



AMERICAN INTERNATIONAL UNIVERSITY–BANGLADESH (AIUB)

FACULTY OF SCIENCE & TECHNOLOGY

DEPARTMENT OF COMPUTER SCIENCE

Introduction to Database

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Section: D

Topic

Vehicle Renting System

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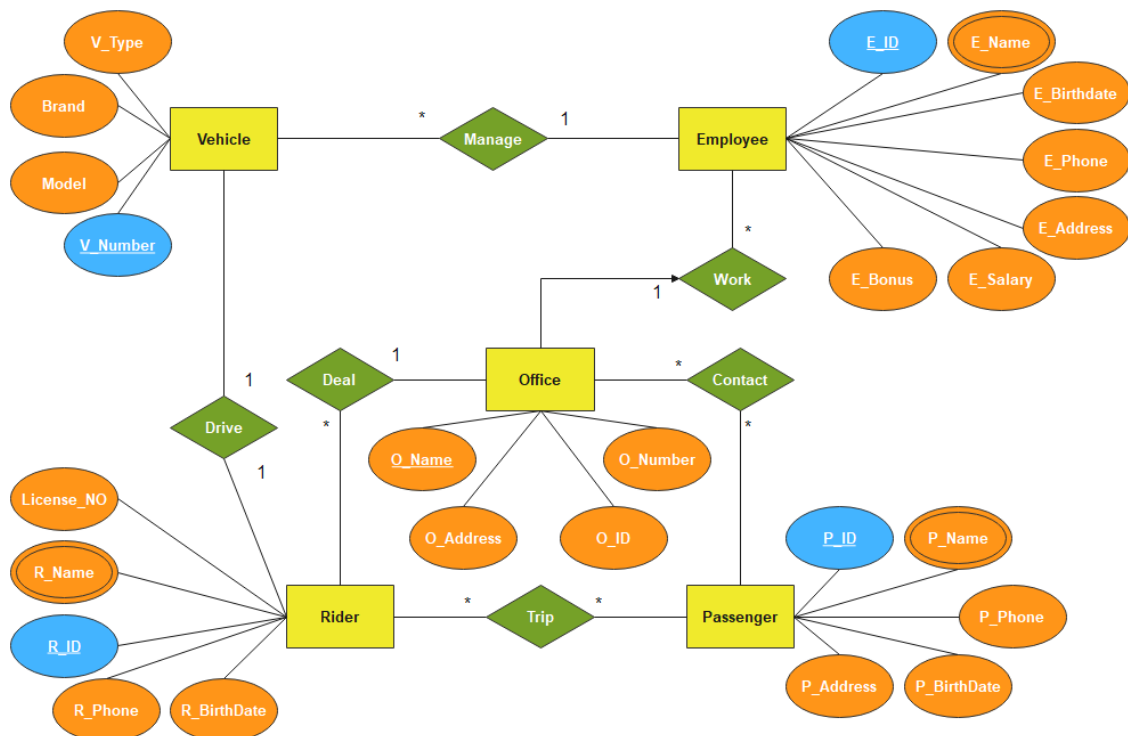
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Overview

- Every passenger has their id, name, phone number, birthdate, and address. The passengers are identified by their id. Their phone number must be unique.
- The passengers called for trip to riders. Every rider has their id, name, driving license number, phone number and birthdate. The riders are identified by their id. Every rider's driving license number must be unique.
- Every rider can drive a vehicle. Every vehicle has a serial number, model, brand and their type like motorcycle, car. The vehicles are identified by their serial number.
- Every vehicle is managed by an employee. Every employee has an id, name, phone number, birthdate, address, salary, and bonus. An employee can manage more than one vehicle. The employees are identified by their id. Their phone number should be unique.
- Every employee can work for an office, but an office can have more than one employee. Every office has id, name, phone number, birthdate, and address. They are identified by their id. Their phone number and name should be unique. The offices deal with riders and contact with passengers.

ERD Diagram



Normalization

Trip (P_ID, P_Name, P_Phone, P_Birthdate, P_Address, R_ID, License_No, R_Name, R_phone, R_BirthDate,)

1NF: P_Name, R_Name, are multivalued attributes.

2NF:

P_ID, P_Name, P_Phone, P_Birthdate, P_Address
R_ID, License_No, R_Name, R_phone, R_BirthDate

3NF:

(No transitive dependency)

P_ID, P_Name, P_Phone, P_Birthdate, P_Address
R_ID, License_No, R_Name, R_phone, R_BirthDate

Table for trip:

1. P_ID, P_Name, P_Phone, P_Birthdate, P_Address
2. R_ID, R_Name, License_No, R_phone, R_BirthDate
3. T_ID, P_ID, R_ID

contact (P_ID, P_Name, P_Phone, P_Birthdate, P_Address, O_Name, O_ID, O_Address, O_Number)

1NF:

P_Name is a multivalued attribute.

