



# SQL

CSCI 201

Principles of Software Development

Jeffrey Miller, Ph.D.  
*jeffrey.miller@usc.edu*



# Outline

- SELECT Statements
- Try It

# SELECT Statements



- SELECT statements are probably the most commonly used SQL statement
- A SELECT statement returns a table
- Consider the following database

Class

classID	prefix	num
1	CSCI	103
2	CSCI	104
3	CSCI	201
4	EE	101
5	EE	102

Student

studentID	fname	lname
1	Sheldon	Cooper
2	Leonard	Hofstadter
3	Howard	Wolowitz
4	Rajesh	Koothrappali

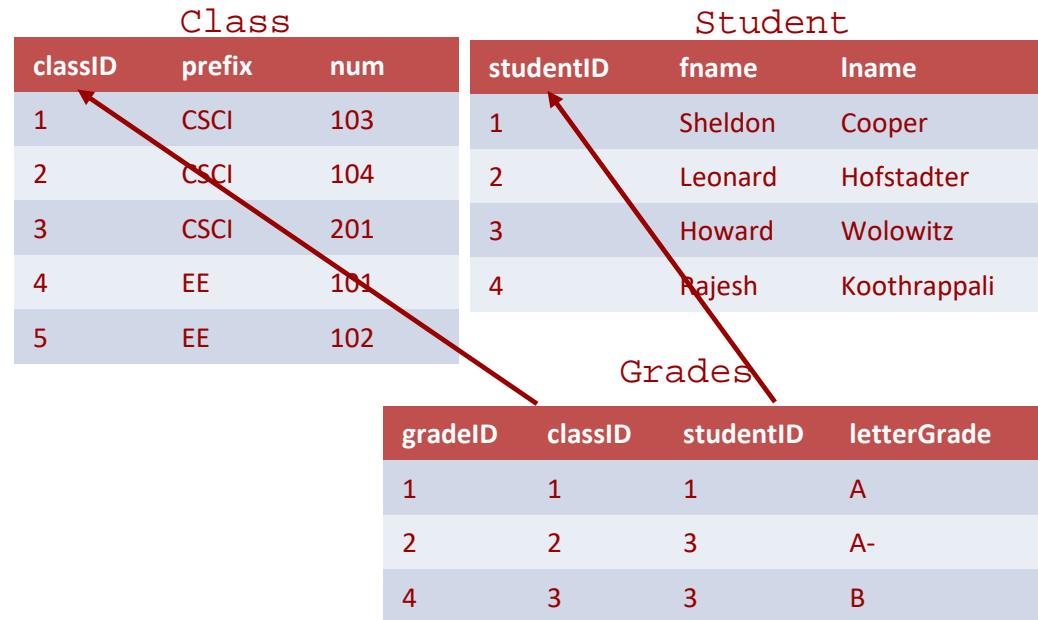
Grades

gradeID	classID	studentID	letterGrade
1	1	1	A
2	2	3	A-
4	3	3	B

# SELECT Example 1



```
SELECT *  
FROM Student  
WHERE studentID > 2;
```

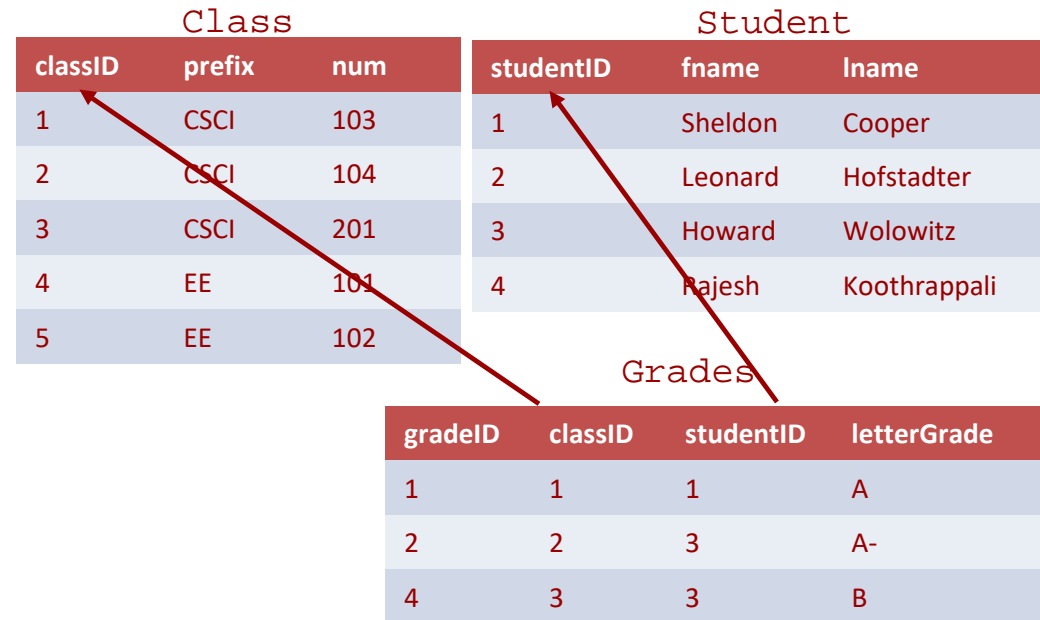


# SELECT Example 1



```
SELECT *  
FROM Student  
WHERE studentID > 2;
```

studentID	fname	lname
1	Sheldon	Cooper
2	Leonard	Hofstadter
3	Howard	Wolowitz
4	Rajesh	Koothrappali

