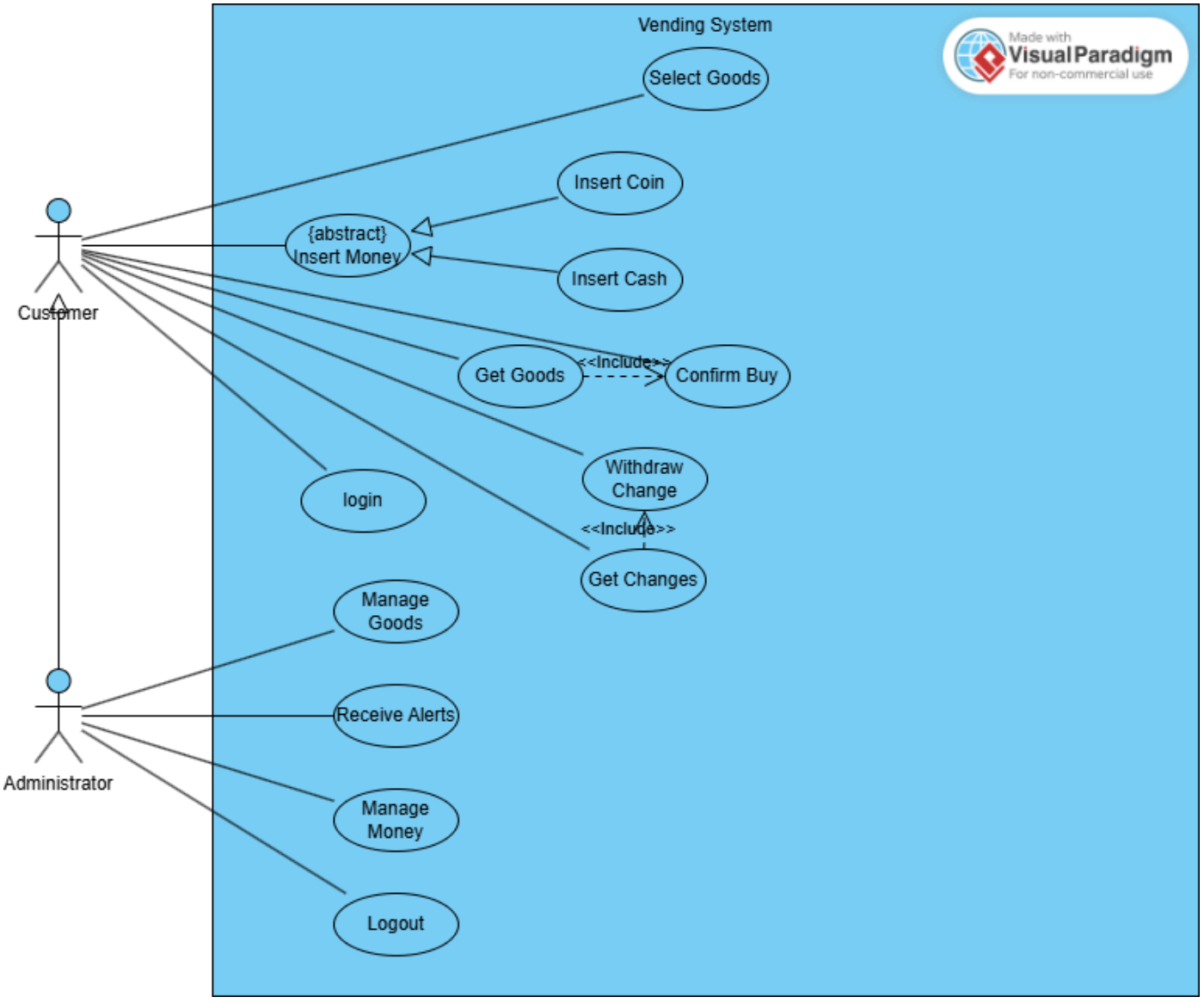