2NF:

P_ID, P_Name, P_Phone, P_Birthdate, P_Address
O_ID, O_Name, O_Address, O_Number

3NF:

(No transitive dependency)

P_ID, P_Name, P_Phone, P_Birthdate, P_Address
O_ID, O_Name, O_Address, O_Number

Table for contact:

4. P_ID, P_Name, P_Phone, P_Birthdate, P_Address
5. O_ID, O_Name, O_Address, O_Number
6. C_ID, P_ID, O_ID

Deal (R_ID, License_No, R_Name, R_phone, R_BirthDate, O_Name, O_ID, O_Address, O_Number)

1NF: R_Name is a multivalued attribute.

2NF:

R_ID, License_No, R_Name, R_phone, R_BirthDate
O_ID, O_Name, O_Address, O_Number

3NF:

(No transitive dependency)

R_ID, License_No, R_Name, R_phone, R_BirthDate
O_ID, O_Name, O_Address, O_Number

Table for Deal:

7. R_ID, R_Name, License_No, R_phone, R_BirthDate, O_ID
8. O_ID, O_Name, O_Address, O_Number

Drive (R_ID, License_No, R_Name, R_phone, R_BirthDate, V_Number, V_Type, model, brand)

1NF:

R_Name is a multivalued attribute.

2NF:

R_ID, License_No, R_Name, R_phone, R_BirthDate
V_Number, V_Type, model, brand

3NF:

(Model ,brand and v_type have transitive dependency)

R_ID, License_No, R_Name, R_phone, R_BirthDate
V_Number
M_ID, model, brand, V_Type

Table for Drive:

9. R_ID, R_Name, License_No, R_phone, R_BirthDate, V_Number
10. V_Number, M_ID
11. M_ID, model, brand, V_Type

Manage

(V_Number, V_Type, model, brand, E_ID, E_Name, E_Birthdate, E_Phone, E_Address, E_Salary, E_Bonus)

1NF:

E_Name is a multivalued attribute.

2NF:

V_Number, V_Type, model, brand

E_ID, E_Name, E_Birthdate, E_Phone, E_Address, E_Salary, E_Bonus

3NF:

(Model, brand and v_type have transitive dependency)

V_Number

M_ID, model, brand, V_Type

E_ID, E_Name, E_Birthdate, E_Phone, E_Address, E_Salary, E_Bonus

Table for Manage:

12. V_Number, M_ID, E_ID

13. M_ID, model, brand, V_Type

14. E_ID, E_Name, E_Birthdate, E_Phone, E_Address, E_Salary, E_Bonus

Work (E_ID, E_Name, E_BirthDate, E_Phone, E_Address, E_Salary, E_Bonus, O_Name, O_ID, O_Address, O_Number)

1NF:

E_Name is a multivalued attribute.

2NF:

E_ID, E_Name, E_BirthDate, E_Phone, E_Address, E_Salary, E_Bonus

O_ID, O_Name, O_Address, O_Number

3NF:

(No transitive dependency)

E_ID, E_Name, E_BirthDate, E_Phone, E_Address, E_Salary, E_Bonus

O_ID, O_Name, O_Address, O_Number

Table for work:

15. E_ID, E_Name, E_BirthDate, E_Phone, E_Address, E_Salary, E_Bonus, O_ID

16. O_ID, O_Name, O_Address, O_Number

Tables for normalization:

1. **P_ID**, P_Name, P_Phone, P_Birthdate, P_Address
2. **R_ID**, R_Name, License_No, R_phone, R_BirthDate
3. **T_ID**, P_ID, R_ID
4. **P_ID**, P_Name, P_Phone, P_Birthdate, P_Address
5. **O_ID**, O_Name, O_Address, O_Number
6. **C_ID**, P_ID, O_ID
7. **R_ID**, R_Name, License_No, R_phone, R_BirthDate, **O_ID**
8. **O_ID**, O_Name, O_Address, O_Number
9. **R_ID**, R_Name, License_No, R_phone, R_BirthDate, **V_Number**
10. **V_Number**, **M_ID**
11. **M_ID**, model, brand, V_Type
12. **V_Number**, **M_ID**, **E_ID**
13. **M_ID**, model, brand, V_Type
14. **E_ID**, E_Name, E_Birthdate, E_Phone, E_Address, E_Salary, E_Bonus
15. **E_ID**, E_Name, E_BirthDate, E_Phone, E_Address, E_Salary, E_Bonus, **O_ID**
16. **O_ID**, O_Name, O_Address, O_Number

Tables After normalization:

Table Name	Attribute
Passenger	P_ID , P_Name, P_Phone, P_Birthdate, P_Address
Rider	R_ID , R_Name, License_No, R_phone, R_BirthDate, O_ID , V_Number
trip	T_ID , P_ID, R_ID
Office	O_ID , O_Name, O_Address, O_Number
contact	C_ID , P_ID, O_ID
Vehicle	V_Number , M_ID , E_ID
VMB	M_ID , model, brand, V_Type
Employee	E_ID , E_Name, E_BirthDate, E_Phone, E_Address, E_Salary, E_Bonus, O_ID

Description of Each Table

The screenshot shows the Oracle Database Express Edition interface. The user is logged in as SCOTT. The command 'DESC PASSENGER' has been entered in the SQL Commands window. The results are displayed in a table format.

