SOFE3700U – Data Management

Group 11 - Final Project

Final Project Name – University Database Management System

Group Member 1 - Team Lead

Name: Abdul Bhutta

Student ID: 100785884

Group Member 2

Name: Ashad Ahmed

Student ID: 100745913

Group Member 3

Name: Milan Saju Samuel

Student ID: 100757350

Group Member 4

Name: Harveen Sandhu

Student ID: 100704514

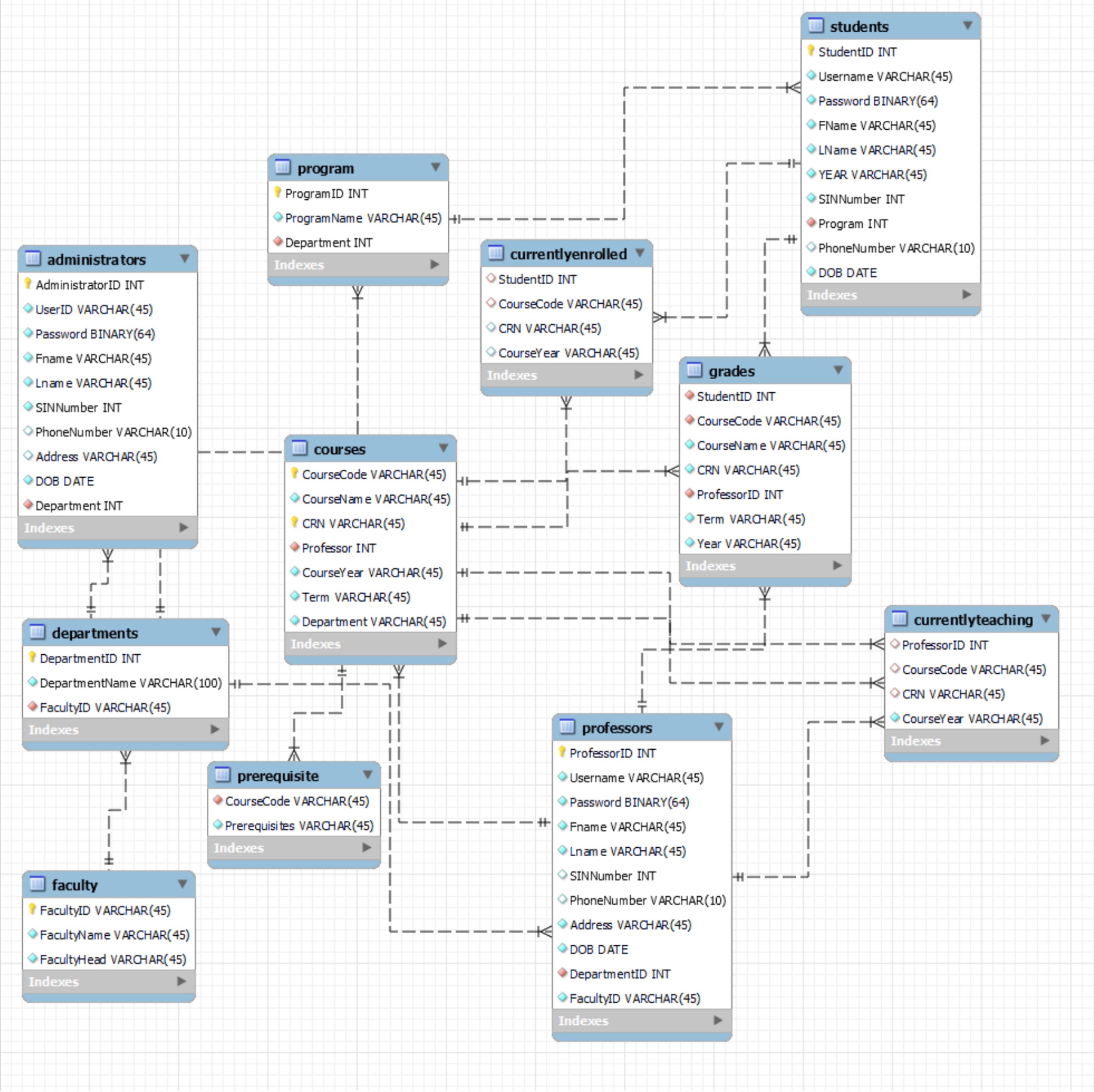
Group Member 5

Name: Matheeshan Sivalingam

Student ID: 100703887

Deliverables A – Relational Schema

Relational Database Scheme



Create Tables

Administrators

```
CREATE TABLE `administrators` (
  `AdministratorID` int NOT NULL,
  `UserID` varchar(45) NOT NULL,
  `Password` binary(64) NOT NULL,
  `Fname` varchar(45) NOT NULL,
  `Lname` varchar(45) NOT NULL,
  `SINNumber` int NOT NULL,
  `PhoneNumber` varchar(10) DEFAULT NULL,
  `Address` varchar(45) DEFAULT NULL,
  `DOB` date NOT NULL,
  `Department` int NOT NULL,
  PRIMARY KEY (`AdministratorID`),
  KEY `adminstrators_ibfk_1` (`Department`),
  CONSTRAINT `administrators_ibfk_1` FOREIGN KEY (`Department`) REFERENCES `departments`
(`DepartmentID`)
);
```

Courses

```
CREATE TABLE `courses` (
  `CourseCode` varchar(45) NOT NULL,
  `CourseName` varchar(45) NOT NULL,
  `CRN` varchar(45) NOT NULL,
  `Professor` int NOT NULL,
  `CourseYear` varchar(45) NOT NULL,
  `Term` varchar(45) NOT NULL,
  `Department` varchar(45) NOT NULL,
  PRIMARY KEY (`CourseCode`,`CRN`),
  UNIQUE KEY `CRN_UNIQUE` (`CRN`),
  KEY `courses_ibfk_1` (`Professor`),
  CONSTRAINT `courses_ibfk_1` FOREIGN KEY (`Professor`) REFERENCES `professors` (`ProfessorID`)
);
```

Currently Enrolled

```
CREATE TABLE `currentlyenrolled` (
  `StudentID` int DEFAULT NULL,
  `CourseCode` varchar(45) DEFAULT NULL,
  `CRN` varchar(45) DEFAULT NULL,
  `CourseYear` varchar(45) DEFAULT NULL,
  KEY `StudentID` (`StudentID`),
  KEY `CourseCode` (`CourseCode`),
  CONSTRAINT `currentlyenrolled_ibfk_1` FOREIGN KEY (`StudentID`) REFERENCES `students`
(`StudentID`),
  CONSTRAINT `currentlyenrolled_ibfk_2` FOREIGN KEY (`CourseCode`) REFERENCES `courses`
(`CourseCode`) );
```

Currently Teaching

```
CREATE TABLE `currentlyteaching` (
  `ProfessorID` int DEFAULT NULL,
  `CourseCode` varchar(45) DEFAULT NULL,
  `CRN` varchar(45) DEFAULT NULL,
  `CourseYear` varchar(45) NOT NULL,
  KEY `ProfessorID` (`ProfessorID`),
  KEY `CourseCode` (`CourseCode`),
  KEY `CRN` (`CRN`),
  CONSTRAINT `currentlyteaching_ibfk_1` FOREIGN KEY (`ProfessorID`) REFERENCES `professors`
(`ProfessorID`),
  CONSTRAINT `currentlyteaching_ibfk_2` FOREIGN KEY (`CourseCode`) REFERENCES `courses`
(`CourseCode`),
  CONSTRAINT `currentlyteaching_ibfk_3` FOREIGN KEY (`CRN`) REFERENCES `courses` (`CRN`)
);
```

