CS335 SOFTWARE ENGINEERING & SOFTWARE PROCESS

2021-2022

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Declaration

We hereby certify that this material, which we now submit for assessment as a continuous assessment project in CS335, Software Engineering & Software Process, is entirely our own work and has not been submitted in whole or in part for assessment for any academic purpose other than in fulfilment for that stated above.

Signed:

Rebecka Mangrah,
Date: 08/05/2022

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Contribution for project development

Responsibilities	Member
Point 1: elicit a substantial set of software requirements	C̶ and Rebecka
Point 2: develop UML diagrams	Rebecka
Point 3: mock-up user interface	
Point 4: develop system tests	Rebecka and C̶
Document editing	Rebecka
Final review	C̶ and Rebecka
Video presentation	

Both members have equally agreed to the abovementioned responsibilities. Even though some of the project responsibilities have been produced separately, all members have reviewed and agreed on the content of each part. Moreover, suggestions and improvement have been prioritised among the members to ensure the quality of this project.

Point 1: Software requirements elicitation

Project Scenario

J&J is a well-known retail company in the retail industry in Ireland. The company currently sell their products in their shops. The only IT infrastructure owned by the company is their website in which the available in-store clothes, accessories and shoes are displayed.

The company would like to expand their business online through an integrated software system to allow customers from European countries to buy from their website.

The objective of this project is to provide an interactive web-service that allows the company's customers to select their desired clothes they want to purchase, pay for them and automatically send a receipt to their emails.

Software system focus: online payment system.

Used technique for requirements elicitation: stories & scenarios

When the user opens the website, he/she must select the quantity needed for an item and click on add to basket under the image of the clothes they want to buy. Then click on the basket icon to review all the products that she/he wants to buy. If the user wants to remove an item, the "remove" button should be selected on the right side of the image else to proceed the "continue to checkout" button should be selected at the bottom-right of the page.

The website will redirect the user on the checkout page where he/she should insert their personal shipping and credit card details. After inserted their details, the user should click on the "confirm payment" button to confirm their purchase. During the confirmation process, a "processing your purchase" message should be displayed until the user personal details has not been verified.

Finally, a message confirming the purchase should be displayed and a receipt should be sent to the user email.

Requirements elicitation

<u>Functional Requirements</u>

1) The confirmation window should be able to verify the personal information details (If not verified then the unverified information should be highlighted in red with a message "Error: insert your correct data" at the bottom of the window page).

2)Users should be able to close the confirmation window and go back to the basket section.

3)Users should be able to select their country to be able to view and purchase the available products

4)Users should be able to remove items from the basket selection.

5)Users should be able to view the total cost (include shipping fees) of their purchase on the basket section.

6) The system should be compatible with all types of browsers.

<u>Non-functional requirements</u>

1) When the system has reached its maximum capacity of processing personal details, no further users should be allowed to proceed with their purchase.

2) The system should accommodate a maximum of 300 users to proceed with their purchase.

3)The system should be able to verify personal and bank details in no more than 3 minutes.

4) When processing and verifying customer's sensitive information, the system shall not display it by default

POINT 2: UML diagrams

This section will describe a complete set of UML diagrams divided into Use case, Sequence diagram, Class diagram and architectural diagram. As our presumed client did not ask to include a software system to identify registered and unregistered customers, the UML diagrams have been designed purely focusing on the online payment software system.

