SOFTWARE DEVELOPMENT

Data Modeling for EcoBikeRental

1. Conceptual Data Model
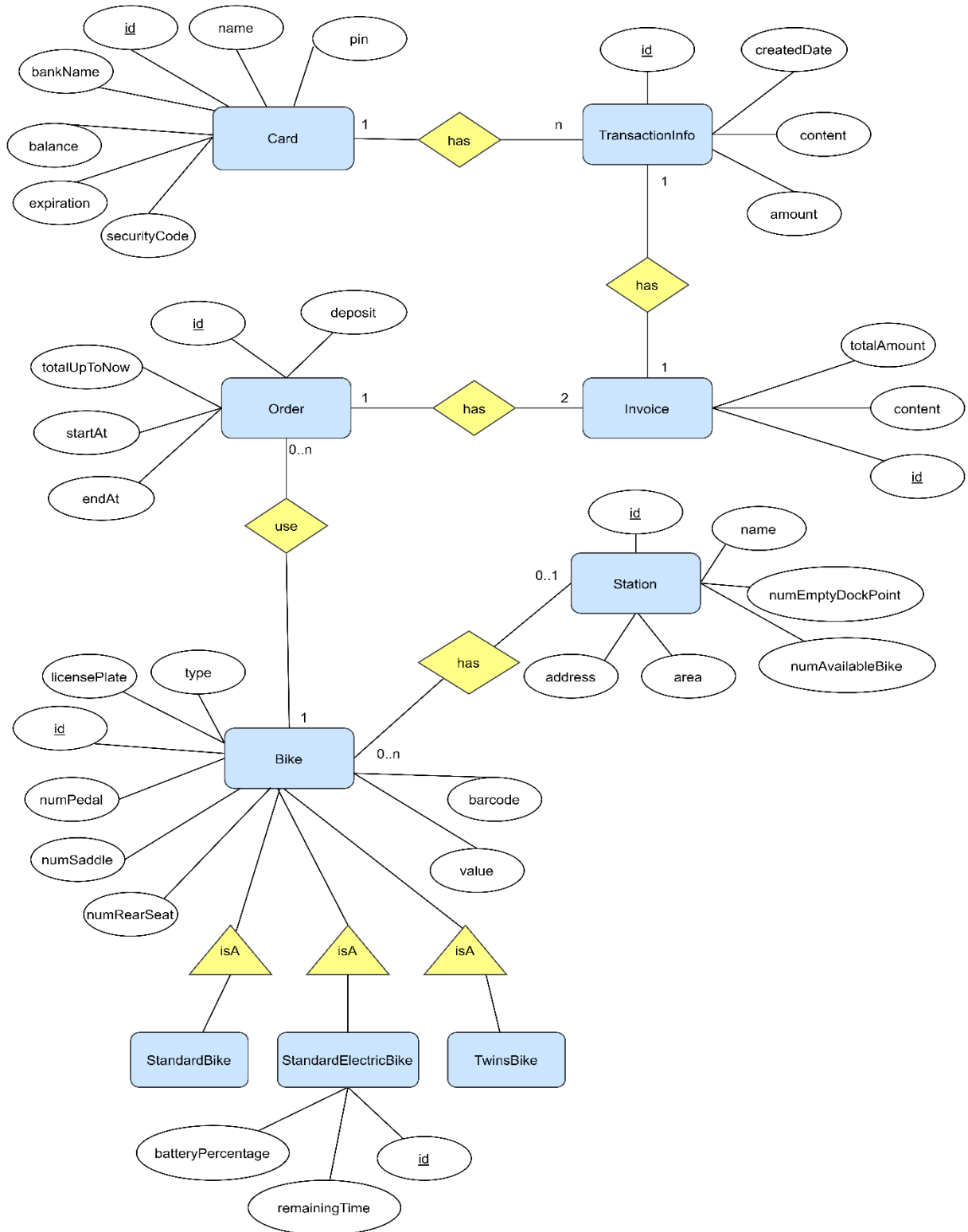

Figure1. ER Diagram

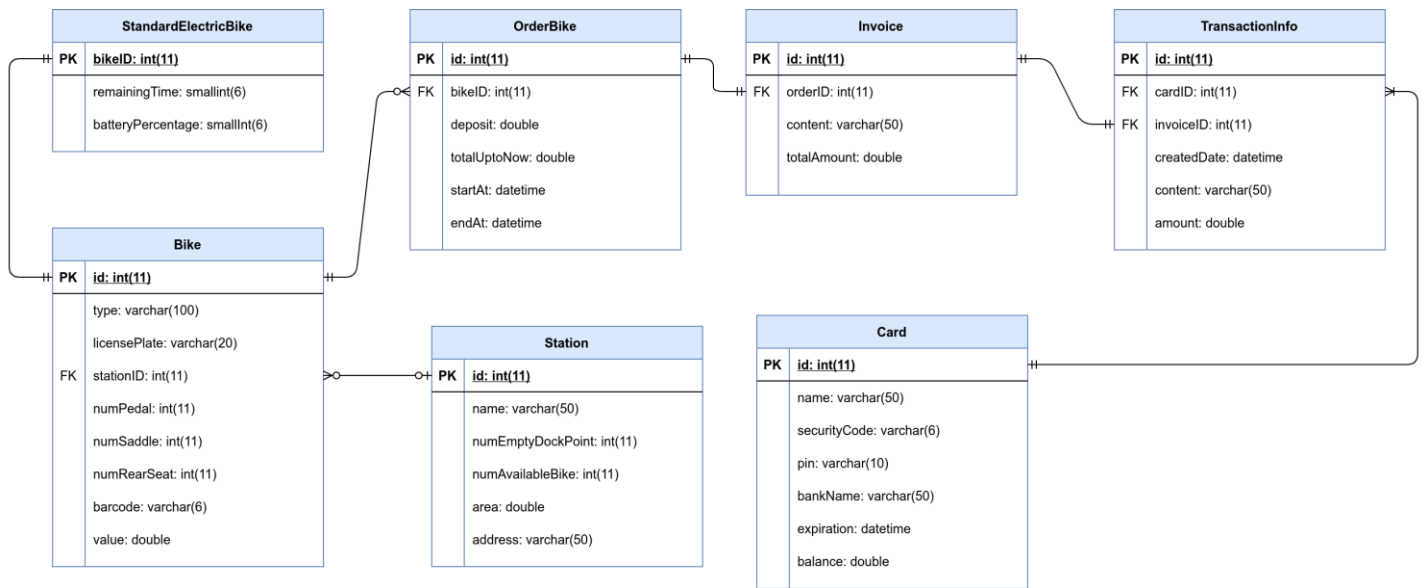## 2. Logical Data Model

Figure2. Relational Diagram

3. Physical Data Model

- **Card**

#	PK	FK	Column name	Data type	Mandatory	Description
1	x		id	Integer	Yes	ID of card, auto increment
2			name	Varchar(50)	Yes	Name of Card's holder
3			securityCode	Varchar(6)	Yes	Security code of card
4			pin	Varchar(10)	Yes	PIN number
5			bankName	Varchar(50)	Yes	Name of Interbank
6			expiration	datetime	Yes	Expiration date of card
7			balance	double	Yes	Balance of card

- **TransactionInfo**

#	PK	FK	Column name	Data type	Mandatory	Description
1	x		id	Integer	Yes	ID of transaction, auto increment
2			content	Varchar(50)	Yes	Content of transaction
3		x	cardID	Integer	Yes	cardID, same as ID of

#	PK	FK	Column name	Data type	Mandatory	Description
						card which is used for the transaction
4		x	invoiceID	Integer	Yes	invoiceID, same as ID of invoice which belongs to the transaction
5			createDate	datetime	Yes	Creation date of the transaction
6			amount	double	Yes	Total amount of money is used for the transaction