Departments

```
CREATE TABLE `departments` (
  `DepartmentID` int NOT NULL,
  `DepartmentName` varchar(100) NOT NULL,
  `FacultyID` varchar(45) NOT NULL,
  PRIMARY KEY (`DepartmentID`),
  KEY `departments_ibfk_1` (`FacultyID`),
  CONSTRAINT `departments_ibfk_1` FOREIGN KEY (`FacultyID`) REFERENCES `faculty` (`FacultyID`)
);
```

Faculty

```
CREATE TABLE `faculty` (
  `FacultyID` varchar(45) NOT NULL,
  `FacultyName` varchar(45) NOT NULL,
  `FacultyHead` varchar(45) NOT NULL,
  PRIMARY KEY (`FacultyID`),
  UNIQUE KEY `FacultyID_UNIQUE` (`FacultyID`)
);
```

Grades

```
CREATE TABLE `grades` (
  `StudentID` int NOT NULL,
  `CourseCode` varchar(45) NOT NULL,
  `CourseName` varchar(45) NOT NULL,
  `CRN` varchar(45) NOT NULL,
  `ProfessorID` int NOT NULL,
  `Term` varchar(45) NOT NULL,
  `Year` varchar(45) NOT NULL,
  KEY `grades_ibfk_1` (`StudentID`),
  KEY `grades_ibfk_2` (`CourseCode`),
  KEY `grades_ibfk_4` (`ProfessorID`),
  CONSTRAINT `grades_ibfk_1` FOREIGN KEY (`StudentID`) REFERENCES `students` (`StudentID`),
  CONSTRAINT `grades_ibfk_2` FOREIGN KEY (`CourseCode`) REFERENCES `courses` (`CourseCode`),
  CONSTRAINT `grades_ibfk_4` FOREIGN KEY (`ProfessorID`) REFERENCES `professors` (`ProfessorID`)
);
```

Prerequisite

```
CREATE TABLE `prerequisite` (
  `CourseCode` varchar(45) NOT NULL,
  `Prerequisites` varchar(45) NOT NULL,
  KEY `prerequisite_ibfk_1` (`CourseCode`),
  CONSTRAINT `prerequisite_ibfk_1` FOREIGN KEY (`CourseCode`) REFERENCES `courses` (`CourseCode`)
);
```

Professors

```
CREATE TABLE `professors` (
  `ProfessorID` int NOT NULL,
  `Username` varchar(45) NOT NULL,
  `Password` binary(64) NOT NULL,
  `Fname` varchar(45) NOT NULL,
  `Lname` varchar(45) NOT NULL,
  `SINNumber` int DEFAULT NULL,
  `PhoneNumber` varchar(10) DEFAULT NULL,
  `Address` varchar(45) NOT NULL,
  `DOB` date NOT NULL,
  `DepartmentID` int NOT NULL,
  `FacultyID` varchar(45) NOT NULL,
  PRIMARY KEY (`ProfessorID`),
  UNIQUE KEY `ProfessorID_UNIQUE` (`ProfessorID`),
  UNIQUE KEY `SINNumber_UNIQUE` (`SINNumber`),
  KEY `professors_ibfk_1` (`DepartmentID`),
  CONSTRAINT `professors_ibfk_1` FOREIGN KEY (`DepartmentID`) REFERENCES `departments`
(`DepartmentID`)
);
```

Program

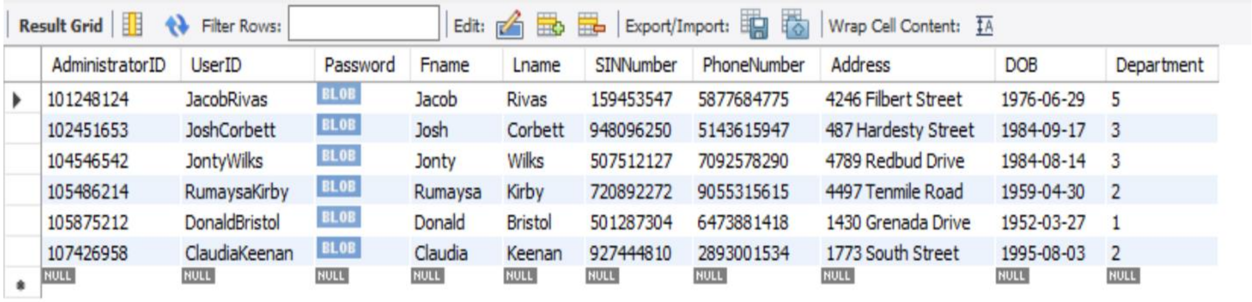
```
CREATE TABLE `program` (
  `ProgramID` int NOT NULL,
  `ProgramName` varchar(45) NOT NULL,
  `Department` int NOT NULL,
  PRIMARY KEY (`ProgramID`),
  UNIQUE KEY `ProgramID_UNIQUE` (`ProgramID`),
  KEY `program_ibfk_1` (`Department`),
  CONSTRAINT `program_ibfk_1` FOREIGN KEY (`Department`) REFERENCES `departments`
(`DepartmentID`)
);
```

Students

```
CREATE TABLE `students` (
  `StudentID` int NOT NULL,
  `Username` varchar(45) NOT NULL,
  `Password` binary(64) NOT NULL,
  `FName` varchar(45) NOT NULL,
  `LName` varchar(45) NOT NULL,
  `YEAR` varchar(45) NOT NULL,
  `SINNumber` int NOT NULL,
  `Program` int NOT NULL,
  `PhoneNumber` varchar(10) DEFAULT NULL,
  `DOB` date NOT NULL,
  PRIMARY KEY (`StudentID`),
  UNIQUE KEY `Password_UNIQUE` (`Password`),
  KEY `students_ibfk_1` (`Program`),
  CONSTRAINT `students_ibfk_1` FOREIGN KEY (`Program`) REFERENCES `program` (`ProgramID`)
);
```

