SQL Demo: Student-Teacher Database

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Student-Teacher Database

STUDENT-TEACHING

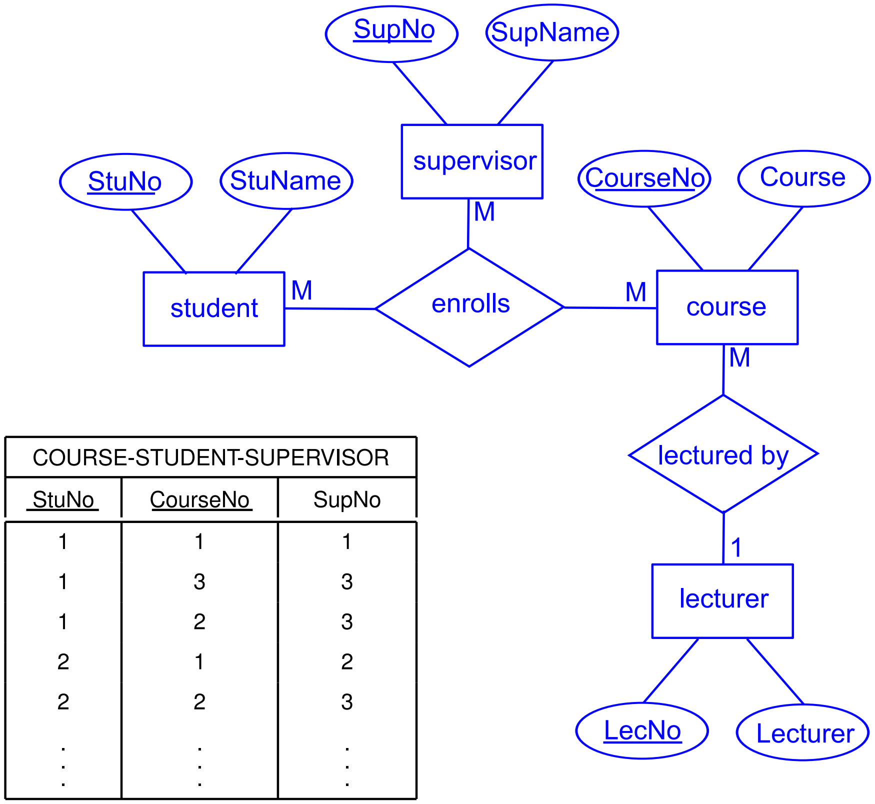
StuNo	Name	Course1	Lecturer1	Supervis1	Course2	Lecturer2	Supervis2	Course3	Lecturer3	Supervis3
1	Alice	maths	Gauss	Black	structures	Brunel	Brown	mechanics	Brunel	Brown
2	Bob	maths	Gauss	White	mechanics	Brunel	Brown			
3	Chris	mechanics	Brunel	Greene	structures	Brunel	Brown	inf. eng.	Shannon	White
4	David	inf. eng.	Shannon	Black	mechanics	Brunel	Greene			
5	Eve	maths	Gauss	White	inf. eng	Shannon	White	structures	Brunel	Greene
6	Fred	inf. eng.	Shannon	Black						

SUPERVISOR

SupNo	SupName
1	Black
2	White
3	Brown
4	Greene

STUDENT

StuNo	StuName
1	Alice
2	Bob
3	Chris
4	David
5	Eve
6	Fred



COURSE-STUDENT-SUPERVISOR

StuNo	CourseNo	SupNo
1	1	1
1	3	3
1	2	3
2	1	2
2	2	3
⋮	⋮	⋮

COURSE

CourseNo	Course
1	maths
2	mechanics
3	structures
4	inf. eng.

