

STUDENT(STID,Name,Major,GradeLevel,Age)

CLASS(Name,Time,Room)

ENROLLMENT(STID,ClassName,Semester,Year,Grade)

What are the names of all students?

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STUDENT(STID,Name,Major,GradeLevel,Age)

CLASS(Name,Time,Room)

ENROLLMENT(STID,ClassName,Semester,Year,Grade)

What are the **names of all students**?

A subset of the of the columns...

STUDENT(STID,Name,Major,GradeLevel,Age)

CLASS(Name,Time,Room)

ENROLLMENT(STID,ClassName,Semester,Year,Grade)

What are the **names of all students**?

A subset of the of the columns...**projection**

STUDENT(STID,Name,Major,GradeLevel,Age)

CLASS(Name,Time,Room)

ENROLLMENT(STID,ClassName,Semester,Year,Grade)

What are the **names of all students**?

$\pi_{\text{Name}}(\text{STUDENT})$



STUDENT(STID,Name,Major,GradeLevel,Age)

CLASS(Name,Time,Room)

ENROLLMENT(STID,ClassName,Semester,Year,Grade)

Give the details of all students who are mathematics majors?

STUDENT(STID,Name,Major,GradeLevel,Age)

CLASS(Name,Time,Room)

ENROLLMENT(STID,ClassName,Semester,Year,Grade)

**Give the details** of all students who are mathematics majors?

Means give all of the attributes

STUDENT(STID,Name,Major,GradeLevel,Age)

CLASS(Name,Time,Room)

ENROLLMENT(STID,ClassName,Semester,Year,Grade)

Give the details of all **students** who are **mathematics majors**?

STUDENT(STID,Name,Major,GradeLevel,Age)

CLASS(Name,Time,Room)

ENROLLMENT(STID,ClassName,Semester,Year,Grade)

Give the details of all **students** who are **mathematics majors**?

Implies a subset of all students

STUDENT(STID,Name,Major,GradeLevel,Age)

CLASS(Name,Time,Room)

ENROLLMENT(STID,ClassName,Semester,Year,Grade)

Give the details of all **students** who are **mathematics majors**?

Implies a subset of all students -- **selection ( $\sigma$ )**

STUDENT(STID,Name,Major,GradeLevel,Age)

CLASS(Name,Time,Room)

ENROLLMENT(STID,ClassName,Semester,Year,Grade)

Give the details of all **students** who are **mathematics majors**?

Implies a subset of all students -- **selection ( $\sigma$ )**

$\sigma_{\text{Major}=\text{"MATH"}}(\text{STUDENTS})$

STUDENT(STID,Name,Major,GradeLevel,Age)

CLASS(Name,Time,Room)

ENROLLMENT(STID,ClassName,Semester,Year,Grade)

Give the names and IDs of all mathematics majors who are juniors?

STUDENT(STID,Name,Major,GradeLevel,Age)

CLASS(Name,Time,Room)

ENROLLMENT(STID,ClassName,Semester,Year,Grade)

Give the names and IDs of all **mathematics majors who are juniors?**

Selection with a more complex condition



STUDENT(STID,Name,Major,GradeLevel,Age)

CLASS(Name,Time,Room)

ENROLLMENT(STID,ClassName,Semester,Year,Grade)

Give the names and IDs of all mathematics majors who are juniors?

$\sigma_{\text{Major} = \text{'MATH'} \wedge \text{GradeLevel} = \text{'JR'}} (\text{STUDENT})$

STUDENT(STID,Name,Major,GradeLevel,Age)

CLASS(Name,Time,Room)

ENROLLMENT(STID,ClassName,Semester,Year,Grade)

Give the **names and IDs** of all mathematics majors who are juniors?

$\sigma_{\text{Major} = \text{'MATH'} \wedge \text{GradeLevel} = \text{'JR'}} (\text{STUDENT})$

STUDENT(STID,Name,Major,GradeLevel,Age)

CLASS(Name,Time,Room)

ENROLLMENT(STID,ClassName,Semester,Year,Grade)

Give the **names and IDs** of all mathematics majors who are juniors?

