Group Account: krc353_1

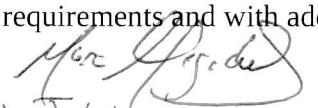
Faculty of Engineering and Computer Science
Expectations of Originality

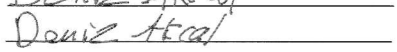
This form sets out the requirements for originality for work submitted by students in the Faculty of Engineering and Computer Science. Submissions such as assignments, lab reports, project reports, computer programs and take-home exams must conform to the requirements stated on this form and to the Academic Code of Conduct. The course outline may stipulate additional requirements for the course.

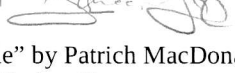
1. Your submissions must be your own original work. Group submissions must be the original work of the students in the group.
2. Direct quotations must not exceed 5% of the content of a report, must be enclosed in quotation marks, and must be attributed to the source by a numerical reference citation[1]. Note that engineering reports rarely contain direct quotations.
3. Material paraphrased or taken from a source must be attributed to the source by a numerical reference citation.
4. Text that is inserted from a web site must be enclosed in quotation marks and attributed to the web site by numerical reference citation.
5. Drawings, diagrams, photos, maps or other visual material taken from a source must be attributed to that source by a numerical reference citation.
6. No part of any assignment, lab report or project report submitted for this course can be submitted for any other course.
7. In preparing your submissions, the work of other past or present students cannot be consulted, used, copied, paraphrased or relied upon in any manner whatsoever.
8. Your submissions must consist entirely of your own or your group's ideas, observations, calculations, information and conclusions, except for statements attributed to sources by numerical citation.
9. Your submissions cannot be edited or revised by any other student.
10. For lab reports, the data must be obtained from your own or your lab group's experimental work.
11. For software, the code must be composed by you or by the group submitting the work, except for code that is attributed to its sources by numerical reference.

You must write one of the following statements on each piece of work that you submit:
For individual work: **"I certify that this submission is my original work and meets the Faculty's Expectations of Originality",** with your signature, I.D. #, and the date.
For group work: **"We certify that this submission is the original work of members of the group and meets the Faculty's Expectations of Originality",** with the signatures and I.D. #s of all the team members and the date.

A signed copy of this form must be submitted to the instructor at the beginning of the semester in each course.

I certify that I have read the requirements set out on this form, and that I am aware of these requirements. I certify that all the work I will submit for this course will comply with these requirements and with additional requirements stated in the course outline. Marc Hegedus 26242219 

Course Number: COMP 353 Instructor: Khaled Jababo
Name: Deniz Akcal I.D. # 26951978
Signature:  Date: August 12th 2019

Iana Belitchka 40032171 

[1] Rules for reference citation can be found in "Form and Style" by Patrich MacDonagh and Jack Bordan, fourth edition, May, 2000, available at http://www.encs.concordia.ca/scs/Forms/Form&Style.pdf.
Approved by the ENCS Faculty Council February 10, 2012

David-Etienne Pigeon 40068000 
Luiz Goncalves 26943799 
Liam Blount-Castonguay 4015 2713 

Main Project Report

Group ID: krc353_1

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COMP353

Instructor: Khaled Jababo

Concordia University

August 12th 2019

E/R DIAGRAM

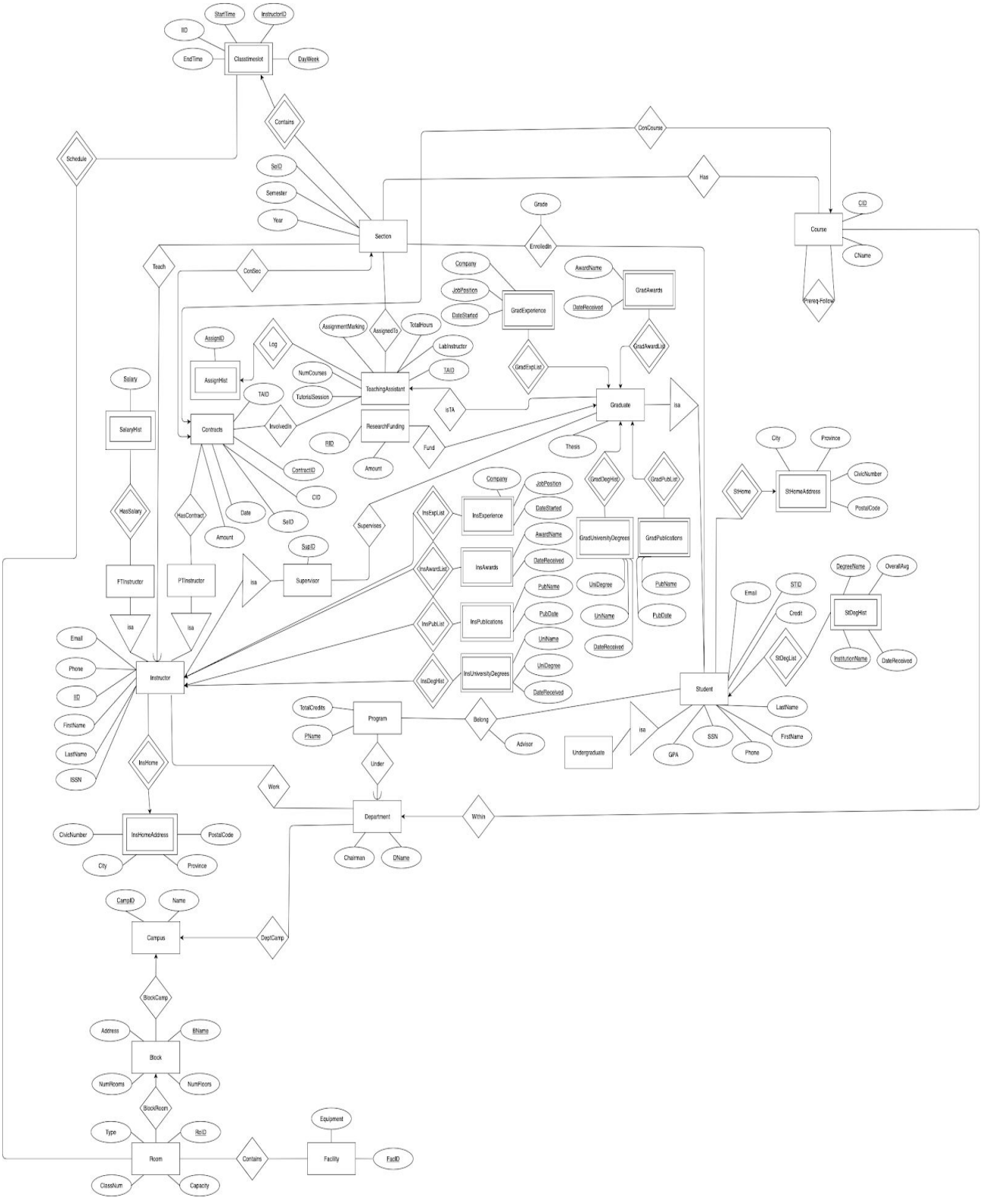


Figure 1: The Database E/R Diagram. A .JPEG of the E/R Diagram has been added for clarity in the .ZIP file.

