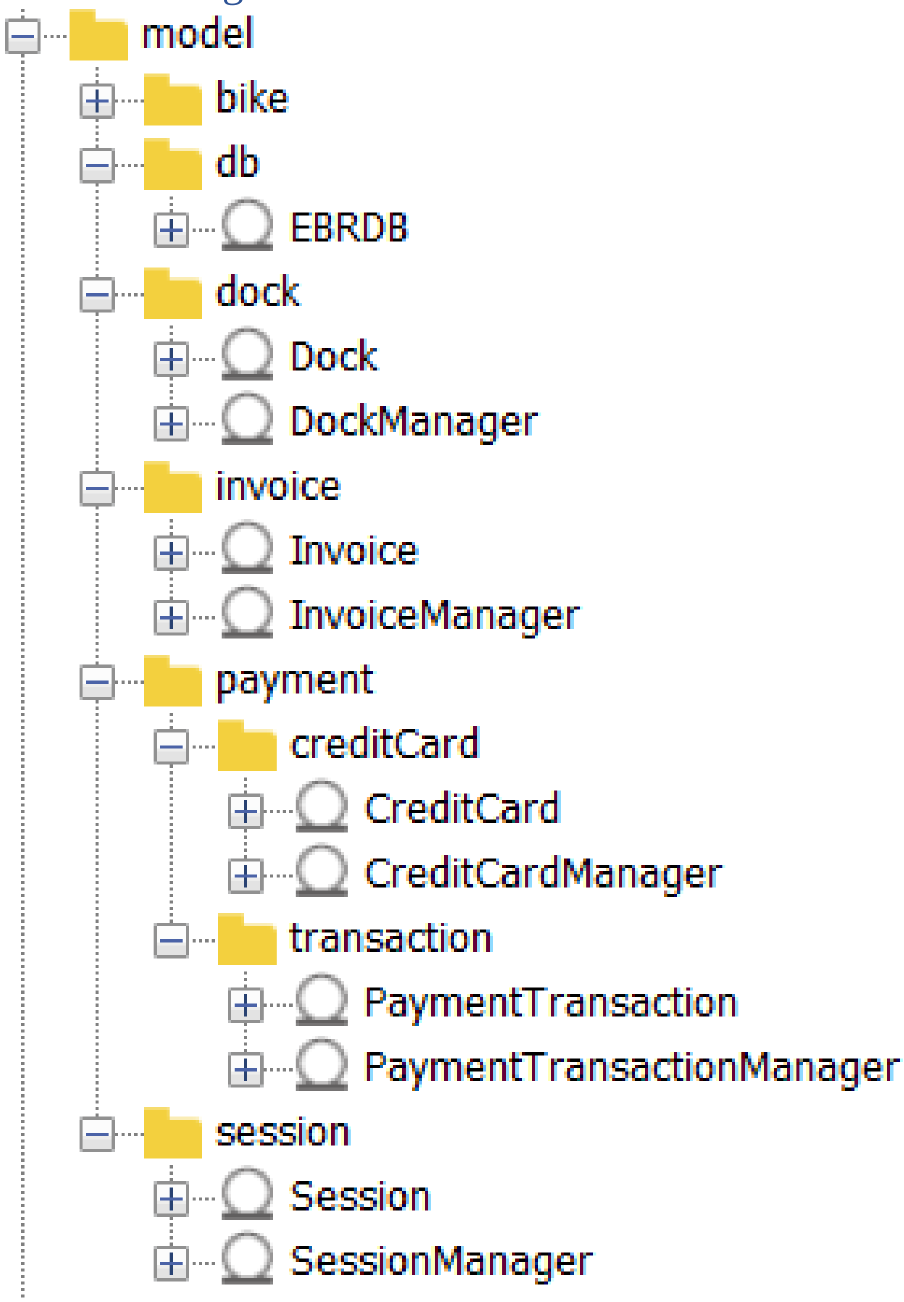
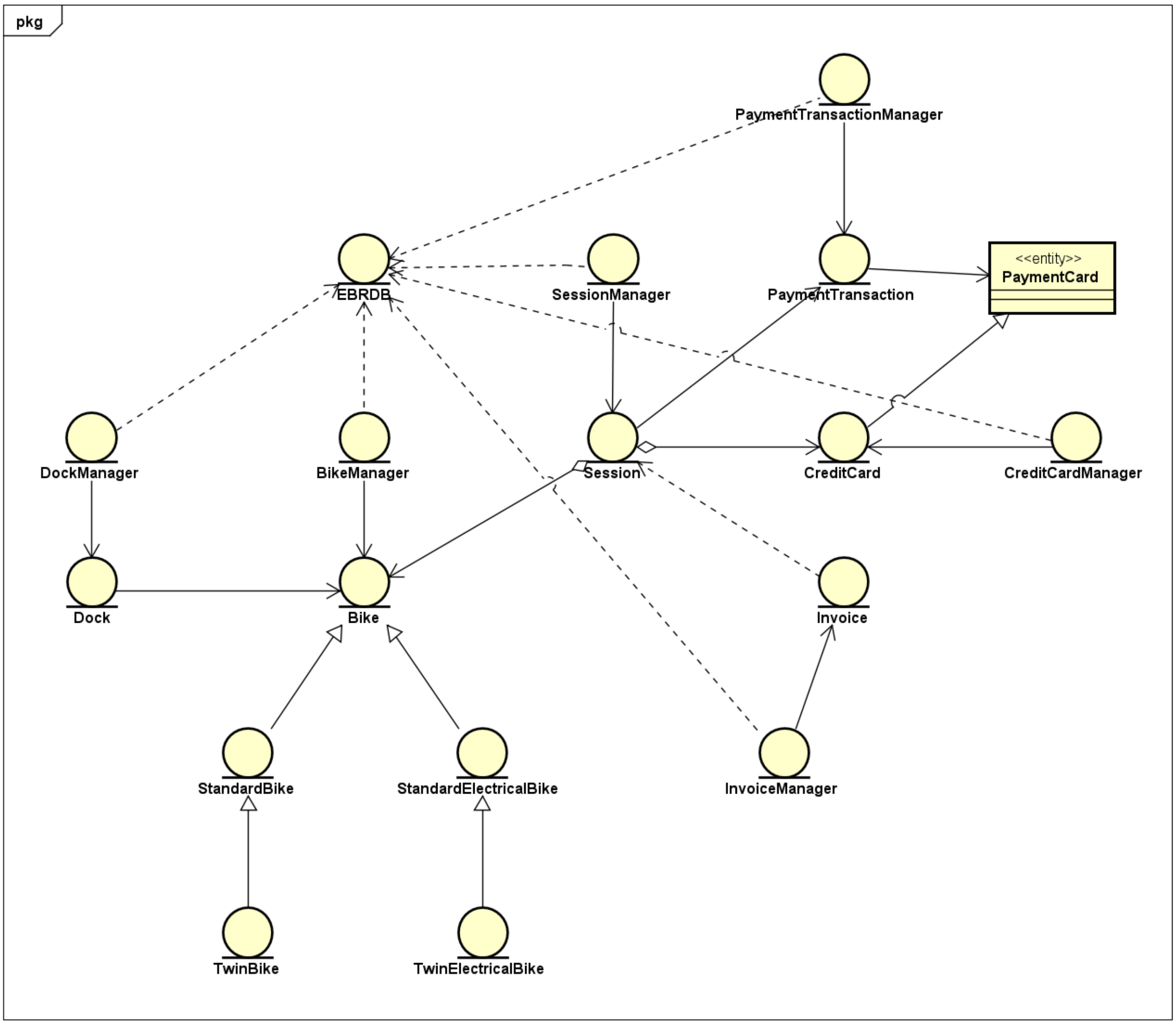
Class Design - Model