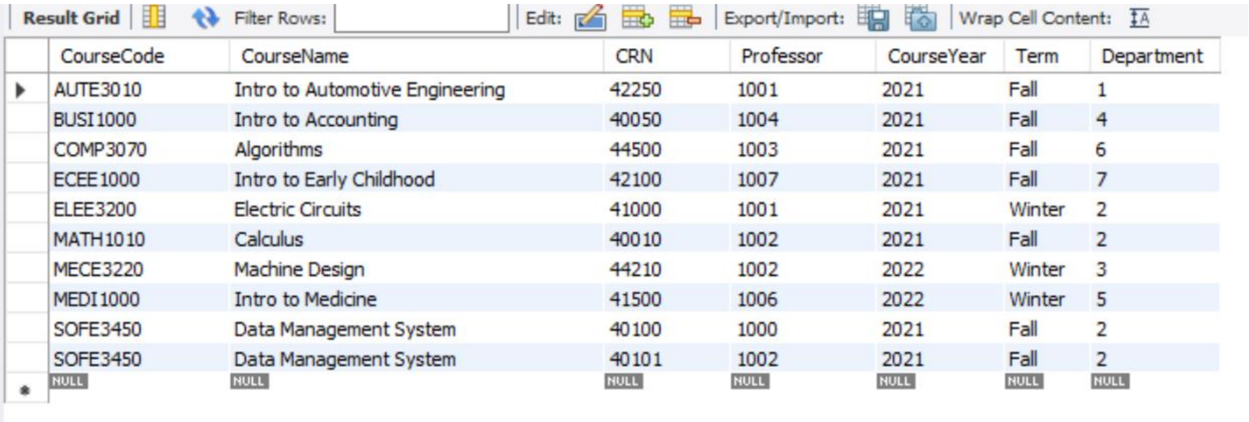
Deliverable B – Sample Data

Administrator Data



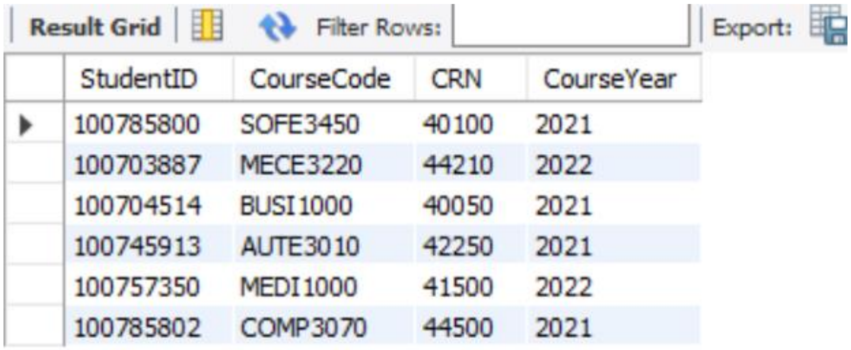
AdministratorID	UserID	Password	Fname	Lname	SINNumber	PhoneNumber	Address	DOB	Department
101248124	JacobRivas	BLOB	Jacob	Rivas	159453547	5877684775	4246 Filbert Street	1976-06-29	5
102451653	JoshCorbett	BLOB	Josh	Corbett	948096250	5143615947	487 Hardesty Street	1984-09-17	3
104546542	JontyWilks	BLOB	Jonty	Wilks	507512127	7092578290	4789 Redbud Drive	1984-08-14	3
105486214	RumaysaKirby	BLOB	Rumaysa	Kirby	720892272	9055315615	4497 Tenmile Road	1959-04-30	2
105875212	DonaldBristol	BLOB	Donald	Bristol	501287304	6473881418	1430 Grenada Drive	1952-03-27	1
107426958	ClaudiaKeenan	BLOB	Claudia	Keenan	927444810	2893001534	1773 South Street	1995-08-03	2
NULL	NULL	NULL	NULL	NULL	NULL	NULL	NULL	NULL	NULL

Courses Data



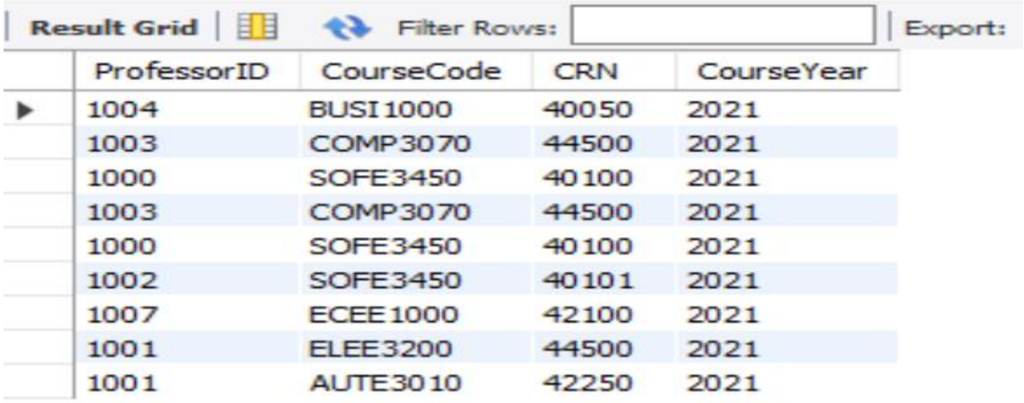
CourseCode	CourseName	CRN	Professor	CourseYear	Term	Department
AUTE3010	Intro to Automotive Engineering	42250	1001	2021	Fall	1
BUSI1000	Intro to Accounting	40050	1004	2021	Fall	4
COMP3070	Algorithms	44500	1003	2021	Fall	6
ECEE1000	Intro to Early Childhood	42100	1007	2021	Fall	7
ELEE3200	Electric Circuits	41000	1001	2021	Winter	2
MATH1010	Calculus	40010	1002	2021	Fall	2
MECE3220	Machine Design	44210	1002	2022	Winter	3
MEDI1000	Intro to Medicine	41500	1006	2022	Winter	5
SOFE3450	Data Management System	40100	1000	2021	Fall	2
SOFE3450	Data Management System	40101	1002	2021	Fall	2
NULL	NULL	NULL	NULL	NULL	NULL	NULL

CurrentlyEnrolled Data



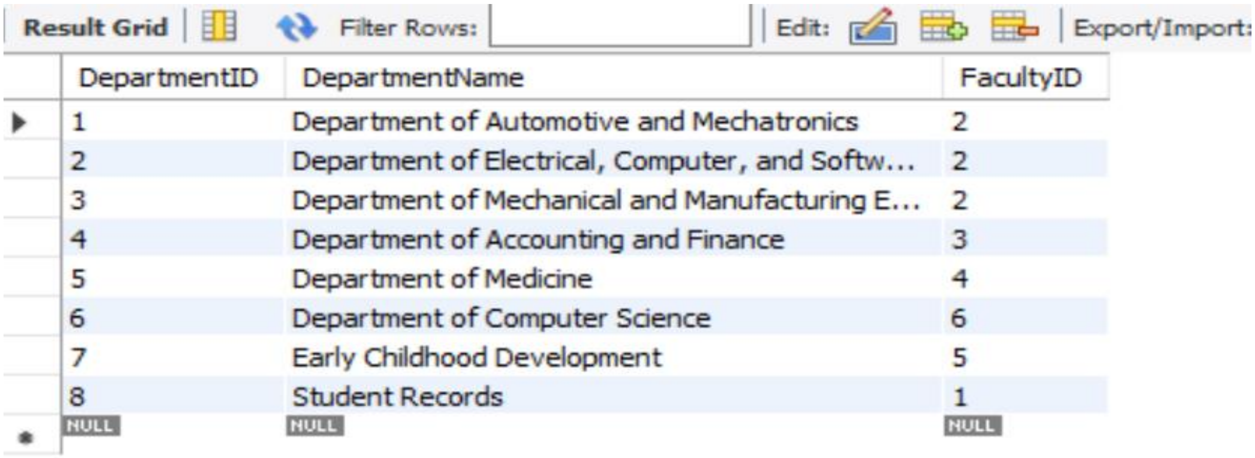
StudentID	CourseCode	CRN	CourseYear
100785800	SOFE3450	40100	2021
100703887	MECE3220	44210	2022
100704514	BUSI1000	40050	2021
100745913	AUTE3010	42250	2021
100757350	MEDI1000	41500	2022
100785802	COMP3070	44500	2021

