American International University-Bangladesh (AIUB)
Department of Computer Science
Faculty of Science &Technology (FST)
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Title: WhimsyMart

An Interactive E-Commerce Solution

Software Requirement Engineering
Sec: **B**

Project submitted
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Date: 29/09/2024

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1. PROBLEM DOMAIN

Existing e-commerce platforms lack real-time interaction, making shopping less engaging and informative for customers.

1.1 Background to the Problem

An e-commerce website allows individuals to purchase and sell physical items, and digital products online rather than at a physical store. A firm can use an e-commerce platform to handle orders, receive payments, manage logistics and delivery, and provide customer care [2]. The e-commerce environment has expanded dramatically, with big businesses such as Amazon, eBay, and Daraz dominating the sector. These platforms serve various product categories, making them one-stop shopping for different customer demands. However, certain features of these platforms, including personalization, consumer interaction, and user experience, can be enhanced. By developing a product-based e-commerce website that addresses these specific shortcomings, we can provide a superior shopping experience for consumers and outperform existing market leaders.

While major e-commerce platforms like Amazon and Daraz offer vast product selections and personalization, they still fail to provide a deeply interactive and immersive shopping experience that connects users with brands, experts, and communities in real-time.

1.2 Solution to the Problem

WhimsyMart provides real-time interaction and immersive features, making online shopping more engaging and informative for customers.

The proposed solution is "WhimsyMart," a product-based e-commerce platform offering a wide range of items, similar to Amazon and Daraz. Focused on B2C transactions, WhimsyMart aims to attract a large customer base by enhancing personalization, user interaction, and overall shopping experience.

WhimsyMart's distinctive features and benefits offer it an advantage over well-known e-commerce sites:

Live Video Consultations: Customers can interact with sellers or experts via live video to ask questions and get advice, ideal for high-value items like electronics or fashion.
Real-Time Group Shopping: Friends or family can shop together online, sharing live comments, reviews, and opinions in real time, enhancing the social aspect of shopping.
AI-Driven Product Try-On: AR features allow users to "try on" clothes or visualize items like furniture at home using their mobile cameras.
Personal Shopping Assistants: AI-powered assistants provide real-time recommendations, answering questions and offering personalized advice.

Objective:
WhimsyMart aims to develop a user-friendly e-commerce website that surpasses competitors by offering personalized recommendations, social media integration, and enhanced user engagement, while ensuring efficiency and reliability through careful planning and execution

2. SOLUTION DESCRIPTION

2.1 System Features

2.1.1 Functional Requirements

- **User Authentication and Authorization:**
  - ❖ Users should be able to register, log in, and manage their accounts.
  - ❖ Passwords must be encrypted and securely stored.
  - ❖ Role-based access control should be implemented to differentiate between customer, and administrator accounts.

- **Product Management:**
  - ❖ Admins should be able to create, edit, and delete product listings, including uploading images, setting prices, and managing inventory.
  - ❖ Products should be organized into categories and subcategories.

- **Search and Filtering:**
  - ❖ Users should be able to search for products by keyword or category.
  - ❖ Filtering options should be available, such as price range, color, size, and other product-specific attributes.

- **Shopping Cart and Checkout:**
  - ❖ Users should be able to include, remove, and modify items in their shopping carts.
  - ❖ The checkout process should include user-friendly steps, such as shipping address input, shipping method selection, and payment method input.

- **Payment Processing:**
  - ❖ Integration with secure and reliable payment gateways (e.g., Bkash, Nagad) should be established.
  - ❖ The website should be PCI DSS compliant to ensure secure handling of credit card information.

- **Order Management:**
  - ❖ Customers should receive email confirmations upon order placement.
  - ❖ Customers should have access to their order history and track the status of their orders.
  - ❖ Order statuses should be manageable and updateable by administrators. (e.g., processing, shipped, delivered).

- **Responsive Design:**
  - ❖ The e-commerce website should be optimized for both desktop and mobile devices, ensuring a seamless user experience across platforms.
- **SEO Optimization:**
  - ❖ The website should be designed with SEO best practices in mind, including proper use of meta tags, header tags, and URLs.
- **Administrative Dashboard:**
  - ❖ Administrators should have access to a dashboard to manage customers, products, orders, and other site-wide settings.

2.1.2 Non-Functional Requirements

- **Performance:**
  - ❖ Response Time: The website should load within 3 seconds on a standard broadband connection.
  - ❖ Throughput: The system should be able to handle a minimum of 10,000 concurrent users during peak hours.
- **Availability and Reliability:**
  - ❖ The e-commerce platform should have an uptime of 99.99% (approximately 52 minutes of downtime per year).
  - ❖ Implement redundant systems and failover mechanisms to ensure continuous operation in case of component failure.
- **Security:**
  - ❖ Data Protection: Implement encryption for sensitive data, both in transit and at rest.
  - ❖ Authentication and Authorization: Implement strong authentication and role-based access control.
  - ❖ Regular security audits and vulnerability assessments should be performed.
- **Usability:**
  - ❖ The website should be easy to navigate, with a clear and consistent design.
  - ❖ It should be accessible on various devices (desktop, mobile, tablet) and browsers.
- **Maintainability:**
  - ❖ Modular and clean code should be written to facilitate easy updates, bug fixes, and feature enhancements.