1. Create Initial Design Classes



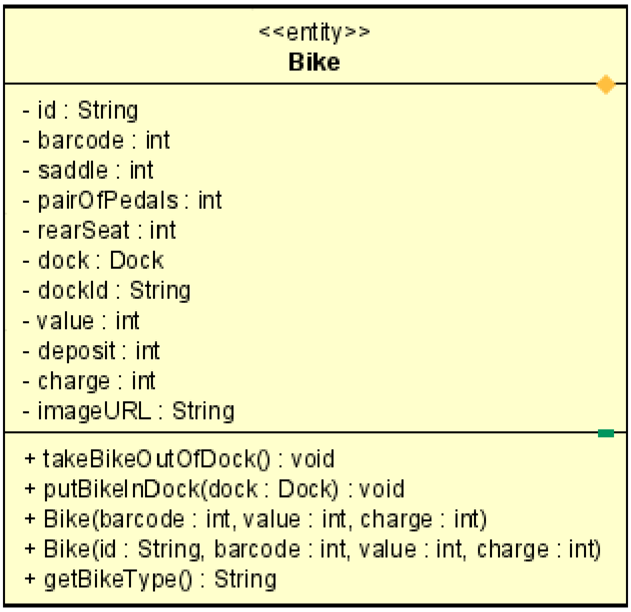
- model
  - bike
  - db
    - EBRDB
  - dock
    - Dock
    - DockManager
  - invoice
    - Invoice
    - InvoiceManager
  - payment
    - creditCard
      - CreditCard
      - CreditCardManager
    - transaction
      - PaymentTransaction
      - PaymentTransactionManager
  - session
    - Session
    - SessionManager

2. Define Relationships Between Classes



3. Class Design

3.1. Class “Bike”



<<entity>>
Bike

- id : String
- barcode : int
- saddle : int
- pairOfPedals : int
- rearSeat : int
- dock : Dock
- dockId : String
- value : int
- deposit : int
- charge : int
- imageURL : String

+ takeBikeOutOfDock() : void
+ putBikeInDock(dock : Dock) : void
+ Bike(barcode : int, value : int, charge : int)
+ Bike(id : String, barcode : int, value : int, charge : int)
+ getBikeType() : String

Attribute

#	Name	Data type	Default value	Description
1	id	String	NULL	Bike id
2	barcode	int	NULL	barcode
3	saddle	int	NULL	saddle
4	pairOfPedals	int	NULL	Pair of pedals
5	rearSeat	int	NULL	Number of rear seats
6	dock	Dock	NULL	dock
7	dockId	String	NULL	Dock id
8	value	int	NULL	value
9	doposit	int	NULL	deposit
10	charge	int	NULL	charge
11	imageURL	String	NULL	Image URL

Operation

#	Name	Return type	Desciption
1	takeBikeOutOfDock	void	Take bike out of dock
2	putBikeInDock	void	Put bike to a dock
3	getBikeType	String	Get bike type

Parameter:

dock

Barcode

Value

Charge

id

Exception:

None

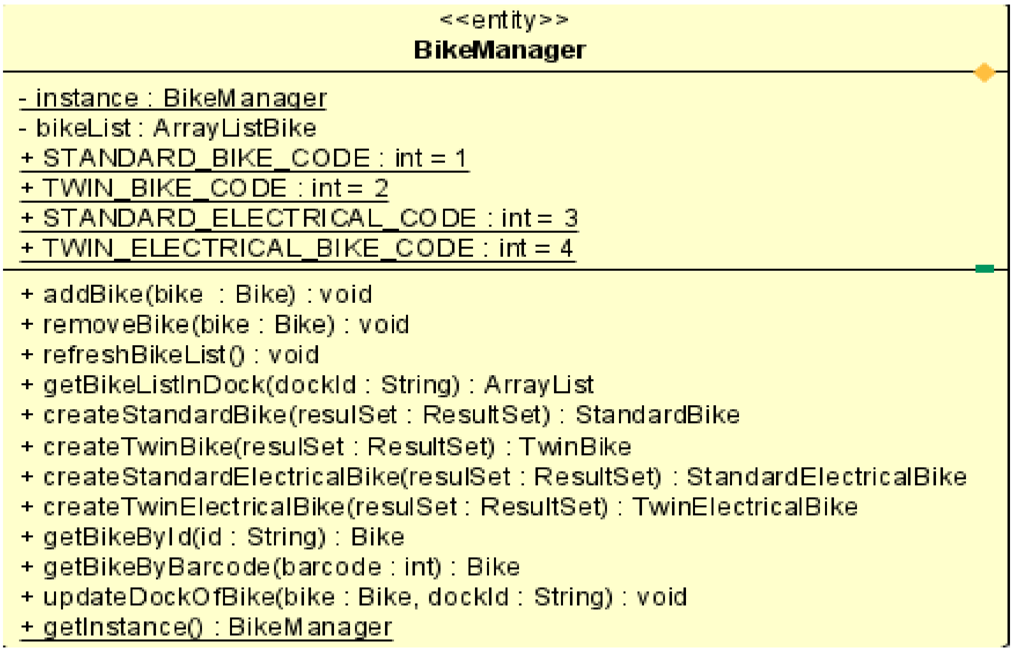
Method

None

State

None

3.2. Class “BikeManager”



```
<<entity>>
BikeManager

- instance : BikeManager
- bikeList : ArrayListBike
+ STANDARD_BIKE_CODE : int = 1
+ TWIN_BIKE_CODE : int = 2
+ STANDARD_ELECTRICAL_CODE : int = 3
+ TWIN_ELECTRICAL_BIKE_CODE : int = 4

+ addBike(bike : Bike) : void
+ removeBike(bike : Bike) : void
+ refreshBikeList() : void
+ getBikeListInDock(dockId : String) : ArrayList
+ createStandardBike(resulSet : ResultSet) : StandardBike
+ createTwinBike(resulSet : ResultSet) : TwinBike
+ createStandardElectricalBike(resulSet : ResultSet) : StandardElectricalBike
+ createTwinElectricalBike(resulSet : ResultSet) : TwinElectricalBike
+ getBikeById(id : String) : Bike
+ getBikeByBarcode(barcode : int) : Bike
+ updateDockOfBike(bike : Bike, dockId : String) : void
+ getInstance() : BikeManager
```

Attribute

#	Name	Data type	Default value	Description
1	instance	BikeManager	NULL	Bike instance
2	bikeList	ArrayList	NULL	Bike list
3	STANDARD_BIKE_CODE	int	1	Code of standard bike
4	TWIN_BIKE_CODE	int	2	Code of twin bike
5	STANDARD_ELECTRICAL_BIKE_CODE	int	3	Code of standard e bike
6	TWIN_ELEC TRICAL_BIKE_CODE	int	4	Code of twin e bike

Operation

#	Name	Return type	Desciption
1	addBike	void	Add bike
2	removeBike	void	Remove bike
3	refreshBikeList	void	Refresh bike list
4	getBikeListInDock	ArrayList	Get bike list in dock
5	createStandardBike	StandardBike	Create standard bike
6	createTwinBike	TwinBike	Create twin bike
7	createStandardEBike	StandardEBike	Create standard e bike
8	createTwinEBike	TwinEBike	Create twin e bike
9	getBikeById	Bike	Get bike by id

10	getBikeByBarcode	Bike	Get bike by barcode
11	updateDockOfBike	void	Update dock
12	getInstance	BikeManager	Get bike instance

Parameter:

bike

DockId

ResultSet

Id – bikeId

barcode

Exception:

None

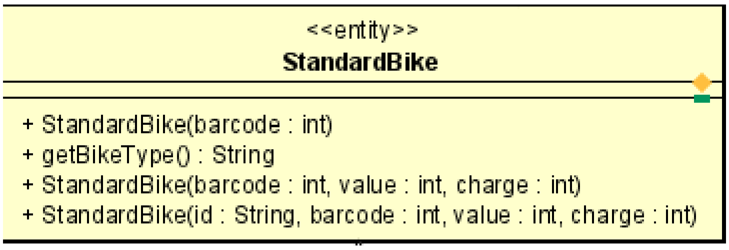
Method

None

State

None

3.3. Class “StandardBike”


<<entity>>
StandardBike
+ StandardBike(barcode : int)
+ getBikeType() : String
+ StandardBike(barcode : int, value : int, charge : int)
+ StandardBike(id : String, barcode : int, value : int, charge : int)

Attribute

None

Operation

#	Name	Return type	Desciption
1	getBikeType	String	Get bike type

Parameter:

None

Exception:

None

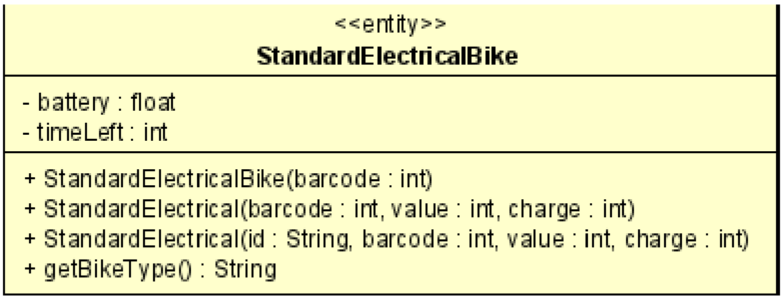
Method

None

State

None

3.4. Class “StandardElectricalBike”



<<entity>>
StandardElectricalBike
- battery : float
- timeLeft : int
+ StandardElectricalBike(barcode : int)
+ StandardElectrical(barcode : int, value : int, charge : int)
+ StandardElectrical(id : String, barcode : int, value : int, charge : int)
+ getBikeType() : String

Attribute

#	Name	Data type	Default value	Description
1	battery	float	100.0	battery remained
2	timeLeft	int	NULL	usage time base on battery and bike

Operation

None

Parameter:

None

Exception:

None

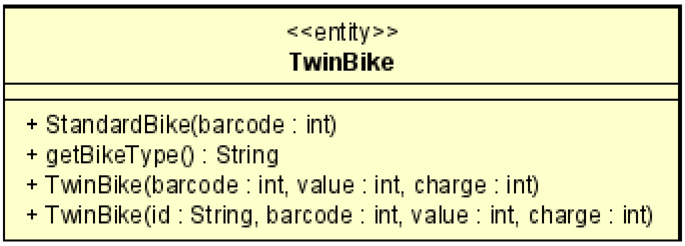
Method

None

State

None

3.5. Class “TwinBike”


<<entity>>
TwinBike
+ StandardBike(barcode : int)
+ getBikeType() : String
+ TwinBike(barcode : int, value : int, charge : int)
+ TwinBike(id : String, barcode : int, value : int, charge : int)

Attribute

None

Operation

#	Name	Return type	Desciption
1	getBikeType	String	Get bike type

Parameter:

None

Exception:

None

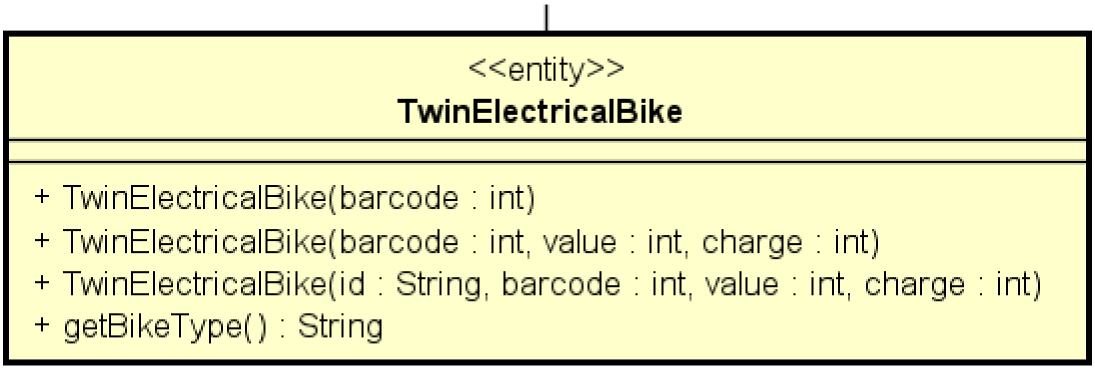
Method

None

State

None

3.6. Class "TwinElectricalBike"


<<entity>>
TwinElectricalBike
+ TwinElectricalBike(barcode : int)
+ TwinElectricalBike(barcode : int, value : int, charge : int)
+ TwinElectricalBike(id : String, barcode : int, value : int, charge : int)
+ getBikeType( ) : String

Attribute

None

Operation

#	Name	Return type	Desciption
1	getBikeType	String	Get bike type

Parameter:

None

Exception:

None

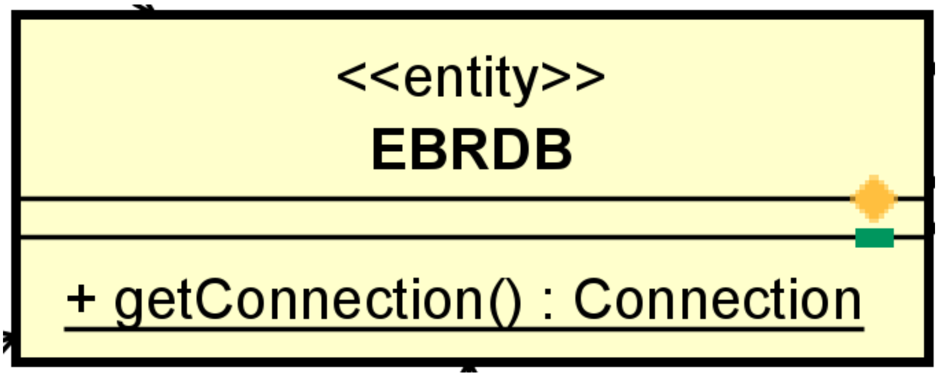
Method

None

State

None

3.7. Class “EBRDB”



Attribute

None

Operation

#	Name	Return type	Desciption
1	getConnection	Connect	get a connection to PostgreSQL database

Parameter:

None

Exception:

None

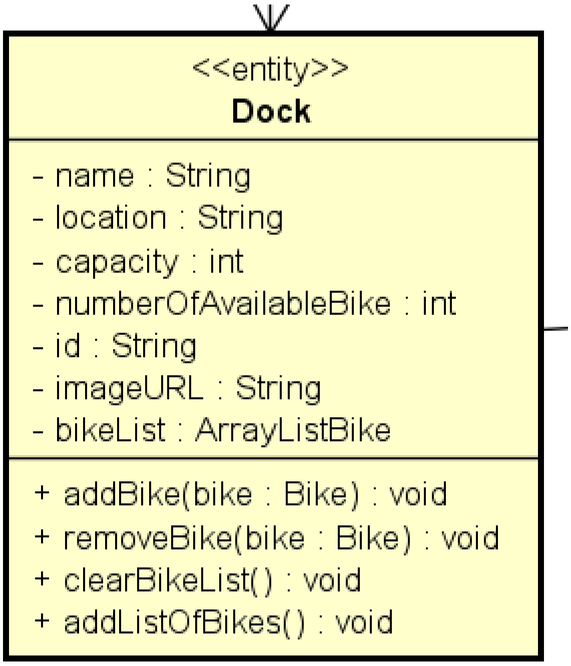
Method

None

State

None

3.8. Class “Dock”


<<entity>>
Dock
- name : String
- location : String
- capacity : int
- numberOfAvailableBike : int
- id : String
- imageURL : String
- bikeList : ArrayListBike
+ addBike(bike : Bike) : void
+ removeBike(bike : Bike) : void
+ clearBikeList( ) : void
+ addListOfBikes( ) : void

3

Attribute

#	Name	Data type	Default value	Description
1	name	String	NULL	Name of dock
2	location	String	NULL	Dock location
3	capacity	int	NULL	Dock size
4	numberOfAvailableBike	int	NULL	Number of available bikes
5	id	String	NULL	Dock id
6	imageURL	String	NULL	Dock image
7	bikeList	ArrayList<Bike>	NULL	Bike list in dock

Operation

#	Name	Return type	Desciption
1	addBike	void	Add bike to dock
2	removeBike	void	Remove bike out of dock
3	clearBikeList	void	Clear bike list in dock
4	addListOfBike	void	Add bike list to dock

Parameter:

bike

Exception:

None

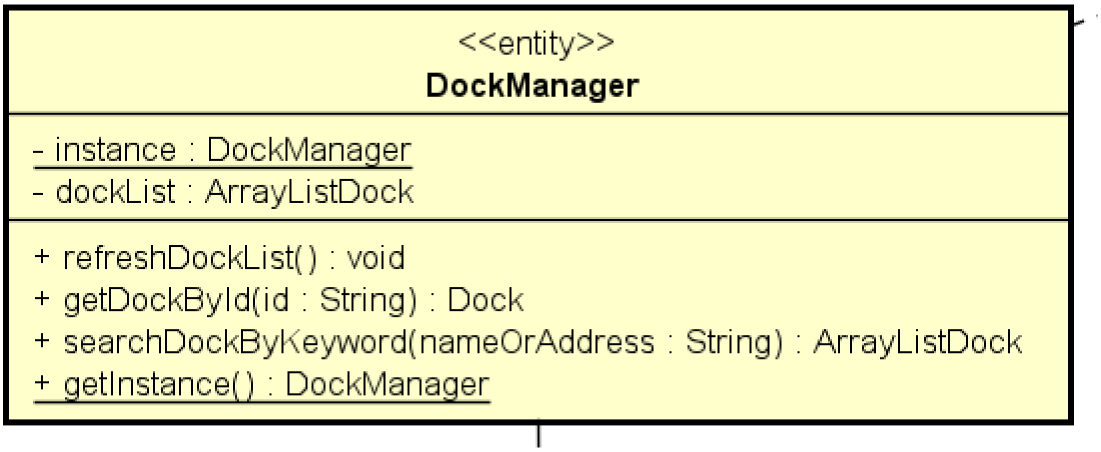
Method

None

State

None

3.9. Class “DockManager”


<<entity>>
DockManager
- instance : DockManager
- dockList : ArrayListDock
+ refreshDockList() : void
+ getDockById(id : String) : Dock
+ searchDockByKeyword(nameOrAddress : String) : ArrayListDock
+ getInstance() : DockManager

Attribute

#	Name	Data type	Default value	Description
1	instance	DockManager	NULL	Instance of a dock
2	dockList	ArrayList<Dock>	NULL	Dock list

Operation

#	Name	Return type	Desciption
1	refreshDockList	void	Refresh dock list
2	getDockById	Dock	Get dock by id
3	searchDockByKeyword	ArrayList<Dock>	Get docks by keyword
4	getInstance	DockManager	Get dock instance

Parameter:

Id - dock id

NameOfAddress – dock address

Exception:

None

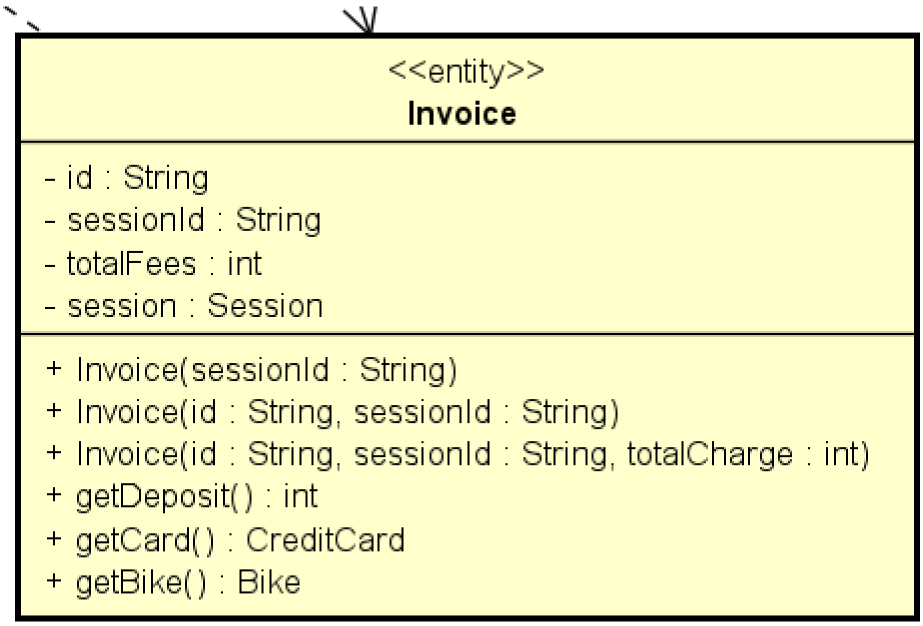
Method

None

State

None

3.10. Class “Invoice”



<<entity>>
Invoice

- id : String
- sessionId : String
- totalFees : int
- session : Session

+ Invoice(sessionId : String)
+ Invoice(id : String, sessionId : String)
+ Invoice(id : String, sessionId : String, totalCharge : int)
+ getDeposit() : int
+ getCard() : CreditCard
+ getBike() : Bike

Attribute

#	Name	Data type	Default value	Description
1	id	String	NULL	Invoice id
2	sessionId	String	NULL	Session id
3	totalFees	int	NULL	Total charge
4	session	Session	NULL	Session correspond to invoice

Operation

#	Name	Return type	Desciption
1	getDeposit	int	Get deposit
2	getCard	CreditCard	Get credit card
3	getBike	Bike	Get bike

Parameter:

None

Exception:

None

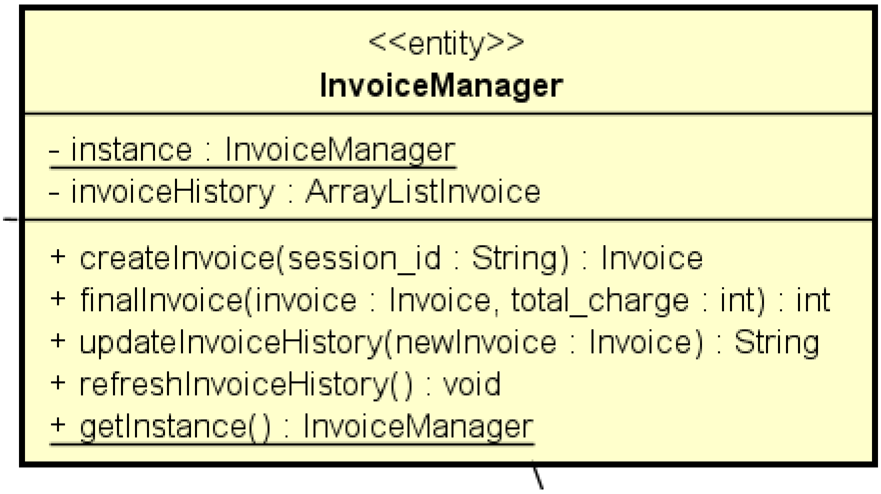
Method

None

State

None

3.11. Class “InvoiceManager”


<<entity>>
InvoiceManager
- instance : InvoiceManager
- invoiceHistory : ArrayListInvoice
+ createInvoice(session_id : String) : Invoice
+ finalInvoice(invoice : Invoice, total_charge : int) : int
+ updateInvoiceHistory(newInvoice : Invoice) : String
+ refreshInvoiceHistory() : void
+ getInstance() : InvoiceManager

Attribute

#	Name	Data type	Default value	Description
1	instance	DockManager	NULL	Instance of a dock
2	invoiceHistory	ArrayList<Invoice>	NULL	Invoice History

