Technical University of Denmark

Department of Applied Mathematics and Computer Science

Test Assignment 02327 with Answers

The assignment will be conducted during the lecture hours on the 14. April 2020 from 10:00-10:20.
All aides are allowed.

No communication in any form with anybody regarding this exercise is allowed during the exercise.
For general questions you can call Flemming Schmidt at 2139 4525.

All individual exercise files returned will be tested for plagiarism.

Each assignment has a 10% weight in the mark, each sub assignment shows its weight.

Assignments

1. The relational model   10%

Write your answers in a studentnumber.pdf file, and write your studentnumber, full name and birthday on the first page.

Return the studentnumber.pdf file to DTU INSIDE, this course, file folder Assignments/Opgaver.

State relevant assumptions for your answers, if any are missing.

Feel free to answer the assignments in Danish, English or both.

Flemming Schmidt,
External Lecturer

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1. The relational model

1.1 3% Explain how a Database Engineer would describe the data below.

```
mysql> SELECT * FROM Students;
+--------+----------+------------+------------+------------+
| StudID | StudName | Birth      | DeptName   | TotCredits |
+--------+----------+------------+------------+------------+
| 00128  | Zhang    | 2000-04-18 | Comp. Sci. |        102 |
| 12345  | Shankar  | 2003-12-06 | Comp. Sci. |         32 |
| 19991  | Brandt   | 2001-05-24 | History    |       NULL |
| 23121  | Chavez   | 2000-04-18 | Finance    |        110 |
| 44553  | Peltier  | 2003-10-18 | Physics    |         56 |
| 45678  | Levy     | 2002-08-01 | Physics    |         46 |
+--------+----------+------------+------------+------------+
```

Answer:

A Database Engineer would write: A Students table exist with 5 attributes named StudID, StudName, Birth, DeptName and TotalCredits and with 6 rows, each representing a student entity. StudID is probably the only primary key attribute, making all rows unique. The Students table is at least in 3. Normal Form. Best guesses on domains/datatypes are that StudID is CHAR(5), StudName (VARCHAR(15), Birth DATE, DeptName VARCHAR(15) and TotCredits INTEGER, however other domains/datatypes are possible. DeptName will probably be a foreign key attribute referencing a departments table. TotCredits accepts a NULL value for a not existing or unknown value.

1.2 2% Explain Domains and the use of NULL values using the Students table.

Answer:

Values for an Attribute are taken from a Domain, which defines all legal Attribute values.
For instance, the Domain for StudName consists of 7 character strings, Birth is Dates, and TotCredits is Integers. A NULL value is an Attribute value used for a not existing value or an unknown value.
For instance, the Student Brandt has a not existing or unknown TotCredits defined as NULL.

1.3 1% Explain the concept of a Super Key, Candidate Key and Primary Key.

Answer:

A Super Key is a set of Attribute values that uniquely determines a row in a table (and also points to a unique entity or relationship in the real world).
A Candidate Key is a minimal Super Key, the minimal set of Attributes that uniquely determines a row in a table.
A Primary Key is a Candidate Key selected by the Database Designer.

1.4 3% Explain the concept and value of Foreign Keys using the Students table and assuming a Departments table exists.

Answer:

Attribute DeptName is a Foreign Key in the table Student referencing the Attribute DeptName and Primary Key in the table Departments. Only department names that exist in table Departments can be inserted into Students. If a departments name is changed in table Departments the DBMS will automatically change all instances of the department name in the referencing tables. If a department name is deleted in table Departments then either rows can be deleted in the referencing tables or the value can be set to NULL.

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1.5 1% Describe and explain the Table Schema and Table Instance for table Students.

Answer:

A Table Schema defines a Table name, Attribute names and Primary Key Attributes.

Like: Students(StudID, StudName, Birth, DeptName and TotCredits).

A Table Instance is the contents of a table at a given specific time, like the table shown in 1.1.

END

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