$\sigma_{\text{Major} = \text{'MATH'} \wedge \text{GradeLevel} = \text{'JR'}} (\text{STUDENT})$

Once again, a projection. Pay attention to the order of the attributes

STUDENT(STID,Name,Major,GradeLevel,Age)

CLASS(Name,Time,Room)

ENROLLMENT(STID,ClassName,Semester,Year,Grade)

Give the **names and IDs** of all mathematics majors who are juniors?

$\pi_{\text{Name,STID}}(\sigma_{\text{Major= 'MATH'} \wedge \text{GradeLevel= 'JR'}}(\text{STUDENT}))$

STUDENT(STID,Name,Major,GradeLevel,Age)

CLASS(Name,Time,Room)

ENROLLMENT(STID,ClassName,Semester,Year,Grade)

Give the **names and IDs** of all mathematics majors who are juniors?

$\pi_{\text{Name,STID}}(\sigma_{\text{Major= 'MATH'} \wedge \text{GradeLevel= 'JR'}}(\text{STUDENT}))$

The selection had to be performed before the projection, why?

STUDENT(STID,Name,Major,GradeLevel,Age)

CLASS(Name,Time,Room)

ENROLLMENT(STID,ClassName,Semester,Year,Grade)

Give the IDs of all students and the courses they took in Spring 2018.

STUDENT(STID,Name,Major,GradeLevel,Age)

CLASS(Name,Time,Room)

ENROLLMENT(STID,ClassName,Semester,Year,Grade)

Give the **IDs** of all students and the **courses** they took in **Spring 2018**.

STUDENT(STID,Name,Major,GradeLevel,Age)

CLASS(Name,Time,Room)

**ENROLLMENT**(STID,ClassName,Semester,Year,Grade)

Give the **IDs** of all students and the **courses** they took in **Spring 2018**.

All necessary information is in the ENROLLMENT relation



STUDENT(STID,Name,Major,GradeLevel,Age)

CLASS(Name,Time,Room)

ENROLLMENT(STID,ClassName,Semester,Year,Grade)

Give the IDs of all students and the **courses** they took in **Spring 2018**.

$\sigma_{\text{Semester}='Spring' \wedge \text{Year}='2018'}$ (ENROLLMENT)

STUDENT(STID,Name,Major,GradeLevel,Age)

CLASS(Name,Time,Room)

ENROLLMENT(STID,ClassName,Semester,Year,Grade)

Give the **IDs** of all students and the **courses** they took in Spring 2018.

$\sigma_{\text{Semester}='Spring' \wedge \text{Year}='2018'}$ (ENROLLMENT)

STUDENT(STID,Name,Major,GradeLevel,Age)

CLASS(Name,Time,Room)

ENROLLMENT(STID,ClassName,Semester,Year,Grade)

Give the IDs of all students and the **courses** they took in Spring 2018.

$\pi_{\text{STID,ClassName}}(\sigma_{\text{Semester='Spring'} \wedge \text{Year='2018'}}(\text{ENROLLMENT}))$

STUDENT(STID,Name,Major,GradeLevel,Age)

CLASS(Name,Time,Room)

ENROLLMENT(STID,ClassName,Semester,Year,Grade)

Give the names and IDs of all students and the courses they took in Spring 2018.

STUDENT(STID,Name,Major,GradeLevel,Age)

CLASS(Name,Time,Room)

ENROLLMENT(STID,ClassName,Semester,Year,Grade)

Give the names and **IDs of all students and the courses they took in Spring 2018.**

STUDENT(STID,Name,Major,GradeLevel,Age)

CLASS(Name,Time,Room)

ENROLLMENT(STID,ClassName,Semester,Year,Grade)

Give the names and **IDs of all students and the courses they took in Spring 2018.**

This was what we determined in the previous problem.

