



Introducing Walmart AI Online Ordering System

Requirements Analysis

Class Assessment 1

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Background

Company Overview

Walmart Inc., established in 1962, is a global retail giant operating a vast network of hypermarkets, discount department stores, and grocery outlets. Over the years, Walmart has evolved into one of the world's leading retailers, offering an extensive range of products, from groceries and clothing to electronics and home goods. The company is distinguished by its commitment to cost leadership, operational efficiency, and the strategic use of technology to improve its supply chain and enhance the customer experience.

Introduction

Our report is based on Walmart's online ordering system. We will highlight Walmart's present ordering system process before introducing Walmart AI to the online ordering system. As a result, the steps or process for placing an order for home delivery will be simplified from the steps required to place an online order right now.

We are solely focused on the online ordering system aspect of introducing Walmart AI, which can be done through a website or an application. Both are pretty much the same when it comes to online ordering systems, with the exception that the user interface may differ between a website and a mobile application, such as security and development, but your report is more focused on online ordering through a website.

The current process for ordering something at Walmart works like this:

You can place an order for delivery; for example, if you want to buy a backpack and have it delivered to your home. To place an order on the Walmart website, you must first create an account; no orders may be placed without one. (This is for the home delivery order explanation.) Once you've signed in to your account, you may enter your home address, then search for the bag you want to buy, add it to your basket, enter your credit card information, and place your order.

