

HANOI UNIVERSITY OF SCIENCE AND TECHNOLOGY

School of Information and Communications Technology

Software Design Documentation

AIMS Software

Course: Software Design and Construction

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1. Introduction

1.1. Objective

This SDD is a comprehensive and detailed blueprint for the development of AIMS software. It serves as a centralized repository of design decisions, architectural considerations, and implementation strategies. The SDD ensures that developers, testers, and project managers have a shared understanding of the software's structure, functionality, and components.

1.2. Scope

The product that the SDD refers to is AIMS Software (An Internet Media Store Software). AIMS is a desktop e-commerce software supporting online transactions of a media store. It helps the product managers complete their work in managing products of the store, also assists administrators controlling information of their users. The software at the same time is used by customers for selecting the products they want to purchase, placing and paying the orders.

1.3. Glossary

No	Term	Explanation	Example	Note
1	product	The item that store sells in general	Customers can see detail of a product by clicking at the item.	
2	price	The amount of money charged for a product	The price of the product may change depending on market demand.	
3	value	The perceived worth of a product, determined by factors such as quality, demand and customer satisfaction	The price of the product must always be between 30% and 150% of the product value.	
4	order	A request to supply products in the store	To place a successful order, customers need to proceed with payment.	
5	invoice	A statement listing products provided and their prices, along with customer and order's related information	The software displays and temporarily save invoice information.	

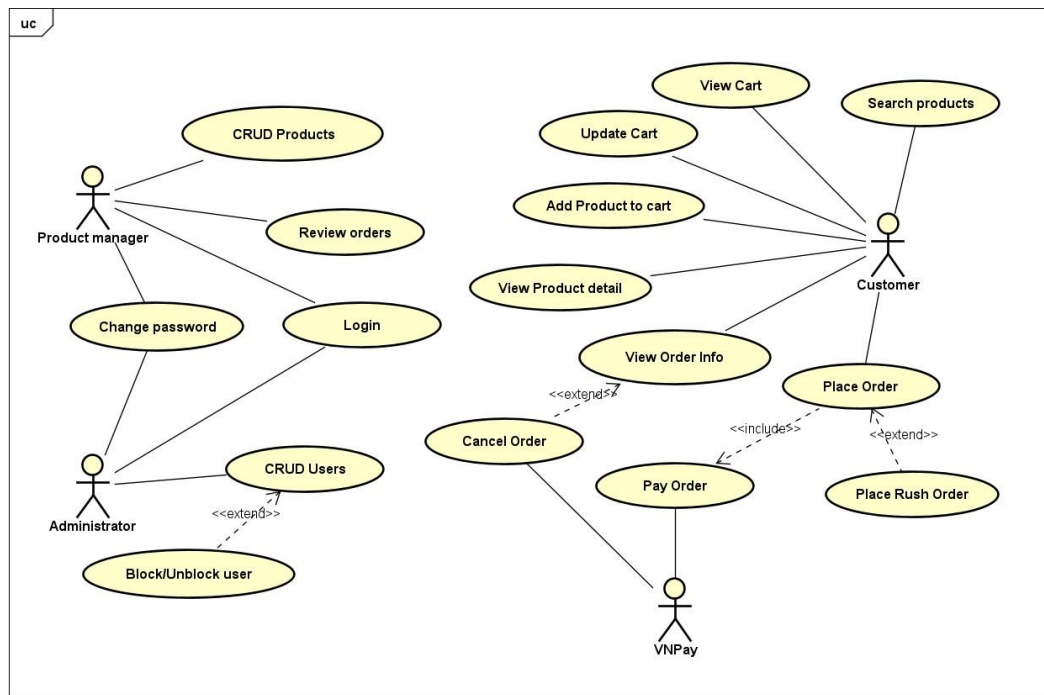
1.4. References

- AIMS – Problem Statement v2.0 – Nguyen Thi Thu Trang, HUST

2. Overall description

2.1. General Overview

The system is involved by 3 main actors, with detail described in general use case diagram. This diagram is also used in the SRS of AIMS Software.



2.2. Assumptions/Constraints/Risks

2.2.1. Assumptions

AIMS software has an use case relating to another subsystem. To be more specific, UC “Pay order” interacts with VNPay – a platform for mobile banking and money transactions.

2.2.2. Constraints

The software requires Internet connection to work effectively with some functions.

2.2.3. Risks

As mentioned before, due to the dependency with VNPay, the software could not work well if the connection to that subsystem is malfunctioning.