2.2 UML Diagrams

2.2.1 Use-Case Diagram:

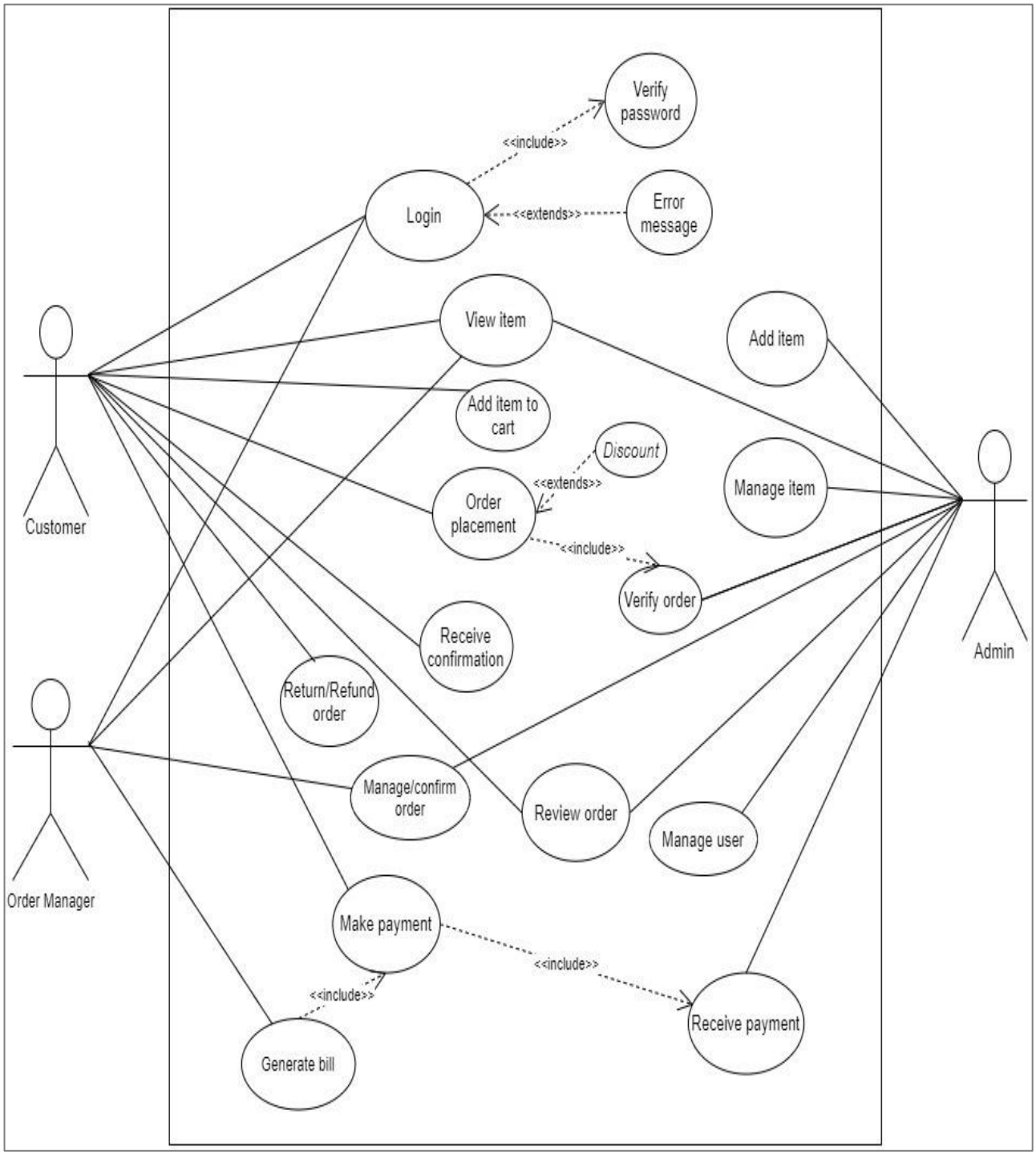


Figure 1

The diagram provided is a Use-Case Diagram that illustrates the interactions among different users (actors) and the system for an e-commerce or similar management system. Here's a detailed breakdown of the diagram:

1. **Actors**:

   - **Customer**: A user who interacts with the system to perform various shopping-related activities.
   - **Order Manager**: A role within the system responsible for managing and confirming orders.
   - **Admin**: An administrator who manages system settings and functionalities.

2. **Use Cases**:

   - **Login**: Both the Customer and Admin can log in. This use case includes verifying the password and handling error messages.
   - **View Item**: Allows the Customer to view items in the system.

   - **Add Item to Cart**: The Customer can add items to their shopping cart, which can also involve discounts.
   - **Order Placement**: The Customer can place orders, which involves verifying the order and receiving confirmation.
   - **Return/Refund Order**: The Customer can request returns or refunds, which the Order Manager manages or confirms.
   - **Manage/Confirm Order**: Handled by the Order Manager to manage and confirm orders.
   - **Review Order**: The Order Manager can review the order details.
   - **Make Payment**: The Customer can make payments. This includes generating the bill.
   - **Generate Bill**: Related to the Make Payment use case, handled by the Order Manager.
   - **Receive Payment**: Managed by the Admin, indicating the system's ability to process and confirm payments received.
   - **Manage User**: The Admin can manage user settings and information.
   - **Manage Item**: The Admin has the capability to manage item listings within the system.

3. **Relationships**:

   - **Include**: This relationship indicates that a use case includes the functionality of another use case as a part of its process.
   - **Extend**: This relationship shows optional or additional behaviors that extend the base use case under certain conditions.

   This diagram helps in visualizing the system functionalities from the perspective of different user roles, showing how they interact with the system to perform various tasks related to managing orders, handling payments, and administering the system.