E/R RELATION SCHEMA

```
create table AssignHist
(
	AssignID int,
	TAID int,
	primary key (AssignID, TAID),
	foreign key (TAID) references TeachingAssistant (TAID)
);

create table AssignTo
(
	SeID int,
	TAID int,
	primary key (SeID, TAID),
	foreign key (SeID) references Section (SeID),
	foreign key (TAID) references TeachingAssistant (TAID)
);

create table Belong
(
	STID int,
	PName char(30),
	Advisor char(30),
	primary key (STID, PName),
	foreign key (STID) references Student (STID),
	foreign key (PName) references Program (PName)
);

Create table Block
(
	BName char(30) primary key,
	Address varchar(30),
	NumFloors int,
	NumRooms int
);

create table BlockCamp
(
	CampID int,
	BName varchar(30) primary key,
	foreign key (BName) references Block (BName),
	foreign key (CampID) references Campus (CampID)
);
```

```
create table BlockRoom
(
	RoID int,
	BName varchar(30),
	primary key (BName, RoID),
	foreign key (BName) references Block (BName),
	foreign key (RoID) references Room (RoID)
);

create table Campus
(
	CampID Int Primary Key,
	Name char(30)
);

create table ClassTimeslot
(
	StartTime time,
	DayWeek varchar(30),
	SeID int,
	EndTime time,
	RoID int,
	primary key (StartTime, DayWeek, SeID, RoID),
	foreign key (RoID) references Room (RoID),
	foreign key (SeID) references Section (SeID)
);

create table Contains
(
	facID int,
	RoID int,
	primary key (facID, RoID),
	foreign key (facID) references Facility (facID)
	foreign key (RoID) references Room (RoID)
);

create table Contracts
(
	CID int,
	Date date,
	Amount float,
	SeID int,
	TAID int,
	ContractID int primary key,
	foreign key (CID) references Course (CID),
	foreign key (SeID) references Section (SeID)
);
```

```
create table Course
(
	CID int primary key,
	CName char(30)
);

create table Department
(
	DName char(30) primary key,
	Chairman char(30)
);

create table DeptCamp
(
	CampID int,
	DName varchar(30) primary key,
	foreign key (CampID) references Campus (CampID),
	foreign key (DName) references Department (DName)
);

create table EnrolledIn
(
	STID int,
	SeID int,
	Grade char(2),
	primary key (STID, SeID),
	foreign key (STID) references Student (STID),
	foreign key (SeID) references Section (SeID)
);

create table Facility
(
	equipment varchar(30),
	facID INT Primary key,
);

create table Fund
(
	STID int,
	RID int  primary key,
	foreign key (STID) references Graduate (STID),
	foreign key (RID) references ResearchFunding (RID)
);
```

```
create table FTInstructor
(
	IID int primary key,
	foreign key (IID) references Instructor (IID)
);

create table GradAwards
(
	AwardName char(30),
	DateReceived date,
	STID int,
	primary key (AwardName, DateReceived, STID),
	foreign key (STID) references Graduate (STID)
);

create table GradExperience
(
	JobPosition char(30),
	STID int,
	DateStarted date,
	Company varchar(30),
	primary key (JobPosition, Company, DateStarted, STID),
	foreign key (STID) references Graduate (STID)
);

create table GradPublications
(
	PubName char(30),
	PubDate date,
	STID int,
	primary key (STID, PubName, PubDate),
	foreign key (STID) references Graduate (STID)
);

create table Graduate
(
	STID int primary key,
	thesis int,
	foreign key (STID) references Student (STID)
);
```

```
create table GradUniversityDegrees
(
	UniDegree char(30),
	UniName char(30),
	DateReceived date,
	STID int,
	primary key (UniDegree, STID, UniName, DateReceived),
	foreign key (STID) references Graduate (STID)
);

create table Has
(
	CID int,
	SeID int primary key,
	foreign key (CID) references Course (CID),
	foreign key (SeID) references Section (SeID)
);

create table HasContract
(
	IID int,
	ContractID int,
	primary key (IID, ContractID),
	foreign key (ContractID) references Contracts (ContractID),
	foreign key (IID) references PTInstructor (IID)
);

create table InsAwards
(
	AwardName char(30),
	DateReceived date,
	IID int,
	primary key (AwardName, DateReceived, IID),
	foreign key (IID) references Instructor (IID)
);

create table InsExperience
(
	JobPosition varchar(30),
	DateStarted date,
	Company varchar(30),
	IID int,
	primary key (JobPosition, DateStarted, Company, IID),
foreign key (IID) references Instructor (IID)
);
```

```
create table InsHomeAddress
(
	City char(30),
	Province char(30),
	CivicNumber int,
	PostalCode int,
	IID int primary key,
	foreign key (IID) references Instructor (IID)
);

create table InsPublications
(
	PubName varchar(30),
	PubDate date,
	IID int,
	primary key (PubName, PubDate, IID),
	foreign key (IID) references Instructor (IID)
);

create table Instructor
(
	IID int primary key,
	ISSN int,
	Phone varchar(30),
	FirstName varchar(30),
	SupID int,
	Email varchar(30),
	LastName varchar(30),
	foreign key (SupID) references Supervisor (SupID)
);

create table IsTA
(
	STID int primary key,
	TAID int,
	foreign key (STID) references Graduate (STID)
	foreign key (TAID) references TeachingAssistant (TAID)
);

create table InsUniversityDegrees
(
	UniName varchar(30),
	UniDegree varchar(30),
	IID int,
	DateReceived date,
	primary key (UniName, UniDegree, DateReceived, IID),
	foreign key (IID) references Instructor (IID)
);
```

```
create table InvolvedIn
(
	ContractID int,
	TAID int,
	primary key (ContractID, TAID),
	foreign key (ContractID) references Contracts (ContractID)
	foreign key (TAID) references TeachingAssistant (TAID)
);

create table `PrereqFollow`
(
	CID1 int,
	CID2 int,
	primary key (CID1, CID2),
	foreign key (CID1) references Course (CID),
	foreign key (CID2) references Course (CID)
);

create table Program
(
	PName char(30) primary key,
	TotalCredits int
);

create table PTInstructor
(
	IID int primary key
);

create table ResearchFunding
(
	RID int primary key,
	Amount int
);

create table Room
(
	RoID int primary key,
	ClassNum int,
	Capacity int,
	Type varchar(30)
);
```

```
create table SalaryHist
(
	IID int primary key,
	Salary float primary key,
	foreign key (IID) references FTInstructor (IID)
);

create table Section
(
	SeID int primary key,
	Semester char(30),
	Year int,
	foreign key (instructorID) references Instructor (IID)
);

create table StDegHist
(
	DegreeName char(30),
	OverallAvg float,
	InstitutionName char(30),
	DateReceived date,
	STID int,
	primary key (DegreeName, InstitutionName, STID),
	foreign key (STID) references Student (STID)
);

create table StHomeAddress
(
	City char(30),
	Province char(30),
	CivicNumber int,
	PostalCode int,
	STID int primary key,
	foreign key (STID) references Student (STID)
);

create table Student
(
	STID int primary key,
	Credit int,
	FirstName char(30),
	LastName char(30),
	GPA float,
	SSN int,
	Phone varchar(30),
	Email varchar(30)
);
```

```
create table Supervises
(
	SupID int,
	STID int,
	primary key (STID, SupID),
	foreign key (STID) references Graduate (STID)
	foreign key (SupID) references Supervisor (SupID)
);


create table Supervisor
(
	SupID int primary key
);

create table Teach
(
	SeID int default,
	IID int default,
	primary key (IID, SeID),
	foreign key (IID) references Instructor (IID)
	foreign key (SeID) references Section (SeID)
);

create table TeachingAssistant
(
	TAID int primary key,
	TotalHours int,
	AssignmentMarking char,
	LabInstructor char,
	NumCourses int,
	TutorialSession char
);

create table Under
(
	DName char(30),
	PName char(30) primary key,
	foreign key (DName) references Department (DName),
	foreign key (PName) references Program (PName)
);

create table Undergraduate
(
	STID int primary key,
	foreign key (STID) references Student (STID)
);
```

```
create table Within
(
	CID int primary key,
	DName char(30),
	foreign key (DName) references Department (DName),
	foreign key (CID) references Course (CID)
);

create table Work
(
	DName varchar(30),
	IID int,
	primary key (DName, IID),
	foreign key (DName) references Department (DName),
	foreign key (IID) references Instructor (IID)
);
```

