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# Database Technology– FSS 2018

## Exercise 2: SQL Part 1

### 2.1. SQL queries using university database

1. Start the XAMPP Control Panel and start MySQL/MariaDB and Apache
2. Open your Browser and browse to http://localhost/phpmyadmin
3. Click on the SQL tab and formulate SQL queries (using the university database) for the following tasks:
   a. Find the highest salary of any instructor.
   b. Find the titles of courses in the Comp. Sci. department that have 3 credits.
   c. Find the IDs of all students who were taught by an instructor named Einstein; make sure there are no duplicates in the result.
   d. Find the enrollment of each section that was offered in Spring 2009.
   e. Find all instructors earning the highest salary (there may be more than one with the same salary).
   f. Find the maximum enrollment, across all sections, in Spring 2009.
   g. Find the sections that had the maximum enrollment in Spring 2009.
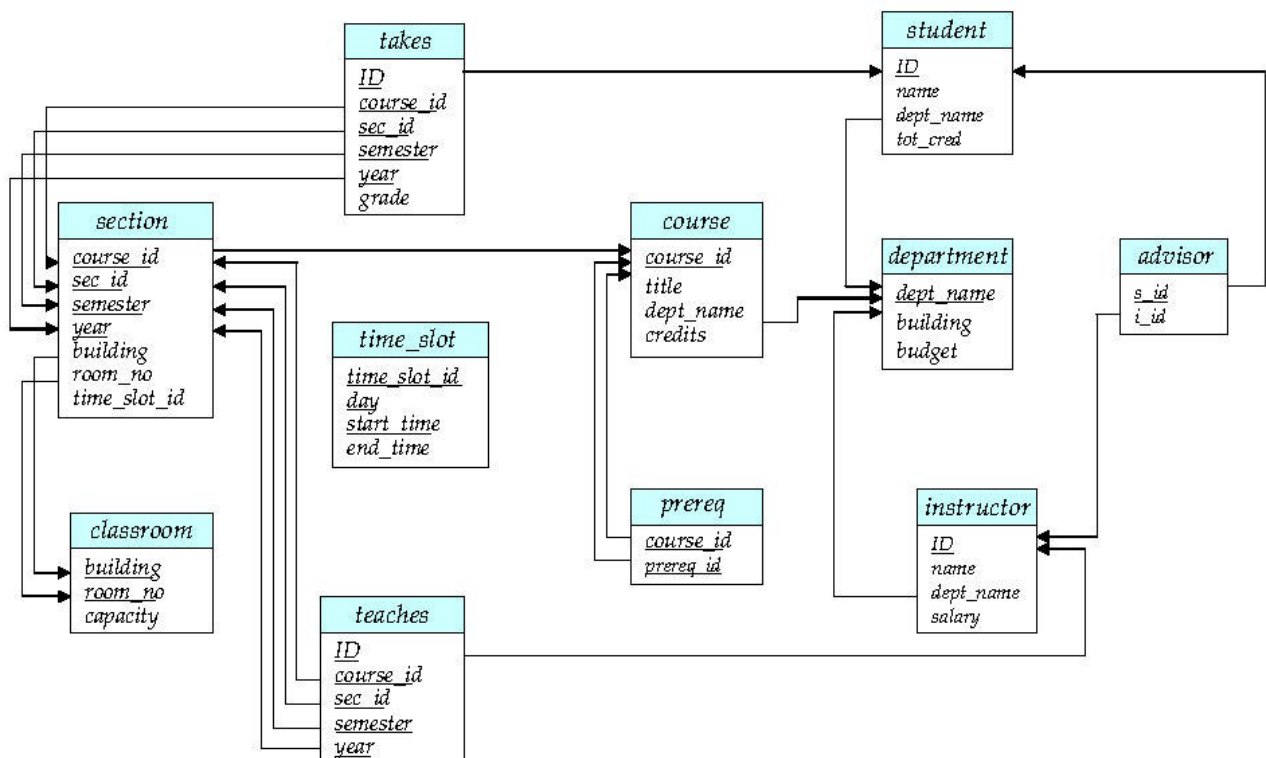
## 2.2. SQL DDL using university schema

Write SQL DDL for the following tables in the university schema. Make any reasonable assumptions about data types, and be sure to declare primary and foreign keys.

a. department
b. course
c. instructor
d. time_slot

## 2.3. SQL Like

The SQL "like" operator is case sensitive, but the lower() function on strings can be used to perform case insensitive matching. To show how, write a query that finds departments whose names contain the string "sci" as a substring, regardless of the case.

## 2.4. Cartesian Product

Consider the SQL query

```
SELECT p.a1
FROM p, r1, r2
WHERE p.a1 = r1.a1 or p.a1 = r2.a1
```

Under what conditions does the preceding query select values of p.a1 that are either in r1 or in r2? Examine carefully the cases where one of r1 or r2 may be empty.

## 2.5. Relational algebra

Consider the following relational database. Give an expression in SQL for each of the queries.

employee (employee_name, street, city)
works (employee_name, company_name, salary)
company (company_name, city)
manages (employee_name, manager_name)

a. Find the names and cities of residence of all employees who work for First Bank Corporation.
b. Find the names, street addresses, and cities of residence of all employees who work for First Bank Corporation and earn more than $10,000.
c. Assume that the companies may be located in several cities. Find all companies located in every city in which Small Bank Corporation is located.
d. Find the company that has the most employees.
e. Find those companies whose employees earn a higher salary, on average, than the average salary at First Bank Corporation.
f. Find all employees in the database who do not work for First Bank Corporation.
g. Find all employees in the database who earn more than each employee of Small Bank Corporation.