- **Station**

#	PK	FK	Column name	Data type	Mandatory	Description
1	x		id	Integer	Yes	ID of station, auto increment
2			name	Varchar(50)	Yes	Name of the station
3			numEmptyDockPoint	Integer	Yes	Number of empty dock points in the station
4			numAvailableBike	Integer	Yes	Number of available bike for renting in the station
5			area	double	Yes	Area of the station
6			address	varchar(50)	Yes	Address of the station

- **Bike**

#	PK	FK	Column name	Data type	Mandatory	Description
1	x		id	Integer	Yes	id of the bike , auto increment
2			type	Varchar(50)	Yes	type of bike
3			licensePlate	Varchar(6)	Yes	license plate of the bike
4			numPedal	Integer	Yes	numbers of pedal
5			numSaddle	Integer	Yes	numbers of saddle of the bike
6			numRearSeat	Integer	Yes	numbers of rear seat
7			value	Integer	Yes	value of the bike
8			Barcode	Varchar(6)	Yes	Barcode of the bike

- **StandardElectricBike**

#	PK	FK	Column name	Data type	Mandatory	Description
1	x	X	id	Integer	Yes	id of the bike
2			batteryPercentage	Integer	Yes	percentage of battery
3		x	remainingTime	Integer	Yes	remaining time of the bike

- **Order**

#	PK	FK	Column name	Data type	Mandatory	Description
1	x		id	Integer	Yes	ID of order, auto increment
2			deposit	double	Yes	Amount of deposit when renting bike
3			startAt	datetime	Yes	When user rents bike
4			endAt	datetime	No	When the user returns bike
5			totalUpToNow	double	No	The amount of renting money (not include deposit)
6		x	bikeID	integer	Yes	The id of the bike that user is/was renting

- **Invoice**

#	PK	FK	Column name	Data type	Mandatory	Description
1	x		id	Integer	Yes	ID of the invoice, auto increment
2			content	Varchar(50)	Yes	The content of the Invoice
3			totalAmount	double	Yes	The amount of money for the transaction
4		x	orderID	Integer	Yes	The Order of which this invoice is used for

- **Database Script:**

```
CREATE TABLE Card(
    id INT AUTO_INCREMENT PRIMARY KEY,
    NAME VARCHAR(50) not null,
    securityCode VARCHAR(6)  not null,
    pin VARCHAR(10)  not null,
    bankName VARCHAR(50)  not null,
    expiration DATETIME  not null,
    balance DOUBLE  not null
);

CREATE TABLE Order (
```

```sql
    id INT AUTO_INCREMENT PRIMARY KEY,
    deposit double  not null,
    totalUpToNow DOUBLE,
    bikeID int not null,
    startAt DATETIME not null,
    endAt DATETIME,
    FOREIGN KEY bikeID REFERENCES Bike(id)
);

CREATE TABLE Invoice(
    id INT AUTO_INCREMENT PRIMARY KEY,
    content VARCHAR(50) not null,
    totalAmount DOUBLE not null,
    orderID int not null,
    FOREIGN KEY orderID REFERENCES Order(id)
);

CREATE TABLE TransactionInfo(
    id INT AUTO_INCREMENT PRIMARY KEY,
    cardID INT,
    invoiceID INT,
    createdDate DATETIME,
    content VARCHAR(50),
    amount DOUBLE,
    FOREIGN KEY cardID REFERENCES Card(id),
    FOREIGN KEY invoiceID REFERENCES Invoice(id)
);

CREATE TABLE Station(
    id INT AUTO_INCREMENT PRIMARY KEY,
    name VARCHAR(50) not null,
    numEmptyDockPoint INT not null,
    numAvailableBike INT not null,
    area DOUBLE not null,
    address VARCHAR(50) not null
);

create table Bike (

type varchar(100),
```

```sql
    licensePlate varchar(20),

    id int AUTO_INCREMENT PRIMARY key,

    stationID int ,

    numPedal int ,

    numSaddle int ,

    numRearSeat int ,

  barcode varchar(6) not null,

    value double not null,

   FOREIGN key stationID REFERENCES Station(id)

)

create table StandardElectricBike(

id int primary key,

batteryPercentage int(2) ,

remainingTime double,

foreign key id references Bike(id)

)
```