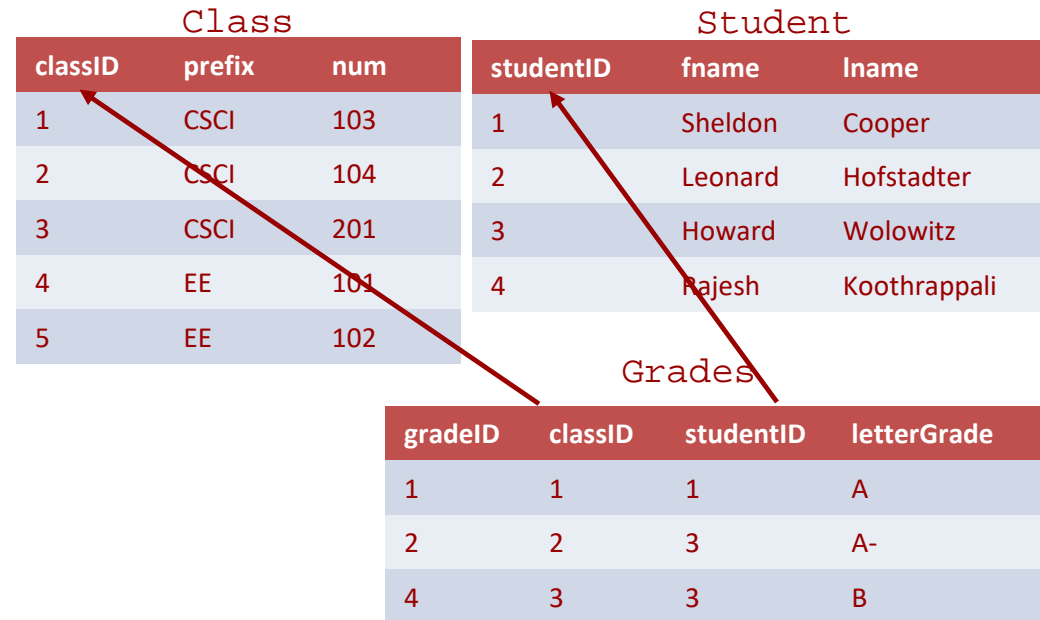


# SELECT Example 1



```
SELECT *  
FROM Student  
WHERE studentID > 2;
```

studentID	fname	lname
1	Sheldon	Cooper
2	Leonard	Hofstadter
3	Howard	Wolowitz
4	Rajesh	Koothrappali

