



AMERICAN INTERNATIONAL UNIVERSITY- BANGLADESH

Faculty of Science and Technology

Project Title: AIRPORT MANAGEMENT SYSTEM

Course Name: INTRODUCTION TO DATABASE

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Section: A

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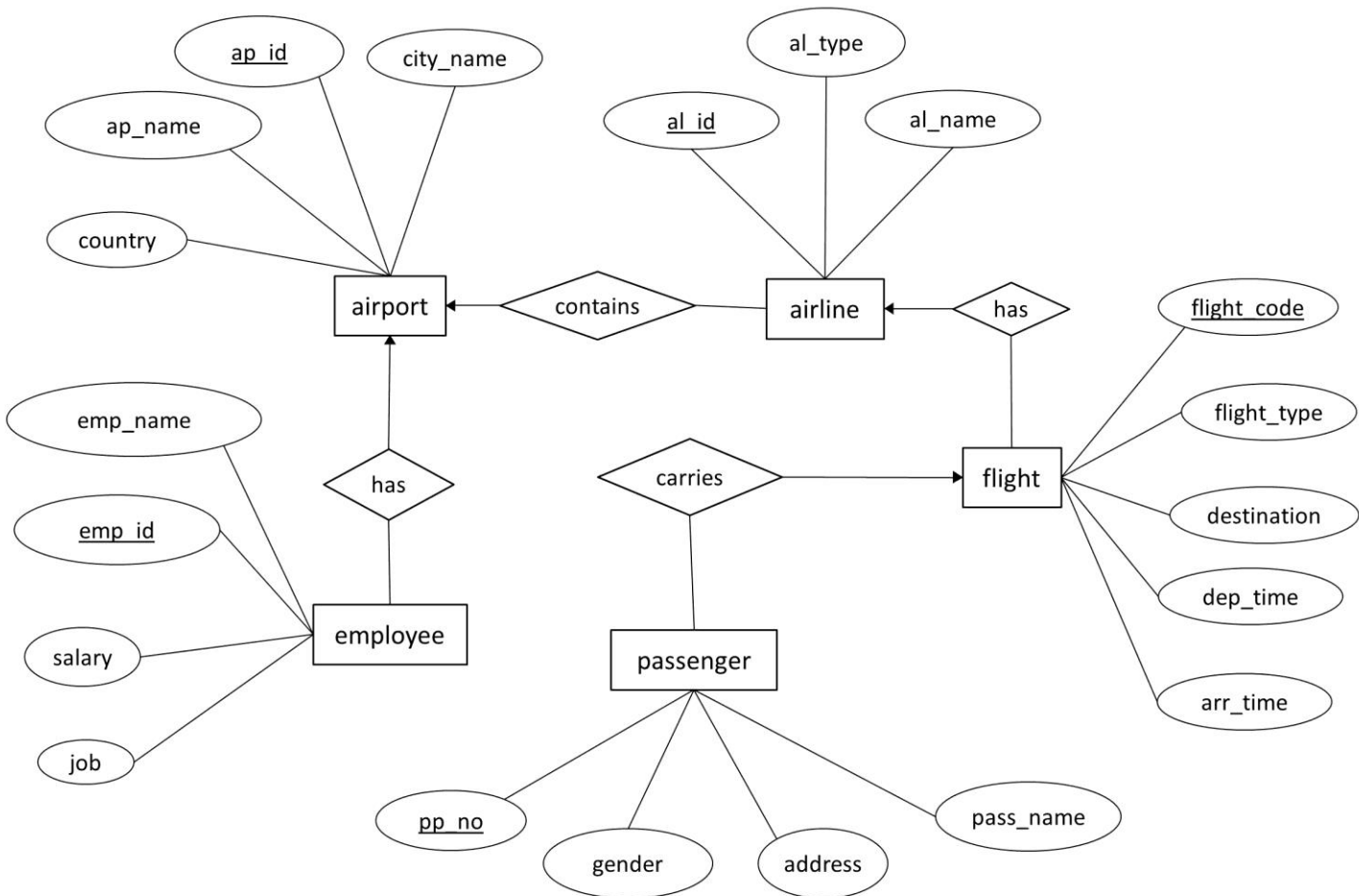
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Case Scenario:

In Bangladesh, there is a plan of creating an airport management system where people can travel easily. The airport is identified by airport id which is the primary key, every airport has a name, city and country. The airport contains many airline company where the airline has unique airline id, it also has airline name and the type of the airline. Each airline has many flights . The flight has unique flight code, it also has destination, departure time, flight type, arrival time. Each flight contains many passengers and the passengers are individually identified by passenger id, passenger name, gender and address. The airport has many employees who are uniquely identified by employee id, employee name, job and salary.

ER Diagram:



Normalisation:

airport-1-----has-----*employee

UNF:

ap_id, ap_name, city_name, country, emp_id,
emp_name, salary, job

1NF: There is no multi valued attribute relation, so it is already in 1NF.

ap_id, ap_name, city_name, country, emp_id,
emp_name, salary, job

2NF:

1. ap_id, ap_name, city_name, country
2. emp_id, emp_name, salary, job

3NF:

1. ap_id, ap_name
2. city_name, country
3. emp_id, emp_name
4. salary, job

Table Creation:

1. ap_id, ap_name, (city_name)
2. city_name, country
3. emp_id, emp_name, (job),(ap_id)
4. salary, job

airport -1-----contain-----*airline

UNF:

ap_id, ap_name, city_name, country, al_id, al_type,
al_name

1NF: There is no multi valued attribute relation, so it is already in 1NF.

ap_id, ap_name, city_name, country, al_id, al_type,
al_name

2NF:

1. ap_id, ap_name, city_name, country
2. al_id, al_type, al_name

3NF:

1. ap_id, ap_name,
2. city_name, country
3. al_id, al_type, al_name

Table Creation:

1. ap_id, ap_name, (city_name)
2. city_name, country
3. al_id, , al_name, al_type, (ap_id)

airline-1-----has-----*flight

UNF:

al_id, al_type, al_name, flight_code, flight_type,
destination, dep_time, arr_time

1NF: There is no multi valued attribute relation, so already in 1NF.

al_id, al_type, al_name, flight_code, flight_type,
destination, dep_time, arr_time

2NF:

1. al_id, al_type, al_name
2. flight_code, flight_type, destination, dep_time, arr_time

3NF:

1. al_id, al_type, al_name
2. flight_code, flight_type, destination, dep_time, arr_time

Table Creation:

1. al_id, al_type, al_name,
2. flight_code, flight_type, destination, dep_time, arr_time, (al_id)

flight-1-----contains-----*passenger

UNF:

flight_code, flight_type, destination, dep_time, arr_time
pp_no, pass_name, gender, address

1NF: There is no multi valued attribute relation, so already in 1NF.

pp_no, gender, address, pass_name, flight_code,
flight_type, destination, dep_time, arr_time

2NF:

1. pp_no, gender, address, pass_name
2. flight_code, flight_type, destination, dep_time, arr_time

3NF:

1. pp_no, gender, address, pass_name
2. flight_code, flight_type, destination, dep_time, arr_time

Table Creation:

1. pp_no, gender, address, pass_name, (flight_code)
2. flight_code, flight_type, destination, dep_time, arr_time

Table

1. ap_id, ap_name, (city_name)
2. city_name, country
3. emp_id, emp_name, (job), (ap_id)
4. salary, job
5. ~~ap_id, ap_name, (city_name)~~
6. ~~city_name, country~~
7. al_id, al_type, al_name, (ap_id)
8. ~~al_id, al_type, al_name,~~
9. flight_code, flight_type, destination, dep_time, arr_time, (al_id)
10. pp_no, gender, address, pass_name, (flight_code)
11. ~~flight_code, flight_type, destination, dep_time, arr_time~~

Final Table

1. ap_id, ap_name, (city_name)
2. city_name, country
3. emp_id, emp_name, (job),(ap_id)
4. salary, job
5. al_id, , al_name, al_type (ap_id)
6. flight_code, flight_type, destination, dep_time, arr_time, (al_id)
7. pp_no, gender, address, pass_name, (flight_code)

