National College of Ireland

MSc in Cloud Computing – Full-time – Year 1 – MSCCLOUD 1
Post Graduate Diploma in Science in Cloud Computing – Part-time – Year 1 – PGDCLOUD 1

Semester One Examinations – 2015/16

Monday 11th January 2016
10.00am – 12.00pm

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Cloud Architecture

Dr. Daniel Doolan
Mr. David Tracey

Answer All Questions

Duration of exam: 2 hours
Attachments: None

Requires: Calculator

1. (i) Distinguish between IaaS and PaaS types of Cloud Services, providing examples of each type. **(8 marks)**

(ii) Discuss either High Availability or Fault Tolerance using examples of architectures, such as Multicomputer Cluster or Grids or Cloud Platforms to show how either can be achieved. **(12 marks)**

(Total: 20 marks)

2. (i) List 5 key challenges in cloud computing. **(5 marks)**

(ii) Discuss the key features of technical/architectural approaches that have contributed to addressing these challenges, giving examples of each approach. **(15 marks)**

(Total: 20 marks)

3. (i) Describe the reasons for the emergence of multi-core GPU's and their role in large scale computers, giving one architecture that uses them. **(5 marks)**

(ii) Describe Brewer's CAP Theorem and use it to classify one system. **(7 marks)**

(iii) Describe the benefits and drawbacks of using Virtualisation on a single machine and also in a cluster environment. **(8 marks)**

(Total: 20 marks)

4. (i) For a given program, 98% of its code is parallelisable. If this program is executed on a multi-processor system and runs at the same speed on all processors without additional overheads, what is the parallel speedup on: (**10 marks)**

10;
100;
10,000;
1,000,000 cores.

(ii) If the serial part is reduced to 0.2%, what is the parallel speedup on 10,000 cores. **(5 marks)**

(iii) Discuss why the speedup exhibits the behaviour shown. **(5 marks)**

(Total: 20 marks)

5. (i) Describe the roles of the key components in HDFS and describe how it achieves HA, scalability and fault tolerance. **(10 marks)**

(ii) Describe the MapReduce programming model and how it achieves scalability. **(10 marks)**

(Total : 20marks)