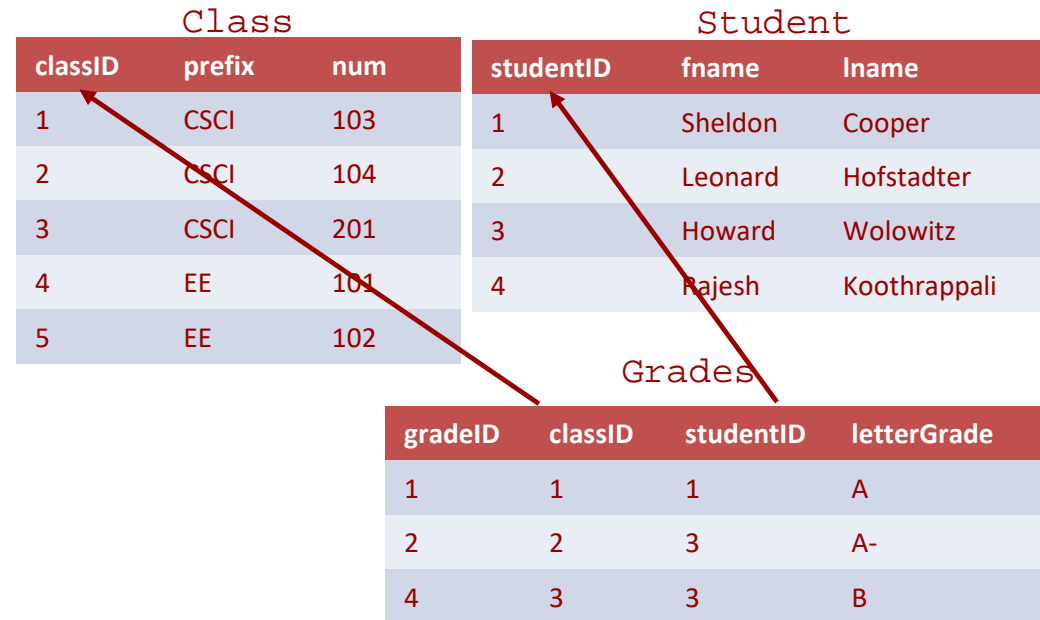


# SELECT Example 1



```
SELECT *  
FROM Student  
WHERE studentID > 2;
```

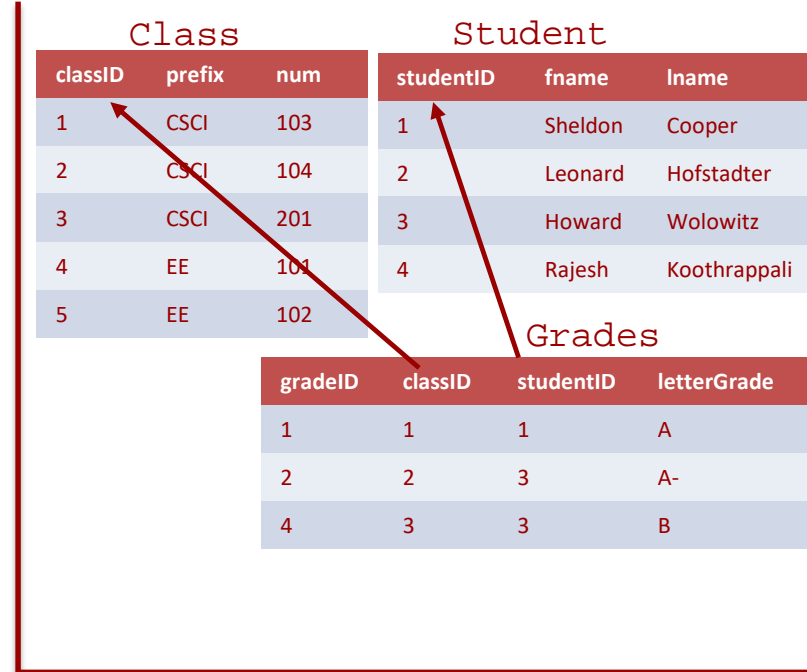
studentID	fname	lname
1	Sheldon	Cooper
2	Leonard	Hofstadter
3	Howard	Wolowitz
4	Rajesh	Koothrappali



# SELECT Example 2



```
SELECT *  
FROM Student s, Grades g  
WHERE fname = 'Howard';
```





# SELECT Example 2

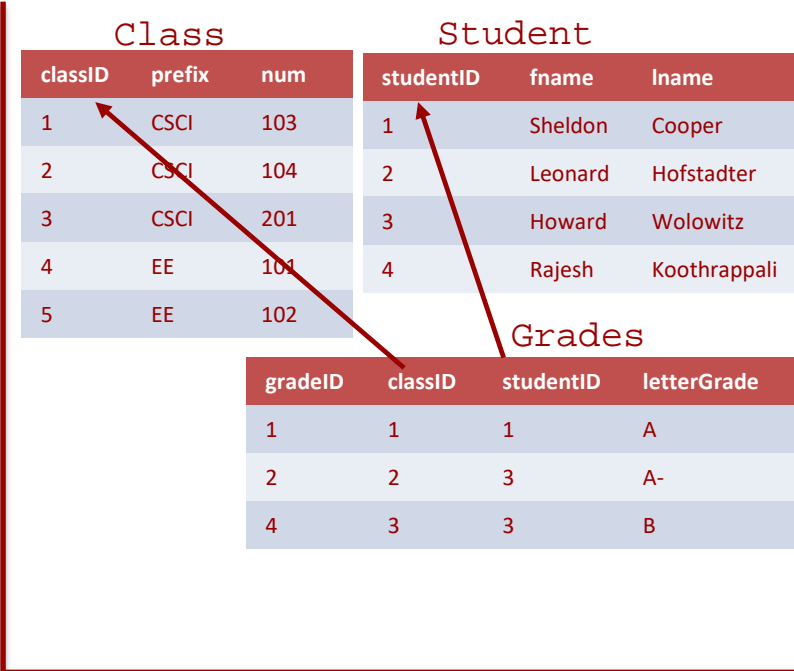


**SELECT \***

**FROM Student s, Grades g**

**WHERE fname = 'Howard';**

studentID	fname	lname	gradeID	classID	studentID	letterGrade
1	Sheldon	Cooper	1	1	1	A
2	Leonard	Hofstadter	1	1	1	A
3	Howard	Wolowitz	1	1	1	A
4	Rajesh	Koothrappali	1	1	1	A
1	Sheldon	Cooper	2	2	3	A-
2	Leonard	Hofstadter	2	2	3	A-
3	Howard	Wolowitz	2	2	3	A-
4	Rajesh	Koothrappali	2	2	3	A-
1	Sheldon	Cooper	4	3	3	B
2	Leonard	Hofstadter	4	3	3	B
3	Howard	Wolowitz	4	3	3	B
4	Rajesh	Koothrappali	4	3	3	B