3. System Architecture and Architecture Design

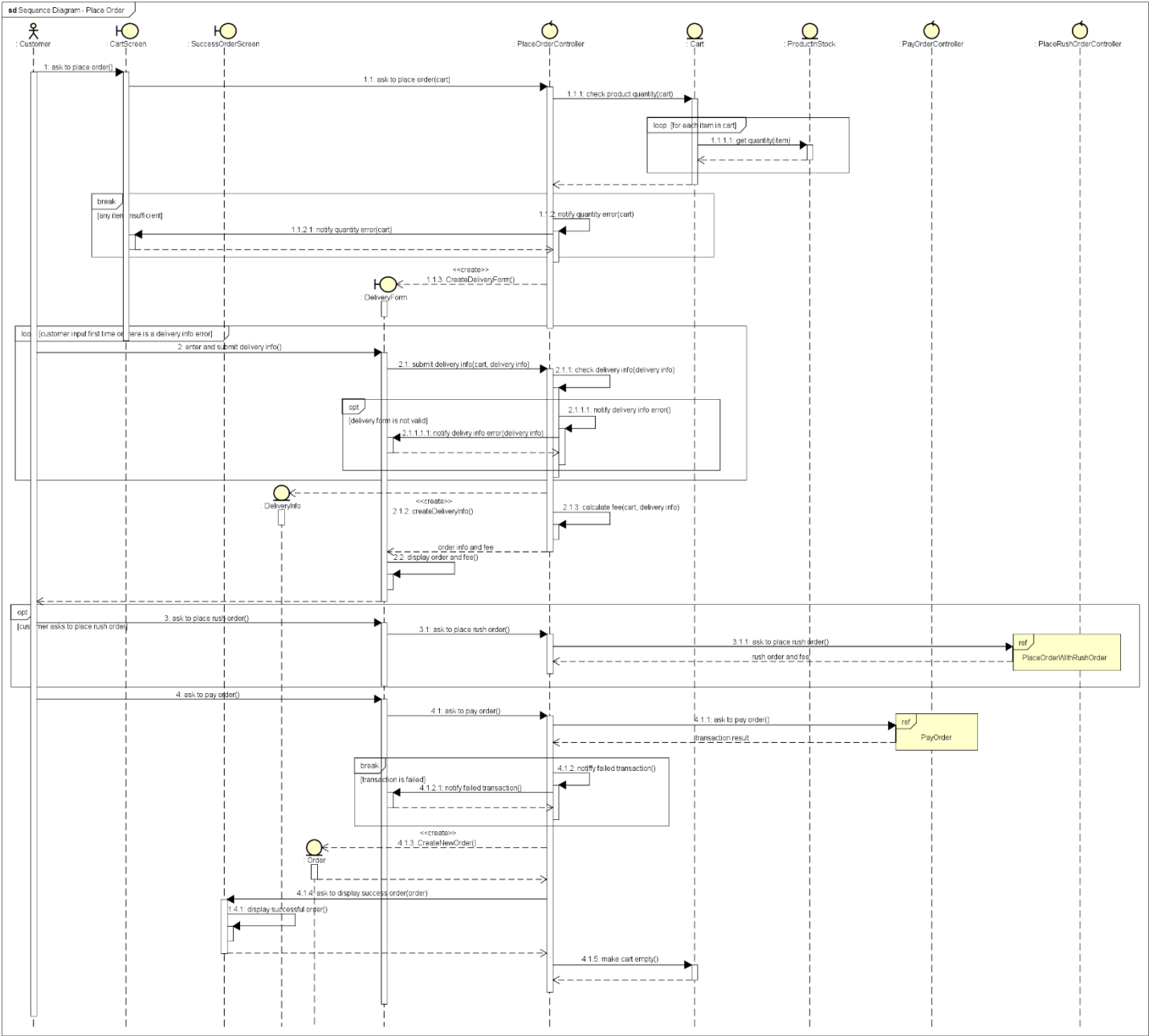
3.1. Architectural Patterns

<Not specified>

3.2. Interaction Diagrams

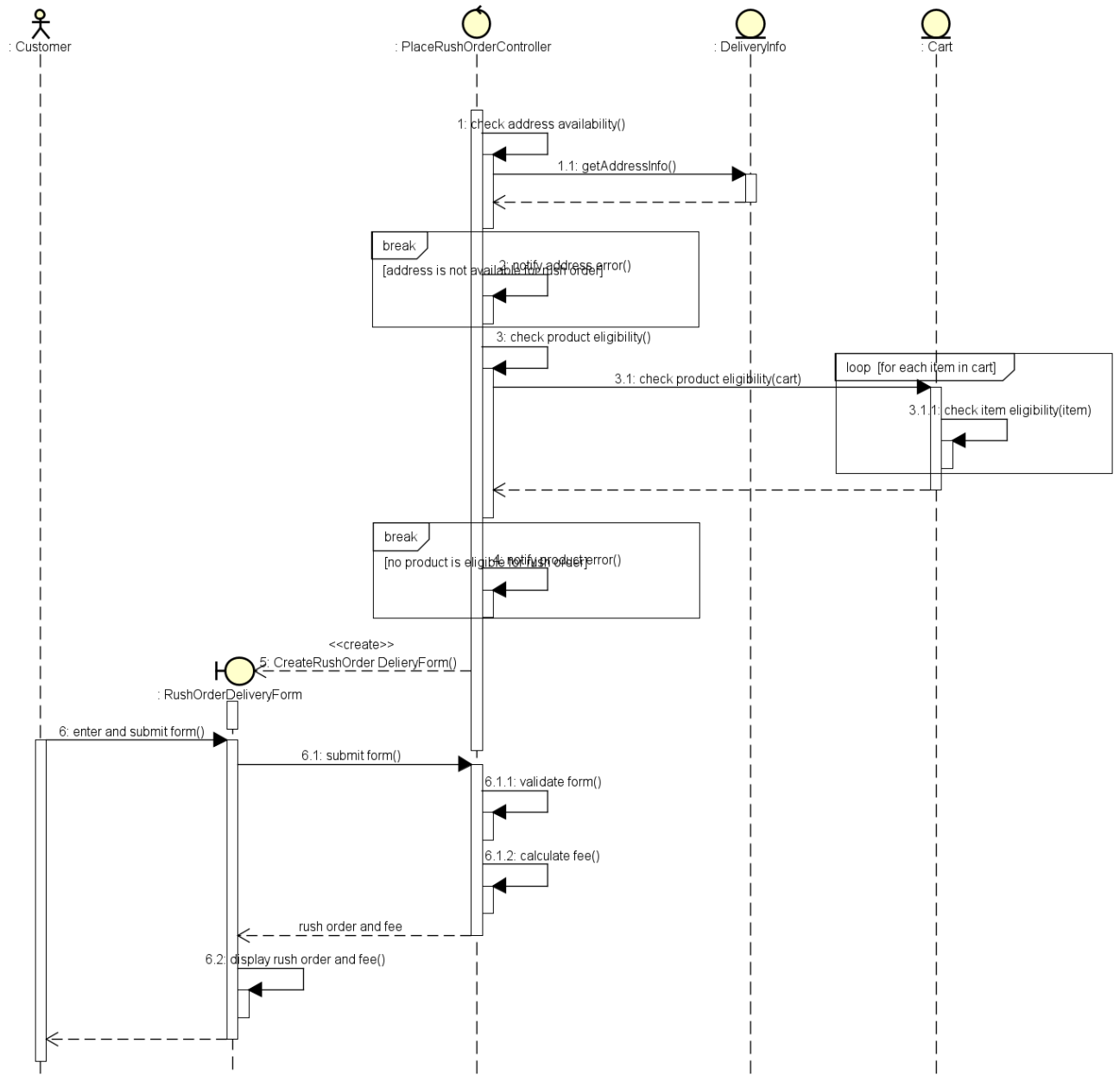
There are 3 main order-related use cases:

UC Place Order:

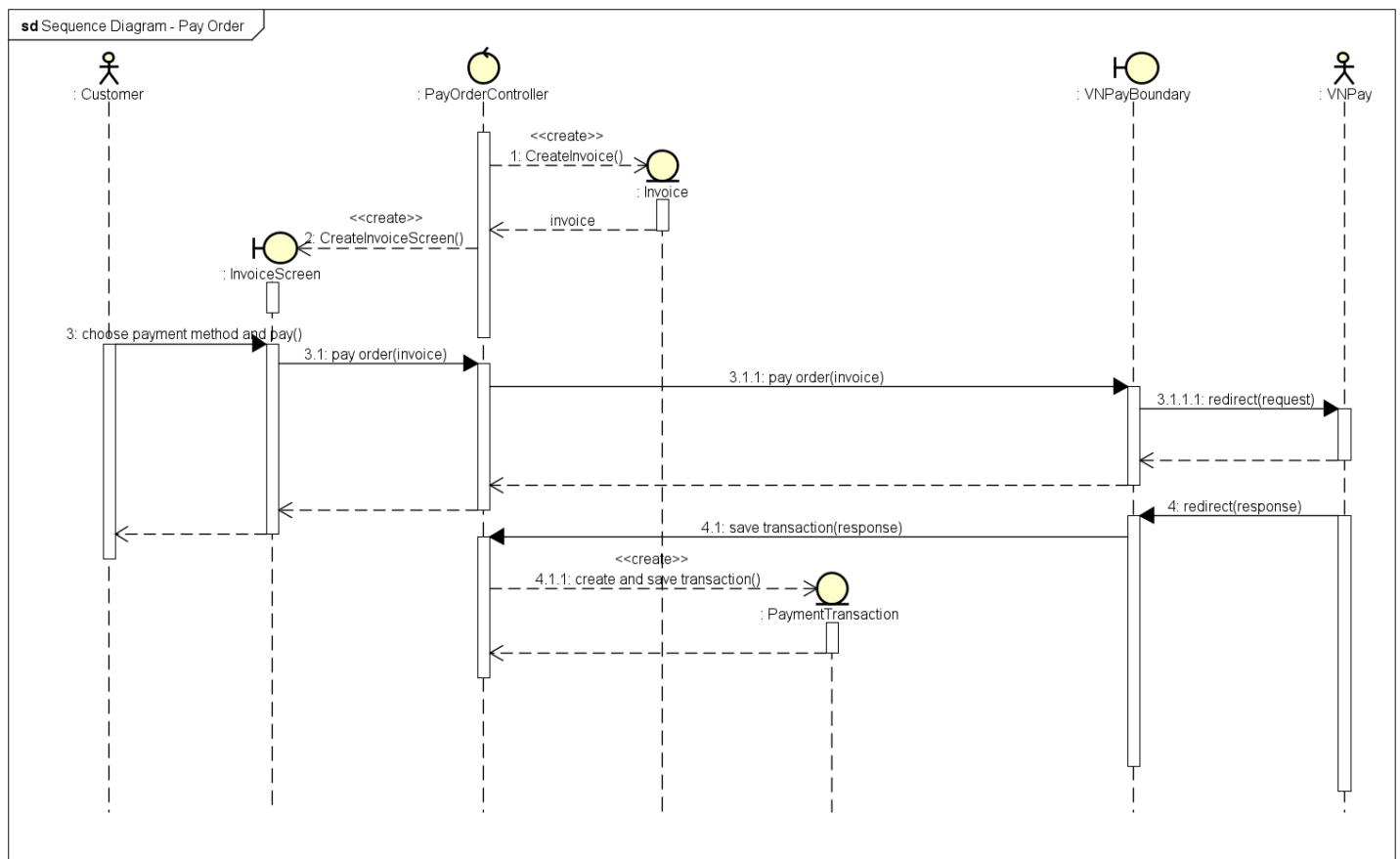


UC Place Rush Order:

sd Sequence Diagram - Place Rush Order

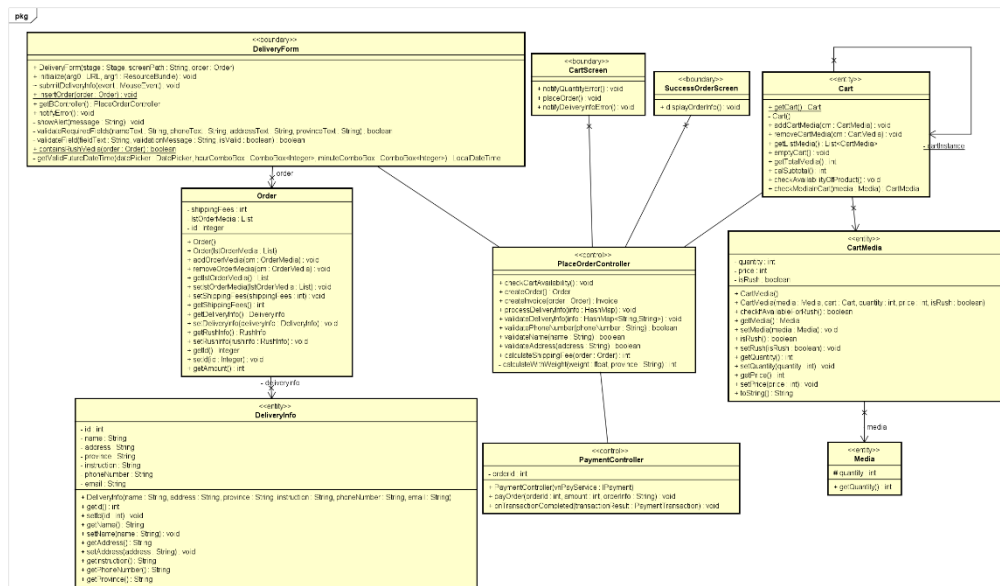


UC Pay Order:

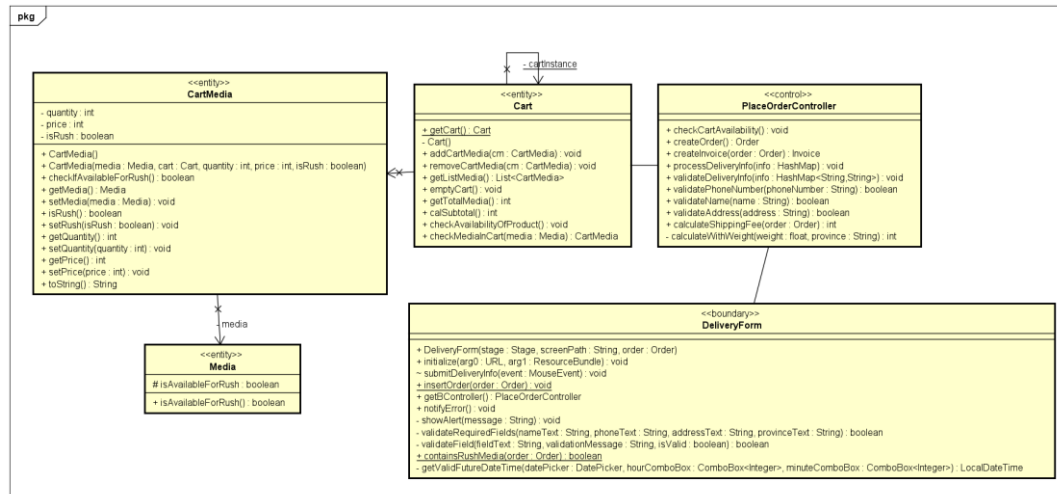


3.3. Analysis Class Diagram

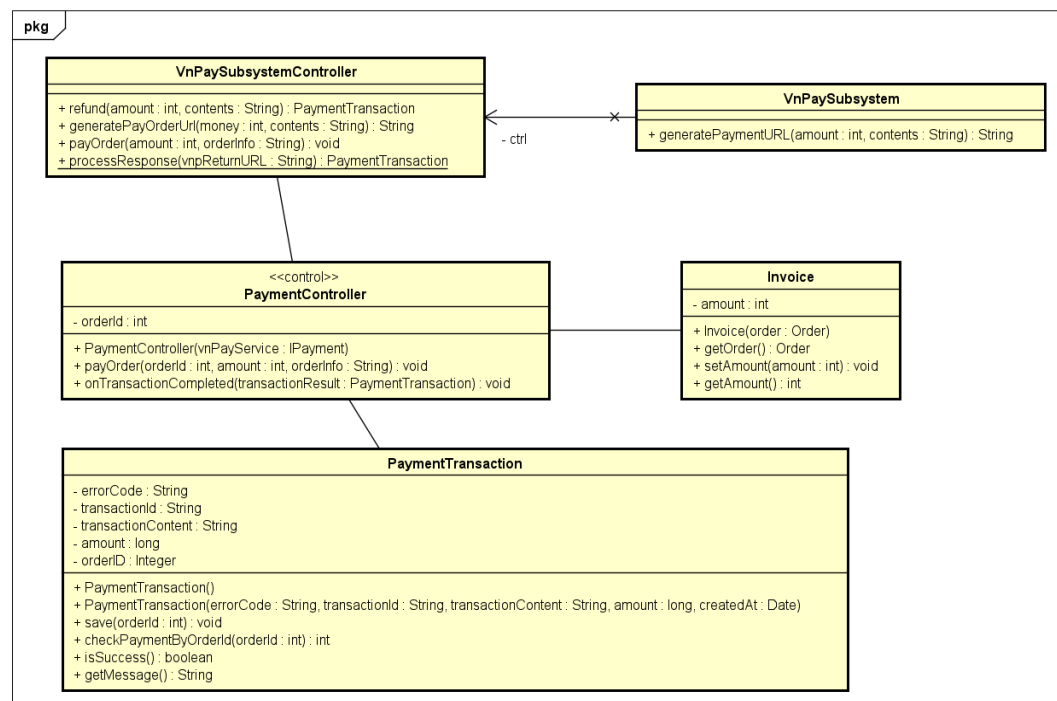
UC Place Order:



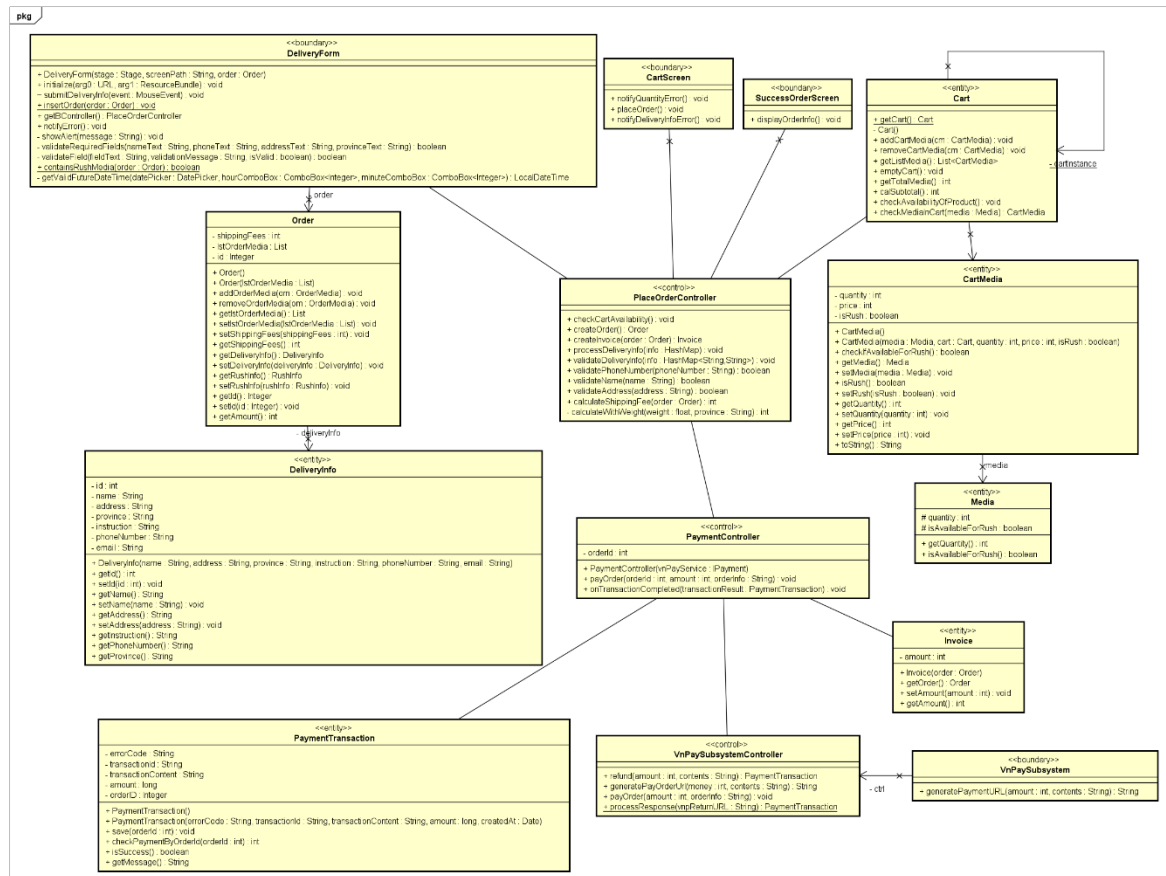
UC Place Rush Order:



UC Pay Order:



3.4. Unified Analysis Class Diagram



3.5. Security Software Architecture

With the scope of order related use cases, there is no architecture for security for AIMS software.

4. Detailed Design

4.1. User Interface Design

4.1.1. Screen Configuration Standardization

- Display:

Number of colors supported: 16,777,216 colors.

Resolution: 1366×768 pixels.

- Screen:

Location of standard buttons: Mostly at the bottom (vertically) and in the middle (horizontally) of the frame.

Location of the messages: Starting from the top vertically and in the middle horizontally of the frame down to the bottom.

Display of the screen title: The title is located at the top left of the frame.

Consistency in expression of alphanumeric numbers: comma for separator of thousand while strings only consist of characters, digits, commas, dots, spaces, underscores, and hyphen symbol.

- Control:

Size of the text: mostly medium size (mostly 24px). Font: Inter. Color: #000000

Input check process: Should check if it is empty or not. Next, check if the input is in the correct format or not.

Sequence of moving the focus: There will be some stack frames as some forms are displayed in a popup. At that time, the main screen cannot be operated while the pop up is shown. After the opening screen, the first screen (home screen) will appear.

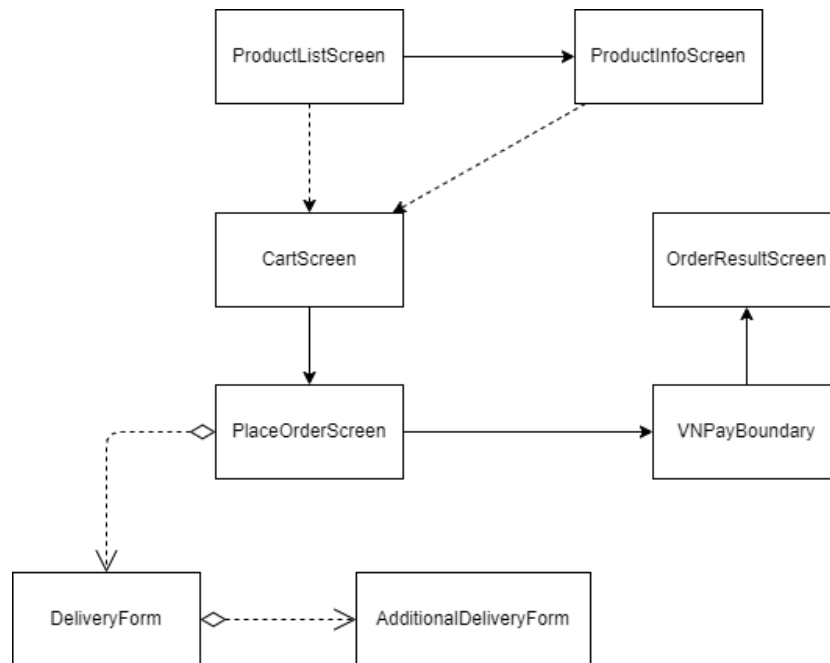
- Direct input from the keyboard:

There will be no shortcuts. There are back buttons to move back to the previous screen.

- Error:

A message will be given to notify the users what the problem is.

