Database Management Systems

Project 1

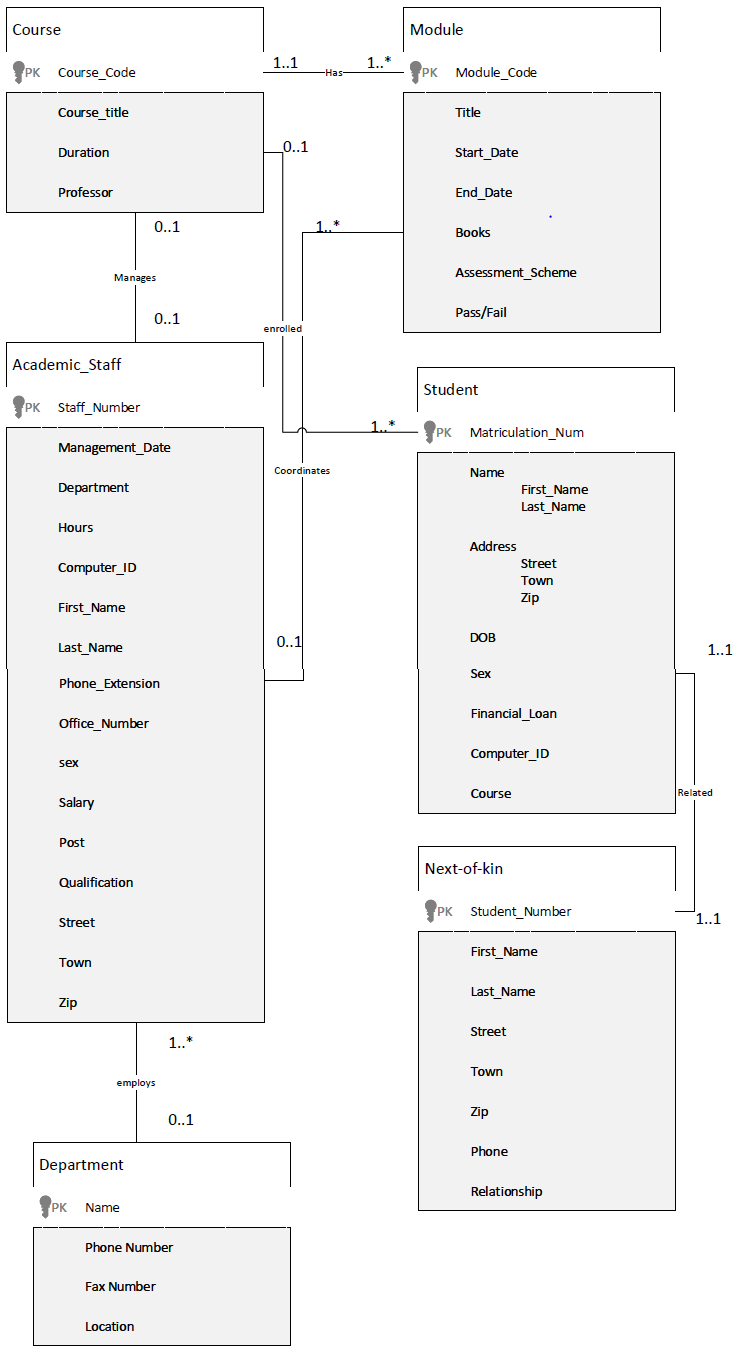
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# Entity-Relationship Diagram



# Schemas

Department

|  |  |  |  |
| --- | --- | --- | --- |
| **Name** | Phone\_Number | Fax\_Number | Location |

Academic\_Staff

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **Staff\_Number** | Management\_Date | Department | Hours | Computer\_ID | First\_Name | |
|  | Last\_Name | Phone\_extension | Office\_Number | Sex | Salary |
|  | Post | Qualification | Street | Town | Zip |

Course

|  |  |  |  |
| --- | --- | --- | --- |
| **Course\_Code** | Course\_title | Duration | Professor |