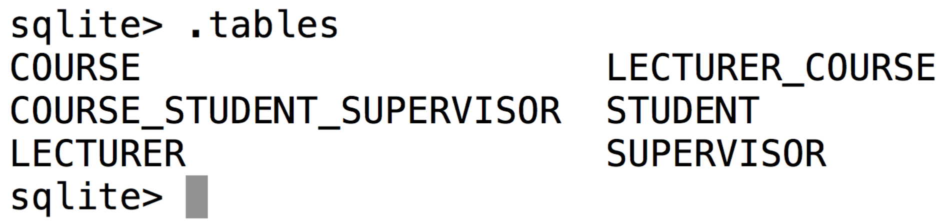
COURSE-LECTURER

CourseNo	LecturerNo
1	1
2	2
3	2
4	3

LECTURER

LecturerNo	Lecturer
1	Gauss
2	Brunel
3	Shannon

The Tables

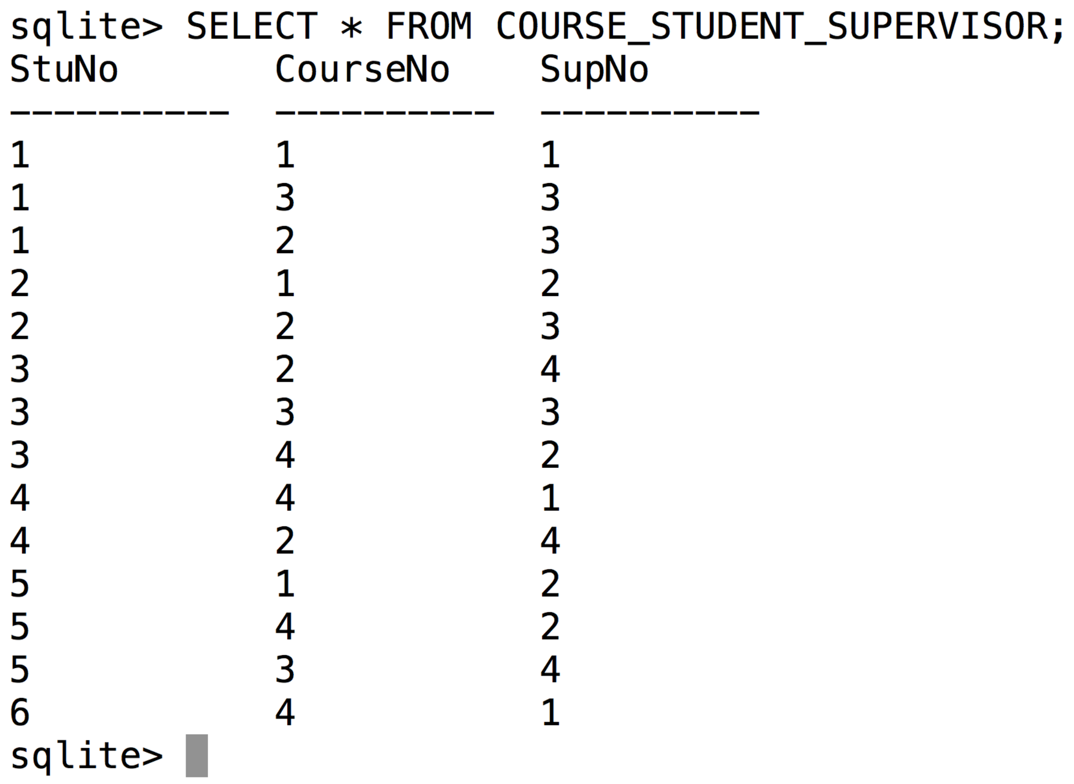


```
sqlite> .tables
COURSE                      LECTURER_COURSE
COURSE_STUDENT_SUPERVISOR   STUDENT
LECTURER                    SUPERVISOR
sqlite> 
```

Viewing tables

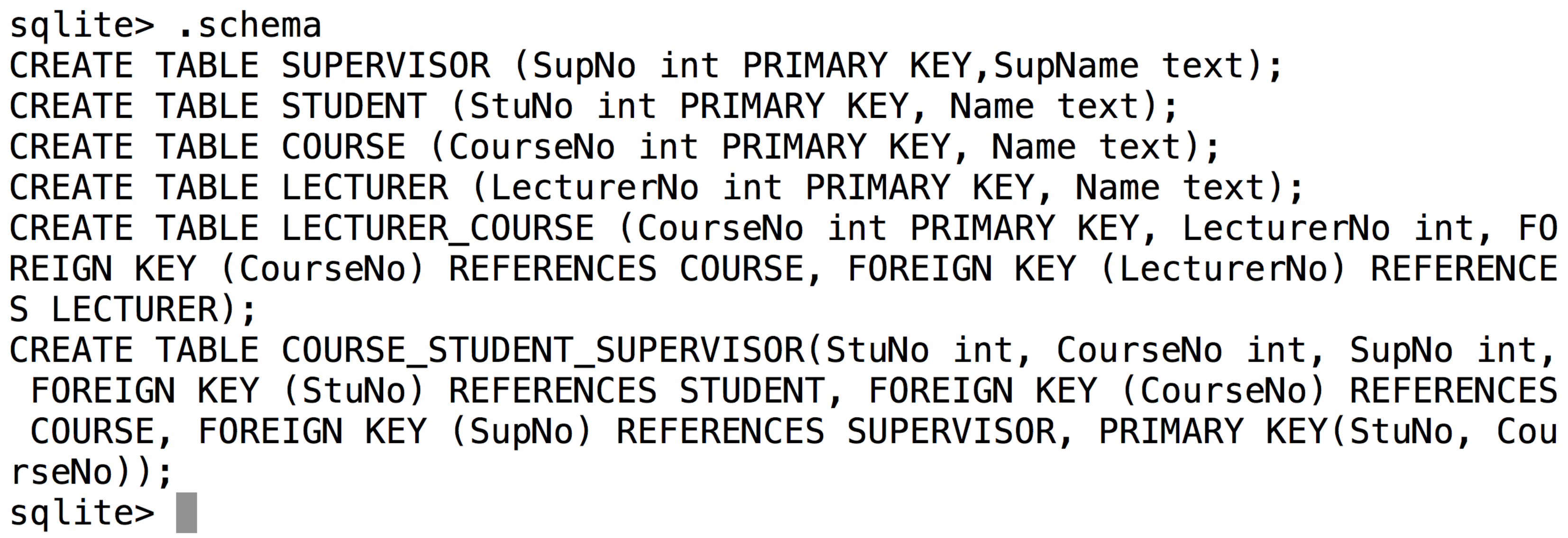
```
sqlite> SELECT * FROM LECTURER;
LecturerNo  Name
----------  ----------
1           Gauss
2           Brunel
3           Shannon
4           Punskaya
sqlite> 
```