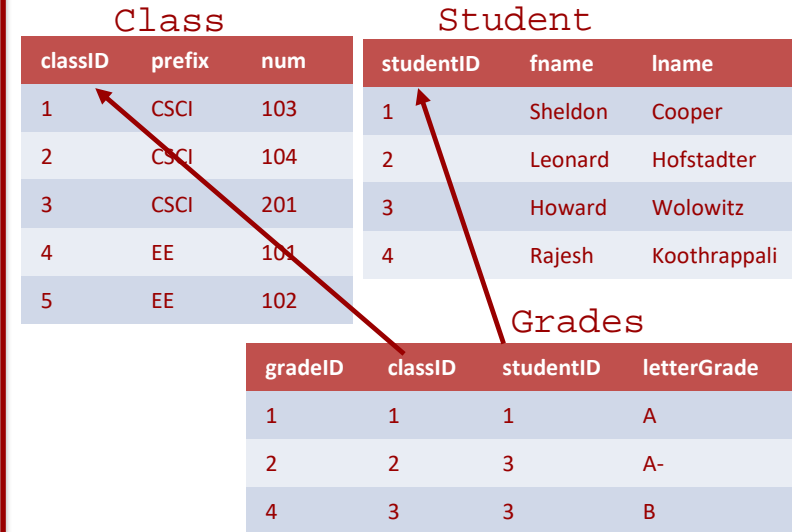


# SELECT Example 2



```
SELECT *  
FROM Student s, Grades g  
WHERE fname = 'Howard';
```

studentID	fname	lname	gradeID	classID	studentID	letterGrade
1	Sheldon	Cooper	1	1	1	A
2	Leonard	Hofstadter	1	1	1	A
3	Howard	Wolowitz	1	1	1	A
4	Rajesh	Koothrappali	1	1	1	A
1	Sheldon	Cooper	2	2	3	A-
2	Leonard	Hofstadter	2	2	3	A-
3	Howard	Wolowitz	2	2	3	A-
4	Rajesh	Koothrappali	2	2	3	A-
1	Sheldon	Cooper	4	3	3	B
2	Leonard	Hofstadter	4	3	3	B
3	Howard	Wolowitz	4	3	3	B
4	Rajesh	Koothrappali	4	3	3	B



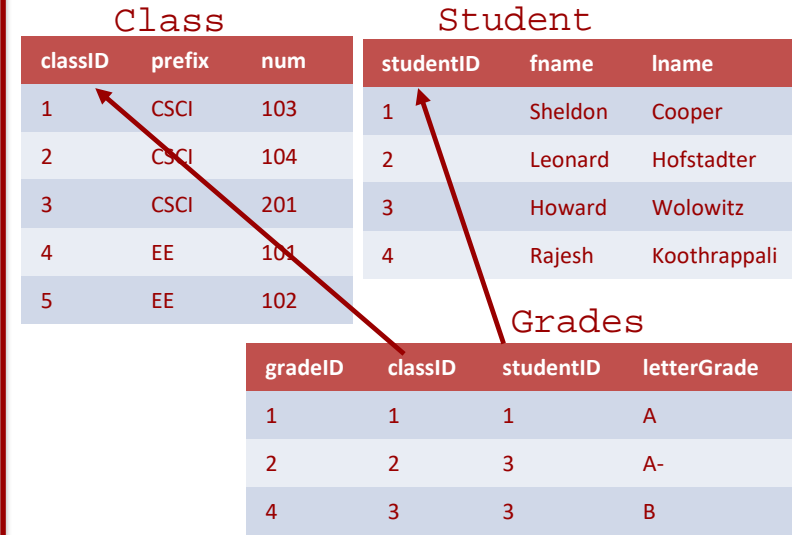
# SELECT Example 2



SELECT \*

```
FROM Student s, Grades g
WHERE fname = 'Howard';
```

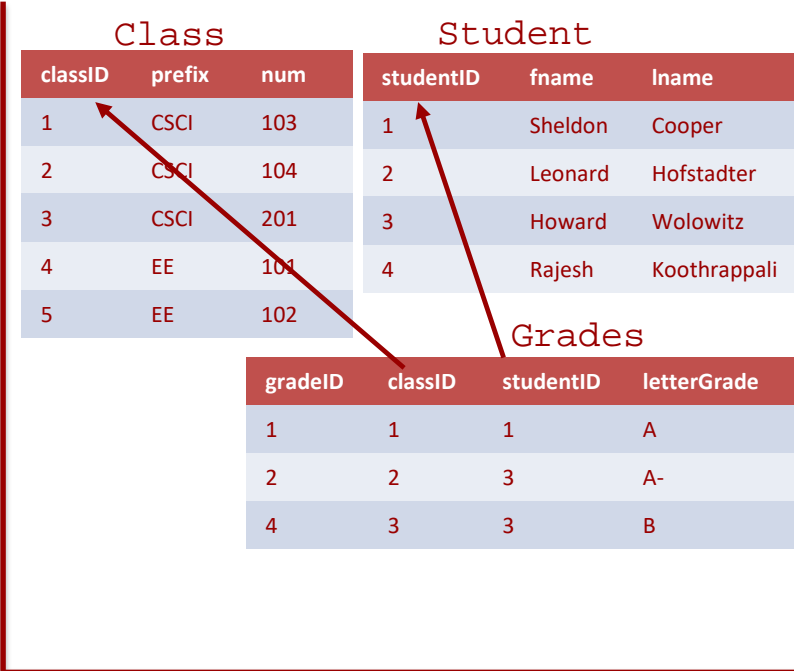
studentID	fname	lname	gradeID	classID	studentID	letterGrade
1	Sheldon	Cooper	1	1	1	A
2	Leonard	Hofstadter	1	1	1	A
3	Howard	Wolowitz	1	1	1	A
4	Rajesh	Koothrappali	1	1	1	A
1	Sheldon	Cooper	2	2	3	A-
2	Leonard	Hofstadter	2	2	3	A-
3	Howard	Wolowitz	2	2	3	A-
4	Rajesh	Koothrappali	2	2	3	A-
1	Sheldon	Cooper	4	3	3	B
2	Leonard	Hofstadter	4	3	3	B
3	Howard	Wolowitz	4	3	3	B
4	Rajesh	Koothrappali	4	3	3	B