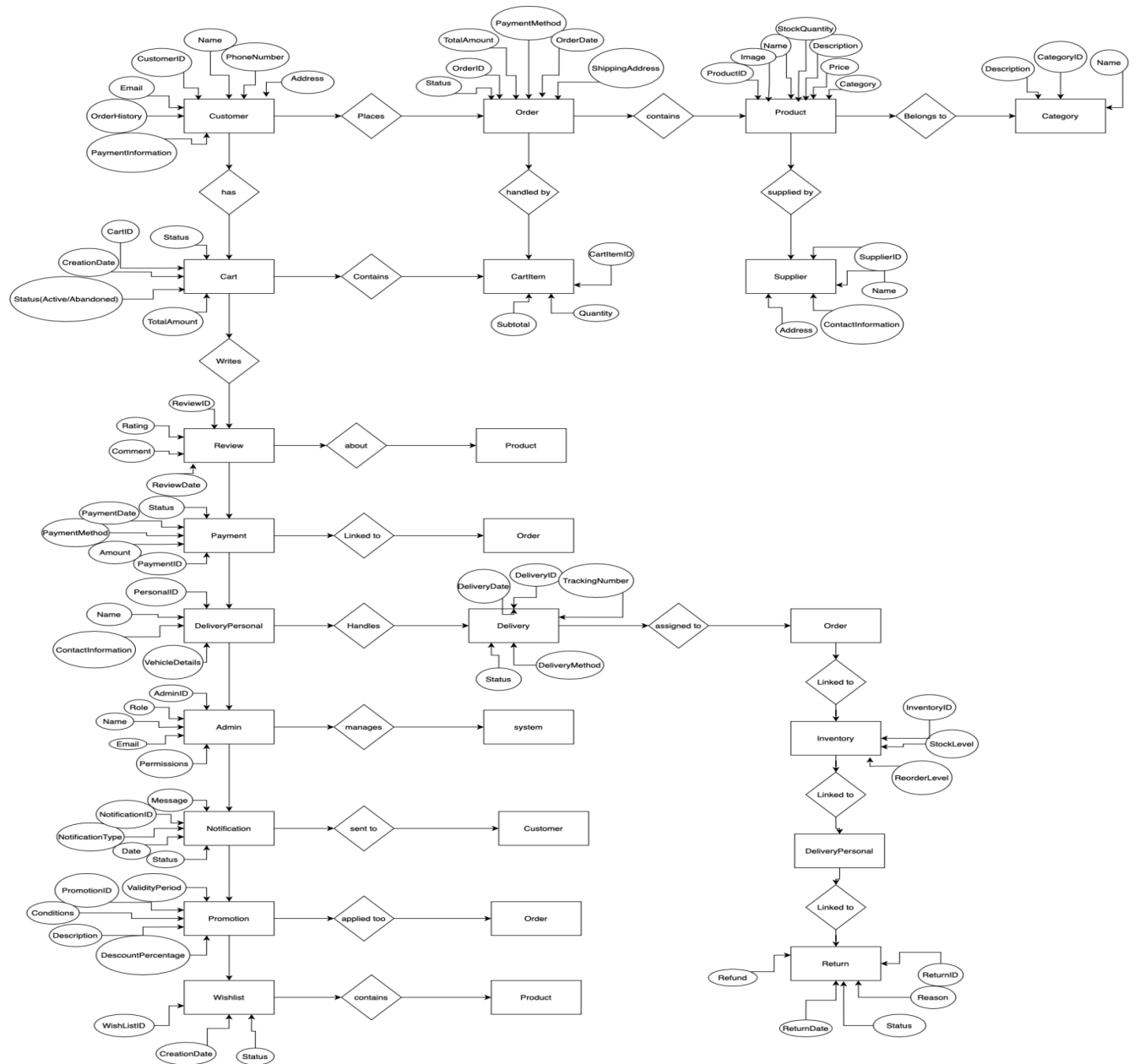
I have provided the steps below:-

- 1) Make sure you are logged into your Walmart account.
- 2) Once logged in, you can browse for the things you want to purchase.
- 3) You can enter the shipping information to get it home delivered.
- 4) Once you've added all of the products you want to purchase into the basket
- 5) You can proceed to the checkout.
- 6) After adding your credit card details (if not already in your Walmart account), proceed to make the payment.
- 7) The order will be delivered to you.

Entities for online ordering system current process -

- 1) Customer
- 2) Order
- 3) Product
- 4) Category
- 5) Cart
- 6) CartItem
- 7) Payment
- 8) Review
- 9) Delivery
- 10) DeliveryPersonal
- 11) Supplier
- 12) Inventory
- 13) Admin
- 14) Promotion
- 15) Notification
- 16) Return
- 17) Wishlist

