THE UNIVERSITY OF WESTERN AUSTRALIA

DESK No. | | | |

FAMILY NAME: _____

GIVEN NAMES: _____

SIGNATURE: _____

STUDENT NUMBER: | | | | | | | |

SEMESTER 2, 2019 EXAMINATIONS

CITS5503

Cloud Computing

Physics, Mathematics & Computing
EMS

This paper contains: 3 Pages **(including title page)**

Time Allowed: **2:00** hours

INSTRUCTIONS:

There are a total of 6 questions in this exam paper, worth a total of 100 marks.

Students are expected to answer all questions.

All answers should be answered in the **answer booklet**.

Answers written on this **exam booklet** will be ignored.

THIS IS A CLOSED BOOK EXAMINATION

SUPPLIED STATIONERY	ALLOWABLE ITEMS
1 x Answer Booklet 18 Pages	**UWA Approved Calculator with Sticker**

PLEASE NOTE

Examination candidates may only bring authorised materials into the examination room. If a supervisor finds, during the examination, that you have unauthorised material, in whatever form, in the vicinity of your desk or on your person, whether in the examination room or the toilets or en route to/from the toilets, the matter will be reported to the head of school and disciplinary action will normally be taken against you. This action may result in your being deprived of any credit for this examination or even, in some cases, for the whole unit. This will apply regardless of whether the material has been used at the time it is found.
Therefore, any candidate who has brought any unauthorised material whatsoever into the examination room should declare it to the supervisor immediately. Candidates who are uncertain whether any material is authorised should ask the supervisor for clarification.

Candidates must comply with the Examination Rules of the University and with the directions of supervisors.
No electronic devices are permitted during the examination.
All question papers and answer booklets are the property of the University and remain so at all times.

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Question 1. Cloud Computing (20 points)

a. [20 points] Describe the concepts of *vertical* and *horizontal* scale. Describe 2 different ways in which you could scale a web application horizontally. Describe a potential architecture to scale a database to handle the scaling out of web servers.

Question 2. Virtual Machines and Containers (20 points)

a. [10 points] Describe what *virtualisation* is. Describe the characteristic attributes of the different types of virtualisation (Language, Operating System and Hardware).

b. [10 points] Describe what *containers* are with reference to Docker. Discuss their similarities and differences from an operating system virtualisation perspective as provided by VirtualBox or VMware.

Question 3. Storage (10 points)

a. [10 points] Describe what *S3* is and describe its "eventual consistency" mechanism. What are the potential considerations if you are writing a multi-user application that uses S3? What other technology could you use if you want to avoid the problems of eventual consistency?

Question 4. Identity and Access Management (20 points)

a. [20 points] A medium sized company has users that belong in different departments and perform different functions. The company has implemented a policy of document access that is specific to the job that a person does and their level in the organisation.

   Describe how you could use *AWS IAM* to provide authorization and authentication in this organisation to access to documents, as well as access and perform actions using applications.

Question 5. Networking, Network Address Translation (20 points)

a. [10 points] When an EC2 instance is created in AWS, it is assigned to a region and a Virtual Private Cloud (VPC).

   Describe how network addresses are allocated to a VPC and sub-networked when an EC2 instance is created. How is the EC2 connected to other machines and to the Internet?

b. [10 Points] Describe 2 ways in which security is implemented in AWS networks at the network level. What are the similarities and differences between these 2 security implementations?

Question 6. DevOps (10 points)

a. [10 points] What is *DevOps*? Describe how you would implement the automation of creation of machines, configuration of software and deployment of application programs using AWS.