



AMERICAN INTERNATIONAL UNIVERSITY–BANGLADESH (AIUB)

Dept. of Computer Science Faculty of Science and Technology

Introduction To Database

Spring 2022-2023

Section: J

Group:7

Project:

Consultant Management System

Supervised By

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Submitted By:

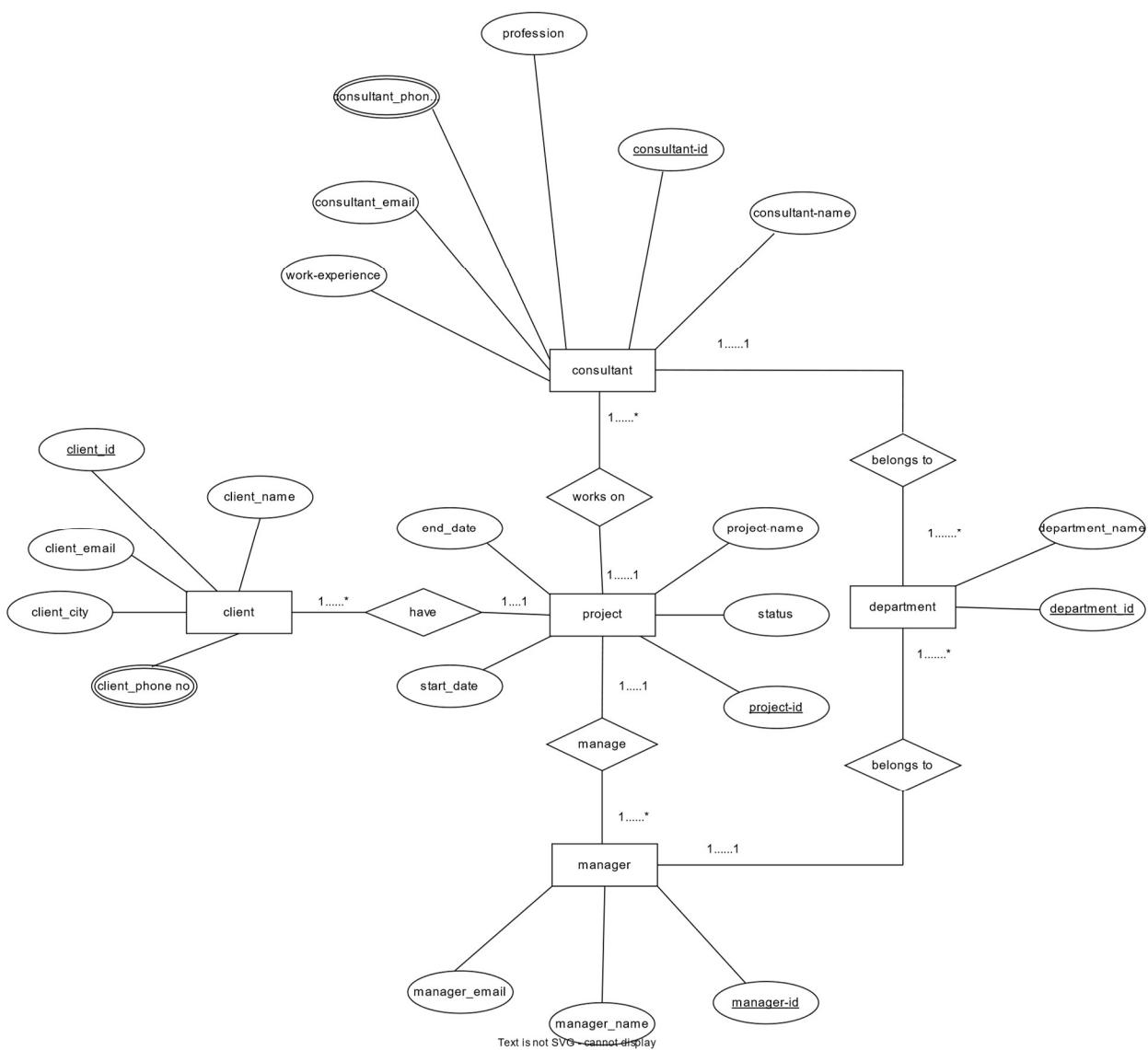
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Case Study

RSS consulting firm has been in operation for several years and has grown rapidly in recent years. The firm employs a large number of consultants who work on various client project. However, the firm has been struggling to manage its consultant and their work effectively. So, they decided to hire a team of software developers to design and implement a consultant management system that provides a central database to manage the consultant and their work on various client project. The system should track all relevant information about each consultant, each project, and the interactions between them. The system should improve the efficiency and productivity of the consulting firm. The team designed a database schema that included tables for consultants, department, manager, projects, and clients. The consultant table is linked with the department table as well as the project table. The manager table is linked with the department table and project table. The client table is connected with the project table. The team selected suitable technologies, including a relational database management system (RDBMS) like Oracle express edition 10g.

The main entities of the Consultant Management System are Client, Project, Manager, Department, Consultant. Client select their project. Each project has a unique ID, name, start date, end date, and status. Projects can have multiple consultants assigned to them. Projects are initiated by clients, who have their unique ID, name, and phone_no. Project is managed by manager. One manager can handle multiple project ,but one project is assigned by only one manager. Each manager has a unique ID, and email. Also manager belongs to department. Departments represent different functional areas within the organization and have a unique ID and name. Consultants are assigned to specific departments based on their expertise. Each consultant has a unique ID, name, email. They are assigned to projects and belong to a specific department. Consultants also joined with project. Also the consultant have many project but one project can be manage by one consultant.

ER Diagram:



Normalization:

Client have Project

UNF:

→ client_id, client_name, e-mail, phone_no, city, project_id, project_name, start_date, end_date, status

1NF: phone_no is a multivalued attribute.

→ client_id, client_name, e-mail, phone_no, city

→ project_id, project_name, start_date, end_date, status

2NF: There are partial dependencies with client_id and phone_no.

→ client_id, client_name, e-mail, city

→ client_id (FK), phone_no

→ project_id, project_name, start_date, end_date, status

3NF: There is no transitive dependency.

→ client_id, client_name, e-mail, city

→ client_id (FK), phone_no

→ project_id, project_name, start_date, end_date, status

Manager manage Project

UNF:

→ project_id, project_name, start_date, end_date, status, manager_id, manager_name, manager_email

1NF: There are no multivalued attributes.

→ project_id, project_name, start_date, end_date, status

→ manager_id, manager_name, manager_email

2NF:

→ project_id, project_name, start_date, end_date, status, manager_id (FK)

→ manager_id, manager_name, manager_email

3NF: There is no transitive dependency.

→ project_id, project_name, start_date, end_date, status, manager_id (FK)

→ manager_id, manager_name, manager_email

Manager belongs to Department

UNF:

manager_id, manager_name, manager_email, dept_id, dept_name

1NF: There are no multivalued attributes

→ manager_id, manager_name, manager_email

→ dept_id, dept_name

2NF:

→ manager_id, manager_name, manager_email, dept_id (FK)

→ dept_id, dept_name

3NF: There is no transitive dependency.

→ manager_id, manager_name, manager_email, dept_id (FK)

→ dept_id, dept_name

Consultant belongs to Department

UNF:

consultant_id, consultant_name, consultant_email, phone_no, profession, work_exp, dept_id, dept_name

1NF: phone_no is a multivalued attribute.

→ dept_id, dept_name

→ consultant_id, consultant_name, consultant_email, phone_no, profession, work_exp

2NF:

→ dept_id, dept_name

→ consultant_id, consultant_name, consultant_email, profession, work_exp, dept_id (FK)

→ consultant_id (FK), phone_no

3NF: There is no transitive dependency.

→ dept_id, dept_name

→ consultant_id, consultant_name, consultant_email, profession, work_exp, dept_id (FK)

→ consultant_id (FK), phone_no

Consultant works on project

UNF:

consultant_id, consultant_name, consultant_email, phone_no, profession, work_exp, project_id,
project_name, start_date, end_date, status

1NF: phone_no is a multivalued attribute.

- consultant_id, consultant_name, consultant_email, phone_no, profession, work_exp
- project_id, project_name, start_date, end_date, status

2NF:

- consultant_id, consultant_name, consultant_email, profession, work_exp, project_id (FK)
- consultant_id (FK), phone_no
- project_id, project_name, start_date, end_date, status

3NF: There is no transitive dependency.

- consultant_id, consultant_name, consultant_email, profession, work_exp, project_id (FK)
- consultant_id (FK), phone_no
- project_id, project_name, start_date, end_date, status

Temporary table:

1. client_id, client_name, e-mail, city
2. client_id (FK), phone_no
3. project_id, project_name, start_date, end_date, status
4. project_id, project_name, start_date, end_date, status, manager_id (FK)
5. manager_id, manager_name, manager_email
6. manager_id, manager_name, manager_email, dept_id (FK)
7. dept_id, dept_name
8. ~~dept_id, dept_name~~
9. consultant_id, consultant_name, consultant_email, profession, work_exp, dept_id (FK)
10. consultant_id (FK), phone_no
11. consultant_id, consultant_name, consultant_email, profession, work_exp, project_id (FK)
12. ~~consultant_id (FK), phone_no~~
13. project_id, project_name, start_date, end_date, status

Final Table:

1. client_id, client_name, e-mail, city
2. client_id (FK), phone_no
3. project_id, project_name, start_date, end_date, status, client_id (FK)
4. project_id, project_name, start_date, end_date, status, manager_id (FK)
5. manager_id, manager_name, manager_email
6. manager_id, manager_name, manager_email, dept_id (FK)
7. dept_id, dept_name
8. consultant_id, consultant_name, consultant_email, profession, work_exp, dept_id (FK)
9. consultant_id (FK), phone_no
10. consultant_id, consultant_name, consultant_email, profession, work_exp, project_id (FK)
11. project_id, project_name, start_date, end_date, status