Entity Relationship diagram for the current process -



SQL Code for the current process -

```
-- Creating Customer table
CREATE TABLE Customer (
  CustomerID INT PRIMARY KEY,
  Name VARCHAR(100),
  Email VARCHAR(100),
  Phone VARCHAR(20),
  Address VARCHAR(255)
);

-- Creating Order table
CREATE TABLE Order (
  OrderID INT PRIMARY KEY,
  OrderDate DATE,
  CustomerID INT,
  TotalAmount DECIMAL(10, 2),
  PaymentStatus VARCHAR(50),
  ShippingStatus VARCHAR(50),
  FOREIGN KEY (CustomerID) REFERENCES Customer(CustomerID)
);

-- Creating Product table
CREATE TABLE Product (
  ProductID INT PRIMARY KEY,
  Name VARCHAR(100),
  Description TEXT,
  CategoryID INT,
  Price DECIMAL(10, 2),
  StockLevel INT,
  FOREIGN KEY (CategoryID) REFERENCES Category(CategoryID)
);

-- Creating Category table
CREATE TABLE Category (
  CategoryID INT PRIMARY KEY,
  Name VARCHAR(100),
  Description TEXT
);

-- Creating Cart table
CREATE TABLE Cart (
  CartID INT PRIMARY KEY,
  CustomerID INT,
  FOREIGN KEY (CustomerID) REFERENCES Customer(CustomerID)
);

-- Creating CartItem table
CREATE TABLE CartItem (
  CartItemID INT PRIMARY KEY,
  CartID INT,
  ProductID INT,
  Quantity INT,
  FOREIGN KEY (CartID) REFERENCES Cart(CartID),
  FOREIGN KEY (ProductID) REFERENCES Product(ProductID)
);

-- Creating Payment table
CREATE TABLE Payment (
  PaymentID INT PRIMARY KEY,
  OrderID INT,
  PaymentDate DATE,
  Amount DECIMAL(10, 2),
  PaymentMethod VARCHAR(50),
  FOREIGN KEY (OrderID) REFERENCES Order(OrderID)
);

-- Creating Review table
CREATE TABLE Review (
  ReviewID INT PRIMARY KEY,
  CustomerID INT,
  ProductID INT,
  Rating INT,
  Comment TEXT,
  FOREIGN KEY (CustomerID) REFERENCES Customer(CustomerID),
  FOREIGN KEY (ProductID) REFERENCES Product(ProductID)
);

-- Creating Delivery table
CREATE TABLE Delivery (
  DeliveryID INT PRIMARY KEY,
