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Database Management

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Part A:

1. A relation is basically a data structure that takes the form of a table filled with rows called "tuples" and columns called “attributes”.
2. A tuple is simply a single row in a relation.
3. An attribute is a single column in a relation and all data that is stored under an attribute will be the same type of data.
4. A domain is the allowed values for attributes. Let’s say we have an attribute called “major”, all majors would have to be a two letter string that corresponds to an actual major. All “major” attributes would have to follow these rules to be valid.
5. A schema is the actual blueprint of the database, it contains the design/layout, the names of the relations, and the rules behind it. The instance on the other hand refers to the actual data stored in the database. An example of a schema would be the rules behind a “School” database with many different types of relations, the schema would determine the names of the tables, the overall design of the database, and the rules behind how the data is stored and how it can be interacted with. The instance in this example would be the actual data stored in the database, like the names of all the students or the names of all the courses.

6. A key is a set of attributes that help uniquely identify a tuple. A primary key will help to identify a tuple of values that will be the primary means of identifying the set of information that wouldn't allow duplicates. For example, a student's id would be a primary key because it would identify the student and all of their corresponding information

Part B:

Students:

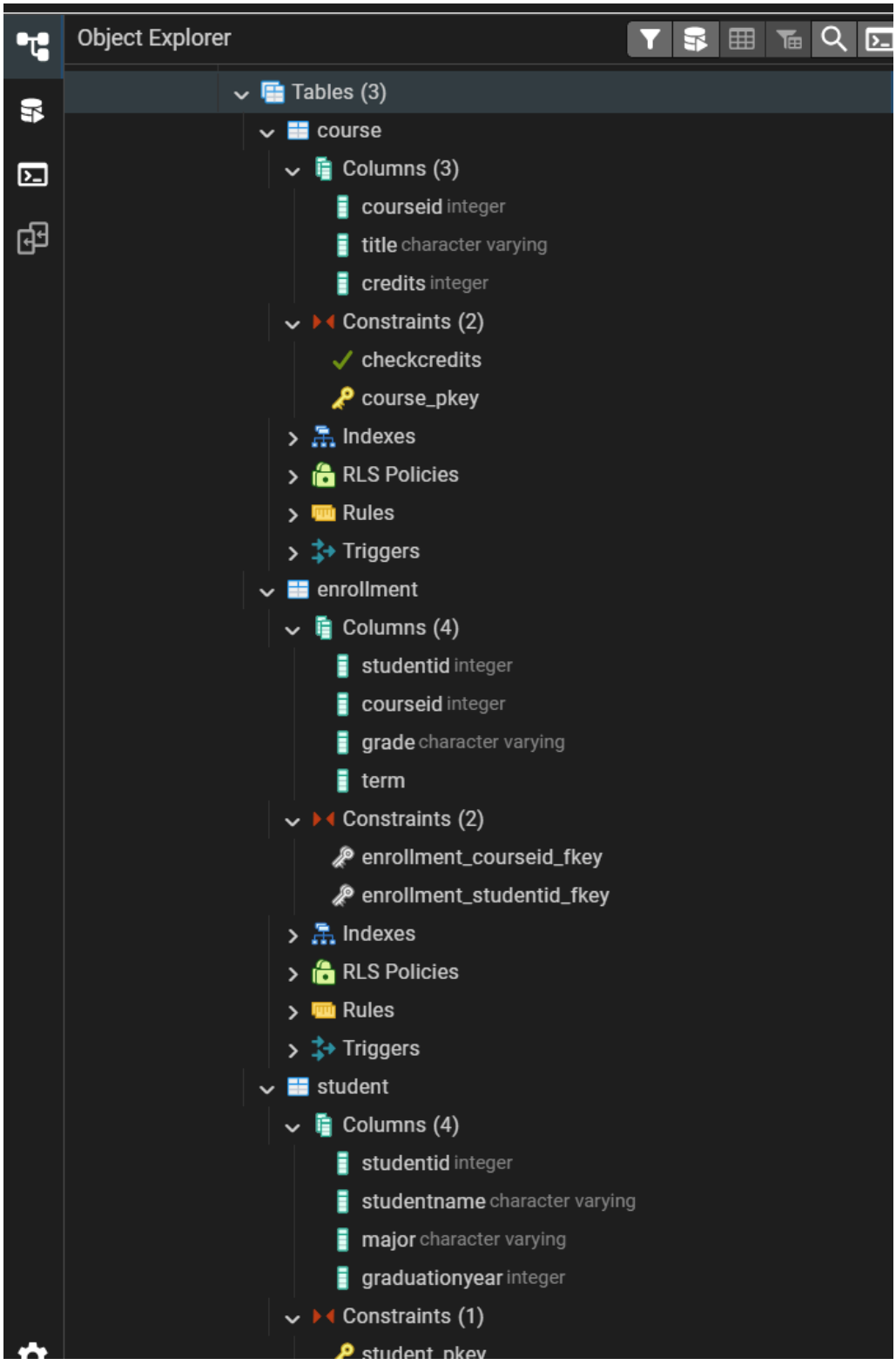
	studentid [PK] integer	studentname character varying	major character varying	graduationyear integer
1	201234	James	CS	2025
2	201256	John	PH	2026
3	201649	Stacy	CS	2027
4	202237	Maya	BS	2028
5	678094	Logan	CB	2029
6	345604	Emma	ML	2026

