Faculty of Engineering and

Technology Computer

Science Department

Software Engineering -

COMP433

Course Project
– Phase 4

Project Name: Hope Furniture office website

Prepared By:

Amany Hmidan 1200255

rawan sous 1200129

Lana batnij 1200308

Introduction

In today's dynamic workplace, innovation is essential. Technology has become the cornerstone of our professional environments. At our furniture website, we recognize this shift and are committed to equipping businesses with the necessary tools to maximize their potential and ease the experience for our clients.

Our office furniture systems go beyond just desks and offices; they are strategic investments in productivity. We provide a comprehensive range of solutions designed to seamlessly integrate with your existing technology, promoting a collaborative and efficient workspace.

What distinguishes us from others

- Scalability and Flexibility: Our website is designed to easily scale resources and manage the expansion of our services. It efficiently handles order management and facilitates seamless communication with the delivery company and the bank, ensuring smooth transactions and timely deliveries.

- Enhanced Security: Enjoy top-tier security with our industry-leading protocols to ensure your data is protected and only accessible by authorized personnel.

- customization option, to make your own office: with a team of experts and AR engineers design your own office with your preferences, with the option of seeing the result in 3d before making it.

-flawless and smooth payment procedure: the system has the feature of paying directly through the website with a Visa card.

- the website provides tracking your order option, to increase the trust between us and our clients.

System Features

- ☐ **User Registration Website: Simplify the onboarding process with our user-friendly registration platform, ensuring a smooth start for all new users, and provide the choice to view the website and view the furniture as a guest, also provide upgraded features, especially for the registered user, which is the customization choice.**
- ☐ **Smart search engine: Effortlessly find the perfect furniture and solutions with our intelligent search engine, which delivers accurate and relevant results tailored to your specific needs, for example, providing a 3d photo, and choices for color and material. Also The search results shell will be rearranged based on users' chosen filter, such as price range, dimension, style, and whether in-stock or not.**

  And the search process should include suggestions and auto-completion as the user types, for speed and guidance.

- ☐ **Customization special orders choice: personalize your office setup with our special order customization options, allowing you to choose designs, materials, and configurations that match your unique preferences and, also a smooth contact 24/7 a week with engineers to help you achieve the best result.**

- ☐ **Track the order choice: Stay informed about your order's status with our comprehensive tracking system, providing real-time updates from the moment you place your order until it arrives at your doorstep.**

Requirement Elicitation, Analysis andModeling.

Business (requirement statement or) description outline.

Our Business: HOPE Furniture Shop

At HOPE Furniture Shop, our mission is to serve our customers through our online platform, available as a website. Our goal is to provide a seamless shopping experience for our diverse clientele, including everyday consumers, companies, supermarkets, clinics, and salons.

Our website displays a catalog of our furniture products, especially offices of all sizes, designs, and materials, complete with photos and prices ranging from $30 to $1000, catering to a wide audience. The majority of our visitors are businesses, and big organizers looking for quality furniture.

Our online platform features a robust shopping cart system, allowing customers to add, and remove furniture pieces they wish to purchase. The system displays the price for each item and the total balance of the cart. Then the system will allow the user to choose between delivery or without.

Our delivery system ensures that the selected furniture products are delivered to the customer's specified location at the chosen time and also allows the user to track the location of their order. In addition, customers can choose to get their place

HOPE Furniture Shop operates as a sole proprietorship, managed by Rawan Sous

, Amany Hmidan, Lana Batnij

User and System Requirements

UR1 The system shall enable the users to search for office furniture products that meet the clients' needed specifications.

SR 1.1 The search engine enables the user to search using any attribute like name, category, material, color, price, or combination.

SR 1.2 The search results shell will be rearranged based on users' chosen filter, such as price range, dimension, style, and in-stock

SR 1.3 The searching process should include suggestions and auto completion as the user types, for speed and guidance.

UR2 The system shall allow the users to see furniture products in virtual room settings or via augmented reality (AR) technology.

SR 2.1 There should be multiple images for the item, each from a different angle to show the product from all perspectives, and the images should be clear with high-resolution

SR 2.2 The system should provide a genuine visual representation and accurate characterization of the furniture product.

UR3 The system should give the users a choice to customize an office furniture product based on their preferences.

SR 3.1 The system shall provide a feature that allows users to customize a product, by enabling them to provide a picture of what they similarly want, with details about the exact size, colors, material, and any details they want to add.

SR 3.2 The system shall have the option of delivering an image of the product with the user's customization choices using Computer design tools, to allow the user to have a real-time preview before confirming the order.

SR 3.3 The system will provide the contact info of the customization team that will work on the order, so the customers can make sure everything is as they want.

UR4 The system shall allow the users to confirm the customization orders only.

SR 4.1 The system should provide the option of cancellation for the customized product order after 2 days of confirming the order.

UR 5 The system shall allow customers to be added to cart .

SR 4.1 The system should ensure that the user has a valid visa card before adding to cart.

SR 5.2 the system should decline the add to cart operation if the balance in the visa card is less than the price with over 10% difference.

SR5.3 the system shall display the new balance after successfully adding to cart.

UR6 The system should include a payment procedure, with an external bank.

SR 6.1 The system should send the card info , such as expiration data to the bank to authorize and validate .
SR 6.2 The system should warn the user if the balance in the add to cart is over the balance in the card , and decline the item.

SR 6.3 The system should provide an option to pay in cash only if the difference between the balance and the price is less than 10%.

UR7 The system should offer to provide a reliable delivery process

SR 7.1 The system shall have the choice of tracking the order location, moment by moment.

SR 7.2 The system should provide the user the chance to change the shipping address within 48 hours of placing an order.

SR 7.3 The system shall provide the customer via email with the contact info like the name, phone number, fax, and email of the delivery company that will deliver the product

SR 7.4 The system should provide the customer the option of installing the product after being delivered.

UR8 Users should be able to take the lead in the management of their accounts for a better ordering experience.

SR 8.1 The system shall have a registration feature where it asks the user to enter a username, password, email, and location.

SR 8.2 The system should allow users to update their account information, such as email address, shipping address, and even the password.

SR 8.3 Registered users shall be able to see offers like seasonal sales, discounts, flash sales, and coupons, and that is to improve the ordering demand and improve the experience.

Effort and cost Estimation

User Requirements	Estimated No of Developers	Estimated Effort	Total Effort
UR 1	1	2 pw	2 pw
UR 2	2	3 pw	6 pw
UR 3	2	3 pw	6 pw
UR 4	1	2 pw	1 pw
UR 5	2	2 pw	2 pw
UR 6	1	2 pw	2 pw
UR 7	1	1 pw	1 pw
Total effort	10/7= 1.2 developers on average needed	15 pw	20 pw
Schedule time = 30%		Minimum time = 15*1.30 = 19.5 w	Maximum Time = 20*1.30 = 26 w
Cost		Average Salary per week = 200$	200*26 =5200 $
Profit Margin Min =10% Max =30%		Min cost -> Max cost ->	5200*1.10= 5720 5200*1.30= 6760

Scenario for customizing an office furniture piece [Amany Hmidan 1200255]

Initial Assumption:

Dana wants to customize a desk for her office. She visits a website for office furniture, and logs into her account. Once she's logged in, the system gives her the choice to search for a piece of furniture or customize her own. She chooses to customize a furniture piece.

Normal Flow:

1. Dana selects "Customize a Furniture Piece" and chooses "Desk" from a menu that includes furniture types that can be customized.

2. She uploads a picture of a desk that is similar to what she wants to customize.

3. The system provides a form where she can enter the exact dimensions: length = 140cm, width = 90cm, height = 80cm.

4. Dana picks a wood type called "Ash" from the wood type menu and selects the color "White Oiled" from the color menu.

5. The system displays a visualized image of the customized desk based on her specifications.

6. Dana likes the image and confirms the customization order. Then the system notifies her with the price.

7. The system displays the contact information of the customization engineer assigned to manufacture the desk, including their email address and phone number.

8. Dana communicates with the customization engineer via email, detailing any additional requirements and asking for the expected completion date.