QUERIES

1)

INSERT INTO Instructor
VALUES(33, 100, ‘4186646637’, ‘Fabien’, 33, ‘Fabien@Junde.com’, ‘Junde’);

Output:
New tuple created:

33	100	41866446637	Fabien	33	fabien@Junde.com	Junde

DELETE FROM Instructor
WHERE IID = 33;

Output:
Tuple deleted.

UPDATE Instructor
SET LastName = ‘Funs’
WHERE IID = 33;

Output:
From creating, we get:

33	100	41866446637	Fabien	33	fabien@Junde.com	Funs

SELECT *
FROM Instructor;

Output:

```
mysql> mysql> select * from Instructor;
+-----+---------+------------+------------+-------+----------------------+------------+
| IID | ISSN    | Phone      | FirstName  | SupID | Email                | LastName   |
+-----+---------+------------+------------+-------+----------------------+------------+
|   1 |  901000 | 5141220000 | Lisa       |  NULL | lisa@cranterson.com  | Cranterson |
|   2 |  901001 | 5141220001 | Ernest     |     2 | ernest@steig.com     | Steig      |
|   3 |  901002 | 5141220002 | Melissa    |  NULL | melissa@roberts.com  | Roberts    |
|   4 |  901003 | 5141220003 | Jake       |     5 | jake@ralph.com       | Ralph      |
|   5 |  901004 | 5141220004 | Claire     |     1 | Claire@devons.com    | Devons     |
|   6 |  901005 | 5141220005 | Jeremy     |  NULL | jeremy@kudo.com      | Kudo       |
|   7 |  901006 | 5141220006 | Linda      |     3 | linda@torrents.com   | Torrents   |
|   8 |  901007 | 5141220007 | Jessica    |     8 | Jessica@stevenson.com| Stevenson  |
|   9 |  901008 | 5141220008 | Issac      |     5 | Isaac@harrison.com   | Harrison   |
|  10 |  901009 | 5141220009 | Nicholas   |     7 | Nicholas@larsen.com  | Larsen     |
|  11 |  901010 | 5141220010 | Christiano |  NULL | christiano@ronaldo.com| Ronaldo   |
|  12 |  901011 | 4184559000 | Bob        |     1 | bob@saggette.com     | Sagette    |
|  13 | 9010112 | 4184559001 | Kevin      |     1 | kevin@luu.com        | Luu        |
|  14 | 9010113 | 4184559002 | Kevin      |     8 | kevin@michel.com     | Michel     |
|  15 | 9010114 | 4380093300 | Davidoid   |  NULL | davidoid@junky.com   | Junky      |
|  16 | 9010115 | 4380093301 | Lola       |  NULL | lola@beefo.com       | Beefo      |
|  17 | 9010116 | 4380093302 | George     |     3 | Georgea@mooser.com   | Mooser     |
|  18 | 9010117 | 4380093303 | Eaton      |     6 | Eaton@joe.com        | Joe        |
|  19 | 9010118 | 4380093304 | Chem       |     6 | Chem@xenon.com       | Xenon      |
|  20 | 9010119 | 4380093305 | Xavier     |     6 | xavier@naura.com     | Naura      |
|  21 | 9010120 | 4380093306 | Natasha    |  NULL | natasha@britney.com  | Britney    |
+-----+---------+------------+------------+-------+----------------------+------------+
21 rows in set (0.00 sec)
```

2)

INSERT INTO Student
VALUES(56, 90, ‘Liam’, ‘Beaulieu’, 2.6, 120, ‘4185602233’, ‘Liam@Beaulieu.com’);

Output:

56	90	Liam	Beaulieu	2.6	120	4185602233	Liam@Beaulieu.com

DELETE FROM Student
WHERE STID = 56;

Output:
Tuple deleted.