Course:

	courseid [PK] integer	title character varying	credits integer
1	446	Programming	4
2	202	Philosophy	3
3	102	Physics	4
4	607	Literature	3
5	889	Business	4

Enrollment:

	studentid integer	courseid integer	grade character varying	term text
1	201256	202	C	Spri...
2	345604	102	F	Spri...
3	202237	889	[null]	Spri...
4	201234	607	[null]	Fall
5	201234	446	B	Fall
6	201649	102	A	Fall
7	678094	202	A	Wint...
8	678094	889	A	Wint...


Object Explorer
Tables (3)
course
Columns (3)
courseid integer
title character varying
credits integer
Constraints (2)
checkcredits
course_pkey
Indexes
RLS Policies
Rules
Triggers
enrollment
Columns (4)
studentid integer
courseid integer
grade character varying
term
Constraints (2)
enrollment_courseid_fkey
enrollment_studentid_fkey
Indexes
RLS Policies
Rules
Triggers
student
Columns (4)
studentid integer
studentname character varying
major character varying
graduationyear integer
Constraints (1)

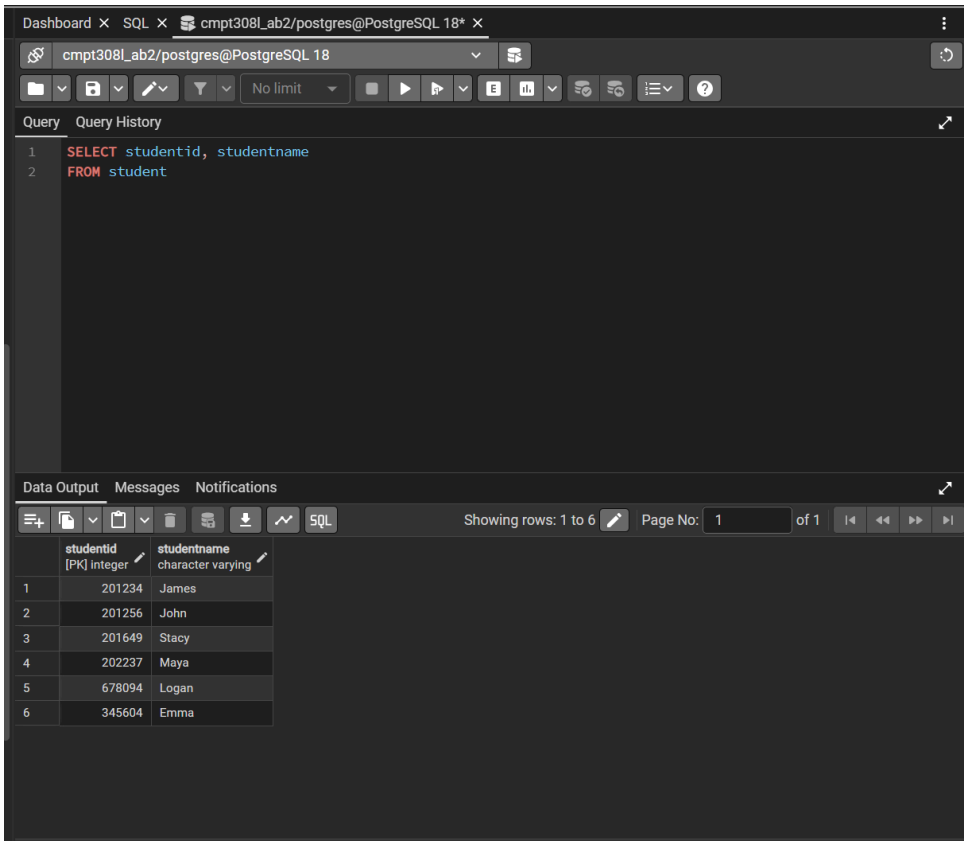
```sql
CREATE TABLE Enrollment(
    term VARCHAR,
    studentID INT,
    FOREIGN KEY (studentID) REFERENCES student (studentID),
    courseID INT,
    FOREIGN KEY (courseID) REFERENCES course (courseID),
    grade VARCHAR,
    PRIMARY KEY (studentID, courseID, term)
)
```

```sql
CREATE TABLE Course(
    courseID INT PRIMARY KEY,
    title varChar,
    credits INT,
    CONSTRAINT checkCredits CHECK (credits>0)
)
```