Use case
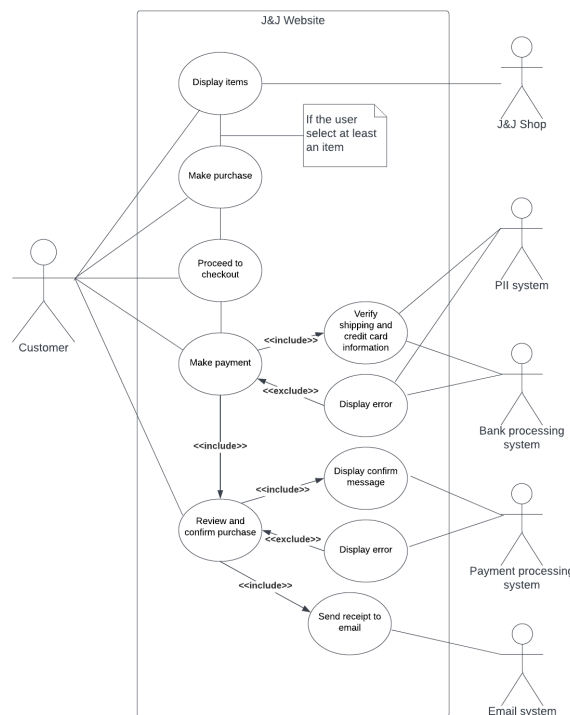
The Use Case diagram has been developed for J&J Website system. The primary actor for this software system are the web-customers while the secondary actors are the PII (Personal Identifiable Information) system, bank processing system, J&J shop, payment processing system and email system. J&J website system allows customers to view the available items, review items that need to be purchased, proceed to checkout which will prompt the customer to insert their shipping and credit card information and confirm their purchase.

Both the "make payment" and "review and confirm purchase" use cases have included or excluded base case. When a customer inserts their shipping and credit card information, the PII and bank processing system are automatically called from the J&J system to verify the customer's

information. If the information is verified, the main system will direct the customer on a refreshed page to confirm their purchase else it will display an error message on each of the parts that has not been verified. On the other hand, once the customer has confirmed their purchase, the main system will call and connect to the payment processing system which will automatically display a confirmation message once confirmed and a receipt will be sent to the customer email through the email system.

The primary actor has a relationship with all the displayed use cases while the secondary actors only have a relationship with the "make payment" or "view item" use cases. The customer authentication system will only verify customers shipping information while the credit card processing system will verify customer's credit card information. J&J shop has only access to the main website where the items are displayed to make any changes on their inserted information.

