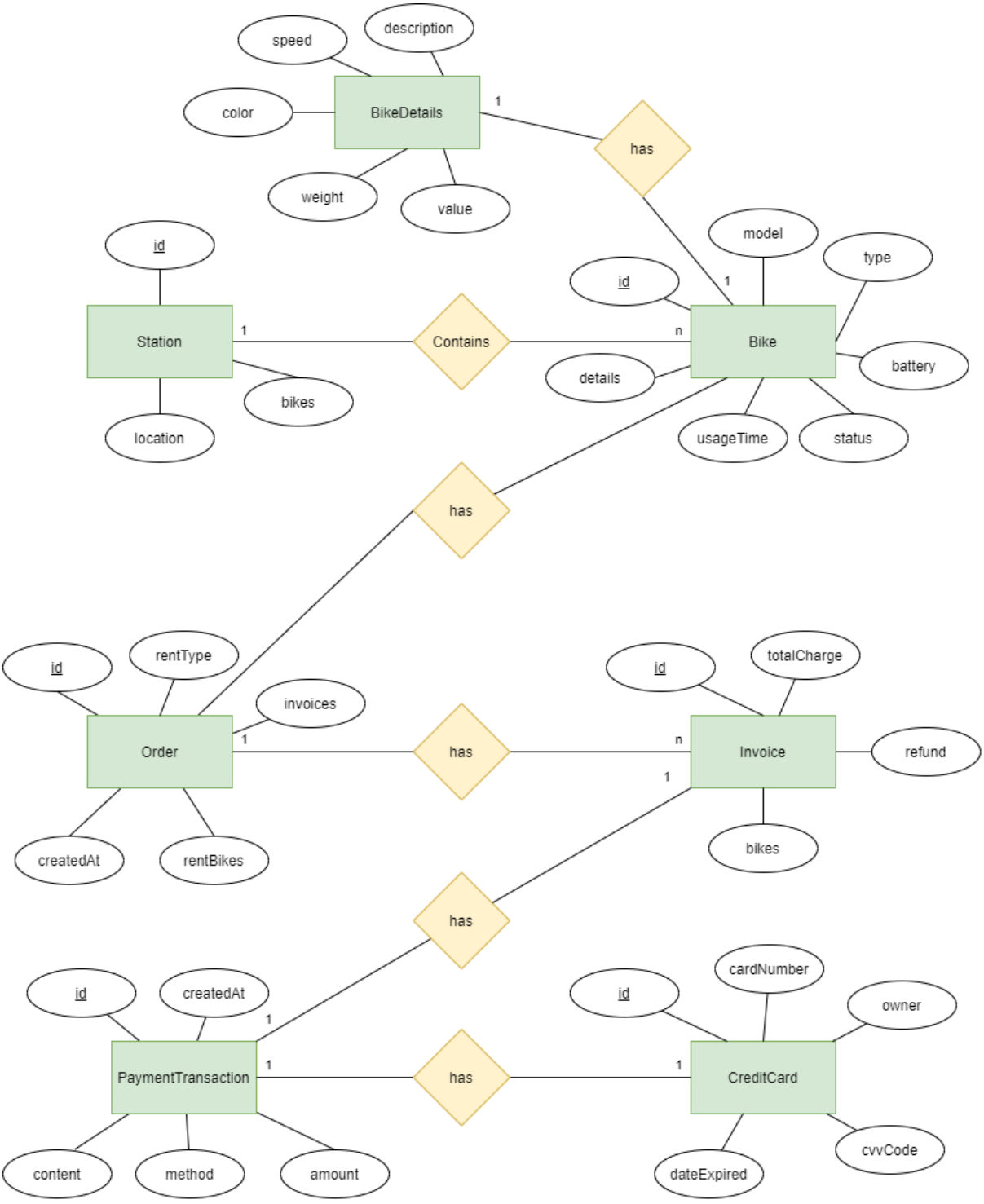
DATA MODELING
ECOB – Ecobike Rental App

1. ER DIAGRAM



2. LOGICAL DATA MODEL

Station {

_id: ObjectID,

location: String,

bikes: [ObjectID]

}

Bike {

_id: objectID

model: String

type: String

battery: Integer

status: Boolean,

usageTime: Integer,

details: ObjectID

}

BikeDetails {

_id: ObjectID,

speed: Double,

value: Integer,

color: String,

weight: Double,

description: String,

}

CreditCard {

_id: ObjectID

cardNumber: String

owner: String

cvvCode: String

dateExpired: String

}

PaymentTransaction {

_id: ObjectID

createAt: Date

amount: Integer

creditCard: {

cardNumber: String

owner: String

cvvCode: String

dateExpired: String

}

method: String

content: String

}

Order {

_id: ObjectID,

rentType: String,

rentBikes: [ObjectID],

invoices: [ObjectID],

deposit: Integer,

createdAt: Date

}

Invoice {

_id: ObjectID,

bikes: [ObjectID],

refund: Integer,

totalCharge: Integer

}

3. PHYSICAL DATA MODEL (NOSQL-MONGODB)

Station

#	PK	FK	Name	Data Type	Mandatory	Description
1	x		_id	ObjectID	Yes	ID, auto generated
2			location	String	Yes	Location of the station
3		x	bikes	Array	No	Reference of bikes in the station. A station may be empty.

Bike

#	PK	FK	Name	Data Type	Mandatory	Description
1	x		_id	ObjectID	Yes	ID, auto generated
2			model	String	Yes	Bike model
3			type	String	Yes	Bike type, e.g., standard, elec, twin, elec twin.
4			batery	Integer	Yes	Bike current battery status
5			status	Boolean	Yes	Is currently being rented?
6			usageTime	Integer	Yes	Accumulated usage time in minutes
7		x	details	Array	Yes	Referenced bike detail info

BikeDetails

#	PK	FK	Name	Data Type	Mandatory	Description
1	x		_id	ObjectID	Yes	ID, auto generated
2			speed	Double	Yes	Max speed
3			color	String	Yes	Bike color
4			weight	float	Yes	Bike weight
5			description	String	No	Bike description
6			value	Integer		The value of the bike

CreditCard

#	PK	FK	Column name	Data type	Mandatory	Description
1	x		cardNumber	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

PaymentTransaction

#	PK	FK	Name	Data type	Mandatory	Description
1	X		_id	ObjectID	Yes	ID, auto generated
2			createAt	Date	Yes	Date of creation
3			amount	Integer	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

Order

#	PK	FK	Name	Data type	Mandatory	Description
1	x		_id	ObjectID	Yes	ID, auto generated
2			rentType	String	Yes	Renting type, e.g., normal, 24-hour
3		x	rentBikes	Array	Yes	Reference of rented bikes

4		X	invoices	Array	Yes	Reference of invoices
5			deposit	Integer	No	Deposited amount
6			createAt	Date	Yes	Date of creation

Invoice

#	PK	FK	Name	Data type	Mandatory	Description
1	X		_id	ObjectID	Yes	ID, auto generated
2		x	bikes	Array	Yes	Reference of returned bikes
3			refund	Integer	No	Refund money after deposit or in 24-hour rent type
4			totalCharge	Integer	Yes	Total charge to pay