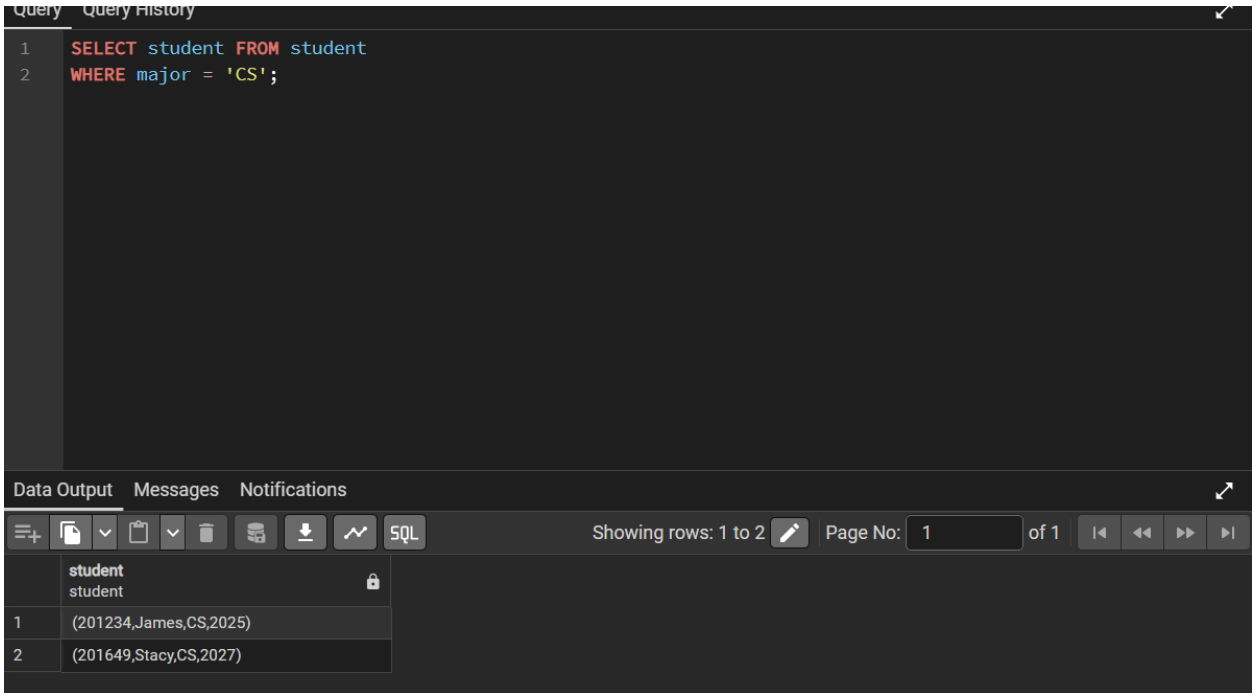
```sql
CREATE TABLE Student(
    studentID INT PRIMARY KEY,
    studentName varChar,
    major varChar,
    graduationYear INT

)
```