Table creation:

```
➔ CREATE TABLE Client_info (
    client_id INT PRIMARY KEY,
    client_name VARCHAR(40) NOT NULL,
    client_email VARCHAR(40),
    client_city VARCHAR(20)
);
```

The screenshot shows the Oracle Database Express Edition interface. In the SQL Commands tab, the following SQL code is entered:

```
CREATE TABLE Client_info (
    client_id INT PRIMARY KEY,
    client_name VARCHAR(40) NOT NULL,
    client_email VARCHAR(40),
    client_city VARCHAR(20)
);
describe Client_info
```

Below the code, the results of the describe command are shown:

Object Type	TABLE	Object	CLIENT_INFO						
Table	Column	Data Type	Length	Precision	Scale	Primary Key	Nullable	Default	Comment
CLIENT_INFO	CLIENT_ID	Number	-	-	0	1	-	-	-
	CLIENT_NAME	Varchar2	40	-	-	-	-	-	-
	CLIENT_EMAIL	Varchar2	40	-	-	-	✓	-	-
	CLIENT_CITY	Varchar2	20	-	-	-	✓	-	-

At the bottom of the interface, the status bar displays "Language: en-us", "Application Express 2.1.0.00.39", and "Copyright © 1999, 2006, Oracle. All rights reserved."

```
→CREATE TABLE Client_no (
    client_id INT,
    phone_no VARCHAR(20),
    FOREIGN KEY (client_id) REFERENCES client_info(client_id)
);
```

ORACLE Database Express Edition

User PROJECT

Home > SQL > SQL Commands

```
CREATE TABLE Client_no (
    client_id INT,
    phone_no VARCHAR(20),
    FOREIGN KEY (client_id) REFERENCES client_info(client_id)
);

describe Client_no
```

Save Run

Results Explain Describe Saved SQL History

Object Type TABLE Object CLIENT_NO

Table	Column	Data Type	Length	Precision	Scale	Primary Key	Nullable	Default	Comment
CLIENT_NO	CLIENT_ID	Number	-	-	0	-	✓	-	-
	PHONE_NO	Varchar2	20	-	-	-	✓	-	-

1 - 2

Language: en-us Application Express 2.1.0.00.39 Copyright © 1999, 2005, Oracle. All rights reserved.

29°C Rain showers Search ENG 10:27 PM 5/14/2023

```

→CREATE TABLE Project_info (
    project_id INT PRIMARY KEY,
    project_name VARCHAR(50),
    start_date DATE,
    end_date DATE,
    status VARCHAR(20),
    client_id INT,
    FOREIGN KEY (client_id) REFERENCES Client_info(client_id)
);

```

The screenshot shows the Oracle Database Express Edition interface. The SQL command window contains the code for creating the `Project_info` table, including the primary key constraint and a foreign key reference to the `Client_info` table. Below the command window, the `Object Type` is set to `TABLE` and the `Object` is `PROJECT_INFO`. A detailed table description is displayed, listing columns such as `PROJECT_ID`, `PROJECT_NAME`, `START_DATE`, `END_DATE`, `STATUS`, and `CLIENT_ID`, along with their data types, lengths, and primary key status. The bottom status bar shows system information like language, weather, and system time.

Table	Column	Data Type	Length	Precision	Scale	Primary Key	Nullable	Default	Comment
PROJECT_INFO	PROJECT_ID	Number	-	-	0	1	-	-	
	PROJECT_NAME	Varchar2	50	-	-	-	✓	-	-
	START_DATE	Date	7	-	-	-	✓	-	-
	END_DATE	Date	7	-	-	-	✓	-	-
	STATUS	Varchar2	20	-	-	-	✓	-	-
	CLIENT_ID	Number	-	-	0	-	✓	-	-

```
➔ CREATE TABLE manager_info (
    manager_id INT PRIMARY KEY,
    manager_name VARCHAR(50) NOT NULL,
    manager_email VARCHAR(50) UNIQUE
);
```

The screenshot shows the Oracle Database Express Edition interface. In the SQL Commands tab, the following SQL code is entered:

```
CREATE TABLE manager_info (
    manager_id INT PRIMARY KEY,
    manager_name VARCHAR(50) NOT NULL,
    manager_email VARCHAR(50) UNIQUE
);
describe manager_info
```

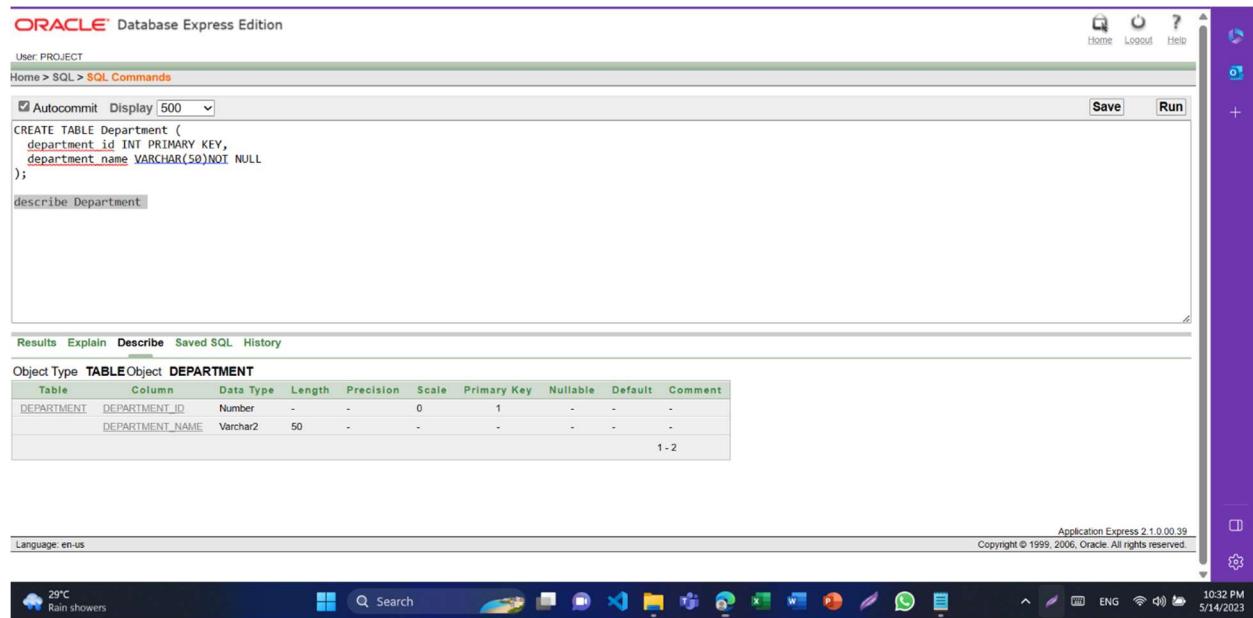
The results show the table structure:

Object Type	Table	Column	Data Type	Length	Precision	Scale	Primary Key	Nullable	Default	Comment
MANAGER_INFO	MANAGER_ID	Number	-	-	0	-	1	-	-	-
	MANAGER_NAME	Varchar2	50	-	-	-	-	-	-	-
	MANAGER_EMAIL	Varchar2	50	-	-	-	✓	-	-	-

At the bottom, it says "1 - 3".

The status bar at the bottom indicates "Language: en-us" and "Application Express 2.1.0.00.39 Copyright © 1999, 2006, Oracle. All rights reserved."

```
➔CREATE TABLE Department (
    department_id INT PRIMARY KEY,
    department_name VARCHAR(50)NOT NULL
);
```



The screenshot shows the Oracle Database Express Edition interface. In the SQL Commands tab, the following SQL code is entered:

```
CREATE TABLE Department (
    department_id INT PRIMARY KEY,
    department_name VARCHAR(50)NOT NULL
);
```

Below the code, the command `describe Department` is entered. The results show the table structure:

Table	Column	Data Type	Length	Precision	Scale	Primary Key	Nullable	Default	Comment
DEPARTMENT	DEPARTMENT_ID	Number	-	-	0	1	-	-	-
	DEPARTMENT_NAME	Varchar2	50	-	-	-	-	-	-

At the bottom of the interface, the status bar displays "Language: en-us", "Application Express 2.1.0.00.39", and "Copyright © 1999, 2006, Oracle. All rights reserved."

```

→CREATE TABLE manager_with_project (
    project_id INT PRIMARY KEY,
    project_name VARCHAR(50),
    start_date DATE,
    end_date DATE,
    status VARCHAR(20),
    manager_id INT,
    FOREIGN KEY (manager_id) REFERENCES manager_info (manager_id)
);

```

The screenshot shows the Oracle Database Express Edition interface. The SQL Commands window contains the SQL code for creating the 'manager_with_project' table. The table has columns for project_id (INT, primary key), project_name (VARCHAR(50)), start_date, end_date, status, and manager_id (INT, with a foreign key reference to the manager_info table). A DESCRIBE command is also present at the bottom of the SQL window.

The Results window displays the description of the 'MANAGER_WITH_PROJECT' table, showing six columns: PROJECT_ID, PROJECT_NAME, START_DATE, END_DATE, STATUS, and MANAGER_ID. The table is defined as a TABLE object.

Table	Column	Data Type	Length	Precision	Scale	Primary Key	Nullable	Default	Comment
MANAGER_WITH_PROJECT	PROJECT_ID	Number	-	-	0	1	-	-	-
	PROJECT_NAME	Varchar2	50	-	-	-	✓	-	-
	START_DATE	Date	7	-	-	-	✓	-	-
	END_DATE	Date	7	-	-	-	✓	-	-
	STATUS	Varchar2	20	-	-	-	✓	-	-
	MANAGER_ID	Number	-	-	0	-	✓	-	-

At the bottom of the interface, there are various system icons and a status bar indicating the date and time (10:31 PM, 5/14/2023).

```

→CREATE TABLE department_manager (
    manager_id INT PRIMARY KEY,
    manager_name VARCHAR(50)NOT NULL,
    department_id INT,
    manager_email VARCHAR(50)UNIQUE,
    CONSTRAINT fk_department_id FOREIGN KEY (department_id) REFERENCES
Department(department_id)
);

```

The screenshot shows the Oracle Application Express interface. The top part displays the SQL command for creating the `department_manager` table. The bottom part shows the resulting table structure:

Object Type	Table	Column	Data Type	Length	Precision	Scale	Primary Key	Nullable	Default	Comment
DEPARTMENT_MANAGER	MANAGER_ID	Number	-	-	0	1	-	-	-	
	MANAGER_NAME	Varchar2	50	-	-	-	-	-	-	
	DEPARTMENT_ID	Number	-	-	0	-	✓	-	-	
	MANAGER_EMAIL	Varchar2	50	-	-	-	✓	-	-	

Details: 1 - 4 rows.