2.2.2 Class Diagram:

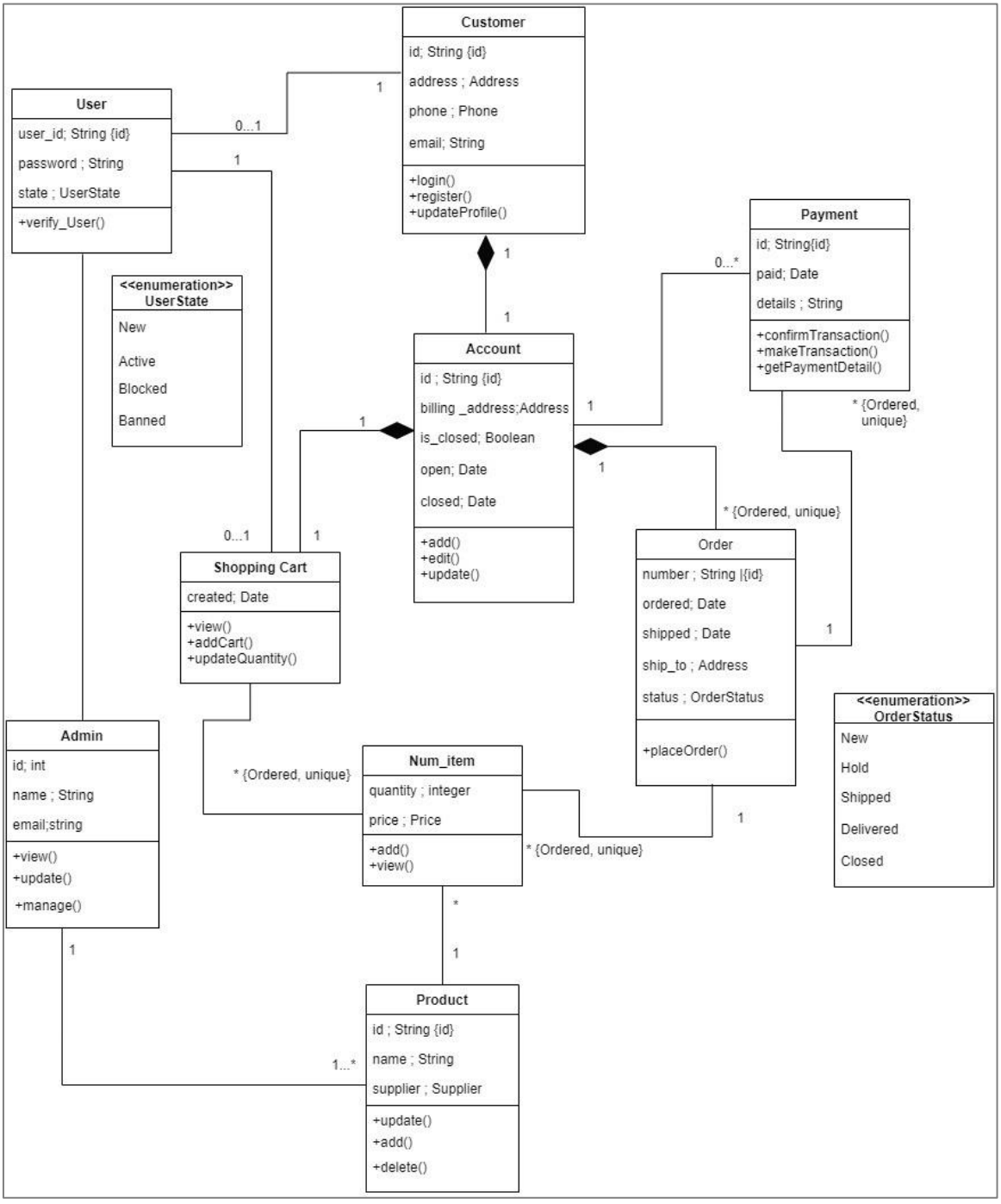


Figure 2

The diagram provided appears to be a **Class Diagram** for an e-commerce system. It represents various entities (classes), their attributes, and their relationships. Here's a breakdown of the key components and relationships:

1. Classes and Attributes:

- **User**:
  - Attributes: user_id, password, state
  - Methods: verify_User()
  - Association with Customer and Admin. A user can either be a customer or an admin.
  - The state is defined by the UserState enumeration (e.g., New, Active, Blocked, Banned).
- **Customer**:
  - Attributes: id, address, phone, email
  - Methods: login(), register(), updateProfile()
  - Relationship: A Customer has a 1-to-1 association with an Account.
- **Account**:
  - Attributes: id, billing_address, is_closed, open, close
  - Methods: add(), edit(), update()
  - Association with Customer (1-to-1) and Order (1-to-many). An account can have multiple orders, but only one account is linked to a customer.
- **Order**:
  - Attributes: number, ordered, shipped, ship_to, status
  - Methods: placeOrder()
  - Association: Multiple orders can be associated with one account. Each order has a status defined by the OrderStatus enumeration (New, Hold, Shipped, Delivered, Closed).
- **OrderStatus**:
  - Enumeration values: New, Hold, Shipped, Delivered, Closed
  - Used in the Order class to define the current state of the order.
- **Payment**:
  - Attributes: id, paid, details
  - Methods: confirmTransaction(), makeTransaction(), getPaymentDetail()
  - Each payment is associated with one or more orders (0..* association).
- **Shopping Cart**:
  - Attributes: created
  - Methods: view(), addCart(), updateQuantity()
  - Association: A shopping cart has multiple items and is connected to Customer or User.
- **Num_Item**:
  - Attributes: quantity, price
  - Methods: add(), view()
  - Association: An item in the shopping cart or order, linked to a Product with a many-to-one relationship.
- **Product**:
  - Attributes: id, name, supplier
  - Methods: update(), add(), delete()
  - Each product can appear in multiple orders or shopping carts but is related to a specific supplier.

- **Admin**:
    - ❖ Attributes: id, name, email
    - ❖ Methods: view(), update(), manage()
    - ❖ Association with the system for administrative management (likely responsible for managing users, products, etc.).

2. Relationships:

- **Associations**: The lines connecting the classes indicate relationships. For example:
    - ❖ A Customer has a 1-to-1 association with an Account.
    - ❖ An Account can have multiple Order entries.
    - ❖ A Shopping Cart contains multiple items (Num_Item), which are associated with Product.
    - ❖ The Order is linked to Payment and contains multiple items.
    - ❖ The Admin class has operations to manage or update the system.

3. Enumerations:

- **UserState**: Defines different possible states of a User (New, Active, Blocked, Banned).
- **OrderStatus**: Defines various statuses of an Order (New, Hold, Shipped, Delivered, Closed).

This class diagram captures the structure of the system, focusing on how customers, orders, products, payments, and accounts interact, along with administrative control. It models the relationships and functions available to each class and defines how the entities collaborate to support the functionality of an e-commerce platform.