Student

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Matriculation\_Num** | Name | Address | DOB | Sex |
|  | Financial\_Loan | Computer\_ID | Course |  |

Next-of-kin

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Student\_Number** | First\_Name | Last\_Name | Street | Town |
|  | Zip | Phone | Relationship |  |

Module

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Module\_Code** | Title | Start\_Date | End\_Date | Books {FK} |
|  | Assessment\_Scheme | Pass/Fail |  |  |

# SQL: Create Table Statements

-- ADDRESS COMPOSITE ATTRIBUTE --

CREATE TABLE Student\_Address (

Street VARCHAR(20) NOT NULL,

Town VARCHAR(10) NOT NULL,

Zip VARCHAR(5) NOT NULL,

PRIMARY KEY(Street)

)

-- STUDENT NAME COMPOSITE ATTRIBUTE --

CREATE TABLE Student\_Name (

First\_Name VARCHAR(15) NOT NULL,

Last\_Name VARCHAR(15) NOT NULL,

PRIMARY KEY(First\_Name)

)

-- BOOKS MULTIVALUED ATTRIBUTE TABLE --

CREATE TABLE Books (

Book\_Name VARCHAR(100) NOT NULL,

PRIMARY KEY(Book\_Name)

)

-- MODULE TABLE --

CREATE TABLE Module (

Module\_Code VARCHAR(10) NOT NULL,

Title VARCHAR(20) NOT NULL,

[Start\_Date] datetime NOT NULL,

End\_Date datetime NOT NULL,

Books VARCHAR(100) NOT NULL,

Assessment\_Scheme INT NOT NULL,

PassFail VARCHAR(100) NOT NULL,

PRIMARY KEY(Module\_Code),

FOREIGN KEY(Books) REFERENCES Books

)

-- DEPARTMENT TABLE --

CREATE TABLE Department(

Name VARCHAR(15) NOT NULL,

Phone\_Number VARCHAR(15),

Fax\_Number VARCHAR(15),

Location VARCHAR(50) NOT NULL,

PRIMARY KEY(Name)

)

-- ACADEMIC STAFF TABLE --

CREATE TABLE Academic\_Staff (

Staff\_Number VARCHAR(100) NOT NULL,

Management\_Date datetime,

Department VARCHAR(15) NOT NULL,

[Hours] INT,

Computer\_ID VARCHAR(10),

First\_Name VARCHAR(20) NOT NULL,

Last\_Name VARCHAR(20) NOT NULL,

Phone\_Extension INT,

Office\_Number VARCHAR(5) NOT NULL,

sex CHAR NOT NULL,

Salary INT NOT NULL,

Post VARCHAR(50) NOT NULL,

Qualification VARCHAR(100),

Street VARCHAR(20) NOT NULL,

Town VARCHAR(10) NOT NULL,

Zip VARCHAR(5) NOT NULL,

PRIMARY KEY(Staff\_Number),

FOREIGN KEY(Department) REFERENCES Department

)

-- COURSE TABLE --

CREATE TABLE Course (

Course\_Code VARCHAR(10) NOT NULL,

Course\_title VARCHAR(50) NOT NULL UNIQUE,

Duration INT NOT NULL,

Professor VARCHAR(100)NOT NULL,

PRIMARY KEY(Course\_Code),

FOREIGN KEY(Professor) REFERENCES Academic\_Staff

)

-- NEXT-OF-KIN TABLE --

CREATE TABLE NextOfKin (

Student\_Number INT NOT NULL,

First\_Name VARCHAR(15) NOT NULL,

Last\_Name VARCHAR(15) NOT NULL,

Street VARCHAR(20) NOT NULL,

Town VARCHAR(15) NOT NULL,

Zip VARCHAR(5) NOT NULL,

Phone VARCHAR(15) NOT NULL,

Relationship VARCHAR(20) NOT NULL

PRIMARY KEY(Student\_Number)

)

