PROJECT REPORT

Department of Computer Science and Engineering(CSE)

International Islamic University Chittagong

Project Name : Online Exam System

Course Title: Database Management System Lab

Course Code : CSE-2424

Submitted By:

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Semester: Autumn-2024

Submitted To:

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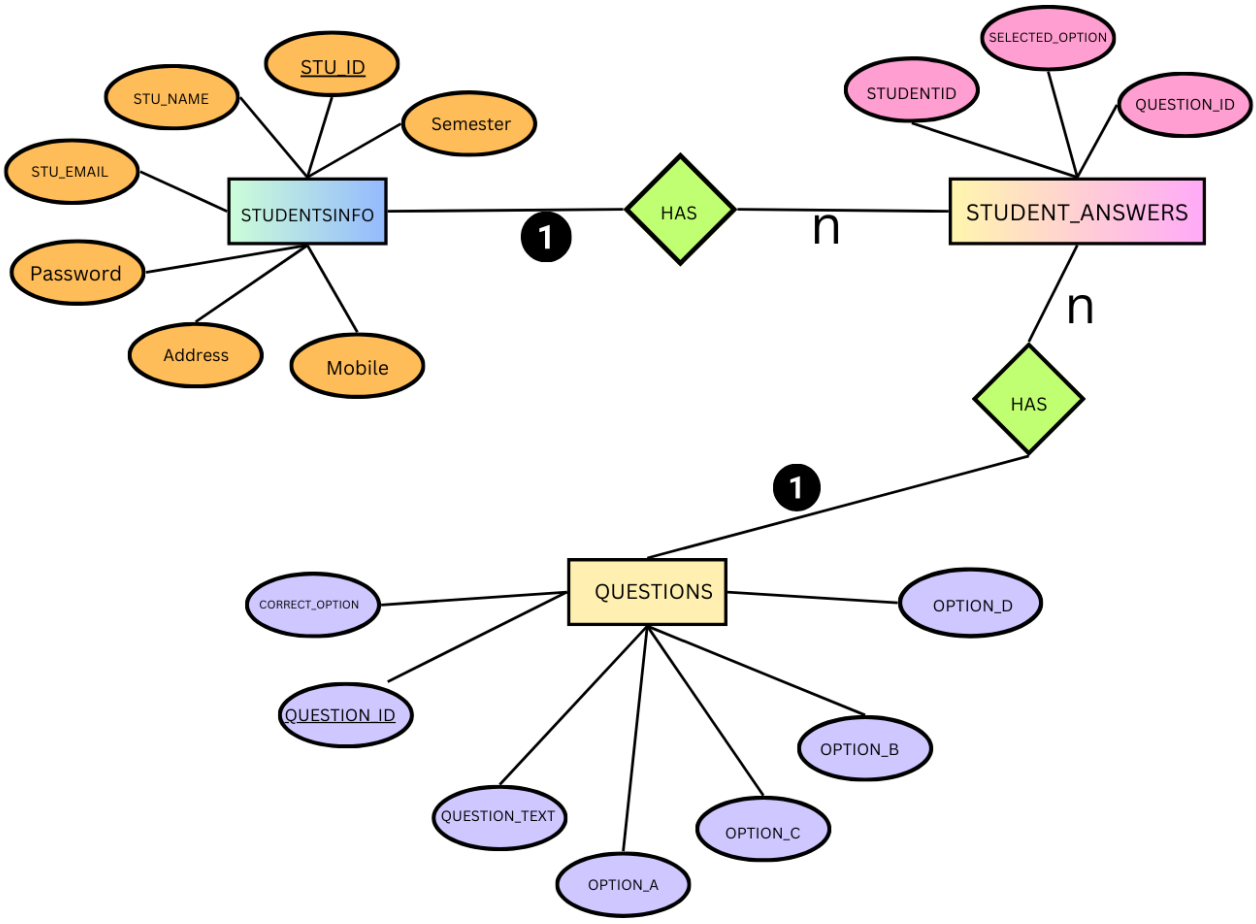
ABSTRACT OF MY SYSTEM

The "Online Exam System" is a platform designed to streamline examinations by managing student data, generating random questions, and analyzing results. It features a secure student database for personalized access, a dynamic question bank to ensure unique exams, and answer evaluation. By this project, I have learned to use Oracle and SQL language effectively, gaining valuable insights into database management systems (DBMS).

ER DIAGRAM OF THE SYSTEM



SCHEMA

- STUDENTSINFO:

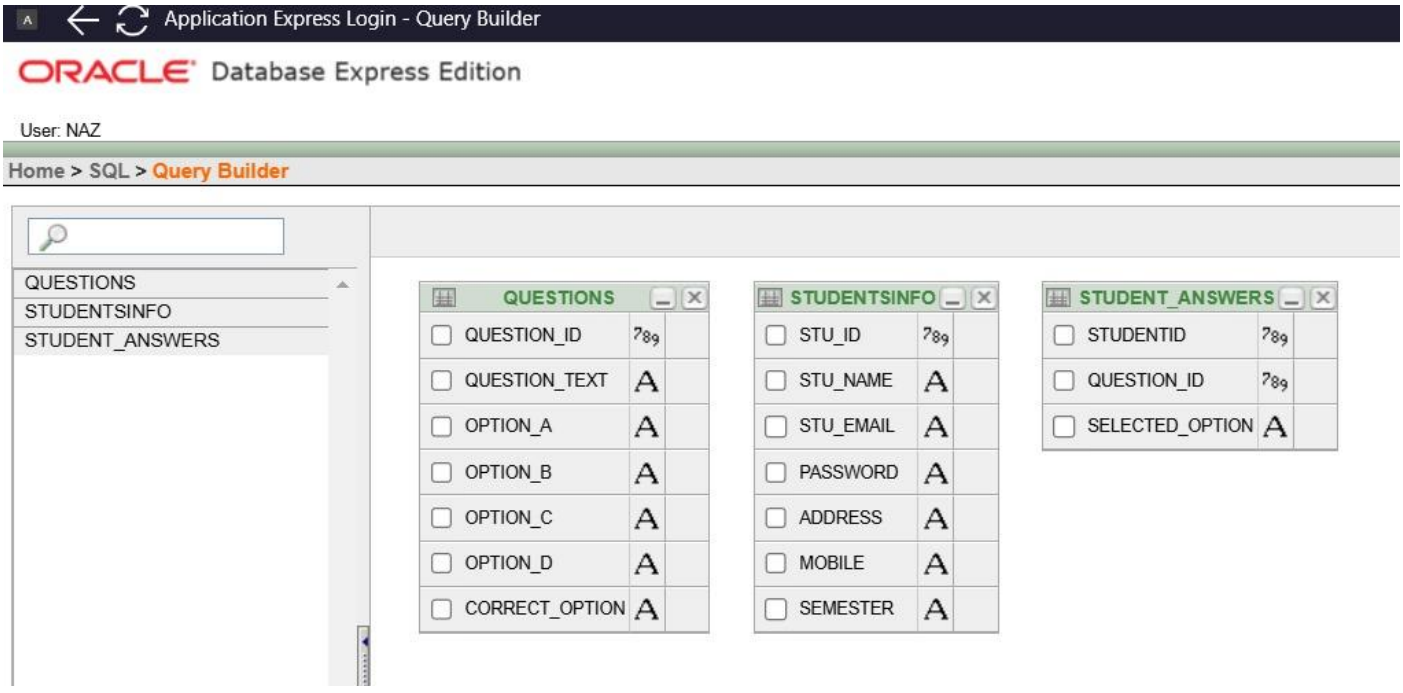
(STU_ID , STU_NAME,STU_EMAIL, PASSWORD,ADDRESS,MOBILE ,SEMESTER).