Sequence diagram
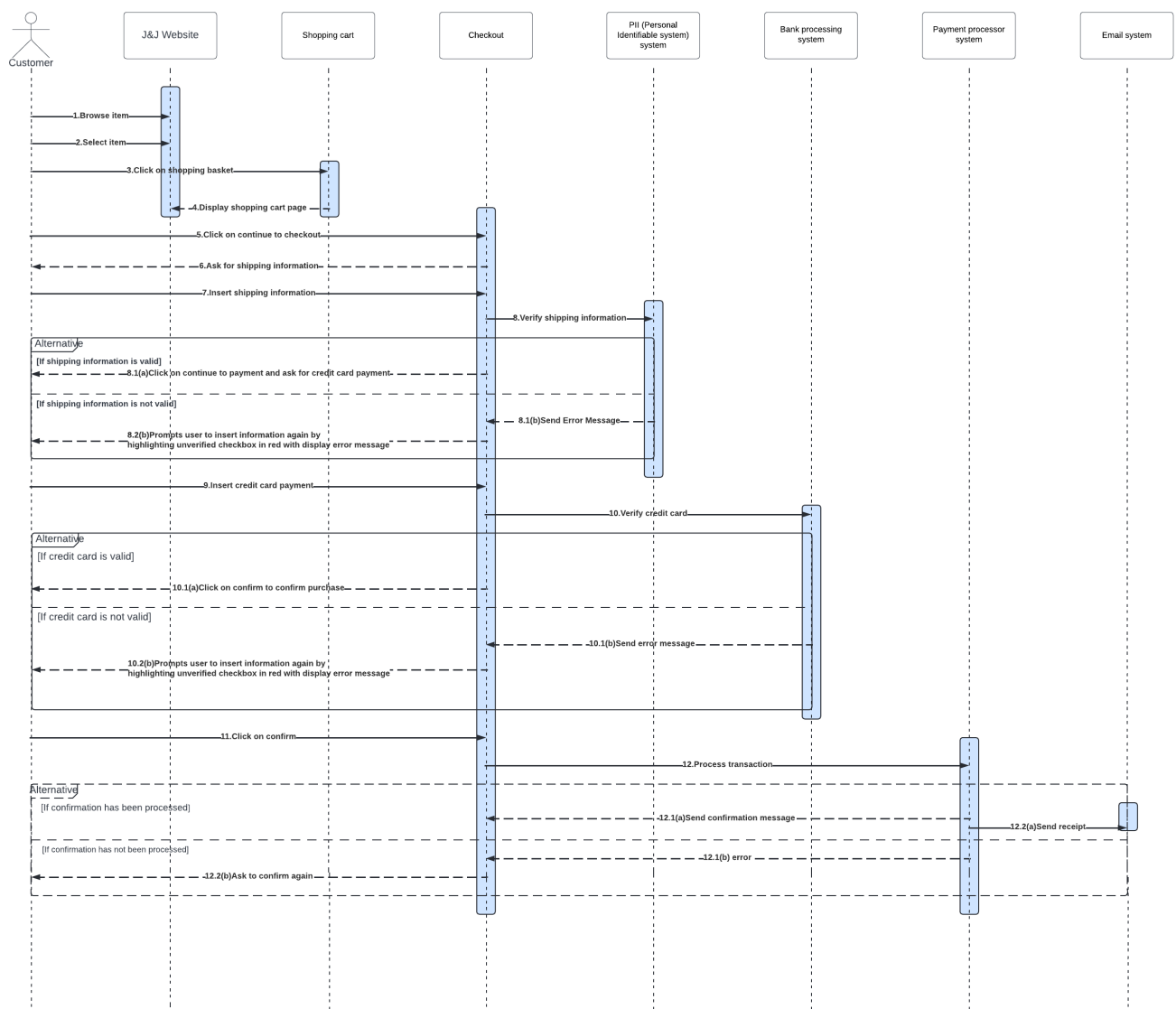
The sequence diagram presents the process to purchase an item through J&J Website. The parts involved are the customer, J&J website, shopping cart, checkout, PII system and bank processing system, payment processor system and email system. The part that is the most active during this process is the checkout part as it is the focus of the purchasing process. When a customer would like to make purchase he/she will firstly browse (1) through J&J website and select their desired item/s (2). After selecting their items, the customer will click on shopping cart (3) to review their selected items and then click to "continue to checkout" (5) to proceed with their payment. The website will redirect the customer to the checkout page where it will ask the customer to insert their shipping information (6). When the customer has inserted their shipping information (7) and clicked on continue to payment, the main system will proceed to verify the information (8) by calling and connecting to the customer authentication system. If the shipping information is valid, the checkout page will automatically prompt the customer to insert their credit card information (8.1(a)), else the customer authentication system will send an error message (8.1(b)) and the unverified checkbox will be highlighted in red with the display of an error message (Error: insert your correct data) (8.2(b)). After the shipping information has been verified, the customer will have to insert their credit card information (9), the main system will again proceed to verify the information (10) by calling and connecting to the credit card authentication and processing system. If the credit card information is valid, the checkout page will display a review of the product that will be purchased and ask the customer to confirm to proceed with the transaction (10.1(a)), else the credit card authentication and processing system will send an error message (10.1(b)) and the unverified checkbox will be highlighted in red with the display of an error message (Error: insert your correct data) (10.2(b)). Once the customer has clicked on the confirm button (11), the main system will proceed with the transaction by calling and connecting to the payment processing system (12). If the transaction has been successful a confirmation message will be displayed (12.1(a)) and a receipt will be sent to the customer's email address through the email system (12.2(a)). If the transaction has not been verified, the payment processing system will send an error message (12.1(b)) and the customer will need to click on the confirmation button again (12.2(b)).