CurrentlyTeaching Data



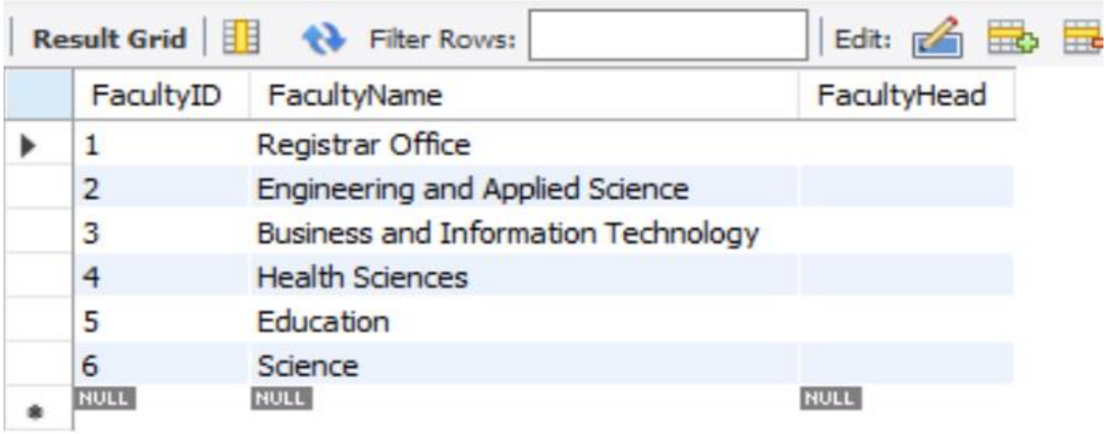
ProfessorID	CourseCode	CRN	CourseYear
1004	BUSI1000	40050	2021
1003	COMP3070	44500	2021
1000	SOFE3450	40100	2021
1003	COMP3070	44500	2021
1000	SOFE3450	40100	2021
1002	SOFE3450	40101	2021
1007	ECEE1000	42100	2021
1001	ELEE3200	44500	2021
1001	AUTE3010	42250	2021

Departments Data



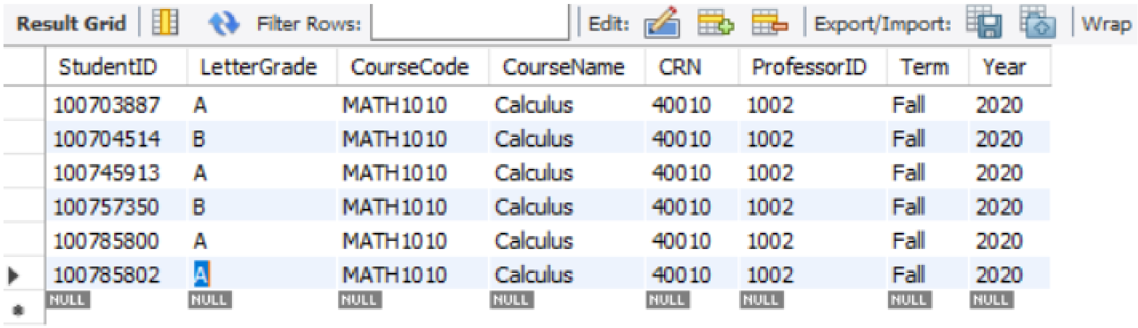
DepartmentID	DepartmentName	FacultyID
1	Department of Automotive and Mechatronics	2
2	Department of Electrical, Computer, and Softw...	2
3	Department of Mechanical and Manufacturing E...	2
4	Department of Accounting and Finance	3
5	Department of Medicine	4
6	Department of Computer Science	6
7	Early Childhood Development	5
8	Student Records	1
NULL	NULL	NULL

Faculty Data



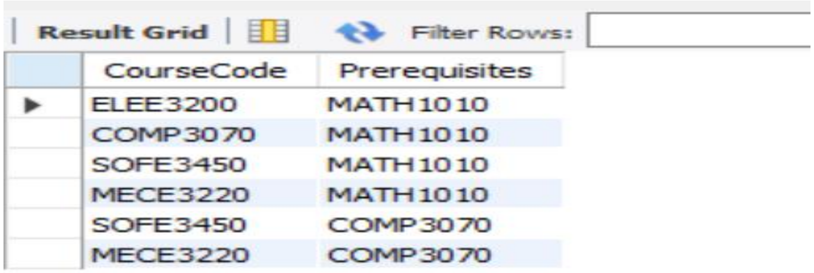
FacultyID	FacultyName	FacultyHead
1	Registrar Office	
2	Engineering and Applied Science	
3	Business and Information Technology	
4	Health Sciences	
5	Education	
6	Science	
NULL	NULL	NULL

Grades Data



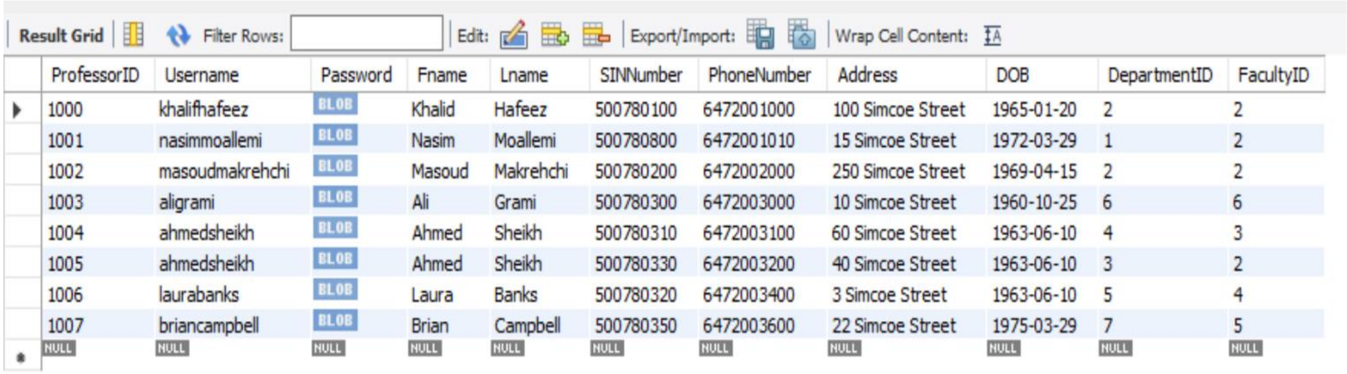
StudentID	LetterGrade	CourseCode	CourseName	CRN	ProfessorID	Term	Year
100703887	A	MATH1010	Calculus	40010	1002	Fall	2020
100704514	B	MATH1010	Calculus	40010	1002	Fall	2020
100745913	A	MATH1010	Calculus	40010	1002	Fall	2020
100757350	B	MATH1010	Calculus	40010	1002	Fall	2020
100785800	A	MATH1010	Calculus	40010	1002	Fall	2020
100785802	A	MATH1010	Calculus	40010	1002	Fall	2020
NULL	NULL	NULL	NULL	NULL	NULL	NULL	NULL