- QUESTIONS:

(QUESTION, QUESTION_TEXT, OPTION_A ,OPTION_B ,

OPTION_C ,OPTION_D ,CORRECT_OPTION).

- STUDENT_ANSWER:
  (STUDENTID,QUESTION_ID,SELECTED_OPTION)



Results Explain Describe Saved SQL History

COLUMN_NAME	KEY_TYPE
QUESTION_ID	Primary Key
QUESTION_TEXT	None
OPTION_A	None
OPTION_B	None
OPTION_C	None
OPTION_D	None
CORRECT_OPTION	None

7 rows returned in 0.15 seconds CSV Export

Results Explain Describe Saved SQL History

COLUMN_NAME	KEY_TYPE
STU_ID	Primary Key
STU_NAME	None
STU_EMAIL	Unique Key
PASSWORD	None
ADDRESS	None
MOBILE	None
SEMESTER	None

7 rows returned in 0.09 seconds CSV Export

Results Explain Describe Saved SQL History

COLUMN_NAME	KEY_TYPE
STUDENTID	None
QUESTION_ID	Foreign Key
QUESTION_ID	None
SELECTED_OPTION	None

4 rows returned in 0.12 seconds CSV Export

DDL Statements & Tables with Data :

STUDENTSINFO

```
-- Table: STUDENTSINFO
CREATE TABLE STUDENTSINFO (
STU_ID NUMBER PRIMARY KEY,
STU_NAME VARCHAR2(100),
STU_EMAIL VARCHAR2(100) UNIQUE,
PASSWORD VARCHAR2(50),
ADDRESS VARCHAR2(200),
MOBILE VARCHAR2(15),
SEMESTER VARCHAR2(20));
```

Results Explain Describe Saved SQL History

STU_ID	STU_NAME	STU_EMAIL	PASSWORD	ADDRESS	MOBILE	SEMESTER
1	John Doe	john.doe@example.com	password123	123 Main St, City	1234567890	1st
2	Jane Smith	jane.smith@example.com	password456	456 Oak St, City	0987654321	2nd
3	Alice Brown	alice.brown@example.com	password789	789 Pine St, City	1122334455	3rd
4	Bob White	bob.white@example.com	password101	101 Birch St, City	2233445566	4th
5	Charlie Green	charlie.green@example.com	password202	202 Cedar St, City	3344556677	1st
6	Diana Black	diana.black@example.com	password303	303 Maple St, City	4455667788	2nd
7	Eve White	eve.white@example.com	password404	404 Elm St, City	5566778899	3rd
8	Frank Yellow	frank.yellow@example.com	password505	505 Walnut St, City	6677889900	4th
9	Grace Red	grace.red@example.com	password606	606 Pine St, City	7788990011	1st
10	Hank Blue	hank.blue@example.com	password707	707 Oak St, City	8899001122	2nd

More than 10 rows available. Increase rows selector to view more rows.

10 rows returned in 0.03 seconds CSV Export

QUESTIONS

```
-- Table: QUESTIONS
CREATE TABLE QUESTIONS (
QUESTION_ID NUMBER PRIMARY KEY,
QUESTION_TEXT VARCHAR2(500),
OPTION_A VARCHAR2(100),
OPTION_B VARCHAR2(100),
OPTION_C VARCHAR2(100),
OPTION_D VARCHAR2(100),
CORRECT_OPTION VARCHAR2(100)
);
```

Results Explain Describe Saved SQL History

QUESTION_ID	QUESTION_TEXT	OPTION_A	OPTION_B	OPTION_C	OPTION_D	CORRECT_OPTION
1	What is 2 + 2?	3	4	5	6	B
2	What is the square root of 16?	2	3	4	5	C
3	What is 5 * 6?	30	35	25	40	A
4	What is 15 divided by 3?	4	5	6	7	B
5	What is the value of p (pi) approximately?	2.14	3.14	4.14	3.44	B
6	What is the result of 9 + 10?	18	19	20	21	B
7	If a triangle has angles 60°, 60°, and 60°, what type of triangle is it?	Right-angled	Isosceles	Equilateral	Scalene	C
13	What is the speed of light?	3x10^8 m/s	3x10^6 m/s	3x10^5 m/s	3x10^9 m/s	A
14	What is the SI unit of force?	Newton	Joule	Pascal	Watt	A
15	What is the acceleration due to gravity on Earth?	9.8 m/s²	10 m/s²	8.9 m/s²	9.5 m/s²	A

More than 10 rows available. Increase rows selector to view more rows.

10 rows returned in 0.00 seconds CSV Export

STUDENT_ANSWER

```
-- Table: STUDENT_ANSWER
CREATE TABLE STUDENT_ANSWER (
STUDENTID NUMBER,
QUESTION_ID NUMBER,
SELECTED_OPTION VARCHAR2(100),
FOREIGN KEY (STUDENTID) REFERENCES StudentsInfo(STU_ID),
FOREIGN KEY (QUESTION_ID) REFERENCES Questions(QUESTION_ID)
);
```

Results | Explain | Describe | Saved SQL | History

STUDENTID	QUESTION_ID	SELECTED_OPTION
2	1	B
2	2	C
2	3	A
3	7	C
2	5	M
4	16	A
4	13	A
4	15	A
4	14	A
3	6	B

10 rows returned in 0.09 seconds CSV Export

Language: en-gb

STUDENT ONLINE EXAM & RESULT ANALYSIS

```
INSERT ALL
INTO student_answers (studentid, question_id, selected_option) VALUES (2, 1, 'B')
INTO student_answers (studentid, question_id, selected_option) VALUES (2, 2, 'C')
INTO student_answers (studentid, question_id, selected_option) VALUES (2, 3, 'A')
INTO student_answers (studentid, question_id, selected_option) VALUES (2, 4, 'B')
SELECT * FROM dual;
SELECT
sa.studentid,
SUM(CASE
WHEN sa.selected_option = q.correct_option THEN 1
ELSE 0
END) AS total_score
FROM
student_answers sa
JOIN
questions q ON sa.question_id = q.question_id
GROUP BY
sa.studentid;
```

Results Explain Describe Saved SQL History

STUDENTID	TOTAL_SCORE
2	7
4	4
3	2

3 rows returned in 0.03 seconds CSV Export

Random Question Generation

```
SELECT *
FROM (
SELECT *
FROM questions
ORDER BY DBMS_RANDOM.VALUE)
WHERE ROWNUM <= 10;
```

Results Explain Describe Saved SQL History

QUESTION_ID	QUESTION_TEXT	OPTION_A	OPTION_B	OPTION_C	OPTION_D	CORRECT_OPTION
13	What is the speed of light?	3x10^8 m/s	3x10^6 m/s	3x10^5 m/s	3x10^9 m/s	A
63	What does HTTP stand for?	HyperText Transfer Protocol	Hyper Transfer Text Protocol	Home Text Transfer Protocol	HyperText Transport Protocol	A
23	What is the chemical formula for water?	H2O	CO2	O2	H2O2	A
47	What was the ancient civilization of Egypt known for?	Pyramids and pharaohs	Great wall and emperors	Castles and knights	Temples and warriors	A
2	What is the square root of 16?	2	3	4	5	C
29	What is the molecular weight of CO2?	44 g/mol	32 g/mol	56 g/mol	28 g/mol	A
24	What is the atomic number of Carbon?	6	8	12	16	A
38	Which of the following is a synonym for "happy"?	Sad	Joyful	Angry	Tired	B
50	What year did the Berlin Wall fall?	1989	1991	1961	1975	A
36	What is the largest organ in the human body?	Heart	Lungs	Skin	Liver	C