9. The customization engineer responds with an initial completion date, assuming all materials are available. He also provides regular updates through email during the manufacturing process, such as when the wood is sourced, when the desk is being assembled, and when the finishing touches are applied.

10. After the customization engineer finishes the desk, he notifies Dana via email, and a notification is also sent to her account.

11. Once Dana clicks on the notification, the system will provide her with a tracking link where she can view the current location of the desk and an estimated delivery date.

12. Dana pays through visa, or can choose to pay upon delivery if she doesn’t have enough balance in her card.

Alternative Flows:

Alternative Flow 1: Choosing a Furniture Type

1. Dana uses the search bar that the system displays and she types "Desk."

2. The system displays search results for desks with different shapes, colors, and sizes.

3. Dana chooses a desk that is similar for what she wants to customize, and when she clicks on the image, she chooses the option "customize this item".

4. Dana continues with the normal flow from step 3.

Alternative Flow 2: Selecting Wood Type and Color

1. After step 3 in normal flow, Dana chooses to view popular wood types and colors recommended by the system based on user preferences.

2. The system displays a list of popular wood types and colors.

3. Dana selects "Maple" for wood type and "Clear" for color from the recommended options.

4. The system displays a visualized image with "Oak" wood type and "Natural Finish" color to show how this wood looks.

5. Dana reviews the image. She likes how they look and continues to proceed with the normal flow from Step 5.

Error Flows:

Error Flow 1: Failure to Display Visualized Image

1. After Dana provides the customization details as in the first 4 steps, the system begins processing the request to generate the visualized image.

2. An unexpected failure happens in the server that handles the visualizing process, causing it to stop and be unable to provide the image.

3. The system displays an error message to Dana: "We are unable to generate the visualized image at this time. Please try again later or contact customer support for assistance."

4. Dana cannot confirm the order without seeing the visualized image, so she is unable to continue with her customization order.

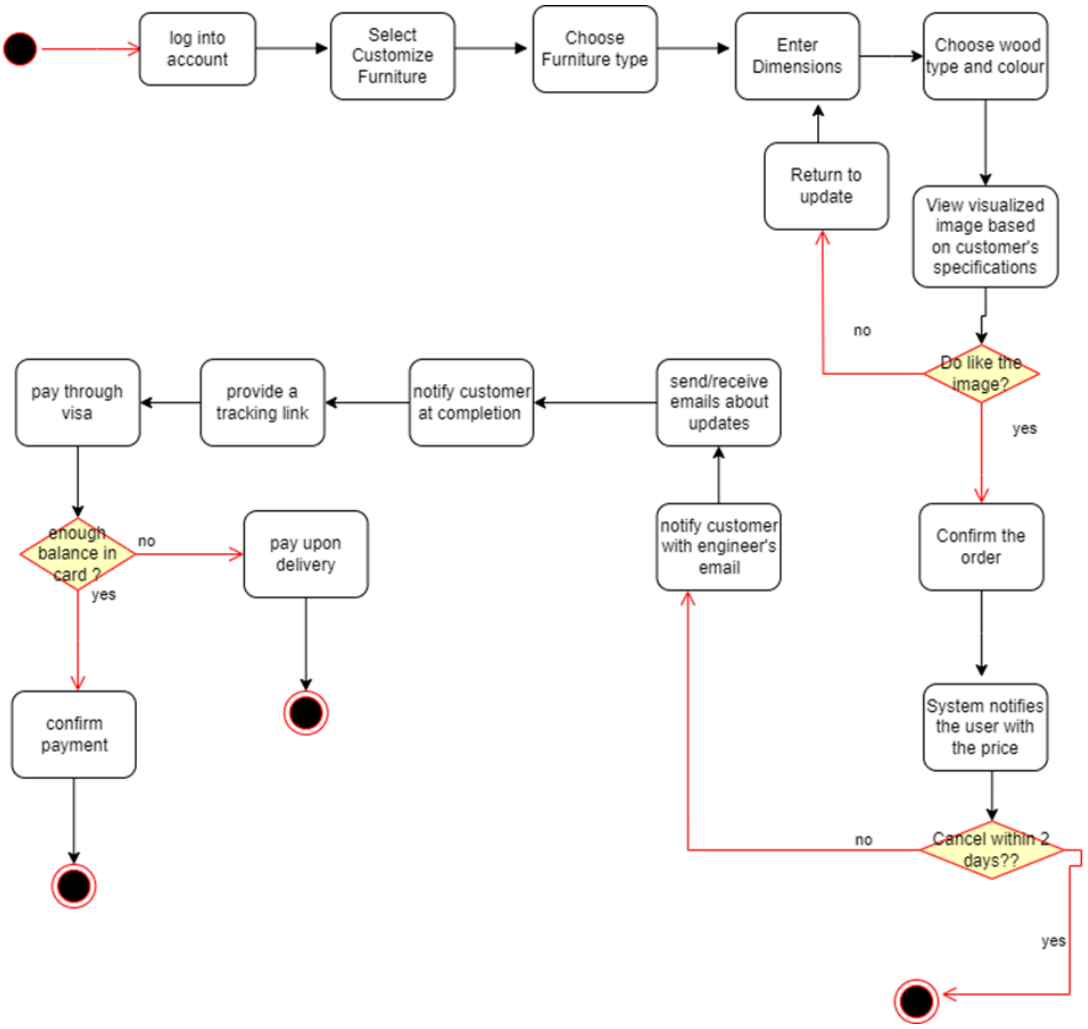
Use case description for customizing an office furniture piece [Amany Hmidan 1200255]

Actors	Customer, Customization Engineer
Description	A customer may customize a piece of furniture for his office through an office furniture website. The process involves selecting dimensions, wood type, and color, and uploading an image of the desired furniture. After confirming, the customer communicates with an engineer to finalize details and track the manufacturing and delivery process.
Pre-conditions	The customer is a registered user and logged into his account. All necessary materials for customization such as wood types are available in the inventory for the customization engineer to use.

Sequence/Flow of Events	1. Customer selects "Customize a Furniture Piece" and chooses a piece of furniture from a menu (Desk, chair, gaming chair, bookcase, cabinet). 2. Customer uploads a picture of a furniture piece that is similar to what he wants to customize and provides the exact dimensions (length, width, height). 3. Customer picks a wood type from the wood type menu and selects a color from the color menu. 4. The system displays a visualized image of the customized furniture based on dimensions, wood and color that the customer chose. 5. If the customer likes the image, he confirms the customization order, then the system notifies him with price. If not, he returns to the customization page and selects another wood type, color, or update the dimensions. Then the flow continues from step 4. 6. The system displays the contact information of the engineer assigned to manufacture the table, including their email address and phone number. 7. If the customer wants to cancel the order within two days, he selects the "Cancel Order" option. The system checks if the cancellation is within the allowed two-day period and asks for confirmation, and notifies the engineer of the cancellation. If he does not want to cancel, the flow continues to step 8 8. Customer communicates with the engineer via email, detailing any additional requirements and asking for a projected completion date. 9. The engineer responds with an initial completion date, assuming all materials are available. He also provides regular updates through email during the manufacturing process, such as when the wood is sourced, when the table is being assembled, and when the finishing touches are applied. 10. After the engineer finishes the table, he notifies the customer via email, and a notification is also sent to her account. 11. Once the customer clicks on the notification, the system will provide her with a tracking link where he

	can view the current location of the table and an estimated delivery date. 12. Customer pays through visa, or can choose to pay upon delivery if she doesn't have enough balance in her card.
Data	Customer's customization details (height, width, color, wood type), engineer's contact information **(**email, phone)
Stimulus/Trigger	Customer selects "Customize a Furniture Piece" on the website's main page. Or when the customer searches for furniture and clicks on the image, he clicks on the option "customize this item" above the image.
Post-conditions/ Response	1. The system updates the order status to "confirmed customization". 2. Notification for the engineer to start manufacturing. 3. Notification for the customer when the customization order is completed.
Comments	1. The user must enter valid dimensions and a valid image extension. 2. The communication between the engineer and the customer must be reliable. 3. Cancellation is only allowed within two days to ensure the engineer has not started manufacturing.

