

CS521 Course Project:

Online Bookstore

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Overview Statement

In this project, we select the online bookstore as the topic. By researching the online bookstore like Amazon, we analysis and design the online bookstore system.

In this bookstore, customers can buy books and manage their order. They can also upgrade their account to enjoy 2-day free ship. And we have customer support and technical support to solve problems about customers and this system.

Requirement & Feature List

The bookstore sells different kinds of books.

There are three types of books: paperback, hardcover and ebook.

Items shipped from bookstore can be returned within 30 days of receipt.

After the bookstore received the returned items, customers will get the refund.

For all the customers, shipping is free when the total price of the order is above \$35.

For prime customers, free two day ship priority is available.

There are three payment methods: credit card, bank account and store card.

Customer:

- Customers can buy books from the bookstore.
- Customers can search books from the bookstore.
- Customers can cancel the order in the bookstore.
- Customers can return the book to the bookstore.
- Customers can apply replacement or refund if their items are missing 24 hours past expected delivery.
- Customers can create a new account in the bookstore.
- Customers can become the prime member with \$98/year.
- Customers can update the personal information of their account.
- Customers can contact the customer support to get some help.
- Customers can pay the order using their credit card or bank account after being verified.

Manager:

- Manager can add new books for the bookstore.
- Manager can cancel any order in the bookstore.
- Manager can determine whether to give refund/replacement or not.
- Manager can change the price of any book in the bookstore.
- Manager can distribute store card to customers.

Technical Support:

- Technical support can get problem report of the system..
- Technical support can solve problems of the system.
- Technical support can create a list of the Top100 bestsellers.

Customer Support:

- Customer support can provide some help to customers when customers contact them.
- Customer support can report technical problems to technical support.

Shipping department:

- Shipping department can ship the book to the customer.
- Shipping department can get the returned items from the customer and ship to the bookstore.

Bank:

- The bank can verify the credit card information and bank account information of the customers.

Domain dictionary

Name	Type	Description
Customer	Role	People who can use this system to buy books and manage their order. They can also manage their account and get help from customer support.
Book	Object	Product sold in the bookstore is book.
Order	Object	Placed after customer checkout. Can be cancelled.
Shopping Cart	Object	A wish list of customers before they check out. Can add or delete items in it.
Account	Object	Used by customers to do all the operations in the bookstore.
Search Book	Process	Search books from the bookstore. Performed by customer.
Add Book to Shopping Cart	Process	Add book to shopping cart. Performed by customer.
Checkout	Process	Pay and Place the order after adding book to cart and choosing the payment way. Performed by customer.
Credit Card Payment	Process	Pay the bill by credit card which has been verified by bank.
Bank Account Payment	Process	Pay the bill by bank account which has been verified by bank.
Store Card Payment	Process	Pay the bill by store card which is distributed by manager.
Apply Cancel Order	Process	Apply to cancel the existing order. Performed by customer.
Return Book	Process	Return unsatisfied book back to the bookstore within 30 days of receipt. Performed by customer.
Apply Replacement	Process	Apply replacement when the books are missing 24 hours past expected delivery. Performed by customer.
Create Account	Process	Create account in the book store. Performed by customer.
Update Account	Process	Update the personal information of account. Performed by customer.
Upgrade Account	Process	Become the prime member with \$98/year. Performed by customer.
Contact Customer Support	Process	Contact the customer support to get some help. Performed by customer.

Missing Policy	Business Rule	Customers can apply replacement or refund if their items are missing 24 hours past expected delivery.
Return Policy	Business Rule	Items shipped from bookstore can be returned within 30 days of receipt.
Prime Policy	Business Rule	Customers can become the prime member with \$98/year.
Free Two Day Policy	Business Rule	Prime customers can use free two day shipping priority.
Prime Customer	Role	Customers who can use free two day shipping priority.
Use Free Two Day Shipping Priority	Process	Use free two day shipping priority after upgrade account. Performed by prime customer.
Manager	Role	People who determine the cancellation, refund and replacement issue. They also have the right to change the price.
Refund	Object	Money given back to customer after books are returned successfully.
Store Card	Object	Card distributed by manager. Can be used to buy books in the bookstore.
Cancel Order	Process	Determine to cancel order after customers apply to cancel order. Performed by manager.
Give Refund	Process	Determine to give refund after customers return books. Performed by manager.
Give Replacement	Process	Determine to give replacement after customers apply replacement. Performed by manager.
Change Price	Process	Change the price of any book in the bookstore. Performed by manager.
Add New Books	Process	Add new books for the bookstore. Performed by manager.
Distribute Store Card	Process	Distribute store card to customers. Performed by manager.
Customer Support	Role	People who help customers to solve problems.
Technical Problem	Object	Technical problems which need help from technical support.
Offer Help	Process	Offer help after customers contact them. Performed by customer support.
Report Technical Problem	Process	Report technical problems to technical support. Performed by customer support.

Technical Support	Role	People who work to solve technical problems and create ranking list.
Ranking List	Object	List which includes the information of Top100 bestsellers.
Problem Report	Object	Report which has the detailed information of the technical problems.
Create Ranking List	Process	Create a list of the Top100 bestsellers. Performed by technical support.
Get Problem Report	Process	Get problem report from customer support. Performed by technical support.
Solve Problems	Process	Solve problems of the system. Performed by technical support.
Shipping Department	Role	Provide the service of shipping and returning books
Ship Book	Process	Ship the book to the customer. Performed by shipping department.
Get Returned Book	Process	Get the returned items from the customer and ship to the bookstore. Performed by shipping department.
Shipping Free Policy	Business Rule	Shipping Free Policy
Bank	Role	Help customers to verify their bank information
Credit Card	Object	Credit card used to pay bill, owned by customer and verified by bank.
Bank Account	Object	Bank account used to pay bill, owned by customer and verified by bank.
Verify Credit Card	Process	Verify the credit card information of the customers. Performed by bank.
Verify Bank Account	Process	Verify bank account information of the customers. Performed by bank.
Verification Policy	Business Rule	Customers can pay the order using their credit card or bank account after being verified.