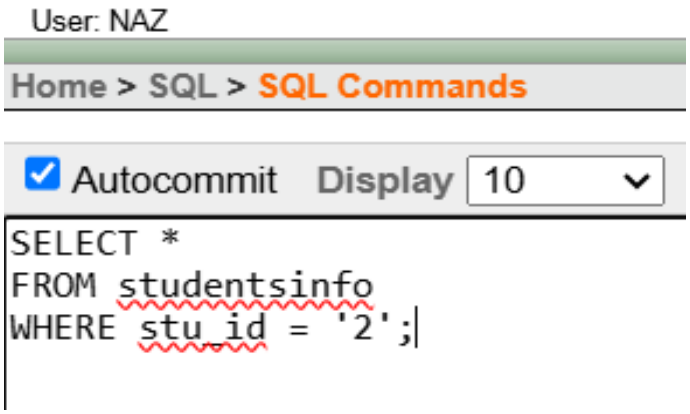
10 rows returned in 0.18 seconds CSV Export

SEARCHING DATA FROM INDIVIDUAL TABLE

(At Least 10 Ways)

QUESTION 1:

Find the details of the student whose id=2



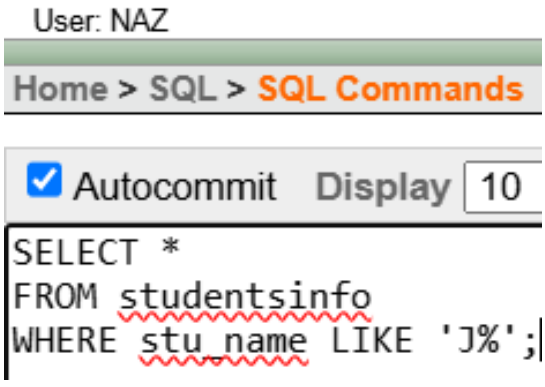
Results | Explain | Describe | Saved SQL | History

STU_ID	STU_NAME	STU_EMAIL	PASSWORD	ADDRESS	MOBILE	SEMESTER
2	Jane Smith	jane.smith@example.com	password456	456 Oak St, City	0987654321	2nd

1 rows returned in 0.00 seconds CSV Export

QUESTION 2:

Find The students whose name started by " J"



Results | Explain | Describe | Saved SQL | History

STU_ID	STU_NAME	STU_EMAIL	PASSWORD	ADDRESS	MOBILE	SEMESTER
1	John Doe	john.doe@example.com	password123	123 Main St, City	1234567890	1st
2	Jane Smith	jane.smith@example.com	password456	456 Oak St, City	0987654321	2nd
12	Jack Purple	jack.purple@example.com	password909	909 Birch St, City	1011122334	4th

3 rows returned in 0.00 seconds CSV Export

QUESTION 3:

Find The students whose score is the highest.

User: NAZ

Home > SQL > SQL Commands

Autocommit Display 10

```
SELECT
    sa.studentid,
    SUM(CASE
        WHEN sa.selected_option = q.correct_option THEN 1
        ELSE 0
    END) AS total_score
FROM
    student_answers sa
JOIN
    questions q ON sa.question_id = q.question_id
GROUP BY
    sa.studentid
HAVING
    SUM(CASE
        WHEN sa.selected_option = q.correct_option THEN 1
        ELSE 0
    END) = (
        SELECT MAX(total_score)
        FROM (
            SELECT
                SUM(CASE
                    WHEN sa.selected_option = q.correct_option THEN 1
                    ELSE 0
                END) AS total_score
            FROM
                student_answers sa
            JOIN
                questions q ON sa.question_id = q.question_id
            GROUP BY
                sa.studentid
        )
    );
```

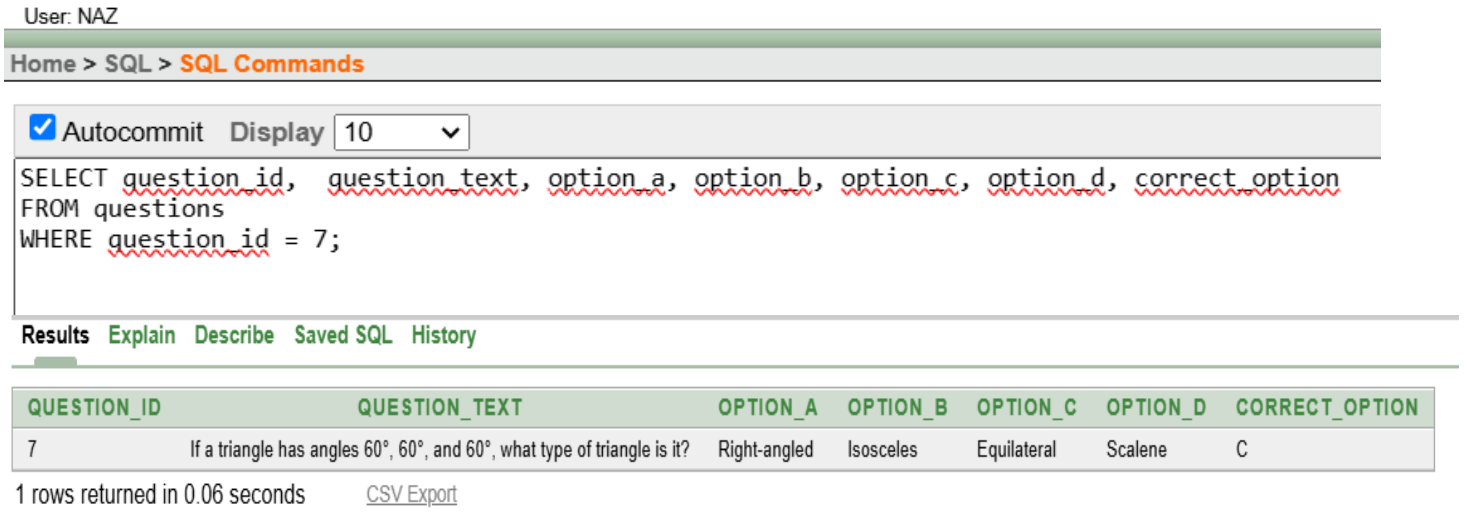
Results Explain Describe Saved SQL History