-- STUDENT TABLE --

CREATE TABLE Student(

Matriculation\_Num INT NOT NULL,

Name VARCHAR(15) NOT NULL,

[Address] VARCHAR(20) NOT NULL,

DOB datetime NOT NULL,

Sex CHAR NOT NULL,

Financial\_Loan INT,

Computer\_ID INT,

Course VARCHAR(10),

PRIMARY KEY(Matriculation\_Num),

FOREIGN KEY(Name) REFERENCES Student\_Name,

FOREIGN KEY([Address]) REFERENCES Student\_Address,

FOREIGN KEY(Course) REFERENCES Course,

FOREIGN KEY(Matriculation\_Num) REFERENCES NextOfKin

)

# SQL: Database Population. Examples of insert statements into each table

INSERT INTO Department (Name, Phone\_Number, Fax\_Number, Location) VALUES

('CIS','605 392 3800','605 833 2901','Mclaury'),

('Math','605 392 3802','605 833 2903','Mclaury'),

('ME','605 392 3802','605 833 2903','Mechanical');

INSERT INTO Academic\_Staff VALUES

('1','20120618 10:34:09 AM', (SELECT Name FROM Department WHERE Name='CIS'), 3, '1', 'Larry', 'Pyeatt', 215,'215','M',20,'associate professor','PhD','123 street','Rapid City','57701'),

('2','20120618 10:34:01 AM', (SELECT Name FROM Department WHERE Name='Math'), 8,'2','Roger','Schrader',214,'214','M',21,'lecturer','MS','124 street','Rapid City','57701'),

('3','20120618 10:34:02 AM', (SELECT Name FROM Department WHERE Name='CIS'), 6,'3','Mengyu','Qiao',213,'213','M',99,'assistant professor','PhD','125 street','Rapid City','57701'),

('4','20120618 10:34:03 AM', (SELECT Name FROM Department WHERE Name='Math'), 4,'4','Paul','Hinker',212,'212','M',23,'assistant professor','PhD','126 street','Rapid City','57701'),

('5','20120618 10:34:04 AM', (SELECT Name FROM Department WHERE Name='Math'), 5,'1','Antonette','Logar',211,'211','F',22,'department head','PhD','123 street','Rapid City','57701'),

('6','20120618 10:34:05 AM', (SELECT Name FROM Department WHERE Name='Math'), 9,'6','Reta','Davies',210,'210','F',23,'Senior lecturer','PhD','123 street','Rapid City','57701'),

('7','20120618 10:34:06 AM', (SELECT Name FROM Department WHERE Name='CIS'), 7,'7','Kyle','Riley',216,'216','M',26,'department head','PhD','123 street','Rapid City','57701');

INSERT INTO Course VALUES

('CSC 110','Intro to CSC', 1, (SELECT Staff\_Number FROM Academic\_Staff WHERE First\_Name='Reta' AND Last\_Name='Davies')),

('CSC 150','Computer Science 1', 1, (SELECT Staff\_Number FROM Academic\_Staff WHERE First\_Name='Kyle' AND Last\_Name='Riley')),

('CSC 250','Computer Science 2', 1, (SELECT Staff\_Number FROM Academic\_Staff WHERE First\_Name='Roger' AND Last\_Name='Schrader')),

('CSC 300','Data Structures', 1, (SELECT Staff\_Number FROM Academic\_Staff WHERE First\_Name='Paul' AND Last\_Name='Hinker')),

('CSC 314','Assembly', 1, (SELECT Staff\_Number FROM Academic\_Staff WHERE First\_Name='Larry' AND Last\_Name='Pyeatt')),

('CSC 372','Analysis of Algorithms', 1, (SELECT Staff\_Number FROM Academic\_Staff WHERE First\_Name='Antonette' AND Last\_Name='Logar')),

('CSC 470','Software Engineering', 1, (SELECT Staff\_Number FROM Academic\_Staff WHERE First\_Name='Paul' AND Last\_Name='Hinker')),