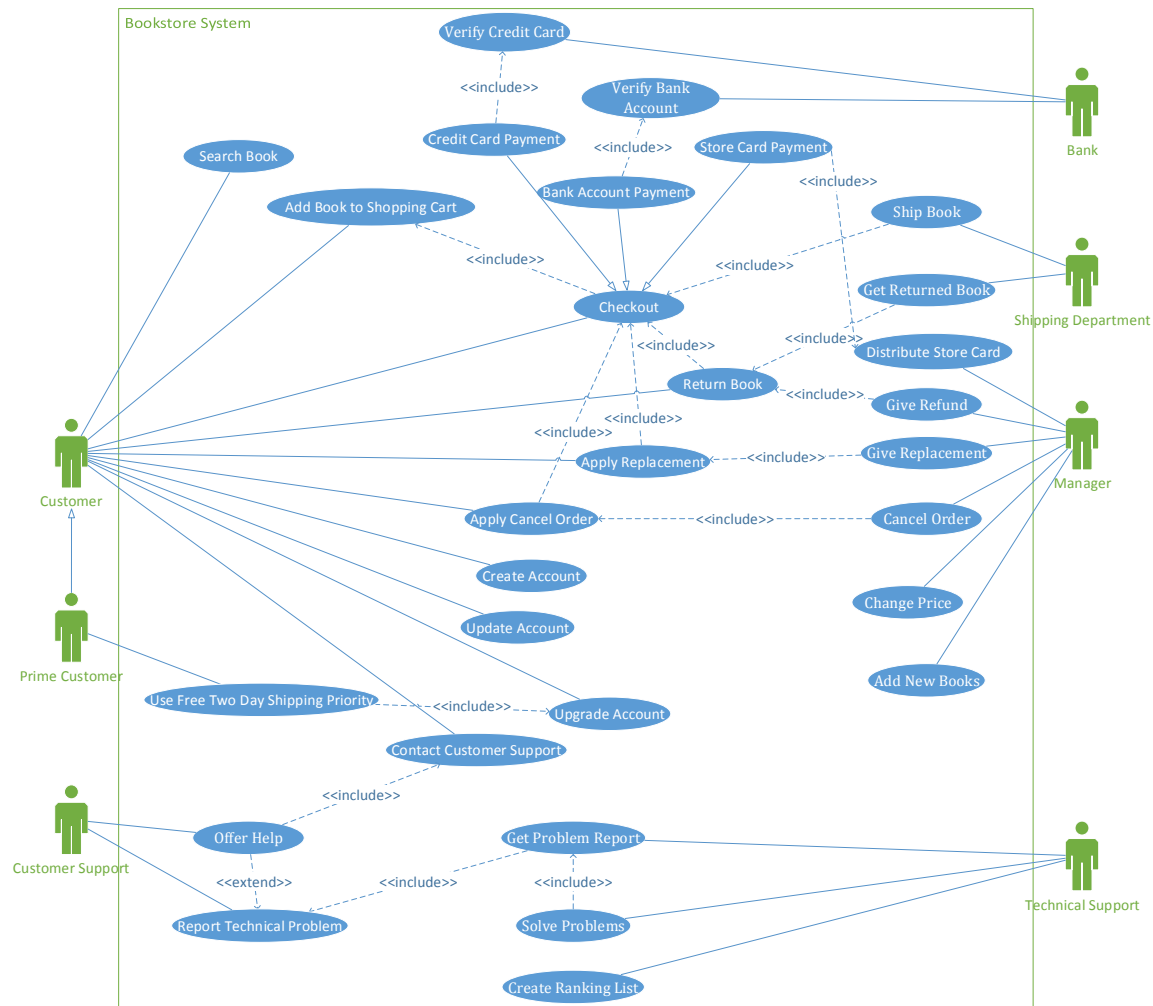
Actor dictionary

Actor	Description	Abstraction	Use case(s)
Customer	People who can use this system to buy books and manage their order. They can also manage their account and get help from customer support.	No	<ol style="list-style-type: none"> 1. Search Book 2. Add Book to Shopping Cart 3. Checkout 4. Apply Cancel Order 5. Return Book 6. Apply Replacement 7. Create Account 8. Update Account 9. Upgrade Account 10. Contact Customer Support
Prime Customer	Customers who can use free two day shipping priority.	No	Use Free Two Day Shipping Priority
Manager	People who determine the cancellation, refund and replacement issue. They also have the right to buy new books, change the price and distribute store card.	No	<ol style="list-style-type: none"> 1. Cancel Order 2. Give Refund 3. Give Replacement 4. Add New Books 5. Change Price 6. Distribute Store Card
Technical Support	People who work to solve technical problems and create ranking list.	No	<ol style="list-style-type: none"> 1. Create Ranking List 2. Get Problem Report 3. Solve Problems
Customer Support	People who help customers to solve problems.	No	<ol style="list-style-type: none"> 1. Offer Help 2. Report Technical Problem
Shipping Department	Provide the service of shipping and returning books	No	<ol style="list-style-type: none"> 1. Ship Book 2. Get Returned Book
Bank	Help customers to verify their bank information	No	<ol style="list-style-type: none"> 1. Verify Credit Card 2. Verify Bank Account

Use Cases

- Search Book
- Add Book to Shopping Cart
- Checkout
- Apply Cancel Order
- Return Book
- Apply Replacement
- Create Account
- Update Account
- Upgrade Account
- Contact Customer Support
- Use Free Two Day Shipping Priority
- Cancel Order
- Give Refund
- Give Replacement
- Add New Books
- Change Price
- Distribute Store Card
- Create Ranking List
- Get Problem Report
- Solve Problems
- Offer Help
- Report Technical Problem
- Ship Book
- Get Returned Book
- Verify Credit Card
- Verify Bank Account

