

## LAB-5 (program)

### PROGRAM 5: AIRLINE FLIGHTS DATABASE

Consider the following database that keeps track of airline flight information:

FLIGHTS (flno: integer, from: string, to: string, distance: integer, departs: time, arrives: time, price: integer)

AIRCRAFT (aid: integer, aname: string, cruisingrange: integer)

CERTIFIED (eid: integer, aid: integer)

EMPLOYEE (eid: integer, ename: string, salary: integer)

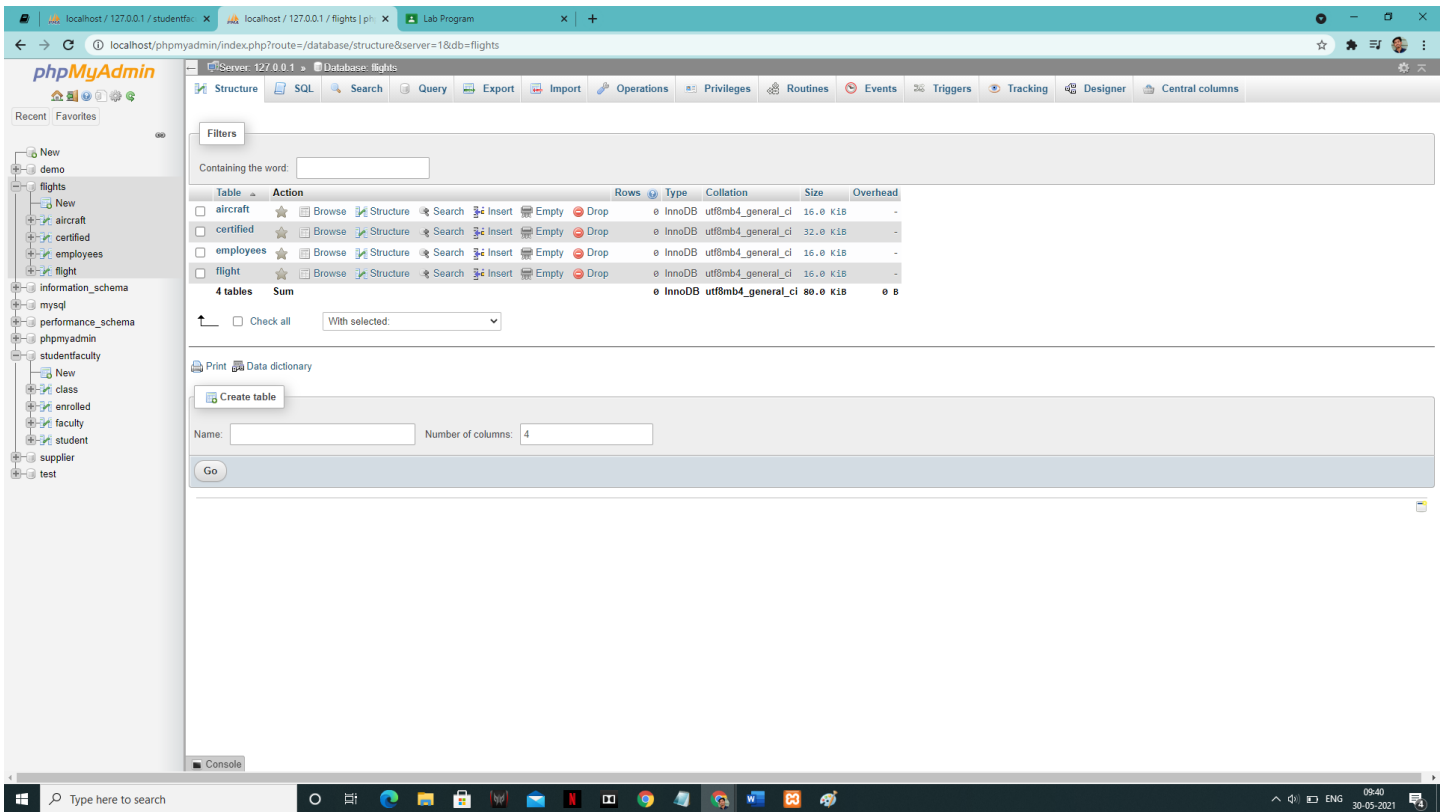
Note that the Employees relation describes pilots and other kinds of employees as well; Every pilot is certified

for some aircraft, and only pilots are certified to fly.