Object Type: TABLE Object: PASSENGER

Table	Column	Data Type	Length	Precision	Scale	Primary Key	Nullable	Default	Comment
PASSENGER	P_ID	Number	-	10	0	1	-	-	-
	P_NAME	Varchar2	25	-	-	-	✓	-	-
	P_PHONE	Number	-	11	0	-	✓	-	-
	P_BIRTHDATE	Date	7	-	-	-	✓	-	-
	P_ADDRESS	Varchar2	25	-	-	-	✓	-	-

Language: en-us

The screenshot shows the Oracle Database Express Edition interface. The user is logged in as SCOTT. The command 'DESC RIDER' has been entered in the SQL Commands window. The results are displayed in a table format.

Object Type: TABLE Object: RIDER

Table	Column	Data Type	Length	Precision	Scale	Primary Key	Nullable	Default	Comment
RIDER	R_ID	Number	-	10	0	1	-	-	-
	R_NAME	Varchar2	25	-	-	-	✓	-	-
	LICENCE_NO	Varchar2	15	-	-	-	✓	-	-
	R_PHONE	Number	-	11	0	-	✓	-	-
	R_BIRTHDATE	Date	7	-	-	-	✓	-	-
	O_ID	Number	-	10	0	-	✓	-	-
	V_NUMBER	Number	-	10	0	-	✓	-	-

SQL Commands

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ORACLE Database Express Edition

User: SCOTT

Home > SQL > SQL Commands

☒ Autocommit Display 10 Save Run

DESC OFFICE

Results Explain Describe Saved SQL History

Object Type TABLE Object OFFICE

Table	Column	Data Type	Length	Precision	Scale	Primary Key	Nullable	Default	Comment
OFFICE	O_ID	Number	-	10	0	1	-	-	-
	O_NAME	Varchar2	25	-	-	-	✓	-	-
	O_ADDRESS	Varchar2	25	-	-	-	✓	-	-
	O_NUMBER	Number	-	11	0	-	✓	-	-

1 - 4

Language: en-us

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SQL Commands

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ORACLE Database Express Edition

User: SCOTT

Home > SQL > SQL Commands

☒ Autocommit Display 10 Save Run

DESC CONTACT

Results Explain Describe Saved SQL History

Object Type TABLE Object CONTACT

Table	Column	Data Type	Length	Precision	Scale	Primary Key	Nullable	Default	Comment
CONTACT	C_ID	Number	-	10	0	1	-	-	-
	P_ID	Number	-	10	0	-	✓	-	-
	O_ID	Number	-	10	0	-	✓	-	-

1 - 3

Language: en-us

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SQL Commands

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ORACLE Database Express Edition

User: SCOTT

Home | Logout | Help

Home > SQL > SQL Commands

☒ Autocommit Display 10 Save Run

DESC VEHICLE

Results Explain Describe Saved SQL History

Object Type **TABLE** Object **VEHICLE**

Table	Column	Data Type	Length	Precision	Scale	Primary Key	Nullable	Default	Comment
VEHICLE	V_NUMBER	Number	-	10	0	1	-	-	-
	M_ID	Number	-	10	0	-	✓	-	-
	E_ID	Number	-	10	0	-	✓	-	-

1 - 3

Language: en-us

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SQL Commands

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Home > SQL > SQL Commands

☒ Autocommit Display 10 Save Run

DESC VMB

Results Explain Describe Saved SQL History

Object Type **TABLE** Object **VMB**

Table	Column	Data Type	Length	Precision	Scale	Primary Key	Nullable	Default	Comment
VMB	M_ID	Number	-	10	0	1	-	-	-
	MODEL	Varchar2	20	-	-	-	✓	-	-
	BRAND	Varchar2	15	-	-	-	✓	-	-
	V_TYPE	Varchar2	10	-	-	-	✓	-	-

1 - 4

Language: en-us

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DESC 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	E_ID	Number	-	10	0	1	-	-	-
	E_NAME	Varchar2	25	-	-	-	✓	-	-
	E_BIRTHDATE	Date	7	-	-	-	✓	-	-
	E_PHONE	Number	-	11	0	-	✓	-	-
	E_ADDRESS	Varchar2	25	-	-	-	✓	-	-
	E_SALARY	Number	-	7	0	-	✓	-	-
	E_BONUS	Number	-	7	0	-	✓	-	-
	Q_ID	Number	-	10	0	-	✓	-	-

1 - 8

SQL Commands

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User: SCOTT

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☒ Autocommit Display 10 Save Run

DESC TRIP

Results Explain Describe Saved SQL History

Object Type TABLE Object TRIP

Table	Column	Data Type	Length	Precision	Scale	Primary Key	Nullable	Default	Comment
TRIP	T_ID	Number	-	10	0	1	-	-	-
	P_ID	Number	-	10	0	-	✓	-	-
	R_ID	Number	-	10	0	-	✓	-	-

1 - 3

Language: en-us

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Screenshot of Each Table Data