UPDATE Student
SET FirstName = ‘David’
WHERE STID = 56;

Output:

56	90	David	Beaulieu	2.6	120	4185602233	Liam@Beaulieu.com

SELECT *
FROM Student;

Output:

```
mysql> select * from Student;
+------+--------+-----------+------------+------+---------+------------+-------------------------+
| STID | Credit | FirstName | LastName   | GPA  | SSN     | Phone      | Email                   |
+------+--------+-----------+------------+------+---------+------------+-------------------------+
|    1 |     90 | Felix     | Harris     |  3.1 |     453 | 5144443450 | felix@harrix.com        |
|    2 |     90 | James     | Watson     |    2 |    9536 | 5144443451 | james@watson.com        |
|    3 |     90 | Marcus    | Morris     |  2.7 |   86234 | 5144443452 | marcus@morris.com       |
|    4 |     90 | Johnny    | Howard     |  3.4 |   34986 | 5144443453 | johnny@howard.com       |
|    5 |     90 | John      | Smith      |  3.1 |     393 | 5144443454 | john@smith.com          |
|    6 |     44 | Phil      | Newton     |  2.1 |    9856 | 5144443455 | phil@newton.com         |
|    7 |     44 | Andrew    | Morrison   |    2 |   25806 | 5144443456 | andrew@morrison.com     |
|    8 |     44 | Mackenzie | Johnson    |  3.2 |     259 | 5144443457 | mackenzie@johnson.com   |
|    9 |     44 | Max       | Phillips   |    3 |    5274 | 5144443458 | max@phillips.com        |
|   10 |     44 | Linus     | Torvards   |    4 |    2494 | 5144443459 | linus@torvards          |
|   11 |     44 | Khaled    | Jababo     |    4 |     348 | 5144443460 | khaled@jababo.com       |
|   12 |     44 | Aiman     | Hanna      |    4 | 7238734 | 5144443461 | aiman@hanna.com         |
|   13 |     44 | Messi     | Lionel     |    1 |    1283 | 5144443462 | messi@lionel.com        |
|   14 |     44 | Luis      | Loni       |    3 |      19 | 5144443463 | luis@loni.com           |
|   15 |     44 | Goun      | Lio        |    2 |      18 | 5144443464 | goun@lio.com            |
|   16 |     44 | Harves    | Ri         |    2 |     171 | 5144443465 | harves@ri.com           |
|   17 |     44 | Jonathan  | Izzmifirtre|  3.9 |      16 | 5144443466 | jonathan@izzmifirtre.com|
|   18 |     44 | Nicolas   | Tabourette |  3.8 |    5744 | 5144443467 | nicolas@tabourette.com  |
|   19 |     44 | Nathan    | Mackinnon  |  3.8 |   54272 | 5144443468 | nathan@mackinnon.com    |
|   20 |     44 | Sydney    | Crosby     |    4 |    2576 | 5144443469 | sydney@crosby.com       |
|   21 |     44 | David     | Izzmifartre|  3.9 |     572 | 5144443470 | david@izzmifartre.com   |
|   22 |     44 | Poche     | Jigyuan    |    4 |     647 | 5144443471 | poche@jigyuan.com       |
|   23 |     44 | Larry     | Simpson    |  2.7 |      62 | 5144443472 | larry@simpson.com       |
|   24 |     44 | Foki      | Ruki       |    2 |      56 | 5144443473 | foki@ruki.com           |
|   25 |     44 | Smity     | Sam        |    4 |    6253 | 5144443474 | smity@sam.com           |
|   26 |     44 | Rawl      | Sol        |    3 |     236 | 5144443475 | rawl@sol.com            |
|   27 |     44 | Sara      | Flore      |    4 |       6 | 5144443476 | sara@flore.com          |
|   28 |     90 | Joey      | Looker     |  3.2 |      42 | 5144443477 | joey@looker.com         |
|   29 |     90 | Lucienne  | Bouchard   |  1.5 |     124 | 5144443478 | lucienne@bouchard.com   |
|   30 |     90 | Esmeralda | Bobo       |  2.7 |   76474 | 5144443479 | esmeralda@bobo.com      |
|   31 |     90 | Laurent   | Voyer      |  2.8 |    5633 | 5144443480 | laurent@voyer.com       |
|   32 |     90 | Eddey     | Boucher    |    3 |      63 | 5144443481 | eddey@boucher.com       |
+------+--------+-----------+------------+------+---------+------------+-------------------------+
32 rows in set (0.00 sec)
```

3)

INSERT INTO TeachingAssistant
VALUES(45, 200, ‘y’, ‘n’, 2,’y’);

Output:

45	200	y	n	2	y

DELETE FROM TeachingAssistant
WHERE TAID = 45;

Output:
Tuple deleted.

UPDATE TeachingAssistant
SET TotalHours = 259
WHERE TAID = 45;

Output:

45	259	y	n	2	y

SELECT S.FirstName, S.LastName, S.Email, S.Credit, S.GPA
FROM Student S INNER JOIN IsTA TA on TA.STID = S.STID
WHERE S.GPA > 3.2;

Output:

```
mysql> SELECT S.FirstName, S.LastName, S.Email, S.Credit, S.GPA
    -> FROM Student S INNER JOIN IsTA TA on TA.STID = S.STID
    -> WHERE S.GPA > 3.2;
+-----------+-------------+-------------------------+--------+------+
| FirstName | LastName    | Email                   | Credit | GPA  |
+-----------+-------------+-------------------------+--------+------+
| Smity     | Sam         | smity@sam.com           |     44 |    4 |
| Mackenzie | Johnson     | mackenzie@johnson.com   |     44 |  3.2 |
| Linus     | Torvards    | linus@torvards          |     44 |    4 |
| Poche     | Jigyuan     | poche@jigyuan.com       |     44 |    4 |
| Khaled    | Jababo      | khaled@jababo.com       |     44 |    4 |
| Sydney    | Crosby      | sydney@crosby.com       |     44 |    4 |
| Aiman     | Hanna       | aiman@hanna.com         |     44 |    4 |
| Nathan    | Mackinnon   | nathan@mackinnon.com    |     44 |  3.8 |
| David     | Izzmifartre | david@izzmifartre.com   |     44 |  3.9 |
| Nicolas   | Tabourette  | nicolas@tabourette.com  |     44 |  3.8 |
| Jonathan  | Izzmifirtre | jonathan@izzmifirtre.com|     44 |  3.9 |
| Sara      | Flore       | sara@flore.com          |     44 |    4 |
+-----------+-------------+-------------------------+--------+------+
12 rows in set (0.00 sec)
```

4)

```
SELECT distinct Name
FROM Campus
GROUP BY Name;
```

Output:

```
mysql> SELECT distinct Name
    -> FROM Campus
    -> GROUP BY Name;
+----------------------+
| Name                 |
+----------------------+
| Billie Holiday Campus |
| EastWest Campus      |
| Germane Campus       |
| Hill Campus          |
| King James Campus    |
| Loyola Campus        |
| Oxford Campus        |
| St George Campus     |
| West Campus          |
| Zimmerman Campus     |
+----------------------+
10 rows in set (0.00 sec)
```

5)

```
SELECT BName
FROM BlockCamp
WHERE CampID = 7;
```

Output:

```
mysql> SELECT BName
    -> FROM BlockCamp
    -> WHERE CampID = 7;
+---------+
| BName   |
+---------+
| A Block |
| B Block |
| C Block |
| D Block |
| E Block |
+---------+
5 rows in set (0.00 sec)
```