Part C:

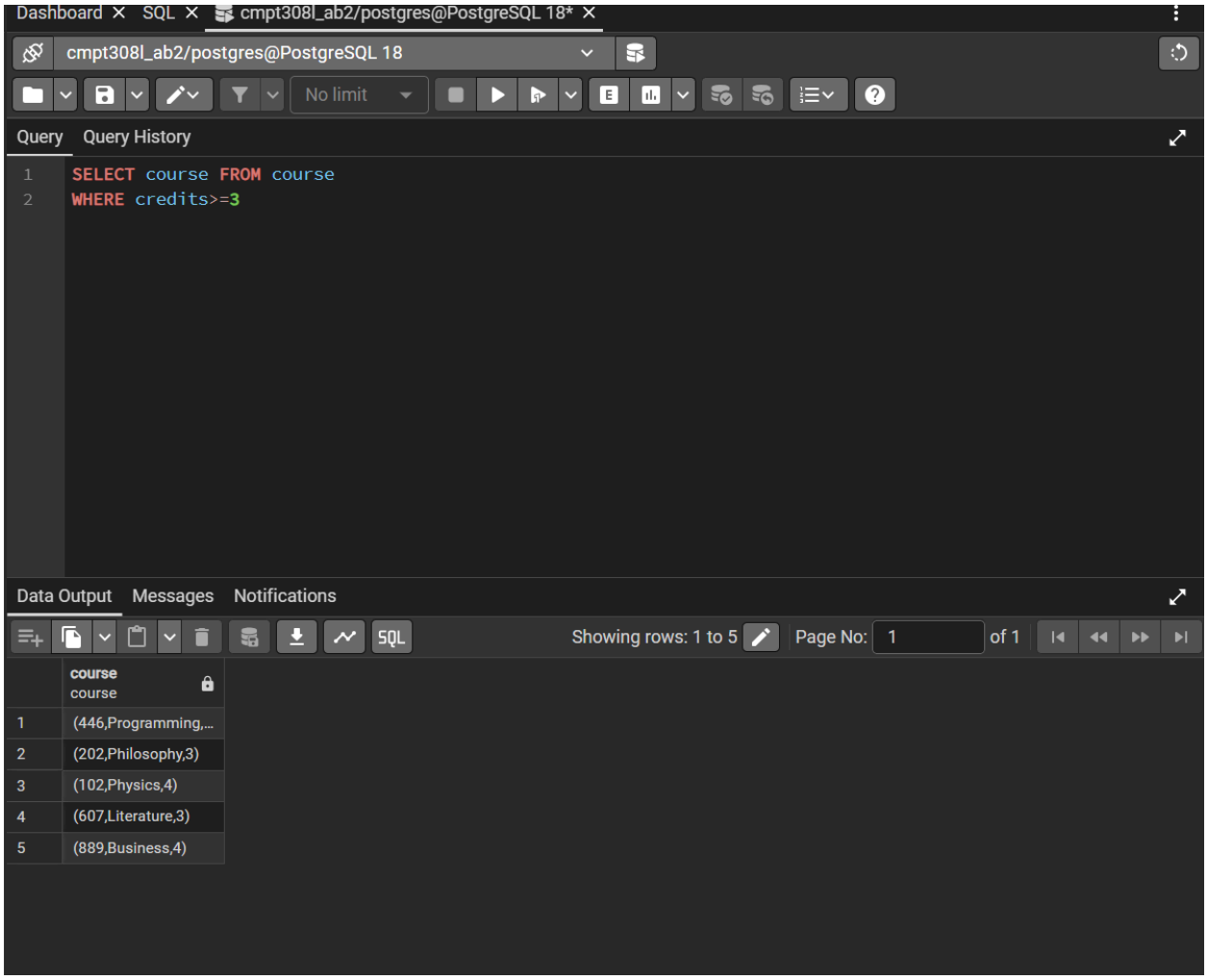
1:


Dashboard
SQL
cmpt308l_ab2/postgres@PostgreSQL 18*
cmpt308l_ab2/postgres@PostgreSQL 18
No limit
Query
Query History
SELECT studentid, studentname
FROM student
Data Output
Messages
Notifications
Showing rows: 1 to 6
Page No: 1
of 1
studentid [PK] integer
studentname character varying
1 201234 James
2 201256 John
3 201649 Stacy
4 202237 Maya
5 678094 Logan
6 345604 Emma

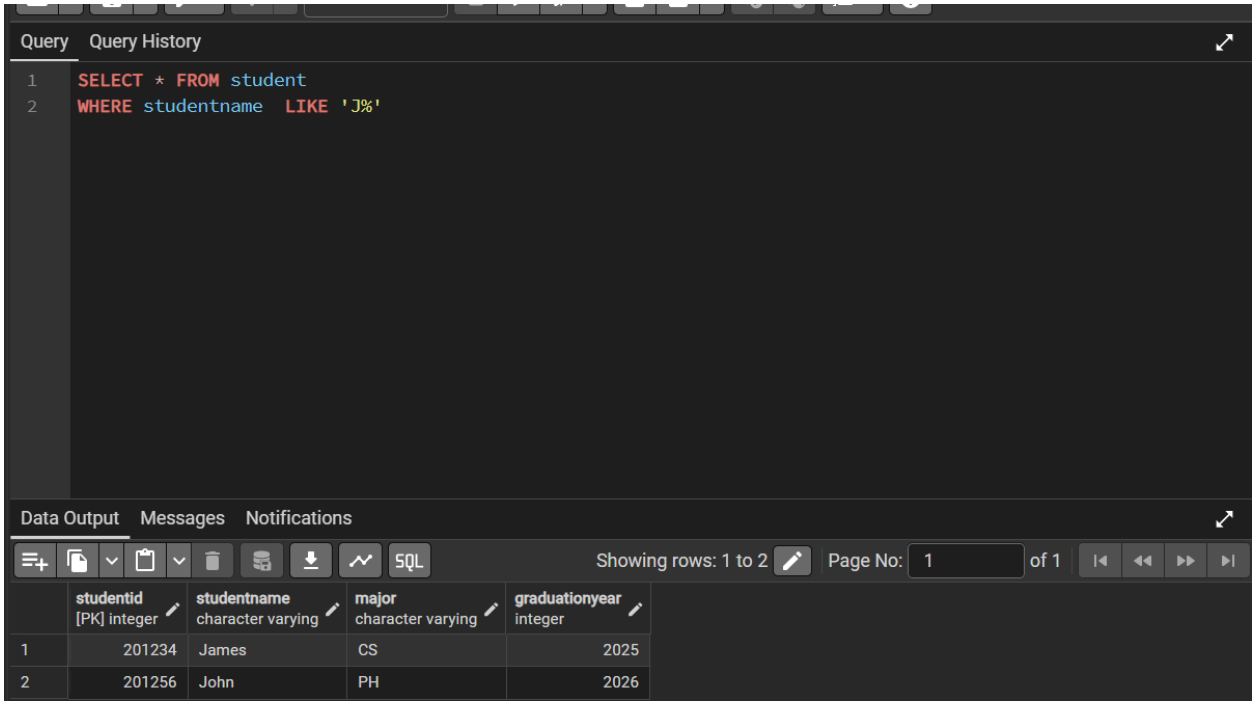
2:


Query
Query History
SELECT student FROM student
WHERE major = 'CS';
Data Output
Messages
Notifications
Showing rows: 1 to 2
Page No: 1
of 1
student
student
1 (201234,James,CS,2025)
2 (201649,Stacy,CS,2027)