STUDENT(STID,Name,Major,GradeLevel,Age)

CLASS(Name,Time,Room)

ENROLLMENT(STID,ClassName,Semester,Year,Grade)

Give the names and **IDs of all students and the courses they took in Spring 2018.**

$\pi_{\text{STID,ClassName}}(\sigma_{\text{Semester='Spring'} \wedge \text{Year='2018'}}(\text{ENROLLMENT}))$

STUDENT(STID,Name,Major,GradeLevel,Age)

CLASS(Name,Time,Room)

ENROLLMENT(STID,ClassName,Semester,Year,Grade)

Give the **names** and IDs of all students

$\pi_{\text{STID,ClassName}}(\sigma_{\text{Semester='Spring'} \wedge \text{Year='2018'}}(\text{ENROLLMENT}))$



STUDENT(STID,Name,Major,GradeLevel,Age)

CLASS(Name,Time,Room)

ENROLLMENT(STID,ClassName,Semester,Year,Grade)

Give the **names** and IDs of all students

$$\pi_{\text{STID,ClassName}}(\sigma_{\text{Semester='Spring'} \wedge \text{Year='2018'}}(\text{ENROLLMENT}))$$

Retrieving the names of the students requires accessing them from the STUDENT relation.

STUDENT(STID,Name,Major,GradeLevel,Age)

CLASS(Name,Time,Room)

ENROLLMENT(STID,ClassName,Semester,Year,Grade)

Give the **names** and IDs of all students

$\pi_{\text{STID,ClassName}}(\sigma_{\text{Semester='Spring'} \wedge \text{Year='2018'}}(\text{ENROLLMENT}))$

Retrieving the names of the students requires accessing them from the STUDENT relation.

This necessitates ***joining*** the STUDENT relation with the relation returned by the above query.

**STUDENT**(STID, **Name**, Major, GradeLevel, Age)

**CLASS**(Name, Time, Room)

**ENROLLMENT**(STID, ClassName, Semester, Year, Grade)

Give the **names and IDs of all students**

$$\pi_{\text{STID}, \text{ClassName}}(\sigma_{\text{Semester}='Spring' \wedge \text{Year}='2018'}(\text{ENROLLMENT}))$$

Retrieving the names of the students requires accessing them from the STUDENT relation.

This necessitates ***joining*** the STUDENT relation with the relation returned by the above query.

Since both relations have the attribute STID in common, we can use a natural join.

STUDENT(STID,Name,Major,GradeLevel,Age)

CLASS(Name,Time,Room)

ENROLLMENT(STID,ClassName,Semester,Year,Grade)

Give the names and IDs of all students and the courses they took in Spring 2018.

**STUDENT \*  $\pi_{\text{STID,ClassName}}(\sigma_{\text{Semester='Spring'} \wedge \text{Year='2018'}}(\text{ENROLLMENT}))$**

STUDENT(STID,Name,Major,GradeLevel,Age)

CLASS(Name,Time,Room)

ENROLLMENT(STID,ClassName,Semester,Year,Grade)

Give the **names** and **IDs** of all students and the **courses** they took in Spring 2018.

**STUDENT \*  $\pi_{STID,ClassName}(\sigma_{Semester='Spring' \wedge Year='2018'}(ENROLLMENT))$**

Now we use a projection to return just the requested values.

STUDENT(STID,Name,Major,GradeLevel,Age)

CLASS(Name,Time,Room)

ENROLLMENT(STID,ClassName,Semester,Year,Grade)

Give the names and IDs of all students and the courses they took in Spring 2018.

$\pi_{\text{Name,STID,ClassName}}(\text{STUDENT} * \pi_{\text{STID,ClassName}}(\sigma_{\text{Semester='Spring'} \wedge \text{Year='2018'}}(\text{ENROLLMENT})))$

STUDENT(STID,Name,Major,GradeLevel,Age)

CLASS(Name,Time,Room)

ENROLLMENT(STID,ClassName,Semester,Year,Grade)

What are the student numbers of all students not yet enrolled in a class?