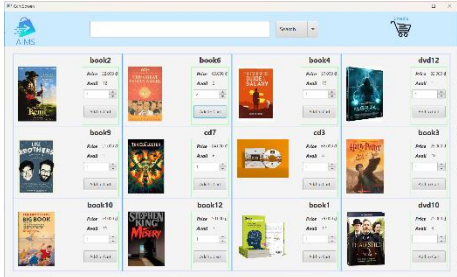
4.1.2. Screen Transition Diagrams



1

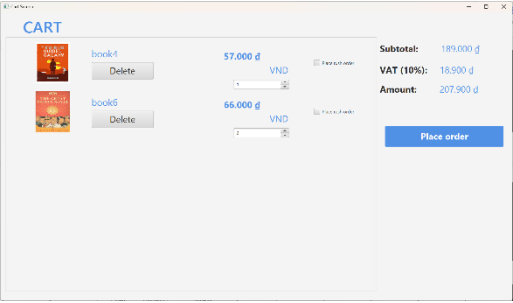
4.1.3. Screen Specifications

Product list screen:

AIMS Software		Date of creation	Approved by	Reviewed by	Person in charge
Screen specification	Product list screen	20/10/2024			Nguyễn Hữu Đức
		Control	Operation	Function	
		Area for displaying items of the store	Initial	Display the media with corresponding information	
		Search bar	Click/use keyboard	Field for input search keyword for finding media	
		Cart icon	Click	Display cart screen	
		Add to cart button	Click	Add the corresponding media to cart	
Screen name	Product list screen				

Item name	Number of digits (bytes)	Type	Field attribute	Remark
Media title	256	String	Black	Left-justified
Media price	10	Numeral	Black	Left-justified
Quantity available	5	Numeral	Black	Left-justified

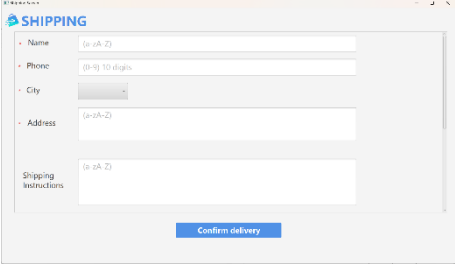
Cart screen:

AIMS Software		Date of creation	Approved by	Reviewed by	Person in charge
Screen specification	Cart screen	20/10/2024			Nguyễn Hữu Đức
		Control	Operation	Function	
		Area for displaying items in the cart	Initial	Display the media with corresponding information	
		Area for displaying subtotal	Initial	Display the subtotal	
		Rush delivery checkbox	Click	Request rush delivery for product	
		Delete button	Click	Remove item from the cart	
		Back icon button	Click	Display previous screen	
		Quantity adjust buttons and field	Click/use keyboard	Adjust the quantity of items in the cart	

Screen name	Cart screen			
Item name	Number of digits (bytes)	Type	Field attribute	Remark
Media title	256	String	Blue	Left-justified
Media price	10	Numeral	Blue	Right-justified
Quantity in cart	5	Numeral	Black	Left-justified
Subtotal	10	Numeral	Blue	Right-justified
VAT	10	Numeral	Blue	Right-justified

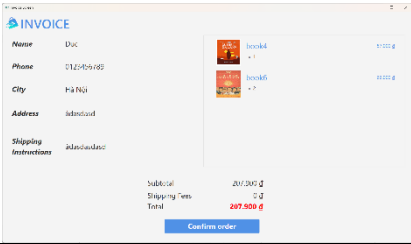
Delivery form:

AIMS Software	Date of creation	Approved by	Reviewed by	Person in charge
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Screen specification	Delivery form	20/10/2024			Nguyễn Hữu Đức
	Control	Operation	Function		
	Area for displaying fields of the form	Initial	Required input for delivery information		
	Confirm button	Click	Process to submit the form		

Screen name	Delivery form			
Item name	Number of digits (bytes)	Type	Field attribute	Remark
Name	256	String	Black	Left-justified
Phone number	10	String	Black	Left-justified
City	256	String	Black	Left-justified
Address	256	String	Black	Left-justified
Shipping intructions	1024	String	Black	Left-justified

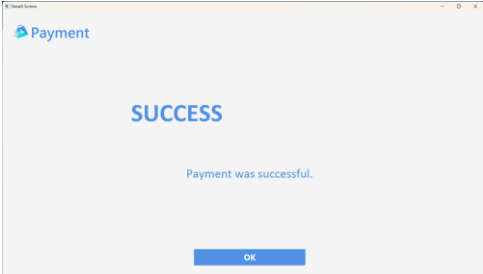
Order info screen:

AIMS Software		Date of creation	Approved by	Reviewed by	Person in charge
Screen specification	Order Info screen	20/10/2024			Nguyễn Hữu Đức
	Control	Operation	Function		
	Area for displaying items in the order	Initial	Display the media with corresponding information		
	Area for displaying delivery info	Initial	Display the information for delivery		
		Pay order button	Click	Process to pay the order	

Screen name	Order info screen			
Item name	Number of digits (bytes)	Type	Field attribute	Remark
Name	256	String	Black	Left-justified
Phone number	10	String	Black	Left-justified

City	256	String	Black	Left-justified
Address	256	String	Black	Left-justified
Shipping instructions	1024	String	Black	Left-justified
Media title	256	String	Blue	Left-justified
Media price	10	Numeral	Blue	Center-justified
Quantity in order	5	Numeral	Black	Center-justified
Amount	10	Numeral	Black	Right-justified
Subtotal	10	Numeral	Black	Right-justified
Shipping fees	10	Numeral	Black	Right-justified
Total	10	Numeral	Red	Right-justified

Payment Result screen:

AIMS Software		Date of creation	Approved by	Reviewed by	Person in charge
Screen specification	Payment Result screen	20/10/2024			Nguyễn Hữu Đức
		Control	Operation	Function	
		Payment status text	Initial	Display the status of the payment/order	

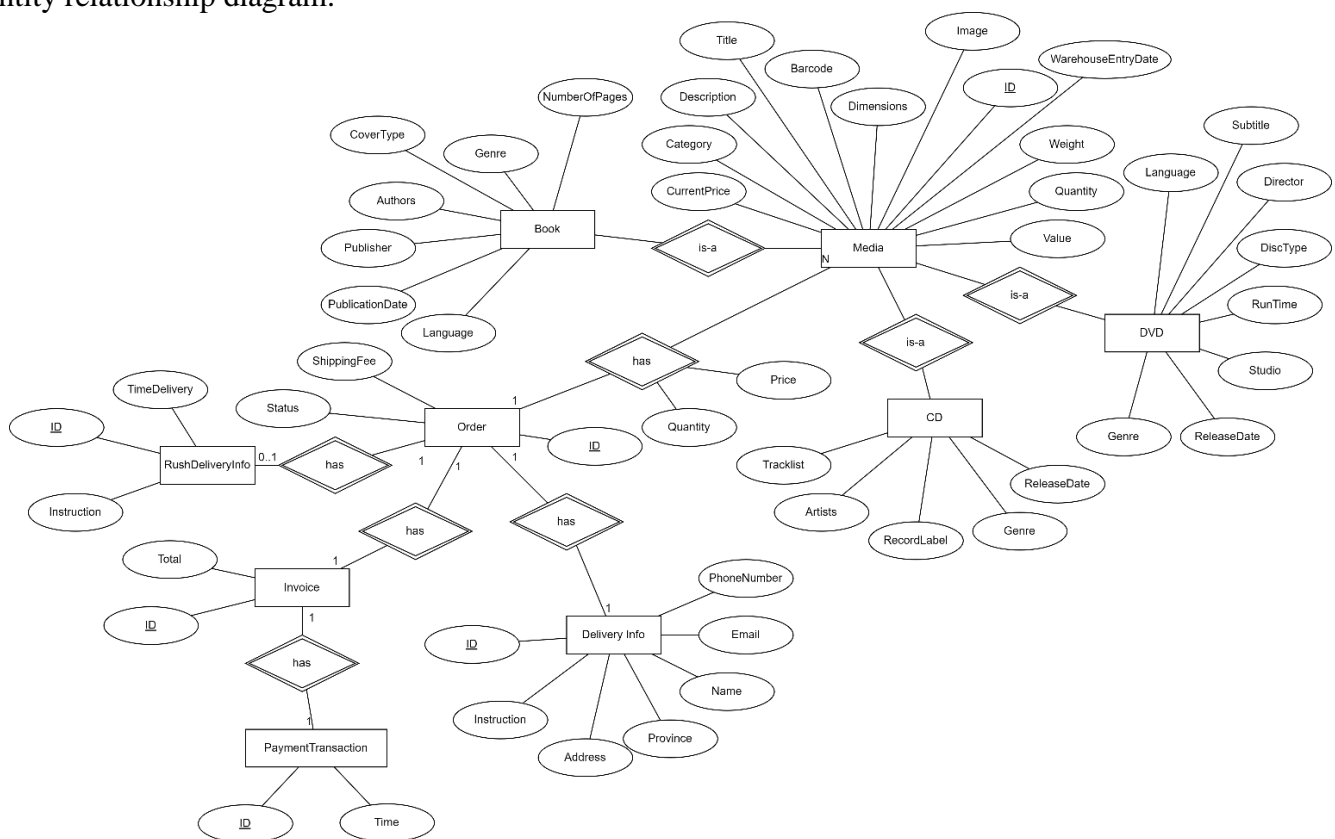
	Return to home button	Click	Redirect the software to home screen
--	-----------------------	-------	--------------------------------------