STUDENTID	TOTAL_SCORE
2	7

1 rows returned in 0.14 seconds CSV Export

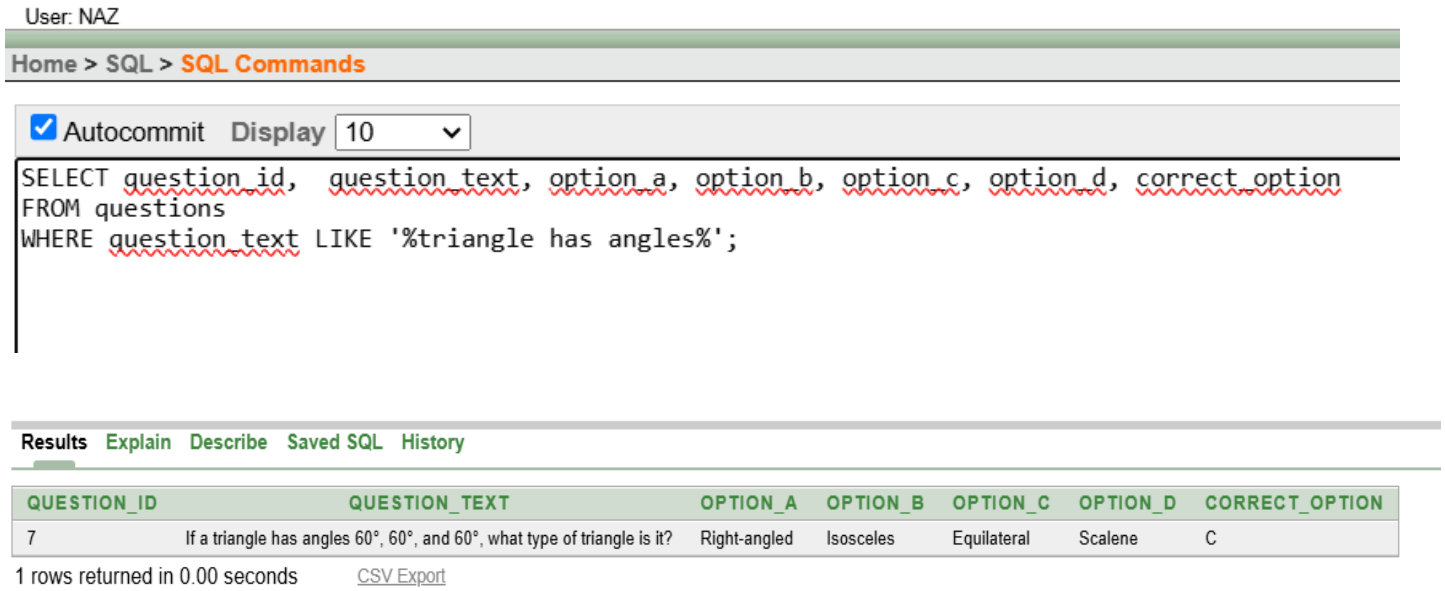
QUESTION 4:

Show the question statement whose question_id is 7.



QUESTION 5:

Find the question whose question text has this part “triangle has angles”



QUESTION 6:

Find the questions whose correct answer is ‘A’

User: NAZ

Home > SQL > SQL Commands

Autocommit Display 10

```
SELECT question_id, question_text, option_a, option_b, option_c, option_d, correct_option
FROM questions
WHERE correct_option = 'A';
```

Results Explain Describe Saved SQL History

QUESTION_ID	QUESTION_TEXT	OPTION_A	OPTION_B	OPTION_C	OPTION_D	CORRECT_OPTION
3	What is 5 * 6?	30	35	25	40	A
13	What is the speed of light?	3x10^8 m/s	3x10^6 m/s	3x10^5 m/s	3x10^9 m/s	A
14	What is the SI unit of force?	Newton	Joule	Pascal	Watt	A
15	What is the acceleration due to gravity on Earth?	9.8 m/s²	10 m/s²	8.9 m/s²	9.5 m/s²	A
16	What is the unit of electric current?	Ampere	Volt	Ohm	Tesla	A
17	What is the formula for kinetic energy?	½mv²	mv	mgh	½mgh	A
18	What is the frequency of a wave if its wavelength is 2 m and its speed is 4 m/s?	2 Hz	4 Hz	8 Hz	1 Hz	A
21	Which of the following is not a type of electromagnetic wave?	Sound wave	Radio wave	Microwave	X-ray	A
22	What is the energy stored in a capacitor?	½CV²	CV	C²V	C/V	A
23	What is the chemical formula for water?	H2O	CO2	O2	H2O2	A

More than 10 rows available. Increase rows selector to view more rows.

10 rows returned in 0.02 seconds CSV Export

QUESTION 7:

Find the students who are in 1st semester

User: NAZ

Home > SQL > SQL Commands

Autocommit Display 10

```
SELECT stu_id, stu_name, semester
FROM studentsinfo
WHERE semester = '1st';
```

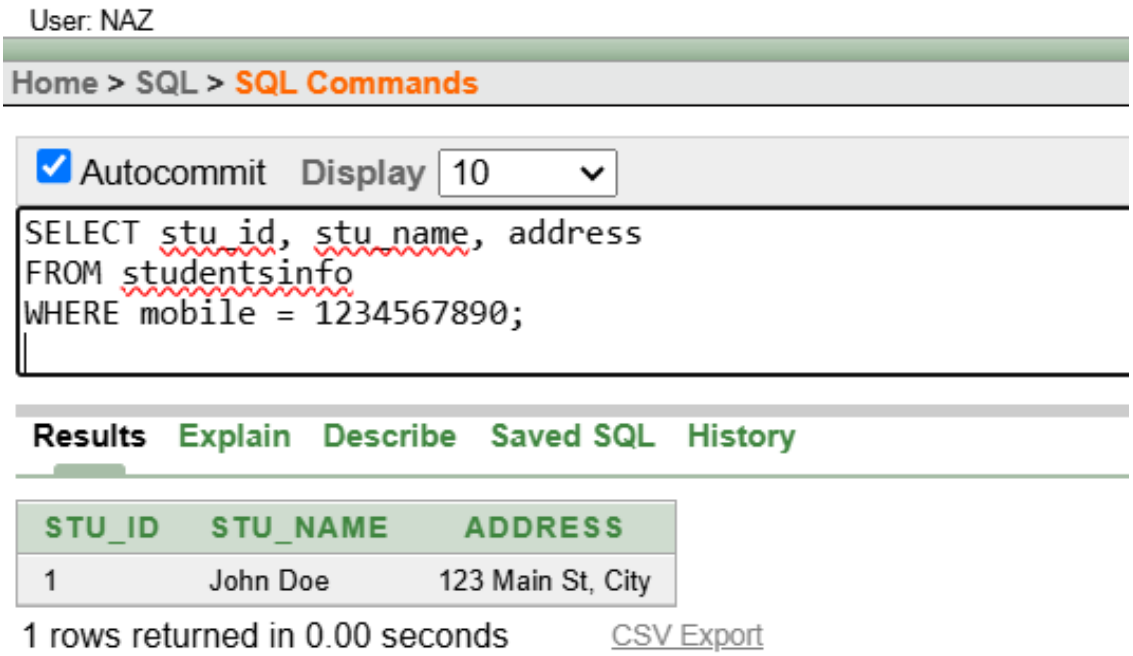
Results Explain Describe Saved SQL History

STU_ID	STU_NAME	SEMESTER
1	John Doe	1st
5	Charlie Green	1st
9	Grace Red	1st

3 rows returned in 0.02 seconds CSV Export

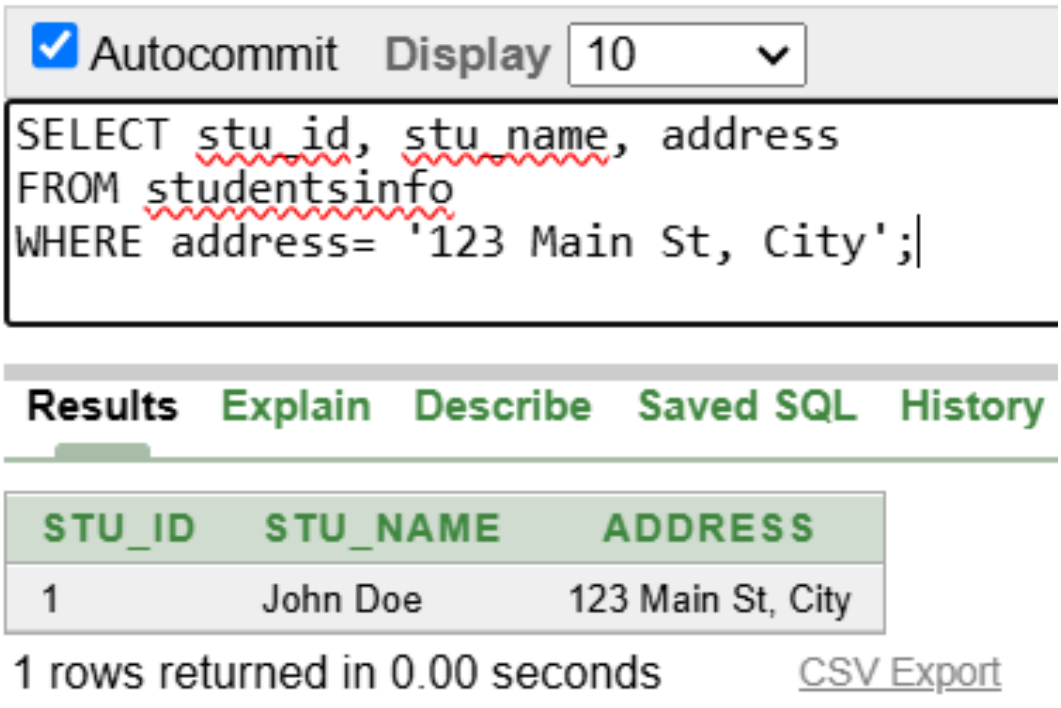
QUESTION 8:

Find the students whose mobile number is 1234567890



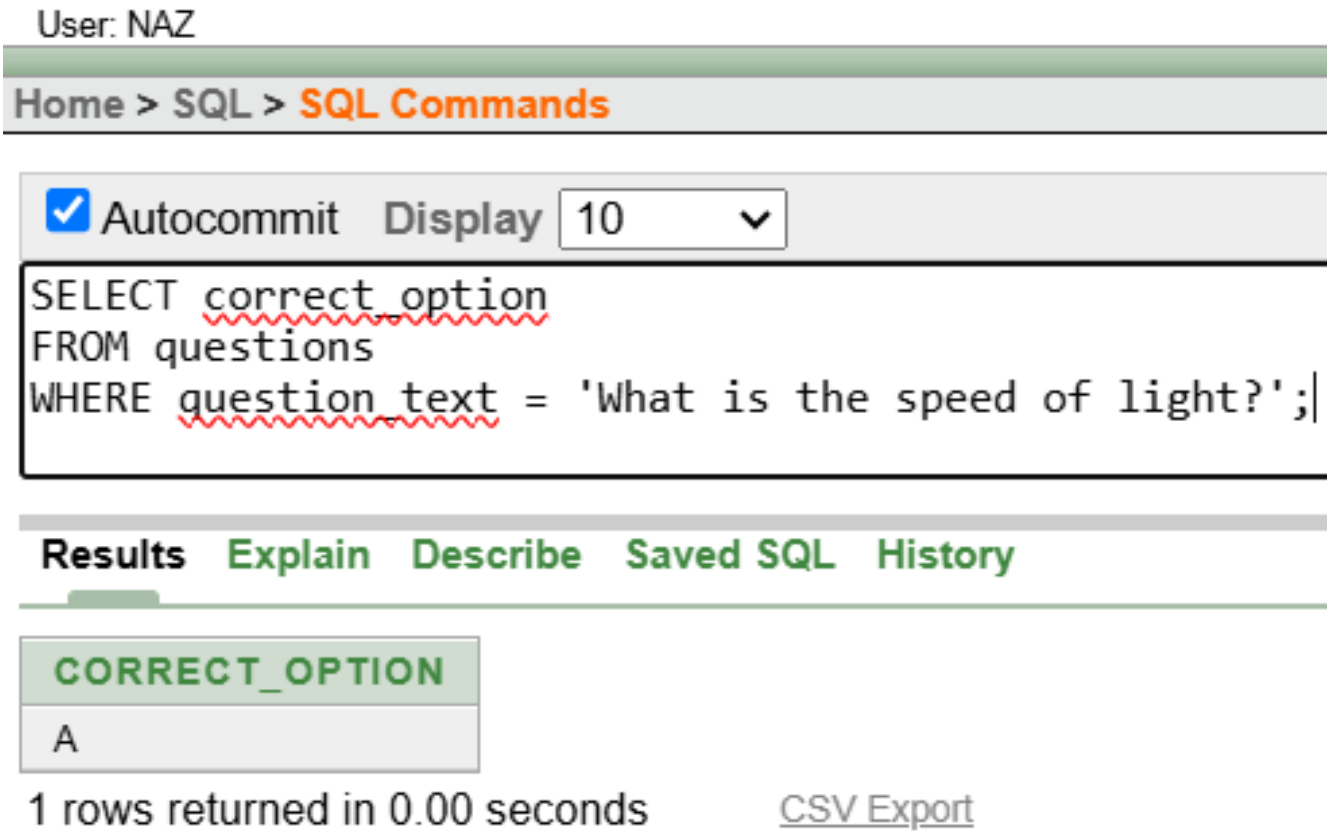
QUESTION 9:

Find the students whose address is 123 Main St, City



QUESTION 10:

Find the correct answer option of the question 'What is the speed of light?'



SEARCHING DATA FROM MULTIPLE TABLE

(At Least 5 Ways)

Question 1:

Find the student details and their total score based on the answers they selected in the Student_Answer table.

User: NAZ

Home > SQL > SQL Commands

Autocommit Display 10

```
SELECT
    si.STU_ID,
    si.STU_NAME,
    si.STU_EMAIL,
    SUM(CASE
            WHEN sa.SELECTED_OPTION = q.CORRECT_OPTION THEN 1
            ELSE 0
        END) AS total_score
FROM
    studentsinfo si
JOIN
    student_answers sa ON si.STU_ID = sa.STUDENTID
JOIN
    Questions q ON sa.QUESTION_ID = q.QUESTION_ID
GROUP BY
    si.STU_ID, si.STU_NAME, si.STU_EMAIL;
```

Results Explain Describe Saved SQL History

STU_ID	STU_NAME	STU_EMAIL	TOTAL_SCORE
2	Jane Smith	jane.smith@example.com	7
3	Alice Brown	alice.brown@example.com	2
4	Bob White	bob.white@example.com	4

3 rows returned in 0.01 seconds CSV Export

Question 2:

Find all the questions with their correct options, and the names of students who answered those questions correctly.

User: NAZ

Home > SQL > SQL Commands

Autocommit Display 10

```
SELECT
    q.QUESTION_TEXT,
    q.CORRECT_OPTION,
    si.STU_NAME
FROM
    questions q
JOIN
    student_answers sa ON q.QUESTION_ID = sa.QUESTION_ID
JOIN
    studentsinfo si ON sa.STUDENTID = si.STU_ID
WHERE
    sa.SELECTED_OPTION = q.CORRECT_OPTION;
```

Results Explain Describe Saved SQL History

QUESTION_TEXT	CORRECT_OPTION	STU_NAME
What is 2 + 2?	B	Jane Smith
What is the square root of 16?	C	Jane Smith
What is 5 * 6?	A	Jane Smith
What is 15 divided by 3?	B	Jane Smith
What is 2 + 2?	B	Jane Smith
What is the square root of 16?	C	Jane Smith
What is 5 * 6?	A	Jane Smith
If a triangle has angles 60°, 60°, and 60°, what type of triangle is it?	C	Alice Brown
What is the unit of electric current?	A	Bob White
What is the speed of light?	A	Bob White
More than 10 rows available. Increase rows selector to view more rows.		

10 rows returned in 0.00 seconds CSV Export

Question 3:

Find the students who are in the semester '2nd' and the questions they have attempted.

