DUBLIN INSTITUTE OF TECHNOLOGY

DT211C BSc. (Honours) Degree in Computer Science (Infrastructure)

Year 3

WINTER EXAMINATIONS 2016/2017

CLOUD COMPUTING [CMPU3007]

INTERNAL EXAMINER
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WEDNESDAY 11TH JANUARY 1.00 P.M. – 3.00 P.M.

TWO HOURS

Question 1 is **compulsory.**
Answer question 1 **and** any two of the other three questions.
Question 1 is worth 50 marks, all other questions are worth 25 marks

Illustrate your answers with appropriate examples and diagrams

1 (a) Describe four of the essential characteristics which define a cloud computing system according to the NIST definition of cloud computing.

(12 Marks)

(b) Using examples in your answer, distinguish between SaaS, IaaS and PaaS service models in cloud computing systems

(9 Marks)

(c) Define what is meant by the following kinds of cloud computing deployments:

- Private
- Public
- Community

(9 Marks)

(d) Describe how cloud computing has enabled the creation of startup technology businesses which may not otherwise exist.

(10 Marks)

(e) Discuss some of the key criticisms of cloud computing. In your answer, suggest ways in which these can be mitigated by the provider or end-user.

(10 Marks)

2 (a) Explain how compute virtualisation contributes to green computing objectives.

(6 Marks)

(b) With the aid of a diagram, compare a docker container with hypervisor-hosted virtual machine as a unit of application deployment. State two advantages of containers compared with virtual machines.

(10 Marks)

(c) Explain what the following docker commands are doing. In your answer mention what each of the command line options and arguments is contributing

```
   $ docker run -d -p 5000:5000
   --name server lab4

$ docker exec -it server
/bin/bash

$ docker run -it --link
server:proxy ubuntu /bin/bash
```

(9 Marks)

3 (a) Define the term NoSQL database and describe the four general types of NoSQL databases that have become popular

(10 Marks)

(b) Consider a successful cloud service backed by a relational database running in a master-slave configuration on two separate medium-sized compute nodes. The provider is concerned that the current database deployment will be too small for expected increased demand.

Detail the options available to this provider for scaling out this database deployment to handle increased demand. State any assumptions you make in your proposal.

(15 Marks)

4 (a) Discuss the following security implications of public cloud computing in terms of confidentiality, integrity and availability:

- Lack of physical custody of infrastructure
- Cloud vendor default settings
- Lack of transparency and trust
- Regulatory compliance

(16 Marks)

(b) Describe three cloud customer security responsibilities of a public cloud offering like the AWS Elastic Compute Cloud (EC2)

(9 Marks)