Suggest and summarise steps this company can take in order to reduce the size of these costs. These steps can be before, during or after the cloud is built.

(10 marks)

Total (20 marks)

QUESTION 4 (Cloud Security and Programming Techniques)

(a)   Data in storage needs stronger protection from attack than data in transit. Explain how such data would be protected and defend this statement by explaining how long data can be retained even after deletion.

(10 marks)

(b)   Some cloud based applications benefit from using a Memcache to speed up data access. Explain how this optimisation technique works and analyse what kind of data would be most suitable and least suitable for such a technique.

(10 marks)

Total (20 marks)

QUESTION 5 (Cloud Storage and Reference Architecture)

(a)   Justify why in Google File System the chubby lock servers are placed a large physical distance apart and have their own separate communication network. If a chubby node has a failure rate of 1% what evaluate the probability that all 5 would fail at the same time.

(10 marks)

(b)   Using the NIST model and a suitable diagram show how a Cloud Consumer without technical expertise would get a cloud based application developed and provisioned. Explain how payment for cloud services would work in such a model.

(10 marks)

Total (20 marks)

QUESTION 6 (Cloud Algorithms and Mathematics)

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

(12 marks)

(b)   Compare the three different classes of schedulers that could potentially be used in a cloud. Choose one such scheduler and justify why you would use it in the cloud

(8 marks)

Total (20 marks)