# SELECT Example 3



```
SELECT s.fname, g.letterGrade
FROM Student s, Grades g
WHERE fname = 'Howard'
AND s.studentID=g.studentID;
```

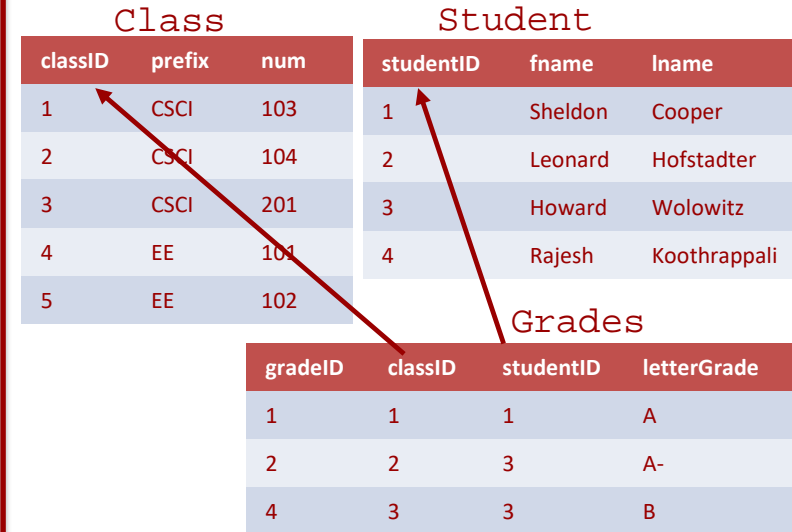


# SELECT Example 3



```
SELECT s.fname, g.letterGrade
FROM Student s, Grades g
WHERE fname = 'Howard'
AND s.studentID=g.studentID;
```

studentID	fname	lname	gradeID	classID	studentID	letterGrade
1	Sheldon	Cooper	1	1	1	A
2	Leonard	Hofstadter	1	1	1	A
3	Howard	Wolowitz	1	1	1	A
4	Rajesh	Koothrappali	1	1	1	A
1	Sheldon	Cooper	2	2	3	A-
2	Leonard	Hofstadter	2	2	3	A-
3	Howard	Wolowitz	2	2	3	A-
4	Rajesh	Koothrappali	2	2	3	A-
1	Sheldon	Cooper	4	3	3	B
2	Leonard	Hofstadter	4	3	3	B
3	Howard	Wolowitz	4	3	3	B
4	Rajesh	Koothrappali	4	3	3	B

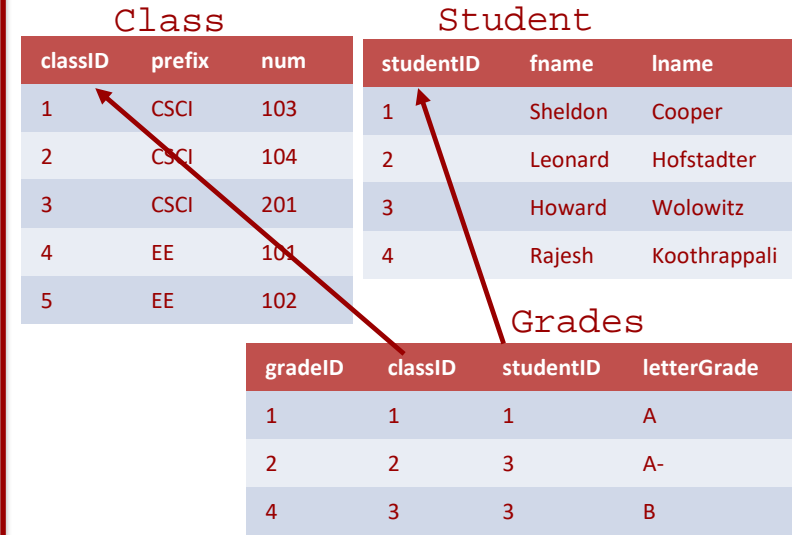


# SELECT Example 3



```
SELECT s.fname, g.letterGrade
FROM Student s, Grades g
WHERE fname = 'Howard'
AND s.studentID=g.studentID;
```