2.2.3 Activity Diagram:

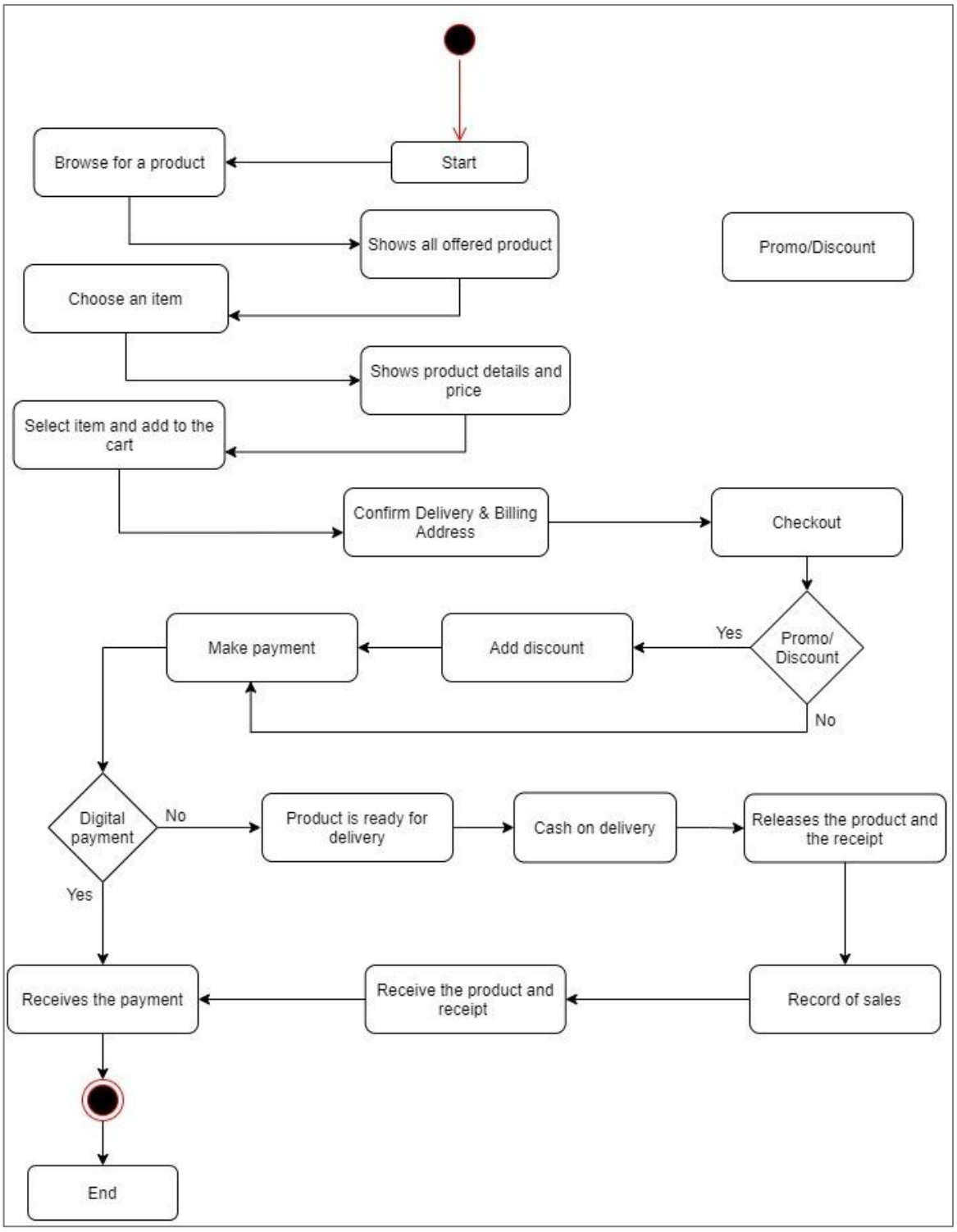


Figure 3

This diagram represents a **Process Flowchart** for an e-commerce transaction, outlining the steps involved in browsing, selecting, purchasing, and receiving products. Here's a breakdown of the key steps:

Start:

- The process begins with the customer starting the transaction.

Browse for a Product:

- The customer browses through the available products.
- The system displays all the offered products to the customer.

Choose an Item:

- The customer selects an item from the list.
- The system shows the details and price of the selected product.

Select Item and Add to Cart:

- The customer adds the chosen item to the cart.

Confirm Delivery & Billing Address:

- The customer confirms their delivery and billing address before proceeding to checkout.

Checkout:

- The checkout process begins.
- A decision is made whether the customer wants to use a promo/discount.
  - **If Promo/Discount is applied**:
    - The customer adds the discount and proceeds to the payment.
  - **If no Promo/Discount**:
    - The customer proceeds directly to payment.

Make Payment:

- The customer makes the payment for the order.

Digital Payment or Cash on Delivery:

- A decision is made based on the payment method.
  - **If Digital Payment**:
    - The system receives the payment, and the process moves towards delivery.
  - **If Cash on Delivery**:
    - The product is released for delivery, and the sales record is updated.

Receive the Product and Receipt:

- After payment, the product is delivered along with the receipt.

End:

- The process completes once the product and receipt are received.

Promo/Discount (Optional):

- Promo codes or discounts can be applied at checkout, influencing the payment total.

3. Social Impact

The “WhimsyMart” e-commerce website can have notable influences on the society. The significant influence of e-commerce on the economy, in general, will be on productivity and inflation. Increased competition, cost savings, and changes in seller pricing behavior may all contribute to the continued expansion of e-commerce, which reduces inflation [5]. It streamlines the buying process, making things more accessible to customers from every aspect of life. The online store promotes diversity and economic progress by enabling a broad selection of products. Furthermore, by advocating for eco-friendly products and responsible shipping practices, our e-commerce website may encourage sustainable consumer behavior. The e-commerce website can also help build a more connected, inclusive, and environmentally conscious society while promoting economic growth.

4. Development Plan with Project Schedule

The e-commerce website's development plan was established using the classic Waterfall method. Planning, Requirement Analysis, Design, Development, Testing, Deployment, and Maintenance are the seven major phases of the project timeline.