Instance activity diagram for customizing an office furniture piece [Amany Hmidan 1200255]



Scenario for user requirements: Add to cart [Rawan Sous 1200129]

Initial assumption

Dana wants to buy a new office from hope furniture website , Dana login in as a guest or registered user and filled all info needed to login as name , email ,etc, then Dana has filled the card info and the system confirms that her card is valid (not expired) with decent amount of money to able to add to cart.

Normal:

When a customer logged in or sign up as a guest to add to cart, after login even guest or registered users they both have to fill their card info to be able to add to cart, the customer started shopping by searching for a specific furniture items, the customer browse several furniture items, once he has found the item, he read the details of the furniture item he wants to obtain more information such as (color, material, dimensions, material properties(waterproof.), then he added the item to the cart, once the customer is satisfied with his order and his cart is ready, he decided to buy it, the system checks his balance to add the item to cart successfully , then the system gives the customer the choice to use delivery company and asks the user to fill some info needed such as name , phone number, location and time desired .

Alternative:

Ahmad logged in or signed up , Ahmad has his card validated by the system, and started shopping , he added the piece of furniture he wanted to the cart .his PayPal visa card has only 48$. but the cart ended with an overall value of 50$ by only 4% difference .which exceeds the amount of money in his visa card.so in this case the item is still confirmed and added to cart successfully , and the system gives the user the option to pay the rest in cash.

Alternative:

If Rawan filled here info to login to the website since she is a registered user , but system failure has happened leading to error in login authentication , however Rawan still got the choice of visit the website as a guest , fill her card info , and add items desired to card, since to be registered user is only needed for customization .

Error:

If Rawan logged in or signed up to the website with an expired PayPal card, the system will warn Rawan that the PayPal card was invalid or expired. Before she can add any item to the cart.

Error:

Hanin logged in or signed up , and got her card validated but the system server went down before the affirmation message appeared to her about her card status , so she could not add any item to the card .

Error

Hanin logged in or signed up , and got her card info right , and the system sends these info to the bank to validate it and authorize rawan to use it , how ever an error in the bank system happened , so that the bank did not send the system , the authorization and validation for the card , so Hanin could not add any item to card.

Error:

Salwa has logged in , or signed up , has her card validated and authorized, Salwa searched for a specific item , saw all details chooses color and size , but when adding to cart , an error happened in the database that it could not retrieve the price of this specific item , due to Database server failure.

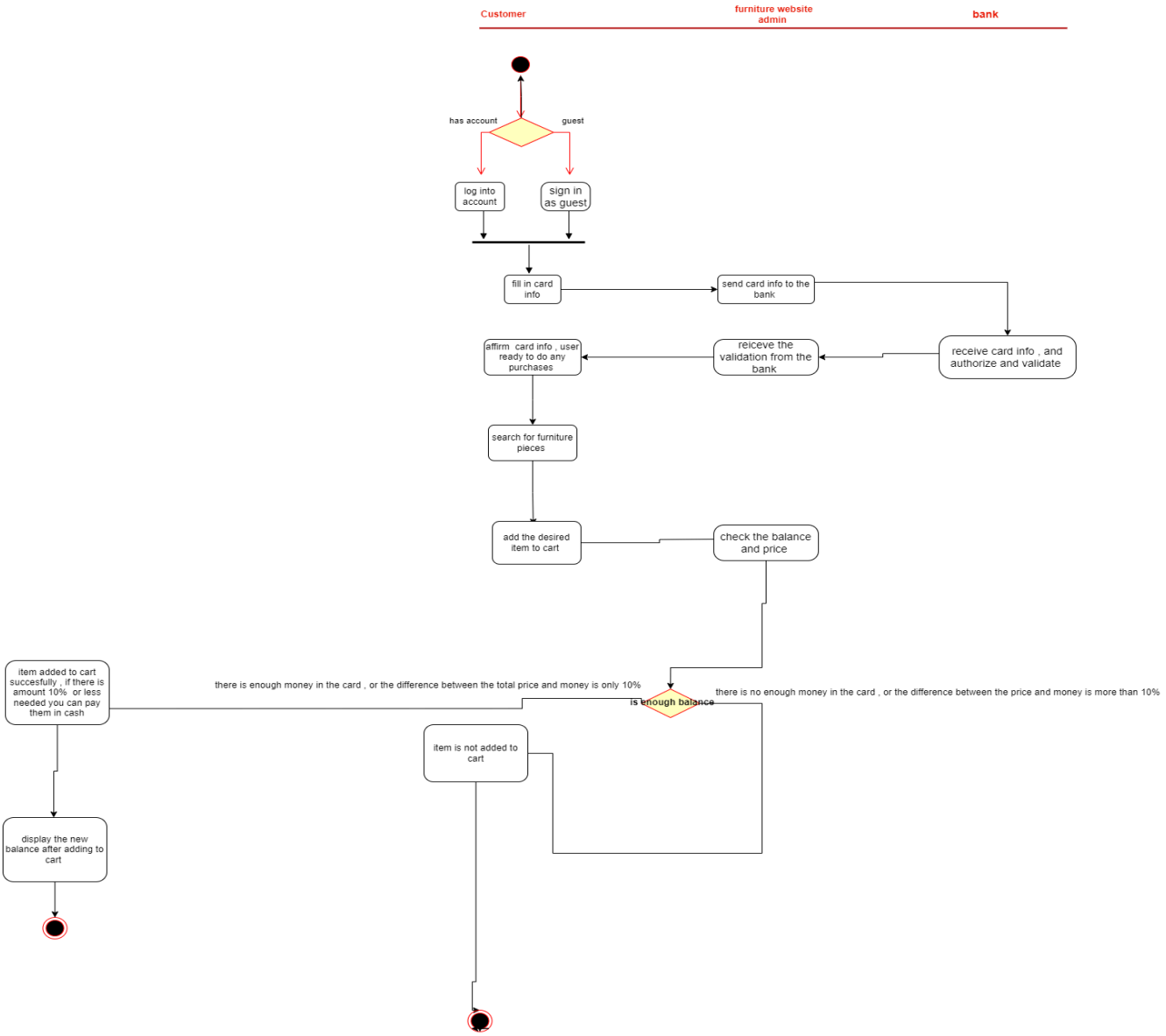
Use case description: Add to cart [Rawan Sous 1200129]

Actors	Customer, Furniture website Admin , Bank
Description	it is a process occurs when the customer has an intuition to buy a product, it is basically moving the wanted product to a section called Shopping Cart, after that he has two options:either he continues to browsing and shopping or confirm adding to products a with the delivery process
Pre-conditions	Ø The Customer has a registered account in the system and has logged in successfully to the website. Ø The customer has filled visa card info and his card is valid Ø This is the customer first time , and he signed up as a guest

Sequence/Flow of Events	1. Customer visits the website and wants to purchase some product/s. 2. The Customer logs into the website or sign up 3. The admin will validate both user login 4.The customer fill in card info 5. Admin sends card info to the bank 6. The bank sends the admin the validation and authorization for the card 7. The Customer starts shopping & looking for a desired item. 8. Customer chooses a product he wishes to buy & starts checking extra information found in the information page about it. 9. Customer is satisfied in buying the product then clicks the “Add to Shopping Cart” button to send their product to the shopping cart. 10.The admin will check the balance of the card and price of the item , so that he can decide to accept and add successfully to the cart , or decline , if the amount is equal or less than needed by a difference of 10% , the item is added to cart 11. The admin checks the balance and the difference is more than 10% between the price and balance the admin declines this item and it is not added to the cart 12. Any error or failure in the authentication process for the card from both bank or system , will lead to failure in adding to the cart 13 . Failure in authentication for user registration is not an issue; the user could still visit the website as a guest , and shop and add to cart**.**

Data	Product's ID, Product's Name, Product's Image, Product's Price.
Stimulus/Trigger	Ø The Price of a Product. "The customer adds a product after realizing its price is affordable". Because of sales Ø The Image of a Product. "The customer likes a product from its image and decides to add it to the shopping cart". Ø The Previous knowledge for a specific Product.
Post-conditions/ Response	1. The item(s) have been added to the customer's Shopping Cart. 2. The Shopping Cart Balance is updated. 3. The customer can start the delivery process if he wants.
Comments	Adding items to cart successfully is very useful to keep track of all desired items purchased , since added to card successfully updates the balance in the visa card

Instance Activity diagram: Add to cart [Rawan Sous 1200129]



Scenario: Delivering Office Furniture [Lana Batnij 1200308]

Initial assumption:

The client could log into their user account, and pick and validate an office furniture order through the software. Money for the purchase will be taken in cash at receiving or has been taken via bank payments and verified. The database has stored the correct order data such as the client's shipping location, contact details, and the exact items they ordered. The order is ready for shipment, and the shipping provider has been recommended for the collection and delivery date. The platform will be set up to track the goods and offer real-time data to the customer.