studentID	fname	lname	gradeID	classID	studentID	letterGrade
1	Sheldon	Cooper	1	1	1	A
2	Leonard	Hofstadter	1	1	1	A
3	Howard	Wolowitz	1	1	1	A
4	Rajesh	Koothrappali	1	1	1	A
1	Sheldon	Cooper	2	2	3	A-
2	Leonard	Hofstadter	2	2	3	A-
3	Howard	Wolowitz	2	2	3	A-
4	Rajesh	Koothrappali	2	2	3	A-
1	Sheldon	Cooper	4	3	3	B
2	Leonard	Hofstadter	4	3	3	B
3	Howard	Wolowitz	4	3	3	B
4	Rajesh	Koothrappali	4	3	3	B

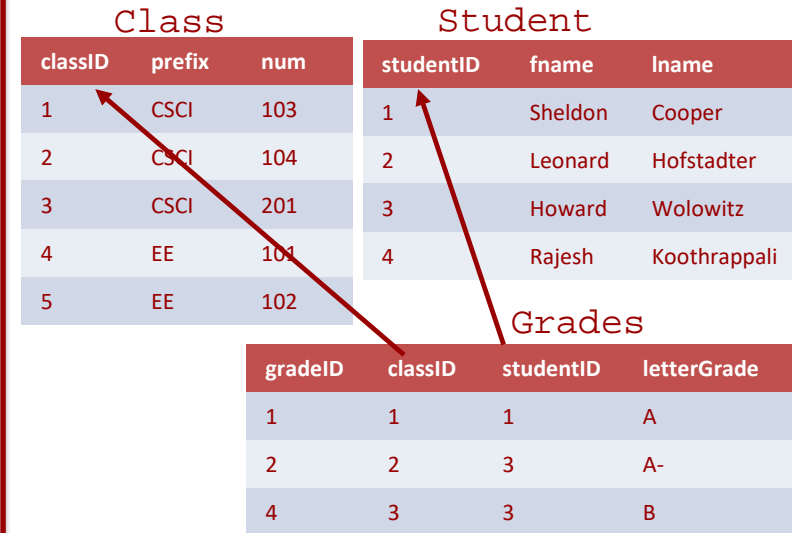


# SELECT Example 3



```
SELECT s.fname, g.letterGrade
FROM Student s, Grades g
WHERE fname = 'Howard'
AND s.studentID=g.studentID;
```

studentID	fname	lname	gradeID	classID	studentID	letterGrade
1	Sheldon	Cooper	1	1	1	A
2	Leonard	Hofstadter	1	1	1	A
3	Howard	Wolowitz	1	1	1	A
4	Rajesh	Koothrappali	1	1	1	A
1	Sheldon	Cooper	2	2	3	A-
2	Leonard	Hofstadter	2	2	3	A-
3	Howard	Wolowitz	2	2	3	A-
4	Rajesh	Koothrappali	2	2	3	A-
1	Sheldon	Cooper	4	3	3	B
2	Leonard	Hofstadter	4	3	3	B
3	Howard	Wolowitz	4	3	3	B
4	Rajesh	Koothrappali	4	3	3	B

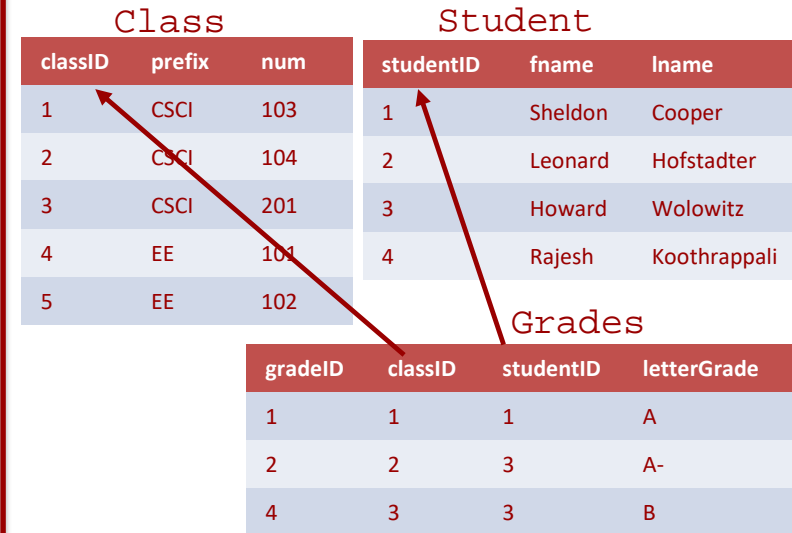


# SELECT Example 3



```
SELECT s.fname, g.letterGrade
FROM Student s, Grades g
WHERE fname = 'Howard'
AND s.studentID=g.studentID;
```

