



National College of Ireland

BSc (Hons) in Computing – Full-time - Year 2 – BSHC 2
BSc (Hons) in Business Information Systems – Full-time - Year 2 - BSHBIS 2
Higher Certificate in Computing Applications and Support – Full-time - Year 2 – HCC 2
BSc (Hons) in Computing – Part-time - Year 2 - BSHCE 2
BSc (Hons) in Business Information Systems – Part-time - Year 2 – BSHBIS 2
Higher Certificate in Computing Applications and Support – Part-time - Year 2 – HCCE 2

Semester Two Examinations – 2012/13

Wednesday 15th May 2013
2.00pm – 3.30pm

Advanced Databases

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Mr. Ciaran O'Leary
Dr. Paul Hayes
Mr. Michael Bradford
Mr. Jer Hayes

Answer **all** questions

Duration of exam: 1 hour 30 minutes

Attachments: None

1. Answer all of the question parts (i) – (v).
- (i) Explain what is meant by the term *Recovery* with respect to a DBMS (Database Management System)?
[8 marks]
 - (ii) Provide an example of how the *Lost Update Problem* can manifest itself when concurrent transactions are executed against a relational database.
[8 marks]
 - (iii) Construct a B-Tree data structure of order 5 containing the following key values:
4 8 12 54 23 2 7 45 34 33 21 6
[8 marks]
 - (iv) Describe two security measures that are provided by Relational Database Management Systems (RDBMS)?
[8 marks]
 - (v) With respect to a Distributed Relational Database what is meant by the following terms:
 - a. *Performance Transparency*
 - b. *Hybrid Fragmentation*[8 marks]
2. Answer all of the question parts (i) – (iii).
- (i) Describe what is meant by each of the following terms with respect to database transactions:
 - a. Durability
 - b. Isolation
 - c. Atomicity
 - d. Consistency[8 marks]
 - (ii) Explain how the *Immediate Update Protocol* works.
[6 marks]
 - (iii) Explain how the *Two Phase Locking Protocol* works.
Does this protocol guarantee that a *deadlock* situation can **not** arise?
[6 marks]

3. Answer all of the question parts (i) – (iii).

- (i) Construct the *term-document incidence matrix* associated with the contents of the following three documents *Doc1*, *Doc2* and *Doc3*:

Doc1

Row column.

Doc2

Sit in row two.

Doc3

Row one column two.

[6 marks]

- (ii) Using the term-document incidence matrix from part (i), list the *term vectors* associated with the following terms:

- a. row
- b. two
- c. column

[6 marks]

- (iii) Show how bitwise operations are performed on the term vectors from part (ii) to return a result vector for the query

row **AND** two **AND NOT** column

[6 marks]

Interpret the result vector.

[2 marks]

4. Answer all of the question parts (i) – (iii).

- (i) Describe the activities associated with the following information flows within a data warehouse:

- a. Upflow
- b. Outflow

[6 marks]

- (ii) Describe the activity of *Data Mining* with respect to data warehousing systems.

[6 marks]

- (iii) What is meant by the following terms:

- a. OLTP
- b. OLAP

[4 marks]

Identify and describe two characteristic differences between OLTP and OLAP systems.

[4 marks]