Viewing tables



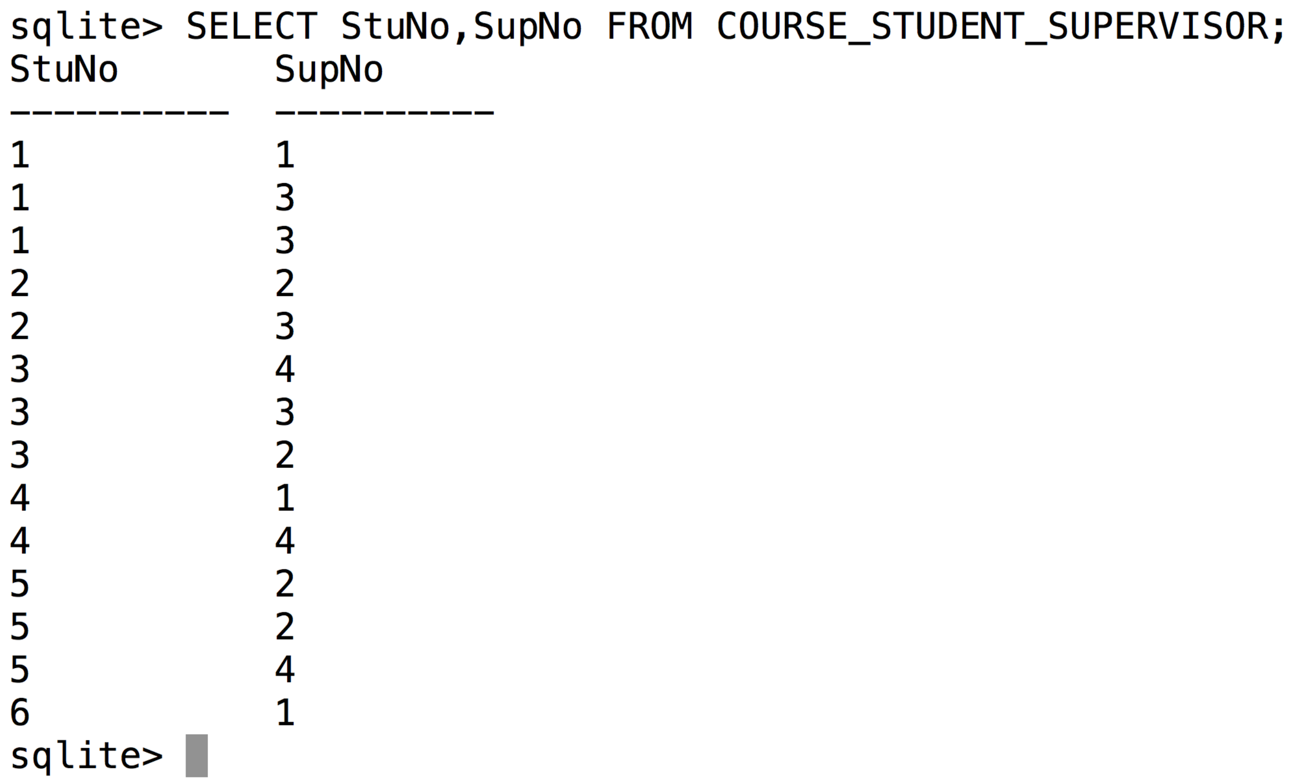
```
sqlite> SELECT * FROM COURSE_STUDENT_SUPERVISOR;
StuNo       CourseNo    SupNo
----------  ----------  ----------
1           1           1
1           3           3
1           2           3
2           1           2
2           2           3
3           2           4
3           3           3
3           4           2
4           4           1
4           2           4
5           1           2
5           4           2
5           3           4
6           4           1
sqlite> 
```

Schema (table schemes)



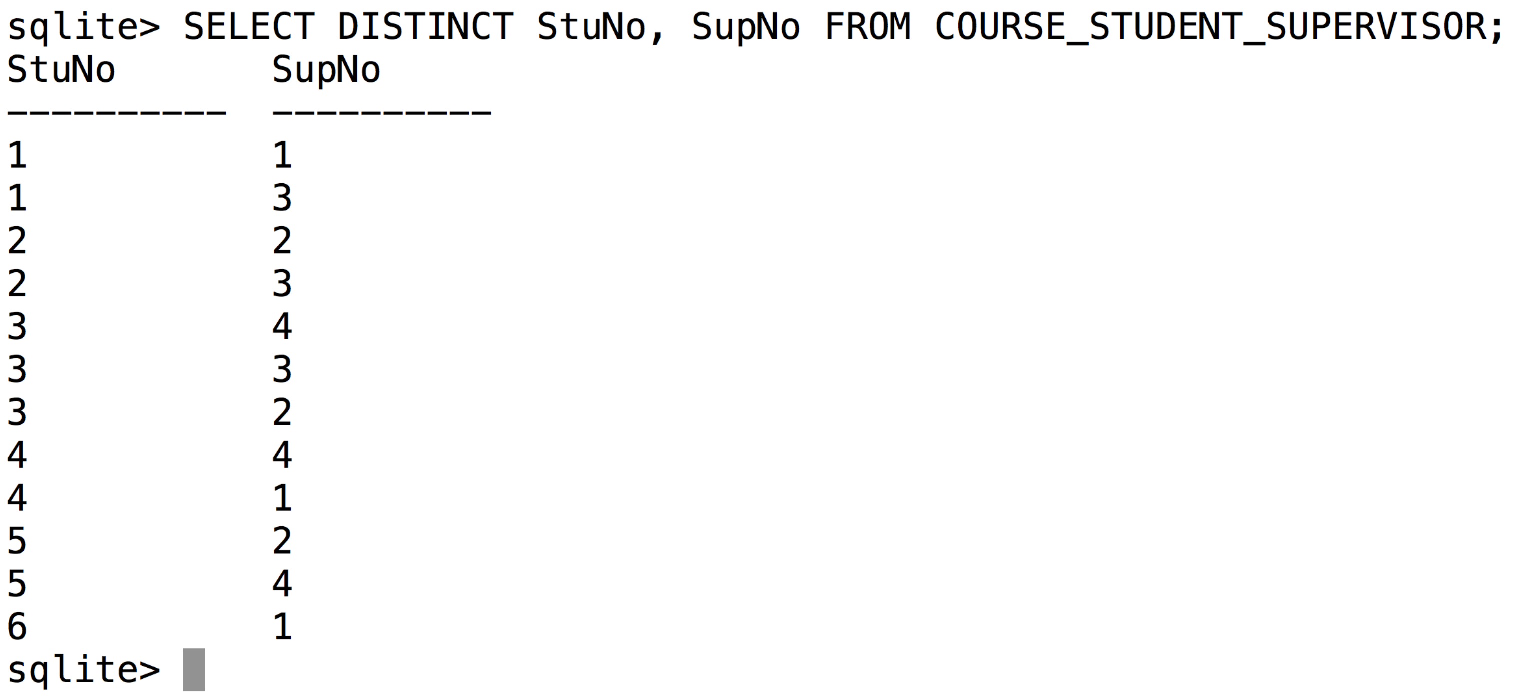
```
sqlite> .schema
CREATE TABLE SUPERVISOR (SupNo int PRIMARY KEY,SupName text);
CREATE TABLE STUDENT (StuNo int PRIMARY KEY, Name text);
CREATE TABLE COURSE (CourseNo int PRIMARY KEY, Name text);
CREATE TABLE LECTURER (LecturerNo int PRIMARY KEY, Name text);
CREATE TABLE LECTURER_COURSE (CourseNo int PRIMARY KEY, LecturerNo int, FO
REIGN KEY (CourseNo) REFERENCES COURSE, FOREIGN KEY (LecturerNo) REFERENCE
S LECTURER);
CREATE TABLE COURSE_STUDENT_SUPERVISOR(StuNo int, CourseNo int, SupNo int,
 FOREIGN KEY (StuNo) REFERENCES STUDENT, FOREIGN KEY (CourseNo) REFERENCES
 COURSE, FOREIGN KEY (SupNo) REFERENCES SUPERVISOR, PRIMARY KEY(StuNo, Cou
rseNo));
sqlite> 
```