SQL Commands

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User: SCOTT

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☒ Autocommit Display 10 Save Run

select * FROM VMB

Results Explain Describe Saved SQL History

M_ID	MODEL	BRAND	V_TYPE
501	APACHE	TVS	MOTORCYCLE
502	PREMIO	TOYOTA	CAR
503	LIVO	HONDA	MOTORCYCLE
504	COROLLA	TOYOTA	CAR

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

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User: SCOTT

Home > SQL > SQL Commands

☒ Autocommit Display 10 Save Run

select * FROM EMPLOYEE

Results Explain Describe Saved SQL History

E_ID	E_NAME	E_BIRTHDATE	E_PHONE	E_ADRESS	E_SALARY	E_BONUS	O_ID
601	TAMIM KARIM	10-NOV-95	1914589632	MOTIJHEEL	15000	2000	301
602	MONIUL ISLAM	05-JUL-92	1914589685	RAMPURA	20000	500	303
603	JUBAYER CHOWDHURY	18-AUG-97	1914589645	KURIL	18000	1000	304
604	FAZLE RABBY	10-JUN-99	1914589618	SAVAR	17000	800	302
605	NAZMUL HOSSAIN	06-APR-00	1914585820	MOTIJHEEL	18000	500	303

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

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Home > SQL > SQL Commands

☒ Autocommit Display 10 Save Run

select * FROM VEHICLE

Results Explain Describe Saved SQL History

V_NUMBER	M_ID	E_ID
701	503	602
702	501	603
703	502	601
704	502	605
705	503	601
706	501	604

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

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☒ Autocommit Display 10 Save Run

select * FROM CONTACT

Results Explain Describe Saved SQL History

C_ID	P_ID	O_ID
401	101	304
402	102	302
403	104	301
404	105	304
405	101	303
406	103	302

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

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Home > SQL > SQL Commands

☒ Autocommit Display 10 Save Run

select * FROM OFFICE

Results Explain Describe Saved SQL History

O_ID	O_NAME	O_ADDRESS	O_NUMBER
301	UBER	BANANI	1943636369
302	PATHAO	GULSHAN	1943636354
303	OBHAI	MOTIJHEEL	1943636321
304	SHOHOZ	RAMPURA	1943636312

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

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SQL Commands

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User: SCOTT

Home > SQL > SQL Commands

☒ Autocommit Display 10 Save Run

select * FROM TRIP

Results Explain Describe Saved SQL History

T_ID	P_ID	R_ID
901	105	805
902	102	806
903	103	803
904	104	804
905	102	801
906	101	805
907	104	803
908	105	802
909	102	804
910	103	806

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

SQL Commands

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User: SCOTT

Home > SQL > SQL Commands

☒ Autocommit Display 10 Save Run

select * FROM RIDER

Results Explain Describe Saved SQL History

R_ID	R_NAME	LICENCE_NO	R_PHONE	R_BIRTHDATE	O_ID	V_NUMBER
801	MAHMUDUL HASAN	DK1015204555	1951654654	05-MAY-98	302	703
802	MEHRAB HASAN	DK1056804555	1856654654	02-JAN-96	301	702
803	SHOYEB KHAN	DK1053694555	1856655894	03-FEB-91	303	705
804	AZIZUL ISLAM	DK1085294555	1852655894	12-APR-99	304	706
805	ABDULLAH MEHEDI	CG1085294555	8522655894	15-JUL-98	303	704
806	ABRAR FAHAD	CG1036994555	142655894	19-OCT-96	302	701

SQL Commands

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☒ Autocommit Display 10 Save Run

select * FROM PASSENGER

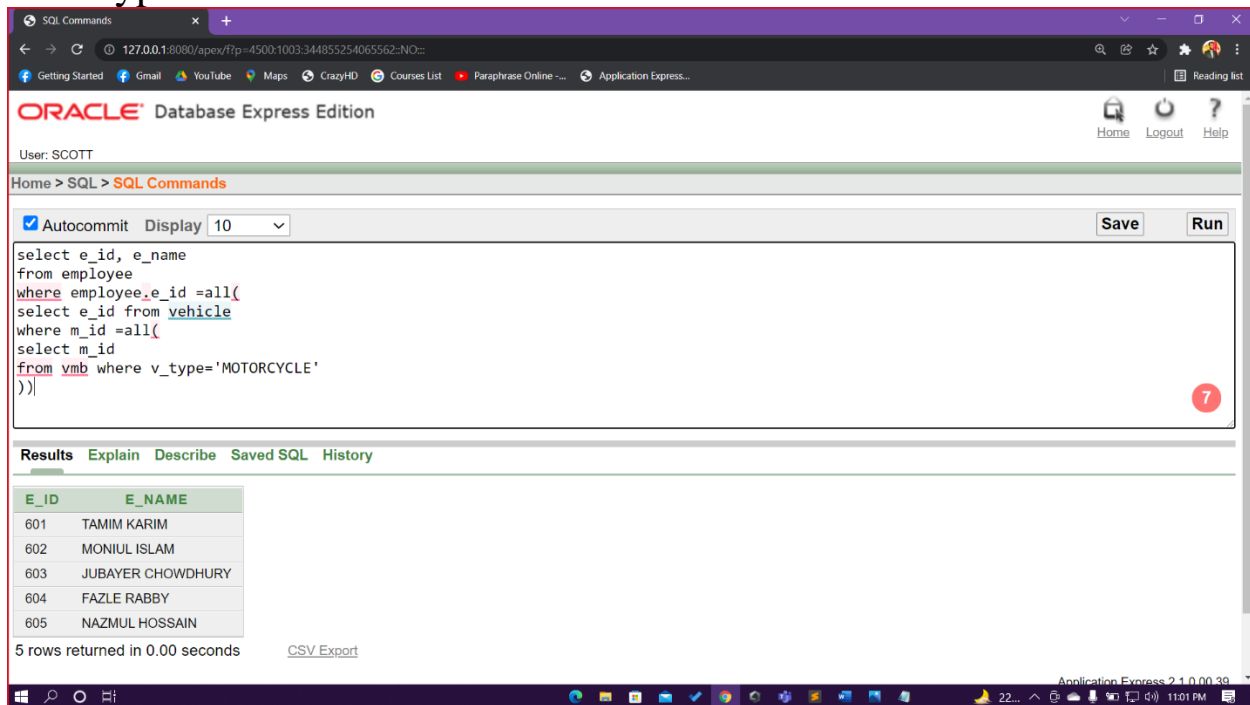
Results Explain Describe Saved SQL History