Prerequisite Data



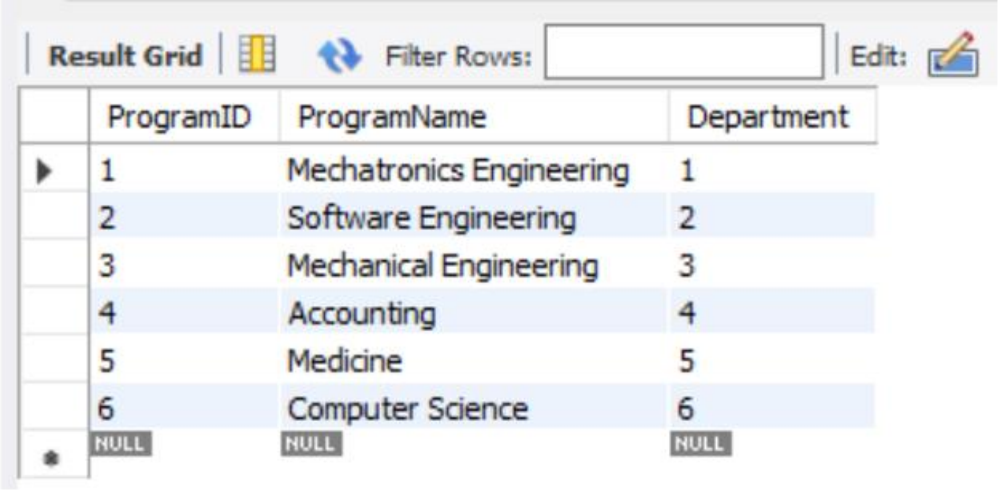
CourseCode	Prerequisites
ELEE3200	MATH1010
COMP3070	MATH1010
SOFE3450	MATH1010
MECE3220	MATH1010
SOFE3450	COMP3070
MECE3220	COMP3070

Professors Data



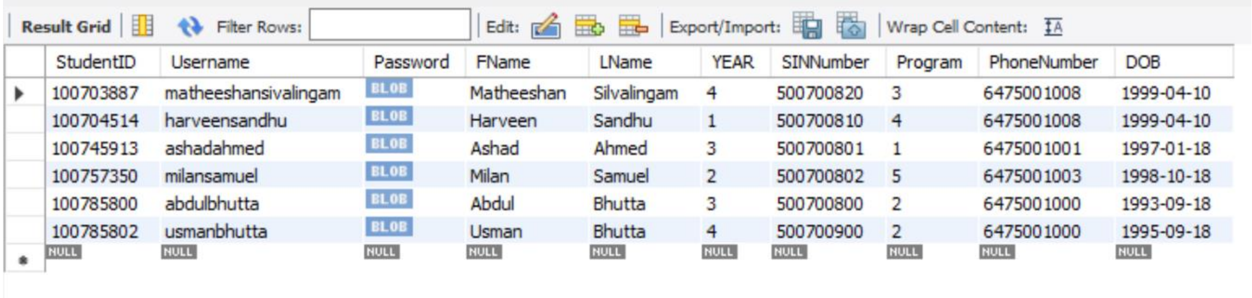
ProfessorID	Username	Password	Fname	Lname	SINNumber	PhoneNumber	Address	DOB	DepartmentID	FacultyID
1000	khalifhafeez	BLOB	Khalid	Hafeez	500780100	6472001000	100 Simcoe Street	1965-01-20	2	2
1001	nasimmoallemi	BLOB	Nasim	Moallemi	500780800	6472001010	15 Simcoe Street	1972-03-29	1	2
1002	masoudmakrehchi	BLOB	Masoud	Makrehchi	500780200	6472002000	250 Simcoe Street	1969-04-15	2	2
1003	aligrami	BLOB	Ali	Grami	500780300	6472003000	10 Simcoe Street	1960-10-25	6	6
1004	ahmedsheikh	BLOB	Ahmed	Sheikh	500780310	6472003100	60 Simcoe Street	1963-06-10	4	3
1005	ahmedsheikh	BLOB	Ahmed	Sheikh	500780330	6472003200	40 Simcoe Street	1963-06-10	3	2
1006	laurabanks	BLOB	Laura	Banks	500780320	6472003400	3 Simcoe Street	1963-06-10	5	4
1007	briancampbell	BLOB	Brian	Campbell	500780350	6472003600	22 Simcoe Street	1975-03-29	7	5
NULL	NULL	NULL	NULL	NULL	NULL	NULL	NULL	NULL	NULL	NULL

Program Data



ProgramID	ProgramName	Department
1	Mechatronics Engineering	1
2	Software Engineering	2
3	Mechanical Engineering	3
4	Accounting	4
5	Medicine	5
6	Computer Science	6
NULL	NULL	NULL

Students Data



StudentID	Username	Password	FName	LName	YEAR	SINNumber	Program	PhoneNumber	DOB
100703887	matheeshansivalingam	BLOB	Matheeshan	Silvalingam	4	500700820	3	6475001008	1999-04-10
100704514	harveensandhu	BLOB	Harveen	Sandhu	1	500700810	4	6475001008	1999-04-10
100745913	ashadahmed	BLOB	Ashad	Ahmed	3	500700801	1	6475001001	1997-01-18
100757350	milansamuel	BLOB	Milan	Samuel	2	500700802	5	6475001003	1998-10-18
100785800	abdulbhutta	BLOB	Abdul	Bhutta	3	500700800	2	6475001000	1993-09-18
100785802	usmanbhutta	BLOB	Usman	Bhutta	4	500700900	2	6475001000	1995-09-18
NULL	NULL	NULL	NULL	NULL	NULL	NULL	NULL	NULL	NULL

Deliverable C – Views

***Some of the views were not implemented as the columns/data were not implemented. Will be implemented by end of the semester. Unable to deliver due to time constraint.**

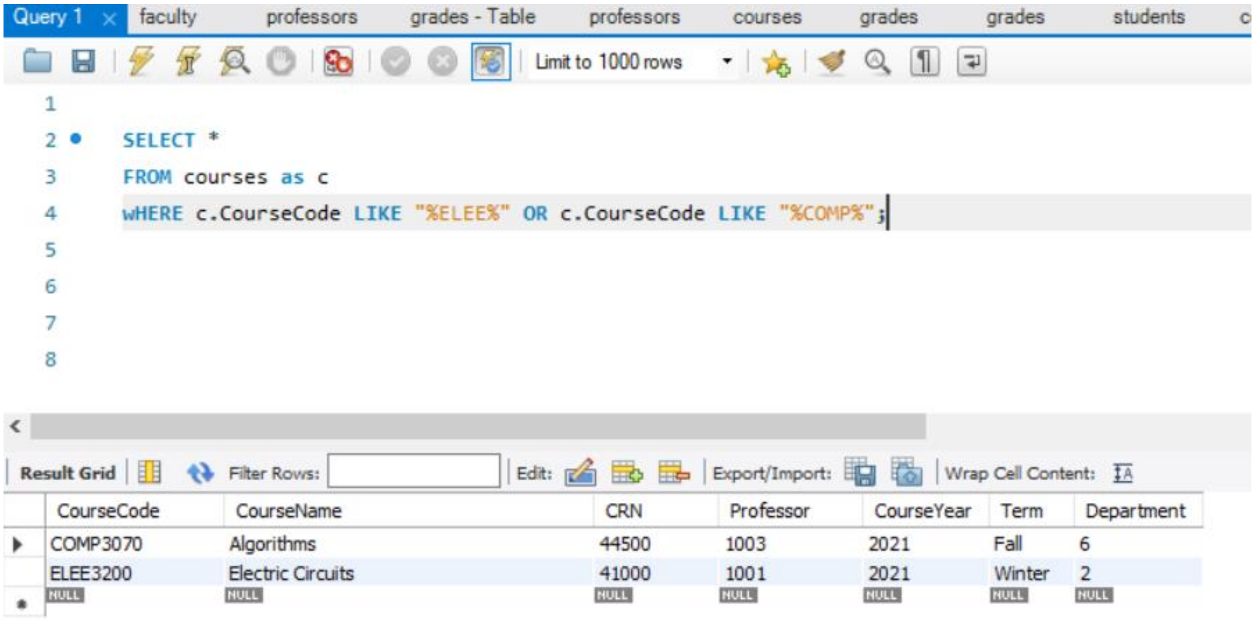
View 1: This join combines each row of the student table with each row of the courses table with each row of the department table.

```
SELECT *
FROM students
CROSS JOIN courses
CROSS JOIN departments
```

