Database Concepts ISYS1055

Assignment 1

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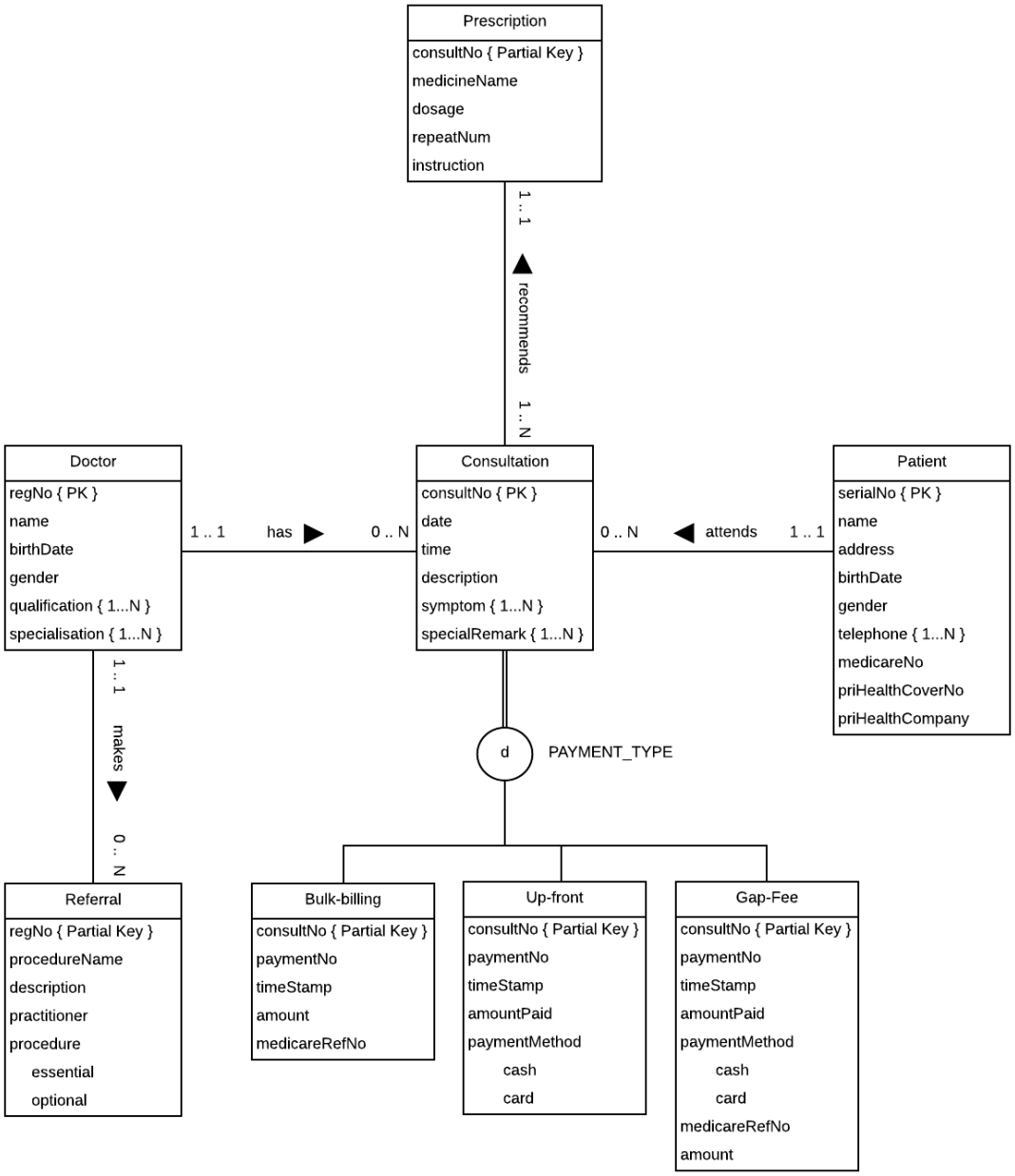
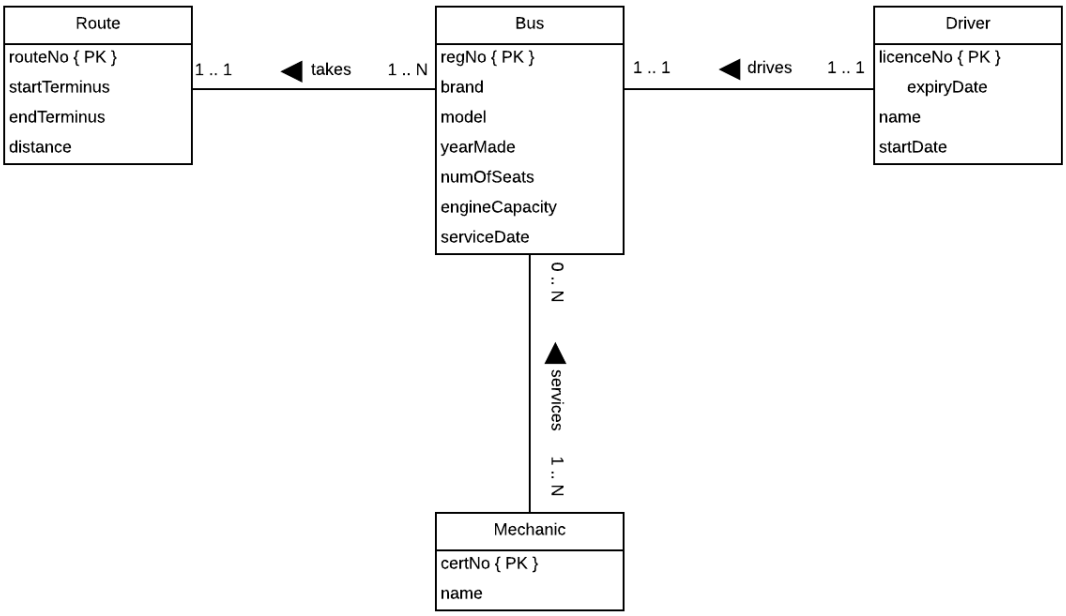
Part A: Entity Relationship Model