List of tasks (Work Breakdown Structure) in each of the seven phases:

1. **Planning: [40 hours]**
    I. Draft project brief
    II. Schedule kickoff meeting
    III. Project timeline estimation
    IV. Share timeline with teammates
    V. WBS Preparation
    VI. Review and acceptance

2. **Requirement Analysis: [42 hours]**
    I. Requirement gathering
    II. Requirement elicitation
    III. Requirement analysis
    IV. Requirement filtering
    V. UML diagrams
    VI. System architecture design
    VII. SRS documentation
    VIII. Review document

3. **Design: [38 hours]**
    I. Database design
    II. UI design
    III. UX design
    IV. Network and security design
    V. Design documentation
    VI. Design review and approval

4. **Development: [400 hours]**
    I. Development planning
    II. Web development
    III. Admin panel development
    IV. Third-party integration
    V. Version control and code review
    VI. Development documentation

5. **Testing: [40 hours]**
    I. Test planning
    II. Test case development
    III. Test environment setup
    IV. Test execution
    V. Bug reporting and tracking = Ongoing
    VI. Regression testing
    VII. User acceptance testing (UAT)
    VIII. Test closure

6. **Deployment: [40 hours]**
    I. Deployment planning
    II. Environment preparation
    III. Release package
    IV. Deployment – staging server
    V. Deployment execution
    VI. Go live

7. **Maintenance: [Ongoing]**

   I. Assign service operation team

   II. Monitoring and performance management
   III. Bug fixing and troubleshooting
   IV. Security updates
   V. Content updates
   VI. System and software updates
   VII. User support

The total time it will take for the project to be completed is approximately 16 working weeks or 4 Man-Months, from April 2, 2023, to July 25, 2023.

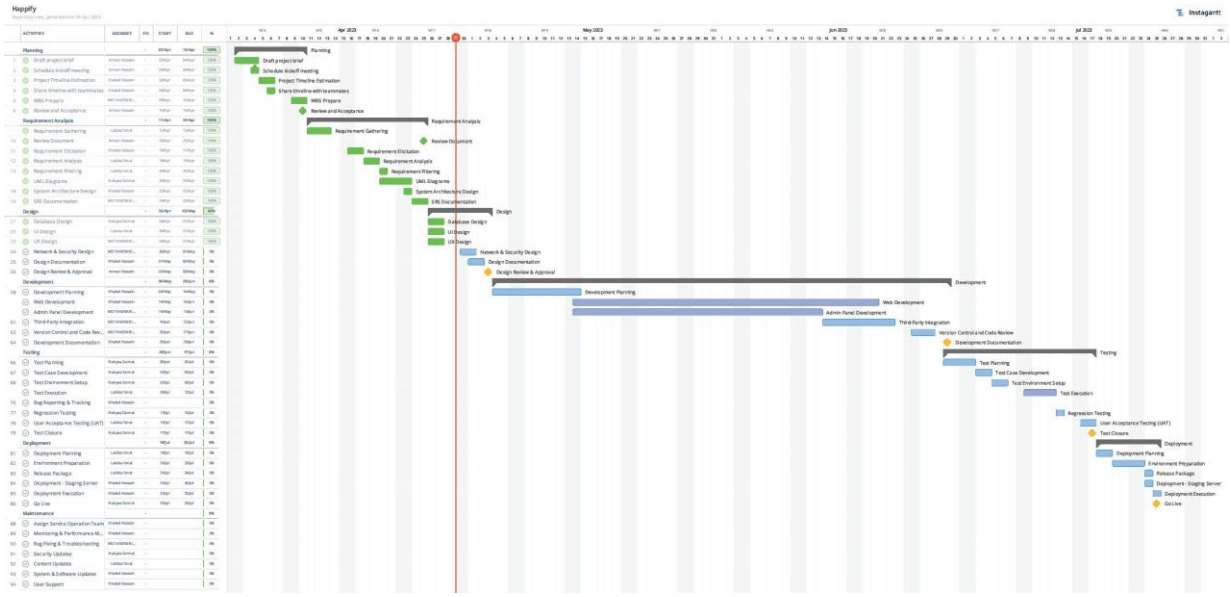


Figure 4: Gantt Chart

5. Marketing Plan

- **Short-term Plan (1 to 6 months):**
  - **Launch Promotion:** Offer a limited-time discount or promotional offer to entice new customers to make their first purchase on WhimsyMart. This can create a sense of urgency and help generate initial buzz.
  - **Social Media Advertising:** Leverage popular social media platforms like Facebook, Instagram, and Twitter to run targeted ads and sponsored posts that reach potential customers in the target demographic.
  - **Influencer Marketing:** Partner with influencers in the specific niche to promote the e-commerce site through sponsored posts, stories, and product reviews. This can help create trust and credibility among their followers.
- **Long-term Plan (6 months to 2 years):**
  - **Search Engine Optimization (SEO):** Implement a comprehensive SEO strategy to improve organic search rankings and drive long-term, sustainable traffic to the site. This includes optimizing the site's structure, content, and meta data to align with relevant keywords.
  - **Content Marketing:** Create and share valuable, informative content such as blog articles, videos, and infographics that showcase the products. This can help you establish authority in the specific niche and attract new customers.
  - **Retargeting Campaigns:** Use retargeting campaigns to re-engage potential customers who have visited the website but did not make a purchase. This can help increase conversion rates and encourage repeat purchases.
  - **Customer Loyalty Program:** Develop a customer loyalty program that rewards repeat customers with exclusive discounts, early access to new products, and other incentives. This can help foster long-term relationships and increase customer lifetime value.
- **Continuous Plan:**
  - **Social Media Engagement:** Maintain an active presence on social media platforms by consistently posting relevant content, engaging with followers, and responding to customer inquiries. This can help build a strong community around the brand and foster positive word-of-mouth.

- **Data Analysis and Optimization:** Regularly analyze user behavior data, site metrics, and marketing campaign performance to identify areas for improvement and optimization. Adjust the marketing strategies accordingly to maximize ROI.

- **Partnerships and Collaborations:** Continuously explore opportunities for partnerships and collaborations with complementary businesses or influencers that can expose your brand to new audiences.

- **Customer Feedback:** Collect and analyze customer feedback through surveys, reviews, and social media interactions to understand their needs and preferences. Use this information to refine the product offerings, marketing strategies, and overall customer experience.