6)

```
SELECT B.Address, B.NumFloors, B.NumRooms, R.type, CASE
  WHEN R.Type='Labroom' or R.Type='Classroom' THEN R.Capacity
  END as 'Capacity', CASE
  WHEN R.Type='Labroom' or R.Type='Classroom' THEN F.equipment
  END as 'Equipment'
FROM Block B
  INNER JOIN BlockRoom BR on B.BName=BR.BName
  INNER JOIN Room R on R.RoID=BR.RoID
  INNER JOIN Contains C on R.RoID=C.RoID
  INNER JOIN Facility F on F.facID=C.facID
WHERE B.BName = 'B Block';
```

Output:

```
mysql> SELECT B.Address, B.NumFloors, B.NumRooms, R.type, CASE   WHEN R.Type='Labroom' or R.T
.Type='Labroom' or R.Type='Classroom' THEN F.equipment   END as 'Equipment' FROM Block B   IN
.RoID=BR.RoID   INNER JOIN Contains C on R.RoID=C.RoID   INNER JOIN Facility F on F.facID=C.f
+--------------------+-----------+----------+-----------+----------+--------------------+
| Address            | NumFloors | NumRooms | type      | Capacity | Equipment          |
+--------------------+-----------+----------+-----------+----------+--------------------+
| 235 westSide street |         3 |       23 | Labroom   |      130 | auditorium         |
| 235 westSide street |         3 |       23 | Labroom   |      130 | microphone         |
| 235 westSide street |         3 |       23 | Labroom   |      130 | overhead projector |
| 235 westSide street |         3 |       23 | Labroom   |       45 | projector          |
| 235 westSide street |         3 |       23 | Labroom   |       45 | air conditioning   |
| 235 westSide street |         3 |       23 | Labroom   |       45 | black board        |
| 235 westSide street |         3 |       23 | classroom |      122 | computers          |
| 235 westSide street |         3 |       23 | classroom |      122 | overhead projector |
| 235 westSide street |         3 |       23 | classroom |      122 | black board        |
| 235 westSide street |         3 |       23 | classroom |      122 | auditorium         |
| 235 westSide street |         3 |       23 | classroom |      122 | microphone         |
| 235 westSide street |         3 |       23 | classroom |      122 | speakers           |
| 235 westSide street |         3 |       23 | classroom |      123 | auditorium         |
| 235 westSide street |         3 |       23 | classroom |      123 | microphone         |
| 235 westSide street |         3 |       23 | classroom |      123 | speakers           |
| 235 westSide street |         3 |       23 | classroom |      124 | projector          |
| 235 westSide street |         3 |       23 | classroom |      124 | air conditioning   |
| 235 westSide street |         3 |       23 | classroom |      124 | tablet             |
| 235 westSide street |         3 |       23 | classroom |      125 | projector          |
| 235 westSide street |         3 |       23 | classroom |      125 | air conditioning   |
| 235 westSide street |         3 |       23 | classroom |      125 | tablet             |
+--------------------+-----------+----------+-----------+----------+--------------------+
21 rows in set (0.00 sec)
```

7)

```
SELECT P.Pname, P.TotalCredits
FROM Program P
  INNER JOIN Under U on P.PName = U.PName
  INNER JOIN Department D on D.DName=U.DName
WHERE D.DName='Judaism';
```

Output:

Pname	TotalCredits
Business	22
Economics	6
English	12
Law	14
Religion	10
Rule the World	30
Understanding Money	90

8)

```
SELECT C.Cname, P.Pname
FROM Section S
 INNER JOIN Has H on S.SeID = H.SeID
 INNER JOIN Course C on C.CID = H.CID
 INNER JOIN Within W on W.CID = C.CID
 INNER JOIN Department D on W.Dname = D.Dname
 INNER JOIN Under U on U.Dname = D.Dname
 INNER JOIN Program P on P.Pname = U.Pname
WHERE S.Semester='Fall' AND P.Pname = 'Canadian History'
GROUP BY P.Pname;
```

Output:

Cname	Pname
Hist300	Canadian History

1 row in set (0.00 sec)

9)

```
SELECT distinct C.Cname,T.IID ,I.FirstName,I.LastName, S.SeID, S.Year,
S.Semester, CT.DayWeek, CT.StartTime, CT.EndTime,CT.RoID, R.Capacity,
B.Address
FROM Instructor I
 INNER JOIN Teach T on I.IID = T.IID
 INNER JOIN Section S on T.SeID = S.SeID
 INNER JOIN Has H on S.SeID = H.SeID
 INNER JOIN Course C on H.CID = C.CID
 INNER JOIN Within W on C.CID = W.CID
 INNER JOIN Department D on D.Dname = W.Dname
 INNER JOIN DeptCamp DC on DC.Dname = D.Dname
 INNER JOIN ClassTimeslot CT on S.SeID = CT.SeID
 INNER JOIN Room R on R.RoID=CT.RoID
 INNER JOIN BlockRoom on R.RoID = BlockRoom.RoID
 INNER JOIN Block B on BlockRoom.BName = B.BName
WHERE D.Dname = 'Physics' AND S.Semester = 'Winter';
```

Output:

```
+---------+-----+-----------+-----------+------+------+----------+-----------+-----------+---------+------+----------+--------------------+
| Cname   | IID | FirstName | LastName  | SeID | Year | Semester | DayWeek   | StartTime | EndTime | RoID | Capacity | Address            |
+---------+-----+-----------+-----------+------+------+----------+-----------+-----------+---------+------+----------+--------------------+
| MECH300 |   1 | Lisa      | Cranterson |    2 | 2020 | Winter   | Wednesday | 09:30:00  | 10:45:00 |    2 |      130 | 235 westSide street |
+---------+-----+-----------+-----------+------+------+----------+-----------+-----------+---------+------+----------+--------------------+
1 row in set (0.01 sec)
```

10)

```
SELECT DISTINCT S.STID, S.FirstName, S.LastName
FROM Section SC
INNER JOIN EnrolledIn E on SC.SeID = E.SeID
INNER JOIN Student S on E.STID = S.STID
INNER JOIN Belong B on B.STID = S.STID
INNER JOIN Program P on P.PName = B.PName
WHERE B.Pname='Arts' AND Semester='Summer';
```

Output:

```
+------+-----------+----------+
| STID | FirstName | LastName |
+------+-----------+----------+
|    1 | Felix     | Harris   |
|    2 | James     | Watson   |
|   14 | Luis      | Loni     |
|   20 | Sydney    | Crosby   |
|   31 | Laurent   | Voyer    |
+------+-----------+----------+
```

11)

```
SELECT I.FirstName, I.LastName
FROM Course C
 INNER JOIN Has H on H.CID = C.CID
 INNER JOIN Section S on H.SeID = S.SeID
 INNER JOIN Teach T on T.SeID = S.SeID
 INNER JOIN Instructor I on T.IID = I.IID
WHERE C.CName = 'COMP249' AND S.Semester = 'Fall';
```

Output:

FirstName	LastName
Eaton	Joe
Chem	Xenon
Jessica	Stevenson
Issac	Harrison
Nicholas	Larsen