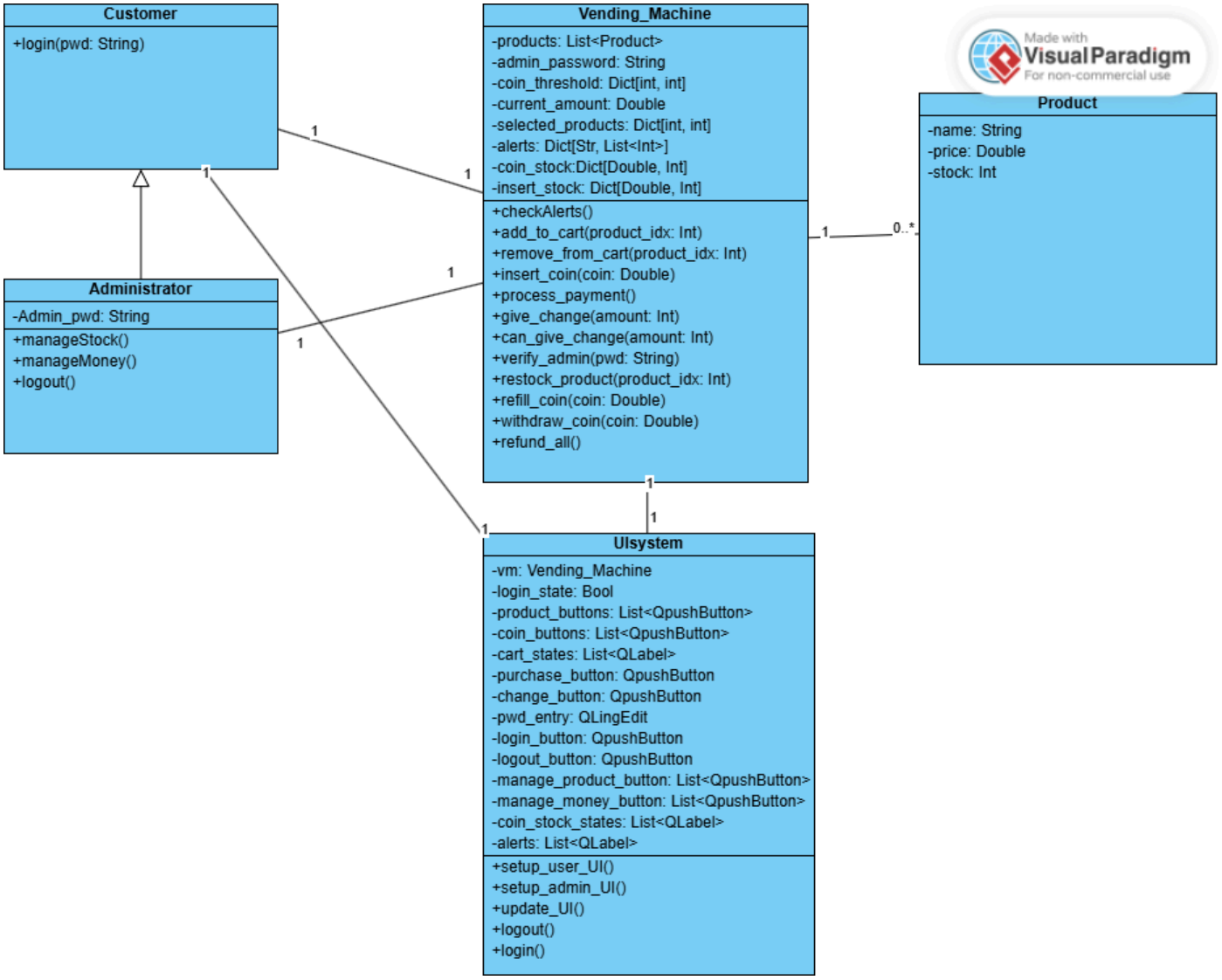
Use Case Diagram