Projection (repeated elements)



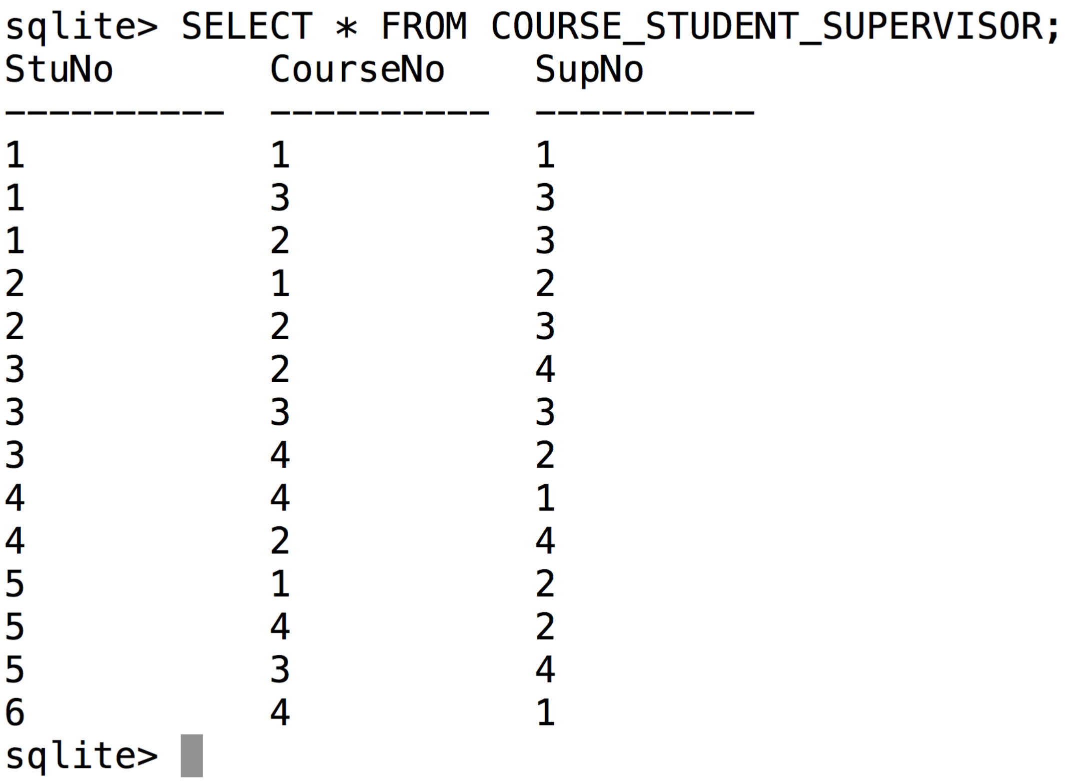
```
sqlite> SELECT StuNo,SupNo FROM COURSE_STUDENT_SUPERVISOR;
StuNo       SupNo
----------  ----------
1           1
1           3
1           3
2           2
2           3
3           4
3           3
3           2
4           1
4           4
5           2
5           2
5           4
6           1
sqlite> 
```

Projection (no repeated elements)



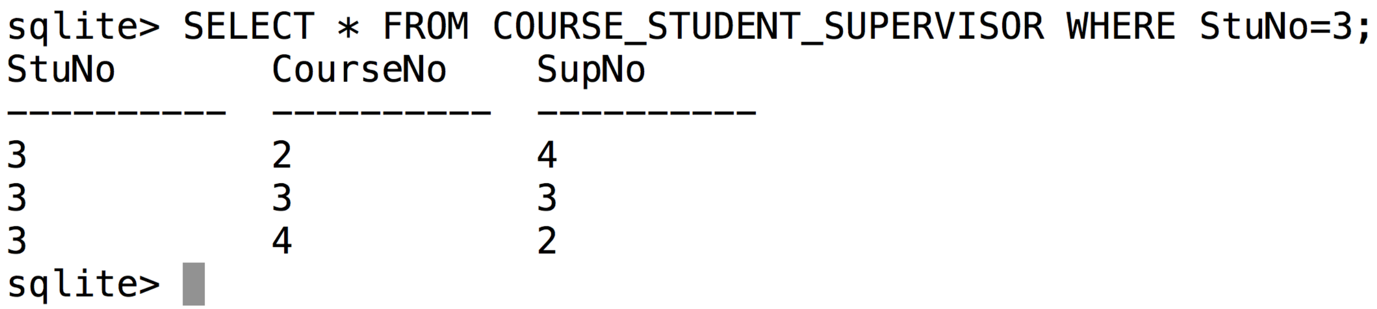
```
sqlite> SELECT DISTINCT StuNo, SupNo FROM COURSE_STUDENT_SUPERVISOR;
StuNo       SupNo
----------  ----------
1           1
1           3
2           2
2           3
3           4
3           3
3           2
4           4
4           1
5           2
5           4
6           1
sqlite> 
```

