

UNIVERSITY OF BOLTON
SCHOOL OF BUSINESS AND CREATIVE
TECHNOLOGIES
COMPUTING PATHWAY
SEMESTER 1 EXAMINATION 2009/2010
DATABASE THEORY AND PRACTICE
MODULE NO: CST2503

Date: Tuesday 19th January 2010

Time: 2.00 – 4.00pm

INSTRUCTIONS TO CANDIDATES: There are SIX questions.

Answer any FOUR

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QUESTION 1

Given the following four tables called student, modul, modulocc, studregoccur

StudentID	Surname	Inits	Sex
0604321	Williams	J	F
0607357	Patel	I	M
0610231	Jones	D	M
0615763	Wong	L	F
0618853	Taylor	T	M

Modulid	Modulname	Level
C113	Visual Programming 1	1
C116	Information Systems	1
C120	Intro to Programming	1
C205	Database	2
C213	Visual Programming 2	2
C218	Object Oriented Prog	2
C320	Advanced Database	3

ModulID	Acyear	Sem	OccLetter
C113	08/9	1	C
C113	08/9	2	C
C116	08/9	1	A
C120	08/9	1	A
C205	08/9	1	A
C205	08/9	1	B
C320	08/9	2	C
C320	08/9	2	D

ModulID	Acyear	Sem	OccLetter	StudentID	Result
C113	08/9	1	C	0604321	P
C113	08/9	1	C	0607357	P
C113	08/9	1	C	0610231	F
C113	08/9	1	C	0618853	F
C113	08/9	2	C	0610231	P
C113	08/9	2	C	0615763	P
C116	08/9	1	A	0610231	F
C116	08/9	1	A	0615763	P
C116	08/9	1	A	0618853	P
C120	08/9	1	A	0604321	P
C120	08/9	1	A	0610231	P
C205	08/9	1	A	0607357	P
C205	08/9	1	A	0610231	P
C205	08/9	1	A	0618853	F
C205	08/9	1	B	0604321	P
C205	08/9	1	B	0615763	P

QUESTION 1 CONTINUED OVER THE PAGE

QUESTION 1 CONTINUED

- a) Indicate which combination of field(s) would make the primary key for the table called studregoccur, and explain your choice.

[4]

- b) Draw an ER diagram for the four tables

[4]

- c) What will be the output of the following SQL command

```
SELECT MODULID, COUNT(*) FROM STUDREGOCCUR  
WHERE RESULT='F' GROUP BY MODULID;
```

[5]

- d) What will be the output of the second SQL command when both are run

```
CREATE VIEW STUDRES AS  
SELECT MODULID, SURNAME, S.STUDENTID, RESULT FROM  
STUDREGOCCUR R, STUDENT S WHERE  
R.STUDENTID=S.STUDENTID;
```

```
SELECT SURNAME, S.STUDENTID, MODULNAME FROM  
STUDRES S, MODUL M WHERE  
M.MODULID=S.MODULID AND RESULT='F';
```

[6]

- e) Write an SQL command (or sequence of commands) to find how many times each module had an occurrence in year 08/9.

[6]

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QUESTION 2

The following tables are for modul, lecturer, canteach, prerequis

Modulid	Modulname	Level
C113	Visual Programming 1	1
C116	Information Systems	1
C120	Introductory Programming	1
C205	Database	2
C213	Visual Programming 2	2
C218	Object Oriented Prog	2
C320	Advanced Database	3

LecturerID	Surname	Forename	Boss	Sex
A100	Lager	John	A104	M
A101	Williamson	John	A104	M
A104	Tiller	Ann	A107	F
A106	Dewsbury	Amanda	A107	F
A107	Goodman	Justine		F

LecturerID	ModulID
A101	C113
A102	C113
A101	C205
A100	C205
A100	C213
A104	C320
A106	C218
A106	C116
A107	C116

ModHasNeed	Modneeded
C213	C113
C218	C120
C218	C116
C320	C205
C205	C116

- a) What field(s) would make the primary key for prerequis. [2]
- b) Draw an ER diagram for the four tables [4]

QUESTION 2 CONTINUED OVER THE PAGE

QUESTION 2 CONTINUED

- c) What would be the output from the following SQL command

```
SELECT M.MODULNAME, N.MODULNAME FROM  
MODUL M, MODUL N, PREREQUIS P WHERE  
P.MODHASNEED = M.MODULID AND  
P. MODNEEDED=N.MODULID;
```

[4]

- d) Write an SQL command which gives a list of employee surnames and the surnames of their boss, in the sequence of the boss. [8]
- e) Explain the purpose of each of the next two commands and indicate what output there would be from the second command.

```
CREATE VIEW ONLYONELECT AS SELECT MODULID FROM  
CANTEACH GROUP BY MODULID HAVING COUNT(*)=1;
```

```
SELECT MODULNAME FROM MODUL M, ONLYONELECT N  
WHERE M.MODULID=N.MODULID
```

[7]

QUESTION 3

- a) An organisation has a set of vehicles available for hire; they have developed an Access database containing a table of bookings for a vehicle, a table of vehicles and other tables to support the operation of the organisation.