Language: en-us Application Express 2.1.0.00.39 Copyright © 1999, 2006, Oracle. All rights reserved.

```

→CREATE TABLE Consultant (
    consultant_id INT PRIMARY KEY,
    consultant_name VARCHAR(50),
    consultant_profession VARCHAR(50),
    consultant_email VARCHAR(100),
    work_experience INT,
    department_id INT,
    CONSTRAINT ck_work_experience CHECK (work_experience >= 0)
);

```

The screenshot shows the Oracle Application Express interface. At the top, there's a navigation bar with 'User PROJECT' and 'Home > SQL > SQL Commands'. Below it is a code editor window containing the SQL command for creating the 'Consultant' table. The table has columns for consultant_id (primary key), consultant_name, consultant_email, consultant_profession, work_experience, and department_id. It includes a foreign key constraint for department_id and a check constraint for work_experience. Below the code editor is a 'describe Consultant' command. At the bottom, there's a table titled 'Object Type TABLE Object CONSULTANT' showing the details of each column: CONSULTANT_ID (Number, Primary Key, Nullable), CONSULTANT_NAME (Varchar2, Nullable), CONSULTANT_EMAIL (Varchar2, Nullable), CONSULTANT_PROFESSION (Varchar2, Nullable), WORK_EXPERIENCE (Number, Nullable), and DEPARTMENT_ID (Number, Nullable). The status bar at the bottom right indicates 'Application Express 2.1.0.0.39', 'Copyright © 1999, 2006, Oracle. All rights reserved.', '10:52 PM', and '5/14/2023'.

Table	Column	Data Type	Length	Precision	Scale	Primary Key	Nullable	Default	Comment
CONSULTANT	CONSULTANT_ID	Number	-	-	0	1	-	-	-
	CONSULTANT_NAME	Varchar2	50	-	-	-	✓	-	-
	CONSULTANT_EMAIL	Varchar2	100	-	-	-	✓	-	-
	CONSULTANT_PROFESSION	Varchar2	50	-	-	-	✓	-	-
	WORK_EXPERIENCE	Number	-	-	0	-	✓	-	-
	DEPARTMENT_ID	Number	-	-	0	-	✓	-	-

```
➔ .CREATE TABLE Consultant_phone (
    consultant_id INT,
    phone_no VARCHAR(20),
    FOREIGN KEY (consultant_id) REFERENCES Consultant(consultant_id)
);
```

User: PROJECT

Home > SQL > SQL Commands

Autocommit Display 500

```
CREATE TABLE Consultant_phone (
    consultant_id INT,
    phone_no VARCHAR(20),
    FOREIGN KEY (consultant_id) REFERENCES Consultant(consultant_id)
);

describe Consultant_phone
```

Results Explain Describe Saved SQL History

Object Type TABLE Object CONSULTANT_PHONE

Table	Column	Data Type	Length	Precision	Scale	Primary Key	Nullable	Default	Comment
CONSULTANT_PHONE	CONSULTANT_ID	Number	-	-	0	-	✓	-	
	PHONE_NO	Varchar2	20	-	-	-	✓	-	
									1 - 2

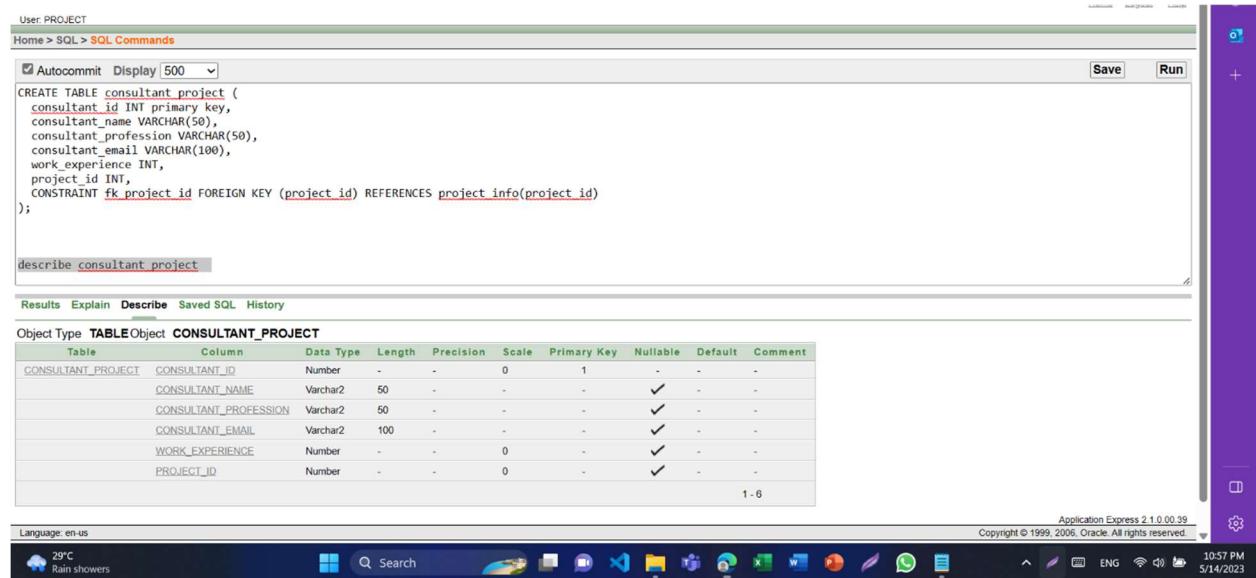
Language: en-us Application Express 2.1.0.00.39 Copyright © 1999, 2006, Oracle. All rights reserved.

29°C Rain showers Search ENG 10:54 PM 5/14/2023

```

→CREATE TABLE consultant_project (
    consultant_id INT primary key,
    consultant_name VARCHAR(50),
    consultant_profession VARCHAR(50),
    consultant_email VARCHAR(100),
    work_experience INT,
    project_id INT,
    CONSTRAINT fk_project_id FOREIGN KEY (project_id) REFERENCES project_info(project_id)
);

```



The screenshot shows the Oracle Application Express interface. The top navigation bar indicates the user is in the 'PROJECT' schema under 'SQL Commands'. The main area contains the SQL code for creating the 'consultant_project' table, which includes columns for consultant ID (primary key), name, profession, email, work experience, and project ID, along with a foreign key constraint. Below the code, there is a 'describe consultant_project' command. The results section shows the table structure with columns: CONSULTANT_ID, CONSULTANT_NAME, CONSULTANT_PROFESION, CONSULTANT_EMAIL, WORK_EXPERIENCE, and PROJECT_ID. The table has 6 rows and 6 columns. The bottom status bar shows the language is en-us, the application version is 2.1.0.00.39, and the copyright notice from Oracle.

Table	Column	Data Type	Length	Precision	Scale	Primary Key	Nullable	Default	Comment
CONSULTANT_PROJECT	CONSULTANT_ID	Number	-	-	0	1	✓	-	-
	CONSULTANT_NAME	Varchar2	50	-	-	-	✓	-	-
	CONSULTANT_PROFESION	Varchar2	50	-	-	-	✓	-	-
	CONSULTANT_EMAIL	Varchar2	100	-	-	-	✓	-	-
	WORK_EXPERIENCE	Number	-	-	0	-	✓	-	-
	PROJECT_ID	Number	-	-	0	-	✓	-	-

→CREATE TABLE Project (

```
project_id INT PRIMARY KEY,  
project_name VARCHAR(50),  
start_date DATE,  
end_date DATE,  
status VARCHAR(20)  
);
```

The screenshot shows the Oracle Database Express Edition interface. The SQL Commands window contains the SQL code for creating the Project table and its description. The table definition is:

```
CREATE TABLE Project (  
    project_id INT PRIMARY KEY,  
    project_name VARCHAR(50),  
    start_date DATE,  
    end_date DATE,  
    status VARCHAR(20)  
);
```

The 'describe Project' command is also present. Below the SQL window, the 'Object Type TABLE Object PROJECT' section displays the table structure:

Table	Column	Data Type	Length	Precision	Scale	Primary Key	Nullable	Default	Comment
PROJECT	PROJECT_ID	Number	-	-	0	1	-	-	-
PROJECT	PROJECT_NAME	Varchar2	50	-	-	-	✓	-	-
PROJECT	START_DATE	Date	7	-	-	-	✓	-	-
PROJECT	END_DATE	Date	7	-	-	-	✓	-	-
PROJECT	STATUS	Varchar2	20	-	-	-	✓	-	-

At the bottom, the status bar shows 'Language: en-us' and the system tray includes icons for weather (29°C Rain showers), search, file explorer, and other system functions.