P_ID	P_NAME	P_PHONE	P_BIRTHDATE	P_ADDRESS
101	SHOHAN MOROL	1968859654	22-JUL-99	DHANMONDI
102	MEDHA CHOWDHURI	1968686822	20-MAY-98	MOTIJHEEL
103	MUSHFIQ HASAN MUNIM	1684848499	02-JAN-97	KURIL
104	KANIZ SUBRENA BINTY	1539090955	05-FEB-95	PALTAN
105	MEHEDI IBNE SHARIF	1311406565	15-JUN-92	DHANMONDI

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

Questions and Their Solutions

1. Display employee id and employee name who manage motorcycle type vehicle



The screenshot shows the Oracle Database Express Edition interface. The user is SCOTT. The SQL Commands window contains the following query:

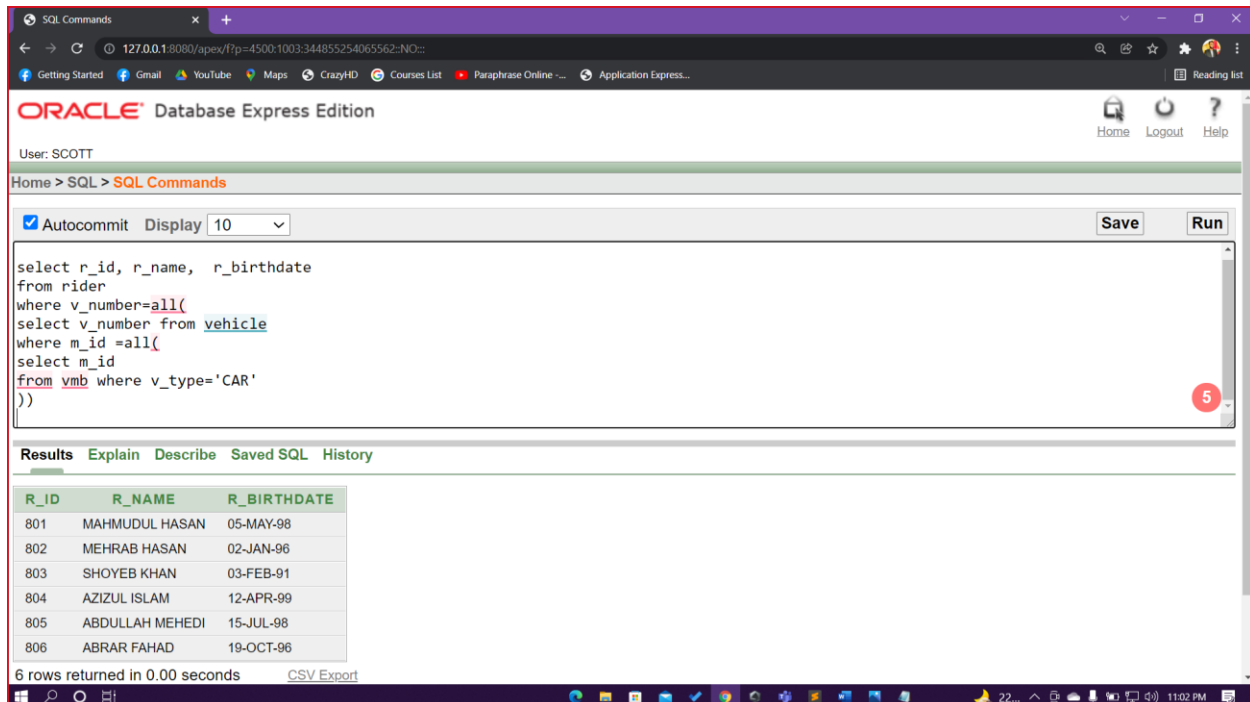
```
select e_id, e_name
from employee
where employee.e_id =all(
select e_id from vehicle
where m_id =all(
select m_id
from vmb where v_type='MOTORCYCLE'
))
```

The query is executed, and the results are displayed in a table with 5 rows:

E_ID	E_NAME
601	TAMIM KARIM
602	MONIUL ISLAM
603	JUBAYER CHOWDHURY
604	FAZLE RABBY
605	NAZMUL HOSSAIN

5 rows returned in 0.00 seconds

2. Display riders id, name, birthdate who rides car.



The screenshot shows the Oracle Database Express Edition interface. The user is SCOTT. The SQL Commands window contains the following query:

```
select r_id, r_name, r_birthdate
from rider
where v_number=all(
select v_number from vehicle
where m_id =all(
select m_id
from vmb where v_type='CAR'
))
```