View 2: All the course names from a students grade from a faculty and then group them by term.

```
SELECT CourseName
FROM Grades
WHERE ProfessorID = ALL
  (SELECT ProfessorID
  FROM Professors
  WHERE Faculty = “2”)
GROUP BY TERM
```

View 3: Find all the students in ELEE or COMP.



```
SELECT *
FROM courses as c
wHERE c.CourseCode LIKE "%ELEE%" OR c.CourseCode LIKE "%COMP%";
```

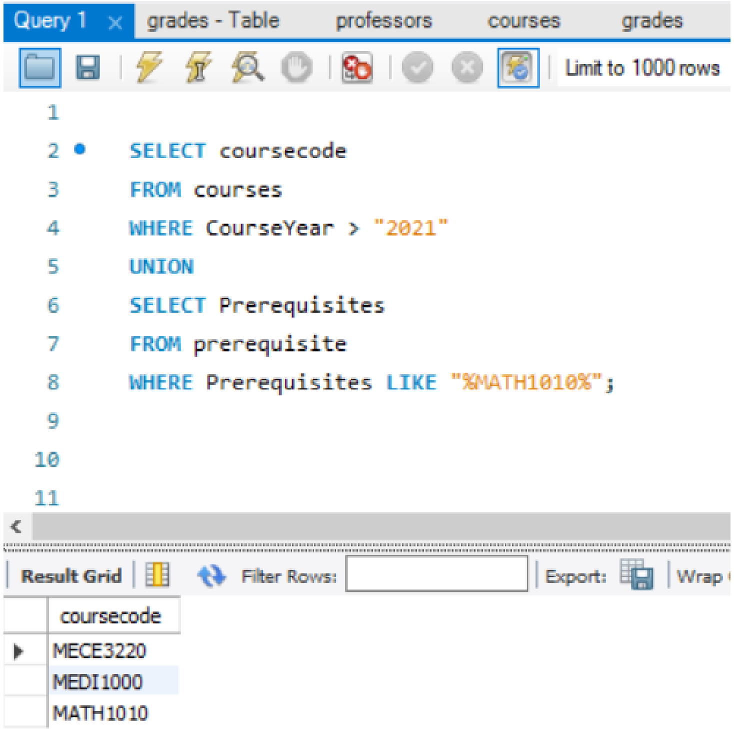
CourseCode	CourseName	CRN	Professor	CourseYear	Term	Department
COMP3070	Algorithms	44500	1003	2021	Fall	6
ELEE3200	Electric Circuits	41000	1001	2021	Winter	2
NULL	NULL	NULL	NULL	NULL	NULL	NULL

View 4: Join the courses table and the currently enrolled table to see all the courses that are offered.

```
SELECT currentlyenrolled.CourseCode
FROM currentlyenrolled
FULL JOIN courses
ON currentlyenrolled.CourseCode = courses.CourseCode;
```

View 5: List all the courses in 2021 and courses that have prerequisite “MATH1010”

```
SELECT coursecode
FROM courses
WHERE CourseYear > "2021"
UNION
SELECT Prerequisites
FROM prerequisite
WHERE Prerequisites LIKE "%MATH1010%";
```

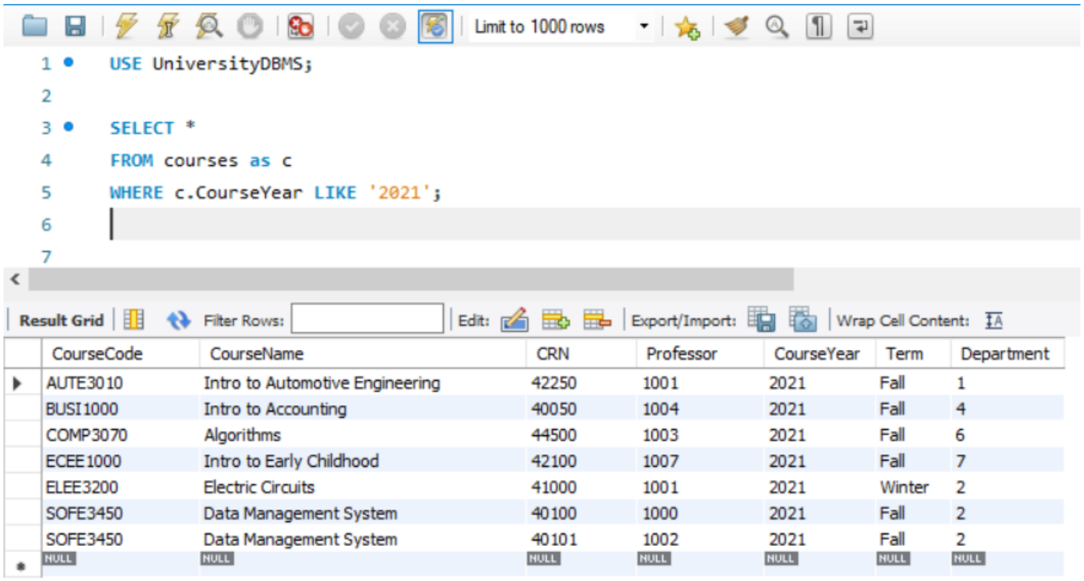


```

SELECT coursecode
FROM courses
WHERE CourseYear > "2021"
UNION
SELECT Prerequisites
FROM prerequisite
WHERE Prerequisites LIKE "%MATH1010%";



```

coursecode
MECE3220
MEDI1000
MATH1010

View 6: Find all courses that were offered in 2021

```
SELECT *
FROM courses as c
WHERE c.CourseYear LIKE '2021';
```