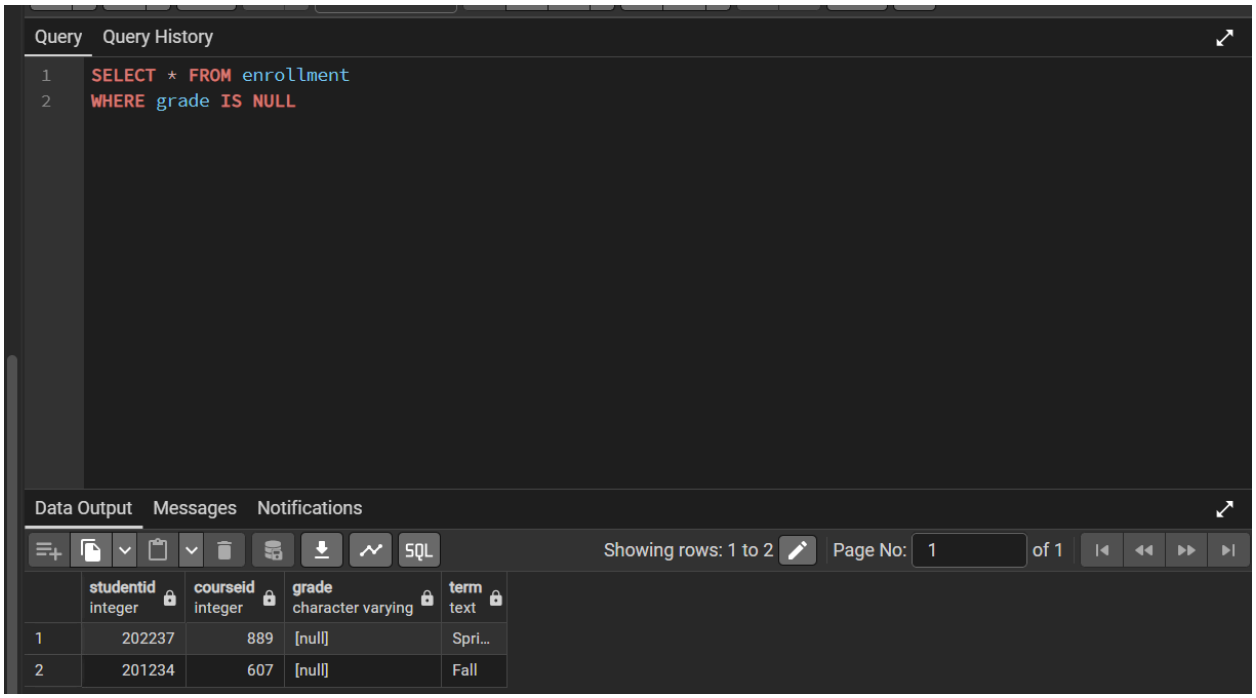
3:


Dashboard
SQL
cmpt308l_ab2/postgres@PostgreSQL 18*
cmpt308l_ab2/postgres@PostgreSQL 18
No limit
Query
Query History
SELECT course FROM course
WHERE credits>=3
Data Output
Messages
Notifications
Showing rows: 1 to 5
Page No: 1
of 1
course
course
1 (446,Programming,...
2 (202,Philosophy,3)
3 (102,Physics,4)
4 (607,Literature,3)
5 (889,Business,4)

4:


Query
Query History
1 SELECT * FROM student
2 WHERE studentname LIKE 'J%'
Data Output
Messages
Notifications
SQL
Showing rows: 1 to 2
Page No: 1
of 1
studentid [PK] integer
studentname character varying
major character varying
graduationyear integer
1 201234 James CS 2025
2 201256 John PH 2026

5:


Query
Query History
1 SELECT * FROM enrollment
2 WHERE grade IS NULL
Data Output
Messages
Notifications
SQL
Showing rows: 1 to 2
Page No: 1
of 1
studentid integer
courseid integer
grade character varying
term text
1 202237 889 [null] Spri...
2 201234 607 [null] Fall

6:

Query Query History

```
1  SELECT * FROM student
2  ORDER BY graduationyear, studentname
```

Data Output Messages Notifications

Showing rows: 1 to 6 Page No: 1 of 1

	studentid [PK] integer	studentname character varying	major character varying	graduationyear integer
1	201234	James	CS	2025
2	345604	Emma	ML	2026
3	201256	John	PH	2026
4	201649	Stacy	CS	2027
5	202237	Maya	BS	2028
6	678094	Logan	CB	2029

Part 4:

Query 2: π_student (σ_major='CS' (student))

Query 3: π_course (σ_credit>=3' (course))

Not-Patrick1/DatabaseLabs: First lab for DB management.