Normal flow:

1- Client: Establishes an order for workplace furniture using the system.
2- Systems: Sends a purchase notification message to the client, with a timeline for delivery.
3- Delivery Company: Receives confirmation to collect the items being delivered from the retailer.
4- System: Gives an email to the customer with tracking data and contact information for the delivery business.
5- Delivery Company: Gets furniture from the retailer.
6- Client: Follows the shipping status via the shipment tracking information given.
7- The delivery company updates the delivery location in real-time as the supplies are sent.
8- Client: Gets the furniture shipped to the specified address.
9- The Delivery Company confirms the delivery of the software.
10- The system creates and forwards an acknowledgment of the shipment email to the customer.

Alternative flows:

- Alternative Flow A: The customer collects up the pieces of furniture themselves
1- Scenario: rather than having the furniture sent out, the consumer favors choosing to pick it up from the vendor.
2- The client chooses the "Pick Up" choice in place of shipping all over the order procedure.
3- System: Verifies the order and gives the customer a notice to collect details.
4- System: Inform the store of the planned appointment.
5- The seller: Sets up items for pickup.
6- Client: get an email including collection instructions and location information.
7- Client: Arrives at the retailer's appointed time to pick up the furnishings.
8- Retailer: Confirms the delivery of the goods to the client.
9- System: Changes the purchase state to "Finished" and generates a confirmation email to the consumer.

Error Flows:

- ***Error Flow A: Ruined Furniture Throughout Handover:***

1- Delivery Company: Determines that the furniture was damaged during transportation.
2- The delivery Company tells the system of the damage.
3- System: Documents the accident and tells the client and shop management of the damage.
4- Client: Gets confirmation of the harm done and cancellation of the package's arrival.
5- The system sends a refund to the buyer.
6- Store Manager: Approaches the client to discuss the next steps, such as reordering or withdrawing the order.

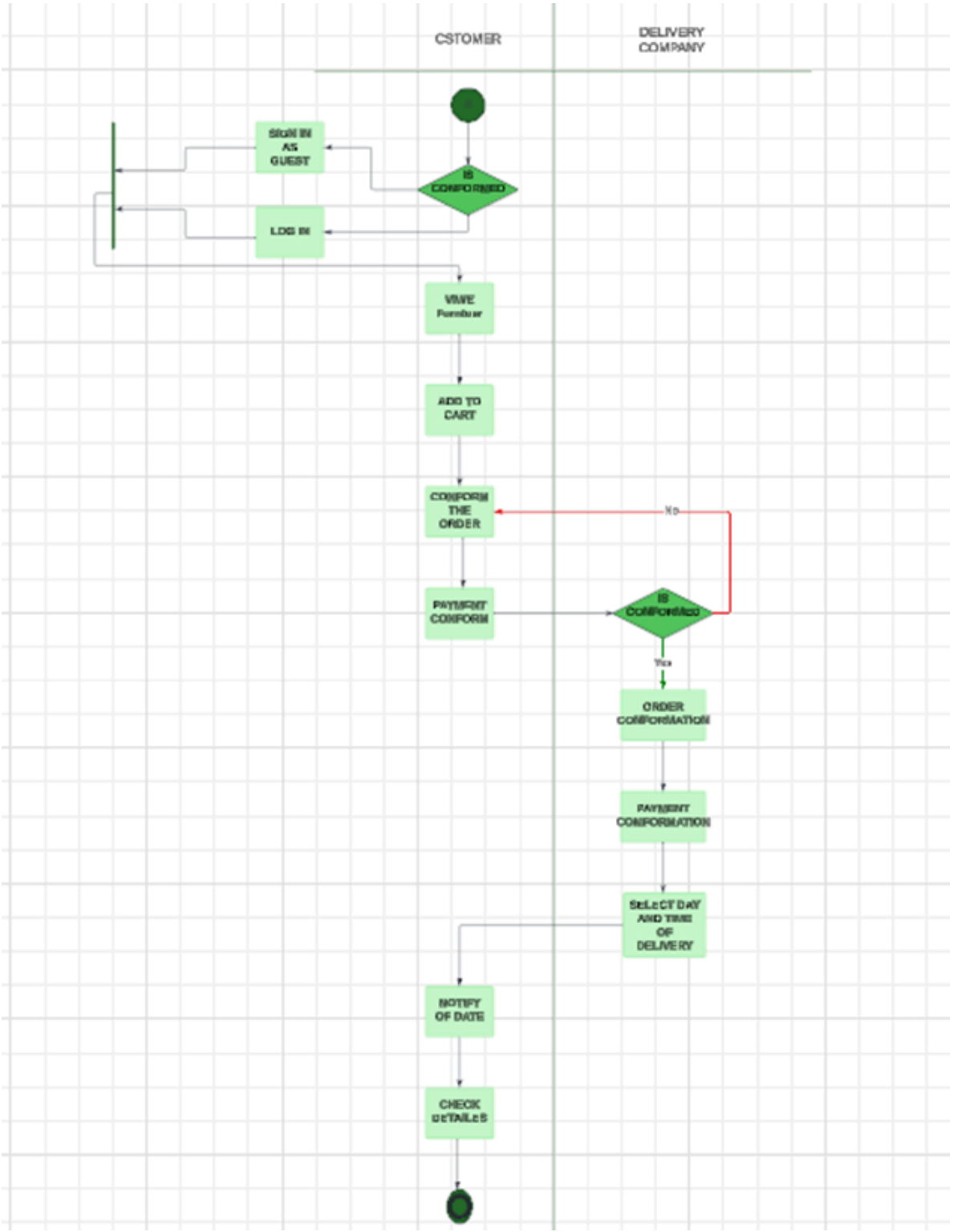
Use case description: Delivering Office Furniture [Lana Batnij 1200308]

Actors	- **Client** - **Delivery Company**
Description	**Each step of delivering picked-up office furniture to the consumer. The process consists of numerous essential elements, including order confirmation, tracking information, address updates, and notification to the consumer at each relevant point in the shipping path. The delivery procedure is designed to guarantee that the consumer receives the goods in a timely way and remains informed. In the case of a delivery error, the system has been developed to handle it politely and tell the consumer as soon as possible.**
Pre-conditions	- **The customer effectively submitted their order.** - **The product will be accessible and set up for delivery.** - **The shipping address entered by the client has been checked and is correct.** - **The delivery suppliers are ready to collect and deliver the items.** - **The furniture is added to the cart successfully**