Write each of the following queries in SQL.

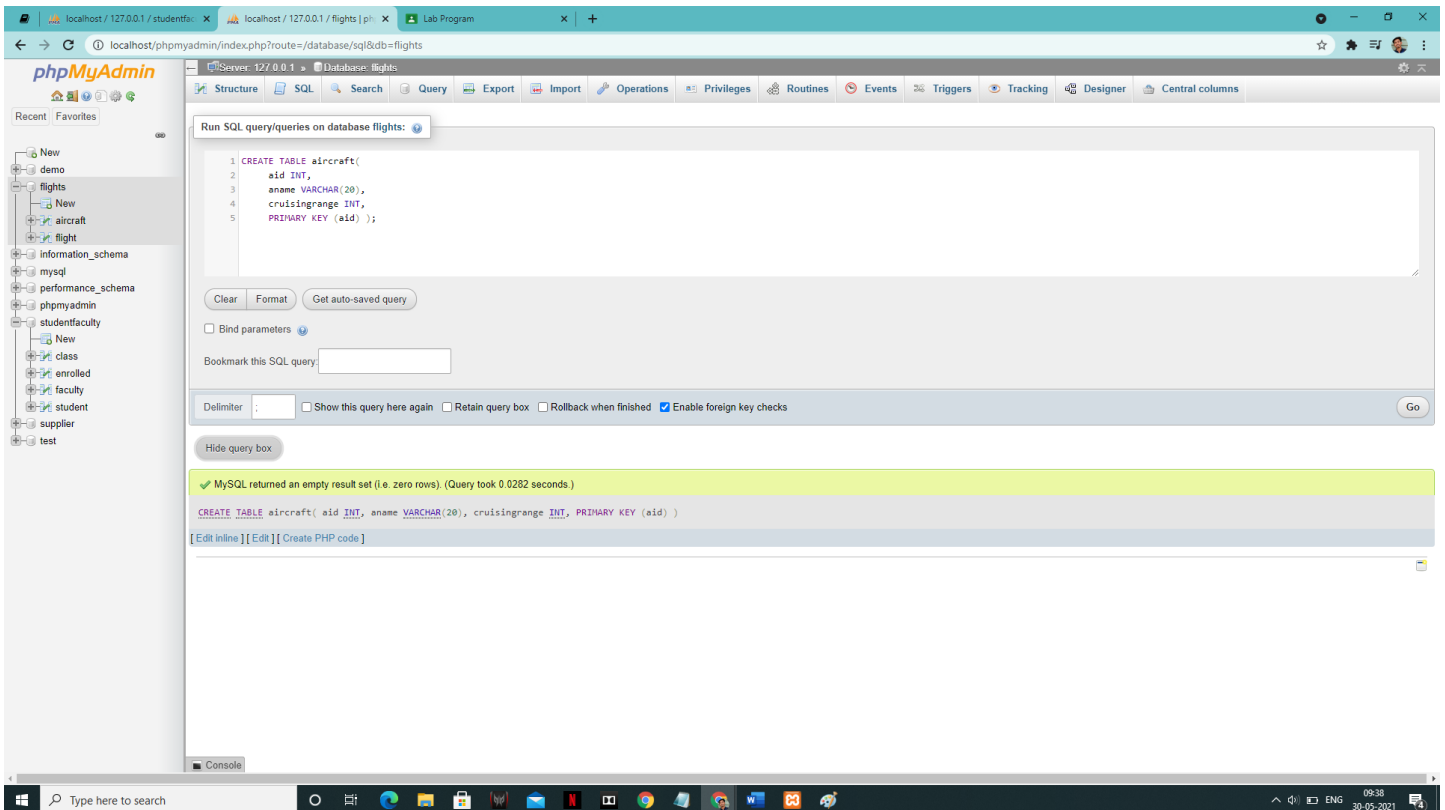
- i. Find the names of aircraft such that all pilots certified to operate them have salaries more than Rs.80,000.
- ii. For each pilot who is certified for more than three aircrafts, find the eid and the maximum cruising range of the aircraft for which she or he is certified.
- iii. Find the names of pilots whose salary is less than the price of the cheapest route from Bengaluru to Frankfurt.
- iv. For all aircraft with cruising range over 1000 Kms, find the name of the aircraft and the average salary of all pilots certified for this aircraft.
- v. Find the names of pilots certified for some Boeing aircraft.
- vi. Find the aids of all aircraft that can be used on routes from Bengaluru to New Delhi.
- vii. A customer wants to travel from Madison to New York with no more than two changes of flight. List the choice of departure times from Madison if the customer wants to arrive in New York by 6 p.m.
- viii. Print the name and salary of every non-pilot whose salary is more than the average salary for pilots.

