National College of Ireland

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MSc in Cloud Computing – Part-time – Year 1 – MSCLOUDE 1
MSc in Cloud Computing – Full-time – Year 1 – MSCLOUD 1
Post Graduate Diploma in Cloud Computing – Part-time – Year 1 – PGDCLOUD 1

Semester One Examinations – 2014/ 2015

Monday 12th January 2015
10.00am – 12.00pm

Cloud Architecture

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Answer all Questions

Duration of exam: 2 hours
Attachments: None

Requires: Calculator

1. Define (a) Public Cloud and (b) Private Cloud system, (c) and an example architecture for a public cloud illustrating the key elements.

(15 marks)

2. For a given program, 99% of its code is parallelisable, i.e. 1% of the code is sequential/serial. If this program is executed on the Tianhe-2/MilkyWay-2 system with 3,120,000 cores and runs at the same speed on all cores without overheads:

   a) What is the parallel speedup on:
      - 10;
      - 100;
      - 10,000;
      - 1,000,000 cores.

   (20 marks; 5 marks per result)

   b) If the serial part is reduced to 0.1%, what is the parallel speedup on 1 million cores.

   (5 marks)

3. Compare the similarities and differences between traditional clusters/grids and computing clouds. Justify your answers in terms of five criteria out of the following seven: (a) Hardware, software and networking support; (b) Resource allocation and provisioning methods; (c) Infrastructure management and protection; (d) Supporting of utility computing services; (e) Operational and cost models applied; (f) High Availability; and/or (g) Scalability.

(15 marks maximum - 3 per criterion justification)

4. Enumerate 5 major issues addressed by virtual machines and virtual clusters in cloud computing. Justify your answer.

(15 marks- 3 marks per issue)

5. A given Cloud Service Provider (CSP) assures that, in case of failure, the maximum time to repair (MTTR) a failed component in its cloud infrastructure is 10 minutes. Assuming a maximum of one failure per year:

   a) Calculate the annual availability without planned downtime.

   (10 marks)

   b) If this CSP wants to offer a five nines SLA based on the availability, what is an acceptable MTTR assuming 1 failure per year with no planned downtime ?

   (10 marks)

   c) Discuss the design approaches you would use to minimise the impact on failure in clouds.

   (10 marks)