STUDENT(STID,Name,Major,GradeLevel,Age)

CLASS(Name,Time,Room)

ENROLLMENT(STID,ClassName,Semester,Year,Grade)

What are the **student numbers of all students** not yet enrolled in a class?



STUDENT(STID,Name,Major,GradeLevel,Age)

CLASS(Name,Time,Room)

ENROLLMENT(STID,ClassName,Semester,Year,Grade)

What are the **student numbers of all students** not yet enrolled in a class?

$\Pi_{\text{STID}}$  (**STUDENT**)

STUDENT(STID,Name,Major,GradeLevel,Age)

CLASS(Name,Time,Room)

ENROLLMENT(STID,ClassName,Semester,Year,Grade)

What are the **student numbers of all students** **enrolled in a class?**

STUDENT(STID,Name,Major,GradeLevel,Age)

CLASS(Name,Time,Room)

ENROLLMENT(STID,ClassName,Semester,Year,Grade)

What are the student numbers of all **students** enrolled in a class?

$\Pi_{\text{STID}}$  (ENROLLMENT)

STUDENT(STID,Name,Major,GradeLevel,Age)

CLASS(Name,Time,Room)

ENROLLMENT(STID,ClassName,Semester,Year,Grade)

What are the student numbers of all students **not yet** enrolled in a class?

STUDENT(STID,Name,Major,GradeLevel,Age)

CLASS(Name,Time,Room)

ENROLLMENT(STID,ClassName,Semester,Year,Grade)

What are the student numbers of all students **not yet** enrolled in a class?

$\Pi_{\text{STID}}(\mathbf{STUDENT}) - \Pi_{\text{STID}}(\mathbf{ENROLLMENT})$

STUDENT(STID,Name,Major,GradeLevel,Age)

CLASS(Name,Time,Room)

ENROLLMENT(STID,ClassName,Semester,Year,Grade)

For each student who took a course give the student's id, name, course taken, and grade in that course.

STUDENT(STID,Name,Major,GradeLevel,Age)

CLASS(Name,Time,Room)

ENROLLMENT(STID,ClassName,Semester,Year,Grade)

For each student who took a course give the student's id, name, course taken, and grade in that course.

The ENROLLMENT relation gives us everything we need except a student's name. To get this we need to use the STUDENT relation.

STUDENT(STID,Name,Major,GradeLevel,Age)

CLASS(Name,Time,Room)

ENROLLMENT(STID,ClassName,Semester,Year,Grade)

For each student who took a course give the student's id, name, course taken, and grade in that course.

The ENROLLMENT relation gives us everything we need except a student's name. To get this we need to use the STUDENT relation.

Since STID is common to both ENROLLMENT and STUDENT we can join them with a natural join.



STUDENT(STID,Name,Major,GradeLevel,Age)

CLASS(Name,Time,Room)

ENROLLMENT(**STID**,ClassName,Semester,Year,Grade)

For each student who took a course give the student's id, name, course taken, and grade in that course.

**STUDENT \* ENROLLMENT**

STUDENT(STID,Name,Major,GradeLevel,Age)

CLASS(Name,Time,Room)

ENROLLMENT(STID,ClassName,Semester,Year,Grade)

For each student who took a course give the **student's id, name, course taken, and grade** in that course.

**STUDENT \* ENROLLMENT**

To produce the data requested we use a projection

STUDENT(STID,Name,Major,GradeLevel,Age)

CLASS(Name,Time,Room)

ENROLLMENT(STID,ClassName,Semester,Year,Grade)

For each student who took a course give the student's id, name, course taken, and grade in that course.

$\Pi_{STID, Name, ClassName, Grade}(STUDENT * ENROLLMENT)$

To reduce the amount of unnecessary attributes in the initial join, we could do projections first

STUDENT(STID,Name,Major,GradeLevel,Age)

CLASS(Name,Time,Room)

ENROLLMENT(STID,ClassName,Semester,Year,Grade)

For each student who took a course give the student's id, name, course taken, and grade in that course.