Insertion:

```
INSERT INTO Client_info (client_id, client_name, client_email, client_city)
```

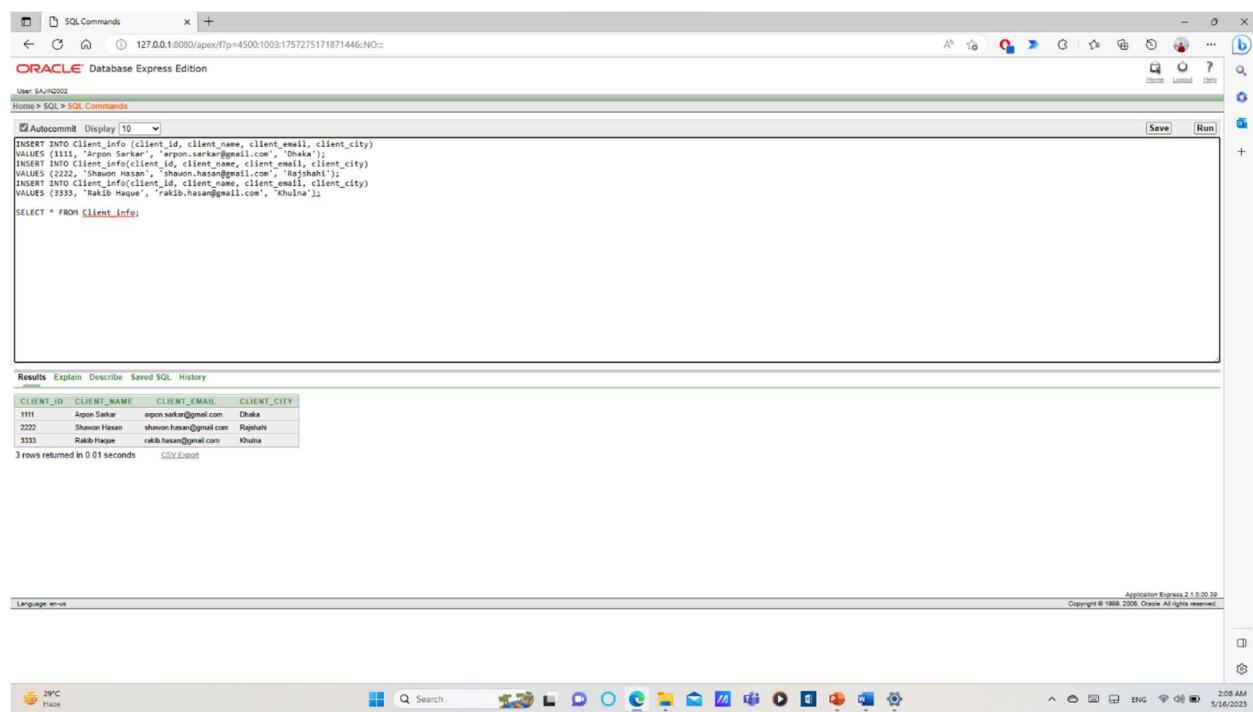
```
VALUES (1111, 'Arpon Sarkar', 'arpon.sarkar@gmail.com', 'Dhaka');
```

```
INSERT INTO Client_info(client_id, client_name, client_email, client_city)
```

```
VALUES (2222, 'Shawon Hasan', 'shawon.hasan@gmail.com', 'Rajshahi');
```

```
INSERT INTO Client_info(client_id, client_name, client_email, client_city)
```

```
VALUES (3333, 'Rakib Haque', 'rakib.hasan@gmail.com', 'Khulna');
```



The screenshot shows the Oracle Database Express Edition SQL Commands interface. The SQL editor contains the following code:

```
INSERT INTO Client_info (client_id, client_name, client_email, client_city)
VALUES (1111, 'Arpon Sarkar', 'arpon.sarkar@gmail.com', 'Dhaka');
INSERT INTO Client_info(client_id, client_name, client_email, client_city)
VALUES (2222, 'Shawon Hasan', 'shawon.hasan@gmail.com', 'Rajshahi');
INSERT INTO Client_info(client_id, client_name, client_email, client_city)
VALUES (3333, 'Rakib Haque', 'rakib.hasan@gmail.com', 'Khulna');

SELECT * FROM Client_info;
```

The results pane displays the data inserted into the Client_info table:

CLIENT_ID	CLIENT_NAME	CLIENT_EMAIL	CLIENT_CITY
1111	Arpon Sarkar	arpon.sarkar@gmail.com	Dhaka
2222	Shawon Hasan	shawon.hasan@gmail.com	Rajshahi
3333	Rakib Haque	rakib.hasan@gmail.com	Khulna

3 rows returned in 0.01 seconds

CSV Export

Language: en-us Application Express 2.1.0.0.39 Copyright © 1999-2006, Oracle. All rights reserved.

```
INSERT INTO Client_no (client_id, phone_no)
VALUES (1111, '017-12345678');
```

```
INSERT INTO Client_no (client_id, phone_no)
VALUES (1111, '019-12345678');
```

```
INSERT INTO Client_no (client_id, phone_no)
VALUES (2222, '015-12345678');
```

```
INSERT INTO Client_no (client_id, phone_no)
VALUES (3333, '018-12345678');
```

The screenshot shows the Oracle Database Express Edition SQL Commands window. The SQL editor contains the following code:

```
INSERT INTO Client_no (client_id, phone_no)
VALUES (1111, '017-12345678');
INSERT INTO Client_no (client_id, phone_no)
VALUES (1111, '019-12345678');
INSERT INTO Client_no (client_id, phone_no)
VALUES (2222, '015-12345678');
INSERT INTO Client_no (client_id, phone_no)
VALUES (3333, '018-12345678');

SELECT * FROM Client_no;
```

The results section displays the following table:

CLIENT_ID	PHONE_NO
1111	017-12345678
1111	019-12345678
2222	015-12345678
3333	018-12345678

Below the table, it says "4 rows returned in 0.00 seconds". The status bar at the bottom right shows "Application Express 2.1.0.00.39 Copyright © 1999, 2006, Oracle. All rights reserved." and the system tray includes icons for 29PC, Haze, Search, and various system services.

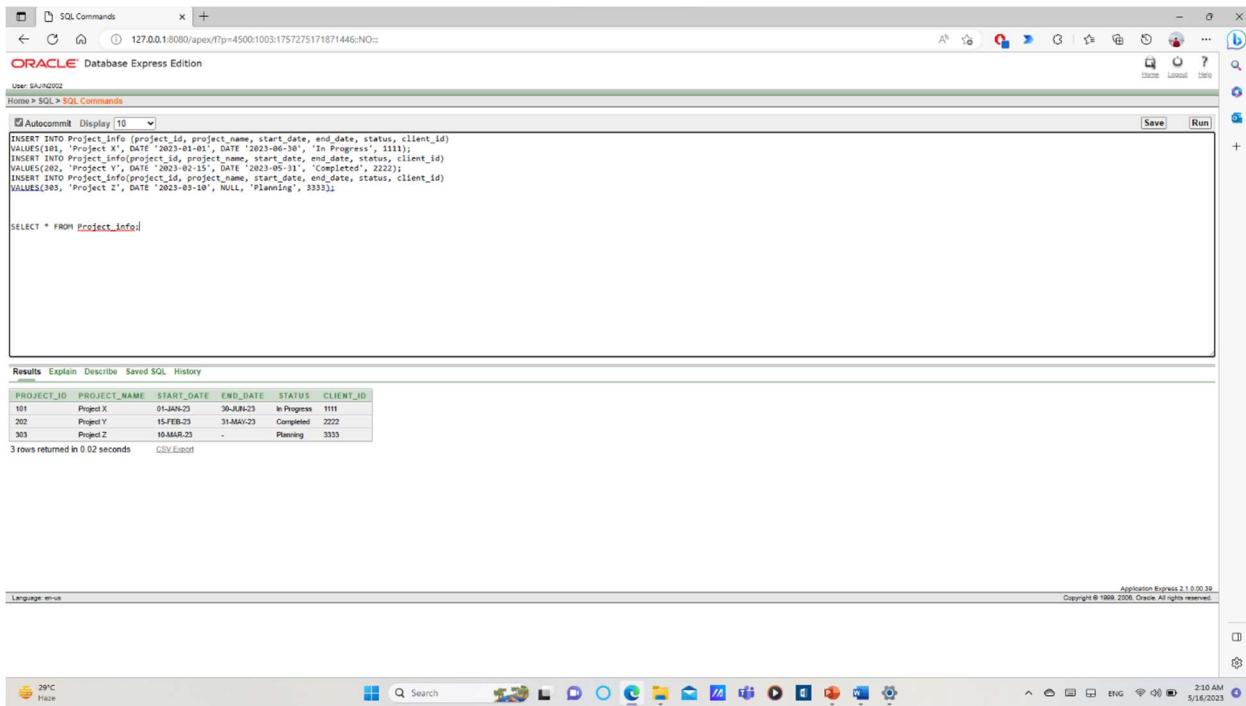
```

INSERT INTO Project_info (project_id, project_name, start_date, end_date, status, client_id)
VALUES(101, 'Project X', DATE '2023-01-01', DATE '2023-06-30', 'In Progress', 1111);

INSERT INTO Project_info(project_id, project_name, start_date, end_date, status, client_id)
VALUES(202, 'Project Y', DATE '2023-02-15', DATE '2023-05-31', 'Completed', 2222);

INSERT INTO Project_info(project_id, project_name, start_date, end_date, status, client_id)
VALUES(303, 'Project Z', DATE '2023-03-10', NULL, 'Planning', 3333);

```



The screenshot shows the Oracle Database Express Edition SQL Commands interface. The SQL editor contains the following code:

```

INSERT INTO Project_info (project_id, project_name, start_date, end_date, status, client_id)
VALUES(101, 'Project X', DATE '2023-01-01', DATE '2023-06-30', 'In Progress', 1111);
INSERT INTO Project_info(project_id, project_name, start_date, end_date, status, client_id)
VALUES(202, 'Project Y', DATE '2023-02-15', DATE '2023-05-31', 'Completed', 2222);
INSERT INTO Project_info(project_id, project_name, start_date, end_date, status, client_id)
VALUES(303, 'Project Z', DATE '2023-03-10', NULL, 'Planning', 3333);

SELECT * FROM Project_info;

```

The results pane displays the following table:

PROJECT_ID	PROJECT_NAME	START_DATE	END_DATE	STATUS	CLIENT_ID
101	Project X	01-JAN-23	30-JUN-23	In Progress	1111
202	Project Y	15-FEB-23	31-MAY-23	Completed	2222
303	Project Z	10-MAR-23	-	Planning	3333

3 rows returned in 0.02 seconds

At the bottom of the window, the status bar shows "Application Express 2.1.0.0.38" and "Copyright © 1999, 2008, Oracle. All rights reserved."

```
INSERT INTO manager_info(manager_id, manager_name, manager_email)
```

```
VALUES (123, 'Ashraf Uddin', 'ashraf.uddin@gmail.com');
```

```
INSERT INTO manager_info(manager_id, manager_name, manager_email)
```

```
VALUES (456, 'Jamal Haque', 'jamal.haque@gmail.com');
```

```
INSERT INTO manager_info(manager_id, manager_name, manager_email)
```

```
VALUES (789, 'Rafique Islam', 'rafique.islam@gmail.com');
```

The screenshot shows the Oracle Database Express Edition SQL Commands interface. The SQL editor contains the following code:

```
INSERT INTO manager_info(manager_id, manager_name, manager_email)
VALUES (123, 'Ashraf Uddin', 'ashraf.uddin@gmail.com');
INSERT INTO manager_info(manager_id, manager_name, manager_email)
VALUES (456, 'Jamal Haque', 'jamal.haque@gmail.com');
INSERT INTO manager_info(manager_id, manager_name, manager_email)
VALUES (789, 'Rafique Islam', 'rafique.islam@gmail.com');

SELECT * FROM manager_info;
```

The results pane displays the data inserted into the manager_info table:

MANAGER_ID	MANAGER_NAME	MANAGER_EMAIL
123	Ashraf Uddin	ashraf.uddin@gmail.com
456	Jamal Haque	jamal.haque@gmail.com
789	Rafique Islam	rafique.islam@gmail.com

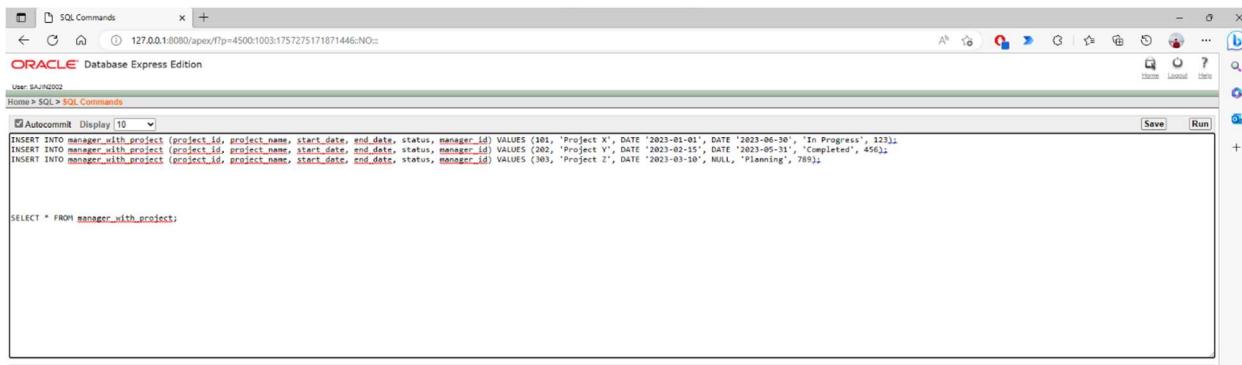
3 rows returned in 0.02 seconds

At the bottom of the window, there is a status bar with the text "Language: en-us" and "Application Express 2.1.0.0.38 Copyright © 1999-2008, Oracle. All rights reserved." Below the window, the Windows taskbar is visible, showing the date and time as "5/16/2023 2:11 AM".

```
INSERT INTO manager_with_project (project_id, project_name, start_date, end_date, status, manager_id)
VALUES (101, 'Project X', DATE '2023-01-01', DATE '2023-06-30', 'In Progress', 123);
```

```
INSERT INTO manager_with_project (project_id, project_name, start_date, end_date, status, manager_id)
VALUES (202, 'Project Y', DATE '2023-02-15', DATE '2023-05-31', 'Completed', 456);
```

```
INSERT INTO manager_with_project (project_id, project_name, start_date, end_date, status, manager_id)
VALUES (303, 'Project Z', DATE '2023-03-10', NULL, 'Planning', 789);
```



The screenshot shows the Oracle Database Express Edition SQL Commands window. The SQL editor contains the following code:

```
INSERT INTO manager_with_project (project_id, project_name, start_date, end_date, status, manager_id) VALUES (101, 'Project X', DATE '2023-01-01', DATE '2023-06-30', 'In Progress', 123);
INSERT INTO manager_with_project (project_id, project_name, start_date, end_date, status, manager_id) VALUES (202, 'Project Y', DATE '2023-02-15', DATE '2023-05-31', 'Completed', 456);
INSERT INTO manager_with_project (project_id, project_name, start_date, end_date, status, manager_id) VALUES (303, 'Project Z', DATE '2023-03-10', NULL, 'Planning', 789);

SELECT * FROM manager_with_project;
```

The results pane displays the following table:

PROJECT_ID	PROJECT_NAME	START_DATE	END_DATE	STATUS	MANAGER_ID
101	Project X	01-JAN-23	30-JUN-23	In Progress	123
202	Project Y	15-FEB-23	31-MAR-23	Completed	456
303	Project Z	10-MAR-23	-	Planning	789

3 rows returned in 0.00 seconds [CSV Export](#)

Language: en-US Application Express 2.1.0.0.39 Copyright © 1999-2008, Oracle. All rights reserved.

```
INSERT INTO Department (department_id, department_name)
```

```
VALUES (963, 'Database');
```

```
INSERT INTO Department (department_id, department_name)
```

```
VALUES (852, 'Marketing');
```

```
INSERT INTO Department (department_id, department_name)
```

```
VALUES (741, 'Law');
```

The screenshot shows the Oracle Database Express Edition SQL Commands interface. The SQL editor contains the following code:

```
INSERT INTO Department (department_id, department_name)
VALUES (963, 'Database');
INSERT INTO Department (department_id, department_name)
VALUES (852, 'Marketing');
INSERT INTO Department (department_id, department_name)
VALUES (741, 'Law');

SELECT * FROM Department;
```

The results pane displays the output of the SELECT query:

DEPARTMENT_ID	DEPARTMENT_NAME
963	Database
852	Marketing
741	Law

Below the table, it says "3 rows returned in 0.02 seconds". The status bar at the bottom right indicates "Application Express 2.1.0.0.38" and "Copyright © 1999-2008, Oracle. All rights reserved."

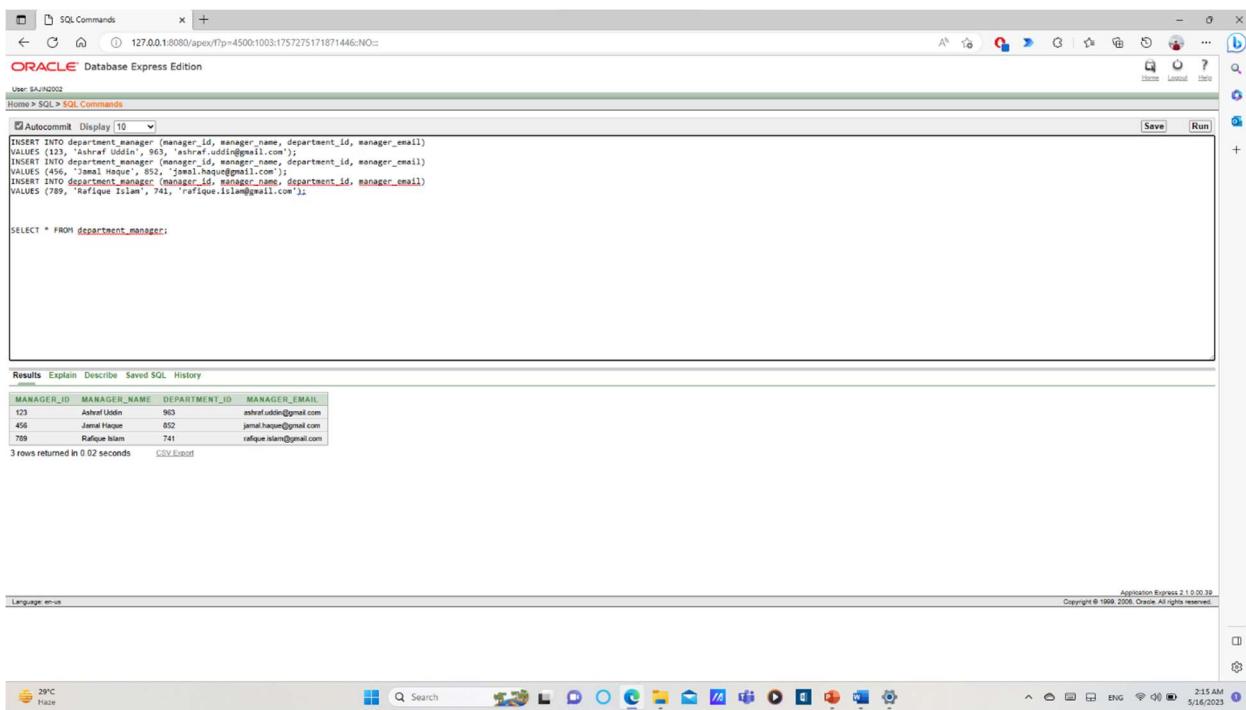
```

INSERT INTO department_manager (manager_id, manager_name, department_id, manager_email)
VALUES (123, 'Ashraf Uddin', 963, 'ashraf.uddin@gmail.com');

INSERT INTO department_manager (manager_id, manager_name, department_id, manager_email)
VALUES (456, 'Jamal Haque', 852, 'jamal.haque@gmail.com');

INSERT INTO department_manager (manager_id, manager_name, department_id, manager_email)
VALUES (789, 'Rafique Islam', 741, 'rafique.islam@gmail.com');