6. Cost and Profit Analysis

Cost Analysis:

The figures below provide a thorough breakdown of the expenses associated with development and marketing.

PROJECT RESOURCE ENGAGEMENT (GENERIC)		Dev HOUR :		440	PROJECT RATE	
SL	POSITION	QTY	RATE/HR	% of WORK	TOTAL HOUR	TOTAL RATE
1	PROJECT MANAGER	1	1000	9%	40	40000
2	BUSINESS ANALYST	1	1000	8%	35	35000
3	TECHNICAL LEAD	1	1000	7%	31	31000
4	DATABASE ADMINISTRATOR	1	800	3%	13	10400
5	WEB DEVELOPER	1	800	91%	400	320000
8	UI/UX DEVELOPER	1	600	4%	18	10800
9	QA ENGINEER	1	600	9%	40	24000
10	NETWORK ENGINEER	1	600	2%	7	4200
11	TECHNICAL WRITER	1	400	0%	0	0
12	TRAINER	1	500	2%	8	4000
	SUB TOTAL:				592	479400
OTHERS						
13	D&C FOR PROPOSAL	1	500	1%	4	2000
14	LEGAL AFFAIRS	0	500	0%	0	0
15	Administrative	1	1000	1%	4	4000
	SUB TOTAL:				8	6000
	GRAND TOTAL:		715	135.9%	600	485400

Figure 5: Development Cost

Marketing Plan	Estimated Cost (BDT)
Short-term Plan	
Launch Promotion	10,000
Social Media Advertising	20,000
Influencer Marketing	30,000
Sub-Total	**60,000**
Long-term Plan	
Search Engine Optimization	20,000
Content Marketing	50,000
Retargeting Campaigns	15,000
Customer Loyalty Program	35,000
Sub-Total	**120,000**
Total One-Time Marketing Cost	**180,000**
Continuous Plan	
Social Media Engagement	20,000
Data Analysis & Optimization	25,000
Partnerships & Collaborations	40,000
Customer Feedback	15,000
Total	**100,000**

Figure 6: Marketing Costs

Profit Analysis:

Annual Maintenance Contract

In order to ensure a seamless operation in the platform, it is important for WhimsyMart to conduct the maintenance services, and as the system will be developed by the same party, better support should be provided. The Annual Maintenance Contract is divided into two parts. The Core AMC part is 30% of the total product pricing. And Rest of 5% is for licensing which is depending on the requirement volume.

FINANCIAL COSTS	%	Cost (BDT)
Project One Time Cost (Dev)	100%	485,400/-
Marketing Plan	100%	180,000/-
AMC	30%	199,620/-
Licensing	5%	30,000/-
TOTAL FIXED ONE TIME COST		**665,400/-**
TOTAL ANNUAL RECURRING COST (AMC)		**229,620/-**

The following amount will be considered as AMC. **229,620/-BDT** excluding VAT, **which is to be paid yearly by Client** after the deployment of the project. The AMC tenure will start from Go Live date of the website deployment.
This amount is for the first year of deployment of the mentioned version. The amount will be reviewed yearly and any further enhancement versions for the platform will have an impact while reviewing the amount.

Note: This AMC is excluding "Server Cost", "Domain Cost" & "SMS Gateway Integration Cost" .

Assumption: Annually 1,000,000/- BDT worth of products to be sold where 5,000/- per unit sales. Based on the assumption the profit ratio and break-even points are calculated.

- Total Variable Expenses = Direct Material Cost + Direct Labor Cost + Service & Licensing Cost [6]
  = 200,000 + 320,000 + 30,000 = 550,000 BDT

- Gross Profit = Sales Revenue – Total Variable Expenses
  = 1,000,000 – 550,000 = 450,000 BDT

- Profit Ratio = Gross Profit ÷ Sales Revenue
  = 450,000 ÷ 1,000,000 ≈ 0.45

Now, calculating the break-even point in terms of unit sales:

- Break-Even Points = Fixed Costs ÷ (Sales Price per Unit – Variable Costs per Unit) [7]

Firstly, the variable costs per unit is calculated:

- Total Variable Expenses = 550,000 BDT
  Total Sales = 1,000,000 BDT ÷ 5,000 BDT per unit = 200 units

- Variable Costs per Unit = Total Variable Expenses ÷ Total Sales
  = 550,000 ÷ 200 = 2,750 BDT per unit

- Therefore, Break-Even Point = 665,400 ÷ (5,000 – 2,750) ≈ 240 units

The e-commerce website would need to sell approx. 240 units to reach the break-even point and start generating profit.