Question 2.1: Designing an Entity-Relationship Model

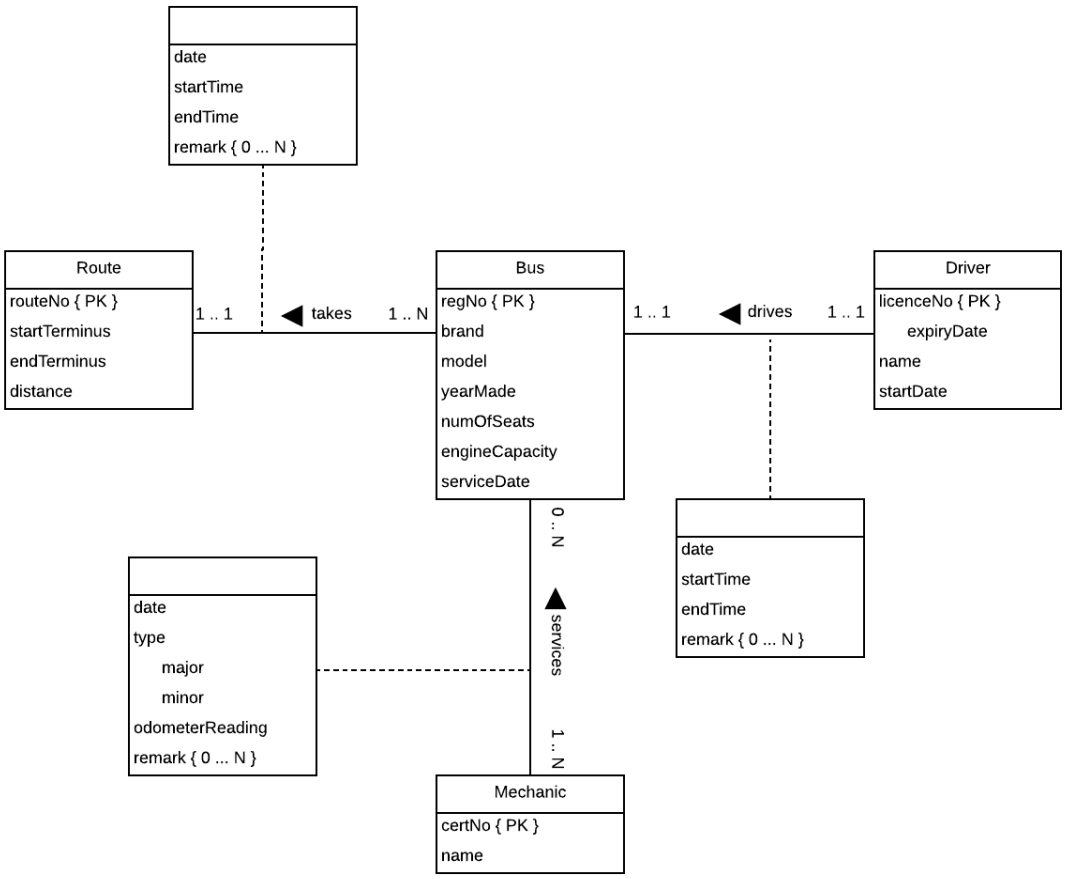


Question 2.2: Designing and refining an Entity-Relationship Model

Entity-Relationship Model 1



Entity-Relationship Model 2 (refined)



Question 2.3: Mapping an ER Model to a Relational Database Schema

Step 1: Map Strong Entities

Author { Email, Name, Address }

Book { ISBN, Title, Edition, year, ListPrice }

Publisher { Name, Address, URL, ABN }

Warehouse { Code, Address }

ShoppingCart { CartID, TimeStamp }

Customer { Email, Name, Address }

Step 2: Map Weak Entities

- Not applicable since the diagram does not contain any weak entities. A weak entity must depend on other entities and have a Partial Key in its attributes.

Step 3: Map 1 to 1 relationships

- Not applicable since there are no 1 to 1 relationships in the diagram.

Step 4: Map 1 to Many Relationships

ShoppingCart { CartID, TimeStamp, Email* }

- Based on the diagram, “OwnedBy” is a 1 to Many relationship. ShoppingCart is the N-side. Therefore, the primary key of Customer (Email) is inserted in the ShoppingCart relation as a foreign key.

