

## Database MidTerm Exam



**From:**

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**Class:**

1 I

**Absence:**

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**Department:**

Information Technology

**Study Program:**

Informatics Engineering

**Part I: Analysis.** Considering the business rules provided, analyze and perform the following tasks.

a. Create the Entity-Relationship Diagram for the following business rule, assume relevant attributes.(10pts)

A Country Bus Company owns a number of busses. Each bus is allocated to a particular route, although some routes may have several busses. Each route passes through a number of towns. One or more drivers are allocated to each stage of a route, which corresponds to a journey through some or all of the towns on a route. Some of the towns have a garage where busses are kept and each of the busses are identified by the registration number and can carry different numbers of passengers, since the vehicles vary in size and can be single or double-decked. Each route is identified by a route number and information is available on the average number of passengers carried per day for each route. Drivers have an employee number, name, address, and sometimes a telephone number.

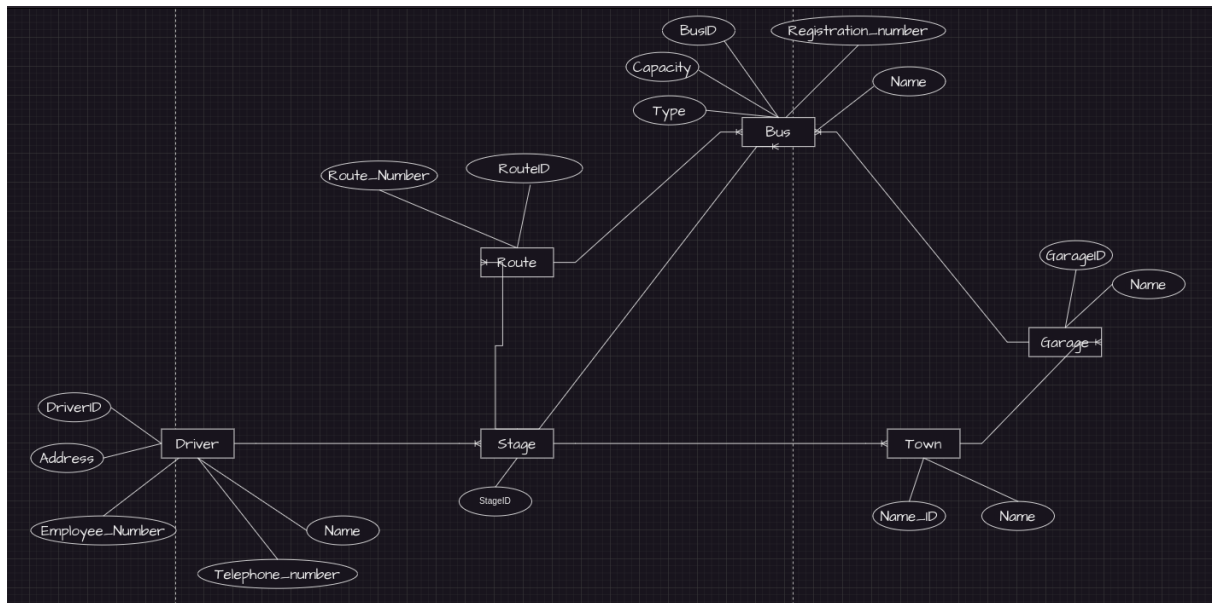
b. Transform the ERD into Relational Schema.(5pts)