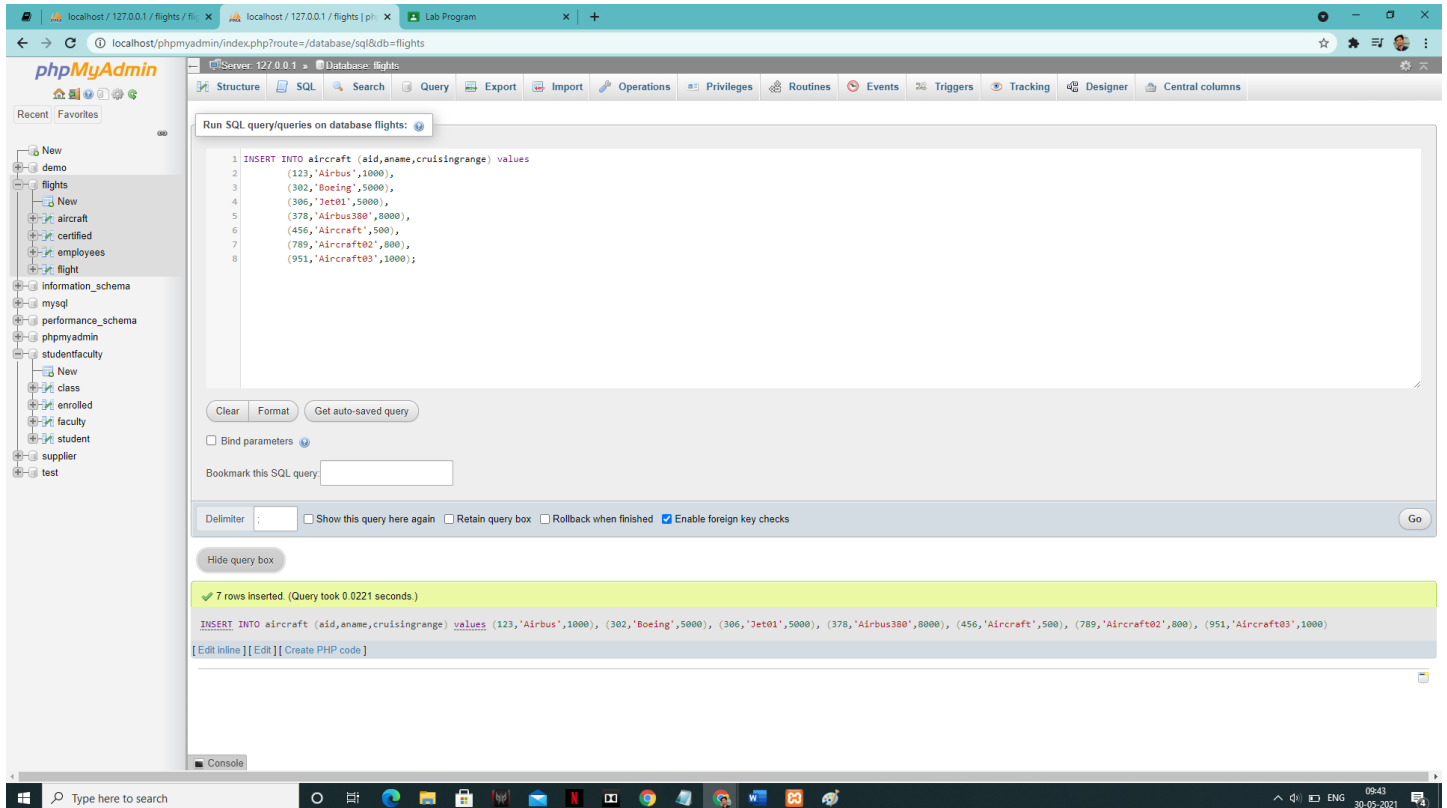
Create table:-



## 2) Enter tuples for each relation.

### 'AIRCRAFT' table:





**'EMPLOYEES' table:**

localhost / 127.0.0.1 / studentfac: x localhost / 127.0.0.1 / flights | p: x Lab Program x +

localhost/phpmyadmin/index.php?route=/database/sql&db=flights

Server: 127.0.0.1 Database: flights

Structure SQL Search Query Export Import Operations Privileges Routines Events Triggers Tracking Designer Central columns

Run SQL query/queries on database flights:

```
1 CREATE TABLE employees(  
2     eid INT,  
3     ename VARCHAR(20),  
4     salary INT,  
5     PRIMARY KEY (eid) );
```

Clear Format Get auto-saved query

☐ Bind parameters

Bookmark this SQL query:

Delimiter: ☐ Show this query here again ☐ Retain query box ☐ Rollback when finished ☒ Enable foreign key checks Go

Hide query box

MySQL returned an empty result set (i.e. zero rows). (Query took 0.0287 seconds)

CREATE TABLE employees (eid INT, ename VARCHAR(20), salary INT, PRIMARY KEY (eid) )

[ Edit inline ] [ Edit ] [ Create PHP code ]

Console

localhost / 127.0.0.1 / flights | flights | p: x Lab Program x +

localhost/phpmyadmin/index.php?route=/database/sql&db=flights

Server: 127.0.0.1 Database: flights

Structure SQL Search Query Export Import Operations Privileges Routines Events Triggers Tracking Designer Central columns

Run SQL query/queries on database flights:

```
1 INSERT INTO employees (eid,ename,salary) VALUES  
2     (1,'Praveen',30000),  
3     (2,'Har1',85000),  