Operation

#	Name	Return type	Desciption
1	createInvoice	Invoice	Create new invoice
2	finalInvoice	int	Complete invoice
3	updateInvoiceHistory	String	Update invoice history
4	refreshInvoiceHistory	void	Refresh invoice history
5	getInstance	InvoiceManager	Get invoice instance

Parameter:

Session_id

Invoice

Total_charge

newInvoice

Exception:

None

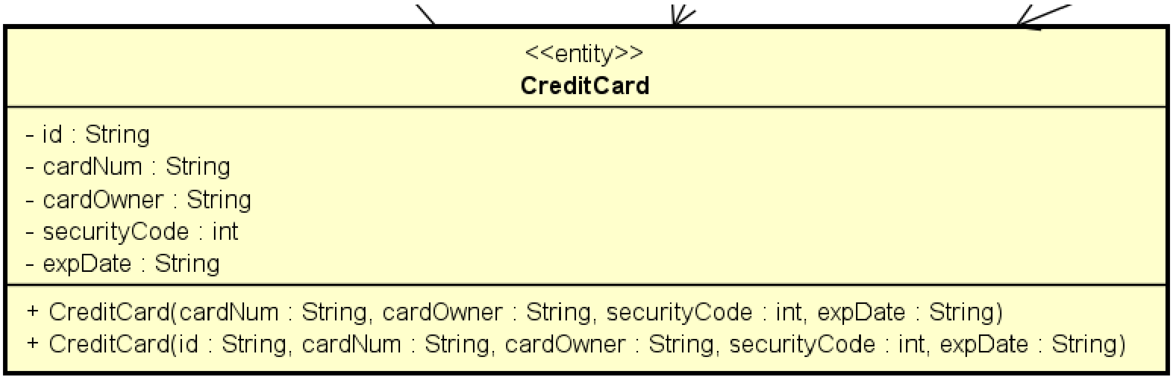
Method

None

State

None

3.12. Class “CreditCard”


<<entity>>
CreditCard
- id : String
- cardNum : String
- cardOwner : String
- securityCode : int
- expDate : String
+ CreditCard(cardNum : String, cardOwner : String, securityCode : int, expDate : String)
+ CreditCard(id : String, cardNum : String, cardOwner : String, securityCode : int, expDate : String)

Attribute

#	**Name**	**Data type**	**Default value**	**Description**
1	id	String	NULL	Card id
2	cardNum	String	NULL	Card number
3	cardOwner	String	NULL	Card owner’s name
4	securityCode	int	NULL	Card security code
5	expDate	String	NULL	Card exp date

Operation

None

Parameter:

None

Exception:

None

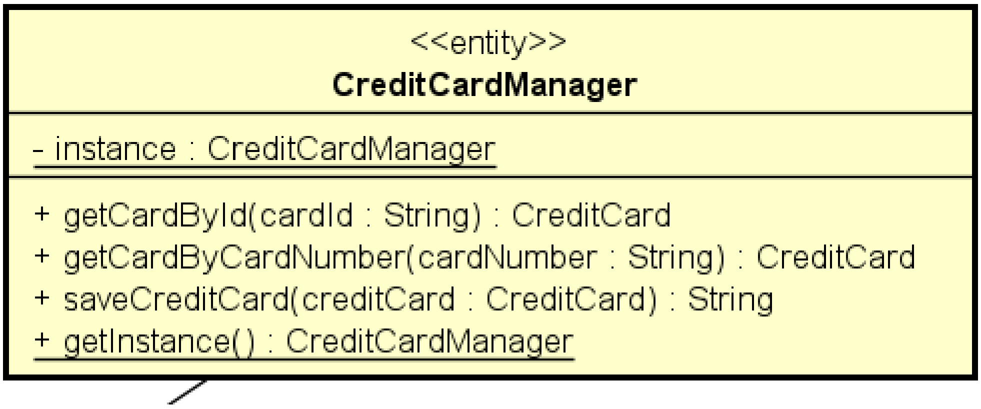
Method

None

State

None

3.13. Class “CreditCardManager”


<<entity>>
CreditCardManager
- instance : CreditCardManager
+ getCardById(cardId : String) : CreditCard
+ getCardByCardNumber(cardNumber : String) : CreditCard
+ saveCreditCard(creditCard : CreditCard) : String
+ getInstance() : CreditCardManager

Attribute

#	Name	Data type	Default value	Description
1	instance	CreditCardManager	NULL	Instance of a card

Operation

#	Name	Return type	Desciption
1	getCardById	CreditCard	Get card by id
2	getCardByCardNumber	CreditCard	Get card by card number
3	saveCreditCard	String	Save credit card
4	getInstance	CreditCardManager	Get card instance

Parameter:

CardId – card id

CardNumber – card number

creditCard

Exception:

None

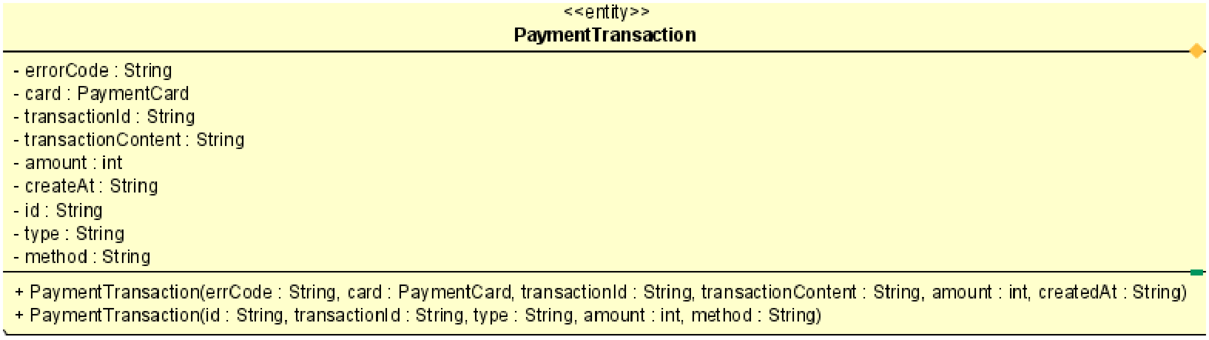
Method

None

State

None

3.14. Class “PaymentTransaction”



<<entity>>
PaymentTransaction

- errorCode : String
- card : PaymentCard
- transactionId : String
- transactionContent : String
- amount : int
- createAt : String
- id : String
- type : String
- method : String

