UNIVERSITY OF WESTMINSTER

ELECTRONICS AND COMPUTER SCIENCE

2012-2013

Code: EBSY505

Title: Database Design and Practice 1

Date: 01 May 2013

Time: 10:00

Duration: 2 Hours

Module Leader: Francois ROUBERT

INSTRUCTIONS TO CANDIDATES

This paper contains 3 sections.

Section 1: **IS COMPULSORY, ANSWER ALL QUESTIONS**

Section 2: **IS COMPULSORY, ANSWER ALL QUESTIONS**

Section 3: **IS COMPULSORY, ANSWER ALL QUESTIONS**

SECTION 1: CARRIES 20 MARKS

SECTION 2: CARRIES 55 MARKS

SECTION 3: CARRIES 25 MARKS

SECTION 1: [20 marks]

Question 1

(a) Explain what logical database design is and how it gets produced in relation to conceptual database design.

[5 Marks]

(b) Briefly discuss the possible steps of a logical database design methodology.

[5 Marks]

Question 2

(a) Give an example of a ternary relationship and explain how the multiplicity constraints can be determined for this ternary relationship.

[5 Marks]

(b) Give an example of a recursive relationship and explain how the multiplicity constraints can be determined for this recursive relationship.

[5 Marks]

SECTION 2: [55 marks]

RestoNation is a chain of restaurants located all over the UK. They employ a certain number of staff and offer menus which are made of many different interesting dishes. These dishes are based on recipes which make use of a wide variety of ingredients.

RestoNation is seeking to design and develop a database-driven menu management system to be used internally by administrators to help them organise the range of dishes on offer more efficiently. They should be able to use the system to search and view information about available restaurants, proposed menus, offered dishes, recipes for these dishes and ingredients used in these recipes.

The Conceptual Entity-Relationship Diagram (ERD) for the RestoNation menu management system is given on Appendix A (page 8). Carefully consider the conceptual ERD on appendix A.

Question 3

(a) Write three system requirements to allow the viewing of available dishes at a specific restaurant.

[3 Marks]

(b) Write three system requirements to allow the viewing of the required ingredients for a specific dish.

[3 Marks]

Question 4

(a) Explain in detail the multiplicity of the relationship *'offers'* (between Restaurant and Menu).

[6 Marks]

(b) Explain how you would map the relationship *'offers'* to a Logical ERD. Provide a diagram to support your answer.

[6 Marks]

Question 5

(a) Explain in detail the multiplicity of the relationship '*includes' (*between Menu and Dish).

[6 Marks]

(b) Explain how you would map the relationship '*includes'* to a Logical ERD. Provide a diagram to support your answer.

[6 Marks]

Question 6

(a) Consider the '*requires'* relationship (between Ingredient and Recipe). Explain what *ingredWeight* and *ingredVolume* are in connection to the relationship and the reason for using them.

[2 Marks]

(b) Explain how you would map the relationship '*requires'* to a Logical ERD (including *ingredWeight* and *ingredVolume)*. Provide a diagram to support your answer.

[6 Marks]

Question 7

(a) Explain what the connection is between the entity Staff and the entities Manager, Waiter and Chef and what the value of using this modelling technique is.

[7 Marks]

(b) Explain how you would map the relationship between the entity Staff and the entities Manager, Waiter and Chef to a Logical ERD. Provide a diagram to support your answer.

[10 Marks]

SECTION 3: [25 marks]

DVDSpace is a DVD rental store which allows members of the general public to rent out a great range of films. Please find below a sample of 2 tables for DVDSpace.

Film

filmId	filmTitle	yrRelease	price	certificate
101	Toy story	1995	2.99	U
103	Hugo	2011	4.49	PG
109	Batman	1989	3.99	15
111	Spiderman	2002	3.65	PG
135	Superman	1978	1.49	U

Copy

copyId	condition	outDate	rtnDate	filmId
5424	Poor	14-JAN-11	16-JAN-11	103
1235	New	04-DEC-11		111
1222	Damaged	22-NOV-11	23-NOV-11	101
8956	New	12-OCT-11	16-OCT-11	103
4544	Good	22-NOV-11		111
4784	New	27-AUG-11	05-SEP-11	103
5265	Good	29-NOV-11		135
4478	Poor	18-AUG-11	21-AUG-11	135
4565	Damaged	21-OCT-11	29-OCT-11	111

For each of the questions below, select the SQL query which best represents the statement given in English. Clearly write your answer a), b), c) or d) on your examination booklet for every question.