4     (3,'S1ddu',50000),  
5     (4,'Yash',45000),  
6     (5,'An11',90000),  
7     (6,'Piyush',75000),  
8     (7,'Aman',100000);
```

Clear Format Get auto-saved query

☐ Bind parameters

Bookmark this SQL query:

Delimiter: ☐ Show this query here again ☐ Retain query box ☐ Rollback when finished ☒ Enable foreign key checks Go

Hide query box

7 rows inserted. (Query took 0.0102 seconds)

INSERT INTO employees (eid,ename,salary) VALUES (1,'Praveen',30000), (2,'Har1',85000), (3,'S1ddu',50000), (4,'Yash',45000), (5,'An11',90000), (6,'Piyush',75000), (7,'Aman',100000)

[ Edit inline ] [ Edit ] [ Create PHP code ]

Console

## 'FLIGHT' table:

The screenshot shows the phpMyAdmin interface with the 'flight' table being created in the 'flights' database. The SQL query is as follows:

```
1 CREATE TABLE flight(  
2   no INT,  
3   frm VARCHAR(20),  
4   too VARCHAR(20),  
5   distance INT,  
6   departs VARCHAR(20),  
7   arrives VARCHAR(20),  
8   price REAL,  
9   PRIMARY KEY (no) );
```

The interface shows the 'Run SQL query/queries on database flights:' section with the query entered. Below the query, there are buttons for 'Clear', 'Format', and 'Get auto-saved query'. The 'Bind parameters' checkbox is unchecked. The 'Bookmark this SQL query:' field is empty. The 'Delimiter' is set to semicolon (;). The 'Show this query here again', 'Retain query box', and 'Rollback when finished' checkboxes are unchecked. The 'Enable foreign key checks' checkbox is checked. The 'Go' button is visible.