12)

```
SELECT I.FirstName, I.LastName
FROM Instructor I
INNER JOIN Work W on I.IID = W.IID
INNER JOIN Department D on D.DName = W.DName
Where D.DName='Physics' AND SupID IS NOT NULL
GROUP BY I.FirstName;
```

Output:

FirstName	LastName
Chem	Xenon
Eaton	Joe
George	Mooser
Nicholas	Larsen
Xavier	Naura

13)

```
SELECT B.Advisor
FROM Belong B
 INNER JOIN Program P on P.PName = B.PName
 INNER JOIN Under U on U.PName = P.PName
 INNER JOIN Department D on U.DName = D.DName
WHERE D.DName = 'Anthropology'
GROUP BY B.Advisor;
```

Output:

```
+--------------+
| Advisor      |
+--------------+
| Elma Aveiro  |
| Jack         |
| Katia Aveiro |
| Marc Luver   |
| Marc Zuter   |
+--------------+
5 rows in set (0.00 sec)
```

14)

```
SELECT ST.FirstName, ST.LastName, ST.STID
FROM Student ST
 INNER JOIN Graduate G on ST.STID = G.STID
 INNER JOIN Supervises SP on G.STID = SP.STID
 INNER JOIN Supervisor S on SP.SupID = S.SupID
 INNER JOIN Instructor I on I.IID= S.SupID
WHERE I.IID = 1;
```

Output:

```
+-----------+----------+------+
| FirstName | LastName | STID |
+-----------+----------+------+
| Phil      | Newton   |    6 |
| Khaled    | Jababo   |   11 |
| Aiman     | Hanna    |   12 |
| Luis      | Loni     |   14 |
| Smity     | Sam      |   25 |
| Rawl      | Sol      |   26 |
| Sara      | Flore    |   27 |
+-----------+----------+------+
```

15)

```
SELECT Student.STID, Student.FirstName, Student.LastName,
TeachingAssistant.AssignmentMarking
FROM Student
 INNER JOIN Graduate on Student.STID = Graduate.STID
 INNER JOIN IsTA on IsTA.STID=Graduate.STID
 INNER JOIN TeachingAssistant on TeachingAssistant.TAID=IsTA.TAID
 INNER JOIN AssignTo on AssignTo.TAID=TeachingAssistant.TAID
 INNER JOIN Section S on AssignTo.SeID = S.SeID
 INNER JOIN Has H on S.SeID = H.SeID
 INNER JOIN Course C on H.CID = C.CID
WHERE C.CID='1' and Semester='Summer';
```

Output:

STID	FirstName	LastName	AssignmentMarking
13	Messi	Lionel	n
16	Harves	Ri	n
14	Luis	Loni	y
27	Sara	Flore	y
15	Goun	Lio	n

16)

```
SELECT S.STID, S.FirstName, S.LastName, SUM(RF.Amount)
FROM Graduate G , Student S, Fund F, ResearchFunding RF
WHERE S.STID=G.STID AND G.STID = F.STID AND F.RID = RF.RID
GROUP BY F.STID;
```

Output:

STID	FirstName	LastName	SUM(RF.Amount)
8	Mackenzie	Johnson	11000
10	Linus	Torvards	8000
14	Luis	Loni	200
15	Goun	Lio	100
16	Harves	Ri	6000
17	Jonathan	Izzmifirtre	3000
18	Nicolas	Tabourette	1500
19	Nathan	Mackinnon	100
20	Sydney	Crosby	20000
21	David	Izzmifartre	1000
22	Poche	Jigyuan	100
23	Larry	Simpson	200
24	Foki	Ruki	300
25	Smity	Sam	100
26	Rawl	Sol	500
27	Sara	Flore	2000

17)

```
SELECT D.DName, D.Chairman, Count(*)
FROM Department D, Within W
WHERE D.DName=W.DName
GROUP BY W.DName;
```

Output:

DName	Chairman	Count(*)
Biology	Juan	4
Computer Science	Ryan	6
Engineering	Max	2
French	Suzy	4
Gender Studies	Loretta	4
History	Juju	5
Physics	Greg	2

18)

```
SELECT P.PName, Count(*)
FROM Program P, Under U
WHERE P.PName=U.PName
GROUP BY U.Dname;
```

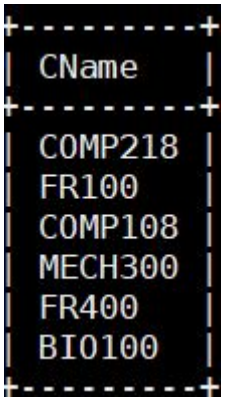
Output:

PName	Count(*)
Arts	2
Computer Science	1
Computer Architecture	3
Canadian History	1
Business	7
Mathematics	1
Rockets	1

19)

```
SELECT C.CName
FROM Course C
INNER JOIN Has H ON C.CID = H.CID
INNER JOIN Section Se ON Se.SeID = H.SeID
INNER JOIN EnrolledIn E ON Se.SeID = E.SeID
INNER JOIN Student S ON S.STID = E.STID
WHERE S.STID = 2 AND Se.Semester = 'Summer';
```

Output:



CName
COMP218
FR100
COMP108
MECH300
FR400
BIO100

20)

First, we get the section ID we want the student to be registered in (39 is the output):

```
SELECT Se.SeID
FROM Course C
  INNER JOIN Has H ON C.CID = H.CID
  INNER JOIN Section Se ON Se.SeID = H.SeID
WHERE C.CName = 'COMP249' AND Se.Semester = 'Winter' AND Se.Year = 2020;
```

Then, we get the student ID with a specific SSN (1 is the output):

```
SELECT St.STID
FROM Student St
WHERE St.SSN = '453';
```

Finally, we insert the above section ID and student ID into table EnrolledIn:

```
INSERT INTO EnrolledIn
VALUES
  (1, 39, NULL);
```

Output:

1	39	NULL

21)

First, we get the student ID (1 is the output):

```
SELECT St.STID
FROM Student St
WHERE St.SSN = '453';
```

Then, we get the section ID (32 is the output):

```
SELECT Se.SeID
FROM Course C
INNER JOIN Has H ON C.CID = H.CID
INNER JOIN Section Se ON Se.SeID = H.SeID
WHERE C.CName = 'COMP248' AND Se.Semester = 'Fall' AND Se.Year = 2020;
```

```
DELETE FROM EnrolledIn
WHERE STID = 'St.STID' AND SeID = 'Se.SeID;
```

Finally, we drop the student with section ID output and student ID output:

```
DELETE FROM EnrolledIn
WHERE STID = 1 AND SeID = 32
```

Output:
Tuple deleted.