  OrderID INT,
  DeliveryDate DATE,
  DeliveryStatus VARCHAR(50),
  DeliveryPersonnelID INT,
  FOREIGN KEY (OrderID) REFERENCES Order(OrderID),
  FOREIGN KEY (DeliveryPersonnelID) REFERENCES DeliveryPersonnel(DeliveryPersonnelID)
);

-- Creating DeliveryPersonnel table
CREATE TABLE DeliveryPersonnel (
  DeliveryPersonnelID INT PRIMARY KEY,
  Name VARCHAR(100),
  ContactInfo VARCHAR(100)
);

-- Creating Supplier table
CREATE TABLE Supplier (
  SupplierID INT PRIMARY KEY,
  Name VARCHAR(100),
  ContactInfo VARCHAR(100),
  Address VARCHAR(255)
);

-- Creating Inventory table
CREATE TABLE Inventory (
  InventoryID INT PRIMARY KEY,
  ProductID INT,
  SupplierID INT,
  Quantity INT,
  FOREIGN KEY (ProductID) REFERENCES Product(ProductID),
  FOREIGN KEY (SupplierID) REFERENCES Supplier(SupplierID)
);

-- Creating Admin table
CREATE TABLE Admin (
  AdminID INT PRIMARY KEY,
  Name VARCHAR(100),
  Email VARCHAR(100),
  Password VARCHAR(100)
);

-- Creating Promotion table
CREATE TABLE Promotion (
  PromotionID INT PRIMARY KEY,
  ProductID INT,
  Discount DECIMAL(5, 2),
  StartDate DATE,
  EndDate DATE,
  FOREIGN KEY (ProductID) REFERENCES Product(ProductID)
);

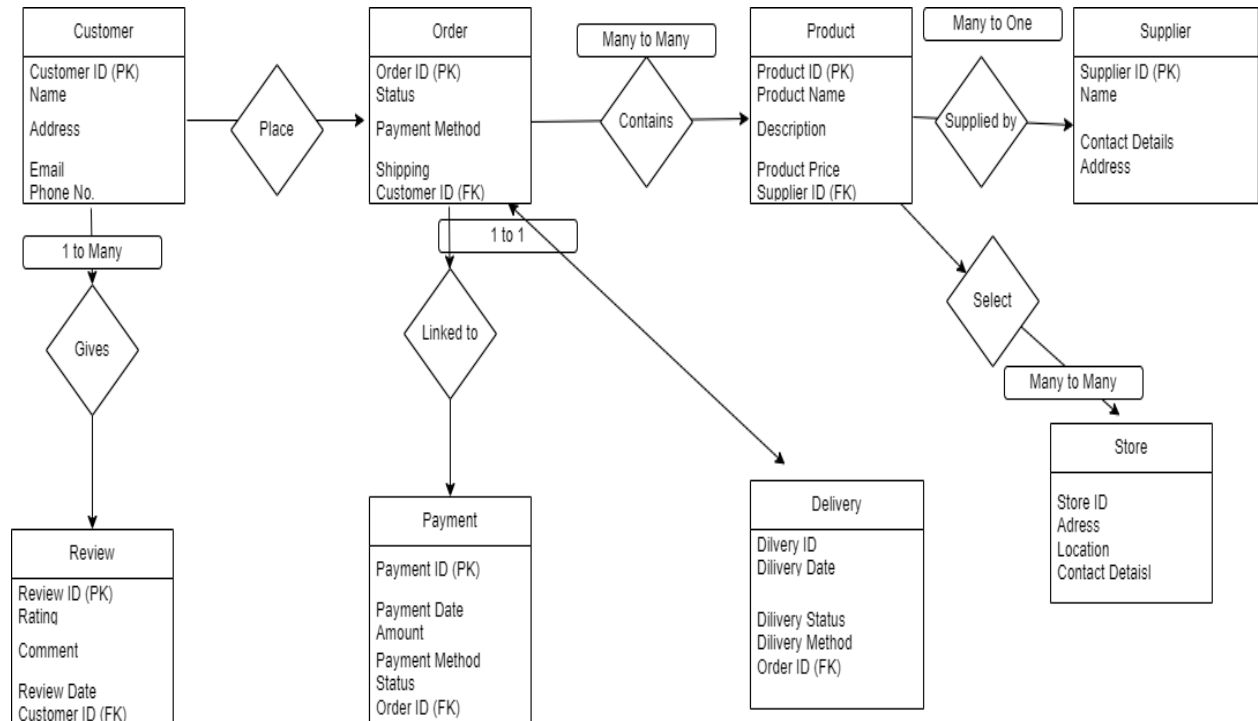
-- Creating Notification table
CREATE TABLE Notification (
  NotificationID INT PRIMARY KEY,
  CustomerID INT,
  Message TEXT,
  DateSent DATE,
  FOREIGN KEY (CustomerID) REFERENCES Customer(CustomerID)
);

-- Creating Return table
CREATE TABLE Return (
  ReturnID INT PRIMARY KEY,
  OrderID INT,
  ReturnDate DATE,
  Reason TEXT,
  Status VARCHAR(50),
  FOREIGN KEY (OrderID) REFERENCES Order(OrderID)
);

-- Creating Wishlist table
CREATE TABLE Wishlist (
  WishlistID INT PRIMARY KEY,
  CustomerID INT,
  ProductID INT,
  FOREIGN KEY (CustomerID) REFERENCES Customer(CustomerID),
  FOREIGN KEY (ProductID) REFERENCES Product(ProductID)
);
```