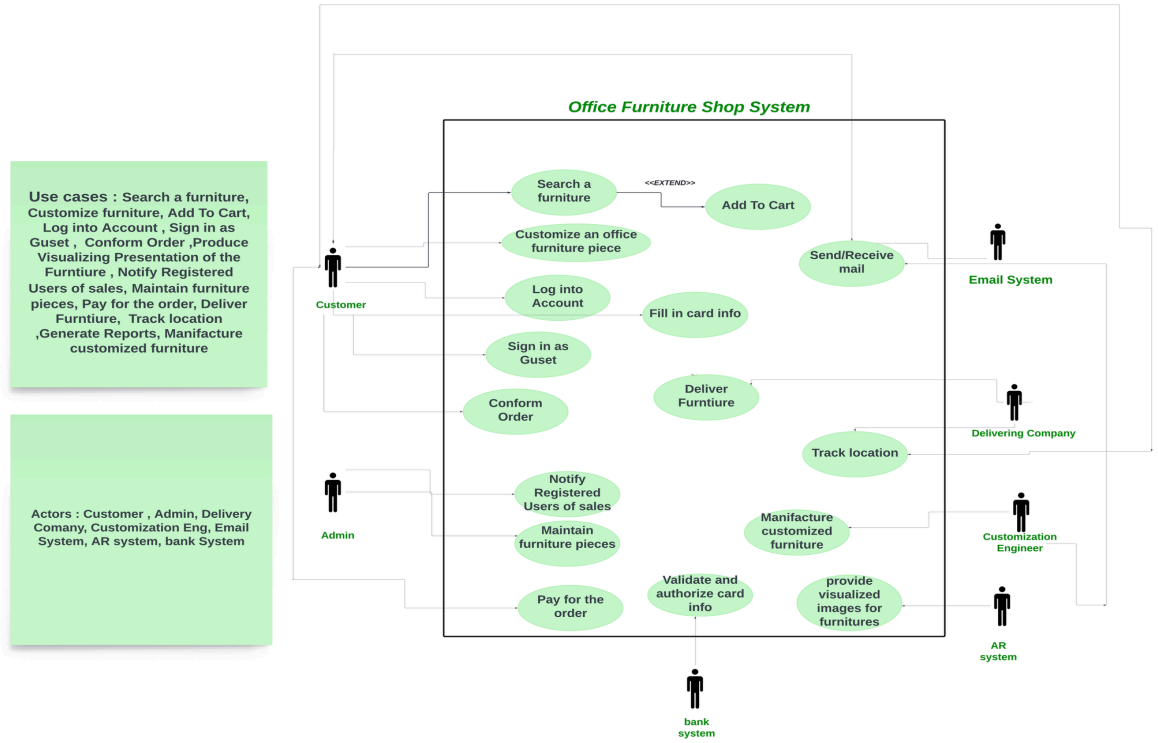
Sequence/Flow of Events	**- System: Provides an order acknowledgment message to the consumer, with the expected delivery date.** **- The Delivery Service brings up the products from the business.** **- System: Gives a consumer an email with monitoring information and contact data for the delivery business.** **- Customer: Monitors delivery status using data from the tracking system.** **- Delivery Company: Maintains the delivery condition in real-time when the goods are shipped.** **- The customer gets the goods at the provided address.** **- The delivery company verifies the shipment in the system.** **- The system generates the confirmation of a delivery email to the purchaser.**
Data	**- Client Data (Name, Full address, Email, and Phone number)** **- Order specification (Product, Product Description, Quantity, Price)** **- Delivery Status Update (Real-time location)**
Stimulus/Trigger	**The client places an order, which begins the delivery procedure.**

Post-conditions/ Response	**- The goods get shipped to the customer's selected address.** **- The delivery status was modified in the system.** **- The client paid for the products and the services** **- The client receives a message confirming delivery.**
Comments	**The system must smoothly manage delivery problems by informing the customer and permitting fixes.**

Instance Activity Diagram: Delivering Office Furniture [Lana Batnij 1200308]



Actors and Use case (Diagram) Analysis & Modelling



Actors Description:

-Customers: they access the system to search and browse for office furniture pieces, add goods to carts, establish user accounts, sign in as guests, customize furniture based on their own preferences, pay, and monitor purchases. They receive sales announcements and confirmations of orders.

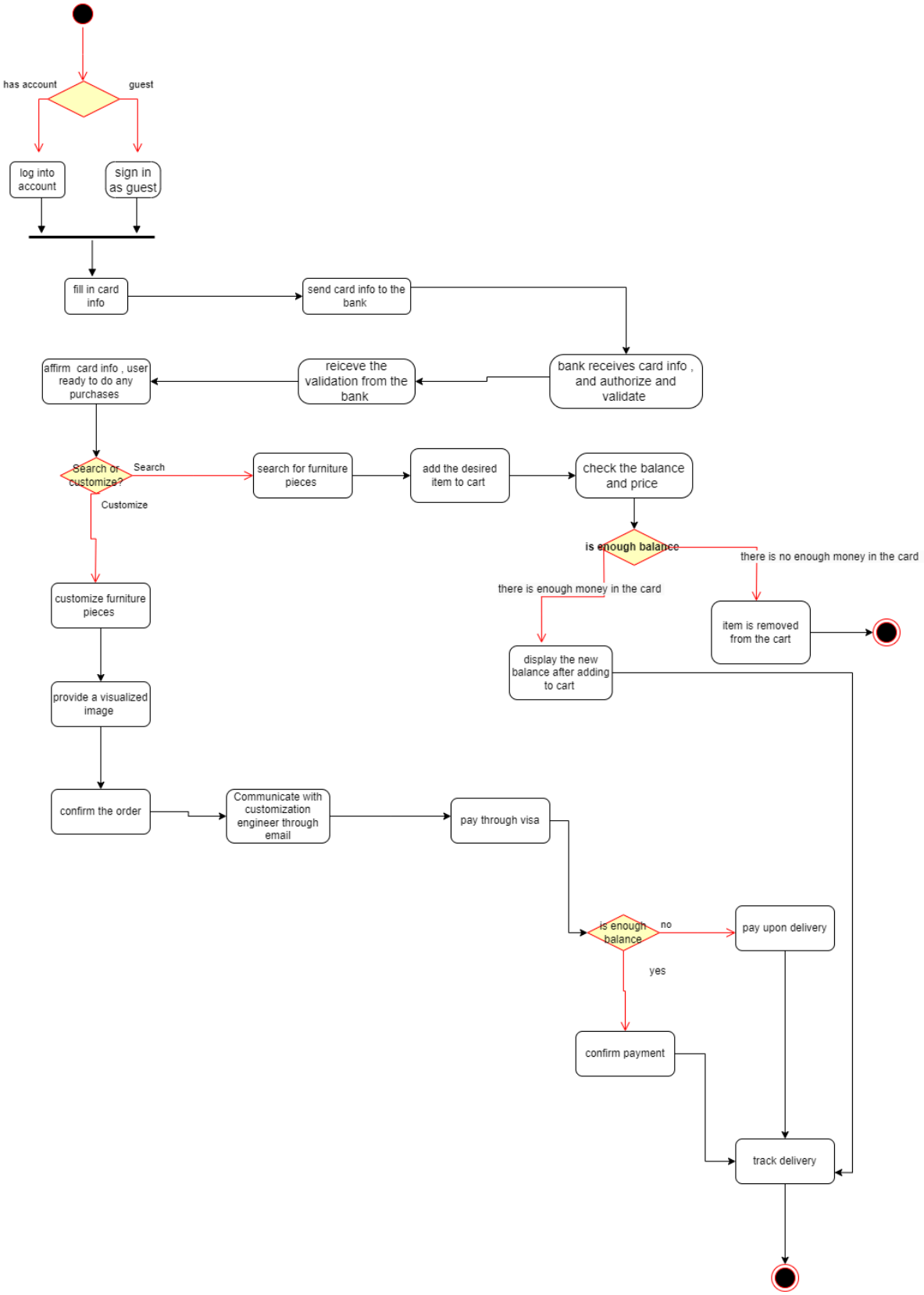
-Admin: administer user accounts, do system repairs, and assure the accuracy of information and security. They ensure that the system runs smoothly and assist in other roles as necessary.

-The delivery company: receives the requested furniture from the shop and transports it to the customer's established address. They offer current status information and manage any delivery concerns.

-AR system: guarantee that the system produces realistic pictures of the furniture. They use augmented reality technologies to show clients how furniture might look in their environment.