Step 5: Map Many to Many relationships

PublishedBy { ISBN*, Name* }

WrittenBy { ISBN*, Email* }

StockedAt { ISBN*, Code*, StockQty }

AddedTo { ISBN*, CartID*, BuyPrice, Qty }

Step 6: Map Multivalued relationships

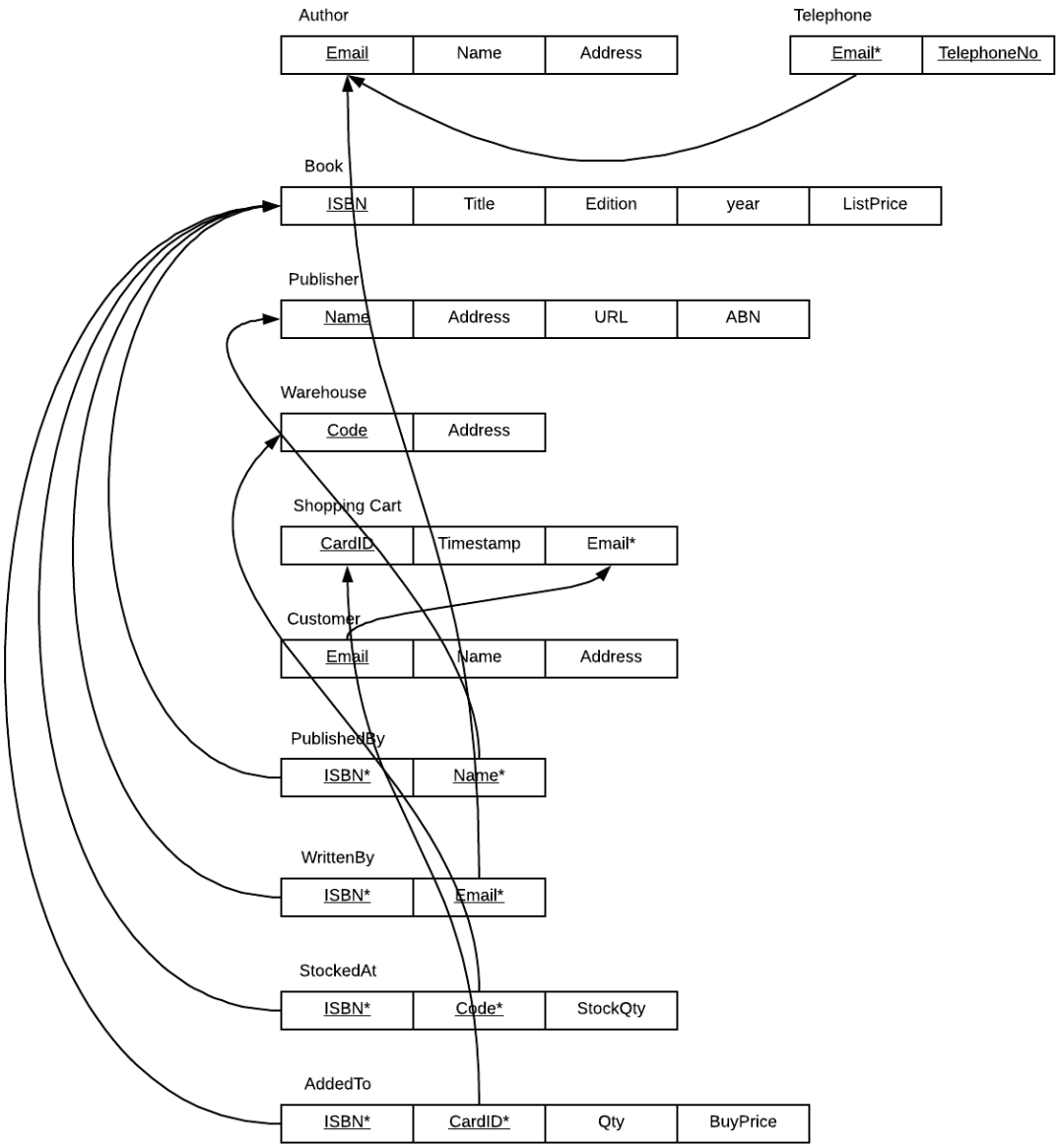
TelephoneNo { Email*, Telephone }

- New relation is created since it is a multi-valued attribute in Author entity. This new relation will include corresponding attribute (Telephone) and the primary key of the owner (Author) entity (Email). Author's primary key will act as a foreign key and these attributes will form as the primary key of TelephoneNo relation.

Step 7: Map Higher Degree relationships

- Not applicable since there are no Higher Degree relationships in the diagram.

Relational Database Schema Diagram



Part B: Relational Database Model

Question 1

a) This command returned a UNIQUE constraint at employee.ssn. The command indicates that both John and Ramesh SSN values are set to 666884444. UNIQUE constraint ensures that all values in the column are different. Since SSN is the primary key of Employee entity, all values under it must be different and unique than other tuples.

b) Both John's and Ramesh's SSN is a foreign key in 2 different tables, dependent and works_on. Therefore, we will need to change the essn values in dependent and works_on table too.

- The first step is to change any essn with Ramesh's SSN to John's SSN. By doing this, when we change Ramesh's SSN in the employee table, MySQL will not return any FOREIGN KEY constraints.