Table Creation

1. CREATE TABLE airport (ap_id NUMBER(20) CONSTRAINT PK_AP PRIMARY KEY, ap_name VARCHAR2 (50), city_name VARCHAR2 (20) NOT NULL CONSTRAINT FK_CITY REFERENCES city);

The screenshot shows the Oracle SQL Developer interface. At the top, there's a toolbar with 'Autocommit' checked and 'Display' set to 200. Below the toolbar, the SQL command is entered in the editor: `1. CREATE TABLE airport (ap_id NUMBER(20) CONSTRAINT PK_AP PRIMARY KEY, ap_name VARCHAR2 (50), city_name VARCHAR2 (20) NOT NULL CONSTRAINT FK_CITY REFERENCES city); describe airport`. The 'Run' button is visible. Below the editor, the 'Results' tab is selected, showing the 'Object Type TABLE Object AIRPORT'. A table displays the structure of the 'airport' table with columns: Table, Column, Data Type, Length, Precision, Scale, Primary Key, Nullable, Default, and Comment. The table has three rows: 'AP_ID' (Number, 20, 0, Primary Key, Not Null), 'AP_NAME' (Varchar2, 50, Not Null), and 'CITY_NAME' (Varchar2, 20, Not Null). The status bar at the bottom indicates 'Application Express 2.1.0.00.39' and 'Copyright © 1999, 2006, Oracle. All rights reserved.'

Table	Column	Data Type	Length	Precision	Scale	Primary Key	Nullable	Default	Comment
AIRPORT	AP_ID	Number	-	20	0	1	-	-	-
	AP_NAME	Varchar2	50	-	-	-	✓	-	-
	CITY_NAME	Varchar2	20	-	-	-	-	-	-

2. CREATE TABLE city(city_name VARCHAR2 (20) PRIMARY KEY, country VARCHAR2 (20));

The screenshot shows the Oracle SQL Developer interface. At the top, there's a toolbar with 'Autocommit' checked and 'Display' set to 200. Below the toolbar, the SQL command is entered in the editor: `2. CREATE TABLE city(city_name VARCHAR2 (20) PRIMARY KEY, country VARCHAR2 (20)); describe city`. The 'Run' button is visible. Below the editor, the 'Results' tab is selected, showing the 'Object Type TABLE Object CITY'. A table displays the structure of the 'city' table with columns: Table, Column, Data Type, Length, Precision, Scale, Primary Key, Nullable, Default, and Comment. The table has two rows: 'CITY_NAME' (Varchar2, 20, Primary Key, Not Null) and 'COUNTRY' (Varchar2, 20, Not Null). The status bar at the bottom indicates 'Application Express 2.1.0.00.39' and 'Copyright © 1999, 2006, Oracle. All rights reserved.'

Table	Column	Data Type	Length	Precision	Scale	Primary Key	Nullable	Default	Comment
CITY	CITY_NAME	Varchar2	20	-	-	1	-	-	-
	COUNTRY	Varchar2	20	-	-	-	✓	-	-

3. CREATE TABLE employee(emp_id NUMBER(10) CONSTRAINT PK_EMPi PRIMARY KEY, emp_name VARCHAR2 (50), mgr NUMBER(10), job VARCHAR2 (10) NOT NULL CONSTRAINT FK_JOB REFERENCES job_info, ap_id NUMBER (20) NOT NULL CONSTRAINT FK_AP REFERENCES airport);

Autocommit

Display 200

Save

Run

```
3. CREATE TABLE employee(  
emp_id NUMBER(10) CONSTRAINT PK_EMPi PRIMARY KEY,  
emp_name VARCHAR2 (50),  
job VARCHAR2 (10) NOT NULL CONSTRAINT FK_JOB REFERENCES job_info,  
ap_id NUMBER (20) NOT NULL CONSTRAINT FK_AP REFERENCES airport);  
describe employee
```