studentID	fname	lname	gradeID	classID	studentID	letterGrade
1	Sheldon	Cooper	1	1	1	A
2	Leonard	Hofstadter	1	1	1	A
3	Howard	Wolowitz	1	1	1	A
4	Rajesh	Koothrappali	1	1	1	A
1	Sheldon	Cooper	2	2	3	A-
2	Leonard	Hofstadter	2	2	3	A-
3	Howard	Wolowitz	2	2	3	A-
4	Rajesh	Koothrappali	2	2	3	A-
1	Sheldon	Cooper	4	3	3	B
2	Leonard	Hofstadter	4	3	3	B
3	Howard	Wolowitz	4	3	3	B
4	Rajesh	Koothrappali	4	3	3	B



fname	letterGrade
Howard	A-
Howard	B





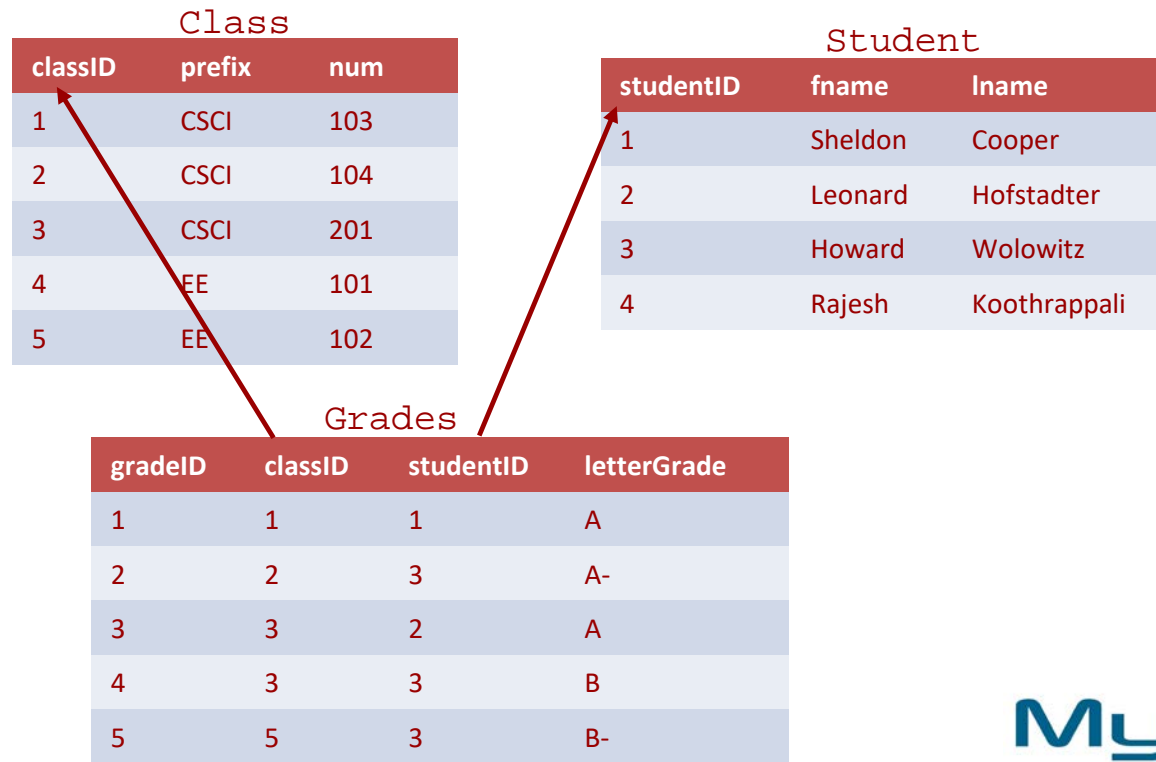
# Outline

- SELECT Statements
- Try It

# Database Creation



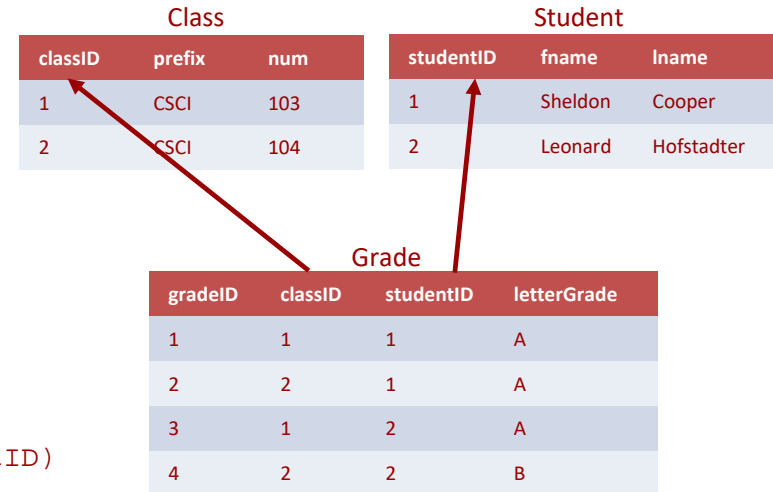
- Create the following database.