Screen name	Payment Result screen			
Item name	Number of digits (bytes)	Type	Field attribute	Remark
Status title	256	String	Blue	Left-justified
Payment info	256	String	Blue	Center-justified

4.2. Data Modeling

4.2.1. Conceptual Data Modeling

Entity relationship diagram:



4.2.2. Database Design

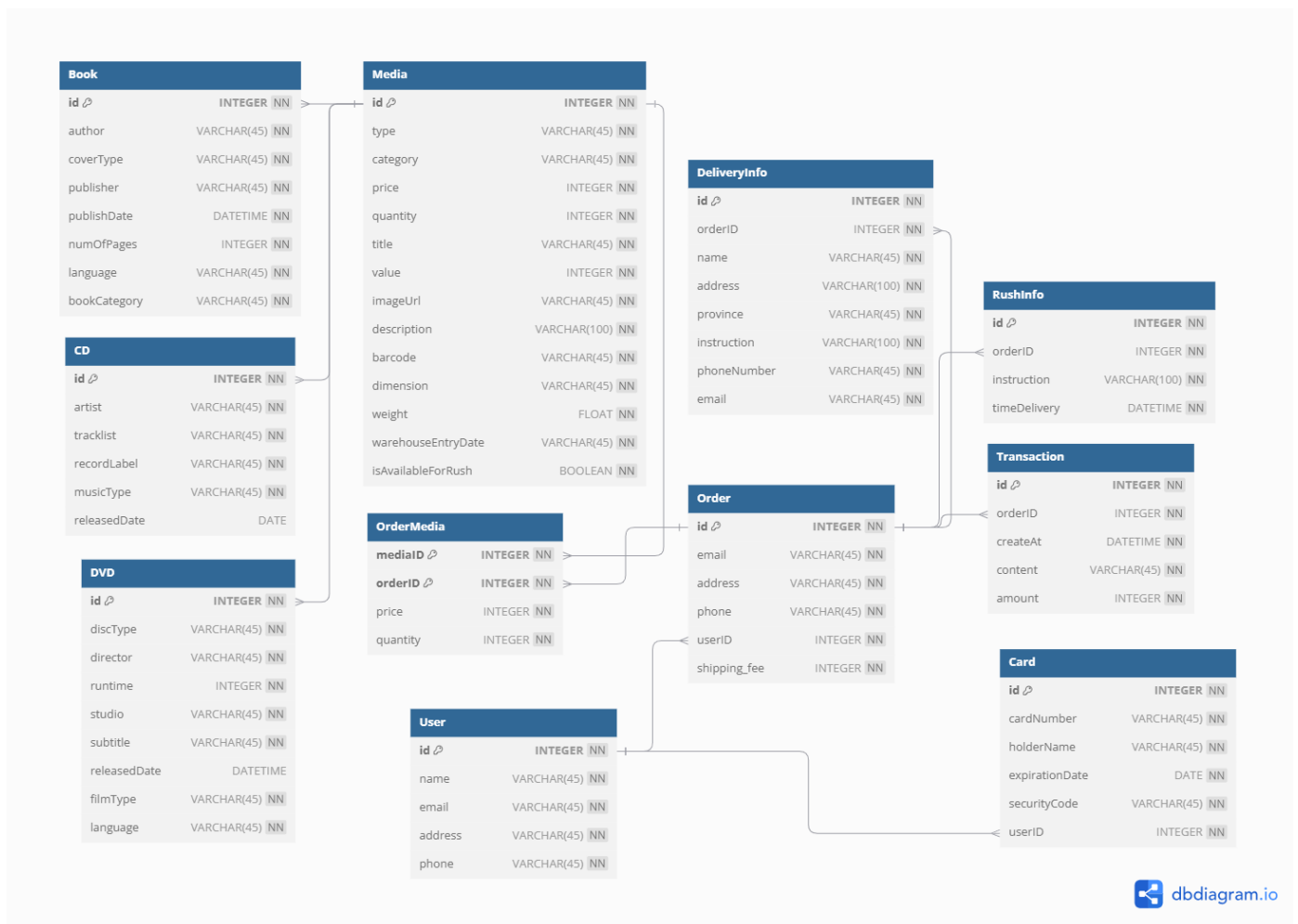
4.2.2.1. Database Management System

DBMS for AIMS software: SQLite

SQLite is a small, fast, self-contained, high-reliability and full-featured SQL database engine. It is the most used database engine in the world and it's open-source software. It uses Structured Query Language (SQL) for database management and is known for its reliability, speed and ease of use.

SQLite is widely used for various applications, from small websites to large-scale enterprise systems.