Class diagram
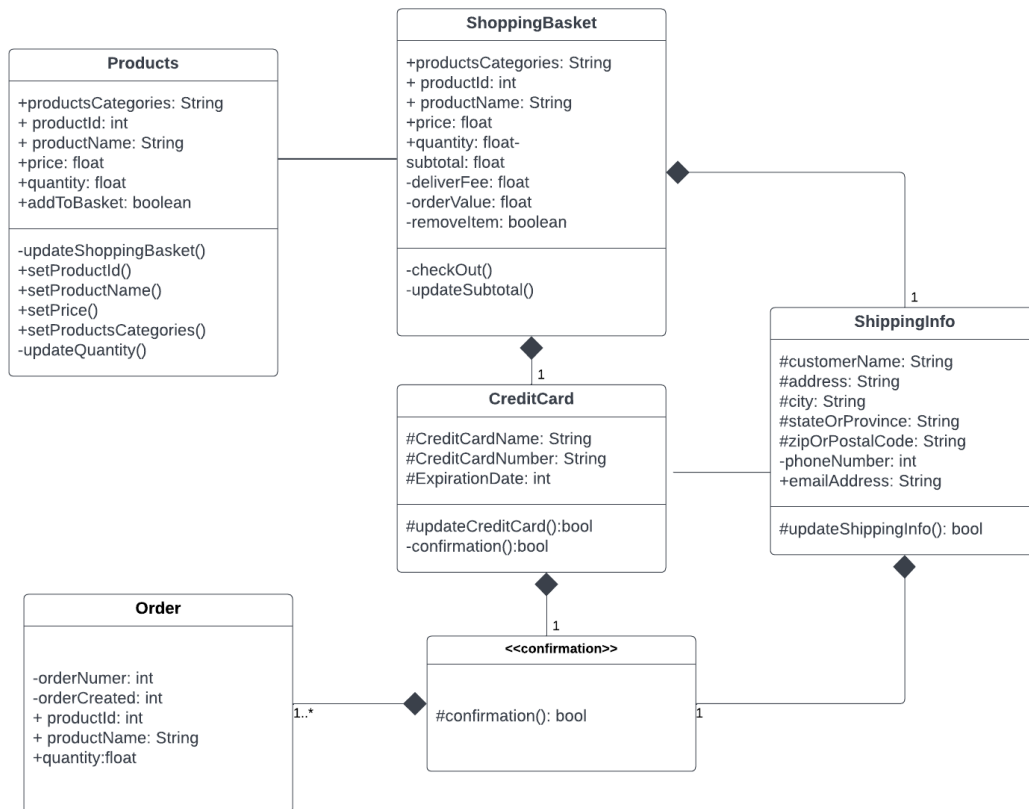
The class diagram has six classes to represent the purchase flowchart. The Products class has six attributes which describe the details of the products (category (productsCategories), id (productid), name (productName), price(price)) in addition of quantity and add to basket attributes. While the attributes representing the detail of the product can be modified at any time, the updateShoppingBasket and updateQuantity will constantly check for any updates. The ShoppingBasket class contains nine attributes. This class inherits all the attributes describing the details of the products with the addition of remove item (removeItem), subtotal (subtotal), order value (orderValue) and deliver free(deliverFee) attributes. The checkout () method checks if the system will need to the customer to checkout page while the updateSubtotal () constantly updates if any item has added or removed. The ShippingInfo class has seven attributes representing the customer's full name (customerName), address (address), city (city), state or Province

(stateOrProvince), zip or postal code (zipOrPostalCode), phone number (phoneNumber) and email address (emailAddress). The updateShipping () method will constantly checks for any updates. This class differently from the previous two depends on the ShoppingBasket class as it would not exist if the ShoppingBasket class did not exist and can store or update only one customer's shipping information. Similarly, the CreditCard method depends on the ShoppingBasket method. This class has three attributes representing the customer's name on the credit card, the credit card number and expiration date. The updateCreditCard () method will check from any updates. The confirmation class will only check if the customer wants to confirm their purchase and it is depended to the CreditCard and ShippingInfo classes. Moreover, there can only be one confirmation process at a time. Finally, the Order class is only called if the confirmation class is true. This class contain five attributes displaying the number of the order (orderNumber), when the order has been created (orderCreated), the purchased product's id (productid) and name (productName) and the product's quantity (quantity).