22)

```
SELECT SHA.City, SHA.Province, SHA.CivicNumber, SHA.PostalCode,
SDH.DegreeName, SDH.OverallAvg, SDH.InstitutionName, SDH.DateReceived,
E.Grade, C.CName
FROM StHomeAddress SHA, StDegHist SDH, Student S
INNER JOIN EnrolledIn E ON S.STID = E.STID
INNER JOIN Section Se ON Se.SeID = E.SeID
INNER JOIN Has H ON Se.SeID = H.SeID
INNER JOIN Course C ON C.CID = H.CID
WHERE S.STID = 7 AND SHA.STID = 7 AND SDH.STID = 7
GROUP BY S.STID;
```

Output:

City	Province	CivicNumber	PostalCode	DegreeName	OverallAvg	InstitutionName	DateReceived	Grade	CName
Montreal	QC	1456	T3T 8H8	Finance	90	JMSB	2018-05-31	D+	BIO100

Functional Dependencies

Weak entity AssignHist:

(AssignID, TAID) → {AssignID, TAID}

Relationship AssignTo:

(SeID, TAID) → {SeID, TAID}

Relationship Belong:

(STID, PName) → {STID, PName, Advisor}

Strong entity Block:

(BName) → {BName, Address. NumFloors, NumRooms}

Relationship BlockCamp:

(BName) → {BName, CampID}

Relationship BlockRoom:

(BName, RoID) → {BName, RoID}

Strong entity Campus:

(CampID) → {CampID, Name}

Weak entity ClassTimeslot:

(StartTime, DayWeek, SeID, RoID) → {StartTime, DayWeek, SeID, RoID, EndTime}

Relationship Contains:

(facID, RoID) → {facID, RoID}

Strong entity Contracts:

(ContractID) → {ContractID, CID, SeID, TAID, Date, Amount}

Strong entity Course:

(CID) → {CID, CName}

Strong entity Department:

(DName) → {DName, Chairman}

Relationship DeptCamp:

(DName) → {DName, CampID}

Relationship EnrolledIn:

(STID, SeID) → {STID, SeID, Grade}

Strong entity Facility:

(facID) → {facID, equipment}

Relationship Fund:

(STID) → {STID, RID}

Strong entity FTInstructor:

(IID) → {IID}

Weak entity GradAwards:

(AwardName, DateReceived, STID) → {AwardName, DateReceived, STID}

Weak entity GradExperience:

(JobPosition, Company, DateStarted, STID) → {JobPosition, Company, DateStarted, STID}

Weak entity GradPublications:

(STID, PubName, PubDate) → {STID, PubName, PubDate}

Strong entity Graduate:

(STID) → {STID, thesis}

Weak entity GradUniversityDegrees:

(UniDegree, STID, UniName, DateReceived) → {UniDegree, STID, UniName, DateReceived}

Relationship Has:

(SeID) → {SeID, CID}

Relationship HasContract:

(IID, ContractID) → {IID, ContractID}

Weak entity InsAwards:

(AwardName, DateReceived, IID) → {AwardName, DateReceived, IID}

Weak entity InsExperience:

(JobPosition, DateStarted, Company, IID) → {JobPosition, DateStarted, Company, IID}

Weak entity InsHomeAddress:

(IID) → {IID, City, Province, CivicNumber, PostalCode}

Weak entity InsPublications:

(PubName, PubDate, IID) → {PubName, PubDate, IID}

Strong entity Instructor:

(IID) → {IID, ISSN, Phone, FirstName, SupID, Email, LastName}

Weak entity InsUniversityDegrees:

(UniName, UniDegree, DateReceived, IID) → {UniName, UniDegree, DateReceived, IID}

Relationship IsTA:

(STID) → {STID, TAID}

Relationship InvolvedIn:

(ContractID, TAID) → {ContractID, TAID}

Relationship PrereqFollow:

(CID1, CID2) → {CID1, CID2}

Strong entity Program:

(PName) → {PName, TotalCredits}

Strong entity PTInstructor:

(IID) → {IID}

Strong entity ResearchFunding:

(RID) → {RID, Amount}

Strong entity Room:

(RoID) → {RoID, ClassNum, Capacity, Type}

Weak entity SalaryHist:

(IID, Salary) → {IID, Salary}

Strong entity Section:

(SeID) → {SeID, Semester, Year}

Weak entity StDegHist:

(DegreeName, InstitutionName, STID) → {DegreeName, InstitutionName, STID, OverallAvg, DateReceived}

Weak entity StHomeAddress:

(STID) → {STID, City, Province, CivicNumber, PostalCode}

Strong entity Student:

(STID) → {STID, Credit, FirstName, LastName, GPA, SSN, Phone, Email}

Relationship Supervises:

(STID, SupID) → {STID, SupID}

Strong entity Supervisor:

(SupID) → {SupID}

Relationship Teach:

(IID, SeID) → {IID, SeID}

Strong entity TeachingAssistant:

(TAID) → {TAID, TotalHours, AssignmentMarking, LabInstructor, NumCourses, TutorialSession}

Relationship Under:

(PName) → {PName, DName}

Strong entity Undergraduate:

(STID) → {STID}

Relationship Within:

(CID) → {CID, DName}

Relationship Work:

(DName, IID) → {DName, IID}

NORMALIZATION

3NF: LHS is a key OR RHS has key attribute

BCNF: LHS is a key

All BCNF are in 3NF.

Weak entity AssignHist:

(AssignID, TAID) → {AssignID, TAID}

=> Trivial. BCNF.

Relationship AssignTo:

(SeID, TAID) → {SeID, TAID}

=> Trivial. BCNF.

Relationship Belong:

(STID, PName) → {STID, PName, Advisor}

=> LHS key; BCNF.

Strong entity Block:

(BName) → {BName, Address. NumFloors, NumRooms}

=> LHS key; BCNF.

Relationship BlockCamp:

(BName) → {BName, CampID}

=> LHS key; BCNF.

Relationship BlockRoom:

(BName, RoID) → {BName, RoID}

=> Trivial. BCNF.

Strong entity Campus:

(CampID) → {CampID, Name}

=> LHS key; BCNF.

Weak entity ClassTimeslot:

(StartTime, DayWeek, SeID, RoID) → {StartTime, DayWeek, SeID, RoID, EndTime}

=> LHS key; BCNF.

Relationship Contains:

(facID, RoID) → {facID, RoID}

=> Trivial. BCNF.

Strong entity Contracts:

(ContractID) → {ContractID, CID, SeID, TAID, Date, Amount}

=> LHS key; BCNF.

Strong entity Course:

(CID) → {CID, CName}

=> LHS key; BCNF.

Strong entity Department:

(DName) → {DName, Chairman}

=> LHS key; BCNF.

Relationship DeptCamp:

(DName) → {DName, CampID}

=> LHS key; BCNF.

Relationship EnrolledIn:

(STID, SeID) → {STID, SeID, Grade}

=> LHS key; BCNF.