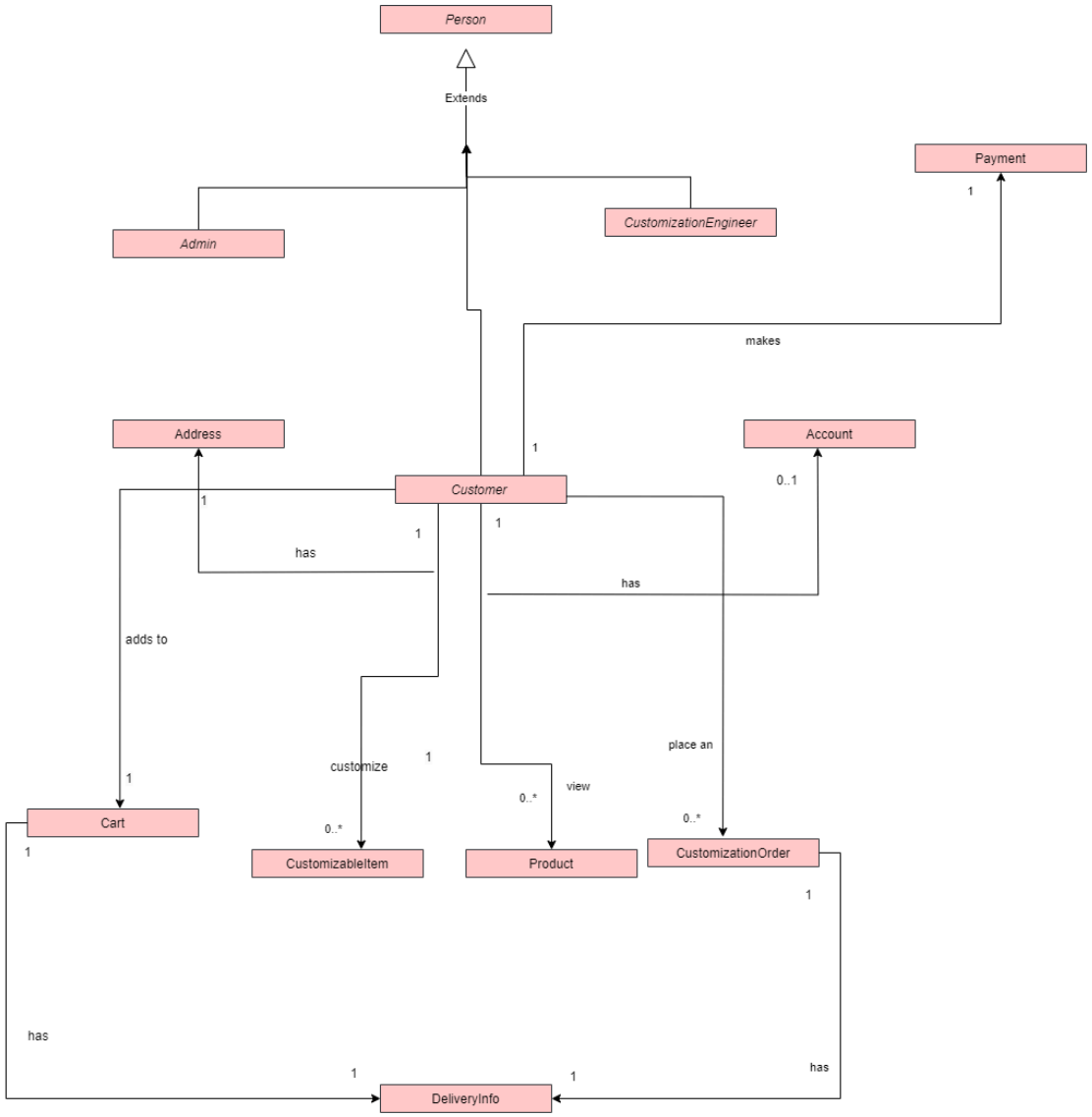
-Bank system: to validate and authorize card information and send validation result back to the system