('CSC 484','DBMS', 1, (SELECT Staff\_Number FROM Academic\_Staff WHERE First\_Name='Mengyu' AND Last\_Name='Qiao'));

INSERT INTO Student\_Name VALUES

('Billy','Bob'),

('William','Johnson'),

('Tod','Ferguson'),

('Tyrell','Jones'),

('Sally','Rain'),

('Daniel','Hamburger'),

('Karen','Bower'),

('Jacob','Ty'),

('Brandon','Bob'),

('John','Johnson'),

('Ted','Ferguson'),

('Timmy','Jones');

INSERT INTO Student\_Address VALUES

('abc street','Rapid City','57701'),

('def street','Houston','82314'),

('ghi street','Dallas','89234'),

('jkl street','Kadoka','51234'),

('mno street','Wall','57123'),

('pqr street','Murdo','57832'),

('stu street','Rapid City','57701'),

('vwx street','Away','99999'),

('no street','Rapid City','57701'),

('yes street','Houston','82314'),

('maybe street','Dallas','89234'),

('ok street','Kadoka','51234');

INSERT INTO NextOfKin VALUES

('1234567','Bob','Billie','new street','town 1','12345', '111 555 1111','Sister'),

('2345678','Bob','Billie','new street','town 2','23424', '222 555 2222','Brother'),

('3456789','Luther','Gullie','new street','town 3','34153', '333 555 3333','Brother'),

('4567890','Brother','Bobby','new street','town 4','41335', '444 555 4444','Cousin'),

('5678901','Jeni','Hamburger','new street','town 1','12345','111 555 5555','Sister'),

('6789012','Jonny','Boy','new street','town 4','41335', '444 555 6666','Brother'),

('7890123','Isaac','Newton','new street','town 2','23424', '222 555 7777','Father'),

('8901234','Connie','Brown','new street','town 1','12345', '111 555 8888','Mother'),

('9999999','Bob','Billie','new street','town 1','12345', '111 555 1111','Sister'),

('8888888','Bob','Billie','new street','town 2','23424', '222 555 2222','Brother'),

('7777777','Luther','Gullie','new street','town 3','34153', '333 555 3333','Brother'),

('6666666','Brother','Bobby','new street','town 4','41335', '444 555 4444','Cousin');

INSERT INTO Student VALUES

(1234567,(SELECT First\_Name FROM Student\_Name WHERE First\_Name = 'Billy' AND Last\_Name = 'Bob'), (SELECT Street FROM Student\_Address WHERE Street = 'abc street' AND Town = 'Rapid City' AND Zip = '57701'),'19930618 10:34:00 AM','F',10000,1234567, 'CSC 110'),

(2345678,(SELECT First\_Name FROM Student\_Name WHERE First\_Name = 'William' AND Last\_Name = 'Johnson'), (SELECT Street FROM Student\_Address WHERE Street = 'def street' AND Town = 'Houston' AND Zip = '82314'), '19930218 10:32:00 AM','M',10000,2345678, 'CSC 110'),

(3456789,(SELECT First\_Name FROM Student\_Name WHERE First\_Name = 'Tod' AND Last\_Name = 'Ferguson'), (SELECT Street FROM Student\_Address WHERE Street = 'ghi street' AND Town = 'Dallas' AND Zip = '89234'), '19930318 10:33:00 AM','M',40000,3456789, 'CSC 110'),

(4567890,(SELECT First\_Name FROM Student\_Name WHERE First\_Name = 'Tyrell' AND Last\_Name = 'Jones'), (SELECT Street FROM Student\_Address WHERE Street = 'jkl street' AND Town = 'Kadoka' AND Zip = '51234'), '19930418 10:34:00 AM','M',35000,4567890, 'CSC 110'),