User: NAZ

Home > SQL > SQL Commands

Autocommit Display 10

```
SELECT
    si.STU_NAME,
    q.QUESTION_TEXT
FROM
    studentsinfo si
JOIN
    student_answers sa ON si.STU_ID = sa.STUDENTID
JOIN
    questions q ON sa.QUESTION_ID = q.QUESTION_ID
WHERE
    si.SEMESTER = '2nd';
```

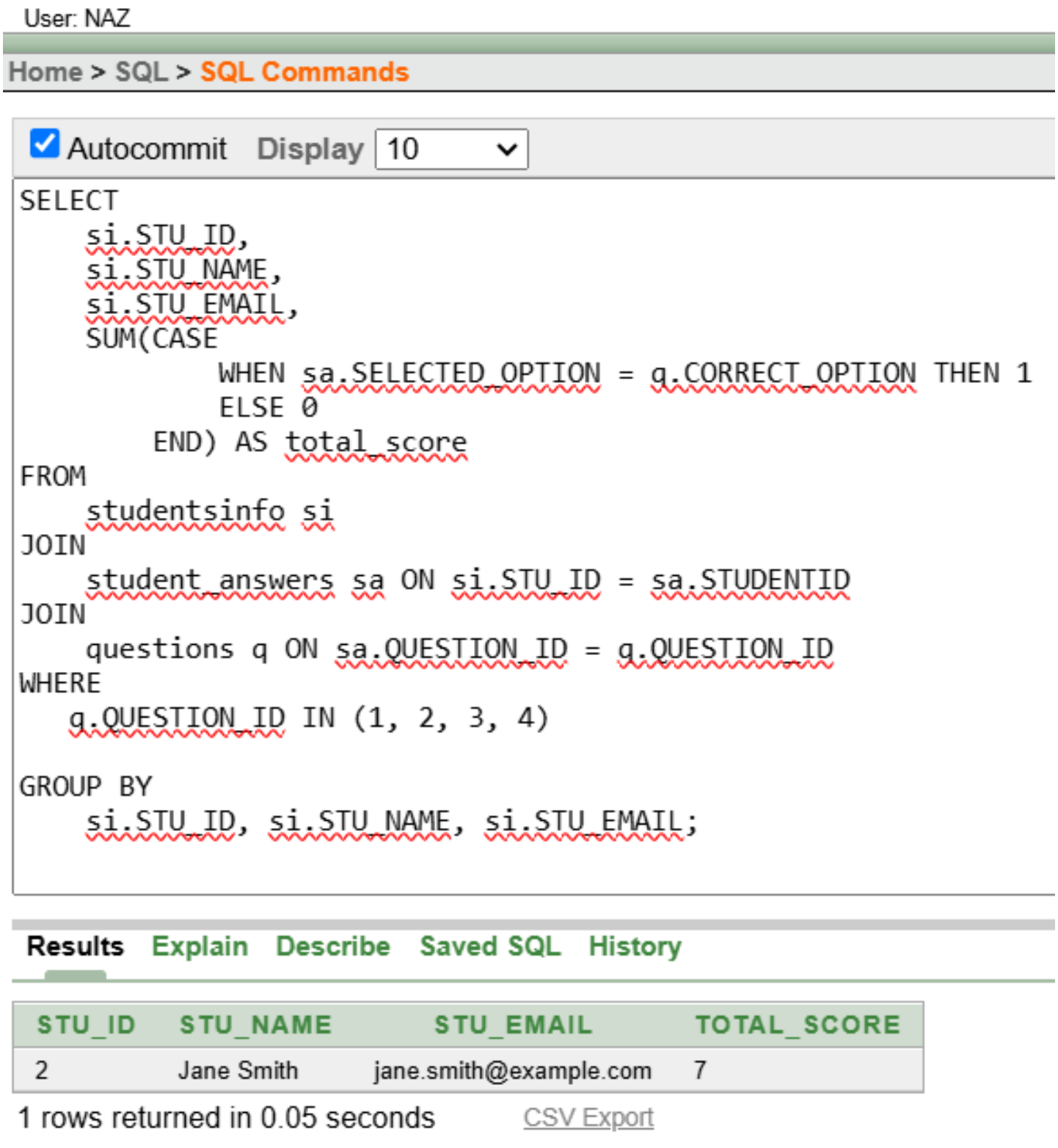
Results Explain Describe Saved SQL History

STU_NAME	QUESTION_TEXT
Jane Smith	What is 2 + 2?
Jane Smith	What is the square root of 16?
Jane Smith	What is 5 * 6?
Jane Smith	What is 15 divided by 3?
Jane Smith	What is the value of p (pi) approximately?
Jane Smith	What is 2 + 2?
Jane Smith	What is the square root of 16?
Jane Smith	What is 5 * 6?
Jane Smith	What is the value of p (pi) approximately?

9 rows returned in 0.02 seconds CSV Export

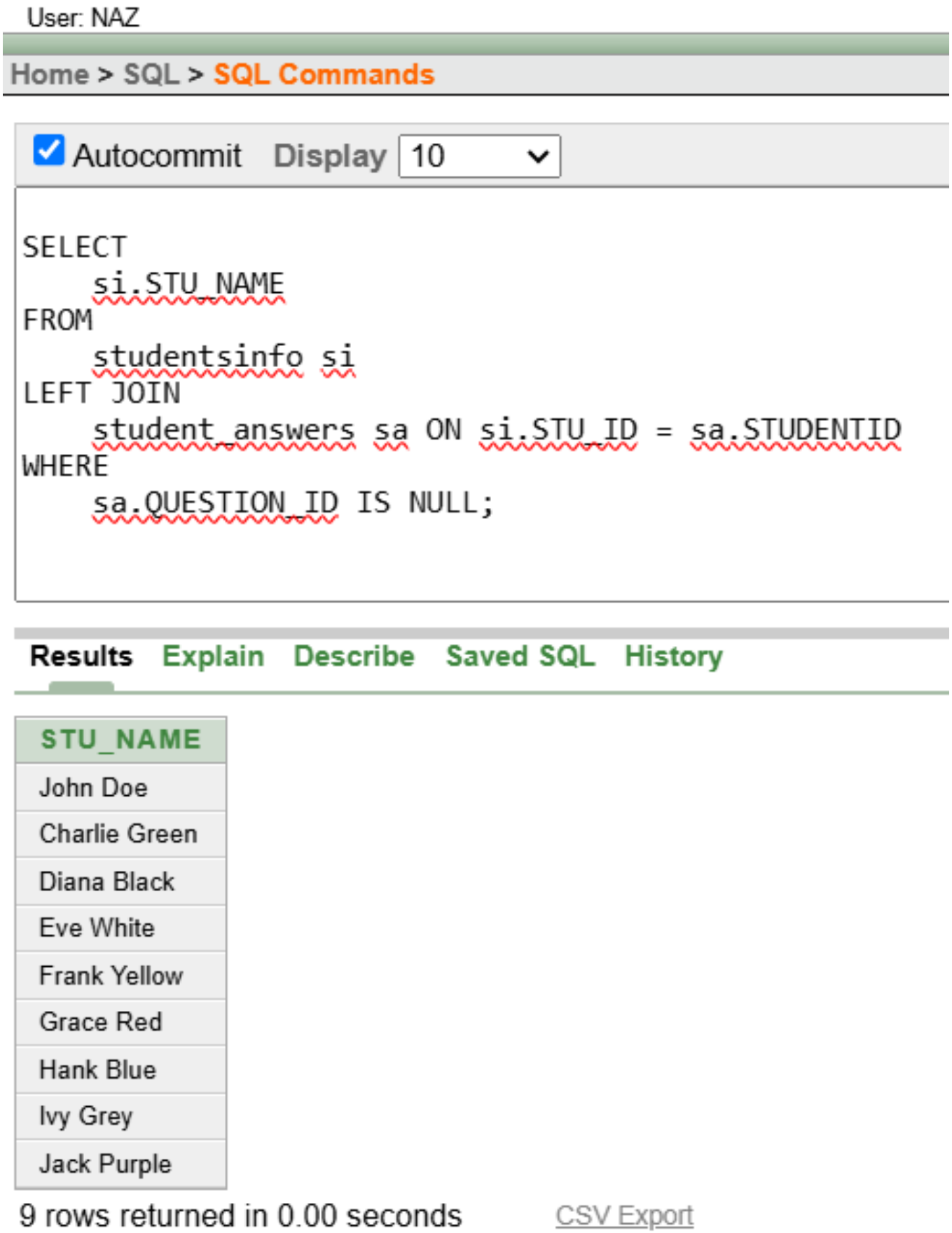
Question 4:

Find the total score, student name, email, id of each student who attempted questions related to question_id (1,2,3,4) based on the correctness of their answers.