Activity Diagram Analysis & Modelling

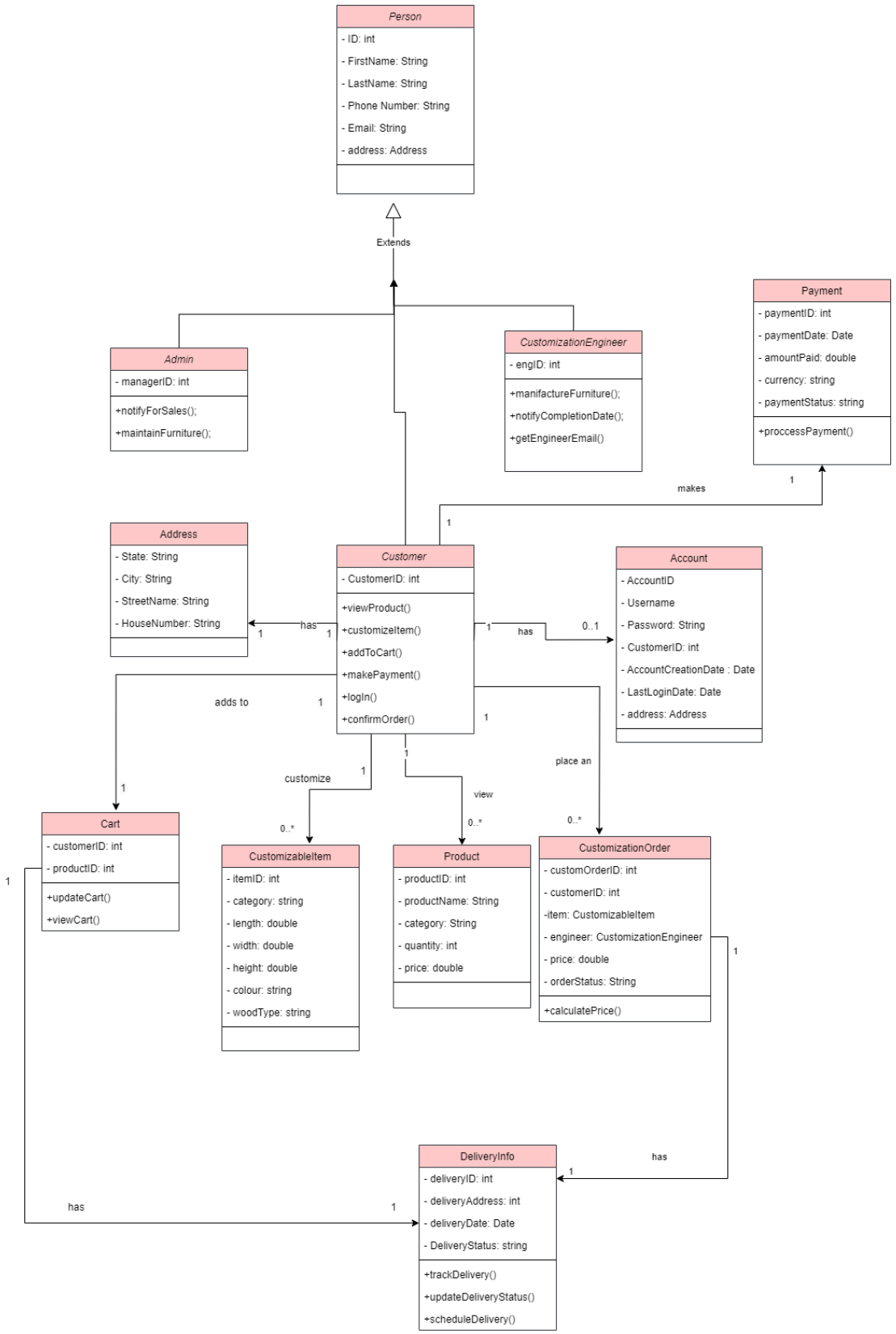


Phase 4

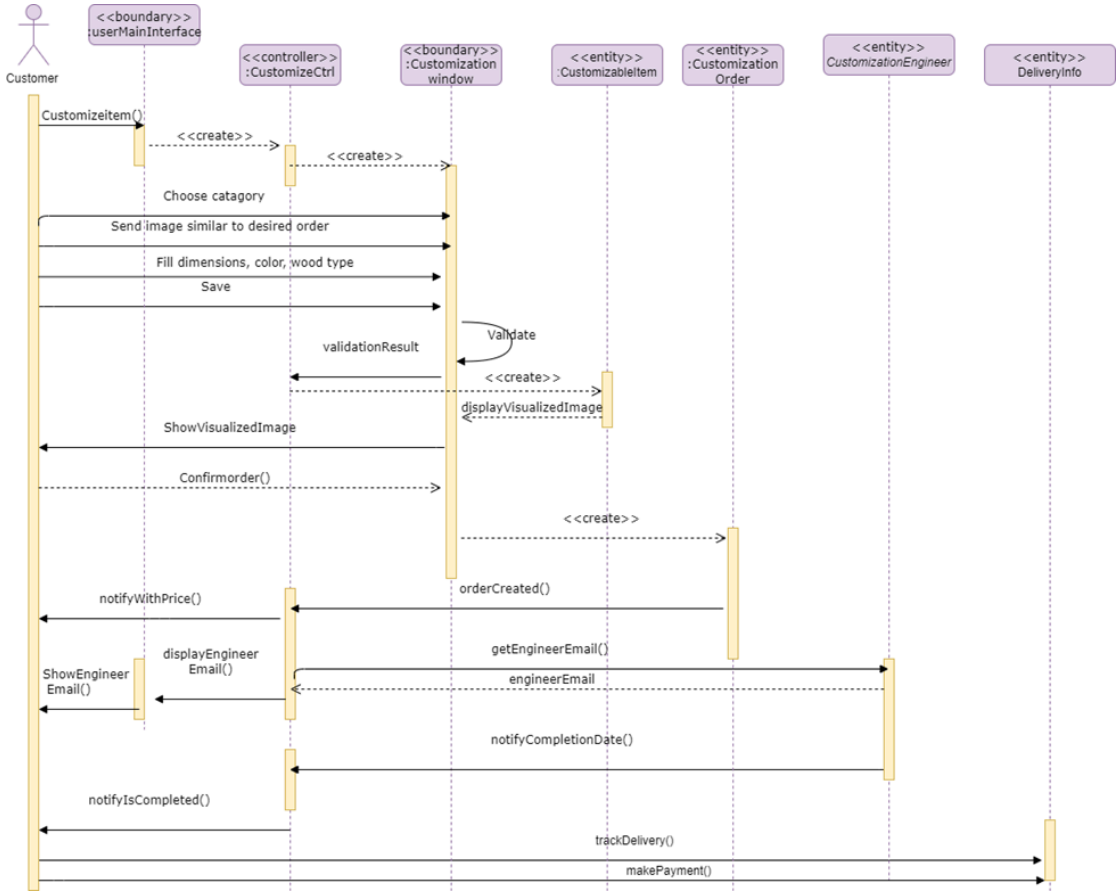
Abstract class diagram



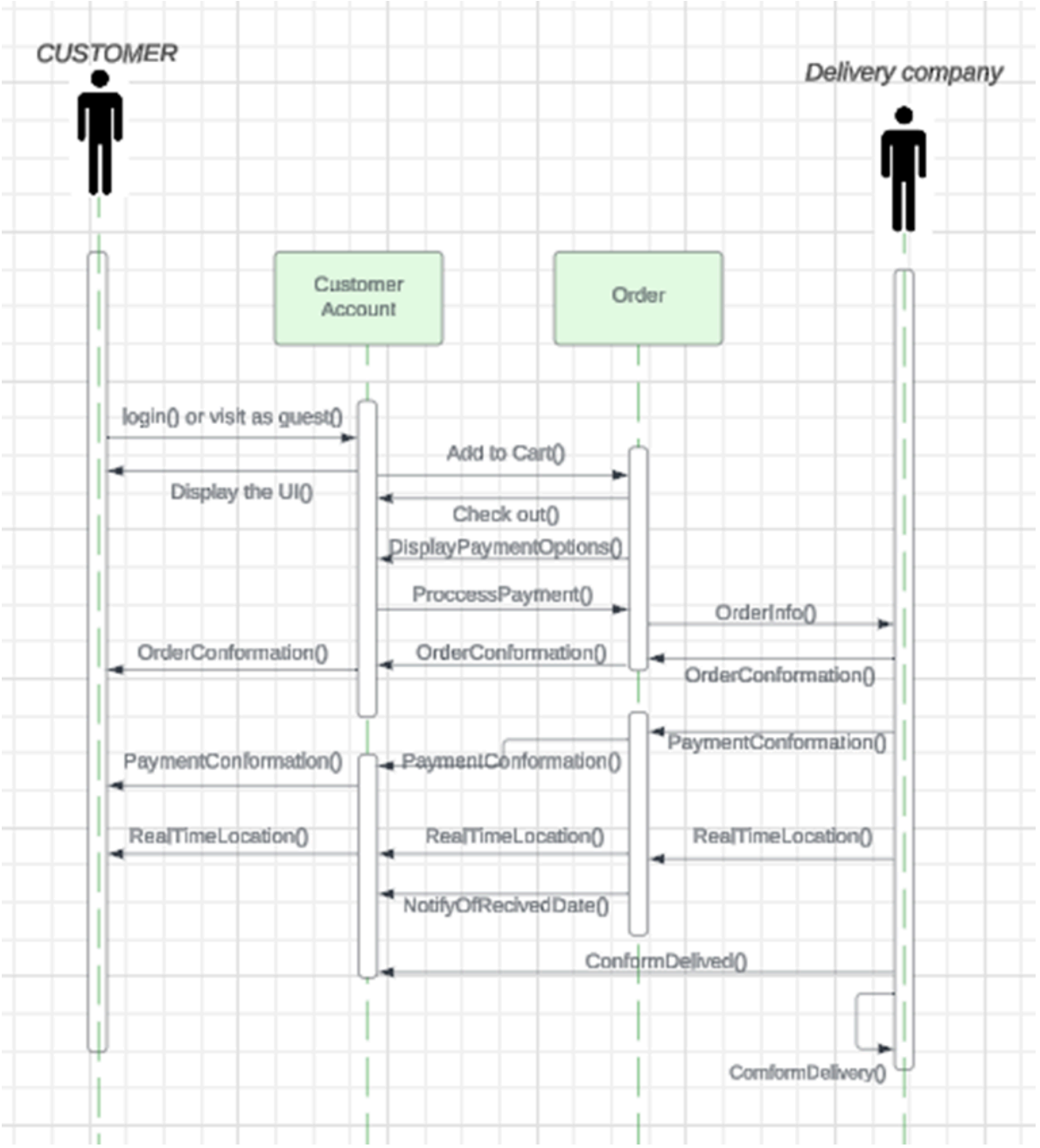
Detailed class diagram



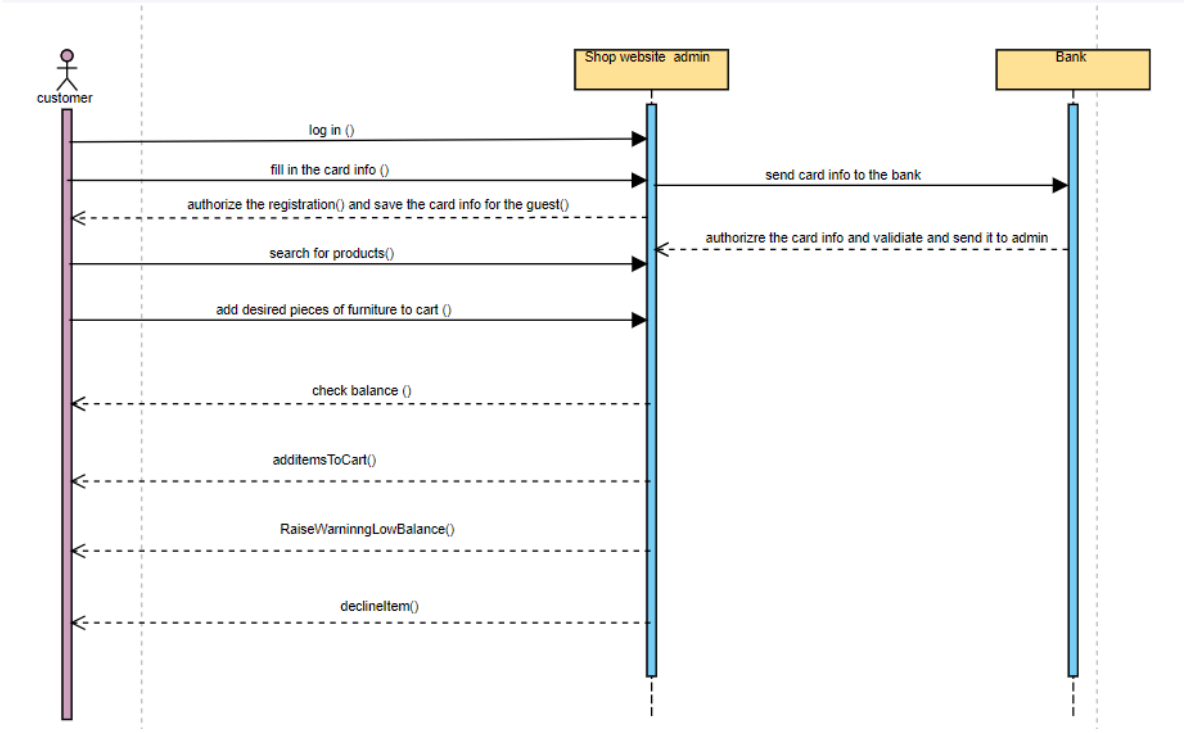
Instance Sequence diagram for customizing an office furniture piece [Amany Hmidan 1200255]