+ PaymentTransaction(errCode : String, card : PaymentCard, transactionId : String, transactionContent : String, amount : int, createdAt : String)
+ PaymentTransaction(id : String, transactionId : String, type : String, amount : int, method : String)

Attribute

#	Name	Data type	Default value	Description
1	errorCode	String	NULL	Error code
2	card	PaymentCard	NULL	Credit card
3	transactionId	String	NULL	Transaction id
4	transactionContent	String	NULL	Contents of transaction
5	amount	int	NULL	Transaction amount
6	createAt	String	NULL	Transaction create time
7	id	String	NULL	PaymentTransaction id
8	type	String	NULL	Transaction type
9	method	String	NULL	Transaction method

Operation

None

Parameter:

None

Exception:

None

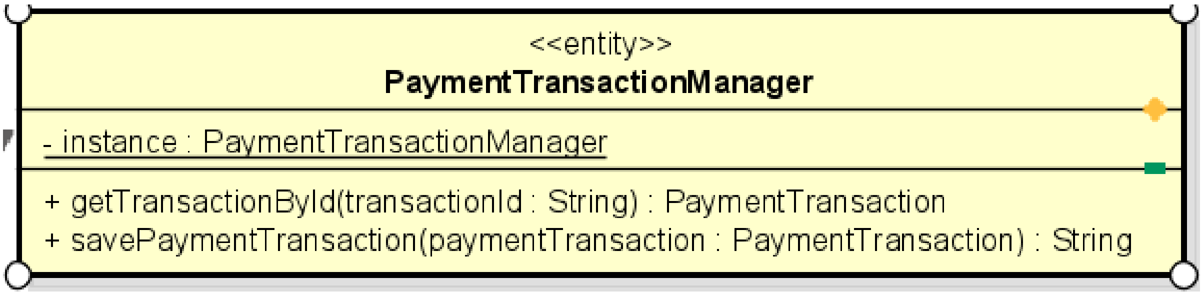
Method

None

State

None

3.15. Class “PaymentTransactionManager”


<<entity>>
PaymentTransactionManager
- instance : PaymentTransactionManager
+ getTransactionById(transactionId : String) : PaymentTransaction
+ savePaymentTransaction(paymentTransaction : PaymentTransaction) : String

Attribute

#	Name	Data type	Default value	Description
1	instance	PaymentTransaction	NULL	Instance of transaction

Operation

#	Name	Return type	Desciption
1	getTransactionById	PaymentTransaction	Get transaction by Id
2	savePaymentTransaction	String	Save payment transaction

Parameter:

TransactionId – transaction id

paymentTransaction

Exception:

None

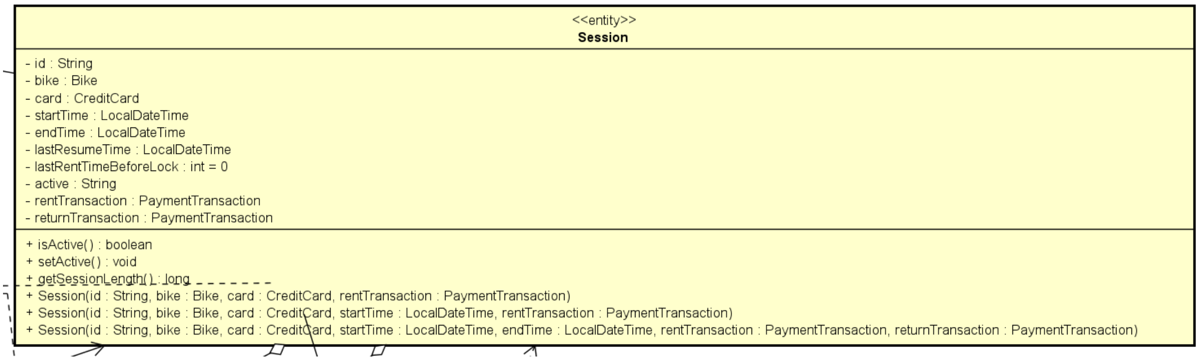
Method

None

State

None

3.16. Class “Session”


<<entity>>
Session
- id : String
- bike : Bike
- card : CreditCard
- startTime : LocalDateTime
- endTime : LocalDateTime
- lastResumeTime : LocalDateTime
- lastRentTimeBeforeLock : int = 0
- active : String
- rentTransaction : PaymentTransaction
- returnTransaction : PaymentTransaction
+ isActive() : boolean
+ setActive() : void
+ getSessionLength() : long
+ Session(id : String, bike : Bike, card : CreditCard, rentTransaction : PaymentTransaction)
+ Session(id : String, bike : Bike, card : CreditCard, startTime : LocalDateTime, rentTransaction : PaymentTransaction)
+ Session(id : String, bike : Bike, card : CreditCard, startTime : LocalDateTime, endTime : LocalDateTime, rentTransaction : PaymentTransaction, returnTransaction : PaymentTransaction)

Attribute

#	Name	Data type	Default value	Description
1	id	String	NULL	Session id
2	bike	Bike	NULL	Bike in session
3	card	CreditCard	NULL	Card in session
4	startTime	LocalDateTime	NULL	Start time
5	endTime	LocalDateTime	NULL	End time
6	lastResumeTime	LocalDateTime	NULL	Last resume time
7	lastRentTimeBeforeLock	int	0	Last rent time before lock
8	active	String	NULL	Session active or not
9	rentTransaction	PaymentTransaction	NULL	Rent transaction
10	returnTransaction	PaymentTransaction	NULL	Return transaction

Operation

#	Name	Return type	Desciption
1	isActive	boolean	Session is active or not
2	setActive	void	Set session active
3	getSessionLength	long	Get session length

Parameter:

None

Exception:

None

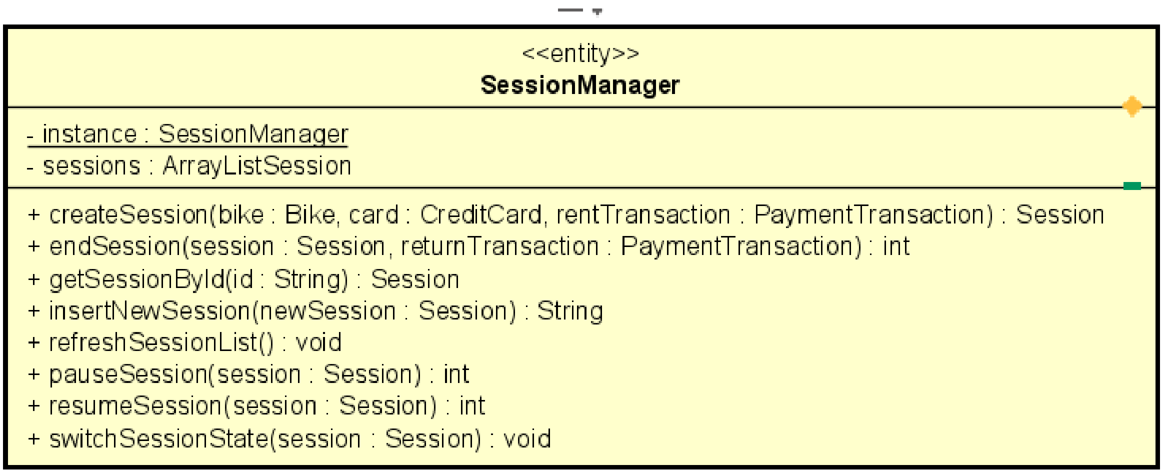
Method

None

State

None

3.17. Class “SessionManager”


<<entity>>
SessionManager
- instance : SessionManager
- sessions : ArrayListSession
+ createSession(bike : Bike, card : CreditCard, rentTransaction : PaymentTransaction) : Session
+ endSession(session : Session, returnTransaction : PaymentTransaction) : int
+ getSessionById(id : String) : Session
+ insertNewSession(newSession : Session) : String
+ refreshSessionList() : void
+ pauseSession(session : Session) : int
+ resumeSession(session : Session) : int
+ switchSessionState(session : Session) : void

Attribute

#	Name	Data type	Default value	Description
1	instance	SessionManager	NULL	Session instance
2	sessions	ArrayList<Session>	NULL	Session list

Operation

#	Name	Return type	Desciption
1	createSession	Session	Create a session
2	endSession	int	Complete session
3	getSessionById	Session	Get session by id
4	insertNewSession	String	Insert new session to db
5	refreshSessionList	void	Refresh session list
6	pauseSession	int	Pause session
7	resumeSession	int	Resume session

Parameter:

Bike

Card

PaymentTransaction

Session

newSession

Exception:

None

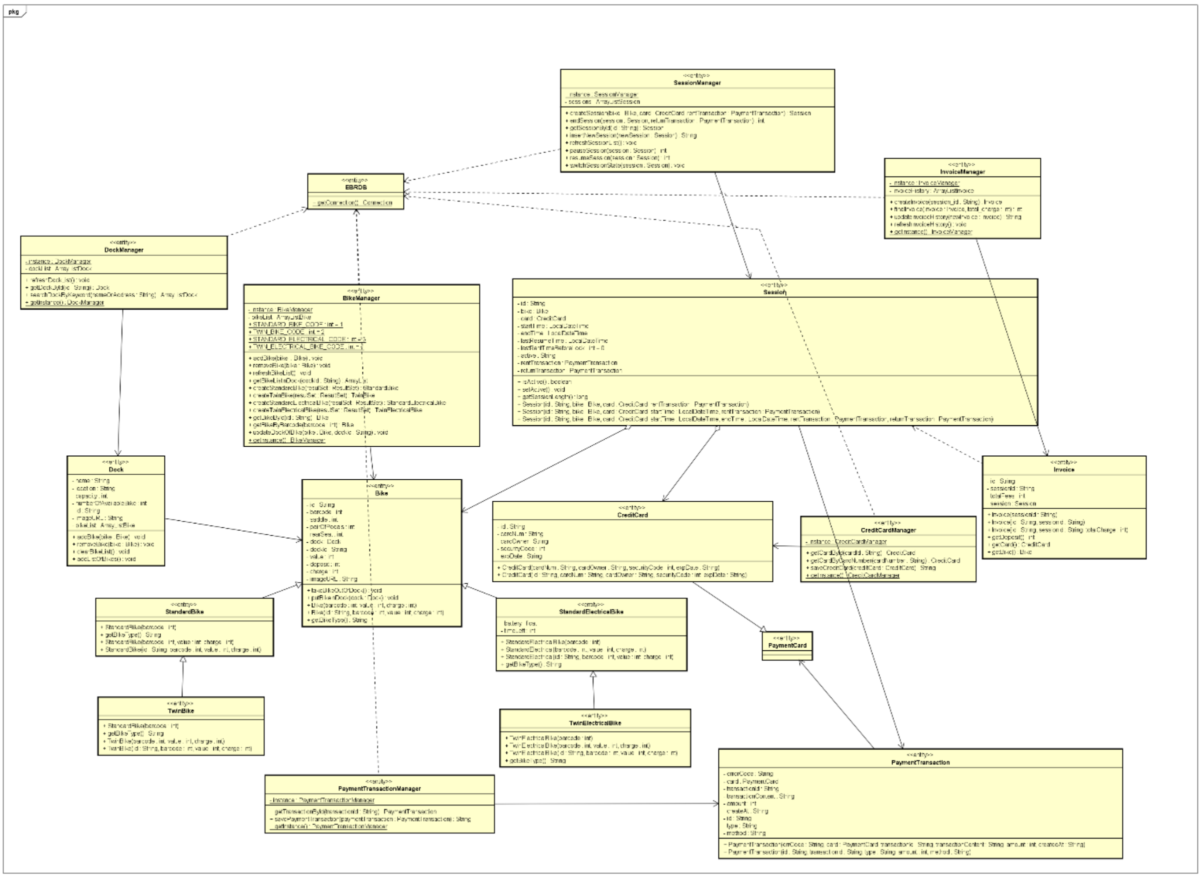
Method

None

State

None

4. Class Diagram


pkg
SessionManager
InvoiceManager
EBRDB
DockManager
BikeManager
Session
Dock
Bike
Invoice
CreditCard
CreditCardManager
StandardBike
StandardElectricBike
PaymentCard
TwinBike
TwinElectricalBike
PaymentTransactionManager
PaymentTransaction