Results

Explain

Describe

Saved SQL

History

Object Type

TABLE

Object

EMPLOYEE

Table	Column	Data Type	Length	Precision	Scale	Primary Key	Nullable	Default	Comment
EMPLOYEE	EMP_ID	Number	-	10	0	1	-	-	-
	EMP_NAME	Varchar2	50	-	-	-	✓	-	-
	JOB	Varchar2	10	-	-	-	-	-	-
	AP_ID	Number	-	20	0	-	-	-	-
									1 - 4

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Education (E)

10:16 PM

12/18/2020

4. CREATE TABLE job_info(job VARCHAR2(10) CONSTRAINT PK_SAL PRIMARY KEY, salary NUMBER(12));

Autocommit

Display 200

Save

Run

```
4. CREATE TABLE job_info(  
job VARCHAR2(10) CONSTRAINT PK_SAL PRIMARY KEY,  
salary NUMBER(12));  
describe job_info
```

Results

Explain

Describe

Saved SQL

History

Object Type

TABLE

Object

JOB_INFO

Table	Column	Data Type	Length	Precision	Scale	Primary Key	Nullable	Default	Comment
JOB_INFO	JOB	Varchar2	10	-	-	1	-	-	-
	SALARY	Number	-	12	0	-	✓	-	-
									1 - 2

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Language: en-gb

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Education (E)

10:17 PM

12/18/2020

5. CREATE TABLE airline(al_id NUMBER(10) CONSTRAINT PK_AL PRIMARY KEY, al_name VARCHAR2 (20), al_type VARCHAR2 (15), ap_id NUMBER (20) NOT NULL CONSTRAINT FK_AP2 REFERENCES airport);

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SQL Commands

Stack Overflow - Where Develop...

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Apps

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Google Drive

Microsoft account [...

#general

Airport-Manageme...

☒ Autocommit

Display 200

Save

Run

5. CREATE TABLE airline(
al_id NUMBER(10) CONSTRAINT PK_AL PRIMARY KEY,
al_name VARCHAR2 (20),
ap_id NUMBER (20) NOT NULL CONSTRAINT FK_AP2 REFERENCES airport);
describe airline

Results

Explain

Describe

Saved SQL

History

Object Type **TABLE** Object **AIRLINE**Application Express 2.1.0.00.39
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Language: en-gb

6. CREATE TABLE flight(flight_code NUMBER(10) CONSTRAINT PK_F PRIMARY KEY, flight_type VARCHAR2 (15), destination VARCHAR2 (30), arr_time VARCHAR2 (10), dep_time VARCHAR2 (10), dep_date DATE, al_id NUMBER (20) NOT NULL CONSTRAINT FK_AL REFERENCES airline);

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SQL Commands

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☒ Autocommit

Display 200

Save

Run

6. CREATE TABLE flight(
flight_code NUMBER(10) CONSTRAINT PK_F PRIMARY KEY,
flight_type VARCHAR2 (15),
destination VARCHAR2 (30),
dep_time VARCHAR2 (10),
arr_time VARCHAR2 (10),
al_id NUMBER (20) NOT NULL CONSTRAINT FK_AL REFERENCES airline);
describe flight

Results

Explain

Describe

Saved SQL

History

Object Type **TABLE** Object **FLIGHT**

Education (E)

10:17 PM
12/18/2020

7) CREATE TABLE passenger (pp_no NUMBER (12) CONSTRAINT PK_P PRIMARY KEY, pass_name VARCHAR2 (30), gender VARCHAR2 (10), address VARCHAR2 (50), flight_code NUMBER (10) NOT NULL CONSTRAINT FK_F REFERENCES flight);

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7) CREATE TABLE passenger (
pp_no NUMBER (12) CONSTRAINT PK_P PRIMARY KEY,
pass_name VARCHAR2 (30),
gender VARCHAR2 (10),
address VARCHAR2 (50),
flight_code NUMBER (10) NOT NULL CONSTRAINT FK_F REFERENCES flight);
describe passenger

