Quiz 01

Database Systems (CS 203)

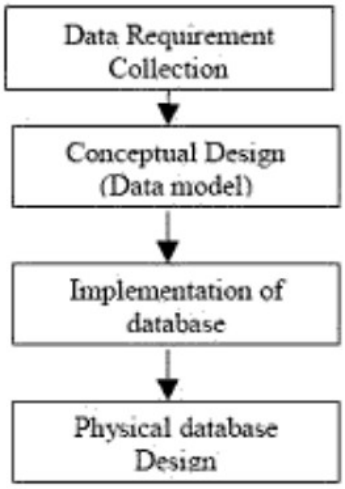
Dated: _____ Roll Number: _____ Sec:_____

Note: Total weightage is **2.5**. Time allowed is 30 minutes. Do not cheat.

Question #01: Define Data, Information, Database, Database Management System, and Database System. **(0.25)**

- **Database:**
  A collection of related data.
- **Data:**
  Known facts that can be recorded and have an implicit meaning.
- **Mini-world:**
  Some part of the real world about which data is stored in a database. For example, student grades and transcripts at a university.
- **Database Management System (DBMS):**
  A software package/ system to facilitate the creation and maintenance of a computerized database.
- **Database System:**
  The DBMS software together with the data itself. Sometimes, the applications are also included.

Question #02: Draw a diagram which shows the complete life cycle of a database application. **(0.25)**



Question #03: Highlight the major difference between a query and a transaction. **(0.25)**

Queries: that access different parts of data and formulate the result of a request

Transactions: that may read some data and "update" certain values or generate new data and store that in the database

Question #04: What is the main purpose of three-schema architecture? **(0.25)**

- **Program-data independence.**
- Support of **multiple views** of the data.

Question #05: Give any suitable example where centralized database architecture is preferred over client-server architecture. **(0.25)**

- Data integrity is maximized and data redundancy is minimised,[6] as the single storing place of all the data also implies that a given set of data only has one primary record. This aids in the maintaining of data as accurate and as consistent as possible and enhances data reliability.
- Generally bigger data security, as the single data storage location implies only a one possible place from which the database can be attacked and sets of data can be stolen or tampered with.
- Better data preservation than other types of databases due to often-included fault-tolerant setup.
- Easier for using by the end-user due to the simplicity of having a single database design.
- Generally easier data portability and database administration.
- More cost effective than other types of database systems as labor, power supply and maintenance costs are all minimized.
- Data kept in the same location is easier to be changed, re-organized, mirrored, or analyzed.
- All the information can be accessed at the same time from the same location.[7]
- Updates to any given set of data are immediately received by every end-user.

Question #06: Highlight the main difference between super key, key, candidate key and composite key. **(0.25)**

- Super key is the combination of attributes such that t1!=t2
- Minimal super key is a key.
- It is a secondary key as it has potential to be a primary key
- combination of more than one attribute such that t1!=t2

Question #7: Suppose that each of the following Update operations is applied directly to the database state shown in the figure given below. Discuss all integrity constraints violated by each operation, if any, and the different ways of enforcing these constraints **(1)**

a. Insert <'Robert', 'F', 'Scott', '943775543', '1972-06-21', '2365 Newcastle Rd, Bellaire, TX', M, 58000, '888665555', 1> into EMPLOYEE .

NO violation

b. Insert <'ProductA', 4, 'Bellaire', 2> into PROJECT .

Referential integrity

c. Insert <'Production', 4, '943775543', '2007-10-01'> into DEPARTMENT .

Referential+ key constraint violation

d. Insert <'677678989', NULL , '40.0'> into WORKS_ON .

Referential+ key constraint violation

e. Insert <'453453453', 'John', 'M', '1990-12-12', 'spouse'> into DEPENDENT .

NO violation

f. Delete the WORKS_ON tuples with Essn = '333445555'.

NO violation

g. Delete the EMPLOYEE tuple with Ssn = '987654321'.

Referential integrity

h. Delete the PROJECT tuple with Pname = 'ProductX'.

Referential integrity

i. Modify the Mgr_ssn and Mgr_start_date of the DEPARTMENT tuple with Dnumber = 5 to '123456789' and '2007-10-01', respectively.

NO violation

j. Modify the Super_ssn attribute of the EMPLOYEE tuple with Ssn = '999887777' to '943775543'.

Referential integrity

k. Modify the Hours attribute of the WORKS_ON tuple with Essn = '999887777' and Pno = 10 to '5.0'.

Referential integrity

EMPLOYEE

Fname	Minit	Lname	Ssn	Bdate	Address	Sex	Salary	Super_ssn	Dno
John	B	Smith	123456789	1965-01-09	731 Fondren, Houston, TX	M	30000	333445555	5
Franklin	T	Wong	333445555	1955-12-08	638 Voss, Houston, TX	M	40000	888665555	5
Alicia	J	Zelaya	999887777	1968-01-19	3321 Castle, Spring, TX	F	25000	987654321	4
Jennifer	S	Wallace	987654321	1941-06-20	291 Berry, Bellaire, TX	F	43000	888665555	4
Ramesh	K	Narayan	666884444	1962-09-15	975 Fire Oak, Humble, TX	M	38000	333445555	5
Joyce	A	English	453453453	1972-07-31	5631 Rice, Houston, TX	F	25000	333445555	5
Ahmad	V	Jabbar	987987987	1969-03-29	980 Dallas, Houston, TX	M	25000	987654321	4
James	E	Borg	888665555	1937-11-10	450 Stone, Houston, TX	M	55000	NULL	1

DEPARTMENT

Dname	Dnumber	Mgr_ssn	Mgr_start_date
Research	5	333445555	1988-05-22
Administration	4	987654321	1995-01-01
Headquarters	1	888665555	1981-06-19

DEPT_LOCATIONS

Dnumber	Dlocation
1	Houston
4	Stafford
5	Bellaire
5	Sugarland
5	Houston

WORKS_ON

Essn	Pno	Hours
123456789	1	32.5
123456789	2	7.5
666884444	3	40.0
453453453	1	20.0
453453453	2	20.0
333445555	2	10.0
333445555	3	10.0
333445555	10	10.0
333445555	20	10.0
999887777	30	30.0
999887777	10	10.0
987987987	10	35.0
987987987	30	5.0
987654321	30	20.0
987654321	20	15.0
888665555	20	NULL

PROJECT

Pname	Pnumber	Plocation	Dnum
ProductX	1	Bellaire	5
ProductY	2	Sugarland	5
ProductZ	3	Houston	5
Computerization	10	Stafford	4
Reorganization	20	Houston	1
Newbenefits	30	Stafford	4

DEPENDENT

Essn	Dependent_name	Sex	Bdate	Relationship
333445555	Alice	F	1986-04-05	Daughter
333445555	Theodore	M	1983-10-25	Son
333445555	Joy	F	1958-05-03	Spouse
987654321	Abner	M	1942-02-28	Spouse
123456789	Michael	M	1988-01-04	Son
123456789	Alice	F	1988-12-30	Daughter
123456789	Elizabeth	F	1967-05-05	Spouse

Good Luck