They wish to create an interface that supports the process of selecting a vehicle for a potential booking; the potential booking will have start and end dates for which a vehicle is required;

Note - assume that any vehicle might be suitable for each request.

Draw a rough sketch illustrating how data could be displayed on a screen to achieve the 'vehicle selection' task and describe the queries that could be used to present the interface. Your explanation should include any new table that is needed.

BOOKING (BookingID, CustomerID, VehicleID, StartDate, EndDate)

VEHICLE(VehicleID, make, model) [10]

- b) When working with PHP and MYSQL, it is possible to create an interface where the user enters data values that will be added to two different tables such as order and orderline.

If the order table has a primary key field of type 'autoincrement' then the value created will also be needed as part of the data to be added to the OrderLine table.

Explain in detail how a computer program can determine the value that has been created for an auto-increment field when a new record is added with an INSERT command. [10]

- c) Database theory treats individual fields as 'atomic'; explain what is meant by this term and assess the use of the SUBSTR function with respect to this concept.

[5]

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QUESTION 4

- a) Explain what is meant by the term 'constraints' within SQL and indicate how they support data integrity. [3]
- b) The Create Table command lets you enforce different constraints on a table. Show examples of four constraints and explain their meaning. [4]
- c) For each of the following commands, explain what Oracle/SQL would inspect when there is a primary key for a table
- i. An **INSERT** command was executed to that table?
 - ii. A **DELETE** command was executed to that table?
- [6]
- d) Explain what is meant by the term 'foreign key'. Specify two 'create' commands in Oracle/SQL to describe an employee and a department, with each employee belonging to one department. [6]
- e) In Oracle/SQL, if you added an **ON DELETE CASCADE** clause to the **REFERENCES** clause when defining a foreign key constraint between a detail table and a primary table. What would Oracle/SQL do if subsequently a **DELETE** command was executed.
- i. That only attempted to delete records from the primary table?
 - ii. That only attempted to delete from the detail table?
- [6]

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QUESTION 5

- a) Describe briefly the three stages of normalisation. [6]
 b) Explain what the result of normalisation is. [4]
 c) The following is a copy of a delivery note. Normalise the contents to third normal form. [15]

Marshall Supplies Ltd
 66, Smithson Street
 Manchester M35 3HG

Customer: *C105*
 Cust Purch No *JH37*
 Delivery : *Jones Hardware*
 Albert Square
 Salford

Date: *25th May 2009*
 Delivery No *D312*

Product Code	Description	Quantity
<i>ZX822</i>	<i>Hex Bolt 22mm</i>	<i>120</i>
<i>QR273</i>	<i>Aluminium Washers 10mm</i>	<i>50</i>
<i>KJ34</i>	<i>Wood screws 8mm</i>	<i>144</i>

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QUESTION 6

An organisation has developed a simple database for sales order processing with the following four tables. The data is needed to generate quotations, accept orders, print delivery notes and print invoices.

Customer (CustID, CustName, Add1, Add2,Postcode)

Order (OrderNo, CustID, Date)

OrderLine (OrderNo, PartID, Quantity)

Stock (PartID, Description, Price, QOH)

They realise that the system is not complex enough to deal with their business as it will not cope with the following problems.

The organisation sends out quotations based on the above tables, but when the customer places their order, the price has changed.

The customer discovers that the product is faulty and expects a credit note for the price paid, but the price has changed.

There is no facility to perform a credit check on a customer that takes into account their credit limit and current debt.

Sometimes the company has insufficient stock to meet the quantity ordered and so they deliver and invoice some goods immediately and more at a later date.

- a) In the existing system, what would be the field(s) to make a primary key for the OrderLine table. [3]
- b) Draw an entity model of the existing system. [4]
- c) Describe two new tables that could be used to overcome the problems and specify their primary keys and foreign keys. [9]
- d) Draw an entity model of the new system. [9]

END OF QUESTIONS