The query is executed, and the results are displayed in a table with 6 rows:

R_ID	R_NAME	R_BIRTHDATE
801	MAHMUDUL HASAN	05-MAY-98
802	MEHRAB HASAN	02-JAN-96
803	SHOYEB KHAN	03-FEB-91
804	AZIZUL ISLAM	12-APR-99
805	ABDULLAH MEHEDI	15-JUL-98
806	ABRAR FAHAD	19-OCT-96

6 rows returned in 0.00 seconds

3. Display passenger name who are born after 1997.

The screenshot shows the Oracle Database Express Edition interface. The user is SCOTT. The SQL command entered is:

```
SELECT * FROM PASSENGER
WHERE P_BIRTHDATE > '18-AUG-1997'
```

The results show 2 rows returned in 0.00 seconds. The data is as follows:

P_ID	P_NAME	P_PHONE	P_BIRTHDATE	P_ADDRESS
101	SHOHAN MOROL	1968859654	22-JUL-99	DHANMONDI
102	MEDHA CHOWDHURI	1968686822	20-MAY-98	MOTIJHEEL

4. Display the employee id, name and their office id, name and office location for all employees as department location wise.

The screenshot shows the Oracle Database Express Edition interface. The user is SCOTT. The SQL command entered is:

```
SELECT EMPLOYEE.E_ID, EMPLOYEE.E_NAME, OFFICE.O_ID, OFFICE.O_NAME, OFFICE.O_ADDRESS
FROM EMPLOYEE, OFFICE
WHERE EMPLOYEE.O_ID=OFFICE.O_ID
ORDER BY OFFICE.O_ADDRESS ASC
```

The results show 5 rows returned in 0.00 seconds. The data is as follows:

E_ID	E_NAME	O_ID	O_NAME	O_ADDRESS
601	TAMIM KARIM	301	UBER	BANANI
604	FAZLE RABBY	302	PATHAO	GULSHAN
602	MONIUL ISLAM	303	OBHAI	MOTIJHEEL
605	NAZMUL HOSSAIN	303	OBHAI	MOTIJHEEL
603	JUBAYER CHOWDHURY	304	SHOHOZ	RAMPURA

5. Display the rider id, name along with their vehicle type, vehicle model and vehicle brand who ride Toyota brand vehicle or vehicle model is Apache.

The screenshot shows the Oracle Database Express Edition interface. The user is SCOTT. The SQL command entered is:

```
select rider_r_id, rider_r_name, vmb.v_type, vmb.brand, vmb.model, employee_e_id, EMPLOYEE.e_name
from rider, vmb, employee, vehicle
where rider_v_number=vehicle.v_number
and vehicle_e_id=employee_e_id
and vmb.brand='TOYOTA'
```

The results are displayed in a table with 7 columns: R_ID, R_NAME, V_TYPE, BRAND, MODEL, E_ID, and E_NAME. The table contains 10 rows of data.

R_ID	R_NAME	V_TYPE	BRAND	MODEL	E_ID	E_NAME
801	MAHMUDUL HASAN	CAR	TOYOTA	PREMIO	601	TAMIM KARIM
802	MEHRAB HASAN	CAR	TOYOTA	PREMIO	603	JUBAYER CHOWDHURY
803	SHOYEB KHAN	CAR	TOYOTA	PREMIO	601	TAMIM KARIM
804	AZIZUL ISLAM	CAR	TOYOTA	PREMIO	604	FAZLE RABBY
805	ABDULLAH MEHEDI	CAR	TOYOTA	PREMIO	605	NAZMUL HOSSAIN
806	ABRAR FAHAD	CAR	TOYOTA	PREMIO	602	MONIUL ISLAM
801	MAHMUDUL HASAN	CAR	TOYOTA	COROLLA	601	TAMIM KARIM
802	MEHRAB HASAN	CAR	TOYOTA	COROLLA	603	JUBAYER CHOWDHURY
803	SHOYEB KHAN	CAR	TOYOTA	COROLLA	601	TAMIM KARIM
804	AZIZUL ISLAM	CAR	TOYOTA	COROLLA	604	FAZLE RABBY

6. Display the vehicle number, brand and model along their manager id and name where employee works for Obhai.

The screenshot shows the Oracle Database Express Edition interface. The user is SCOTT. The SQL command entered is:

```
select vehicle.v_number, vmb.brand, vmb.model, employee_e_id, employee_e_name
from vehicle, employee, vmb, office
where vehicle_m_id=vmb.m_id
and vehicle_e_id=employee_e_id
and employee_o_id=office.o_id
and office.o_name='OBHAI'
```

The results are displayed in a table with 5 columns: V_NUMBER, BRAND, MODEL, E_ID, and E_NAME. The table contains 2 rows of data.