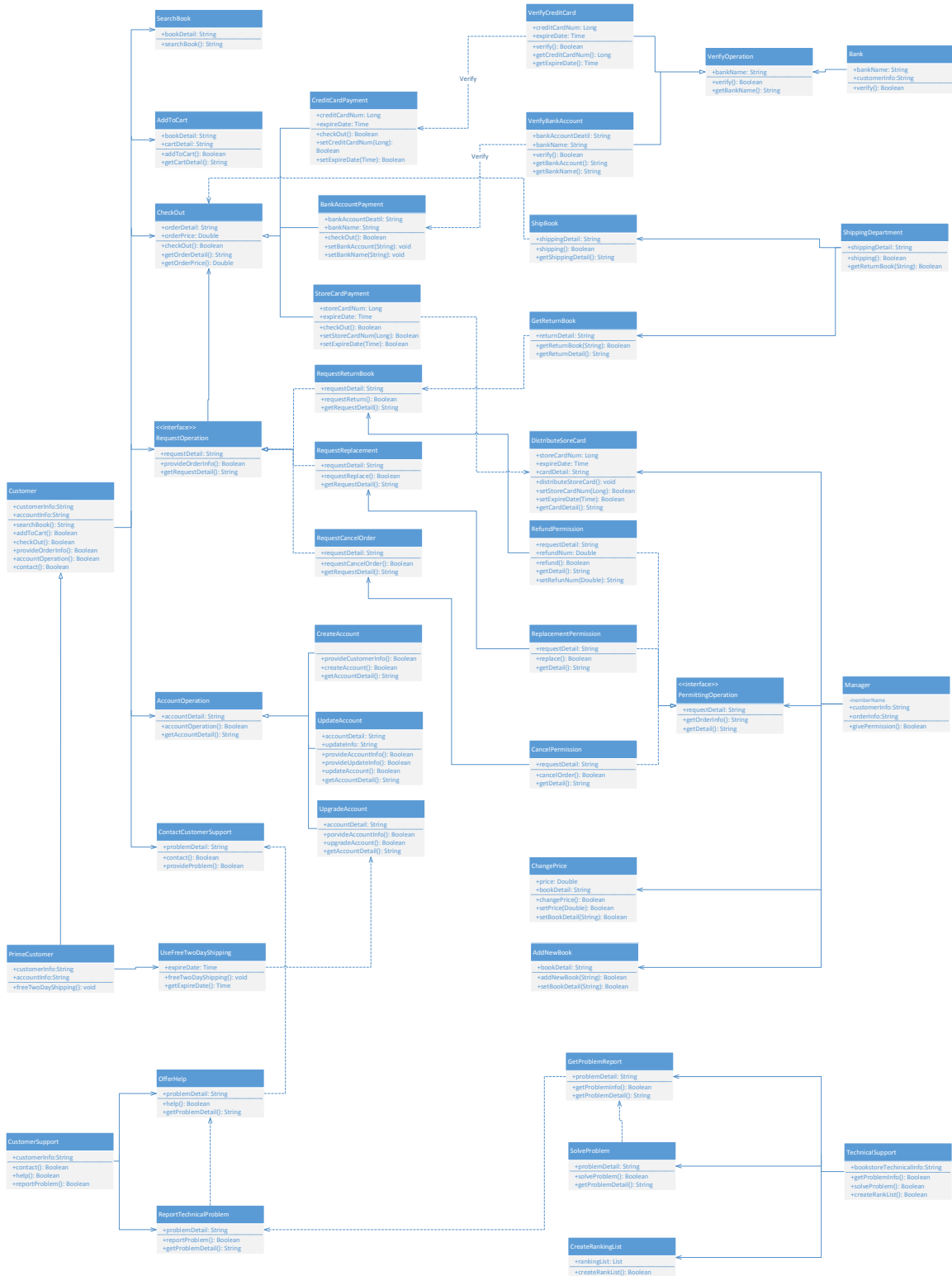
Use Case Diagram



Analysis Model

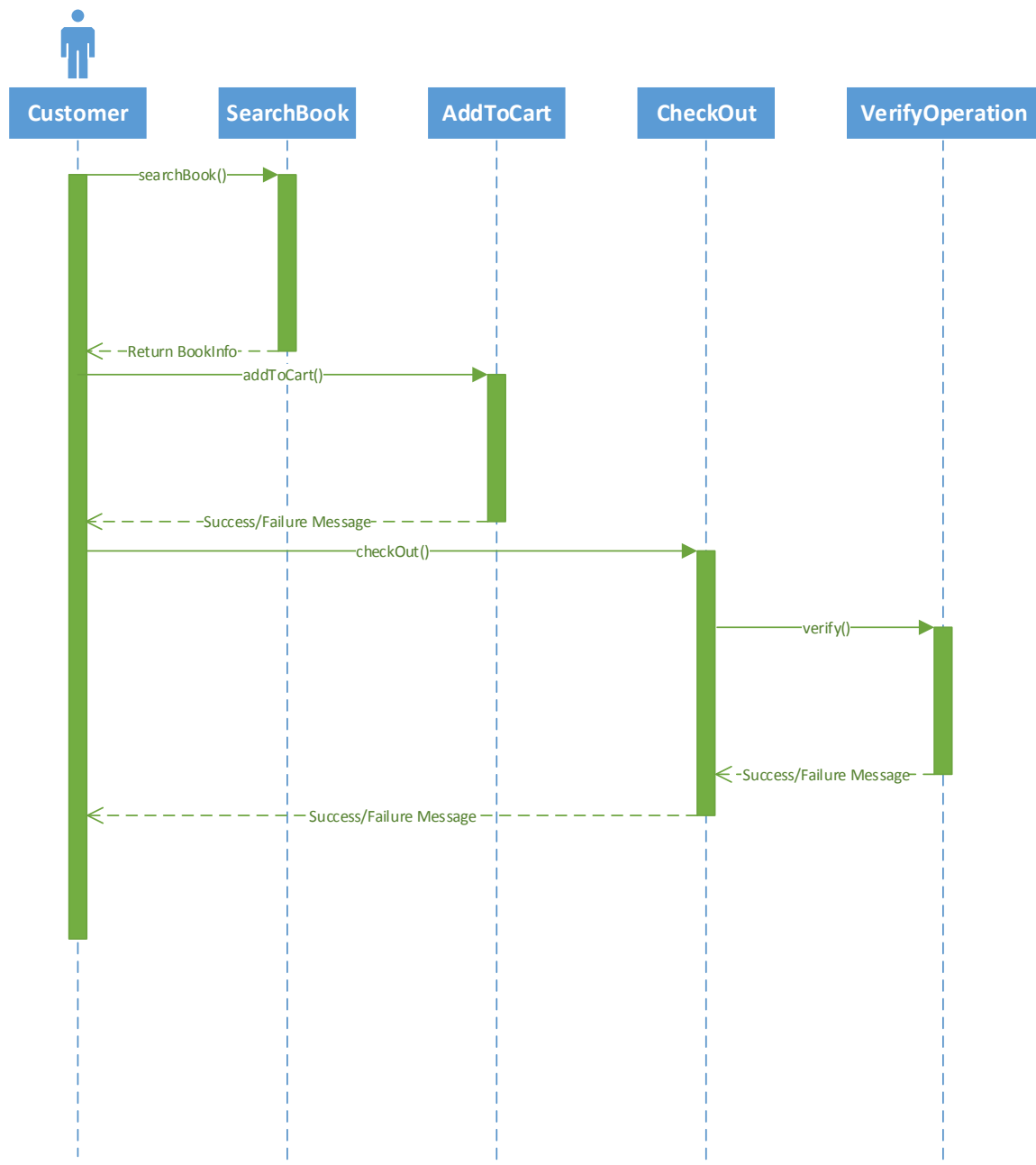


Design Class Diagram