MySQL returned an empty result set (i.e. zero rows). (Query took 0.0356 seconds)

[CREATE TABLE flight\( no INT, frm VARCHAR\(20\), too VARCHAR\(20\), distance INT, departs VARCHAR\(20\), arrives VARCHAR\(20\), price REAL, PRIMARY KEY \(no\) \)](#)

[\[ Edit inline \]](#) [\[ Edit \]](#) [\[ Create PHP code \]](#)

The screenshot shows the phpMyAdmin interface with the 'flight' table being populated with data. The SQL query is as follows:

```
1 INSERT INTO flight (no,frm,too,distance,departs,arrives,price) VALUES  
2   (1,'Bangalore','Mangalore',360,'10:45:00','12:00:00',10000),  
3   (2,'Bangalore','Delhi',5000,'12:15:00','04:30:00',25000),  
4   (3,'Bangalore','Mumbai',3500,'02:15:00','05:25:00',30000),  
5   (4,'Delhi','Mumbai',4500,'10:15:00','12:05:00',35000),  
6   (5,'Delhi','Ranchi',18000,'07:15:00','05:30:00',90000),  
7   (6,'Bangalore','Ranchi',19500,'10:00:00','07:45:00',95000),  
8   (7,'Bangalore','Chennai',17000,'12:00:00','06:30:00',99000);
```

The interface shows the 'Run SQL query/queries on database flights:' section with the query entered. Below the query, there are buttons for 'Clear', 'Format', and 'Get auto-saved query'. The 'Bind parameters' checkbox is unchecked. The 'Bookmark this SQL query:' field is empty. The 'Delimiter' is set to semicolon (;). The 'Show this query here again', 'Retain query box', and 'Rollback when finished' checkboxes are unchecked. The 'Enable foreign key checks' checkbox is checked. The 'Go' button is visible.

7 rows inserted. (Query took 0.0100 seconds)

[INSERT INTO flight \(no,frm,too,distance,departs,arrives,price\) VALUES \(1,'Bangalore','Mangalore',360,'10:45:00','12:00:00',10000\), \(2,'Bangalore','Delhi',5000,'12:15:00','04:30:00',25000\), \(3,'Bangalore','Mumbai',3500,'02:15:00','05:25:00',30000\), \(4,'Delhi','Mumbai',4500,'10:15:00','12:05:00',35000\), \(5,'Delhi','Ranchi',18000,'07:15:00','05:30:00',90000\), \(6,'Bangalore','Ranchi',19500,'10:00:00','07:45:00',95000\), \(7,'Bangalore','Chennai',17000,'12:00:00','06:30:00',99000\)](#)

[\[ Edit inline \]](#) [\[ Edit \]](#) [\[ Create PHP code \]](#)

## CERTIFIED value: -

The screenshot shows the phpMyAdmin interface with the 'flights' database selected. The 'Structure' tab is active, and the 'certified' table is highlighted in the left sidebar. The main query area contains an INSERT statement:

```
1 INSERT INTO certified (eid,aid) VALUES
2 (1,123),
3 (2,123),
4 (1,302),
5 (5,302),
6 (7,302),
7 (1,306),
8 (2,306),
9 (1,378),
10 (2,378),
11 (4,378),
12 (6,456),
13 (3,456),
14 (5,789),
15 (6,789),
16 (3,951),
17 (1,951)
```

The query is executed, and a success message is displayed: "17 rows inserted. (Query took 0.0103 seconds)". Below the message, the executed SQL statement is shown:

```
INSERT INTO certified (eid,aid) VALUES (1,123), (2,123), (1,302), (5,302), (7,302), (1,306), (2,306), (1,378), (2,378), (4,378), (6,456), (3,456), (5,789), (6,789), (3,951), (1,951), (1,789)
```

The screenshot shows the phpMyAdmin interface with the 'flights' database selected. The 'Structure' tab is active, and the 'certified' table is highlighted in the left sidebar. The main query area contains a CREATE TABLE statement:

```
1 CREATE TABLE certified(
2   eid INT,
3   aid INT,
4   PRIMARY KEY (eid,aid),
5   FOREIGN KEY (eid) REFERENCES employees (eid),
6   FOREIGN KEY (aid) REFERENCES aircraft (aid) );
```