```



The screenshot shows the Oracle Database Express Edition interface. The SQL Commands window contains the following SQL code:

```

INSERT INTO department_manager (manager_id, manager_name, department_id, manager_email)
VALUES (123, 'Ashraf Uddin', 963, 'ashraf.uddin@gmail.com');
INSERT INTO department_manager (manager_id, manager_name, department_id, manager_email)
VALUES (456, 'Jamal Haque', 852, 'jamal.haque@gmail.com');
INSERT INTO department_manager (manager_id, manager_name, department_id, manager_email)
VALUES (789, 'Rafique Islam', 741, 'rafique.islam@gmail.com');

SELECT * FROM department_manager;

```

The Results tab displays the output of the SELECT query:

MANAGER_ID	MANAGER_NAME	DEPARTMENT_ID	MANAGER_EMAIL
123	Ashraf Uddin	963	ashraf.uddin@gmail.com
456	Jamal Haque	852	jamal.haque@gmail.com
789	Rafique Islam	741	rafique.islam@gmail.com

At the bottom of the interface, the status bar shows "Language: en-us" and "Application Express 2.1.0.0.39 Copyright © 1999-2008, Oracle. All rights reserved." The system tray at the bottom right shows the date and time as "5/16/2023 2:15 AM".

```

INSERT INTO Consultant (consultant_id, consultant_name, consultant_profession, consultant_email,
work_experience, department_id)

VALUES (111222333, 'Dr. Yasin Ahamed', 'Engineer', 'yasin.ahamed@gmail.com', 5, 963);

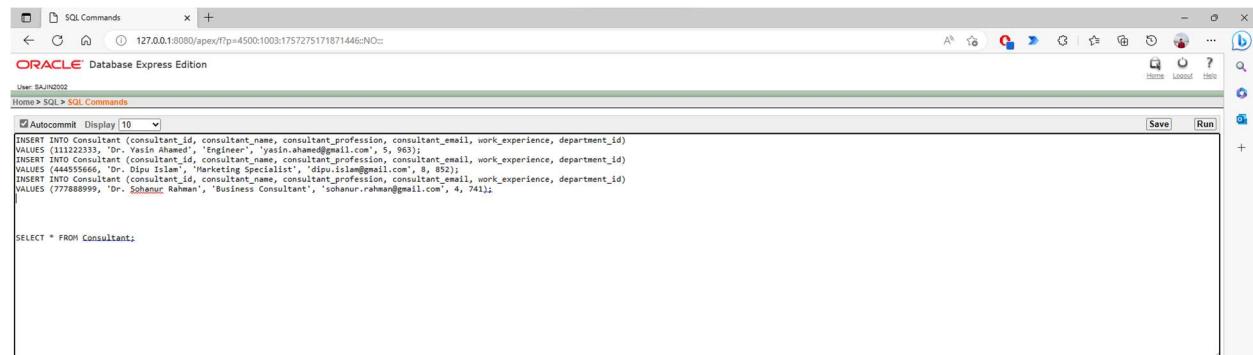
INSERT INTO Consultant (consultant_id, consultant_name, consultant_profession, consultant_email,
work_experience, department_id)

VALUES (444555666, 'Dr. Dipu Islam', 'Marketing Specialist', 'dipu.islam@gmail.com', 8, 852);

INSERT INTO Consultant (consultant_id, consultant_name, consultant_profession, consultant_email,
work_experience, department_id)

VALUES (777888999, 'Dr. Sohanur Rahman', 'Business Consultant', 'sohanur.rahman@gmail.com', 4, 741);

```



The screenshot shows the Oracle Database Express Edition SQL Commands interface. The SQL editor contains the following code:

```

INSERT INTO Consultant (consultant_id, consultant_name, consultant_profession, consultant_email, work_experience, department_id)
VALUES (111222333, 'Dr. Yasin Ahamed', 'Engineer', 'yasin.ahamed@gmail.com', 5, 963);
INSERT INTO Consultant (consultant_id, consultant_name, consultant_profession, consultant_email, work_experience, department_id)
VALUES (444555666, 'Dr. Dipu Islam', 'Marketing Specialist', 'dipu.islam@gmail.com', 8, 852);
INSERT INTO Consultant (consultant_id, consultant_name, consultant_profession, consultant_email, work_experience, department_id)
VALUES (777888999, 'Dr. Sohanur Rahman', 'Business Consultant', 'sohanur.rahman@gmail.com', 4, 741);

SELECT * FROM Consultant;

```

The results pane displays the following table:

CONSULTANT_ID	CONSULTANT_NAME	CONSULTANT_PROFESSION	CONSULTANT_EMAIL	WORK_EXPERIENCE	DEPARTMENT_ID
111222333	Dr. Yasin Ahamed	Engineer	yasin.ahamed@gmail.com	5	963
444555666	Dr. Dipu Islam	Marketing Specialist	dipu.islam@gmail.com	8	852
777888999	Dr. Sohanur Rahman	Business Consultant	sohanur.rahman@gmail.com	4	741

3 rows returned in 0.04 seconds

CSV Export

Application Express 2.1.0.0.39
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```

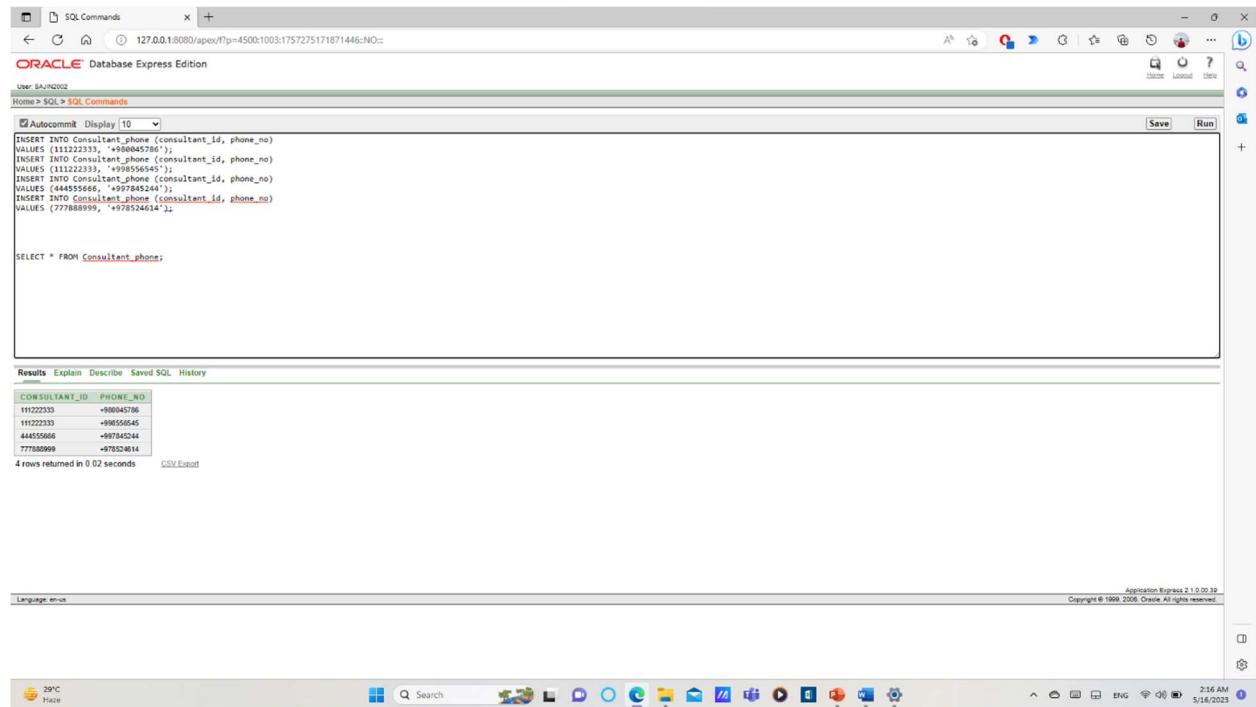
INSERT INTO Consultant_phone (consultant_id, phone_no)
VALUES (111222333, '+980045786');

INSERT INTO Consultant_phone (consultant_id, phone_no)
VALUES (111222333, '+998556545');

INSERT INTO Consultant_phone (consultant_id, phone_no)
VALUES (444555666, '+997845244');

INSERT INTO Consultant_phone (consultant_id, phone_no)
VALUES (777888999, '+978524614');

```



The screenshot shows the Oracle Database Express Edition SQL Commands interface. The SQL editor contains the following code:

```

INSERT INTO Consultant_phone (consultant_id, phone_no)
VALUES (111222333, '+980045786');
INSERT INTO Consultant_phone (consultant_id, phone_no)
VALUES (111222333, '+998556545');
INSERT INTO Consultant_phone (consultant_id, phone_no)
VALUES (444555666, '+997845244');
INSERT INTO Consultant_phone (consultant_id, phone_no)
VALUES (777888999, '+978524614');

SELECT * FROM Consultant_phone;

```

The results section displays the following data:

CONSULTANT_ID	PHONE_NO
111222333	+980045786
111222333	+998556545
444555666	+997845244
777888999	+978524614

4 rows returned in 0.02 seconds

CSV Export

Application Express 2.1.0.00.39
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```

INSERT INTO consultant_project (consultant_id, consultant_name, consultant_profession,
consultant_email, work_experience, project_id)
VALUES (111222333, 'Dr. Yasin Ahamed', 'Engineer', 'yasin.ahamed@gmail.com', 5, 101);

INSERT INTO consultant_project (consultant_id, consultant_name, consultant_profession,
consultant_email, work_experience, project_id)
VALUES (444555666, 'Dr. Dipu Islam', 'Marketing Specialist', 'dipu.islam@gmail.com', 8, 202);

INSERT INTO consultant_project (consultant_id, consultant_name, consultant_profession,
consultant_email, work_experience, project_id)
VALUES (777888999, 'Dr. Sohanur Rahman', 'Business Consultant', 'sohanur.rahman@gmail.com', 4, 303);