Architecture diagram
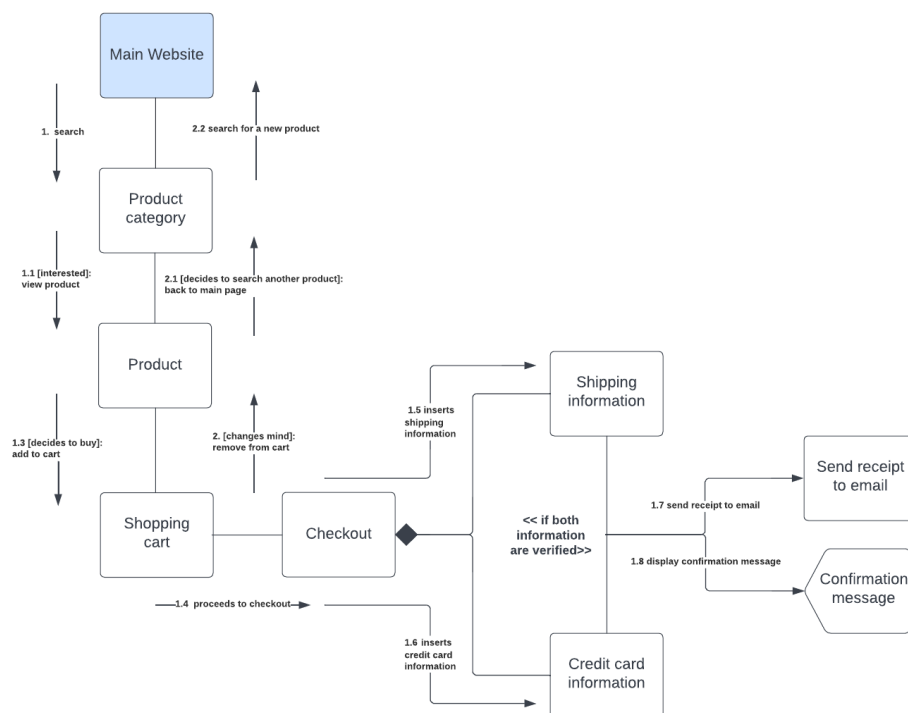
The architecture diagram illustrates the main components of the J&J system. The system activates when the customer access to the main website. He/she will search for a product (1). If the customer is interested in a product (1.1), he/she will add the item to the basket (1.3). To purchase the item/s, the customer will be prompt to continue to the checkout (1.4) where shipping (1.5) and credit card

(1.6) information will be asked to insert. If both information is verified, the system will send a receipt to the customer email address (1.7) while displaying a confirmation message (1.8). On the other hand, if the customer changes their mind, he/she will remove the item from the shopping cart (2) to search to another product (2.1). The customer will have the option to also navigate through the different categories (2.2).