# Sample Script



```
1 DROP DATABASE if exists StudentGrades;
2 CREATE DATABASE StudentGrades;
3 USE StudentGrades;
4 CREATE TABLE Student (
5     studentID int(11) primary key not null auto_increment,
6     fname varchar(50) not null,
7     lname varchar(50) not null
8 );
9 INSERT INTO Student (fname, lname) VALUES ('Sheldon', 'Cooper');
10 INSERT INTO Student (fname, lname) VALUES ('Leonard', 'Hofstadter');
11 CREATE TABLE Class (
12     classID int(11) primary key not null auto_increment,
13     prefix varchar(5) not null,
14     num int(4) not null
15 );
16 INSERT INTO Class (prefix, num) VALUES ('CSCI', 103);
17 INSERT INTO Class (prefix, num) VALUES ('CSCI', 104);
18 CREATE TABLE Grade (
19     gradeID int(11) primary key not null auto_increment,
20     classID int(11) not null,
21     studentID int(11) not null,
22     letterGrade varchar(2) not null,
23     FOREIGN KEY fk1(classID) REFERENCES class(classID),
24     FOREIGN KEY fk2(studentID) REFERENCES student(studentID)
25 );
26 INSERT INTO Grade (studentID, classID, letterGrade) VALUES (1, 1, 'A');
27 INSERT INTO Grade (studentID, classID, letterGrade) VALUES (1, 2, 'A');
28 INSERT INTO Grade (studentID, classID, letterGrade) VALUES (2, 1, 'A');
29 INSERT INTO Grade (studentID, classID, letterGrade) VALUES (2, 2, 'B');
```



# SQL Queries



- Write SQL code to do the following
  - › Print out all of the classes offered
  - › Print out all of the students without the `studentID` value
  - › Print out the name, grade, and class for all students in all of the classes
  - › Print out the name and grade for each student in CSCI 201
  - › Print out the classes and grades for Sheldon Cooper



SQL



# SQL Queries Solution



- Write SQL code to do the following
  - › Print out all of the classes offered
    - `SELECT * FROM class;`
  - › Print out all of the students without the studentID value
    - `SELECT fname, lname FROM student;`
  - › Print out the name, grade, and class for all students in all of the classes
    - `SELECT s.fname, s.lname, c.prefix, c.num, g.letterGrade FROM student s, grade g, class c WHERE c.classID=g.classID AND s.studentID=g.studentID ORDER BY s.fname, s.lname, c.prefix, c.num;`
  - › Print out the name and grade for each student in CSCI 103
    - `SELECT s.fname, s.lname, g.letterGrade FROM student s, grade g, class c WHERE s.studentID=g.studentID AND g.classID=c.classID AND c.prefix='CSCI' AND c.num=103;`
  - › Print out the class and grades for Sheldon Cooper
    - `SELECT c.prefix, c.num, g.letterGrade FROM student s, grade g, class c WHERE c.classID=g.classID AND s.studentID=g.studentID AND s.fname='Sheldon' AND s.lname='Cooper';`

# SQL Statements



- Write SQL code to do the following
  - › Insert CSCI 170 into the database
  - › Change Howard's grade in CSCI 201 to a C+
  - › Add Amy Farrah Fowler into the Student table
  - › Give Amy a grade of A for CSCI 103
  - › Give Amy a grade of B+ for CSCI 170



Note: To be able to perform an UPDATE in MySQL Workbench, you must disable Safe Updates by going to Edit->Preferences->SQL Editor and unchecking the Safe Updates box.

# SQL Queries Solution



- Write SQL code to do the following
  - › Insert CSCI 170 into the database
    - `INSERT INTO class (prefix, num) VALUES ('CSCI', 170);`
  - › Change Howard's grade in EE 101 to a C+
    - `UPDATE grade g, student s, class c SET g.letterGrade='C+' WHERE s.studentID=g.studentID AND s.fname='Howard' AND s.lname='Wolowitz' AND g.classID=c.classID AND c.prefix='CSCI' AND c.num='201';`
  - › Add Amy Farrah Fowler into the Student table
    - `INSERT INTO student (fname, lname) VALUES ('Amy', 'Farrah Fowler');`
  - › Give Amy a grade of A for CSCI 103
    - `INSERT INTO grade (classID, studentID, letterGrade) VALUES ((SELECT classID FROM class WHERE prefix='CSCI' AND num=103), (SELECT studentID FROM student WHERE fname='Amy' AND lname='Farrah Fowler'), 'A');`
  - › Give Amy a grade of B+ for CSCI 170
    - `INSERT INTO grade (classID, studentID, letterGrade) VALUES ((SELECT classID FROM class WHERE prefix='CSCI' AND num=170), (SELECT studentID FROM student WHERE fname='Amy' AND lname='Farrah Fowler'), 'B+');`