Strong entity Facility:

(facID) → {facID, equipment}

=> LHS key; BCNF.

Relationship Fund:

(STID) → {STID, RID}

=> LHS key; BCNF.

Strong entity FTInstructor:

(IID) → {IID}

=> Trivial. BCNF.

Weak entity GradAwards:

(AwardName, DateReceived, STID) → {AwardName, DateReceived, STID}

=> Trivial. BCNF.

Weak entity GradExperience:

(JobPosition, Company, DateStarted, STID) → {JobPosition, Company, DateStarted, STID}

=> Trivial. BCNF.

Weak entity GradPublications:

(STID, PubName, PubDate) → {STID, PubName, PubDate}

=> Trivial. BCNF.

Strong entity Graduate:

(STID) → {STID, thesis}

=> LHS key; BCNF.

Weak entity GradUniversityDegrees:

(UniDegree, STID, UniName, DateReceived) → {UniDegree, STID, UniName, DateReceived}

=>Trivial. BCNF.

Relationship Has:

(SeID) → {SeID, CID}

=> LHS key; BCNF.

Relationship HasContract:

(IID, ContractID) → {IID, ContractID}

=>Trivial. BCNF.

Weak entity InsAwards:

(AwardName, DateReceived, IID) → {AwardName, DateReceived, IID}

=> Trivial. BCNF.

Weak entity InsExperience:

(JobPosition, DateStarted, Company, IID) → {JobPosition, DateStarted, Company, IID}

=> Trivial. BCNF.

Weak entity InsHomeAddress:

(IID) → {IID, City, Province, CivicNumber, PostalCode}

=> LHS key; BCNF.

*Postal Code determines Province, City, and Civic Number. As such, InsHomeAddress could be decomposed, however for simplicity, it has been left unaltered.

Weak entity InsPublications:

(PubName, PubDate, IID) → {PubName, PubDate, IID}

=> Trivial. BCNF.

Strong entity Instructor:

(IID) → {IID, ISSN, Phone, FirstName, SupID, Email, LastName}

=> LHS key; BCNF. (ISSN is also a candidate key).

Weak entity InsUniversityDegrees:

(UniName, UniDegree, DateReceived, IID) → {UniName, UniDegree, DateReceived, IID}

=> Trivial. BCNF.

Relationship IsTA:

(STID) → {STID, TAID}

=> LHS key; BCNF.

Relationship InvolvedIn:

(ContractID, TAID) → {ContractID, TAID}

=> Trivial. BCNF.

Relationship PrereqFollow:

(CID1, CID2) → {CID1, CID2}

=> Trivial. BCNF.

Strong entity Program:

(PName) → {PName, TotalCredits}

=> LHS key; BCNF.

Strong entity PTInstructor:

(IID) → {IID}

=> Trivial. BCNF.

Strong entity ResearchFunding:

(RID) → {RID, Amount}

=> LHS key; BCNF.

Strong entity Room:

(RoID) → {RoID, ClassNum, Capacity, Type}

=> LHS key; BCNF.

Weak entity SalaryHist:

(IID, Salary) → {IID, Salary}

=> Trivial. BCNF.

Strong entity Section:

(SeID) → {SeID, Semester, Year}

=> LHS key; BCNF.

Weak entity StDegHist:

(DegreeName, InstitutionName, STID) → {DegreeName, InstitutionName, STID, OverallAvg, DateReceived}

=> Trivial. BCNF.

Weak entity StHomeAddress:

(STID) → {STID, City, Province, CivicNumber, PostalCode}

=> LHS key; BCNF.

*Postal Code determines Province, City, and Civic Number. As such, InsHomeAddress could be decomposed, however for simplicity, it has been left unaltered.

Strong entity Student:

(STID) → {STID, Credit, FirstName, LastName, GPA, SSN, Phone, Email}

=> LHS key; BCNF. (SSN also a candidate key).

Relationship Supervises:

(STID, SupID) → {STID, SupID}

=> Trivial. BCNF.

Strong entity Supervisor:

(SupID) → {SupID}

=> Trivial. BCNF.

Relationship Teach:

(IID, SeID) → {IID, SeID}

=> Trivial. BCNF.

Strong entity TeachingAssistant:

(TAID) → {TAID, TotalHours, AssignmentMarking, LabInstructor, NumCourses, TutorialSession}

=> LHS key; BCNF.

Relationship Under:

(PName) → {PName, DName}

=> LHS key; BCNF.

Strong entity Undergraduate:

(STID) → {STID}

=> Trivial. BCNF.

Relationship Within:

(CID) → {CID, DName}

=> LHS key; BCNF.

Relationship Work:

(DName, IID) → {DName, IID}

=> Trivial. BCNF.

FUNCTIONALITIES IMPLEMENTED

We have implemented all the queries from number I to XXII on our UI located at http://krc353.encs.concordia.ca as well as 3 additional queries:

1. Check prerequisite(s) of a class
2. Check follow-up(s) of a class
3. Check the FD of Course ID → {CourseID, CourseName}

ADDITIONAL FEATURES

- Before-Insert Trigger to check for ClassTimeslot conflict:

```
CREATE TRIGGER test_timeslot_before_insert
BEFORE INSERT ON ClassTimeslot FOR EACH ROW
BEGIN
  IF (Select COUNT(*)
        from ClassTimeslot
        where (NEW.DayWeek, SeID) IN (Select DayWeek, ClassTimeslot.SeID
                        from (Select SeID
                            from Section
                            where (semester,year) IN (Select semester,year
                                        from Section
                                        where Section.SeID=NEW.SeID)
                            AND Section.SeID<>NEW.SeID) A
                        inner join ClassTimeslot
                        on A.SeID=ClassTimeslot.SeID)
        AND NEW.StartTime >= StartTime AND NEW.StartTime <= EndTime AND (NEW.RoID= RoID OR
NEW.IID=IID)) > 0
    THEN SIGNAL SQLSTATE'12345' SET MESSAGE_TEXT = 'conflicting timeslot' ;
  END IF;
END
```

- Prerequisite Queries:
  SELECT C.Cname
  FROM Course C
  WHERE CID IN (Select P.CID1
  FROM Course C, PrereqFollow P
  WHERE Cname='COMP249' AND C.CID=P.CID2);

  Output:
  COMP248

  SELECT C.Cname
  FROM Course C
  WHERE CID IN (Select P.CID2
  FROM Course C, PrereqFollow P
  WHERE Cname='COMP248' AND C.CID=P.CID1);

  Output:
  COMP249

- FD Check Query (if outputs an empty set, it means that the FD holds)
  For FD CID → {CID, CName}
  SELECT C.CID
  FROM Course C
  GROUP BY C.CID
  HAVING COUNT(DISTINCT C.CName) > 1;
  Output: Empty set

CONTRIBUTIONS