Results Explain Describe Saved SQL History

Object Type **TABLE** Object **PASSENGER**

Table	Column	Data Type	Length	Precision	Scale	Primary Key	Nullable	Default	Comment
PASSENGER	PP_NO	Number	-	12	0	1	-	-	-
	PASS_NAME	Varchar2	30	-	-	-	✓	-	-
	GENDER	Varchar2	10	-	-	-	✓	-	-
	ADDRESS	Varchar2	50	-	-	-	✓	-	-
	FLIGHT_CODE	Number	-	10	0	-	-	-	-

1 - 5

Education (E)

10:25 PM
12/18/2020

Data Insertion

1. Airport

INSERT INTO airport VALUES
(10,'Shahjalal Int. Airport','Dhaka');
INSERT INTO airport VALUES
(20,'Shah Amanat Int. Airport','Chattogram');
INSERT INTO airport VALUES
(30,'Osmani Int. Airport','Sylhet');

2. City:

```
INSERT INTO city VALUES  
( 'Dhaka', 'Bangladesh');  
INSERT INTO city VALUES  
( 'Chattogram', 'Bangladesh');  
INSERT INTO city VALUES  
( 'Sylhet', 'Bangladesh');
```

3. Job_Info:

```
INSERT INTO job_info VALUES  
( 'Manager', 200000);  
INSERT INTO job_info VALUES  
( 'Cleaner', 18000);  
INSERT INTO job_info VALUES  
( 'Director', 500000);  
INSERT INTO job_info VALUES  
( 'Pilot', 500000);
```

4. Employee:

```
INSERT INTO employee VALUES  
(101, 'Ahmad', NULL, 'Director', 10);  
INSERT INTO employee VALUES  
(117, 'Imtiaz', NULL, 'Cleaner', 20);  
INSERT INTO employee VALUES  
(118, 'Hasan', 117, 'Cleaner', 20);  
INSERT INTO employee VALUES  
(102, 'Meha', 101, 'Manager', 30);  
INSERT INTO employee VALUES  
(103, 'Ahsan', 102, 'Pilot', 30);
```

5. Airline:

```
INSERT INTO airline VALUES  
(111,'Bangladesh Biman','International',10);  
INSERT INTO airline VALUES  
(222,'Fly Emirates', 'International',20);  
INSERT INTO airline VALUES  
(333,'Novoair', 'Domestic', 30);  
INSERT INTO airline VALUES  
(444,'Air Bangladesh', 'Domestic', 30);
```

6. Flight:

```
INSERT INTO flight VALUES  
(177,'Buisness class','Bern', '7:00 AM', '8:15 AM', '26-Dec-2020',  
222);  
INSERT INTO flight VALUES  
(277,'Buisness class', 'Manchester', '5:00 PM', '5:45 PM', '27-Dec-  
2020', 111);  
INSERT INTO flight VALUES  
(377,'Economy Class', 'Saidpur Airport', '11:00 AM', '12:15 AM',  
'28-Dec-2020', 333);  
INSERT INTO flight VALUES  
(477,'First class','Sylhet', '2:00 PM', '5:35 PM','31-Dec-2020',  
444);  
INSERT INTO flight VALUES  
(577,'First class','Jessore', '1:00 PM', '3:35 PM','05-Jan-2021',  
333);  
INSERT INTO flight VALUES  
(777,'Economy Class','Dhaka', '11:00 AM', '11:45 AM', '29-Dec-  
2020', 222);
```

7. Passenger:

```
INSERT INTO passenger VALUES  
(100001,'Kawser Irom Rushee','Female', 'Jessore', 577);  
INSERT INTO passenger VALUES  
(200001,'Imtiaz Habib','Male', 'Rajbari', 477);  
INSERT INTO passenger VALUES  
(300001,'Rasheda Begum','Female', 'Munshiganj', 177);  
INSERT INTO passenger VALUES  
(400001,'Smaiha Hossain Meha','Female', 'Dhaka', 277);  
INSERT INTO passenger VALUES  
(500001,'Ikram Khan','Male', 'Dhaka', 277);  
INSERT INTO passenger VALUES  
(600001,'Abdullah', 'Male', 'Dhaka', 277);
```

Joining

1. Equijoin: Display employee id, name, job and which airport they work at, in which city from airport and employee table

The screenshot shows a SQL IDE interface with a query editor and a results pane. The query is an equijoin between the 'airport' and 'employee' tables. The results pane displays 5 rows of data.