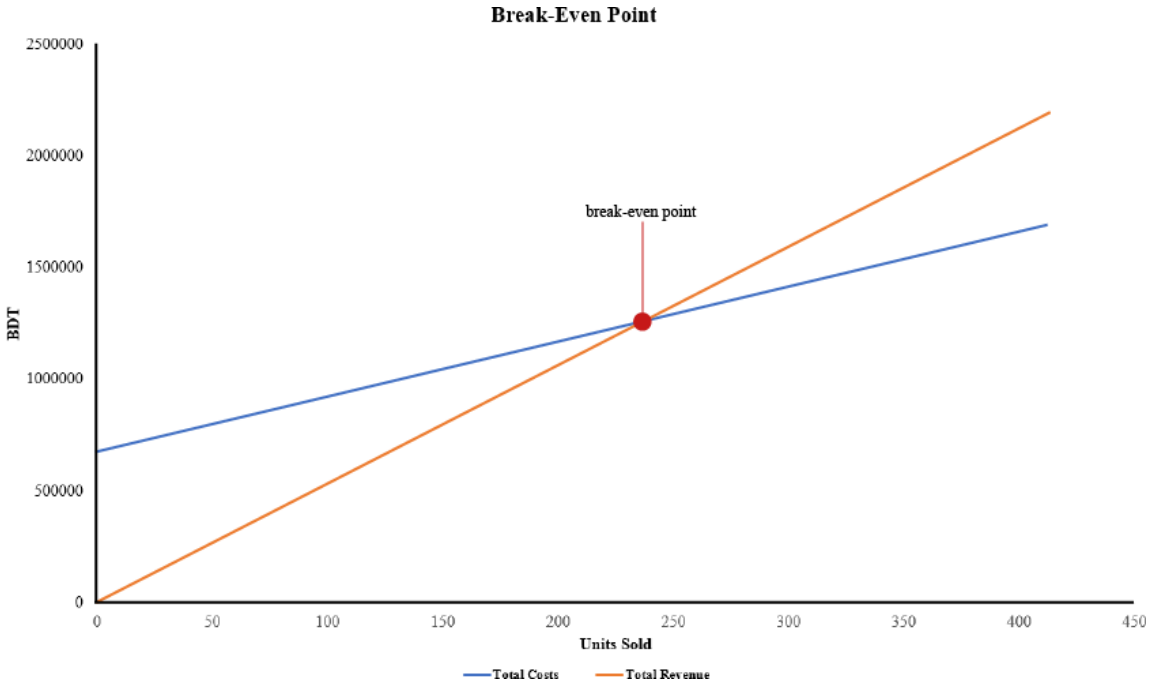


Figure 7: Break-Even Point Graph

7. References

[1] P. Packt, "The E-Commerce Problem Statement," in *Big Data and Business Intelligence*. Available: https://subscription.packtpub.com/book/big+data+and+business+intelligence/9781783981847/1/ch01lvl1sec12/the-e-commerce-problem-statement [Accessed: 16 Apr. 2023]

[2] Mailchimp, "E-commerce Website," *Marketing Glossary*, 2021. [Online]. Available: https://mailchimp.com/marketing-glossary/ecommerce-website/#:~:text=An%20e-commerce%20website%20is,logistics%2C%20and%20provide%20customer%20service [Accessed: 23 Apr. 2023].

[3] Fabric, "Types of E-commerce," *Fabric Blog*, 2021. [Online]. Available: https://fabric.inc/blog/types-of-ecommerce/#:~:text=read%20customer%20reviews.-,B2C%20E-Commerce,type%20of%20e-commerce%20today. [Accessed: 23 Apr. 2023].

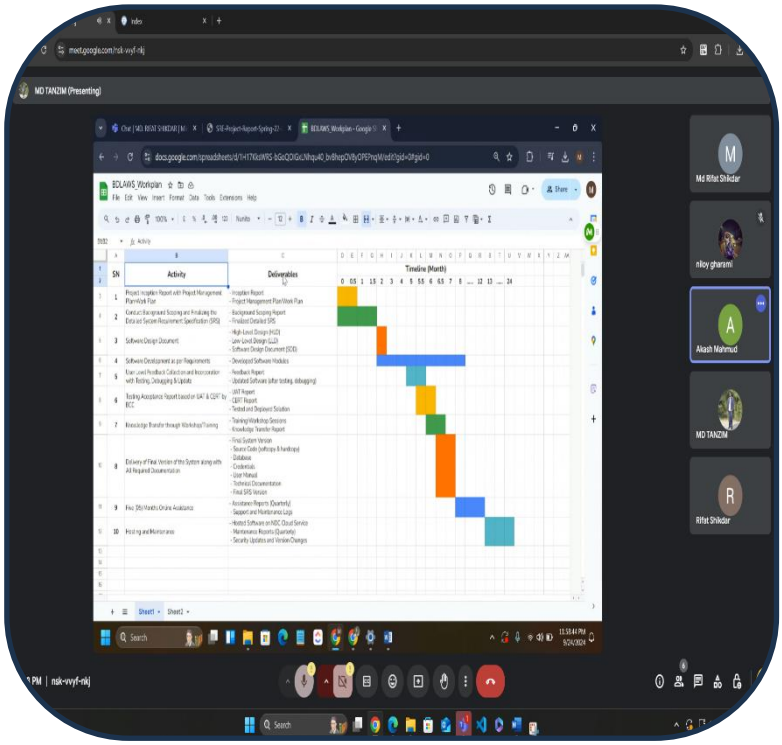
[4] NASSCOM Community, "E-commerce Website: Functional and Non-Functional Requirements," *NASSCOM*, 2021. [Online]. Available: https://community.nasscom.in/communities/mobile-web-development/e-commerce-website-functional-and-non-functional-requirements. [Accessed: 29 Apr. 2023].

[5] AcoWebs, "The Impact of E-Commerce on Society: Positive and Negative Effects," *AcoWebs*, [Online]. Available: https://acowebs.com/impact-ecommerce-society/#:~:text=The%20main%20way%20in%20which,changes%20in%20sellers%27%20pricing%20behavior. [Accessed: 29 Apr. 2023].

[6] "Variable Cost Per Unit," *WallstreetMojo*, [Online]. Available: https://www.wallstreetmojo.com/variable-cost-per-unit/. [Accessed: 30 Apr. 2023].

[7] "Break-Even Point," *ReadyRatios*, [Online]. Available: https://www.readyratios.com/reference/analysis/break_even_point.html. [Accessed: 30 Apr. 2023].

8. Meetings


MD TANZIM (Presenting)
BOLAWS_Workplan
Activity
Deliverables
Timeline (Month)
Md Rifat Shikdar
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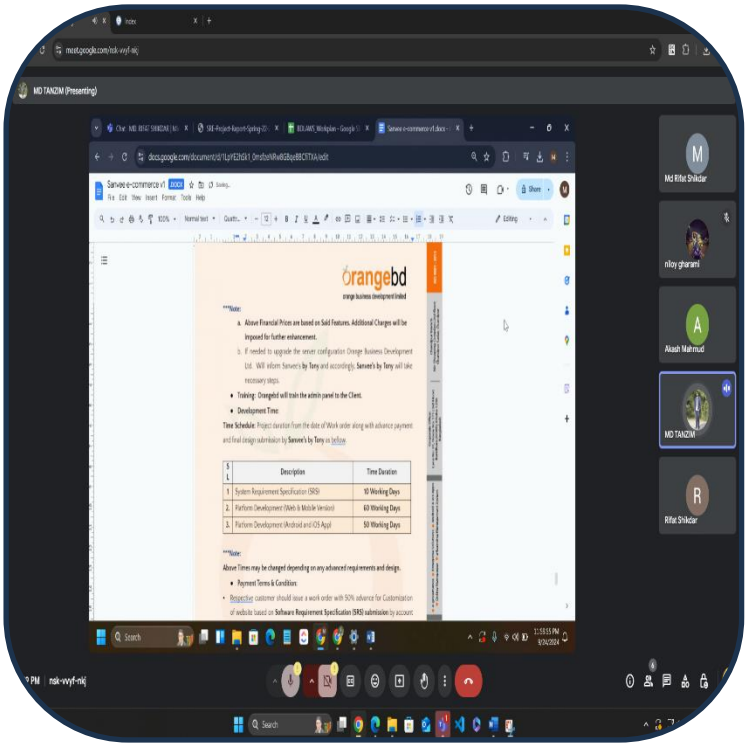
Akash Mahmud
MD TANZIM
Rifat Shikdar