**Part II: Application.** Use the provided current state of the Company Database in answering the following queries.

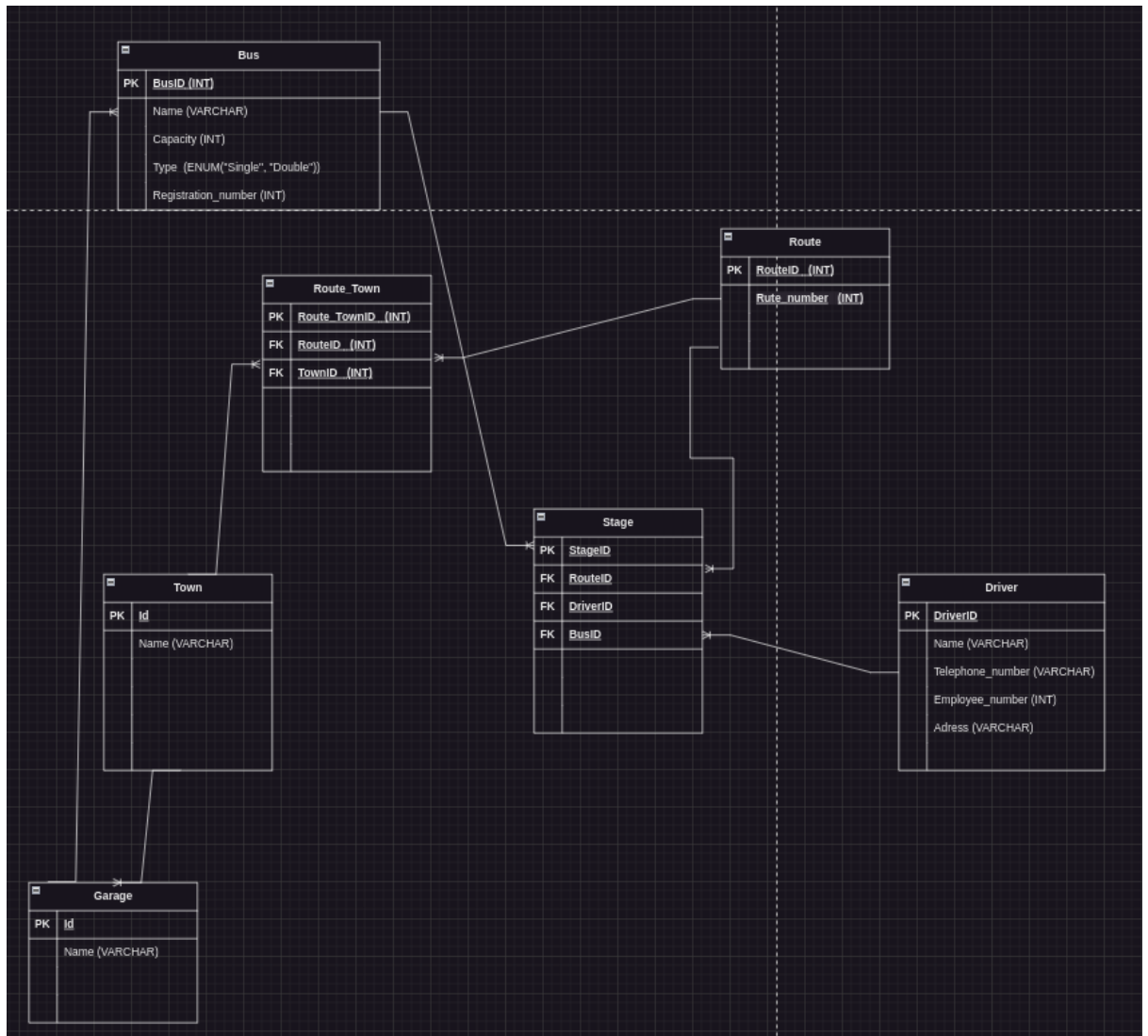
**EMPLOYEE**

Fname	Lname	Ssn	Bdate	Address	Salary	Dno
John	Smith	123456789	1965-01-09	Fondren, Houston, TX	30000	5
Franklin	Wong	333445555	1955-12-08	Voss, Houston, TX	40000	5
Alicia	Zelaya	999887777	1968-01-19	Castle, Spring, TX	25000	4
Jennifer	Wallace	987654321	1941-06-20	Berry, Bellaire, TX	43000	4
Ramesh	Narayan	666884444	1962-09-15	Fire Oak, Humble, TX	38000	5
James	Borg	888665555	1937-11-10	Stone, Houston, TX	55000	1

a. ERD



b. Transform the ERD into Relational Schema.



Part II : Application. Used the provided current state of the company database in answering the following queries.