Instance sequence Diagram: Delivering Office Furniture [Lana Batnij 1200308]



Instance Sequence diagram: Add to cart [Rawan Sous 1200129]



Design goals

General Goals:

- High Cohesion:

Our system will ensure that related classes and methods are grouped together, making each module focused and easy to manage. This organization enhances the clarity and maintainability of the code.

Implementation of components to achieve high cohesion:

- **User Management:** this component will include Customer class and Account class because they are related. It handles customer accounts and their personal information.
  Order Management: Manages order processing, including add to cart and customized orders. It includes Customization Order class and Cart class since they are both related to ordering a furniture piece.
  Product Catalog: Manages the products and customization options. It includes Product and CustomizableItem classes.
- **Payment Processing**: Handles payment transactions.
- **Delivery Management**: Manages delivery information and tracking.
- **Admin:** for handling all processes that are managed by the website admin.
- **Customization Engineer:** for handling information about the engineer that will be assigned to customize the furniture.

- Low Coupling:

Our system will be designed such that modules are largely independent of one another. Changes in one component will have minimal or no impact on others, enhancing the flexibility and ease of updates. Moreover, the components will be separated into three layers based on three-layer architecture, which typically consists of the presentation layer (UI), the business logic layer (BLL) or is called Application layer, and the data access layer (DAL). For example, the UI is responsible to display information and capture inputs, and does not need to know who data will be processed and stored. This separation into layers achieves low coupling and makes the system more modular and maintainable.

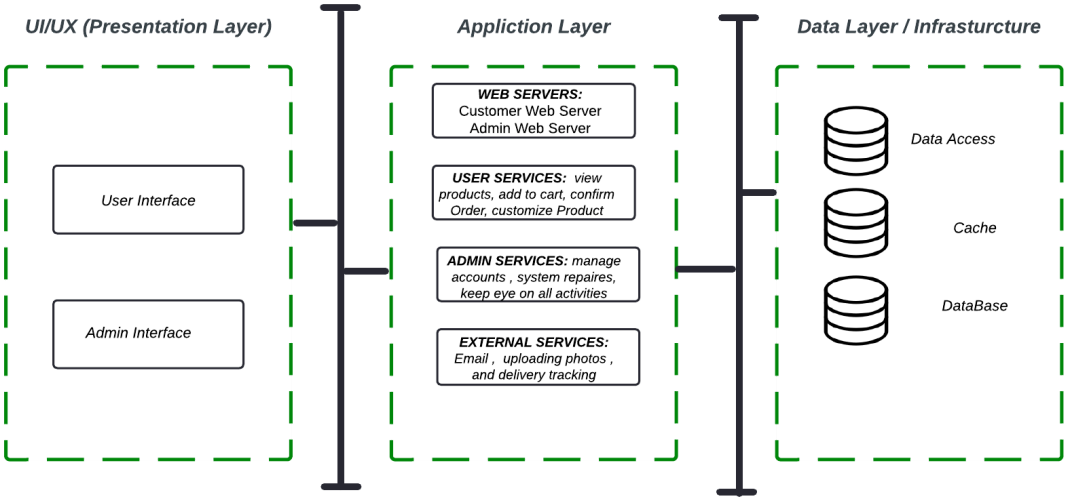
Specific Goals:

- High performance:
  A cache component will be added to store frequently accessed data, this aims to reduce the number of database reads, and hence improve the performance since reading from the cache is much faster, and this way the system can handle a large number of user requests more efficiently.

- Maintainability

  A component called Data Access will be added in order to be responsible for data accessing logic and reading from the cache or database. This way, if we decide to change the data storage technology, only the Data Access component will be changed without affecting the other parts of the system. To implement the data access logic in this component, the Repository pattern can be used, making it easy to switch from a relational database to a cloud storage service like Amazon S3.

System architectural Design:



This design pattern is called layered architecture, it separates the system into discrete levels, each of which has a particular function. System flexibility, scalability, maintainability, and structure are all enhanced by this division of responsibilities. It also guarantees that every layer concentrates on a specific facet of the system's functionality, which promotes low coupling and high cohesion.

- UI/UX (Presentation Layer)

  The Presentation Layer is responsible for displaying the user interface and admin interface as a web page, and capturing their inputs and validating them to send user requests to the Application Layer. It also displays results and feedback to the user.

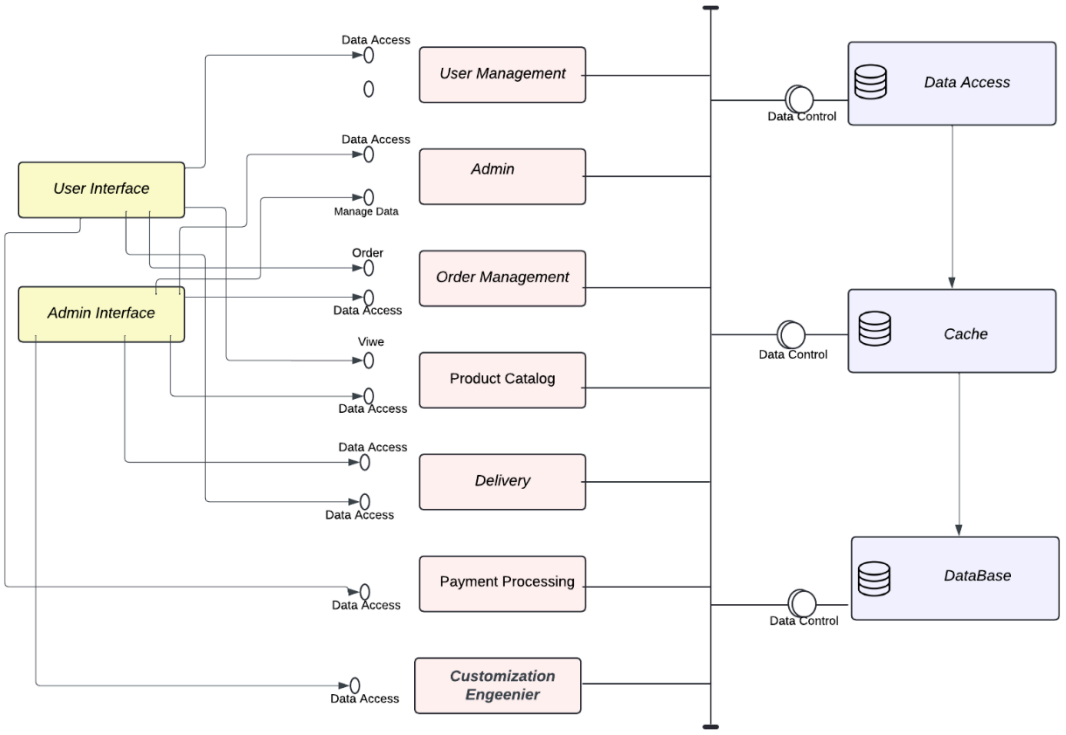
- Application Layer

  The application layer contains all essential functions and business logic. It manages user requests and synchronizes responses between the data and presentation levels.

- Data Layer

  The Data Layer controls how data is stored, retrieved, and altered inside the system. It gives users a dependable and consistent way to access data at the application layer.

System Component Design:



Deployment Diagram