MD TANZIM (Presenting)
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Description
Time Duration
System Requirement Specification (SRS)
Platform Development (Web & Mobile Version)
Platform Development (Android and iOS App)
Md Rifat Shikdar
nloy gharami
Akash Mahmud
MD TANZIM
Rifat Shikdar


MD TANZIM (Presenting)
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MD TANZIM


MD TANZIM (Presenting)
Workplan
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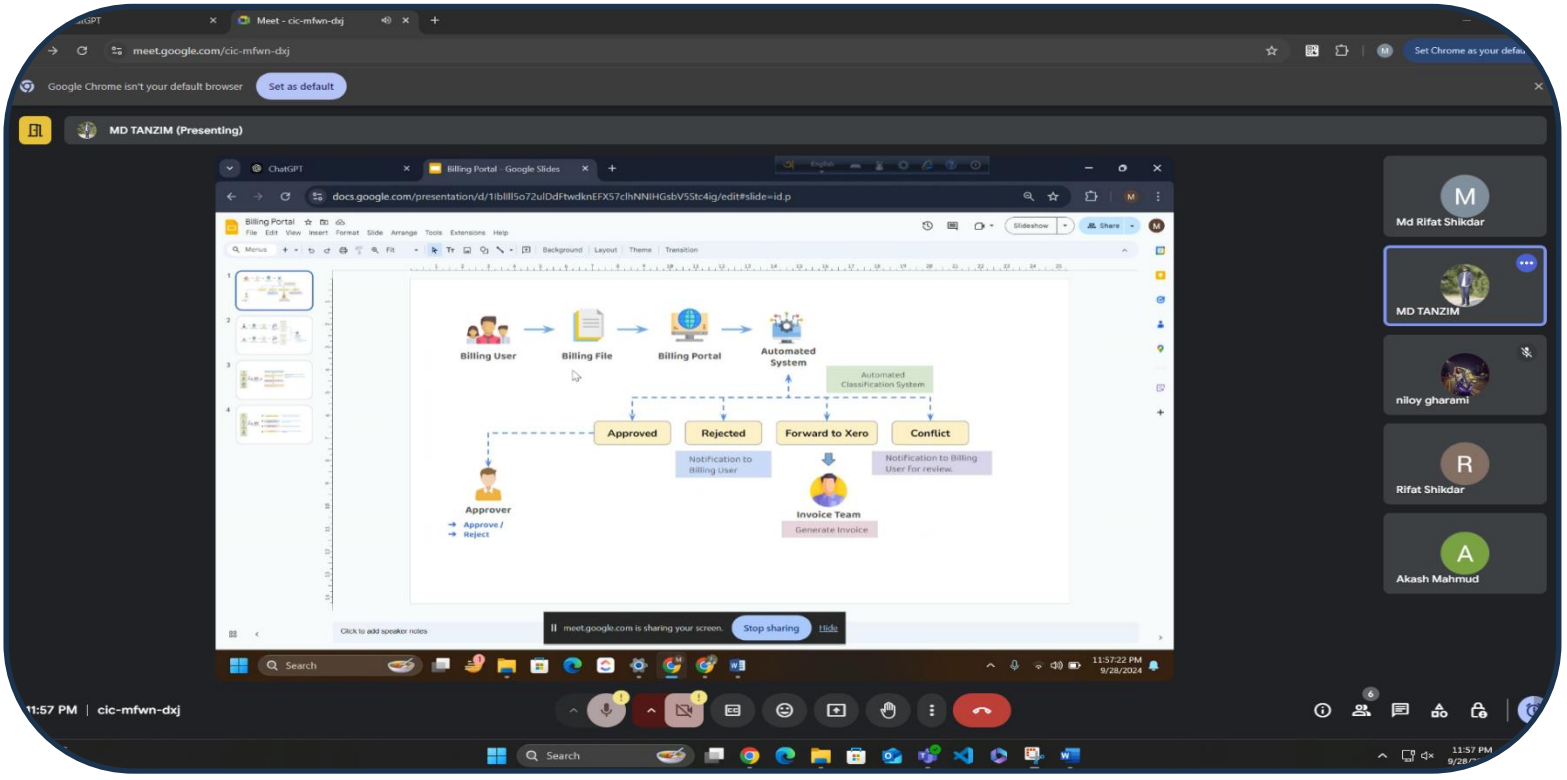
Rifat Shikdar
MD TANZIM


Meet - cic-mfwn-dxj
meet.google.com/cic-mfwn-dxj
Google Chrome isn't your default browser
Set as default
MD TANZIM (Presenting)
Billing Portal - Google Slides
docs.google.com/presentation/d/1iblll5o72ulDdFtwdknEFX57clhNNIHGsbV5Stc4ig/edit#slide=id.p
Billing User
Billing File
Billing Portal
Automated System
Automated Classification System
Approved
Rejected
Forward to Xero
Conflict
Notification to Billing User
Notification to Billing User for review
Approver
Approve / Reject
Invoice Team
Generate Invoice
meet.google.com is sharing your screen.
Stop sharing
Hide
Md Rifat Shikdar
MD TANZIM
niloy gharami
Rifat Shikdar
Akash Mahmud
11:57 PM | cic-mfwn-dxj