

MULTIMEDIA



UNIVERSITY

STUDENT ID NO

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MULTIMEDIA UNIVERSITY

FINAL EXAMINATION

TRIMESTER 2, 2016/2017

TIS3351 – Advanced Database
(All sections / Groups)

25th FEBRUARY 2017
2.30 pm – 4.30 pm
(2 hours)

INSTRUCTIONS TO STUDENTS

1. This question paper consists of 6 pages, including the cover page, with four questions only.
2. Attempt **ALL** questions. All questions carry equal marks and the distribution of the marks for each question is given.
3. Please print all your answers in the answer booklet provided.

The following is a relational schema of a Project Assignment module. The primary key for all the relations are underlined and the foreign keys are in *italic*.

EMPLOYEE (EmpID, EmpName, EmpDateJoin, Salary, *PosID*)

POSITION (PosID, PosDescription, PosChargePerHour)

PROJECT (ProjID, ProjDescription, ProjStartDate, ProjEndDate, *LocID*)

LOCATION (LocID, LocName)

ASSIGNMENT (AsgID, AsgDate, *EmpID*, *ProjID*, AsgStatus, Hours, *BillNo*)

BILLING (BillNo, BillDate, TotalCost)

Based on the relational schema above, answer Questions 1 to 3.

Question 1 [10 marks]

- a) Assumed that tables EMPLOYEE, PROJECT and BILLING have been created, write the SQL command to create table ASSIGNMENT. The data types or constraints of the table are shown below:

Attribute	Data Type / Constraint
AssgID	Identity column with the starting value of 100, and increased by 1 for each new row entered.
AsgDate	The date when the assignment is assigned. Default to the CURRENT Date.
EmpID	The ID of the employee. Should not accept any null value.
ProjID	The ID of the project. Should not accept any null value.
AsgStatus	The status of the Assignment. Ensure that it falls within the followings: New, InProgress, Completed, Terminated.
Hours	The number of hours that an employee is involved in the particular project. Default to 1 and should not accept any null value.
BillNo	The billing number.

The SQL command must include the entity and referential integrity constraints.
[3 marks]

Continued...

- b) Write a SQL command to list all the employee names, employee position description, and also the associated project description, assigned with the Assignment Status 'new' in the month of January 2017.
[2 marks]
- c) Create a view to count the number of project grouped by location name.
[2 marks]
- d) Write a trigger to update the column TotalCost in the BILLING table based on the ChargePerHour multiple by Hours involved in the ASSIGNMENT whenever a new record is inserted.
[3 marks]

Question 2 [10 marks]

A data warehouse is created to record the hours that employee work on a given assignment. The table below shows some sample records in the fact table.

Fact Table - WORKLOG

<u>TimeID</u>	<u>EmpID</u>	<u>ProjID</u>	<u>BillNo</u>	<u>LocID</u>	Hours
11/1/17	E1002	P1001	B1234X	L001	12
11/1/17	E1002	P1002	B1234X	L001	12
14/1/17	E1001	P1001	B1111	L003	4
14/1/17	E1001	P1003	B1111	L003	4
14/1/17	E1001	P1005	B1111	L003	4
23/1/17	E1001	P1005	N1234X	L004	8
25/1/17	E1003	P1004	B1234X	L005	6

- a) Based on the fact table given above, draw the **star schema** for the data warehouse, including the dimension tables. Include the appropriate attributes in the dimension tables.
[4 marks]

Continued...

- b) Assume there are 100 records in each of the four dimension tables. Calculate the size of the fact table in terms of number of rows. [1 mark]
- c) Calculate also the size of the fact table in terms of bytes. Assume that there are six fields in the fact table with average of four bytes per field. [1 mark]
- d) Based on the WORKLOG fact table, illustrate the WORKSHEET relation in temporal database. The Employee are identified by *EmpID*, Project are identified by *ProjID*, while the number of hours are indicated in integer.
- On 11th January, employee E1002 worked on project P001 for 12 hours
 - On 12th January, employee E1002 worked on project P002 for 6 hours
 - From 14th January to 16th January, employee E1001 worked on project P001 for 22 hours.

Illustrate the WORKSHEET relation graphically.

[3 marks]

- e) Define temporal data.

[1 mark]

Question 3 [10 marks]

- a) The Company has implemented Distributed database in their three subsidiaries to enable employee from various unit involved in the Project Assignment. The top management requires information from the BILLING table to be distributed based on distribution as shown in the table below, where SL1 is the headquarter:

Fragment Name	Location	Node Name
BILLING_TB_1a	Selangor	SL1
BILLING_TB_1b	Selangor	SL2
BILLING_TB_2	Johor	JB1
BILLING_TB_3	Pahang	PH1

The database is divided by location and support local mapping transparency. Write a query to list all the bills where the billing cost (BillCost) is more than five thousand in the first quarter of the year 2016 from Selangor.

[2 marks]

Continued...

- b) Supposed that the EMPLOYEE table is divided into two fragments E1 and E2, located at sites SL1 and JB1 respectively. Specify the minimum types of operations the database must support to perform the following operations at the node SL1 (headquarter).

a. SELECT * from E2;

b. UPDATE Employee SET Salary = Salary *1.10

[2 marks]

- c) Draw the object representation for EMPLOYEE should the company intend to migrate to Object-oriented database. [1 mark]

- d) Lock granularity refers to the size of the database object that a single lock is placed upon. List and describe ANY FOUR different levels of lock granularity? [2 marks]

- e) Below is the snapshot on the SQL codes to represent the transactions, whereby BEGIN TRANSACTION and COMMIT are used to group the SQL statements in logical transactions.

On June 11, 2016, customer '10010' makes a credit purchase (60 days) of one unit of product '11QER/31' with a unit price of RM110.00.

1. BEGIN TRANSACTION
2. INSERT INTO INVOICE
VALUES (10983, '10010', '2016-06-11', 110.00, '60');
3. UPDATE PRODUCT
SET P_QTYOH = P_QTYOH - 1
WHERE P_CODE = '11QER/31';
4. UPDATE CUSTOMER
SET CUS_DATESUP = '2016-06-11', CUS_BALANCE =
CUS_BALANCE +110.00
WHERE CUS_CODE = '10010';
5. COMMIT;

Continued...

Create a transaction log (using the format below) to represent the actions of the transactions.

TRL ID	TRX NUM	PREV PTR	NEXT PTR	OPERATION	TABLE	ROW ID	ATTRIBUTE	BEFORE VALUE	AFTER VALUE

[3 marks]

Question 4 [10 marks]

- a) Convert the following ORDER table into XML Version 1.0 representation.

[2 marks]

Table name: Order

Order No	Order Date	CustomerName	TotalPrice
301-1617	2016-12-14	Billy Bob	55.5
100-1415	2017-01-20	Jane Marry	

- b) Represent the answer from (a) into node-labeled data tree.

[2 marks]

- c) Illustrate TWO examples of possible query with ancestor-descendant relationship based on the answer from (b).

[2 marks]

- c) In NoSQL database, how are the value components of a key-value database and a document database different?

[2 marks]

- d) Give an example of JSON (JavaScript Object Notation) file.

[1 mark]

- e) Differentiate between *scaling up* and *scaling out*.

[1 mark]

End of Page.