```

The screenshot shows the Oracle Database Express Edition SQL Commands interface. The SQL editor contains the following code:

```

INSERT INTO consultant_project (consultant_id, consultant_name, consultant_profession, consultant_email, work_experience, project_id)
VALUES (111222333, 'Dr. Yasin Ahamed', 'Engineer', 'yasin.ahamed@gmail.com', 5, 101);
INSERT INTO consultant_project (consultant_id, consultant_name, consultant_profession, consultant_email, work_experience, project_id)
VALUES (444555666, 'Dr. Dipu Islam', 'Marketing Specialist', 'dipu.islam@gmail.com', 8, 202);
INSERT INTO consultant_project (consultant_id, consultant_name, consultant_profession, consultant_email, work_experience, project_id)
VALUES (777888999, 'Dr. Sohanur Rahman', 'Business Consultant', 'sohanur.rahman@gmail.com', 4, 303);

select * from consultant_project;

```

The results grid displays the following data:

CONSULTANT_ID	CONSULTANT_NAME	CONSULTANT_PROFESSION	CONSULTANT_EMAIL	WORK_EXPERIENCE	PROJECT_ID
111222333	Dr. Yasin Ahamed	Engineer	yasin.ahamed@gmail.com	5	101
444555666	Dr. Dipu Islam	Marketing Specialist	dipu.islam@gmail.com	8	202
777888999	Dr. Sohanur Rahman	Business Consultant	sohanur.rahman@gmail.com	4	303

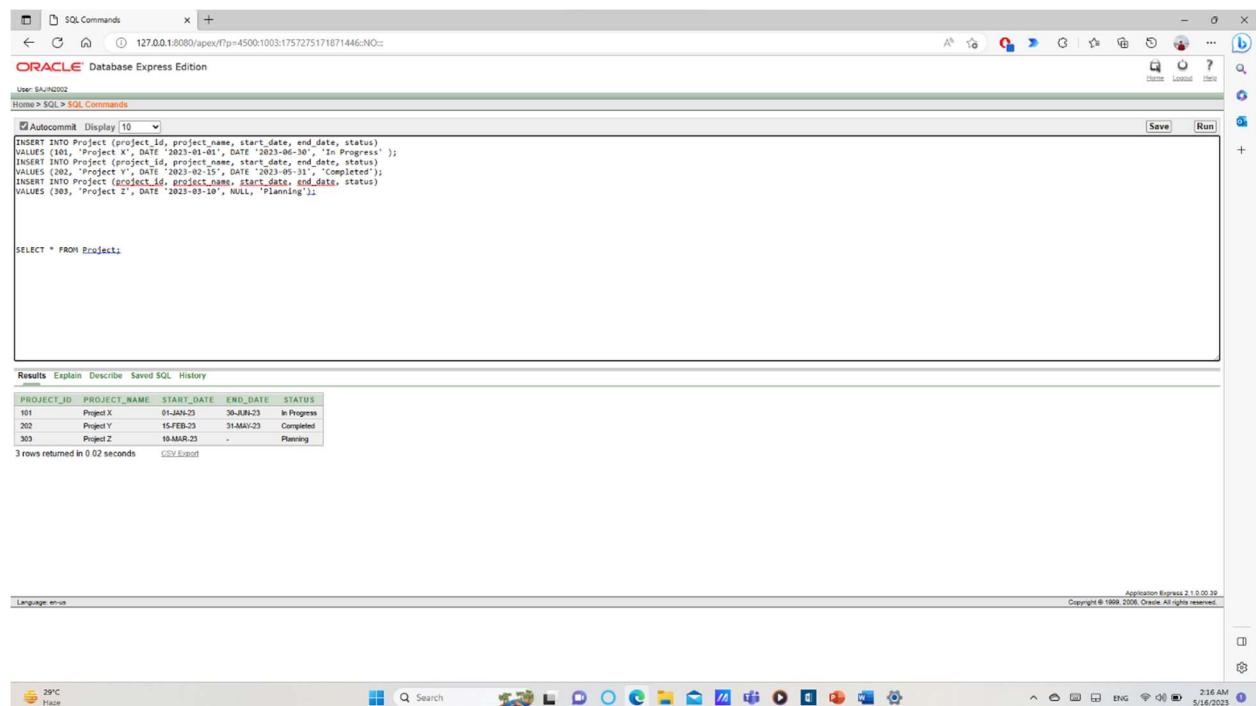
3 rows returned in 0.01 seconds [CSV Export](#)

Application Express 2.1.0.00.39
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```

INSERT INTO Project (project_id, project_name, start_date, end_date, status)
VALUES (101, 'Project X', DATE '2023-01-01', DATE '2023-06-30', 'In Progress' );
INSERT INTO Project (project_id, project_name, start_date, end_date, status)
VALUES (202, 'Project Y', DATE '2023-02-15', DATE '2023-05-31', 'Completed');
INSERT INTO Project (project_id, project_name, start_date, end_date, status)
VALUES (303, 'Project Z', DATE '2023-03-10', NULL, 'Planning');

```



The screenshot shows the Oracle Database Express Edition SQL Commands interface. The SQL code is pasted into the command window, and the results of the executed query are displayed in a grid below.

```

SQL Commands
127.0.0.1:8080/apex/f?p=4500:1003:1757275171871446::NO:::
ORACLE Database Express Edition
User: SA/1234562
Home > SQL > SQL Commands
Autocommit: Display: 10
[SQL] INSERT INTO Project (project_id, project_name, start_date, end_date, status)
VALUES (101, 'Project X', DATE '2023-01-01', DATE '2023-06-30', 'In Progress' );
[SQL] INSERT INTO Project (project_id, project_name, start_date, end_date, status)
VALUES (202, 'Project Y', DATE '2023-02-15', DATE '2023-05-31', 'Completed');
[SQL] INSERT INTO Project (project_id, project_name, start_date, end_date, status)
VALUES (303, 'Project Z', DATE '2023-03-10', NULL, 'Planning');

[SQL] SELECT * FROM Project;

```

PROJECT_ID	PROJECT_NAME	START_DATE	END_DATE	STATUS
101	Project X	01-JAN-23	30-JUN-23	In Progress
202	Project Y	15-FEB-23	31-MAY-23	Completed
303	Project Z	10-MAR-23	-	Planning

Results Explain Describe Saved SQL History

3 rows returned in 0.02 seconds CSV Export

Language: en-us Application Express 2.1.0.0.39 Copyright © 1999, 2006, Oracle. All rights reserved.

2:16 AM 5/16/2023

Sub-Query:

1. Subquery all the clients who is under 'Dr. Yasin Ahmed'

```
SELECT client_name
FROM Client_info
WHERE client_id IN (
    SELECT client_id
    FROM Project_info
    WHERE project_id IN (
        SELECT project_id
        FROM consultant_project
        WHERE consultant_id = (
            SELECT consultant_id
            FROM Consultant
            WHERE consultant_name = 'Dr. Yasin Ahamed'
        ) ) );
```

The screenshot shows the Oracle Database Express Edition interface. The SQL Commands window displays the following SQL query:

```
SELECT client_name
FROM Client_info
WHERE client_id IN (
    SELECT client_id
    FROM Project_info
    WHERE project_id IN (
        SELECT project_id
        FROM consultant_project
        WHERE consultant_id = (
            SELECT consultant_id
            FROM Consultant
            WHERE consultant_name = 'Dr. Yasin Ahamed'
        ) ) );
select * from Consultant;
```

The Results tab shows the output:

CLIENT_NAME
Arpon Sarker

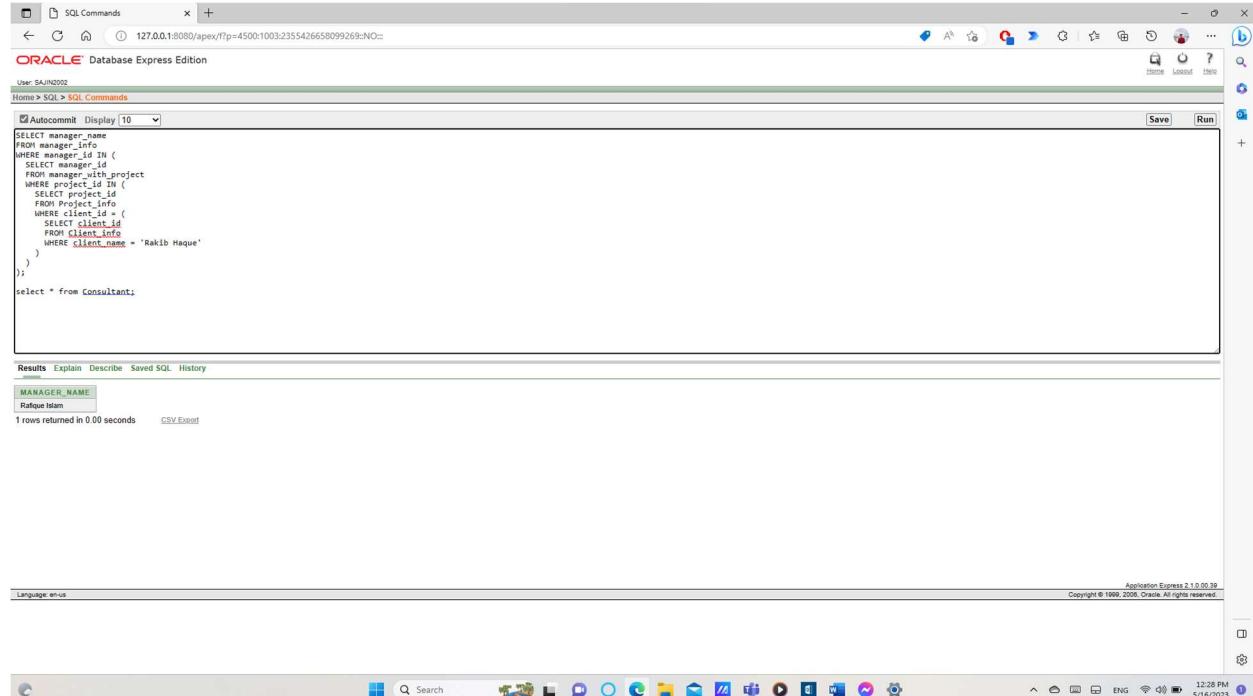
1 rows returned in 0.00 seconds

CSV Export

At the bottom, the status bar indicates "Language: en-us" and "Application Express 2.1.0.00.39 Copyright © 1999, 2006, Oracle. All rights reserved." The system tray shows the date and time as "12:19 PM 5/16/2023".

2. Subquery all the manager who work for Client Rakib Haque.