$\Pi_{STID,Name}(STUDENT) * \Pi_{STID,ClassName,Grade}(ENROLLMENT)$

**STUDENT**(STID,Name,Major,GradeLevel,Age)

CLASS(Name,Time,Room)

ENROLLMENT(STID,ClassName,Semester,Year,Grade)

What are the names and IDs of students enrolled in the class "BD445"?

STUDENT(STID,Name,Major,GradeLevel,Age)

CLASS(Name,Time,Room)

ENROLLMENT(STID,ClassName,Semester,Year,Grade)

What are the names and IDs of students enrolled in the class "BD445"?

STUDENT(STID,Name,Major,GradeLevel,Age)

CLASS(Name,Time,Room)

ENROLLMENT(STID,ClassName,Semester,Year,Grade)

What are the names and IDs of students **enrolled in the class "BD445"**?

STUDENT(STID,Name,Major,GradeLevel,Age)

CLASS(Name,Time,Room)

ENROLLMENT(STID,ClassName,Semester,Year,Grade)

What are the names and IDs of students **enrolled in the class "BD445"**?

**$\sigma_{\text{ClassName}=\text{"BD445"}}(\text{ENROLLMENT})$**



STUDENT(STID,Name,Major,GradeLevel,Age)

CLASS(Name,Time,Room)

ENROLLMENT(STID,ClassName,Semester,Year,Grade)

What are the **names and IDs** of students enrolled in the class "BD445"?

$\sigma_{\text{ClassName}=\text{"BD445"}}(\text{ENROLLMENT})$

STUDENT(STID,Name,Major,GradeLevel,Age)

CLASS(Name,Time,Room)

ENROLLMENT(STID,ClassName,Semester,Year,Grade)

What are the **names and IDs** of students enrolled in the class "BD445"?

$\sigma_{\text{ClassName}=\text{"BD445"}}(\text{ENROLLMENT})$

The rest of this proceeds as in the previous example

STUDENT(STID,Name,Major,GradeLevel,Age)

CLASS(Name,Time,Room)

ENROLLMENT(STID,ClassName,Semester,Year,Grade)

What are the names and IDs of students enrolled in the class "BD445"?

**$\Pi_{\text{Name,STID}}(\text{STUDENTS} * \sigma_{\text{ClassName}=\text{"BD445"}}(\text{ENROLLMENT}))$**

STUDENT(STID,Name,Major,GradeLevel,Age)

CLASS(Name,Time,Room)

ENROLLMENT(STID,ClassName,Semester,Year,Grade)

What are the names and IDs of students enrolled in the class "BD445"?

$\Pi_{\text{Name,STID}}(\text{STUDENTS} * \sigma_{\text{ClassName}=\text{"BD445"}}(\text{ENROLLMENT}))$

or

$\Pi_{\text{Name,STID}}(\text{STUDENTS}) * \Pi_{\text{STID}}(\sigma_{\text{ClassName}=\text{"BD445"}}(\text{ENROLLMENT}))$

STUDENT(STID,Name,Major,GradeLevel,Age)

CLASS(Name,Time,Room)

ENROLLMENT(STID,ClassName,Semester,Year,Grade)

What are the names and meeting times of the student "PARKS" classes?

STUDENT(STID,Name,Major,GradeLevel,Age)

CLASS(Name,Time,Room)

ENROLLMENT(STID,ClassName,Semester,Year,Grade)

What are the names and meeting times of the **student "PARKS"** classes?

$\sigma_{\text{Name}=\text{"PARKS"}}(\text{STUDENT})$

STUDENT(STID,Name,Major,GradeLevel,Age)

CLASS(Name,Time,Room)

ENROLLMENT(STID,ClassName,Semester,Year,Grade)

What are the names and meeting times of the student "PARKS" classes?

**$\sigma_{\text{Name}=\text{"PARKS"}}(\text{STUDENT})$**

To get the classes taken we need to join this with ENROLLMENT. We will reduce the attributes of the above relation to STID first

STUDENT(STID,Name,Major,GradeLevel,Age)

CLASS(Name,Time,Room)

ENROLLMENT(STID,ClassName,Semester,Year,Grade)

What are the names and meeting times of the student "PARKS" classes?