Query:

```
SELECT emp_id, emp_name, job, ap_name, city_name  
FROM airport, employee  
WHERE airport.ap_id=employee.ap_id;
```

Results:

EMP_ID	EMP_NAME	JOB	AP_NAME	CITY_NAME
103	Ahsan	Pilot	Osmani Int. Airport	Sylhet
102	Meha	Manager	Osmani Int. Airport	Sylhet
118	Hasan	Cleaner	Shah Amanat Int. Airport	Chattogram
117	Imtiaz	Cleaner	Shah Amanat Int. Airport	Chattogram
101	Ahmad	Director	Shahjalal Int. Airport	Dhaka

5 rows returned in 0.00 seconds

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5 of 24 - Clipboard Item collected.

2. **Equijoin:** Display the passengers names, destinations and departure time from passenger and flight table

SQL Commands

127.0.0.1:8080/apex/f?p=4500:1003:2598843938629529::NO::

Autocommit Display 100 Save Run

SELECT pass_name, destination, dep time
FROM passenger, flight
WHERE passenger.flight code = flight.flight code;

Results Explain Describe Saved SQL History

PASS_NAME	DESTINATION	DEP_TIME
Rasheda Begum	Bern	8:15 AM
Smaiha Hossain Meha	Manchester	5:45 PM
Imtiaz Habib	Sylhet	5:35 PM
Kawser Irom Rushee	Jessore	3:35 PM

4 rows returned in 0.00 seconds CSV Export

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Language: en-gb 3:08 PM 12/20/2020

3. **Self-join and Outer join:** Display the employee name, employee id and their manager names, also display all the employee names and ids who do not have manager.

SQL Commands

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Autocommit Display 100 Save Run

SELECT e.emp name, e.emp id, f.emp name as Manager
FROM employee e, employee f
WHERE e.mgr = f.emp id(+);

Results Explain Describe Saved SQL History

EMP_NAME	EMP_ID	MANAGER
Ahsan	103	Meha
Hasan	118	Imtiaz
Meha	102	Ahmad
Ahmad	101	-
Imtiaz	117	-

5 rows returned in 0.00 seconds CSV Export

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Language: en-gb 3:39 PM 12/20/2020

Subquery

1. Subquery (without group function): Display the employees who work at Osmani Int. Airport.

The screenshot shows the SQL Commands interface with the following SQL query:

```
SELECT*
FROM employee
WHERE ap_id IN ( SELECT
ap_id
FROM airport
WHERE ap_name = 'Osmani Int. Airport' );
```

The results table displays the following data:

EMP_ID	EMP_NAME	MGR	JOB	AP_ID
103	Ahsan	102	Pilot	30
102	Meha	101	Manager	30

2 rows returned in 0.03 seconds [CSV Export](#)

Language: en-gb

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2. Subquery (without group function): Display the passengers details who are going to Jessore.

The screenshot shows the SQL Commands interface with the following SQL query:

```
SELECT*
FROM passenger
WHERE flight_code IN ( SELECT
flight_code
FROM flight
WHERE destination = 'Jessore' );
```

The results table displays the following data:

PP_NO	PASS_NAME	GENDER	ADDRESS	FLIGHT_CODE
100001	Kawser Irom Rushee	Female	Jessore	577

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

Language: en-gb

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3. Subquery (with group function): Display the departure time, arrival time and flight type of the flights which have the lowest flight code out of all the flights going to Bern.

SQL Commands

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ORACLE Database Express Edition

User: SCOTT

Home > SQL > SQL Commands

☒ Autocommit Display 100

Save Run

```
SELECT dep time as "Departure Time", arr time as "Arrival Time", flight type as "Class"
FROM flight
WHERE flight code =
(SELECT MIN(flight code)
FROM flight
GROUP BY destination
HAVING destination = 'Bern');
```

Results Explain Describe Saved SQL History

Departure Time	Arrival Time	Class
8:15 AM	7:00 AM	Buisness class

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

24 of 24 - Clipboard
Item not Collected: Delete items
to increase available space

4. Subquery (with group function): Display the flight code and flight type of the passenger who is travelling the 3rd earliest.

