

COMP 3005

Assignment #5

Due: April 2

Instruction

1. This is an individual assignment. Copying is not allowed.
2. There are two parts in this assignment.
3. Do Part 1 using OracleVM. Each question in this part is an embedded SQL or PL/SQL program. You need to test each program carefully and submit the final version of the proc program named **P1Qn.pc** and the execution results by taking the necessary screenshots named **P1Qn** for question **n**.
4. Do part 2 using a single word document
5. Submit a single rar or zip file on culearn.

Part 1 (60 Marks)

This part is based on the Sailer-Boat database shown below that has three tables shown below. Please note this database is slightly different from previous one.

Sailer

<u>S#</u>	Name	Age
S1	Smith	20
S2	Jones	30
S3	<i>Lastname</i>	25

Reservation

<u>S#</u>	<u>B#</u>	Day
S1	B1	1-Jan-15
S1	B2	2-Jan-16
S1	B3	3-Feb-17
S2	B1	5-Mar-16
S2	B2	6-Mar-17
S3	B1	8-May-17

Boat

<u>B#</u>	Name	Color
B1	Freedom	Blue
B2	Paradise	Green
B3	Miracle	Red

1. Use Dynamic SQL method 1 to first drop the tables in Sailer-Boat database and then recreate them as shown below. (5 marks: marking scheme P1Q1.pc 2, screenshot 3)

```
[fedora@OracleVM ~]$ ./P2Q1
Connected to ORACLE
Deleting tables:Creating tables:
DROP TABLE Reservation
DROP TABLE Boat
DROP TABLE Sailer
Finished deleting tables
CREATE TABLE Sailer(S# char (2) PRIMARY KEY, Name char (20) NOT NULL, Age number(2) DEFAULT 99)
CREATE TABLE Boat(B# char (2) PRIMARY KEY, Name char (20) UNIQUE, Color char (10))
CREATE TABLE Reservation(S# char (2), B# char (2), Day date, PRIMARY KEY (S#, B#), FOREIGN KEY (S#) R
REFERENCES Sailer (S#) ON DELETE CASCADE, FOREIGN KEY (B#) REFERENCES Boat (B#) ON DELETE CASCADE)
Finished creating tables
Creation all done
[fedora@OracleVM ~]$
```

2. Use Dynamic SQL method 2 to interactively populate the tables as shown below. (10 marks: P1Q2.pc 5, screenshot 5)

```
[fedora@OracleVM ~]$ ./P2Q2
Connected to ORACLE
There are 3 tables in this db:
1. Sailer
2. Boat
3. Reservation

Please enter number 1, 2 or 3 to select a table or enter q to quit.
1
S#:
S1
Name:
Smith
Age:
20
('q' to quit Sailer table else, other key to continue.)
q
There are 3 tables in db:
1. Sailer
2. Boat
3. Reservation

Please enter a number 1, 2 or 3 to select a table or q to quit.
2
B#:
B1
Name:
Freedom
Color:
Blue
'q' to quit Boat table else, other key to continue.
q
There are 3 tables in db:
1. Sailer
2. Boat
3. Reservation

Please enter a number 1, 2 or 3 to select a table or q to quit.
3
S#:
S1
B#:
B1
Date(1-Jan-15):
1-Jan-15
'q' to quit Reservation table else, other key to continue.)
q
There are 3 tables in db:
1. Sailer
2. Boat
3. Reservation

Please enter a number 1, 2 or 3 to select a table or q to quit.
q
Insertion done!
```

3. Use Dynamic SQL method 3 to list all sailer rows, in S# order. Each sailer row should be immediately followed in the listing by all boat rows for boats the sailer reserves, in B# order as shown below. (15 marks: Lastname not changed 0, P1Q3.pc 5, screenshot 10)

```
[fedora@OracleVM ~]$ ./P3Q3
Connected to ORACLE
```