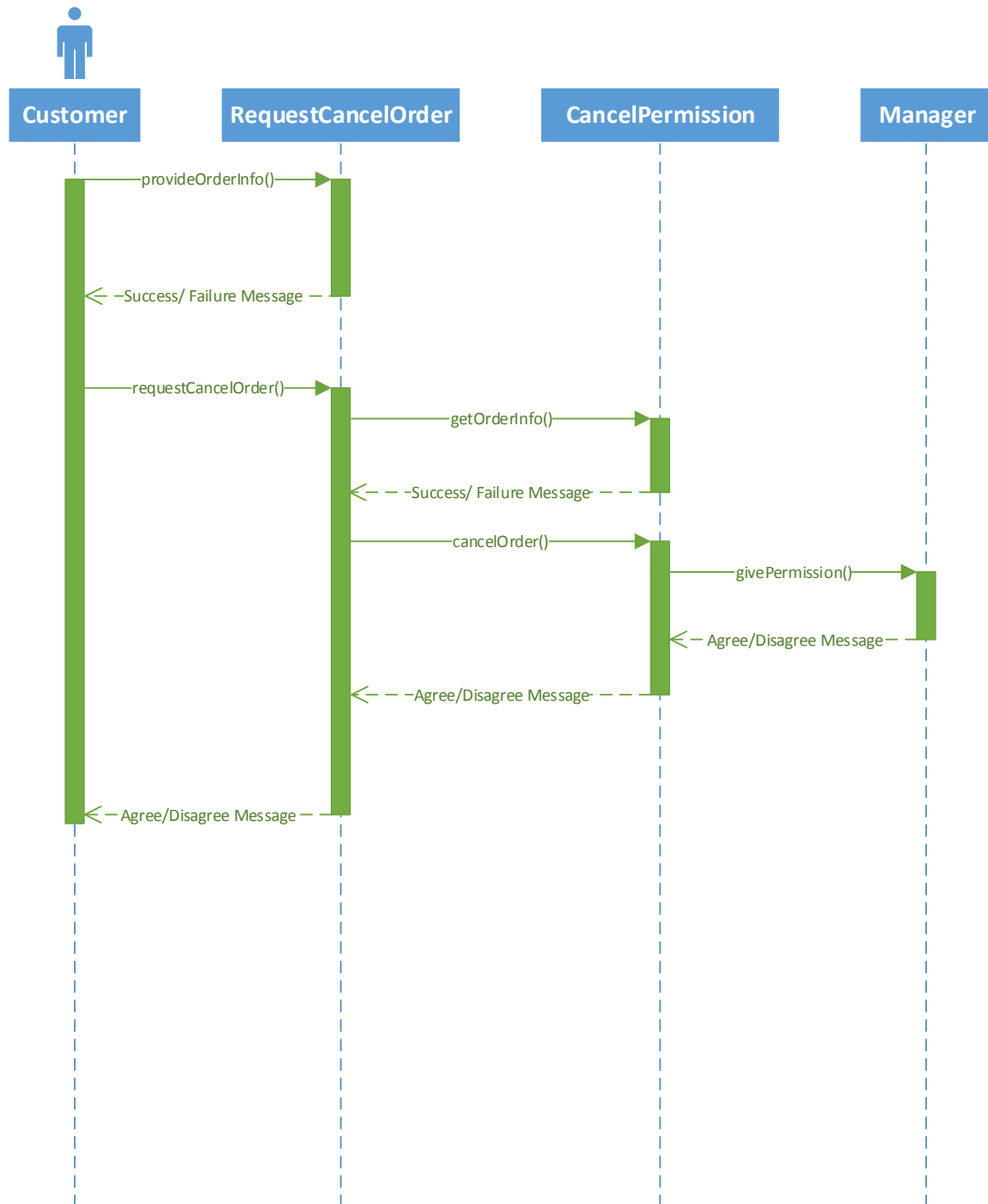


Sequence Diagram

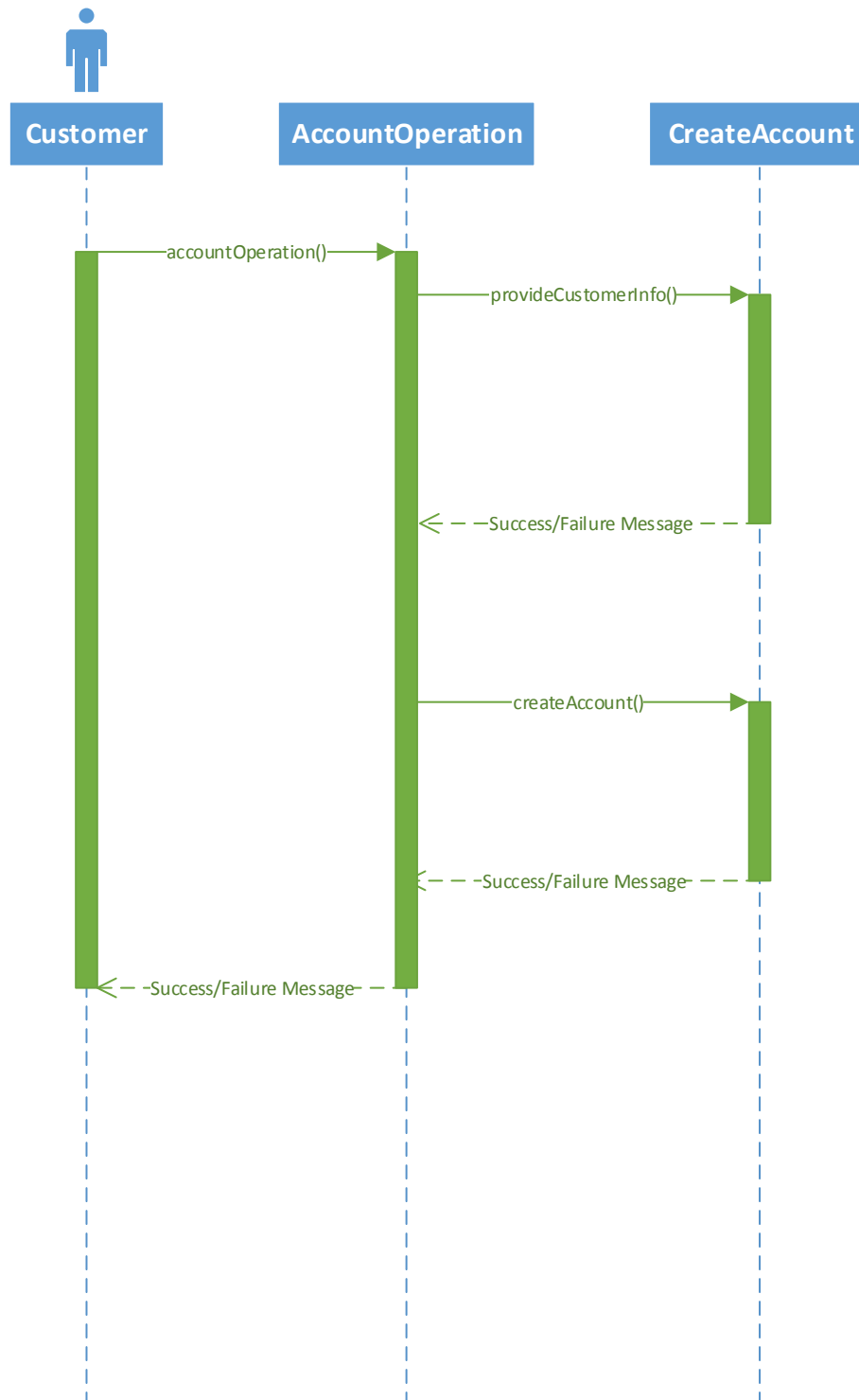
Buy Book



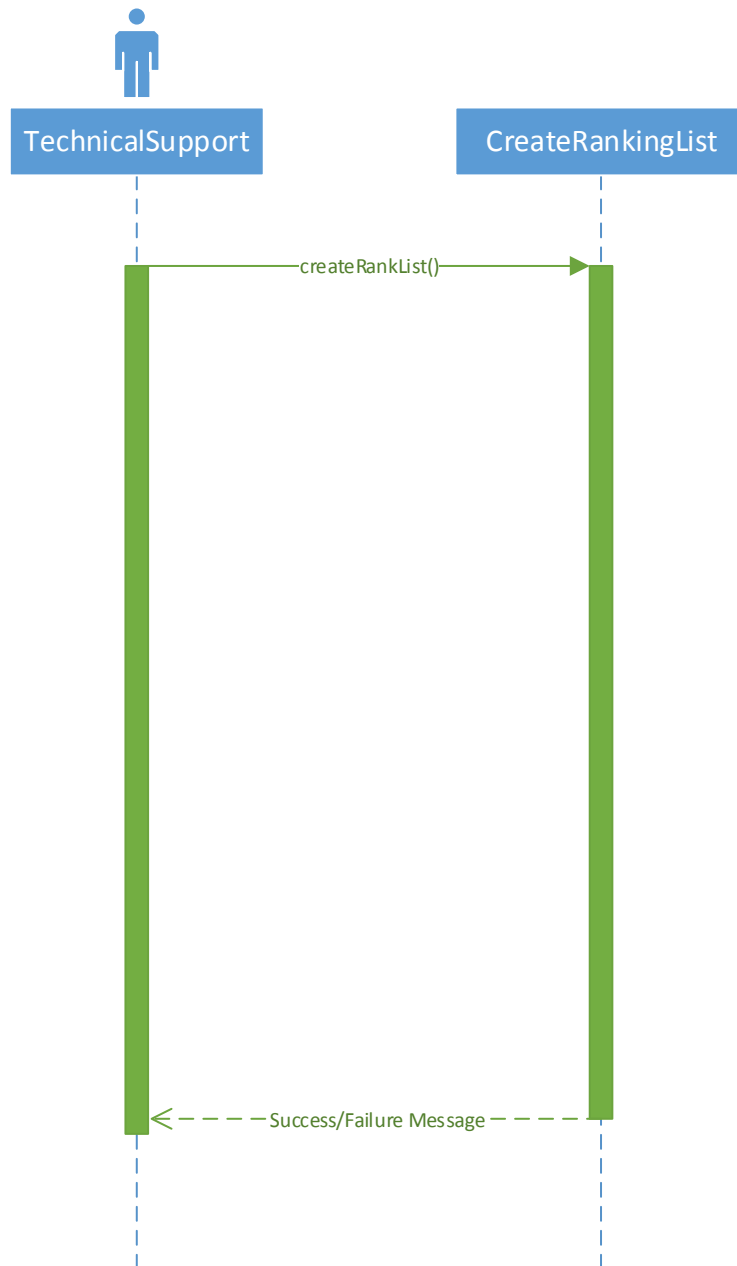