(5678901,(SELECT First\_Name FROM Student\_Name WHERE First\_Name = 'Sally' AND Last\_Name = 'Rain'), (SELECT Street FROM Student\_Address WHERE Street = 'mno street' AND Town = 'Wall' AND Zip = '57123'), '19930518 10:34:00 AM','F',45000,5678901, 'CSC 110'),

(6789012,(SELECT First\_Name FROM Student\_Name WHERE First\_Name = 'Daniel' AND Last\_Name = 'Hamburger'), (SELECT Street FROM Student\_Address WHERE Street = 'pqr street' AND Town = 'Murdo' AND Zip = '57832'), '19930618 10:36:00 AM','M',40000,6789012, 'CSC 110'),

(7890123,(SELECT First\_Name FROM Student\_Name WHERE First\_Name = 'Karen' AND Last\_Name = 'Bower'), (SELECT Street FROM Student\_Address WHERE Street = 'stu street' AND Town = 'Rapid City' AND Zip = '57701'), '19930718 10:37:00 AM','F',30000,7890123, 'CSC 110'),

(8901234,(SELECT First\_Name FROM Student\_Name WHERE First\_Name = 'Jacob' AND Last\_Name = 'Ty'), (SELECT Street FROM Student\_Address WHERE Street = 'vwx street' AND Town = 'Away' AND Zip = '99999'), '19930818 10:38:00 AM','M',20000,8901234, 'CSC 110'),

(9999999,(SELECT First\_Name FROM Student\_Name WHERE First\_Name = 'Brandon' AND Last\_Name = 'Bob'), (SELECT Street FROM Student\_Address WHERE Street = 'no street' AND Town = 'Rapid City' AND Zip = '57701'),'19930618 10:34:00 AM','F',10000,1234567, 'CSC 110'),

(8888888,(SELECT First\_Name FROM Student\_Name WHERE First\_Name = 'John' AND Last\_Name = 'Johnson'), (SELECT Street FROM Student\_Address WHERE Street = 'yes street' AND Town = 'Houston' AND Zip = '82314'), '19930218 10:32:00 AM','M',10000,2345678, 'CSC 110'),

(7777777,(SELECT First\_Name FROM Student\_Name WHERE First\_Name = 'Ted' AND Last\_Name = 'Ferguson'), (SELECT Street FROM Student\_Address WHERE Street = 'maybe street' AND Town = 'Dallas' AND Zip = '89234'), '19930318 10:33:00 AM','M',40000,3456789, 'CSC 110'),

(6666666,(SELECT First\_Name FROM Student\_Name WHERE First\_Name = 'Timmy' AND Last\_Name = 'Jones'), (SELECT Street FROM Student\_Address WHERE Street = 'ok street' AND Town = 'Kadoka' AND Zip = '51234'), '19930418 10:34:00 AM','M',35000,4567890, 'CSC 110');

INSERT INTO Books VALUES

('mod 11 book'),

('mod 12 book'),

('mod 13 book'),

('mod 14 book'),

('mod 15 book'),

('mod 16 book'),

('mod 17 book'),

('mod 18 book');

INSERT INTO Module VALUES

('11','mod 11','20170112 08:00:00 AM','20170508 08:00:00 AM',(SELECT Book\_Name FROM Books WHERE Book\_Name = 'mod 11 book'),70,'P'),

('12','mod 12','20170112 09:00:00 AM','20170508 09:00:00 AM',(SELECT Book\_Name FROM Books WHERE Book\_Name = 'mod 12 book'),70,'P'),

('13','mod 13','20170112 10:00:00 AM','20170508 10:00:00 AM',(SELECT Book\_Name FROM Books WHERE Book\_Name = 'mod 13 book'),70,'P'),

('14','mod 14','20170112 11:00:00 AM','20170508 11:00:00 AM',(SELECT Book\_Name FROM Books WHERE Book\_Name = 'mod 14 book'),70,'P'),

('15','mod 15','20170112 12:00:00 PM','20170508 12:00:00 PM',(SELECT Book\_Name FROM Books WHERE Book\_Name = 'mod 15 book'),70,'P'),