The query is executed, and a success message is displayed: "MySQL returned an empty result set (i.e. zero rows). (Query took 0.0582 seconds)". Below the message, the executed SQL statement is shown:

```
CREATE TABLE certified( eid INT, aid INT, PRIMARY KEY (eid,aid), FOREIGN KEY (eid) REFERENCES employees (eid), FOREIGN KEY (aid) REFERENCES aircraft (aid) )
```

1:-

The screenshot shows the phpMyAdmin web interface. The left sidebar displays a database structure with a tree view. The main area is titled 'Run SQL query/queries on database flights:'. A SQL query is entered in the text area: `SELECT DISTINCT a.aname FROM aircraft a,certified c,employees e WHERE a.aid=c.aid AND c.eid=e.eid AND NOT EXISTS (SELECT * FROM employees e1 WHERE e1.eid=e.eid AND e1.salary<80000);`. Below the query area, there are buttons for 'Clear', 'Format', and 'Get auto-saved query'. A checkbox for 'Bind parameters' is present. A 'Bookmark this SQL query' field is also visible. The 'Delimiter' is set to semicolon. A 'Show this query here again' checkbox is checked. A 'Retain query box' checkbox is checked. A 'Rollback when finished' checkbox is checked. An 'Enable foreign key checks' checkbox is checked. A 'Hide query box' button is present. The results section shows 'Showing rows 0 - 4 (5 total. Query took 0.0116 seconds.)'. The query is repeated. Below the query, there are links for 'Profiling', 'Edit inline', 'Edit', 'Explain SQL', 'Create PHP code', and 'Refresh'. A 'Show all' checkbox is checked. The 'Number of rows' is set to 25. A 'Filter rows' search box is present. Below the results, there is a table with columns 'aname' and 'aid'. The table contains five rows: Airbus, Boeing, JetB1, Airbus380, and Aircraft02. Each row has a checkbox, an 'Edit' button, a 'Copy' button, and a 'Delete' button. Below the table, there is a 'Check all' checkbox. A 'With selected:' checkbox is checked. Below the table, there is a 'Show all' checkbox. The 'Number of rows' is set to 25. A 'Filter rows' search box is present. Below the table, there is a 'Query results operations' section with a 'Console' button.

phpMyAdmin

Run SQL query/queries on database flights:

1 SELECT DISTINCT a.aname FROM aircraft a,certified c,employees e WHERE a.aid=c.aid AND c.eid=e.eid AND NOT EXISTS (SELECT \* FROM employees e1 WHERE e1.eid=e.eid AND e1.salary<80000);

Clear Format Get auto-saved query

☐ Bind parameters

Bookmark this SQL query:

Delimiter: ☐ Show this query here again ☐ Retain query box ☐ Rollback when finished ☒ Enable foreign key checks

Hide query box

Showing rows 0 - 4 (5 total. Query took 0.0116 seconds.)

SELECT DISTINCT a.aname FROM aircraft a,certified c,employees e WHERE a.aid=c.aid AND c.eid=e.eid AND NOT EXISTS (SELECT \* FROM employees e1 WHERE e1.eid=e.eid AND e1.salary<80000)

☐ Profiling ☐ Edit inline ☐ Edit ☐ Explain SQL ☐ Create PHP code ☐ Refresh

☐ Show all Number of rows: 25 Filter rows: Search this table

+ Options

					aname
<input type="checkbox"/>	Edit	Copy	Delete		Airbus
<input type="checkbox"/>	Edit	Copy	Delete		Boeing
<input type="checkbox"/>	Edit	Copy	Delete		JetB1
<input type="checkbox"/>	Edit	Copy	Delete		Airbus380
<input type="checkbox"/>	Edit	Copy	Delete		Aircraft02