Projection (identity projection)



```
sqlite> SELECT * FROM COURSE_STUDENT_SUPERVISOR;
StuNo       CourseNo    SupNo
----------  ----------  ----------
1           1           1
1           3           3
1           2           3
2           1           2
2           2           3
3           2           4
3           3           3
3           4           2
4           4           1
4           2           4
5           1           2
5           4           2
5           3           4
6           4           1
sqlite> 
```

Selection (simple)

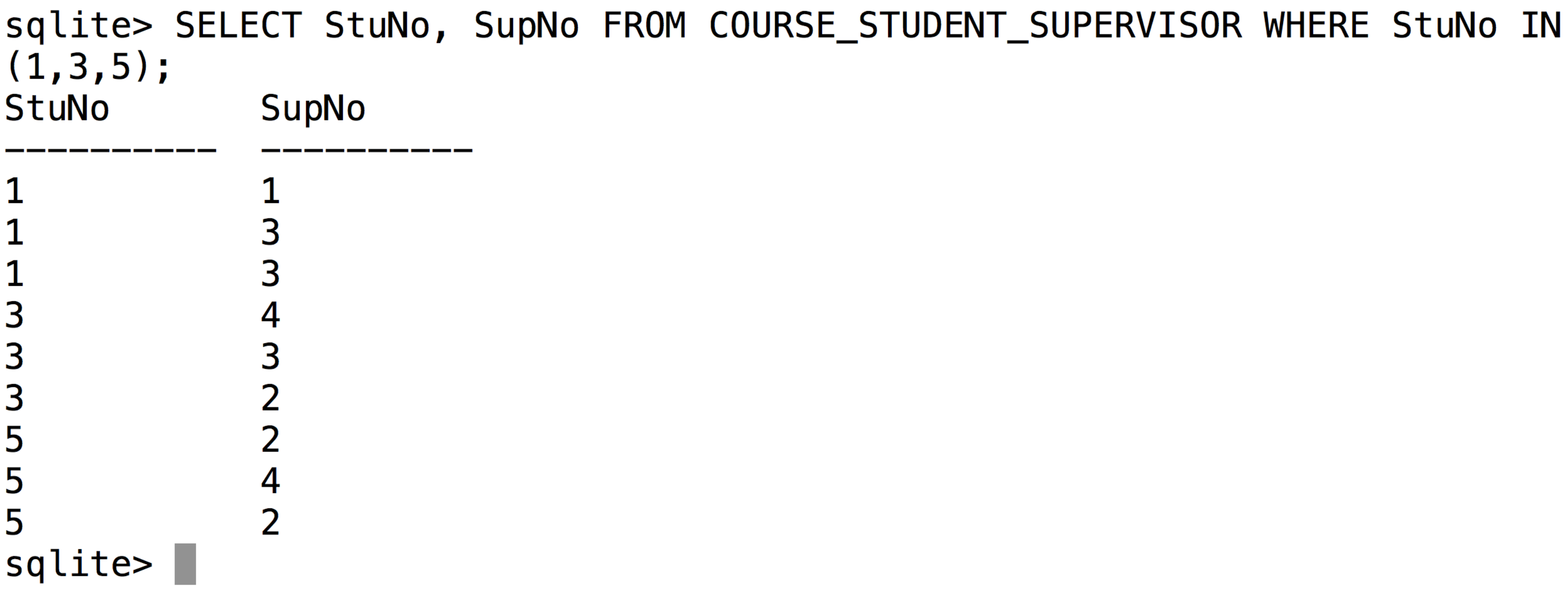


```
sqlite> SELECT * FROM COURSE_STUDENT_SUPERVISOR WHERE StuNo=3;
StuNo       CourseNo    SupNo
----------  ----------  ----------
3           2           4
3           3           3
3           4           2
sqlite> 
```

Selection (complex)

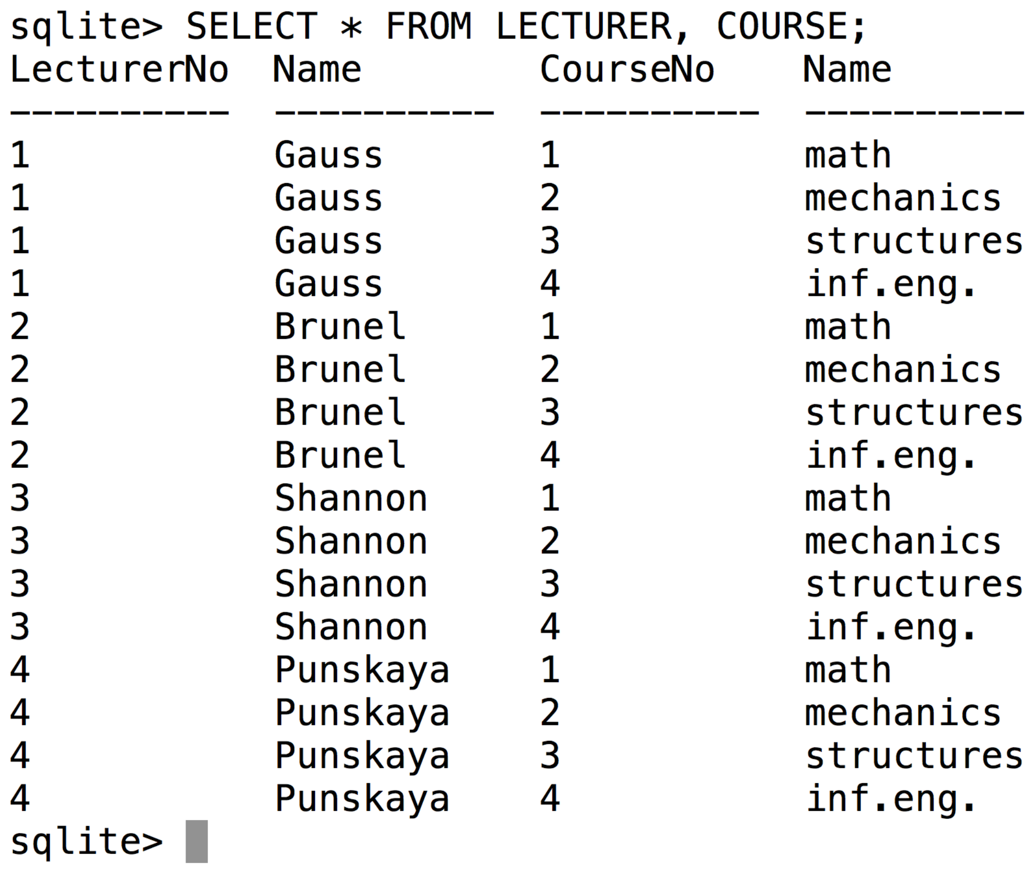
```
sqlite> SELECT * FROM COURSE_STUDENT_SUPERVISOR WHERE StuNo IN (1,3,5);
StuNo       CourseNo    SupNo
----------  ----------  ----------
1           1           1
1           2           3
1           3           3
3           2           4
3           3           3
3           4           2
5           1           2
5           3           4
5           4           2
sqlite> 
```