V_NUMBER	BRAND	MODEL	E_ID	E_NAME
701	HONDA	LIVO	602	MONIUL ISLAM
704	TOYOTA	PREMIO	605	NAZMUL HOSSAIN

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

7. Display the employee id, name and salary who gets salary less than average salary.

The screenshot shows the Oracle Database Express Edition interface. The user is SCOTT. The SQL command entered is:

```
select e_id, e_name, e_salary
from employee
where e_salary < (select avg(e_salary) from employee)
```

The results show 2 rows returned in 0.00 seconds:

E_ID	E_NAME	E_SALARY
601	TAMIM KARIM	15000
604	FAZLE RABBY	17000

The interface includes a 'Save' button, a 'Run' button, and a 'CSV Export' link. The status bar at the bottom indicates 'Application Express 2.1.0.00.39' and 'Copyright © 1999, 2006, Oracle. All rights reserved.'

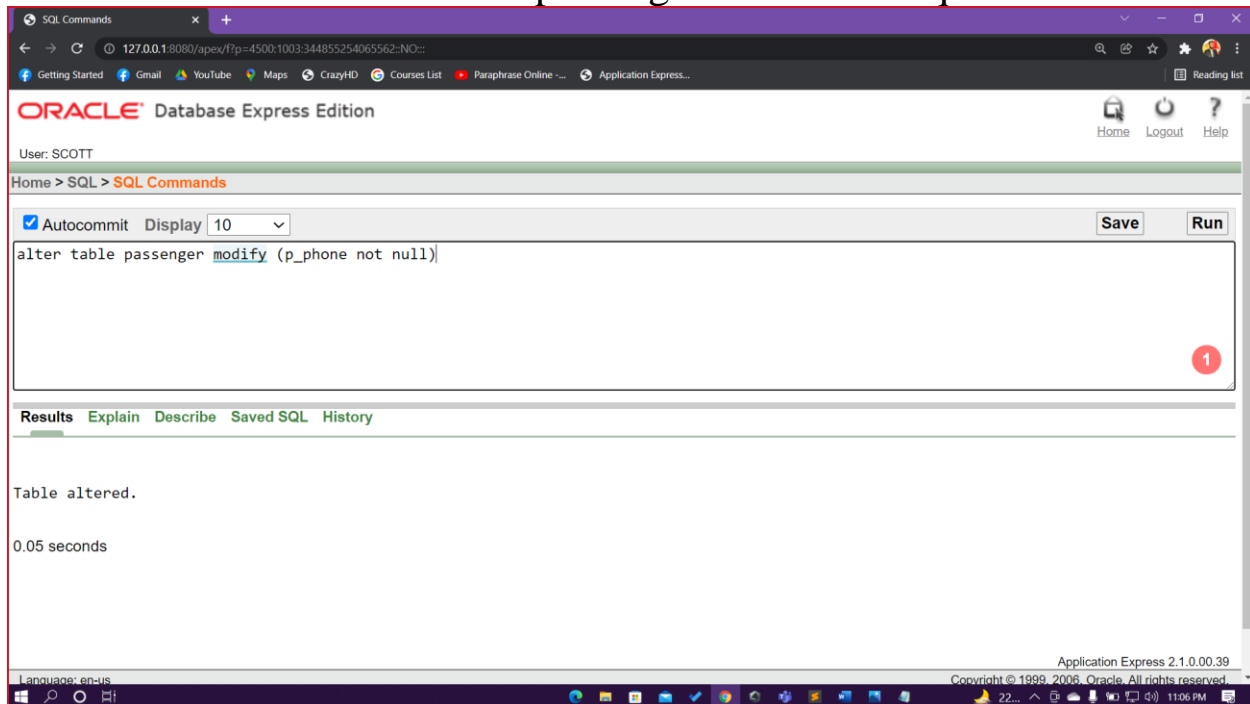
8. Create sequence named sv_id. Increment by 3, Max value 780, starts with 750, cycle, minvalue 707 & no cache.

The screenshot shows the Oracle Database Express Edition interface. The user is SCOTT. The SQL command entered is:

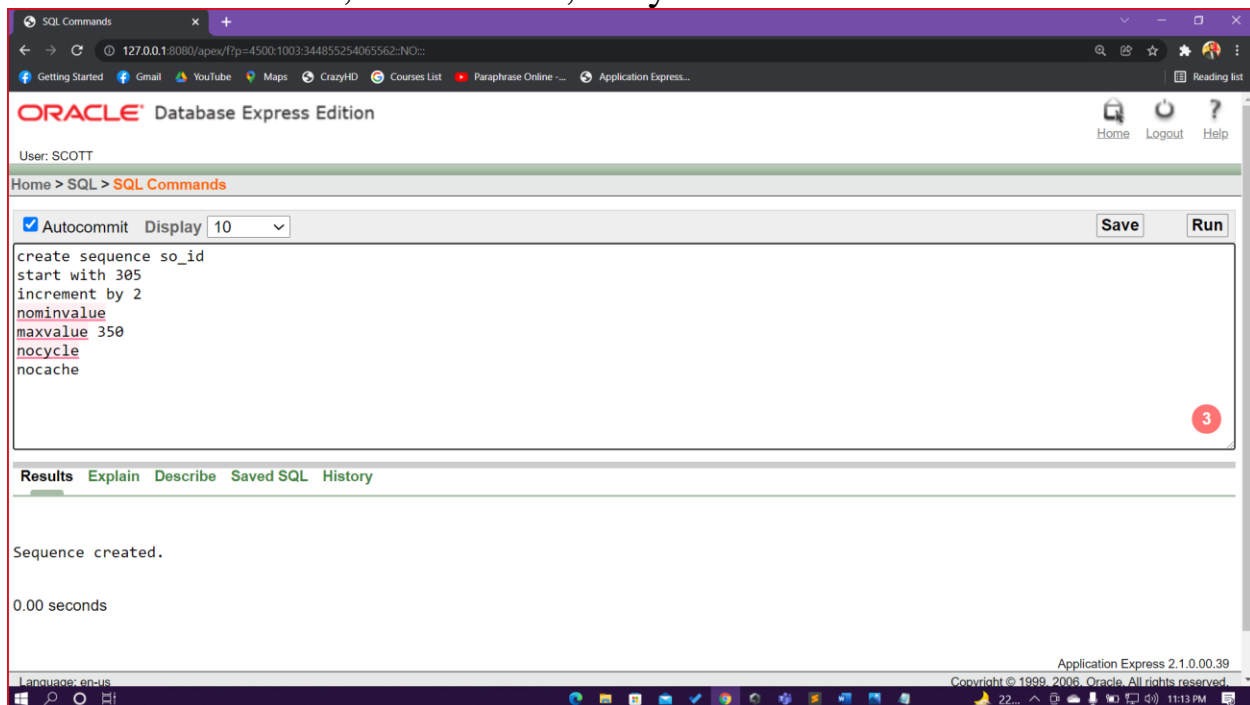
```
create sequence sv_id
start with 750
increment by 3
maxvalue 780
cycle
minvalue 707
nocache
```

The results show 'Sequence created.' and '0.02 seconds'. The interface includes a 'Save' button, a 'Run' button, and a 'CSV Export' link. The status bar at the bottom indicates 'Application Express 2.1.0.00.39' and 'Copyright © 1999, 2006, Oracle. All rights reserved.'

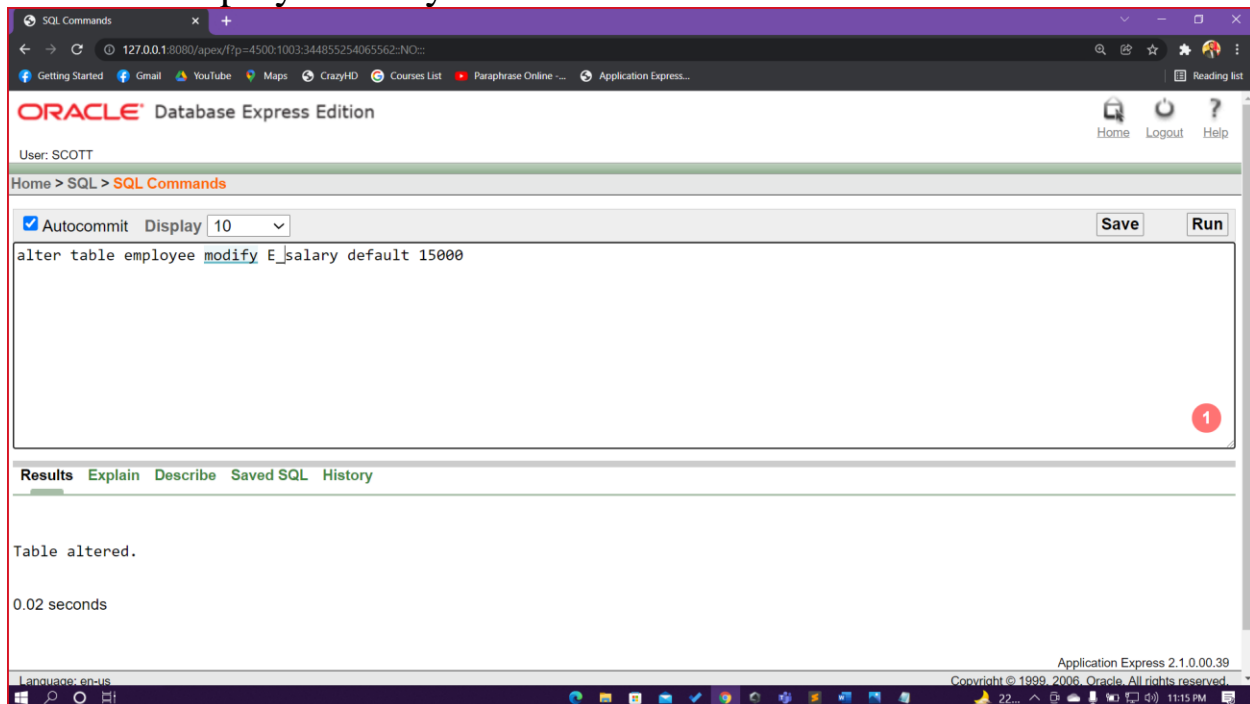
9. Set mobile number of the passengers not null unique.



10. Create sequence named so_id. Increment by 2, Max value 350, starts with 305, nominvalue, nocycle & no cache.



11. Set employee salary as default 15000 taka.



12. Set employee bonus as default 0 taka.