Question 5:

Find all the students who have not attempted any exam.



All Types of Subqueries for the System

Single-row subquery

Query: Find the name and email of the student who has the highest score.

User: NAZ

Home > SQL > SQL Commands

Autocommit Display 10

```
SELECT STU_NAME, STU_EMAIL
FROM studentsinfo
WHERE STU_ID = (
    SELECT STUDENTID
    FROM (
        SELECT STUDENTID, SUM(CASE WHEN sa.SELECTED_OPTION = q.CORRECT_OPTION THEN 1 ELSE 0 END) AS total_score
        FROM student_answers sa
        JOIN Questions q ON sa.QUESTION_ID = q.QUESTION_ID
        GROUP BY STUDENTID
        ORDER BY total_score DESC
    )
    WHERE ROWNUM = 1
);
```

Results Explain Describe Saved SQL History

STU_NAME	STU_EMAIL
Jane Smith	jane.smith@example.com

1 rows returned in 0.03 seconds CSV Export

Multiple row subquery

Query: Find the Students Who Scored Less Than the Top Scorer.

User: NAZ

Home > SQL > SQL Commands

Autocommit Display 10

```
SELECT STU_NAME, STU_EMAIL
FROM studentsinfo
WHERE STU_ID IN (
    SELECT STUDENTID
    FROM (
        SELECT sa.STUDENTID, SUM(CASE WHEN sa.SELECTED_OPTION = q.CORRECT_OPTION THEN 1 ELSE 0 END) AS total_score
        FROM student_answers sa
        JOIN Questions q ON sa.QUESTION_ID = q.QUESTION_ID
        GROUP BY sa.STUDENTID
    )
    WHERE total_score < (
        SELECT MAX(total_score)
        FROM (
            SELECT SUM(CASE WHEN sa.SELECTED_OPTION = q.CORRECT_OPTION THEN 1 ELSE 0 END) AS total_score
            FROM student_answers sa
            JOIN Questions q ON sa.QUESTION_ID = q.QUESTION_ID
            GROUP BY sa.STUDENTID
        )
    )
);
```

Results Explain Describe Saved SQL History

STU_NAME	STU_EMAIL
Bob White	bob.white@example.com
Alice Brown	alice.brown@example.com

2 rows returned in 0.12 seconds CSV Export

Multiple-column subqueries

Query: Find Students Who Share an Address with a Top Scorer.

User: NAZ

Home > SQL > SQL Commands

Autocommit Display 10

```
SELECT STU_ID, STU_NAME, ADDRESS
FROM studentsinfo
WHERE ADDRESS IN (
    SELECT ADDRESS
    FROM studentsinfo
    WHERE STU_ID = (
        SELECT STUDENTID
        FROM (
            SELECT STUDENTID, SUM(CASE WHEN sa.SELECTED_OPTION = q.CORRECT_OPTION THEN 1 ELSE 0 END) AS total_score
            FROM student_answers sa
            JOIN Questions q ON sa.QUESTION_ID = q.QUESTION_ID
            GROUP BY STUDENTID
            ORDER BY total_score DESC
        )
        WHERE ROWNUM = 1
    )
);
```

Results Explain Describe Saved SQL History

STU_ID	STU_NAME	ADDRESS
2	Jane Smith	456 Oak St, City

1 rows returned in 0.05 seconds CSV Export

Correlated subquery

Query: Find students whose total score is greater than the average score of all students.

User: NAZ

Home > SQL > SQL Commands

Autocommit Display 10

```
WHERE EXISTS (
    SELECT 1
    FROM student_answers sa
    JOIN Questions q ON sa.QUESTION_ID = q.QUESTION_ID
    WHERE sa.STUDENTID = si.STU_ID
    GROUP BY sa.STUDENTID
    HAVING SUM(CASE WHEN sa.SELECTED_OPTION = q.CORRECT_OPTION THEN 1 ELSE 0 END) > (
        SELECT AVG(total_score)
        FROM (
            SELECT SUM(CASE WHEN sa2.SELECTED_OPTION = q2.CORRECT_OPTION THEN 1 ELSE 0 END) AS total_score
            FROM student_answers sa2
            JOIN Questions q2 ON sa2.QUESTION_ID = q2.QUESTION_ID
            GROUP BY sa2.STUDENTID
        )
    )
);
```

Results Explain Describe Saved SQL History

STU_ID	STU_NAME	ADDRESS
2	Jane Smith	456 Oak St, City

1 rows returned in 0.03 seconds CSV Export

Nested subquery

Query: Find Students Who Have Never Answered a Question.

User: NAZ

Home > SQL > SQL Commands

Autocommit Display 10

```
SELECT STU_NAME
FROM studentsinfo
WHERE STU_ID NOT IN (
    SELECT DISTINCT STUDENTID
    FROM student_answers
);
```

Results Explain Describe Saved SQL History

STU_NAME
John Doe
Charlie Green
Diana Black
Eve White
Frank Yellow
Grace Red
Hank Blue
Ivy Grey
Jack Purple

9 rows returned in 0.01 seconds CSV Export

PL/SQL for the System

(1)

Query: Insert a new student in studentinfo table.

User: NAZ

Home > SQL > SQL Commands

Autocommit Display 10

```
INSERT INTO studentsinfo (
    STU_ID,
    STU_NAME,
    STU_EMAIL,
    PASSWORD,
    ADDRESS,
    MOBILE,
    SEMESTER
)
VALUES (
    22,
    'Nazrana',
    'nazrana@example.com',
    'password128',
    '123 Main St, City',
    '1234567778',
    '4th'
);
```

Results Explain Describe Saved SQL History

```
1 row(s) inserted.

0.00 seconds
```

(2)

Query: Update new student information in studentinfo table.

