National College of Ireland

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

Semester 2 Examinations – 2010/11

Wednesday, 18th May, 2011
6:30pm – 8:00pm

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Advanced Databases

Mr. Tom Nolan
Mr. Michael Bradford

Answer **all** questions

Duration of exam: 1 hour 30 minutes
Attachments: None

1. Answer all of the question parts (i) – (v).

    (i) What is meant by the term *Concurrency Control* with respect to a DBMS (Database Management System)?

    [8 marks]

    (ii) Consider the following *Staff* table of data physically stored using an *Ordered File Organisation*:

StaffID	LName	Position	Category
SG21	Murphy	Assistant	B
SG23	Malone	Manager	C
SG56	Molloy	Clerk	F
SG57	Zweig	Assistant	B
SH55	Aaron	Manager	J
SN34	Hamilton	Researcher	G
SN44	Clifford	Researcher	G
SN77	Grassman	Analyst	H
SW32	Gibbs	Clerk	P

The following SQL statement is issued:

SELECT * FROM Staff WHERE StaffID = 'SG23'

Describe how the required record would be located using a *Binary Search.*

[8 marks]

    (iii) Construct a B-Tree data structure of order 5 containing the following key values:
         8 5 20 30 15 3 9 60 47 46 16 25 52 39 33 2

    [8 marks]

    (iv) Describe four types of threat that could compromise the security of a DBMS (Database Management System).

    [8 marks]

    (v) Describe
         a. two advantages of a DDBMS (Distributed Database Management System)
         b. two disadvantages of a DDBMS (Distributed Database Management System)

    [8 marks]

2. Answer all of the question parts (i) – (iii).
   (i) List and describe the ACID properties associated with a database transaction.

   [8 marks]

   (ii) Describe the *Two Phase Locking* protocol

   [6 marks]

   (iii) 'A *deadlock* state may arise when using the Two Phase Locking protocol'.
       a. Explain what is meant by the term *deadlock* in this context.
       b. Describe how the DBMS (Database Management System) can detect and recover from a deadlock situation.

   [6 marks]

3. Answer all of the question parts (i) – (iv).
   (i) What is an *Inverted Index*?

   [5 marks]

   (ii) List the steps involved in creating an inverted index.

   [5 marks]

   (iii) Construct the inverted index associated with the contents of the following two documents *Doc1* and *Doc2*:

   Doc1

Search high and low before finding the answer.

   Doc2

Search and destroy the high frequency energy source before dawn.

   [5 marks]

   (iv) Describe the operation of a *Web Crawler*.

   [5 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. Inflow
       b. Outflow

   [6 marks]

   (ii) What is meant by the term *Data Mining*?

   [6 marks]

   (iii) Describe the following characteristics associated with the data stored in a data warehouse:
       a. Subject-oriented
       b. Integrated
       c. Time-variant
       d. Non-volatile

   [8 marks]