Point 3: UI Interface

Step 1: When the customer access to the website, there will a display of the different products with their details under their images. The customer will have the option to navigate through the different categories of items that the website offers (clothes, accessories and shoes) while choosing the quantity needed of the item that they wish to purchase. However, the customer will have to click on the basket icon on the bottom right of the image to add the item on their basket and then click on the basket icon on top-right of the page to access to their basket.
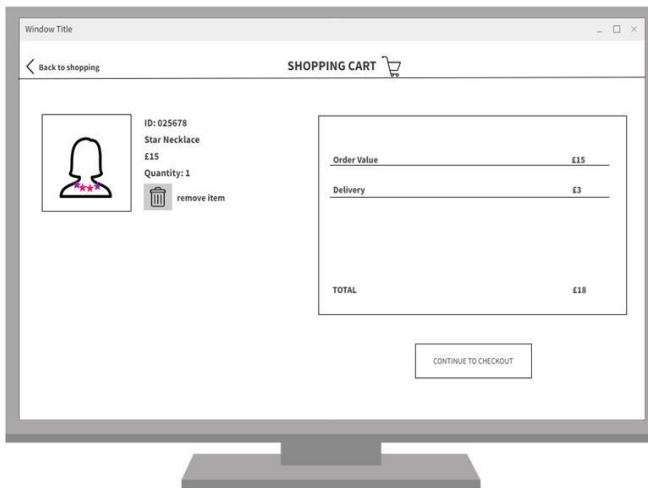
Step two: Once the customer has clicked on the basket, the page will display a list of all the selected item on the left of the page and a breakdown of the total cost will be displayed on the right of the page. The customer will have the option to remove any unwanted item by clicking the "remove item" on left of each item. The customer will have to click on "continue to checkout" to proceed with their purchase.
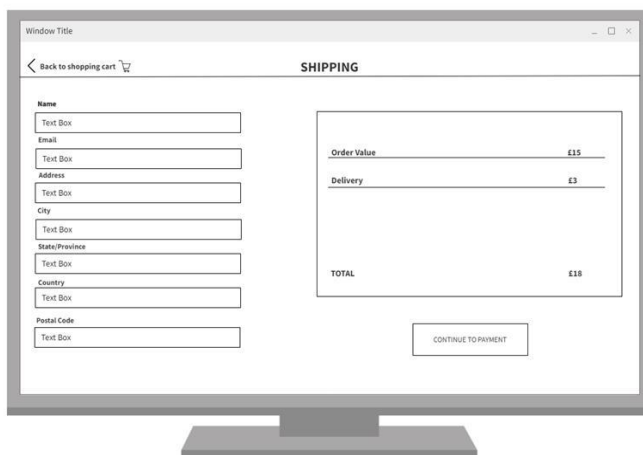
Step three: After the "continue to checkout" button has been clicked; the website will redirect the customer to the shipping page where they will have to insert their correct data. If their data is not correct, the checkbox will be highlighted in red and an error message will be displayed to prompt the user to insert their correct data. Moreover, they will not be able to proceed with their payment.

Step four: After the customer has inserted their correct shipping information and clicked on "continue to payment", the customer will have to insert their credit card information. Similarly with step three, the customer cannot proceed with their payment until the correct information has been inserted.

Step five: After the credit card details has been verified, a confirmation pop-up window will appear displaying a review of their products that the customer will be buying. The customer will have to click on confirm to proceed finally buy their products.

Step six: Once the transaction has been processed, the website will display a message to inform the customer that their purchased has been confirmed.

Point 4: System tests

Scenario 1: The customer expects a receipt of their purchase to be sent to their email address

System J&J Website

Use case Review and confirm purchase

Actor Email system

Dat The data sent are the number of the customer order, the data that has been purchased, each purchased products' id and name and the quantity of each product.

Stimulus When transaction has been processed, the main system will call and connect to the email system.

Response The email system will send a receipt of the customer's purchase to their email address

Comments If the transaction has not been processed, the customer will not receive a receipt email but will be prompt to confirm their purchase again.

Scenario 2: The customer wants to make a purchase

System J&J Website

Use case Make purchase

Actor Customer

Dat The data sent are the category of the product (clothes, shoes or accessories), the product's id, the name of the product, the price and the quantity which will be all stored in a temporary created order.

Stimulus and response When the "continue to checkout" has been clicked, the main system will redirect the customer to insert their data to proceed with the transaction.

Comments The customer needs to select at least an item else he/she cannot make any purchase