Cancel Order



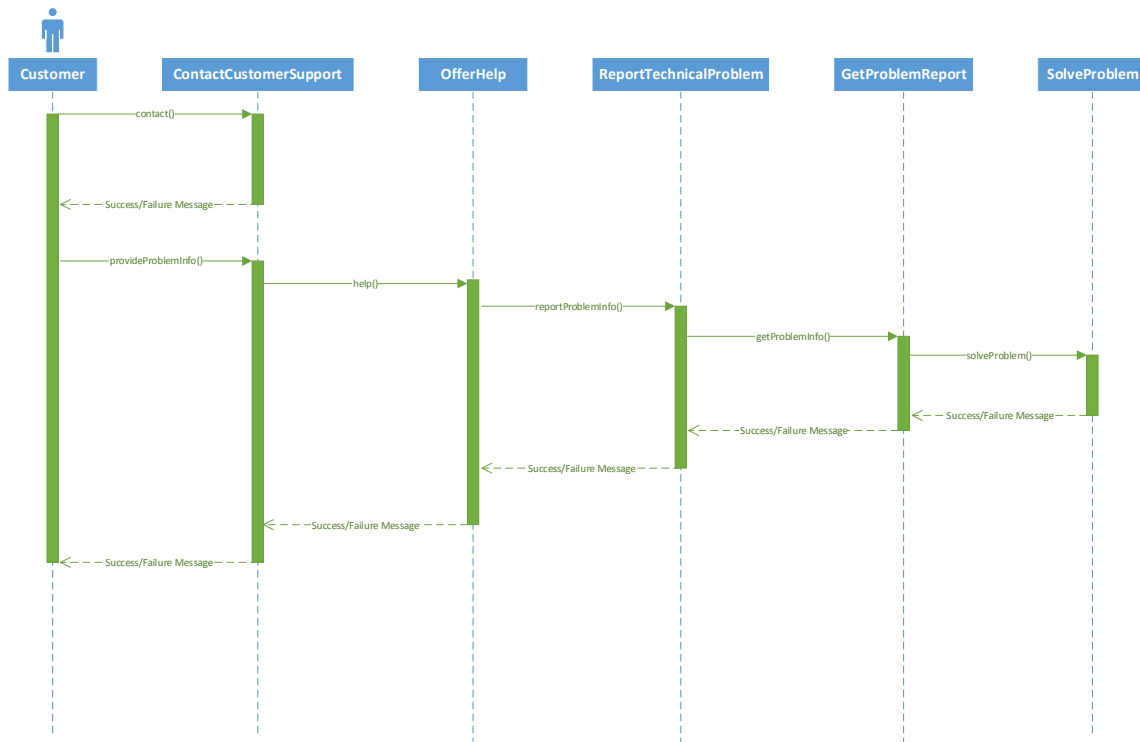
Create Account



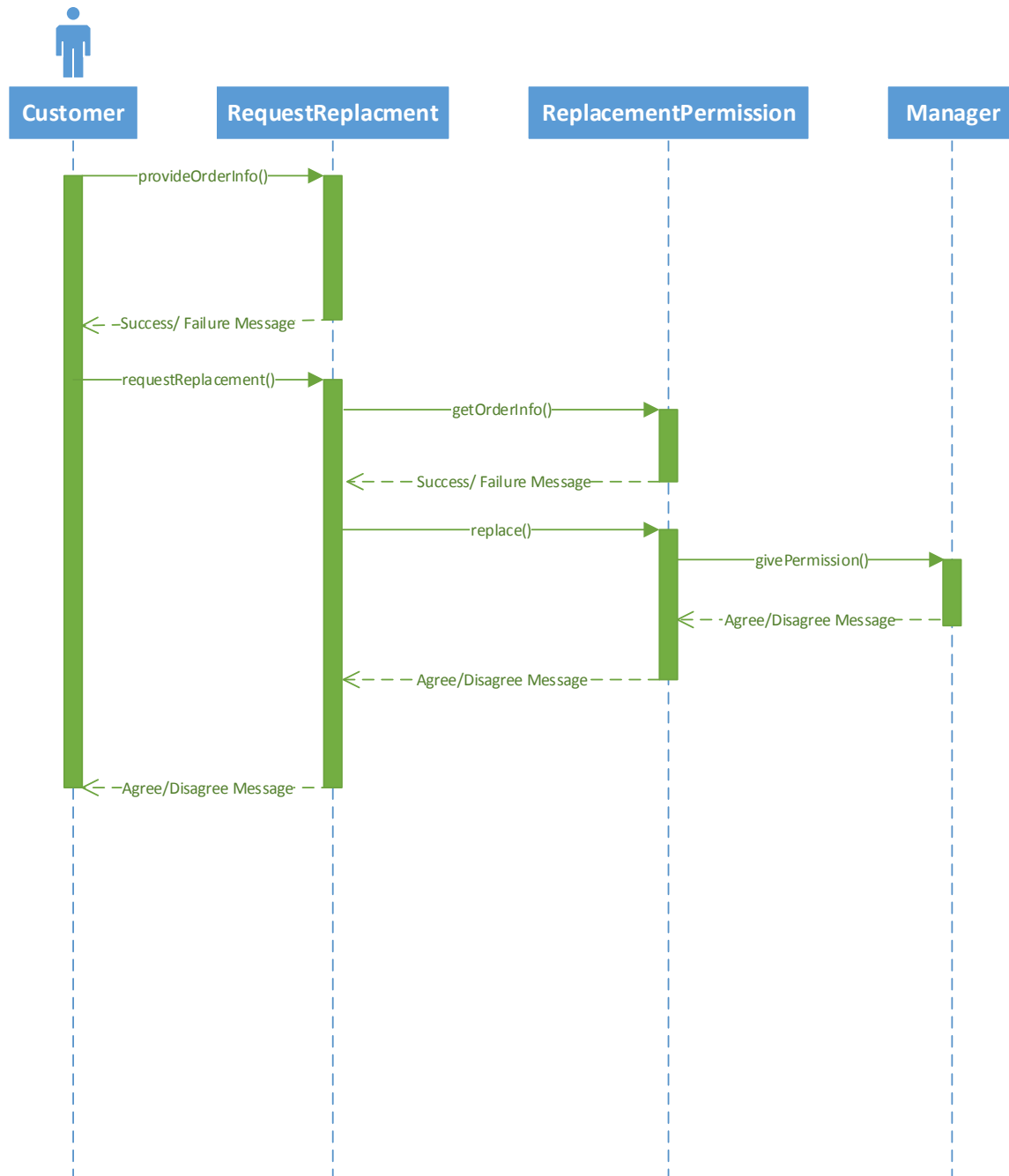
