

**National College of Ireland**

**MSc in Cloud Computing – Full-time – Year 1 – MSCCLOUD 1**

**MSc in Cloud Computing – Part-time – Year 1 – MSCCLOUDE 1**

**Semester One Examinations – 2013/14**

**Tuesday 7th January 2014**

**10.00am – 12.00pm**

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**Cloud Architecture**

Dr. Daniel Doolan  
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Answer all Questions

**Duration of exam:** 2 hours

**Attachments:** None.

### Q1)

Define i) Computer Clusters (5 marks) ii) Computational Grids (5 Marks) ; and iii) Contrast their differences (5 marks).

**[Total: 15 Marks]**

### Q2)

Please provide 5 key enabling technologies in cloud computing systems (2 marks per technology)

**[Total: 10 Marks]**

### Q3)

Consider a multicore processor with 6 heterogeneous cores sequentially labelled A-F. Assume cores A and F have the same processing capabilities, B and C run twice as fast as A, and D and E 4 times faster. Assume all cores are calculating a double precision vector-matrix multiplication using the operations daxpy for an vector of length 512 and a square matrix 256x256. Assume 1 time unit per daxpy on A or F. Given the following division of labour on the six cores:

A= 64 elements; B= 64 Elements; C= 64 Elements; D= 64 Elements; E=128 Elements; and, F= 128 Elements.

Compute a) Completion time (15 marks) and b) core utilisation rate (15 marks).

**[Total: 30 Marks]**

### Q4)

Checkpoint. Define plain transparent checkpoint (5 Marks), forked checkpoint (5 Marks), and user-directed checkpoint (5 Marks). Contrast advantages and disadvantages (5 Marks)

**[Total 20 Marks].**

### Q5)

Define and provide an advantage/disadvantage to the 5 Levels of virtualisation (5 marks per level)

**[Total 25 Marks]**