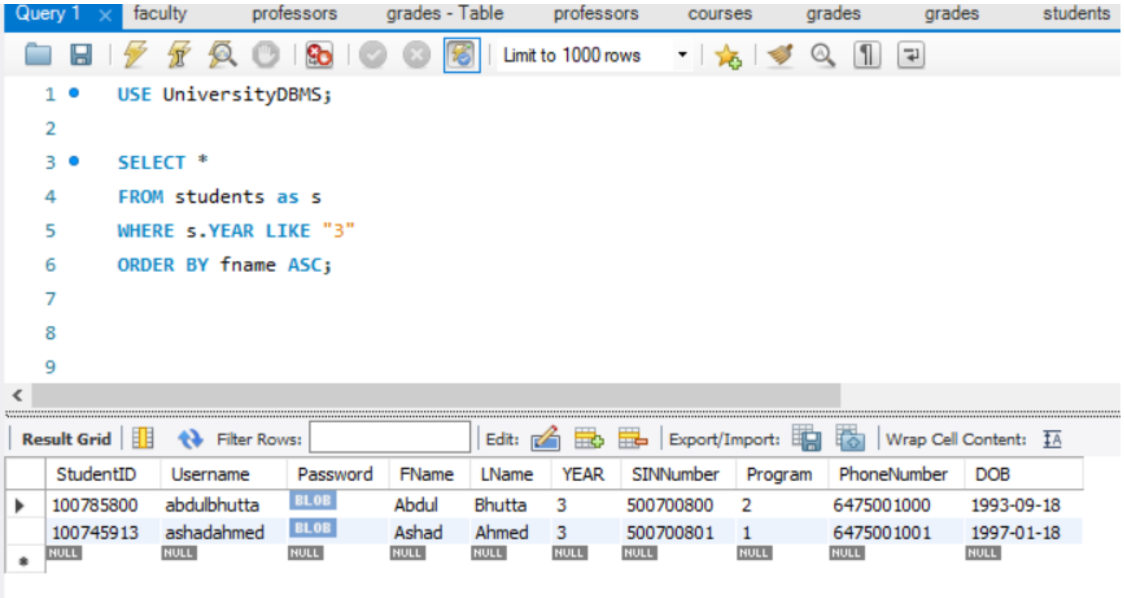


```
USE UniversityDBMS;

SELECT *
FROM courses as c
WHERE c.CourseYear LIKE '2021';
```

CourseCode	CourseName	CRN	Professor	CourseYear	Term	Department
AUTE3010	Intro to Automotive Engineering	42250	1001	2021	Fall	1
BUSI1000	Intro to Accounting	40050	1004	2021	Fall	4
COMP3070	Algorithms	44500	1003	2021	Fall	6
ECEE1000	Intro to Early Childhood	42100	1007	2021	Fall	7
ELEE3200	Electric Circuits	41000	1001	2021	Winter	2
SOFE3450	Data Management System	40100	1000	2021	Fall	2
SOFE3450	Data Management System	40101	1002	2021	Fall	2
NULL	NULL	NULL	NULL	NULL	NULL	NULL

View 7: Find all students that are year 3 in ascending order

SELECT *
FROM students as s
WHERE s.YEAR LIKE "3"
ORDER BY fname ASC;

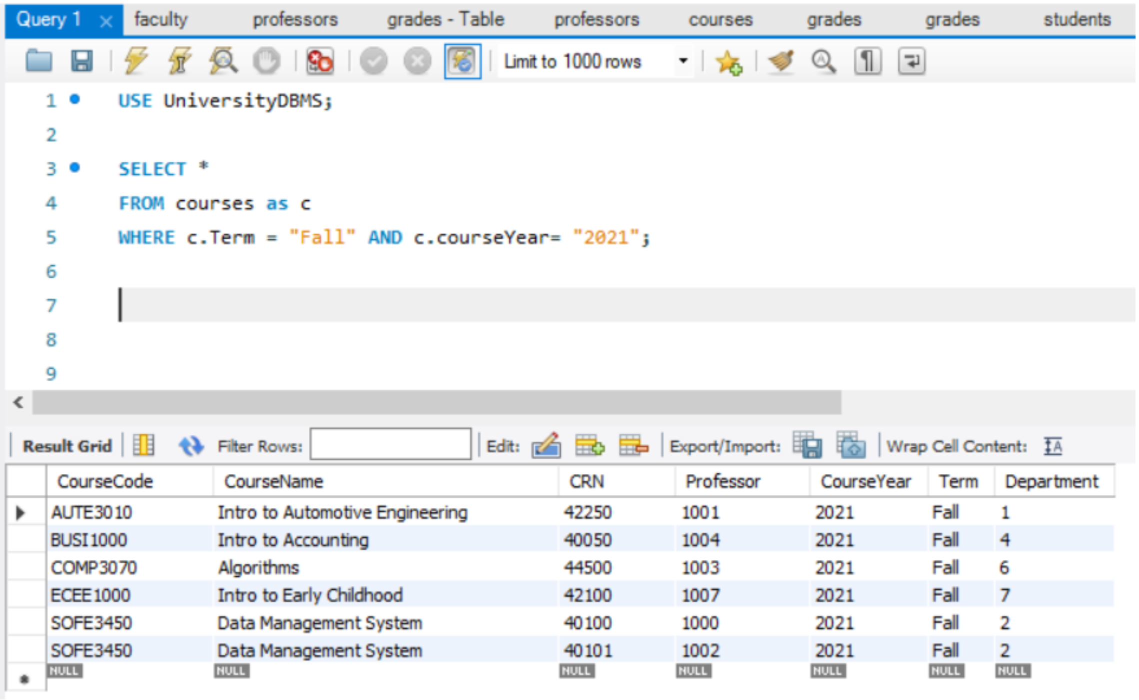


```
USE UniversityDBMS;

SELECT *
FROM students as s
WHERE s.YEAR LIKE "3"
ORDER BY fname ASC;
```

StudentID	Username	Password	FName	LName	YEAR	SINNumber	Program	PhoneNumber	DOB
100785800	abdulbhutta	BLOB	Abdul	Bhutta	3	500700800	2	6475001000	1993-09-18
100745913	ashadahmed	BLOB	Ashad	Ahmed	3	500700801	1	6475001001	1997-01-18
NULL	NULL	NULL	NULL	NULL	NULL	NULL	NULL	NULL	NULL

View 8: Find all the courses that are offered in fall of 2021

SELECT *
FROM courses as c
WHERE c.Term = "Fall" AND c.courseYear= "2021";

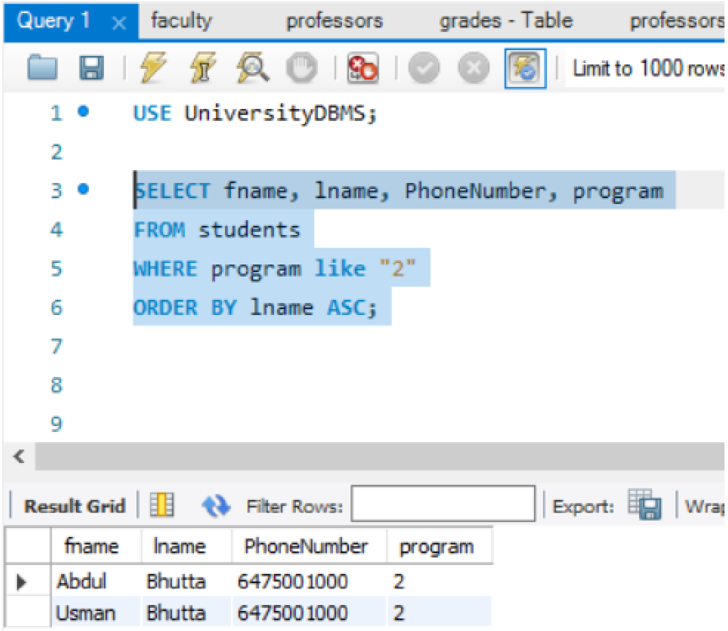


```
USE UniversityDBMS;

SELECT *
FROM courses as c
WHERE c.Term = "Fall" AND c.courseYear= "2021";
```

