I.         ER Diagram
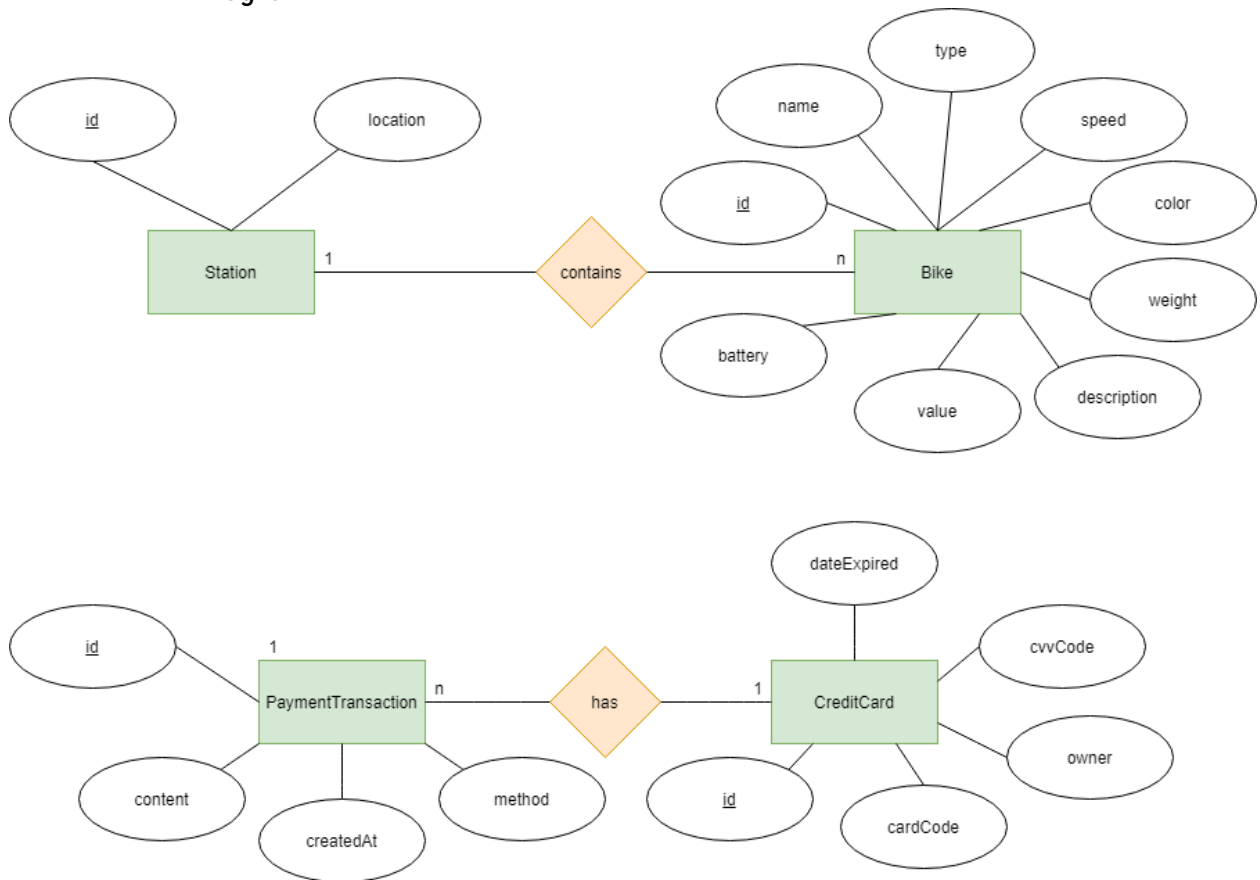


II.        Logical Data Model

Station {
       id : String
       location : String
       bikeId: String[]
}

Bike {
       id: String
       name: String
       speed: float
       type: String
       color: String[]
       weight: float
       description: String
       value: int
       battery: int
       docked_station_id : String
}

CreditCard {

```
        id: int
        cardCode: String
        owner: String
        cvvCode: String
        dateExpired: String
}

PaymentTransaction {
        id: int
        createAt: Date
        amount: int
        creditCard: {
                cardCode: String
                owner: String
                cvvCode: String
                dateExpired: String
        }
        method: String
        content: String
}
```

III.    Physical Data Model ( NoSQL–MongoDB)
        use database
    1.  Station

| # | PK | FK | Name | Data Type | Mandatory | Description |
|---|----|----|------|-----------|-----------|-------------|
| 1 | V | | Id | String | Yes | ID |
| 2 | | | location | String | Yes | Location of the station |
| 3 | | v | bikeId | String[] | no | Id of the bikes in the station. A station maybe empty |

        db.createCollection(station)

    2.  Bike

| | PK | FK | Name | Data Type | Mandatory | Description |
|---|----|----|------|-----------|-----------|-------------|
| 1 | V | | Id | String | Yes | ID |
| 2 | | | name | String | yes | Bike name |
| 3 | | | speed | float | Yes | Max speed |
| 4 | | | type | String | Yes | Bike,ebike,… |
| 5 | | | color | String[] | Yes | Bike color |
| 6 | | | weight | float | Yes | Bike weight |
| 7 | | | description | String | no | Bike description |
| 8 | | | value | int | | The value of the bike |
| 9 | | | battery | int | no | Only Ebike has |

| 10 | | v | stationId | String | no | The station the bike currently in, null if the bike is currently rented |
|----|----|----|-----------|--------|-----|---|

db.createCollection(bike)

3. CreditCard

| # | PK | FK | Column name | Data type | Mandatory | Description |
|---|----|----|-----------|-----------|-----------|-------------|
| 1 | x | | cardCode | String | Yes | Card code |
| 2 | | | owner | String | Yes | Card holder |
| 3 | | | cvvCode | String | Yes | Card cvv code (security number) |
| 4 | | | dateExpired | String | Yes | Expired date |

db.createCollection(creditCard)

4. PaymentTransaction.

| # | PK | FK | Name | Data type | Mandatory | Description |
|---|----|----|------|-----------|-----------|-------------|
| 1 | X | | id | int | Yes | ID |
| 2 | | | createAt | Date | Yes | Date of creation |
| 3 | | | amount | int | Yes | Amount of money involve in the transaction |
| 4 | | X | creditCard | Object | Yes | Used credit card |
| 5 | | | method | String | Yes | Payment method |
| 6 | | | content | String | Yes | Payment content |

db.createCollection(paymentTransaction)