('16','mod 16','20170112 01:00:00 PM','20170508 01:00:00 PM',(SELECT Book\_Name FROM Books WHERE Book\_Name = 'mod 16 book'),70,'P'),

('17','mod 17','20170112 02:00:00 PM','20170508 02:00:00 PM',(SELECT Book\_Name FROM Books WHERE Book\_Name = 'mod 17 book'),70,'P'),

('18','mod 18','20170112 03:00:00 PM','20170508 03:00:00 PM',(SELECT Book\_Name FROM Books WHERE Book\_Name = 'mod 18 book'),70,'P');

# SQL: Assigned Queries

1. -- Query a; name, address, salary for each female

-- member of academic staff who manages a department

SELECT First\_Name, Last\_Name, Street, Town, Zip, Salary

FROM Academic\_Staff

WHERE Post = 'department head' AND sex = 'F'

1. -- Query b; name, sex, salary for each lecturer with a PhD

SELECT First\_Name, Last\_Name, Salary

FROM Academic\_Staff

WHERE Post LIKE '%lecturer%' AND Qualification = 'PhD'

1. -- Query c; forea course w/ >10 students, list title&number of studs

SELECT c.Course\_title as Course\_Name, count(\*) AS Count\_Students

FROM Student e

JOIN Course c

ON e.Course = c.Course\_Code

GROUP BY c.Course\_title

HAVING count(\*) > 10



-- Query d; List # of female and male members of academic staff

-- employed by CIS department

SELECT

SUM(CASE WHEN Academic\_Staff.sex = 'F' AND Department = 'CIS' THEN 1 ELSE 0 END) AS 'Female',

SUM(CASE WHEN Academic\_Staff.sex = 'M' AND Department = 'CIS' THEN 1 ELSE 0 END) AS 'Male'

FROM

Academic\_Staff



-- Query e; for a member of academic staff w/ >6 hours teaching any

-- module, list their last name, module title, and # of hours

Select Last\_Name, [Hours]

FROM Academic\_Staff AS a

WHERE a.Hours > 6

# SQL: Additional Queries



--List all male students --

--Could be used for counting male students, ordering in age for a seating chart, ordering in--

--age for programming examples/change of era--

SELECT Name

FROM Student

WHERE sex = 'M'

ORDER BY DOB



--list all male professors by salary--

--Competition to see who makes more, ordering of male professors by salary (lowest to highest) to see what a raise--

--across the male professors will cost--

SELECT First\_Name, Last\_Name, Salary

FROM Academic\_Staff

WHERE sex = 'M'

ORDER BY Salary



--List name, address, and salary for each male member of academic staff who manages a department--

SELECT First\_Name, Last\_Name, Street, Town, Zip, Salary

FROM Academic\_Staff

WHERE Post = 'department head' AND sex = 'M'



--Get a count of staff and student to get a student to staff to student ratio--

SELECT (

SELECT COUNT(\*)

FROM Academic\_Staff

) AS Staff,

(

SELECT COUNT(\*)

FROM Student

) AS Student

--Get all courses of Professors who live in Rapid City who won't get cancelled in a snow storm

SELECT c.Course\_title as 'Course'

FROM Academic\_Staff a

JOIN Course c

ON a.Staff\_Number = c.Professor AND a.Town LIKE 'Rapid City'

GROUP BY c.Course\_title

**EXTRA EXTRA QUERIES**

--Get names of all professors who work in Math Department that live in rapid city--

SELECT First\_Name, Last\_Name

FROM Academic\_Staff

WHERE Department='Math' AND Town='Rapid City'

--Find the Max Salary--

SELECT MAX(Salary) AS 'Salary'

FROM Academic\_Staff

--Find Professor with the greatest salary to help balance budget cuts--

SELECT First\_Name, Last\_Name

FROM Academic\_Staff

WHERE Salary IN

(SELECT MAX(Salary)

FROM Academic\_Staff)