**ENROLLMENT \*  $\Pi_{STID}(\sigma_{Name="PARKS"}(STUDENT))$**



STUDENT(STID,Name,Major,GradeLevel,Age)

CLASS(Name,Time,Room)

ENROLLMENT(STID,ClassName,Semester,Year,Grade)

What are the names and meeting times of the student "PARKS" classes?

**ENROLLMENT \*  $\Pi_{STID}(\sigma_{Name="PARKS"}(STUDENT))$**

With this form, and by using the natural join, the relation that results has the same structure as ENROLLMENT.

STUDENT(STID,Name,Major,GradeLevel,Age)

CLASS(Name,Time,Room)

ENROLLMENT(STID,ClassName,Semester,Year,Grade)

What are the names and meeting times of the student "PARKS" classes?

**ENROLLMENT \*  $\Pi_{STID}(\sigma_{Name="PARKS"}(STUDENT))$**

To get the meeting time of the classes we must join this relation with CLASS.

STUDENT(STID,Name,Major,GradeLevel,Age)

CLASS(Name,Time,Room)

ENROLLMENT(STID,ClassName,Semester,Year,Grade)

What are the names and meeting times of the student "PARKS" classes?

**ENROLLMENT \*  $\Pi_{STID}(\sigma_{Name="PARKS"}(STUDENT))$**

To get the meeting time of the classes we must join this relation with CLASS.

Because the join attributes to be used do not have the same name we must use an equijoin.

STUDENT(STID,Name,Major,GradeLevel,Age)

CLASS(Name,Time,Room)

ENROLLMENT(STID,ClassName,Semester,Year,Grade)

What are the names and meeting times of the student "PARKS" classes?

**CLASS | $\times$ |<sub>ClassName = Name</sub> (ENROLLMENT \*  $\Pi_{STID}(\sigma_{Name="PARKS"}(STUDENT))$ )**

STUDENT(STID,Name,Major,GradeLevel,Age)

CLASS(Name,Time,Room)

ENROLLMENT(STID,ClassName,Semester,Year,Grade)

What are the names and meeting times of the student "PARKS" classes?

**$\text{CLASS} \mid \times \mid_{\text{ClassName} = \text{Name}} (\text{ENROLLMENT} * \Pi_{\text{STID}}(\sigma_{\text{Name} = \text{"PARKS"}}(\text{STUDENT})))$**

The resulting relation has the form **R(Name,Time,Room, STID,ClassName,Semester,Year,Grade)**

STUDENT(STID,Name,Major,GradeLevel,Age)

CLASS(Name,Time,Room)

ENROLLMENT(STID,ClassName,Semester,Year,Grade)

What are the names and meeting times of the student "PARKS" classes?

**$CLASS \mid \times \mid_{ClassName = Name} (ENROLLMENT * \Pi_{STID}(\sigma_{Name="PARKS"}(STUDENT)))$**

Finally, to get the desired results we apply a projection. Since the ClassName and Name attributes will have the same values, we can choose either in our projection. Because ClassName is more descriptive, we choose this one.

STUDENT(STID,Name,Major,GradeLevel,Age)

CLASS(Name,Time,Room)

ENROLLMENT(STID,ClassName,Semester,Year,Grade)

What are the names and meeting times of the student "PARKS" classes?

$$\Pi_{\text{ClassName,Time}}(\text{CLASS} \bowtie_{\text{ClassName} = \text{Name}} (\text{ENROLLMENT} * \Pi_{\text{STID}}(\sigma_{\text{Name}="PARKS"}(\text{STUDENT}))))$$

STUDENT(STID,Name,Major,GradeLevel,Age)

CLASS(Name,Time,Room)

ENROLLMENT(STID,ClassName,Semester,Year,Grade)

What are the names and IDs of any students who have taken every class?