Create Ranking List



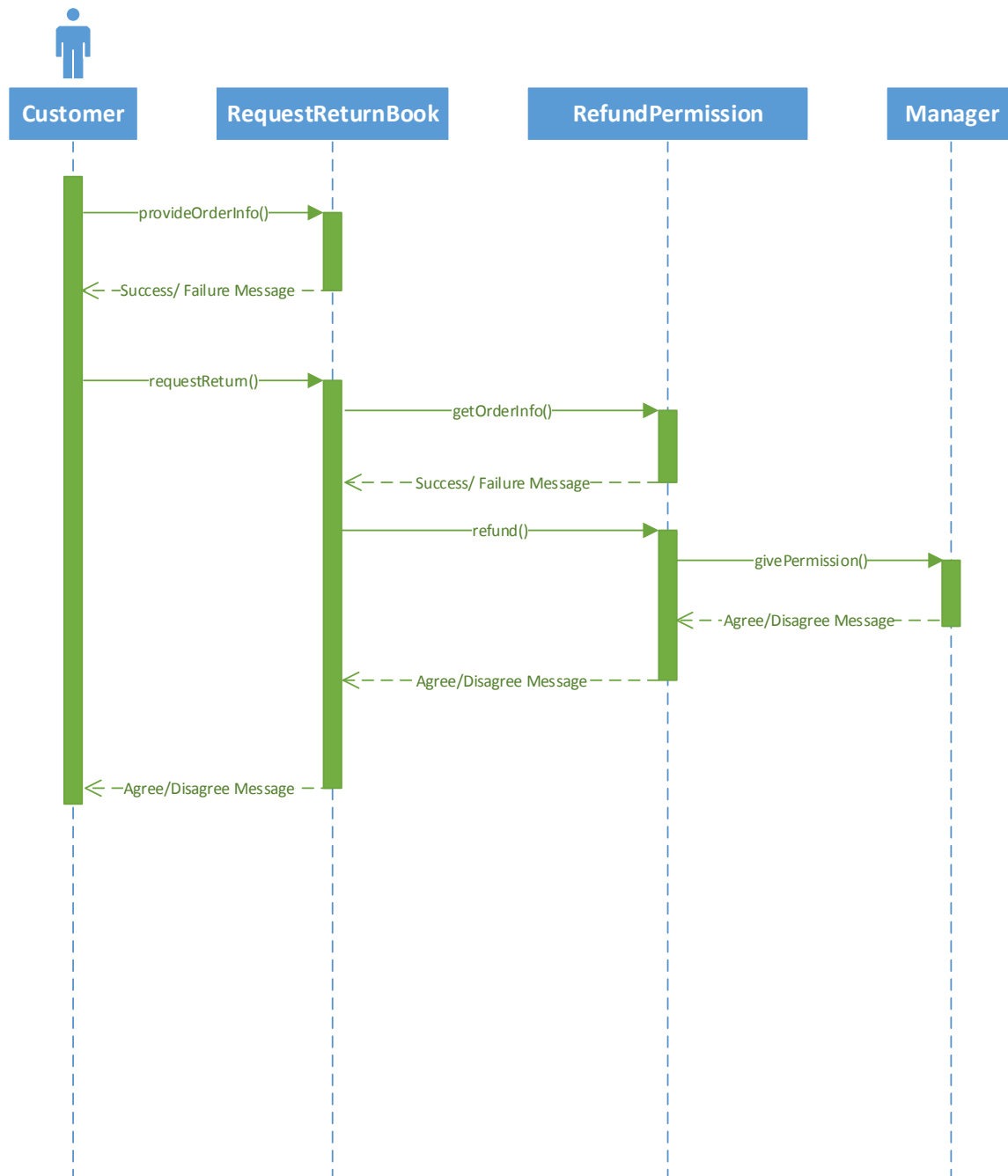
Help



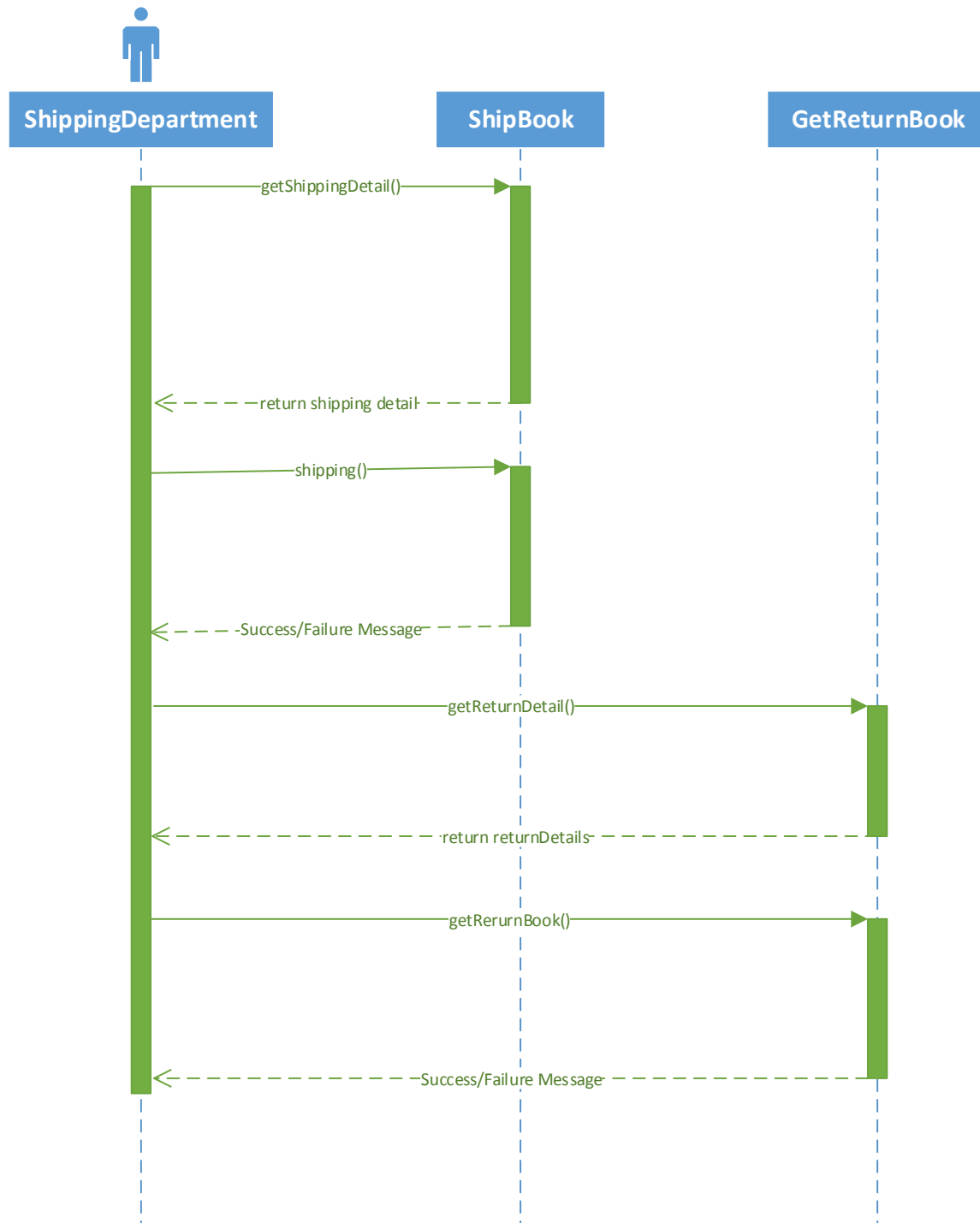
Replace