CourseCode	CourseName	CRN	Professor	CourseYear	Term	Department
AUTE3010	Intro to Automotive Engineering	42250	1001	2021	Fall	1
BUSI1000	Intro to Accounting	40050	1004	2021	Fall	4
COMP3070	Algorithms	44500	1003	2021	Fall	6
ECEE1000	Intro to Early Childhood	42100	1007	2021	Fall	7
SOFE3450	Data Management System	40100	1000	2021	Fall	2
SOFE3450	Data Management System	40101	1002	2021	Fall	2
NULL	NULL	NULL	NULL	NULL	NULL	NULL

View 9: List the first and last name with their phone numbers from program 2 (Software Engineering), alphabetically ordered by last name

SELECT fname, lname, PhoneNumber, program
FROM students
WHERE program like "2"
ORDER BY lname ASC;

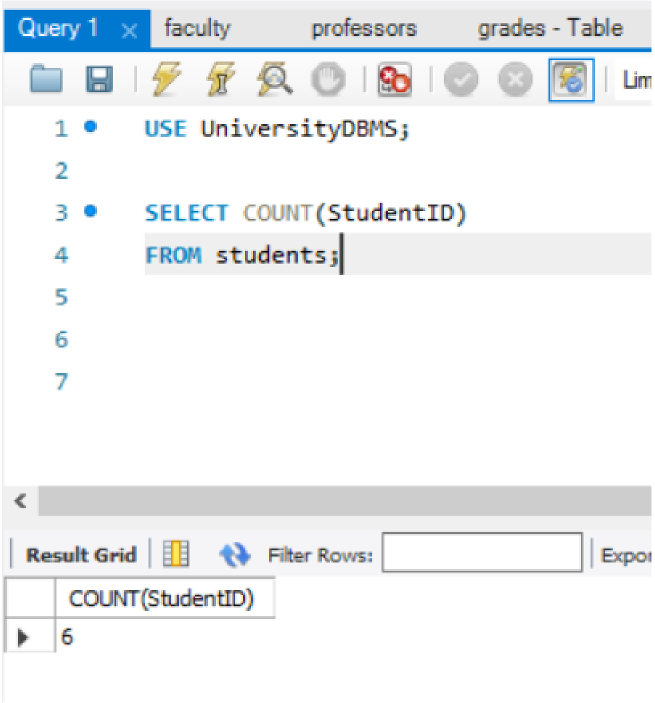


```
USE UniversityDBMS;

SELECT fname, lname, PhoneNumber, program
FROM students
WHERE program like "2"
ORDER BY lname ASC;
```

fname	lname	PhoneNumber	program
Abdul	Bhutta	6475001000	2
Usman	Bhutta	6475001000	2

View 10: Total students at the university.

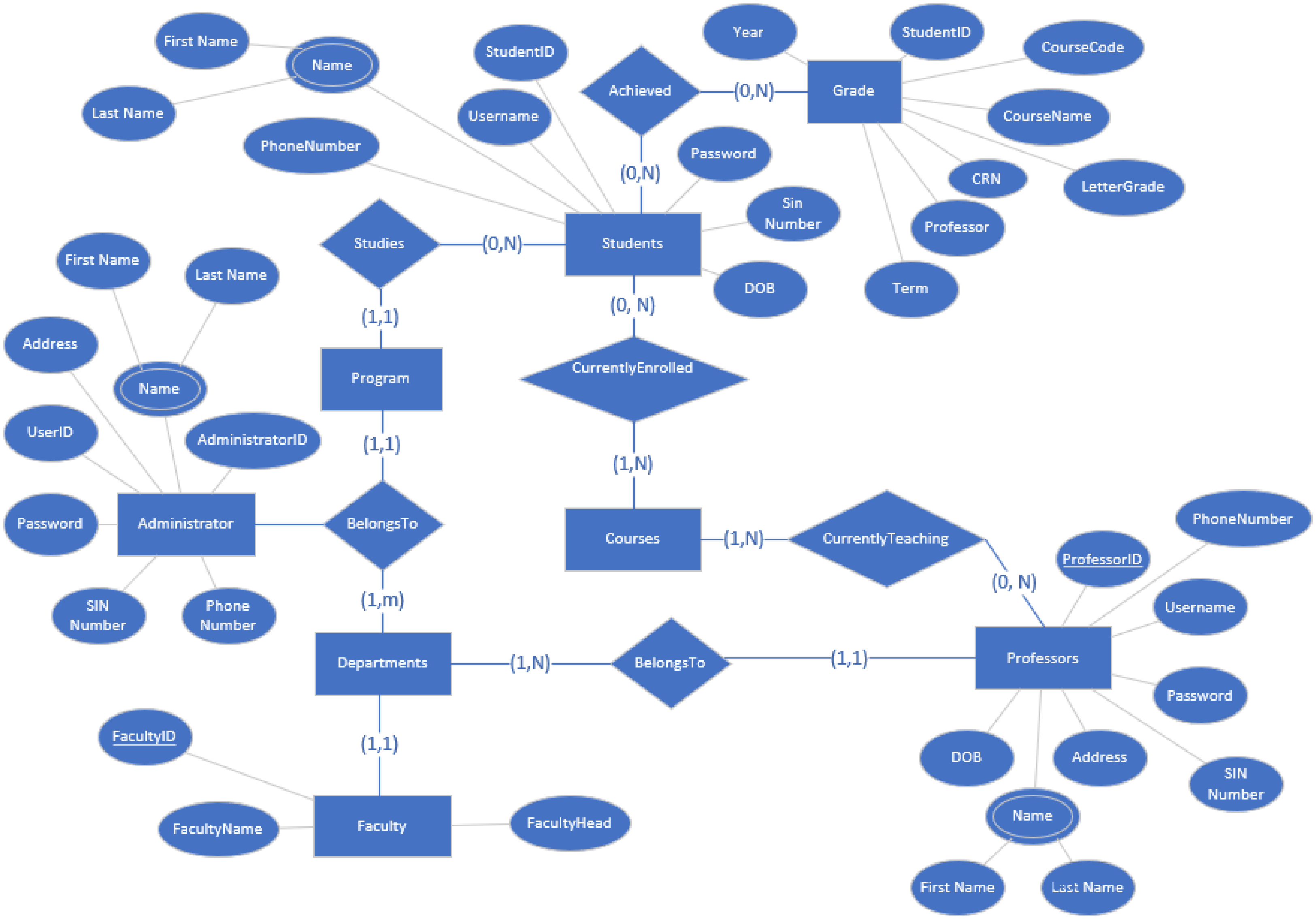
SELECT COUNT(StudentID)
FROM students;



```
USE UniversityDBMS;

SELECT COUNT(StudentID)
FROM students;
```

COUNT(StudentID)
6

Deliverable D – ER Diagram


First Name
Name
Last Name
StudentID
Username
PhoneNumber
Achieved
(0,N)
Year
Grade
StudentID
CourseCode
CourseName
Password
(0,N)
CRN
LetterGrade
Sin Number
Professor
Term
Studies
(0,N)
Students
DOB
(0, N)
First Name
Last Name
Address
Name
(1,1)
Program
CurrentlyEnrolled
UserID
AdministratorID
(1,1)
(1,N)
Password
Administrator
BelongsTo
Courses
(1,N)
CurrentlyTeaching
PhoneNumber
ProfessorID
(0, N)
Username
SIN Number
Phone Number
(1,m)
Departments
(1,N)
BelongsTo
(1,1)
Professors
Password
(1,1)
FacultyID
DOB
Address
SIN Number
FacultyName
Faculty
FacultyHead
Name
First Name
Last Name