Selection and Projection combine



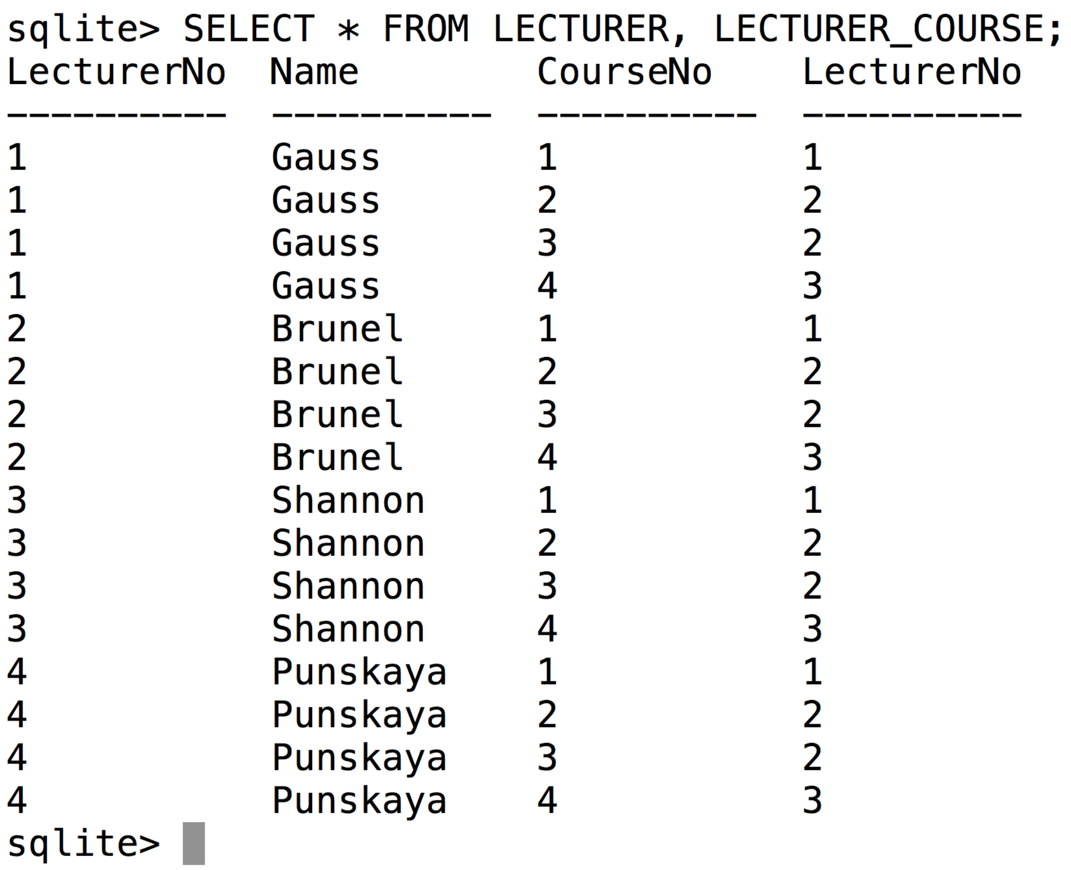
```
sqlite> SELECT StuNo, SupNo FROM COURSE_STUDENT_SUPERVISOR WHERE StuNo IN
(1,3,5);
StuNo       SupNo
----------  ----------
1           1
1           3
1           3
3           4
3           3
3           2
5           2
5           4
5           2
sqlite> 
```