According to the Use Case Diagram, a customer can select goods, insert money(coins or bills), confirm purchase and withdraw changes, as interactions towards the system. And he can get goods or changes for feedback. Also, he can try to login to interact as an administrator.

Administrator, on the other hand, can manage goods, manage money, or receive alerts, in case of lack of money to give change or lack of goods to be purchased. And he can use logout to cancel the control mode.

Class Diagram



From the diagram:

A customer can login with password, or make use of the operations that vending machine provides.

The admin inherit from normal customers, but he holds the password.

A admin can manage product stock and money, as well as logout, which is mentioned previously.

And a class of products is mentioned here, along with its name, price and stock.

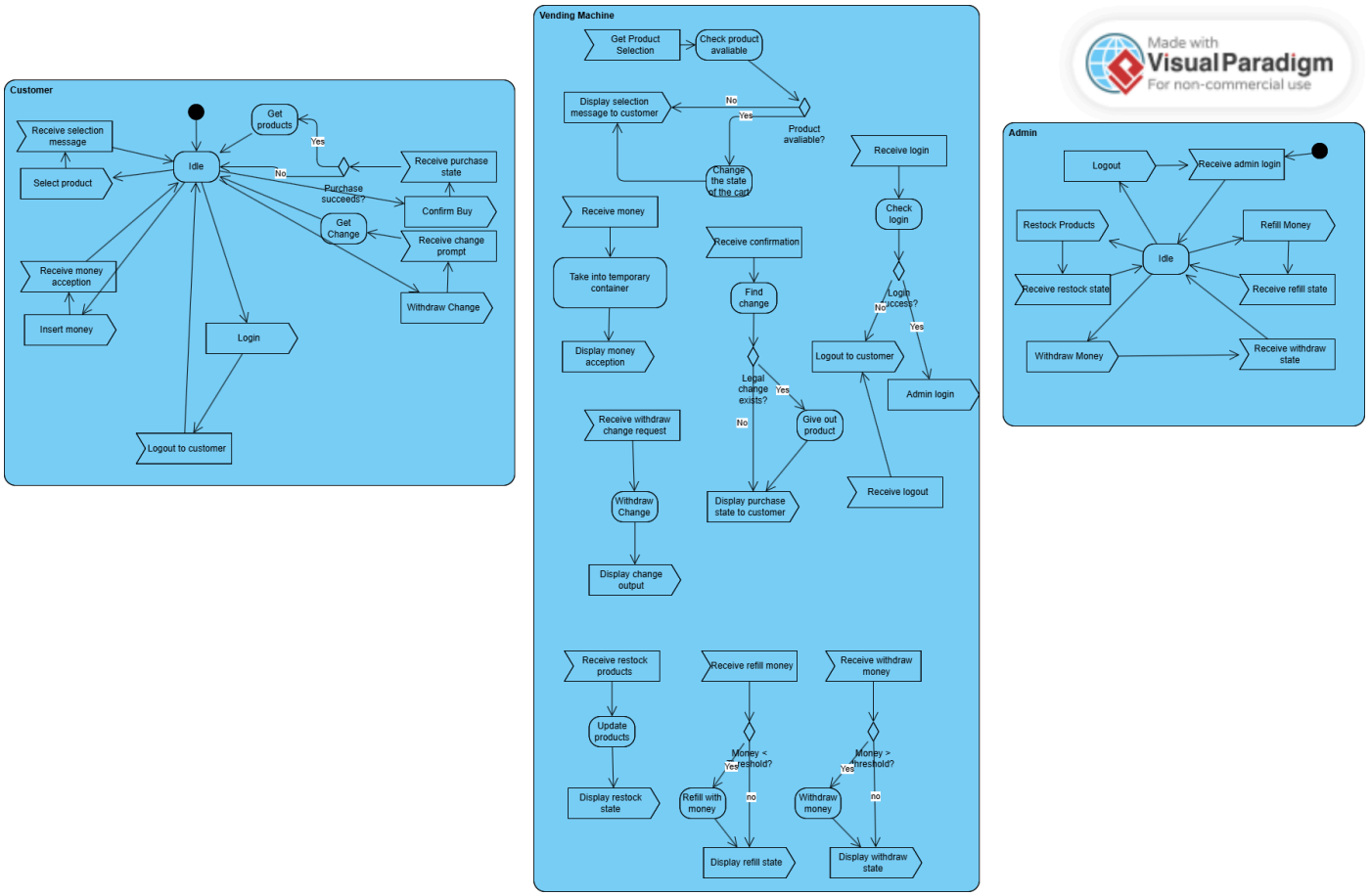
For vending machine itself, it holds a list of products, the correct admin password, ideal money threshold that should be in the machine(coin_threshold), current_amount that holds the user's put-in money, a list of selected_products as shopping cart, alerts that holds the recommendation for admin to manage the

machine, coin_stock that holds how much current currency the machine contains now, and a insert_stock that record the currency user puts in during purchase.

The machine should check and update the alerts, manage to add or remove products from cart, manage insert money, process purchase confirmation, find and give out change, check if login is valid or logout, provide admin with methods of manage products and money.

For UI system, it should contain the vending machine, login_state to determine whether it should show the admin panel, and all the required button and texts shown in the diagram. Notice that it's not required to really organize those button and labels as lists. It just explains that these kinds of buttons and labels are needed to provide users with display and interact ways. However, it's required that the buttons should directly connect with backend(VM) methods for efficiency.

Activity Diagram



Here, customer select product means customer select the product to be added to or removed from the cart. That's why we use "Change the state of the cart" statement to demonstrate the procedure.

Requirement points:

1. For Vending Machine:

   R1.1 Customer can add products into cart if products is available.

   R1.2 Customer cannot add products into cart if products is not available.

   R1.3 Customer can remove products from cart if it exists in the cart.

   R1.4 Customer cannot remove products from cart if it doesn't exist in the cart.

   R1.5 If customer inserts valid money, it will be accepted.

   R1.6 If customer inserts invalid money, it will not be accepted.

   R1.7 Customer can login with correct password.

   R1.8 Customer cannot login with incorrect password.

   R1.9 The machine can find change using greedy algorithm.

   R1.10 If change cannot be found, purchase cannot be confirmed.

   R1.11 If change can be found, purchase can be confirmed.

   R1.12 Purchase can be confirmed only if customer provides enough money.

   R1.13 Only admin can restock products.

   R1.14 Only admin can refill money.

   R1.15 Only admin can withdraw money.

   R1.16 The replenishment for one product that admin makes should always reach exactly 20.

   R1.17 Money can be refilled only if the amount of that kind of money is lower than the corresponding threshold.

   R1.18 Money can be withdrawn only if the amount of that kind of money is greater than the corresponding threshold.

   R1.19 One can logout only if he has logged in.

R1.20 Customer can take back money only if he has inserted money.

R1.21 Admin can see alerts in admin panel.

2. For UI system:

   R2.1 The state of cart should be displayed on the customer panel.

   R2.2 Admin panel should be hidden initially.

   R2.3 A login password entry should be initialized initially.

   R2.4 Successfully login will show the hidden admin panel.

   R2.5 Login will deactivate the login entry.

   R2.6 Logout will hide the admin panel.

   R2.7 Logout will re-activate the login entry.

   R2.8 Amount of inserted money will be shown on customer panel correctly.