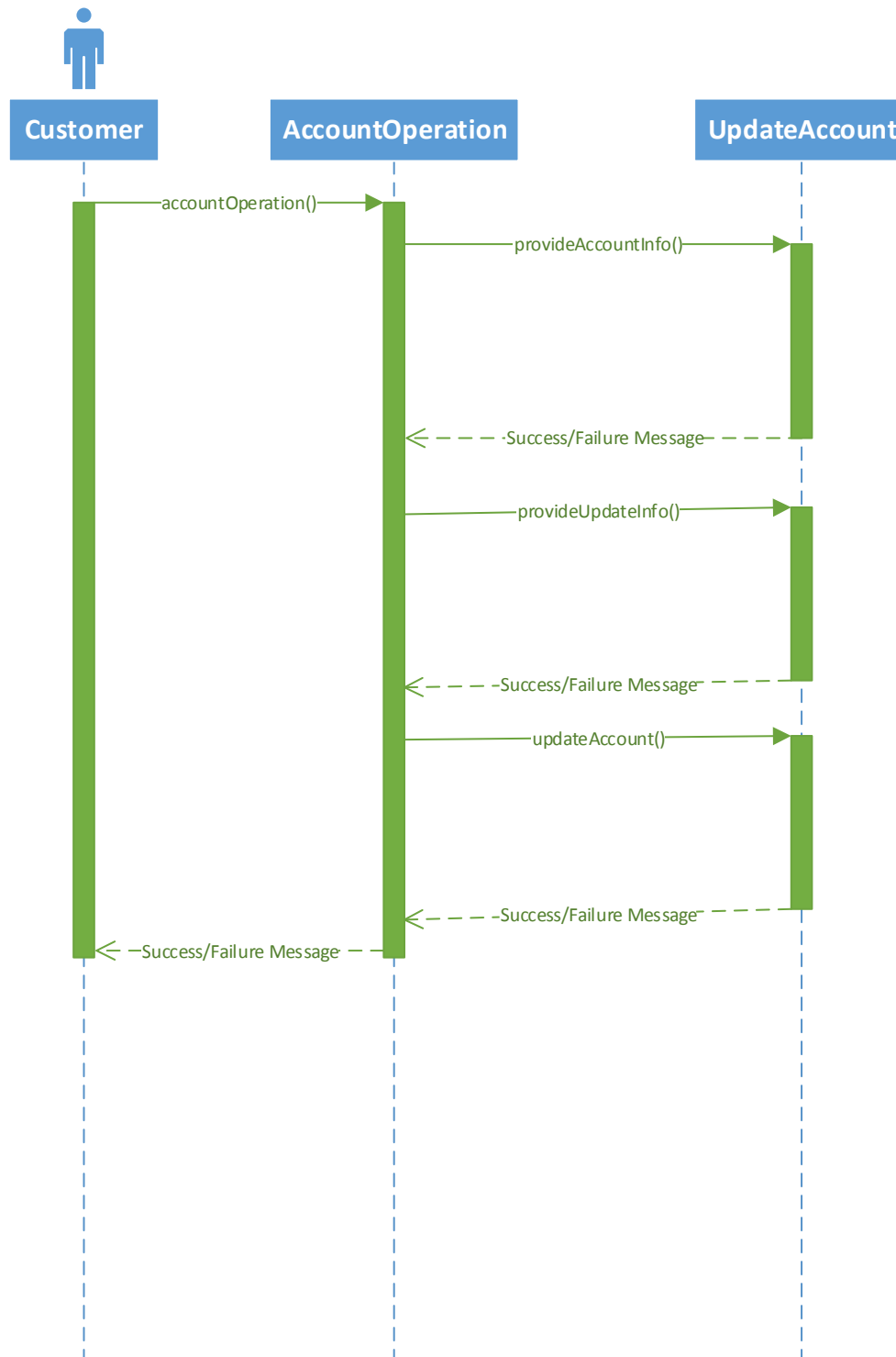
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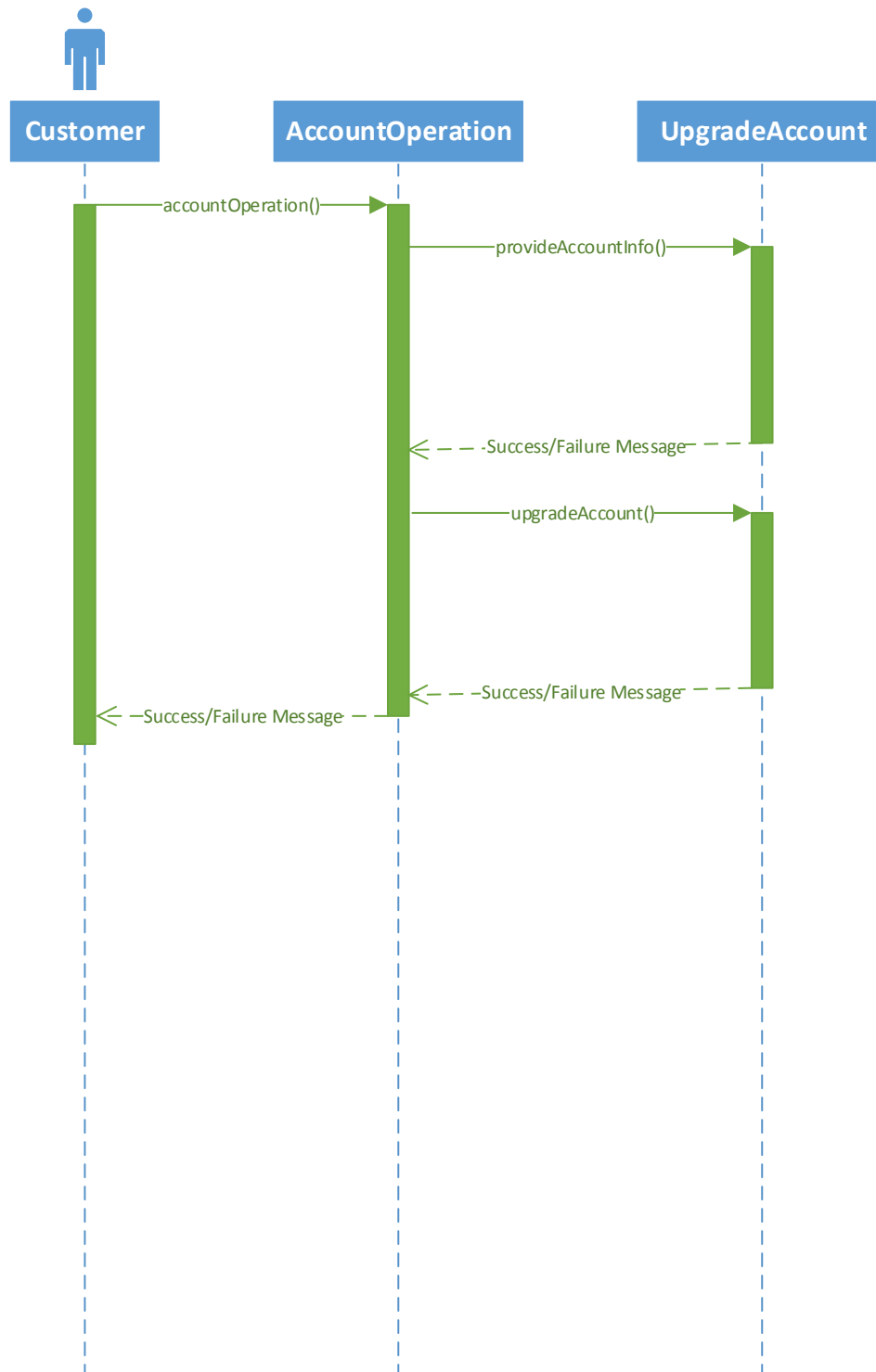
Shipping Operation



