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Normalisation.doc

4.2 Normalisation 4.2.1 Database Design Examine the following database (consisting of one table) that was designed to store the following information:

- Student ID
- Student Name
- Student Dob
- Modules Student is studying

Students *can enroll* in the college *before deciding* which *modules* to take, and *not all modules* are *offered each year*.

The following database, consisting of one table with the **primary key** = studentID and moduleID, was designed.

Give your opinion, using examples from the data below, on whether or not the current database is good or bad.

studentID*	studentName	dob	moduleID*	moduleName
1	Sean	2000-01-03	100	Applied Databases
2	Bill	1990-04-23	100	Applied Databases
3	Tom	1973-12-10	101	Java Programming
3	Tom	1973-12-10	104	Mobile Apps
4	Mary	1991-04-12	101	Java Programming
4	Mary	1991-04-12	102	Computer Architecture
5	Joe	1982-06-29	100	Applied Databases
5	Joe	1982-06-29	104	Mobile Apps Table

Discussion

The database design above is not good.

- The student details are duplicated for every subject taken
- Students cannot enroll without selecting subjects as the moduleID field is a required field.
- Subject details are duplicated for every student taking the same subject.
- There is not way to limit the subject for a given year

A better design for above scenario would be a database with at a table containing student information and a table for subject information. Since all modules are not offered each year there should probably be a table to indicate what is available every year as well. Then lastly a table to indicate subject taken by students referenced from the subject and students tables.

Student Table

The following minimum columns should be in the student table.

studentID*	StudentName	dob
1	Sean	2000-10-03
2	Bill	1990-04-23

studentID*	StudentName	dob
3	Tom	1973-12-10
4	Mary	1991-04-12
5	Joe	1982-06-29

Possible extensions to this table.

- Enrollment status
- Progress levels, like undergraduate etc.

Module Table

At the minimum the modules table should include these fields

moduleID*	moduleName
100	Applied Databases
101	Java Programming
102	Computer Architecture
103	*Unavailabe Subject*
104	Mobile Apps

Possible extensions to the table

- prerequisites to the subject
- graduate levels etc
- module credits

Available Subjects by year

idx*	year	subject
1	2019	100
2	2019	101
3	2019	102
4	2019	104

This table simply lists subjects available for a given year by inserting a year and subject id into the table. This information can the be used for the selection criteria query when subjects are selected by students for a given year.

Sujects selected by student

idx*	Student	Subject
1	1	100
2	2	100
3	3	101
4	3	104

idx*	Student	Subject
6	4	102
7	5	100
8	5	104

The student and subject fields will have foreign key constraints applied to ensure only valid students and subjects are entered in the table. Another constraint on entering data in the table might be to check the availability criteria of the subject chosen.

The last table simply list the selections by student ID against subject ID. It should probably have a flag column to indicate when a subject was completed. Another possible field to add would be credits obtained on completion.

Possible table extensions:

- Subject completed
- Credits obtained

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