- Query

```
1 CREATE DATABASE mid_exam;
2 USE mid_exam;
3 CREATE TABLE Bus (
4   BusID INT NOT NULL PRIMARY KEY AUTO_INCREMENT,
5   Name varchar(255) NOT NULL,
6   Capacity INT NOT NULL,
7   Type ENUM ('Single', 'Double') DEFAULT ('Single'),
8   Registration_number INT NOT NULL
9 );
10
11 CREATE TABLE Driver (
12   DriverID INT NOT NULL PRIMARY KEY AUTO_INCREMENT,
13   Name VARCHAR(255) NOT NULL,
14   Telephone_number VARCHAR(255) NOT NULL,
15   Employee_number INT NOT NULL,
16   Address VARCHAR(255) NOT NULL
17 );
18
19 CREATE TABLE Town (
20   TownID INT NOT NULL PRIMARY KEY AUTO_INCREMENT,
21   Name VARCHAR(255)
22 );
23
24 CREATE TABLE Garage (
25   GarageID INT NOT NULL PRIMARY KEY AUTO_INCREMENT,
26   Name VARCHAR(255) NOT NULL
27 );
28
29 CREATE TABLE Route (
30   RouteID INT NOT NULL PRIMARY KEY AUTO_INCREMENT,
31   Route_number INT NOT NULL
32 );
33
34 CREATE TABLE Stage (
35   StageID INT NOT NULL PRIMARY KEY AUTO_INCREMENT,
36   RouteID INT NOT NULL,
37   DriverID INT NOT NULL,
38   FOREIGN KEY (RouteID) REFERENCES Route(RouteID),
39   FOREIGN KEY (DriverID) REFERENCES Driver(DriverID)
40 );
41
42 CREATE TABLE Route_Town (
43   Route_TownID INT NOT NULL PRIMARY KEY AUTO_INCREMENT,
44   RouteID INT NOT NULL,
45   TownID INT NOT NULL,
46   FOREIGN KEY (RouteID) REFERENCES Route(RouteID),
47   FOREIGN KEY (TownID) REFERENCES Town(TownID)
48 );
```

**PROJECT**

Pname	Plocation	Pnumber	Dnum
Computerization	Stafford	1	5
Reorganization	Houston	10	1
Newbenefits	Sugarland	20	4

**DEPENDENT**

Essn	Dependent_name	Relationship
333445555	Alice	Daughter
333445555	Joy	Spouse
333445555	Theodore	Son
987654321	Abner	Spouse
123456789	Michael	Son
123456789	Alice	Daughter
123456789	Elizabeth	Spouse

**DEPARTMENT**

Dname	Dnumber	Mgr_ssn	Mgr_start_date
Research	5	333445555	1988-04-05
Administration	4	987654321	1995-01-01
Headquarters	1	888665555	1981-06-19

```
1 CREATE DATABASE Company_Database;
2 USE Company_Database;
3
4 CREATE TABLE EMPLOYEE (
5   Fname VARCHAR(255) NOT NULL,
6   Lname VARCHAR(255) NOT NULL,
7   Ssn INT NOT NULL,
8   Bdata DATE NOT NULL,
9   Address VARCHAR(255) NOT NULL,
10  Salary INT NOT NULL,
11  Dno INT NOT NULL
12 );
13
14 CREATE TABLE PROJECT (
15   Pname VARCHAR(255) NOT NULL,
16   Plocation VARCHAR(255) NOT NULL,
17   Pnumber INT NOT NULL,
18   Dnum INT NOT NULL
19 );
20
21 CREATE TABLE DEPENDENT (
22   Essn INT NOT NULL,
23   Dependent_name VARCHAR(255) NOT NULL,
24   Relationship VARCHAR(255) NOT NULL
25 );
26
27 CREATE TABLE DEPARTMENT (
28   Dname VARCHAR(255) NOT NULL,
29   Dnumber INT NOT NULL,
30   Mgr_ssn INT NOT NULL,
31   Mgr_start_date DATE NOT NULL
32 );
33
34 INSERT INTO EMPLOYEE (Fname, Lname, Ssn, Bdata, Address, Salary, Dno)
35 VALUES ('John', 'Smith', 123456789, '1965-01-09', 'Fondren, Houston, TX', 30000, 5),
36 ('Franklin', 'Wong', '333445555', '1955-12-08', 'Voss, Houston, TX', 40000, 5),
37 ('Alicia', 'Zelaya', '999887777', '1968-01-19', 'Castle, Spring, TX', 25000, 4),
38 ('Jennifer', 'Wallace', '987654321', '1941-06-20', 'Berry, Bellaire, TX', 43000, 4),
39 ('Ramesh', 'Narayan', '666884444', '1962-09-15', 'Fire Oak, Humble, TX', 38000, 5),
40 ('James', 'Borg', '888665555', '1937-11-10', 'Stone, Houston, TX', 55000, 1);
41
42
43 INSERT INTO PROJECT (Pname, Plocation, Pnumber, Dnum)
44 VALUES ('Computerization', 'Stafford', 1, 5),
45 ('Reorganization', 'Houston', 10, 1), ('Newbenefits', 'Sugarland', 20, 4);
46
47
48 INSERT INTO DEPENDENT (Essn, Dependent_name, Relationship)
49 VALUES (333445555, 'Alice', 'Daughter'),
50 (333445555, 'Joy', 'Spouse'), (333445555, 'Theodore', 'Son'),
51 (987654321, 'Abner', 'Spouse'), (123456789, 'Michael', 'Son'),
52 (123456789, 'Alice', 'Daughter'),
53 (123456789, 'Elizabeth', 'Spouse');
54
55
56 INSERT INTO DEPARTMENT (Dname, Dnumber, Mgr_ssn, Mgr_start_date)
57 VALUES ('Research', 5, 333445555, '1988-04-05'),
58 ('Administration', 4, 987654321, '1995-01-01'),
59 ('Headquarters', 1, 888665555, '1981-06-19');
```