S#	Name	Age
S1	Smith	20

B#	Name	Color
B1	Freedom	Blue
B2	Paradise	Green
B3	Miracle	Red

Sample

S#	Name	Age
S2	Jones	30

B#	Name	Color
B1	Freedom	Blue
B2	Paradise	Green

S#	Name	Age
S3	Lastname	25

B#	Name	Color
B1	Freedom	Blue

4. Use Dynamic SQL method 4 to allow the user to type algebra query operations *project* and *select* to query the database. Your program should display proper error message using explicit error handling. Take the screenshots for the following queries: (20 marks: P1Q4.pc 10, screenshot 10)
- project name, age (sailer)
 - project name, color (boat)
 - project age (boat)
 - select name='Lastname' (sailer)
 - select age > 20 (sailer)
 - select age > 20 (boat)

5. Use PL/SQL program to redo question 3. Your program should contain a cursor for sailers and a parameterized cursor for boats. (10 marks: P1Q5 5, screenshot 5)

Part 2 (40 Marks)

1. (10 Marks) Consider the following relation. Which of the following functional dependencies may hold in this relation? If the dependency cannot hold, explain why by specifying the tuples that cause the violation.

(a) $A \rightarrow B$

(b) $B \rightarrow C$

(c) $C \rightarrow B$

(d) $B \rightarrow A$

(e) $C \rightarrow A$

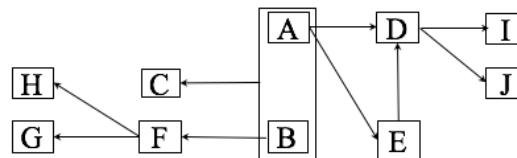
A	B	C
10	b1	c1
10	b2	c2
11	b4	c1
12	b3	c4
13	b1	c1
14	b3	c4

2. (10 Marks) Given a database consisting of one first normal form relation FIRST with attributes $\{A, B, C, D, E, F, G, H, I, J\}$ and the functional dependencies as well as the dependency diagram as follows:

FIRST	A	B	C	D	E	F	G	H	I	J
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Functional Dependencies $\{AB \rightarrow C, A \rightarrow DE, B \rightarrow F, E \rightarrow D, F \rightarrow GH, D \rightarrow IJ\}$

Dependency Diagram



- (a) What is the key for FIRST? (2 marks)
- (b) Normalize FIRST into second normal form by giving the relation names, their attributes with primary keys underscored and foreign keys pointing to the corresponding attributes properly and its dependency diagrams as showing above (4 marks).
- (c) Normalize the result in the second question into the third normal form by giving the relation names, their attributes with primary keys underscored and foreign keys pointing to the corresponding attributes properly and its dependency diagrams as showing above (4 marks).

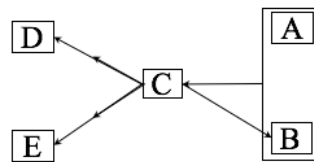
3. (10 Marks) Repeat the questions in Part 2 for the following different set of functional dependencies: $\{AB \rightarrow C, BD \rightarrow EF, AD \rightarrow GH, A \rightarrow I, H \rightarrow J\}$.
4. (10 marks) Given a database consisting of one first normal form relation SECOND with attributes A, B, C, D, E, and the functional and multi-valued dependencies as well as the functional and the multi-valued dependency diagram as follows:

SECOND	A	B	C	D	E
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Functional Dependencies $\{AB \rightarrow C, C \rightarrow B\}$

Multivalued Dependencies $\{C \twoheadrightarrow D, C \twoheadrightarrow E\}$

Dependency Diagram



1. What is the key for SECOND? (2 marks)
2. What is the highest normal form this relation is in? (2 marks)
3. Normalize the relation into BCNF by giving its relation names, their attributes with primary keys underscored and foreign keys pointing to the corresponding attributes properly and its dependency diagrams as showing above (3 marks).
5. Normalize the result in the third question into the fourth normal form by giving its relation names, their attributes with primary keys underscored and foreign keys pointing to the corresponding attributes properly and its dependency diagrams as showing above (3 marks).