```
SELECT manager_name
FROM manager_info
WHERE manager_id IN (
    SELECT manager_id
    FROM manager_with_project
    WHERE project_id IN (
        SELECT project_id
        FROM Project_info
        WHERE client_id = (
            SELECT client_id
            FROM Client_info
            WHERE client_name = 'Rakib Haque'
        )
    )
);
```



The screenshot shows the Oracle Database Express Edition SQL Commands window. The query is displayed in the SQL pane:

```
SELECT manager_name
FROM manager_info
WHERE manager_id IN (
    SELECT manager_id
    FROM manager_with_project
    WHERE project_id IN (
        SELECT project_id
        FROM Project_info
        WHERE client_id = (
            SELECT client_id
            FROM Client_info
            WHERE client_name = 'Rakib Haque'
        )
    )
);
select * from Consultants;
```

The Results pane shows the output:

MANAGER_NAME
Rakib Haque

1 rows returned in 0.00 seconds CSV Export

3. Select all the project information under Jamal Haque.

```
SELECT *
FROM manager_with_project
WHERE manager_id IN (
    SELECT manager_id
    FROM manager_info
    WHERE manager_name = 'Jamal Haque'
);
```

```

SELECT *
FROM manager_with_project
WHERE manager_id IN (
    SELECT manager_id
    FROM manager_info
    WHERE manager_name = 'Jamal Haque'
);
select * from department_manager;

```

Results

PROJECT_ID	PROJECT_NAME	START_DATE	END_DATE	STATUS	MANAGER_ID
202	Project Y	15-FEB-23	31-MAY-23	Completed	458

1 rows returned in 0.00 seconds

CSV Export

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JOINING :

Self join

- Find All the Clients who have multiple project.

```

SELECT p1.project_id, p1.project_name, p2.project_id, p2.project_name
FROM Project_info p1
INNER JOIN Project_info p2 ON p1.client_id = p2.client_id AND p1.project_id <> p2.project_id;

```

```

SELECT p1.project_id, p1.project_name, p2.project_id, p2.project_name
FROM Project_info p1
INNER JOIN Project_info p2 ON p1.client_id = p2.client_id AND p1.project_id <> p2.project_id;

```

Results

no data found

Application Express 2.1.0.0.39
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Outer join

2. Display all the clients' names along with their project names, including the clients who do not have any projects.

```
SELECT c.client_name, p.project_name  
FROM Client c
```

```
LEFT OUTER JOIN Project p ON c.client_id = p.client_id;
```

The screenshot shows a browser window for Oracle Application Express. The URL is 127.0.0.1:8080/apex/?p=4500:1003:1624009351254814:NO. The page title is "SQL Commands". The SQL code entered is:

```
SELECT c.client_name, p.project_name  
FROM Client c  
LEFT OUTER JOIN Project p ON c.client_id = p.client_id;
```

The results section displays a table with three rows:

CLIENT_NAME	PROJECT_NAME
Arpon Sarkar	Project X
Shawon Hasan	Project Y
Rakib Haque	Project Z

Below the table, it says "3 rows returned in 0.00 seconds" and there is a "CSV Export" link. The status bar at the bottom right shows "Application Express 2.1.0.00.39" and network activity: "Down: 0.5 kB/s" and "Up: 1.0 kB/s".

Which clients have unique projects associated with them, including clients with no projects?"

```
SELECT c.client_id, c.client_name, p.project_name  
FROM Client_info c  
LEFT JOIN Project_info p ON c.client_id = p.client_id  
WHERE p.project_id IS NULL OR (p.project_id IS NOT NULL AND (SELECT COUNT(*) FROM Project_info  
WHERE client_id = c.client_id) = 1);
```

The screenshot shows the Oracle Database Express Edition SQL Commands window. The URL is 127.0.0.1:8080/xe/?p=4500:1002:2355426658099269:NO:. The query executed is:

```

SELECT c.client_id, c.client_name, p.project_name
FROM Client_info c
LEFT JOIN Project_info p ON c.client_id = p.client_id
WHERE p.project_id IS NULL OR (SELECT COUNT(*) FROM Project_info WHERE client_id = c.client_id) = 1;

describe Manager_Project_info;

```

The results show a table with three rows:

CLIENT_ID	CLIENT_NAME	PROJECT_NAME
1111	Airon Sakar	Project X
2222	Shawn Hasan	Project Y
3333	Rahil Haque	Project Z

3 rows returned in 0.00 seconds [CSV Export](#)

At the bottom right, it says Application Express 2.1.0.00.39 Copyright © 1999-2006, Oracle. All rights reserved.

Inner Join

Which projects are associated with their respective clients?"

```

SELECT p.project_id, p.project_name, c.client_name
FROM Project_info p
INNER JOIN Client_info c ON p.client_id = c.client_id;

```

The screenshot shows the Oracle Database Express Edition SQL Commands window. The URL is 127.0.0.1:8080/ apex/f?p=4500:1003:2355426658099269:NO:. The query executed is:

```

SELECT p.project_id, p.project_name, c.client_name
FROM Project_info p
INNER JOIN Client_info c ON p.client_id = c.client_id;

```

The results show a table with three rows:

PROJECT_ID	PROJECT_NAME	CLIENT_NAME
101	Project X	Arpon Sarkar
202	Project Y	Shawon Hasan
303	Project Z	Rabb Haque

3 rows returned in 0.01 seconds [CSV Export](#)

Language: en-us Application Express 2.1.0.00.39 Copyright © 1999, 2005, Oracle. All rights reserved. 1:14 PM 5/16/2023

VIEW:

"What are the details of projects and their associated clients?

CREATE VIEW Client_Project_Info AS

```
SELECT p.project_id, p.project_name, p.start_date, p.end_date, p.status, c.client_id, c.client_name,
c.client_email, c.client_city
```

```
FROM Project_info p
```

```
INNER JOIN Client_info c ON p.client_id = c.client_id;
```

```

CREATE VIEW Client_Project_Info AS
SELECT p.project_id, p.project_name, p.start_date, p.end_date, p.status, c.client_id, c.client_name, c.client_email, c.client_city
FROM Project_Info p
INNER JOIN Client_Info c ON p.client_id = c.client_id;

describe Client_Project_Info;

```

Object Type: VIEW Object: CLIENT_PROJECT_INFO

Table	Column	Data Type	Length	Precision	Scale	Primary Key	Nullable	Default	Comment
CLIENT_PROJECT_INFO	PROJECT_ID	Number	-	-	0		✓	-	-
	PROJECT_NAME	Varchar2	50	-	-		✓	-	-
	START_DATE	Date	7	-	-		✓	-	-
	END_DATE	Date	7	-	-		✓	-	-
	STATUS	Varchar2	20	-	-		✓	-	-
	CLIENT_ID	Number	-	-	0		-	-	-
	CLIENT_NAME	Varchar2	40	-	-		✓	-	-
	CLIENT_EMAIL	Varchar2	40	-	-		✓	-	-
	CLIENT_CITY	Varchar2	20	-	-		✓	-	-

1-9

Language: en-us Application Express 2.1.0.00.39
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Which managers are responsible for which projects?

CREATE VIEW Manager_Project_Info AS

```

SELECT m.manager_id, m.manager_name, m.manager_email, p.project_id, p.project_name,
p.start_date, p.end_date, p.status
FROM manager_info m
INNER JOIN manager_with_project mp ON m.manager_id = mp.manager_id
INNER JOIN Project_info p ON mp.project_id = p.project_id;

```

```

CREATE VIEW Manager_Project_Info AS
SELECT m.manager_id, m.manager_name, m.manager_email, p.project_id, p.project_name, p.start_date, p.end_date, p.status
FROM manager_info m
INNER JOIN manager_with_project mp ON m.manager_id = mp.manager_id
INNER JOIN Project_Info p ON mp.project_id = p.project_id;
;

describe Manager_Project_Info;

```

Object Type: VIEW Object: MANAGER_PROJECT_INFO

Table	Column	Data Type	Length	Precision	Scale	Primary Key	Nullable	Default	Comment
MANAGER_PROJECT_INFO	MANAGER_ID	Number	-	0	-	-	-	-	-
	MANAGER_NAME	Varchar2	50	-	-	-	✓	-	-
	MANAGER_EMAIL	Varchar2	50	-	-	-	✓	-	-
	PROJECT_ID	Number	-	-	0	-	✓	-	-
	PROJECT_NAME	Varchar2	50	-	-	-	✓	-	-
	START_DATE	Date	7	-	-	-	✓	-	-
	END_DATE	Date	7	-	-	-	✓	-	-
	STATUS	Varchar2	20	-	-	-	✓	-	-

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Conclusion:

In conclusion, a comprehensive consultant management system has been developed as part of the consultant management database project. The database schema includes all the necessary connections and constraints, as well as tables for clients, projects, managers, departments, and consultants. The system enables the efficient storage, retrieval, and management of information while ensuring data quality and consistency. The initiative facilitates efficient decision-making, analysis, and reporting, which helps in ensuring that the organization's consulting operations run smoothly. Overall, the consultant management database project offers a solid foundation for enhancing operational effectiveness, client management, employee administration, and project management activities in a consulting setting.