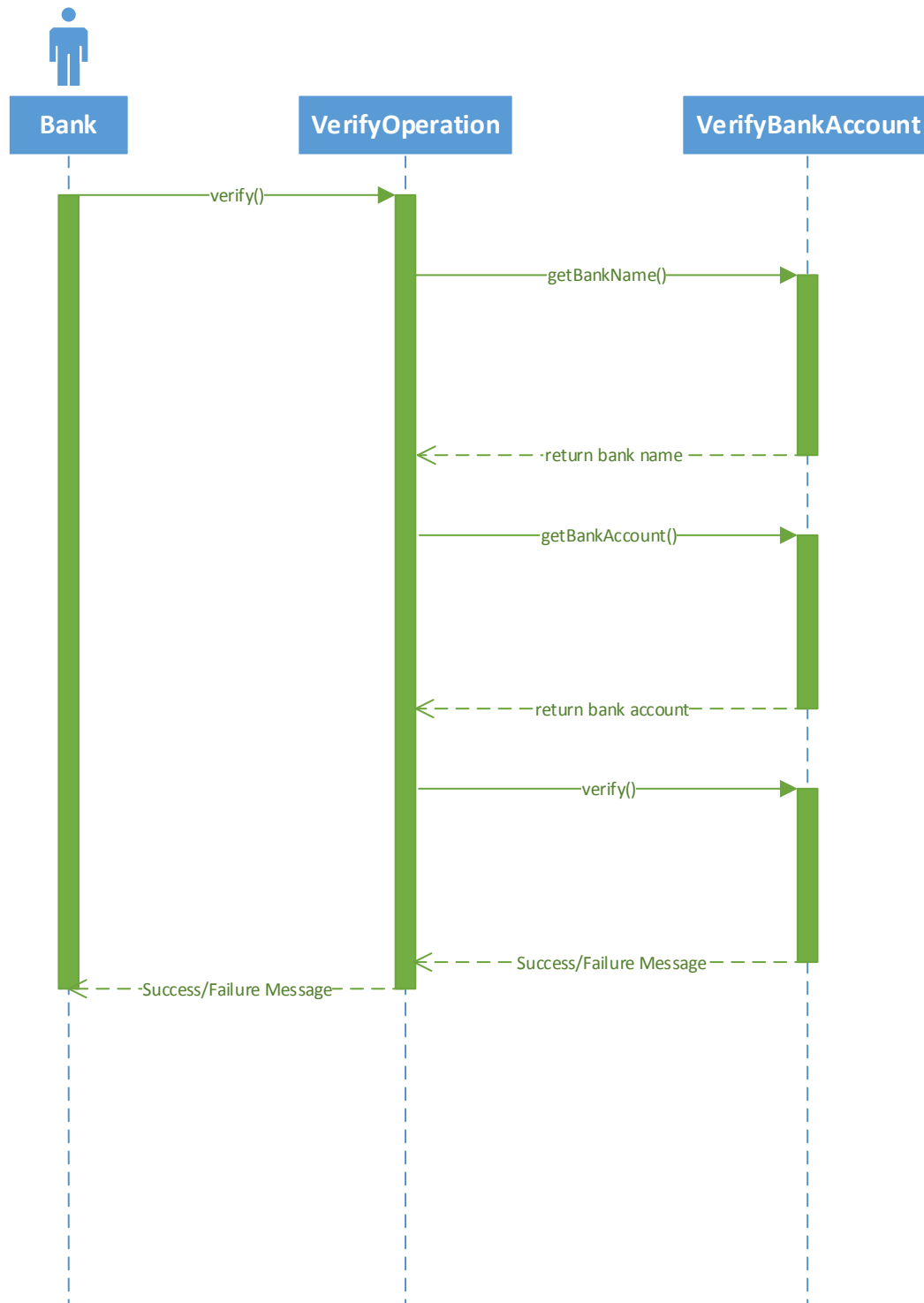
Update Account



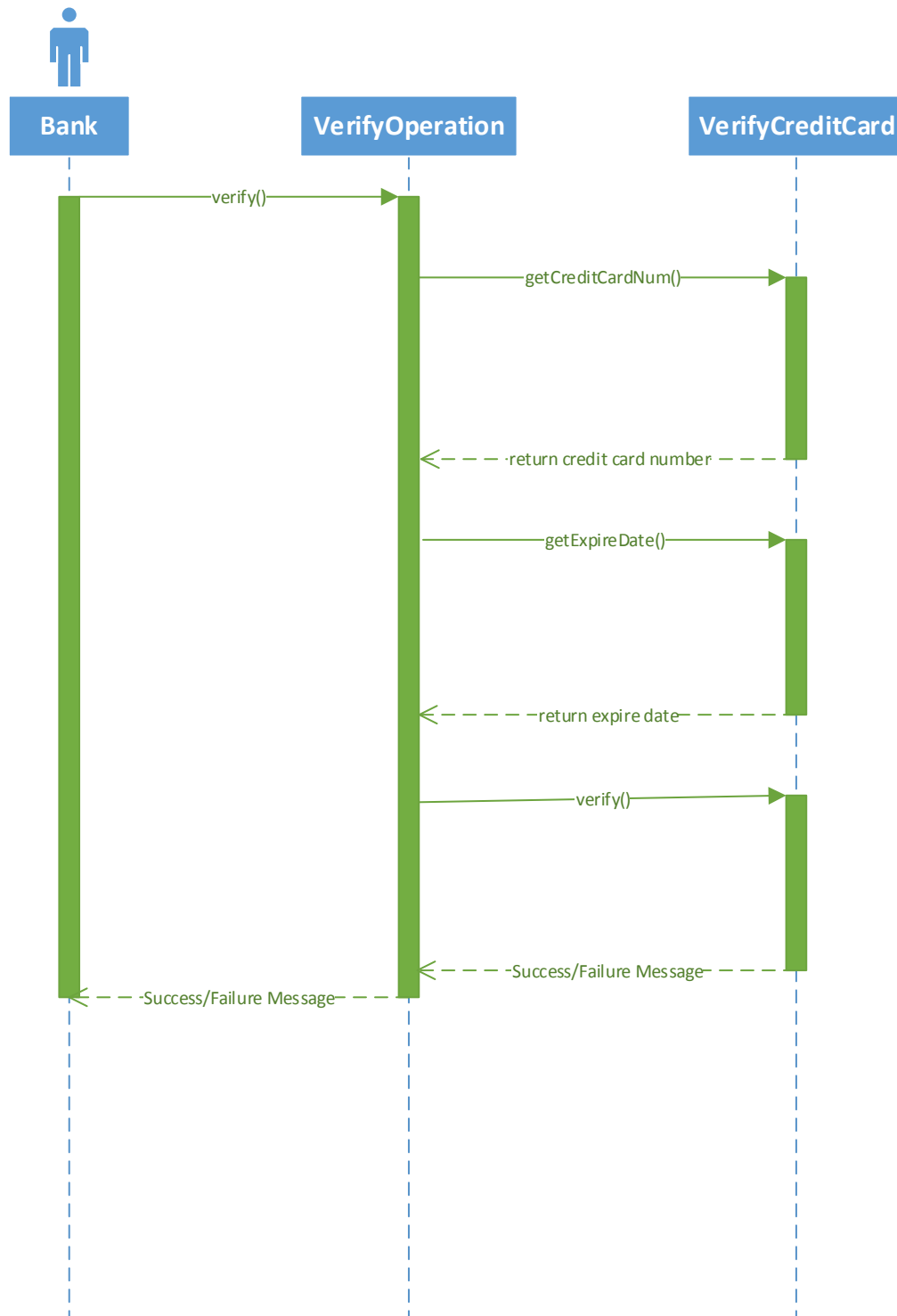
Upgrade Account



Verify Bank Account

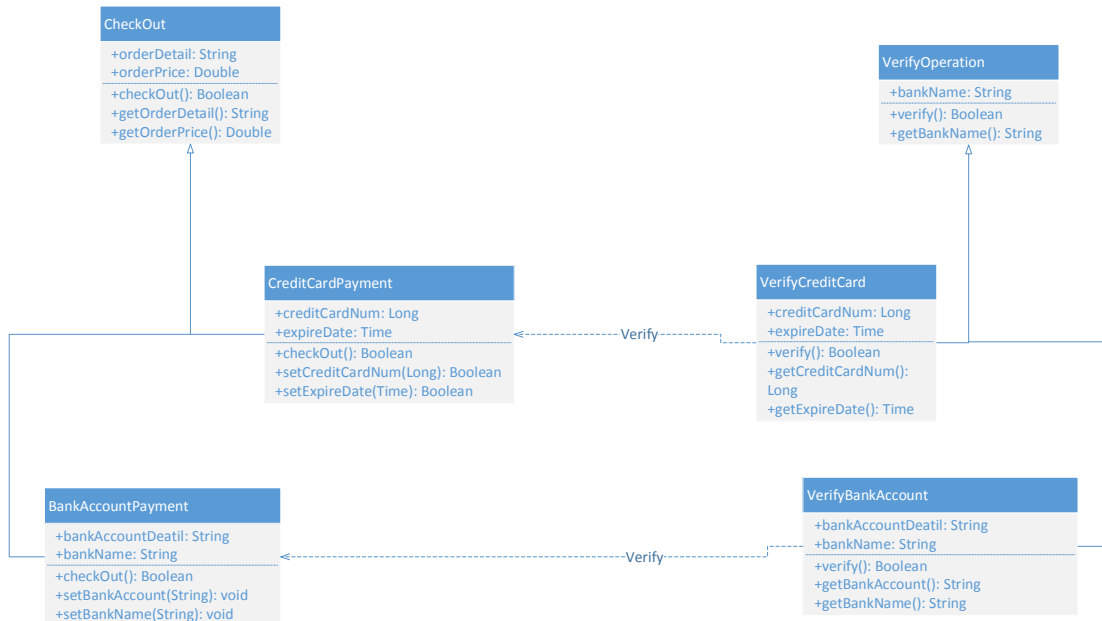


Verify Credit Card



Design Pattern

Factory Method

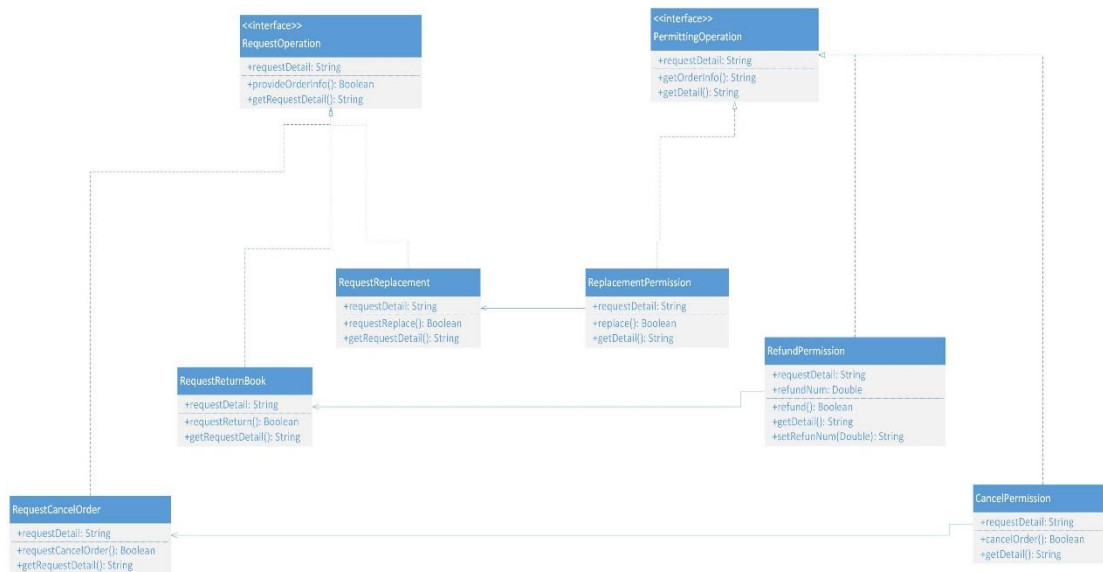


This part of design model describes customer's checkout and bank verification operations. In this diagram, the class "checkout" has two subclasses: "CreditCardPayment" and "BankAccountPayment". And the class "VerifyOperation" also has two subclasses: "VerifyCredit Card" and "VerifyBankAccount". Because bank has to verify credit card after customers choose the credit card payment method, the class "VerifyCreditCard" relies on the class "CreditCardPayment". It is similar in the relationship between "VerifyBankAccount" and "BankAccountPayment". The class "VerifyBankAccount" relies on the class "BankAccountPayment".

So for these two super classes, their subclass has one-to-one corresponding rely-on relationship. This is exactly the format of factory method design pattern. The class "VerifyOperation" is equivalent to "Creator" and the class "Checkout" is equivalent to "Product".

Hence, factory method design pattern is used in this part of design model.

Abstract Factory



This part of design model is used to deal with the request operations of customers and the permitting operations of manager. The concrete classes "RequestReplacement", "RequestReturnBook" and "RequestCancelOrder" implement the abstract interface "RequestOperation". Similarly, the concrete classes "ReplacementPermission", "RefundPermission" and "CancelPermission" implement the abstract interface "PermittingOperation". What's more, if a manager wants to give replacement permission to a customer, he/she has to use the information of the replacement request. So we can say that the class "ReplacementPermission" uses the class "RequestReplacement". Similarly, the class "RefundPermission" uses the class "RequestReturnBook" and the class "CancelPermission" uses the class "RequestCancelOrder".

So this is the format of abstract factory design pattern. Three concrete classes implement an abstract interface. The other three concrete classes implement another abstract interface. And these concrete classes has one-to-one corresponding use relationship.

Hence, abstract factory design pattern is used in this part of design model.