SQL Commands

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ORACLE Database Express Edition

User: SCOTT

Home > SQL > SQL Commands

☒ Autocommit Display 100

Save Run

```
SELECT flight code, flight type
FROM flight
WHERE dep date =
(SELECT MIN(DEP_DATE)
FROM flight
WHERE dep date >
(SELECT MIN(DEP_DATE)
FROM flight
WHERE dep date >
( SELECT MIN(DEP_DATE)
FROM flight)));
```

Results Explain Describe Saved SQL History

FLIGHT_CODE	FLIGHT_TYPE
377	Economy Class

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

Application 24 of 24 - Clipboard
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View

1. Simple View: Create a simple view to display the names of International airlines

The screenshot shows the Oracle Database Express Edition interface. The top navigation bar includes links for Home, Logout, and Help. The breadcrumb trail indicates the current location: Home > SQL > SQL Commands. The SQL editor has Autocommit checked and a display size of 10. The SQL command entered is: `CREATE VIEW AirType AS SELECT al.name FROM airline WHERE al.type = 'International';`. Below the editor, the 'Results' tab is selected, showing the message 'View created.' and an execution time of 0.56 seconds. The Windows taskbar at the bottom shows the time as 9:33 PM on 12/26/2020.

```
CREATE VIEW AirType
AS SELECT al.name
FROM airline
WHERE al.type = 'International';
```

View created.

0.56 seconds

2. Complex View: Create a view named Passenger_destination to show the pp_no as Passenger number, pass_name as Name, flight_code as Flight code, flight type as Type and Destination.

The screenshot shows the Oracle Database Express Edition interface. The top navigation bar includes links for Home, Logout, and Help. The breadcrumb trail indicates the current location: Home > SQL > SQL Commands. The SQL editor has Autocommit checked and a display size of 10. The SQL command entered is: `CREATE VIEW Passenger_Destination ("Passenger Number", Name, "Flight Code", Type, Destination) AS SELECT p.pp_no, p.pass_name, f.flight_code, f.flight type, f.destination FROM passenger p, flight f WHERE p.flight_code = f.flight code;`. Below the editor, the 'Results' tab is selected, showing the message 'View created.' and an execution time of 0.10 seconds. The Windows taskbar at the bottom shows the time as 9:35 PM on 12/26/2020.

```
CREATE VIEW Passenger_Destination ("Passenger Number", Name, "Flight Code", Type, Destination)
AS SELECT p.pp_no, p.pass_name, f.flight_code, f.flight type, f.destination
FROM passenger p, flight f
WHERE p.flight_code = f.flight code;
```

View created.

0.10 seconds

Constraint

Add Constraint in any of your table:

The screenshot shows the Oracle SQL Developer interface. The top bar indicates the current session is 'SQL Commands'. The breadcrumb navigation shows 'Home > SQL > SQL Commands'. The main text area contains the following SQL command:

```
ALTER TABLE flight  
ADD CONSTRAINT UNQ_DTIME UNIQUE(dep_time);
```

Below the command area, the 'Results' tab is selected, displaying the message 'Table altered.' and the execution time '2.59 seconds'. The bottom status bar shows 'Language: en-gb', 'Copyright © 1999, 2006, Oracle.', and the system clock '1:05 AM 12/26/2020'. A clipboard notification is visible in the bottom right corner.

SQL Commands

127.0.0.1:8080/apex/?p=4500:1003:346337472039739:NO...

Home > SQL > SQL Commands

☒ Autocommit Display 200 Save Run

```
ALTER TABLE flight  
ADD CONSTRAINT UNQ_DTIME UNIQUE(dep_time);
```

Results Explain Describe Saved SQL History

Table altered.

2.59 seconds

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Education (E) 1:05 AM 12/26/2020