User: NAZ

Home > SQL > SQL Commands

Autocommit Display 10

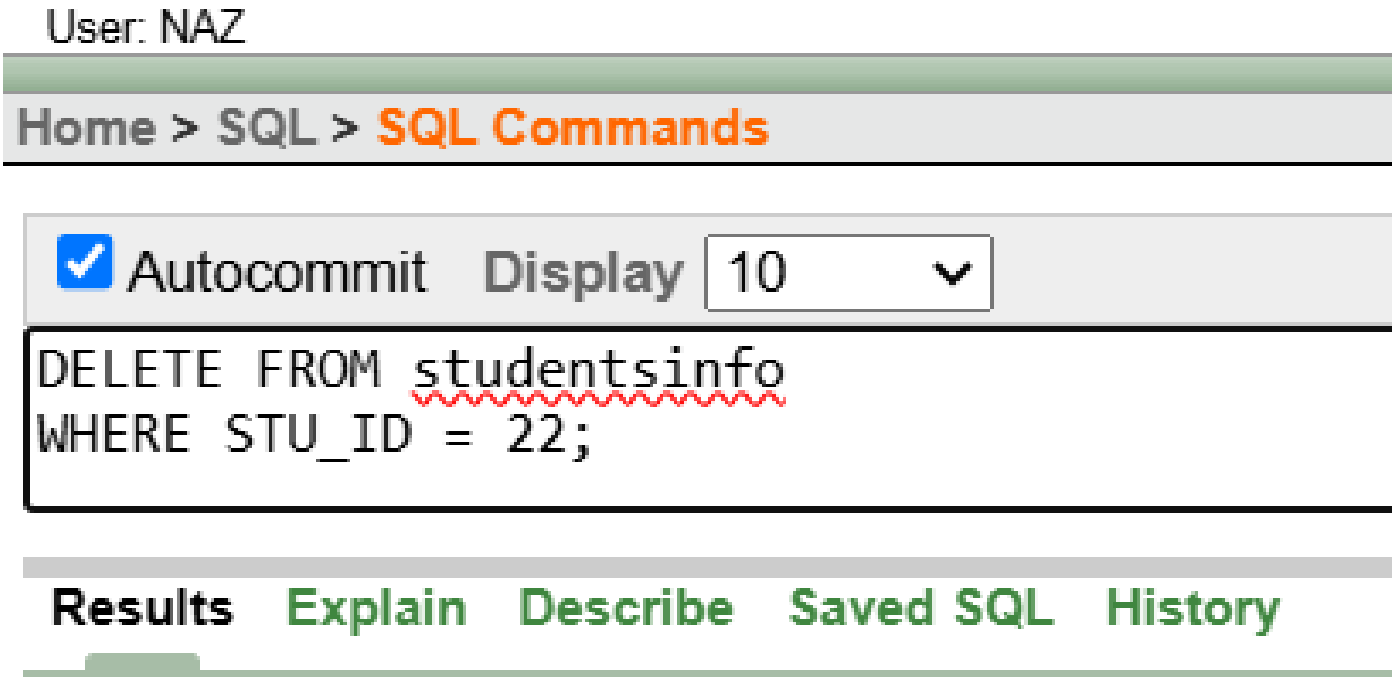
```
UPDATE studentsinfo
SET
    STU_NAME = 'Nazrana Ahmed',
    STU_EMAIL = 'nazrana.ahmed@example.com',
    PASSWORD = 'newpassword123',
    ADDRESS = '456 Main St, City',
    MOBILE = '9876543210',
    SEMESTER = '5th'
WHERE
    STU_ID = 22;
```

Results Explain Describe Saved SQL History

```
1 row(s) updated.
```

(3)

Query: Delete student from the table.

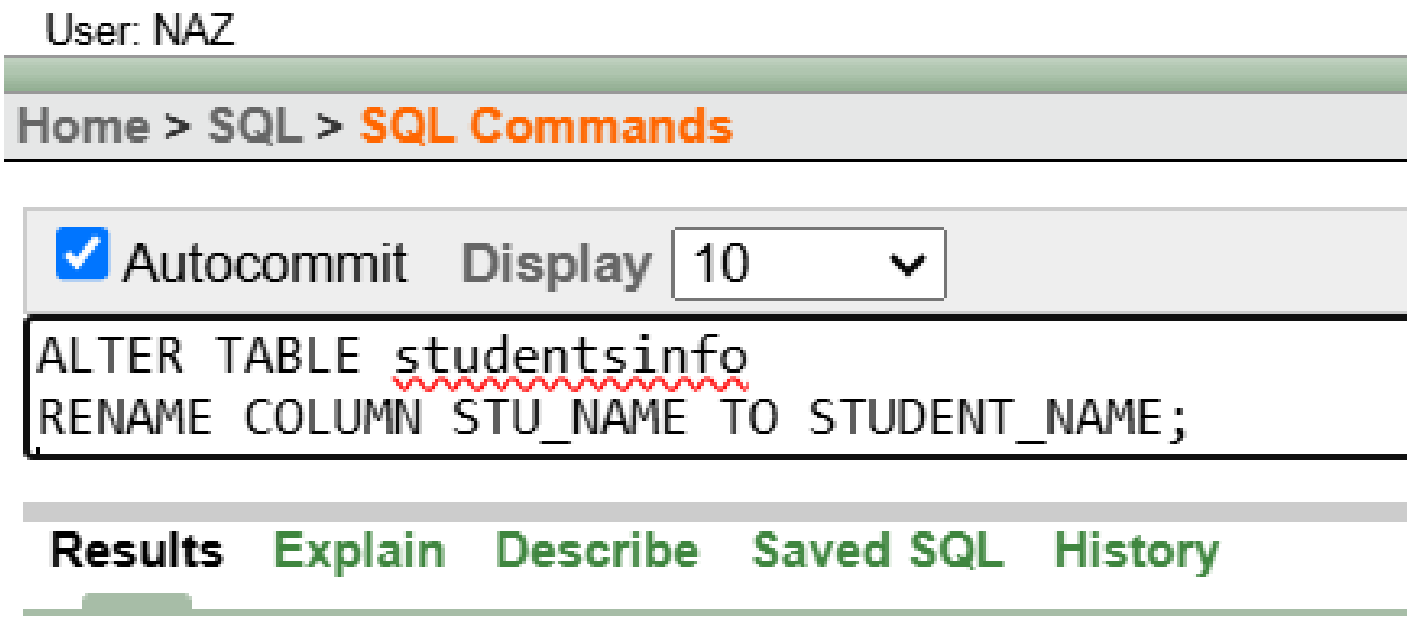


1 row(s) deleted.

0.02 seconds

(4)

Query: Alter column name of the studentinfo table.




```
Table altered.
```

0.32 seconds

(5)

Query: Select student name in sorted order.

User: NAZ

Home > SQL > SQL Commands

Autocommit Display 10

```
SELECT * FROM studentsinfo
ORDER BY STUDENT_NAME;
```

Results Explain Describe Saved SQL History

STU_ID	STUDENT_NAME	STU_EMAIL	PASSWORD	ADDRESS	MOBILE	SEMESTER
3	Alice Brown	alice.brown@example.com	password789	789 Pine St, City	1122334455	3rd
4	Bob White	bob.white@example.com	password101	101 Birch St, City	2233445566	4th
5	Charlie Green	charlie.green@example.com	password202	202 Cedar St, City	3344556677	1st
6	Diana Black	diana.black@example.com	password303	303 Maple St, City	4455667788	2nd
7	Eve White	eve.white@example.com	password404	404 Elm St, City	5566778899	3rd
8	Frank Yellow	frank.yellow@example.com	password505	505 Walnut St, City	6677889900	4th
9	Grace Red	grace.red@example.com	password606	606 Pine St, City	7788990011	1st
10	Hank Blue	hank.blue@example.com	password707	707 Oak St, City	8899001122	2nd
11	Ivy Grey	ivy.grey@example.com	password808	808 Cedar St, City	9900112233	3rd
12	Jack Purple	jack.purple@example.com	password909	909 Birch St, City	1011122334	4th

More than 10 rows available. Increase rows selector to view more rows.

10 rows returned in 0.02 seconds CSV Export

CONCLUSION

The "Online Exam System" project enhanced my skills in Oracle and SQL by developing a secure student database, dynamic question bank, and answer evaluation system. I gained practical experience in designing and normalizing a conceptual model, creating relationships, and enforcing constraints. I also learned advanced query techniques, including searching data from multiple tables and using sub-queries. The project strengthened my understanding of database management and PL/SQL programming. Overall, it provided valuable insights into developing efficient and secure database-driven applications.