STUDENT(STID,Name,Major,GradeLevel,Age)

CLASS(Name,Time,Room)

ENROLLMENT(STID,ClassName,Semester,Year,Grade)

What are the names and IDs of any students who have taken **every** class?

The word “every” here indicates that we are to use the **division** operator, where the divisor is going to be a relation comprised of all class names.

STUDENT(STID,Name,Major,GradeLevel,Age)

CLASS(Name,Time,Room)

ENROLLMENT(STID,ClassName,Semester,Year,Grade)

What are the names and IDs of any students who have taken every class?

$\div \Pi_{\text{Name}}(\text{CLASS})$

STUDENT(STID,Name,Major,GradeLevel,Age)

CLASS(Name,Time,Room)

ENROLLMENT(STID,ClassName,Semester,Year,Grade)

What are the names and IDs of any students who have taken every class?

$\div \Pi_{\text{Name}}(\mathbf{CLASS})$

To reduce the size of the dividend relation, ENROLLMENT, we first reduce the number of attributes just to those we need – STID and ClassName

STUDENT(STID,Name,Major,GradeLevel,Age)

CLASS(Name,Time,Room)

ENROLLMENT(STID,ClassName,Semester,Year,Grade)

What are the names and IDs of any students who have taken every class?

$$\Pi_{STID, ClassName}(ENROLLMENT) \div \Pi_{Name}(CLASS)$$

STUDENT(STID,Name,Major,GradeLevel,Age)

CLASS(Name,Time,Room)

ENROLLMENT(STID,ClassName,Semester,Year,Grade)

What are the names and IDs of any students who have taken every class?

$$\Pi_{STID, ClassName}(\text{ENROLLMENT}) \div \Pi_{Name}(\text{CLASS})$$

This will yield the STID of each student who has taken every course. To get just the name and STID, we perform a natural join with STUDENT and follow this with an appropriate projection.

STUDENT(STID,Name,Major,GradeLevel,Age)

CLASS(Name,Time,Room)

ENROLLMENT(STID,ClassName,Semester,Year,Grade)

What are the names and IDs of any students who have taken every class?

$$\Pi_{\text{Name, STID}}(\text{STUDENT} * (\Pi_{\text{STID, ClassName}}(\text{ENROLLMENT}) \div \Pi_{\text{Name}}(\text{CLASS})))$$

STUDENT(STID,Name,Major,GradeLevel,Age)

CLASS(Name,Time,Room)

ENROLLMENT(STID,ClassName,Semester,Year,Grade)

What are the names and IDs of any students who have taken every MWF8 class?

STUDENT(STID,Name,Major,GradeLevel,Age)

CLASS(Name,Time,Room)

ENROLLMENT(STID,ClassName,Semester,Year,Grade)

What are the names and IDs of any students who have taken every MWF8 class?

This will use the same approach as the previous problem except rather than using all of the Names we obtained from CLASS, we first perform a selection operation to restrict the class names to those that met on MWF8.



STUDENT(STID,Name,Major,GradeLevel,Age)

CLASS(Name,Time,Room)

ENROLLMENT(STID,ClassName,Semester,Year,Grade)

What are the names and IDs of any students who have taken every MWF8 class?

$$\div \prod_{\text{Name}} (\sigma_{\text{Time}='MWF8'}(\text{CLASS}))$$

This will use the same approach as the previous problem except rather than using all of the Names we obtained from class, we first perform a selection operation to restrict the names that met on MWF8.

STUDENT(STID,Name,Major,GradeLevel,Age)

CLASS(Name,Time,Room)

ENROLLMENT(STID,ClassName,Semester,Year,Grade)

What are the names and IDs of any students who have taken every MWF8 class?

$\Pi_{\text{Name, STID}}(\text{STUDENT} * (\Pi_{\text{STID, ClassName}}(\text{ENROLLMENT}) \div \Pi_{\text{Name}}(\sigma_{\text{Time='MWF8'}}(\text{CLASS}))))$