☐ Check all With selected: ☐ Edit ☐ Copy ☐ Delete ☐ Export

☐ Show all Number of rows: 25 Filter rows: Search this table

Query results operations

Console

2:-

localhost / 127.0.0.1 / flights / e | localhost / 127.0.0.1 / flights | p | Lab Program

localhost/phpmyadmin/index.php?route=/database/sql&db=flights

Server: 127.0.0.1 | Database: flights | Table: certified

Run SQL query/queries on database flights:

```
1 SELECT c.eid,MAX(cruisingrange) FROM certified c,aircraft a WHERE c.aid=a.aid GROUP BY c.eid HAVING COUNT(*)>3;
```

Clear Format Get auto-saved query

☐ Bind parameters

Bookmark this SQL query:

Delimiter: ☐ Show this query here again ☐ Retain query box ☐ Rollback when finished ☒ Enable foreign key checks

Go

Hide query box

Showing rows 0 - 0 (1 total, Query took 0.0039 seconds)

```
SELECT c.eid,MAX(cruisingrange) FROM certified c,aircraft a WHERE c.aid=a.aid GROUP BY c.eid HAVING COUNT(*)>3
```

☐ Profiling [Edit inline] [Edit] [Explain SQL] [Create PHP code] [Refresh]

☐ Show all | Number of rows: 25 | Filter rows: Search this table

+ Options

	eid	MAX(cruisingrange)
<input type="checkbox"/>	1	8000

☐ Check all | With selected: ☐ Edit ☐ Copy ☐ Delete ☐ Export

☐ Show all | Number of rows: 25 | Filter rows: Search this table

Query results operations

☐ Print ☐ Copy to clipboard ☐ Export ☐ Display chart ☐ Create view

☐ Bookmark this SQL query

Console

3:-

localhost / 127.0.0.1 / flights / a | localhost / 127.0.0.1 / flights | p | Lab Program

localhost/phpmyadmin/index.php?route=/database/sql&db=flights

Server: 127.0.0.1 | Database: flights | Table: employees

Run SQL query/queries on database flights:

```
1 SELECT DISTINCT e.ename FROM employees e WHERE e.salary< (SELECT MIN(f.price) FROM flight f WHERE f.frm='Bangalore' AND f.too='Ranchi');
```

Clear Format Get auto-saved query

☐ Bind parameters

Bookmark this SQL query:

Delimiter: ☐ Show this query here again ☐ Retain query box ☐ Rollback when finished ☒ Enable foreign key checks

Go

Hide query box

Showing rows 0 - 5 (6 total, Query took 0.0046 seconds)

```
SELECT DISTINCT e.ename FROM employees e WHERE e.salary< (SELECT MIN(f.price) FROM flight f WHERE f.frm='Bangalore' AND f.too='Ranchi')
```

☐ Profiling [Edit inline] [Edit] [Explain SQL] [Create PHP code] [Refresh]

☐ Show all | Number of rows: 25 | Filter rows: Search this table | Sort by key: None

+ Options

	ename
<input type="checkbox"/>	Praveen
<input type="checkbox"/>	Hari
<input type="checkbox"/>	Siddu
<input type="checkbox"/>	Yash
<input type="checkbox"/>	Anil
<input type="checkbox"/>	Plyush

☐ Check all | With selected: ☐ Edit ☐ Copy ☐ Delete ☐ Export

☐ Show all | Number of rows: 25 | Filter rows: Search this table | Sort by key: None

Console

4:-



localhost / 127.0.0.1 / flights / a | localhost / 127.0.0.1 / flights / p | Lab Program

localhost/phpmyadmin/index.php?route=/database/sql&db=flights

Server: 127.0.0.1 Database: flights Table: aircraft

Run SQL query/queries on database flights:

```
1 SELECT a.aid,a.aname,AVG(e.salary) FROM aircraft a,certified c,employees e WHERE a.aid=c.aid AND c.aid=e.aid AND a.cruisingrange>1000 GROUP BY a.aid,a.aname;
```

Showing rows 0 - 2 (3 total, Query took 0.0045 seconds)

```
SELECT a.aid,a.aname,AVG(e.salary) FROM aircraft a,certified c,employees e WHERE a.aid=c.aid AND c.aid=e.aid AND a.cruisingrange>1000 GROUP BY a.aid,a.aname
```

	aid	aname	AVG(e.salary)
<input type="checkbox"/>	302	Boeing	73333.3333
<input type="checkbox"/>	306	Jet01	57500.0000
<input type="checkbox"/>	378	Airbus380	53333.3333