Cartesian Product



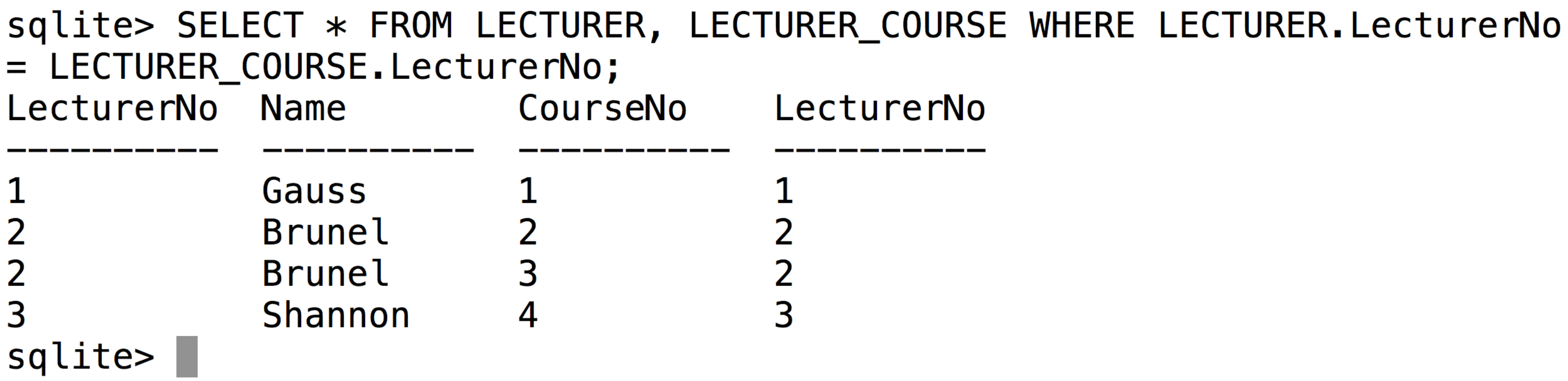
```
sqlite> SELECT * FROM LECTURER, COURSE;
LecturerNo  Name        CourseNo    Name
----------  ----------  ----------  ----------
1           Gauss       1           math
1           Gauss       2           mechanics
1           Gauss       3           structures
1           Gauss       4           inf.eng.
2           Brunel      1           math
2           Brunel      2           mechanics
2           Brunel      3           structures
2           Brunel      4           inf.eng.
3           Shannon     1           math
3           Shannon     2           mechanics
3           Shannon     3           structures
3           Shannon     4           inf.eng.
4           Punskaya    1           math
4           Punskaya    2           mechanics
4           Punskaya    3           structures
4           Punskaya    4           inf.eng.
sqlite> 
```

Cartesian Product



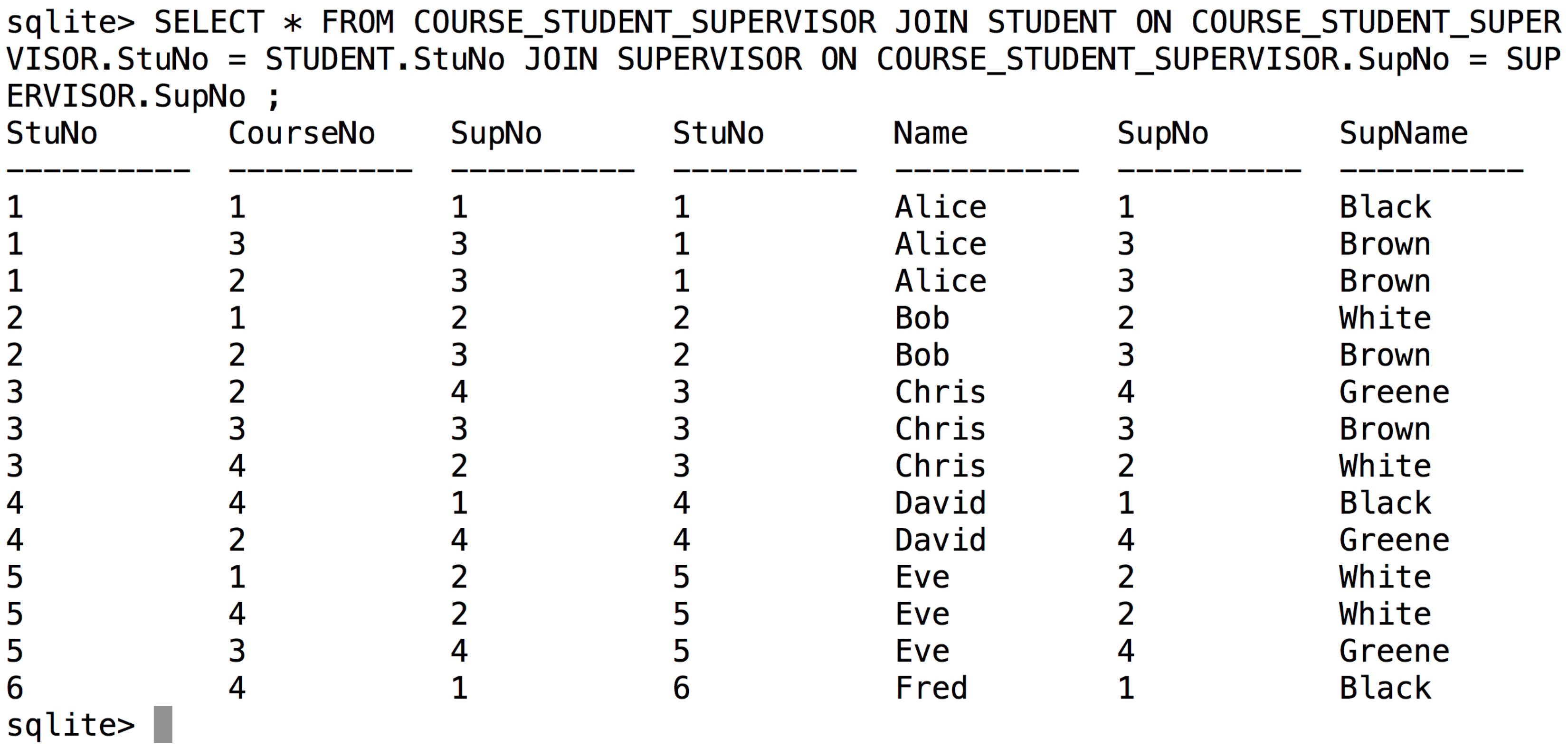
```
sqlite> SELECT * FROM LECTURER, LECTURER_COURSE;
LecturerNo  Name        CourseNo    LecturerNo
----------  ----------  ----------  ----------
1           Gauss       1           1
1           Gauss       2           2
1           Gauss       3           2
1           Gauss       4           3
2           Brunel      1           1
2           Brunel      2           2
2           Brunel      3           2
2           Brunel      4           3
3           Shannon     1           1
3           Shannon     2           2
3           Shannon     3           2
3           Shannon     4           3
4           Punskaya    1           1
4           Punskaya    2           2
4           Punskaya    3           2
4           Punskaya    4           3
sqlite> 
```