4.2.2.2. Database Diagram



CREATE DATABASE IF NOT EXISTS `aims`

```
CREATE TABLE "aims"."Media"(
  "id" INTEGER PRIMARY KEY AUTOINCREMENT NOT NULL,
  "type" VARCHAR(45) NOT NULL,
  "category" VARCHAR(45) NOT NULL,
  "price" INTEGER NOT NULL,
  "quantity" INTEGER NOT NULL,
  "title" VARCHAR(45) NOT NULL,
  "value" INTEGER NOT NULL,
  "imageUrl" VARCHAR(45) NOT NULL,
  "description" VARCHAR(100) NOT NULL,
  "barcode" VARCHAR(45) NOT NULL,
  "dimension" VARCHAR(45) NOT NULL,
  "weight" FLOAT NOT NULL,
  "warehouseEntryDate" VARCHAR(45) NOT NULL,
  "isAvailableForRush" INTEGER NOT NULL
);

CREATE TABLE "aims"."CD"(
```

```

"id" INTEGER PRIMARY KEY NOT NULL,
"artist" VARCHAR(45) NOT NULL,
"tracklist" VARCHAR(45) NOT NULL,
"recordLabel" VARCHAR(45) NOT NULL,
"musicType" VARCHAR(45) NOT NULL,
"releasedDate" DATE,
CONSTRAINT "fk_cd_media"
    FOREIGN KEY("id")
    REFERENCES "Media"("id")
);

CREATE TABLE "aims"."Book"(
    "id" INTEGER PRIMARY KEY AUTOINCREMENT NOT NULL,
    "author" VARCHAR(45) NOT NULL,
    "coverType" VARCHAR(45) NOT NULL,
    "publisher" VARCHAR(45) NOT NULL,
    "publishDate" DATETIME NOT NULL,
    "numOfPages" INTEGER NOT NULL,
    "language" VARCHAR(45) NOT NULL,
    "bookCategory" VARCHAR(45) NOT NULL,
    CONSTRAINT "fk_book_media"
        FOREIGN KEY("id")
        REFERENCES "Media"("id")
);

CREATE TABLE "aims"."User"(
    "id" INTEGER PRIMARY KEY AUTOINCREMENT NOT NULL,
    "name" VARCHAR(45) NOT NULL,
    "email" VARCHAR(45) NOT NULL,
    "address" VARCHAR(45) NOT NULL,
    "phone" VARCHAR(45) NOT NULL
);

CREATE TABLE "aims"."DVD"(
    "id" INTEGER PRIMARY KEY NOT NULL,
    "discType" VARCHAR(45) NOT NULL,
    "director" VARCHAR(45) NOT NULL,
    "runtime" INTEGER NOT NULL,
    "studio" VARCHAR(45) NOT NULL,
    "subtitle" VARCHAR(45) NOT NULL,
    "releasedDate" DATETIME,

```



```

"filmType" VARCHAR(45) NOT NULL,
"language" VARCHAR(45) NOT NULL,
CONSTRAINT "fk_dvd_media"
    FOREIGN KEY("id")
    REFERENCES "Media"("id")
);

CREATE TABLE "aims"."Order"(
    "id" INTEGER PRIMARY KEY AUTOINCREMENT NOT NULL,
    "email" VARCHAR(45) NOT NULL,
    "address" VARCHAR(45) NOT NULL,
    "phone" VARCHAR(45) NOT NULL,
    "userID" INTEGER NOT NULL,
    "shipping_fee" INTEGER NOT NULL,
    CONSTRAINT "fk_order_user"
        FOREIGN KEY("userID")
        REFERENCES "User"("id")
);

CREATE INDEX "aims"."Order.fk_order_user_idx" ON "Order" ("userID");

CREATE TABLE "aims"."OrderMedia"(
    "mediaID" INTEGER NOT NULL,
    "orderID" INTEGER NOT NULL,
    "price" INTEGER NOT NULL,
    "quantity" INTEGER NOT NULL,
    PRIMARY KEY("mediaID","orderID"),
    CONSTRAINT "fk_ordermedia_media"
        FOREIGN KEY("mediaID")
        REFERENCES "Media"("id"),
    CONSTRAINT "fk_ordermedia_order"
        FOREIGN KEY("orderID")
        REFERENCES "Order"("id")
);

CREATE INDEX "aims"."OrderMedia.fk_ordermedia_order_idx" ON "OrderMedia" ("orderID");

CREATE TABLE "aims"."Transaction"(
    "id" INTEGER PRIMARY KEY AUTOINCREMENT NOT NULL,
    "orderID" INTEGER NOT NULL,
    "createAt" DATETIME NOT NULL,
    "content" VARCHAR(45) NOT NULL,
    "amount" INTEGER NOT NULL,

```

```

CONSTRAINT "fk_transaction_order"
    FOREIGN KEY("orderID")
    REFERENCES "Order"("id")
);
CREATE INDEX "aims"."Transaction.fk_transaction_order_idx" ON "Transaction" ("orderID");
CREATE TABLE "aims"."Card"(
    "id" INTEGER PRIMARY KEY NOT NULL,
    "cardNumber" VARCHAR(45) NOT NULL,
    "holderName" VARCHAR(45) NOT NULL,
    "expirationDate" DATE NOT NULL,
    "securityCode" VARCHAR(45) NOT NULL,
    "userID" INTEGER NOT NULL,
    CONSTRAINT "fk_card_user"
        FOREIGN KEY("userID")
        REFERENCES "User"("id")
);
CREATE INDEX "aims"."Card.fk_card_user_idx" ON "Card" ("userID");

CREATE TABLE "aims"."DeliveryInfo"(
    "id" INTEGER PRIMARY KEY AUTOINCREMENT NOT NULL,
    "orderID" INTEGER NOT NULL,
    "name" VARCHAR(45) NOT NULL,
    "address" VARCHAR(100) NOT NULL,
    "province" VARCHAR(45) NOT NULL,
    "instruction" VARCHAR(100) NOT NULL,
    "phoneNumber" VARCHAR(45) NOT NULL,
    "email" VARCHAR(45) NOT NULL,
    CONSTRAINT "fk_deliveryinfo_order"
        FOREIGN KEY("orderID")
        REFERENCES "Order"("id")
);
CREATE INDEX "aims"."DeliveryInfo.fk_deliveryinfo_order_idx" ON "DeliveryInfo" ("orderID");

CREATE TABLE "aims"."RushInfo"(
    "id" INTEGER PRIMARY KEY AUTOINCREMENT NOT NULL,
    "orderID" INTEGER NOT NULL,
    "instruction" VARCHAR(100) NOT NULL,
    "timeDelivery" DATETIME NOT NULL,

```

```
CONSTRAINT "fk_rushinfo_order"  
FOREIGN KEY("orderID")  
REFERENCES "Order"("id")  
);  
CREATE INDEX "aims"."RushInfo.fk_rushinfo_order_idx" ON "RushInfo" ("orderID");
```

4.2.2.3. Database Detail Design

Table: media

#	PK	FK	Column name	Data type	Default value	Mandatory	Description
1	x		id	INT		Yes	ID, auto increment
2			title	VARCHAR(45)		Yes	Product name
3			description	VARCHAR(100)		No	Product description
4			type	VARCHAR(45)		Yes	Can be DVD, CD, Book
5			category	VARCHAR(45)		Yes	Can be story, adventure, ...
6			barcode	VARCHAR(20)		Yes	Product identity code
7			dimensions	VARCHAR(20)		No	Size of product
8			warehouse_entry_date	DATETIME		No	Entry date of product
9			weight	FLOAT		No	Product weight
10			quantity	INT		Yes	Number of products available
11			value	FLOAT		Yes	Real value of product
12			price	FLOAT		Yes	Price at the time product shown on store
13			image_url	varchar(45)		Yes	Image of product
14			is_available_for_rush	INT		Yes	1=TRUE, 0=FALSE

Table: cd

#	PK	FK	Column name	Data type	Default value	Mandatory	Description
1	x		id	INT		Yes	ID, auto increment
2			artists	VARCHAR(80)		No	CD's list of artists
3			record_label	VARCHAR(45)		Yes	CD record label
4			genre	VARCHAR(45)		No	CD genre
5			tracklist	VARCHAR(45)		No	CD tracklist
6			release_date	DATETIME		No	CD release date