Query results operations

Print Copy to clipboard Export Display chart Create view

5:-

localhost / 127.0.0.1 / flights / a | localhost / 127.0.0.1 / flights / p | Lab Program

localhost/phpmyadmin/index.php?route=/database/sql&db=flights

Server: 127.0.0.1 Database: flights Table: employees

Run SQL query/queries on database flights:

```
1 SELECT distinct e.ename FROM employees e,aircraft a,certified c WHERE e.aid=c.aid AND c.aid=a.aid AND a.aname="Boeing";
```

Showing rows 0 - 2 (3 total, Query took 0.0045 seconds)

```
SELECT distinct e.ename FROM employees e,aircraft a,certified c WHERE e.aid=c.aid AND c.aid=a.aid AND a.aname="Boeing"
```

	ename
<input type="checkbox"/>	Praveen
<input type="checkbox"/>	Anil
<input type="checkbox"/>	Aman

Query results operations

Print Copy to clipboard Export Display chart Create view

6:-

The screenshot shows the phpMyAdmin interface with the 'flights' database selected. A SQL query is entered in the 'Run SQL query/queries on database flights:' box:

```
1 SELECT a.aid FROM aircraft a WHERE a.cruisingrange > (SELECT MIN(f.distance) FROM flight f WHERE f.frm='Bangalore' AND f.too='Delhi');
```

The query is executed, and the results are displayed in a table with one row:

aid
378

The interface also shows options for displaying the results, such as 'Number of rows: 25' and 'Filter rows: Search this table'.

7:-

The screenshot shows the phpMyAdmin interface with the 'flights' database selected. A complex SQL query is entered in the 'Run SQL query/queries on database flights:' box:

```
1 select f.departs from flight f where f.no in ((select f0.no from flight f0 where  
2 f0.frm = 'Handison' and f0.too = 'New York' and f0.arrives < '18:00:00') UNION  
3 (select f0.no from flight f0, flight f1 where f0.frm = 'Handison' and f0.too <>  
4 'New York' and f1.frm = f0.too and f0.arrives < f1.departs and f1.too = 'New York' and f1.arrives <  
5 '18:00:00') union (select f0.no from flight f0, flight f1, flight f2 where f0.frm =  
6 'Handison' and f0.too <> 'New York' and f1.frm = f0.too and f0.arrives < f1.departs  
7 and f1.too <> 'New York' AND f2.frm = f1.too and f2.too = 'New York' and f1.arrives <  
8 f2.departs and f2.arrives < '18:00:00'));
```

The query is executed, and the results are displayed as an empty set:

MySQL returned an empty result set (i.e. zero rows). (Query took 0.0133 seconds)

The interface also shows options for displaying the results, such as 'Number of rows: 25' and 'Filter rows: Search this table'.

8:-

The screenshot shows the phpMyAdmin web interface. The browser address bar indicates the URL is `localhost/phpmyadmin/index.php?route=/table/sql&db=flights&table=employees`. The interface is for the 'flights' database, specifically the 'EMPLOYEES' table.

**SQL Query:**

```
1 SELECT ENAME,SALARY FROM EMPLOYEES WHERE EID NOT IN(SELECT EID FROM CERTIFIED) AND SALARY>(SELECT AVG(SALARY) FROM EMPLOYEES WHERE EID IN (SELECT EID FROM CERTIFIED));
```

**Query Execution:** The query was executed successfully. The status bar shows 'Showing rows 0 - 0 (1 total, Query took 0.0040 seconds)'. The SQL query is repeated in the status bar.

**Table Structure:** The table has two columns: 'ENAME' and 'SALARY'.

**Table Data:**

ENAME	SALARY
Rohit	90000

The interface includes various toolbars for SQL operations (SELECT, INSERT, UPDATE, DELETE), a search bar, and options for displaying the results (number of rows, filter rows).