Cartesian Product + Selection = Join



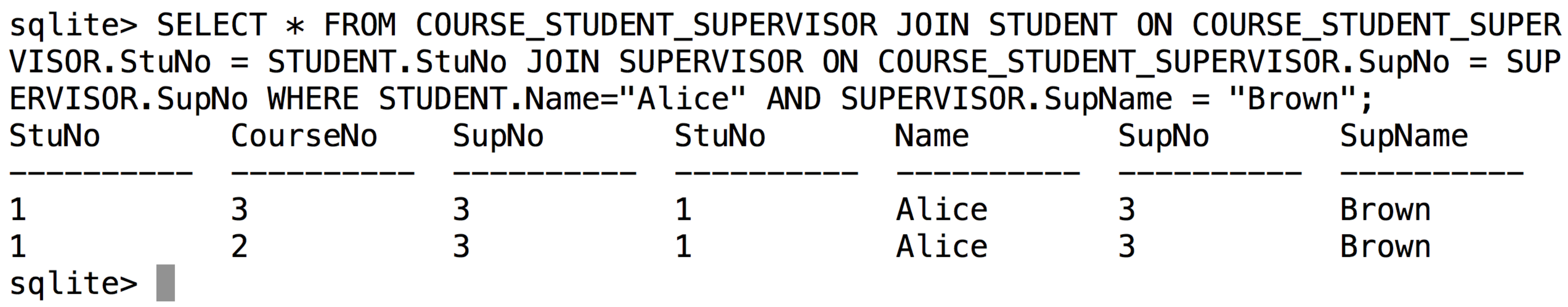
```
sqlite> SELECT * FROM LECTURER, LECTURER_COURSE WHERE LECTURER.LecturerNo
= LECTURER_COURSE.LecturerNo;
LecturerNo  Name        CourseNo    LecturerNo
----------  ----------  ----------  ----------
1           Gauss       1           1
2           Brunel      2           2
2           Brunel      3           2
3           Shannon     4           3
sqlite> 
```

Simple query: step 1



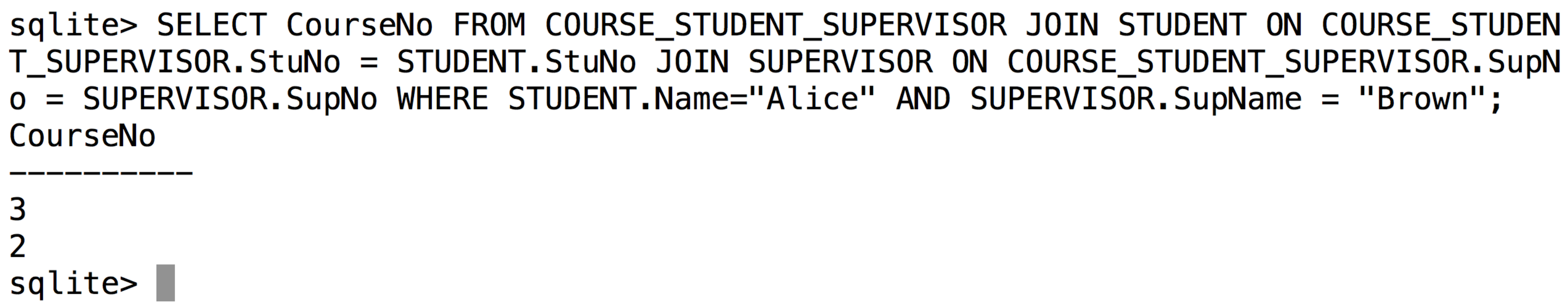
```
sqlite> SELECT * FROM COURSE_STUDENT_SUPERVISOR JOIN STUDENT ON COURSE_STUDENT_SUPER
VISOR.StuNo = STUDENT.StuNo JOIN SUPERVISOR ON COURSE_STUDENT_SUPERVISOR.SupNo = SUP
ERVISOR.SupNo ;
StuNo       CourseNo    SupNo       StuNo       Name        SupNo       SupName
----------  ----------  ----------  ----------  ----------  ----------  ----------
1           1           1           1           Alice       1           Black
1           3           3           1           Alice       3           Brown
1           2           3           1           Alice       3           Brown
2           1           2           2           Bob         2           White
2           2           3           2           Bob         3           Brown
3           2           4           3           Chris       4           Greene
3           3           3           3           Chris       3           Brown
3           4           2           3           Chris       2           White
4           4           1           4           David       1           Black
4           2           4           4           David       4           Greene
5           1           2           5           Eve         2           White
5           4           2           5           Eve         2           White
5           3           4           5           Eve         4           Greene
6           4           1           6           Fred        1           Black
sqlite> 
```

Simple query: step 2



```
sqlite> SELECT * FROM COURSE_STUDENT_SUPERVISOR JOIN STUDENT ON COURSE_STUDENT_SUPER
VISOR.StuNo = STUDENT.StuNo JOIN SUPERVISOR ON COURSE_STUDENT_SUPERVISOR.SupNo = SUP
ERVISOR.SupNo WHERE STUDENT.Name="Alice" AND SUPERVISOR.SupName = "Brown";
StuNo       CourseNo    SupNo       StuNo       Name        SupNo       SupName
----------  ----------  ----------  ----------  ----------  ----------  ----------
1           3           3           1           Alice       3           Brown
1           2           3           1           Alice       3           Brown
sqlite> 
```

Simple query: step 3



```
sqlite> SELECT CourseNo FROM COURSE_STUDENT_SUPERVISOR JOIN STUDENT ON COURSE_STUDEN
T_SUPERVISOR.StuNo = STUDENT.StuNo JOIN SUPERVISOR ON COURSE_STUDENT_SUPERVISOR.SupN
o = SUPERVISOR.SupNo WHERE STUDENT.Name="Alice" AND SUPERVISOR.SupName = "Brown";
CourseNo
----------
3
2
sqlite> 
```