Question 8

Display a list of film titles, years of release, total prices including the 20% VAT for these films which have a U certificate.

a)
```
SELECT filmTitle, Film, yrRelease, (price + 0.2 * price) as "Price incl VAT"
FROM Film
WHERE certificate = 'U';
```

b)
```
SELECT filmTitle, yrRelease, (price + VAT) as "Total Price"
FROM Film
WHERE certificate = 'U';
```

c)
```
SELECT filmTitle, yrRelease, (price + 0.2 * price) as "Price incl VAT"
FROM Film
WHERE certificate = 'U';
```

d)
```
SELECT filmTitle, yrRelease, (price + 0.2 * price) as "Price incl VAT"
WHERE certificate IS 'U'
FROM Film;
```

[5 Marks]

Question 9

Display the ids, titles and years of release of the films which were not released between 2001 and 2004 and which either have a U or PG certificate. Rank the output in ascending order of film titles.

a)
```
SELECT filmId, filmTitle, yrRelease
FROM Film
WHERE certificate = 'U' AND certificate = 'PG'
AND yrRelease < 2001 AND yrRelease >2004
ORDER BY filmTitle;
```

b)
```
SELECT filmId, filmTitle, yrRelease
FROM Film
WHERE (certificate = 'U' OR certificate = 'PG')
AND (yrRelease > 2001 AND yrRelease >2004)
ORDER BY filmTitle;
```

c)
```
SELECT filmId, filmName, yrRelease
FROM Film
WHERE (certificate = 'U' OR certificate = 'PG')
AND yrRelease BETWEEN 2001 AND 2004
ORDER BY filmTitle;
```

d)
```
SELECT filmId, filmTitle, yrRelease
FROM Film
WHERE (certificate = 'U' OR certificate = 'PG')
AND (yrRelease < 2001 OR yrRelease >2004)
ORDER BY filmTitle;
```

[5 Marks]

Question 10

For every different type of certificate allocated to films, display the certificate and the average price of the films of this certificate type.

a)
```
SELECT certificate, AVG(price)
FROM Film
GROUP BY price;
```

b)
```
SELECT certificate, AVG(price)
FROM Film
GROUP BY certificate;
```

c)
```
SELECT certificate, AVG(price)
FROM Film
GROUP BY filmId;
```

d)
```
SELECT filmId, certificate, AVG(price)
FROM Film
GROUP BY certificate;
```

[5 Marks]

Question 11

List the titles, years of release and prices of films which either have a U certificate and were released before 2001 or which cost less than £3.55. Rank the output in ascending order of years of release.

a)
```
SELECT filmTitle, yrRelease, price
FROM Film
WHERE price < 3.55
OR certificate = 'U'
AND yrRelease < 2001
ORDER BY YrRelease;
```

b)
```
SELECT filmTitle, yrRelease, price
FROM Film
WHERE (price < 3.55
OR certificate = 'U')
AND yrRelease < 2001
ORDER BY YrRelease;
```

c)
```
SELECT filmTitle, yrRelease, price
FROM Film
WHERE price < 3.55
OR (certificate = 'U'
OR yrRelease > 2001)
ORDER BY YrRelease DESC;
```

d)
```
SELECT filmTitle, yrReleased, price
FROM Film
WHERE price < 3.55
AND certificate = 'U'
AND yrRelease < 2001
ORDER BY YrRelease;
```

[5 Marks]

Question 12

Display the ids and titles of films which have copies as well as the conditions of these film copies and their return dates.

a)
```
SELECT f.filmId, f.filmTitle, c.condition, c.rtnDate
FROM   Film f JOIN  Copy c
ON (f.filmId = c.copyId);
```

b)
```
SELECT f.filmId, f.filmTitle, c.condition, c.rtnDate
WHERE   Film f LEFT OUTER JOIN Copy c
AND (f.copyId = c.copyId);
```

c)
```
SELECT f.filmId, f. filmTitle, c. condition, c.rtnDate
FROM   Film f JOIN  Copy c
ON (f.filmId = c.filmId);
```

d)
```
SELECT f.filmId, f. filmTitle, c. condition, c.rtnDate
FROM   Film f JOIN  Copy c
GROUP BY filmId;
```

[5 Marks]