- Since there are no foreign keys with Ramesh's SSN we can now change it into a temporary value.

- Third step is to change all foreign keys with John's SSN value to the same temporary value above.

- Fourth step would be changing John's SSN to the correct value.

- Fifth step is updating the dependent and works_on table to John's correct SSN value.

- Finally, update Ramesh's SSN with the correct value and change the essn in dependent table to Ramesh's new SSN value as well.

c)

```
UPDATE works_on
   SET essn = '123456789'
   WHERE hours='40'
UPDATE employee
   SET ssn = '0'
   WHERE ssn = '666884444'
UPDATE works_on
   SET essn = '0'
   WHERE essn= '123456789'
UPDATE dependent
   SET essn = '0'
   WHERE essn= '123456789'
UPDATE employee
   SET ssn = '666884444'
   WHERE ssn= '123456789'
```

UPDATE dependent

SET essn = '666884444'

WHERE essn= '0'

UPDATE works_on

SET essn = '666884444'

WHERE essn= '0'

UPDATE employee

SET ssn = '123456789'

WHERE ssn= '0'

UPDATE works_on

SET essn = '123456789'

WHERE hours = '40'

Updated Database

Employee table

	fName	mInit	lName	ssn	bDate	address	sex	salary	dno	super_SSN
1	John	B	Smith	666884444	1965-01-09	731 Fondren, Houston, TX	M	30000	5	333445555
2	Franklin	T	Wong	333445555	1955-12-08	638 Voss, Houston, TX	M	40000	5	888665555
3	Alicia	J	Zelaya	999887777	1968-01-19	3321 Castle, Spring, TX	F	25000	4	987654321
4	Jennifer	S	Wallace	987654321	1941-06-20	291 Berry, Bellaire, TX	F	43000	4	888665555
5	Ramesh	K	Narayan	123456789	1962-09-15	975 Fire Oak, Humble, TX	M	38000	5	333445555
6	Joyce	A	English	453453453	1972-07-31	5631 Rice, Houston, TX	F	25000	5	333445555
7	Ahmad	V	Jabbar	987987987	1969-03-29	980 Dallas, Houston, TX	M	25000	4	987654321
8	James	E	Borg	888665555	1937-11-10	450 Stone, Houston, TX	M	55000	1	*NULL*

Works_on table

	essn	pNumber	hours
1	666884444	1	32.5
2	666884444	2	7.5
3	123456789	3	40
4	453453453	1	20
5	453453453	2	20
6	333445555	2	10
7	333445555	3	10
8	333445555	10	10
9	333445555	20	10
10	999887777	30	30
11	999887777	10	10
12	987987987	10	35
13	987987987	30	5
14	987654321	30	20
15	987654321	20	15
16	888665555	20	*NULL*

Dependent table

	essn	dependentName	sex	bDate	relationship
1	333445555	Alice	F	1986-04-05	Daughter
2	333445555	Theodore	M	1983-10-25	Son
3	333445555	Joy	F	1958-05-03	Spouse
4	333445555	Abner	M	1942-02-28	Spouse
5	666884444	Michael	M	1988-01-04	Son
6	666884444	Alice	F	1988-12-30	Daughter
7	666884444	Elizabeth	F	1942-05-05	Spouse

Question 2

No violations

The SQL command updated James E. Borg salary from 55000 to 60500, which is increased by 10% (5500).

Question 3

No violations

The SQL command sets the super_SSN value from 333445555 to 666884444 successfully.

Question 4

MySQL message:

Error while executing SQL query on database 'Company': NOT NULL constraint failed: project.pNumber

This SQL command violates a NOT NULL constraint. The command is trying to add a new record in the Project entity where only pName and pLocation values are provided for the record. Based on the diagram, there are 4 attributes in the Project entity and pNumber is the primary key for this entity. Therefore, NOT NULL constraint indicates that pNumber must not have a NULL valued stored, it must have its own unique number stored in the database. Hence, for every new project records it is compulsory for each record to have a pNumber.