Table: dvd

#	PK	FK	Column name	Data type	Default value	Mandatory	Description
1	x		id	INT		Yes	ID, auto increment
2			genre	VARCHAR(45)		No	DVD genre
3			language	VARCHAR(45)		No	DVD language
4			director	VARCHAR(45)		No	DVD director

5			disc_type	VARCHAR(45)		No	DVD disc type
6			studio	VARCHAR(45)		No	DVD studio
7			subtitle	VARCHAR(200)		No	DVD subtitle
8			release_date	DATE		No	DVD release date
9			run_time	INT		No	DVD run timein minutes

Table: book

#	PK	FK	Column name	Data type	Default value	Mandatory	Description
1	x		id	INT		Yes	ID, auto increment
2			authors	VARCHAR(80)		No	Book's list of authors
3			publisher	VARCHAR(45)		No	Book publisher
4			language	VARCHAR(45)		No	Book language
5			genre	VARCHAR(45)		No	Book genre
6			cover_type	VARCHAR(45)		No	Book cover type
7			publication_date	DATE		No	Book publication date
8			number_of_pages	INT		No	Book number of pages

Table: order

#	PK	FK	Column name	Data type	Default value	Mandatory	Description
1	x		id	INT		Yes	ID, auto increment
2			shipping_fee	DOUBLE		Yes	Order shipping fee

Table: order_media

#	PK	FK	Column name	Data type	Default value	Mandatory	Description
1	x		id	INT		Yes	ID, auto increment
2		x	media_id	VARCHAR(45)		Yes	Media ID
3		x	order_id	DOUBLE		Yes	Order ID
4			price	DOUBLE		Yes	Current price of the product
5			quantity	INT		Yes	Number of products purchased
6			is_rush	INT		Yes	1=TRUE, 0=FALSE

Table: delivery_info

#	PK	FK	Column name	Data type	Default value	Mandatory	Description
1	x		id	INT		Yes	ID, auto increment
2		x	order_id	INT		Yes	Order ID

3			name	VARCHAR(45)		Yes	Name of customer
4			province	VARCHAR(45)		Yes	Province of delivery address
5			address	VARCHAR(100)		Yes	Delivery address
6			instruction	VARCHAR(100)		No	Delivery instruction
7			email	VARCHAR(45)		Yes	Customer email
8			phone_number	VARCHAR(45)		Yes	Customer phone number

Table: rush_info

#	PK	FK	Column name	Data type	Default value	Mandatory	Description
1	x		id	INT		Yes	ID, auto increment
2		x	order_id	INT		Yes	Order ID
3			instruction	VARCHAR(100)		No	Rush delivery instruction
4			time_delivery	DATETIME		Yes	Rush delivery time

Table: transaction

#	PK	FK	Column name	Data type	Default value	Mandatory	Description
1	x		id	INT		Yes	ID, auto increment
2		x	order_id	INT		Yes	Order ID
3			createAt	DATETIME		Yes	Created Date of transaction
4			content	STRING		Yes	Content of transaction
5			amount	INT		Yes	Amount of transaction

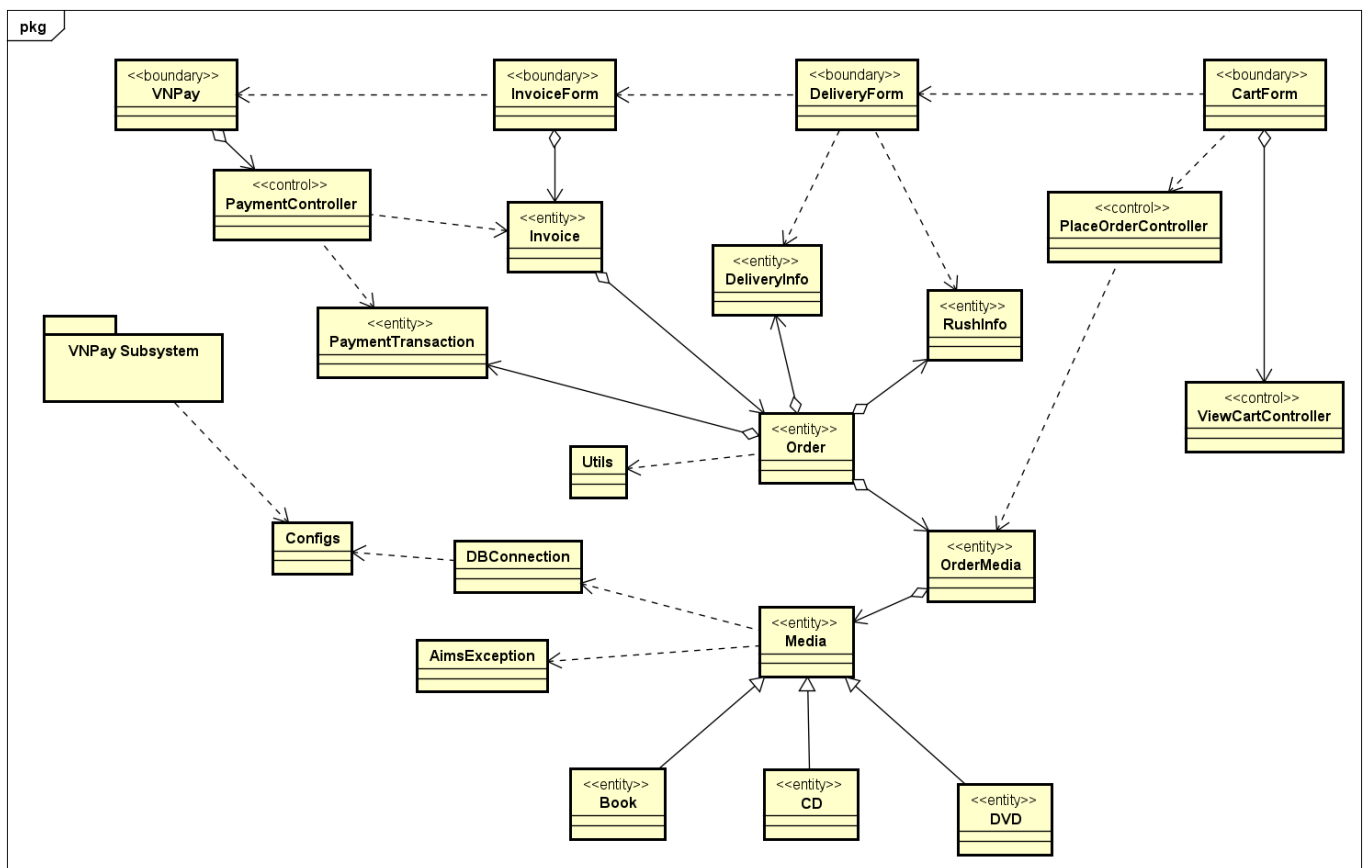
Table: user

#	PK	FK	Column name	Data type	Default value	Mandatory	Description
1	x		id	INT		Yes	ID, auto increment
2			name	VARCHAR(45)		Yes	Username
3			email	VARCHAR(45)		Yes	User's email
4			address	VARCHAR(45)		Yes	User's Address
5			phone	VARCHAR(45)		Yes	User's Phone

4.3. Non-Database Management System Files

4.4. Class Design

4.4.1. General Class Diagram



4.4.2. Class Diagrams

<VNPAY is considered as a 'black box' in this lab, so there is no information about this package yet>

4.4.3. Class Design