A. Create the SQL command to satisfy the following queries. Write at the space provided.(3pts each)

1. Find all information about John Smith.

\_\_\_\_\_

2. What department started on April 5, 1988?

\_\_\_\_\_

3. Where does James Borg lives?

\_\_\_\_\_

4. Who are the spouses of the employees?

\_\_\_\_\_

5. What is the project located at Sugarland?

\_\_\_\_\_

B. Create the SQL command to satisfy the following queries connecting different tables.( 5pts each)

6. Who is the manager of Research department?

\_\_\_\_\_

\_\_\_\_\_

7. Who are the employees that work on project Newbenefits?

\_\_\_\_\_

\_\_\_\_\_

8. Who are dependents of Franklin Wong?

\_\_\_\_\_

\_\_\_\_\_

9. Who are the dependents of employees who were assigned to project Computerization?

\_\_\_\_\_

\_\_\_\_\_

10. In what department do employees belong, whose dependent are their sons?

\_\_\_\_\_

\_\_\_\_\_

B

1.

```
SELECT * FROM EMPLOYEE WHERE Fname='John' AND Lname='Smith';
```



	Id	Fname	Lname	Ssn	BDate	Address	Salary	Dno
1	1	John	Smith	123456789	1965-01-09 00:00:00	Fondren, Houston, TX	30000	5

2.

```
SELECT * FROM DEPARTMENT WHERE Mgr_start_date='1988-04-05';
```

	Dname
1	Research

3.

```
SELECT Address FROM EMPLOYEE WHERE Fname = 'James' AND Lname = 'Borg';
```

	Address
1	Stone, Houston, TX

4.

```
SELECT Dependent_name FROM DEPENDENT WHERE Relationship='Spouse';
```

	Dependent_name
1	Joy
2	Abner
3	Elizabeth

5.

```
SELECT * FROM PROJECT WHERE Plocation='Sugarland';
```

	Pname
1	Newbenefits

B

```
SELECT EMPLOYEE.Fname, EMPLOYEE.Lname
FROM EMPLOYEE, DEPARTMENT
WHERE EMPLOYEE.Ssn = DEPARTMENT.Mgr_ssn
AND DEPARTMENT.Dname = 'Research';
```

6.

	Fname	Lname
1	Franklin	Wong

```
SELECT EMPLOYEE.Fname, EMPLOYEE.Lname
FROM EMPLOYEE, PROJECT
WHERE EMPLOYEE.Ssn = PROJECT.Pnumber
AND PROJECT.Pname = 'Newbenefits';
```

7.

	Fname	Lname
1	Alicia	Zelaya
2	Jennifer	Wallace

```
SELECT Dependent_name
FROM DEPENDENT, EMPLOYEE
WHERE EMPLOYEE.Fname = 'Franklin'
AND EMPLOYEE.Lname = 'Wong'
AND DEPENDENT.Essn = EMPLOYEE.Ssn;
```

8.

	Dependent_name
1	Alice
2	Joy
3	Theodore

```

SELECT Dependent_name
FROM DEPENDENT, PROJECT, EMPLOYEE
WHERE PROJECT.Pname = 'Computerization'
AND PROJECT.Dnum = EMPLOYEE.Dno
AND EMPLOYEE.Ssn = DEPENDENT.Essn;

```

9.

	Dependent_name
1	Alice
2	Joy
3	Theodore
4	Michael
5	Alice
6	Elizabeth

10.

```

SELECT DISTINCT EMPLOYEE.Dno, DEPARTMENT.Dname
FROM EMPLOYEE, DEPARTMENT, DEPENDENT
WHERE EMPLOYEE.Ssn = DEPENDENT.Essn
AND DEPENDENT.Relationship = 'Son'
AND EMPLOYEE.Dno = DEPARTMENT.Dnumber;

```

	Dname
1	Research