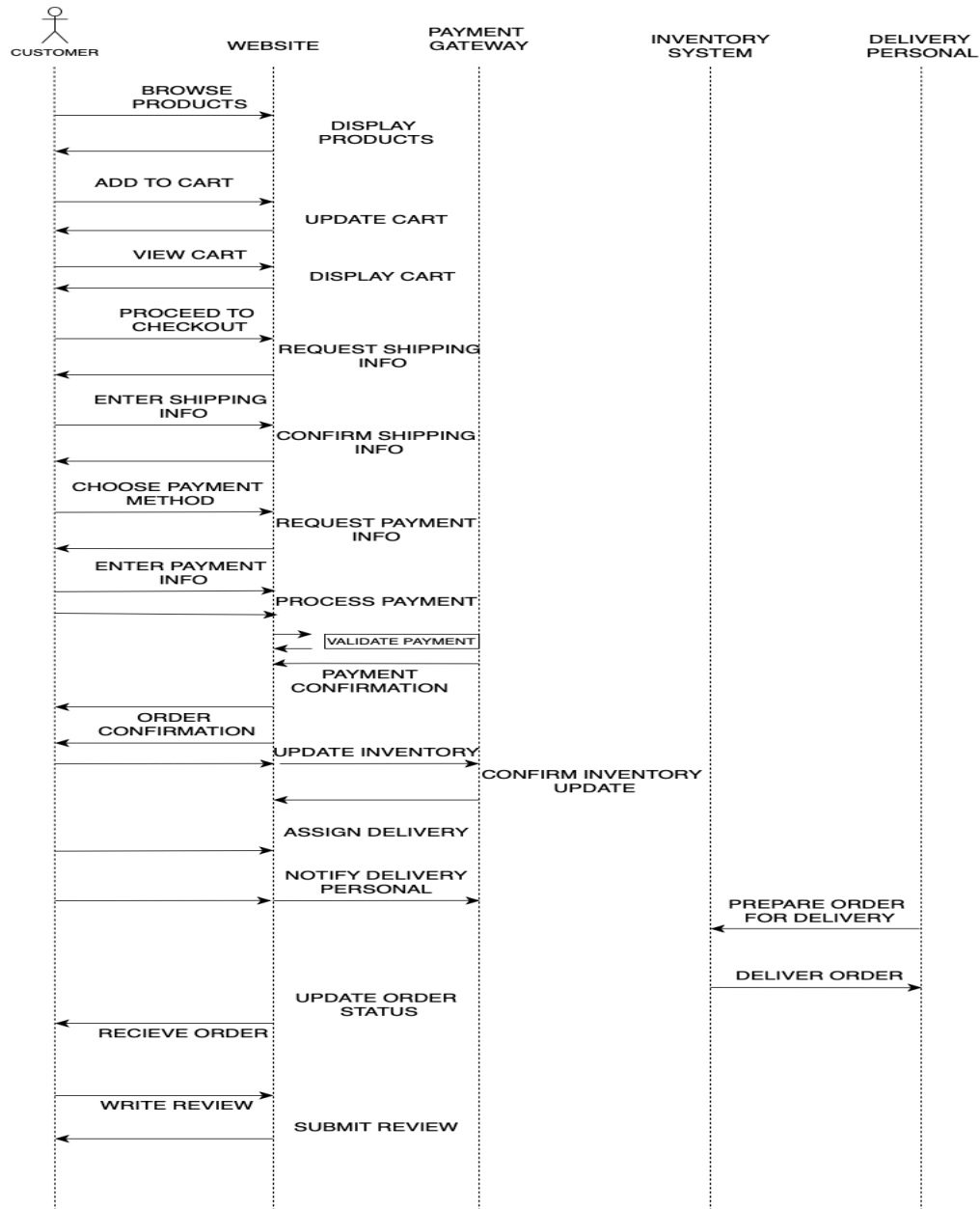
UML diagram for current process -

1. Here Customer places Order and have 1 to Many Relationships as many orders relate to 1 customer. Here are two Primary Keys: Customer ID & Order ID. Customer ID is Foreign Key that creates relationships.
2. Order contains Product have Many to Many relationships as many orders have many products. Here are two Primary Keys: Order ID & Product ID. Product ID is Foreign Key that creates relationships.
3. Products supplied by suppliers and have Many to Many relationships because we can supply multiple products from multiple suppliers. Here are two Primary Keys: Product ID and Supplier ID. Supplier ID is a foreign key that creates relationships.
4. Product and Store have many to many relationships because we have multiple stores branches and multiple products in store. Here are two Primary Keys: Product ID and Store ID. Product ID in Store is a foreign key that creates relationships.
5. Customers give reviews and have One to Many Relationships. Here are two Primary Keys: Customer ID and Review ID. Customer ID in Review is a foreign key that creates relationships.
6. Order linked to Payment has a 1 to 1 relationship. Here are two Primary Keys: Order ID and Payment ID. Order ID in Payment is a foreign key that creates relationships.
7. Order to Delivery has 1 to 1 Relationship. Here are two Primary Keys: Order ID and Delivery ID. Order ID in Delivery is a foreign key that creates relationships.



Sequence Diagram for current process-

In my Sequence diagram, we illustrated the process/flow of how the online ordering system operates.



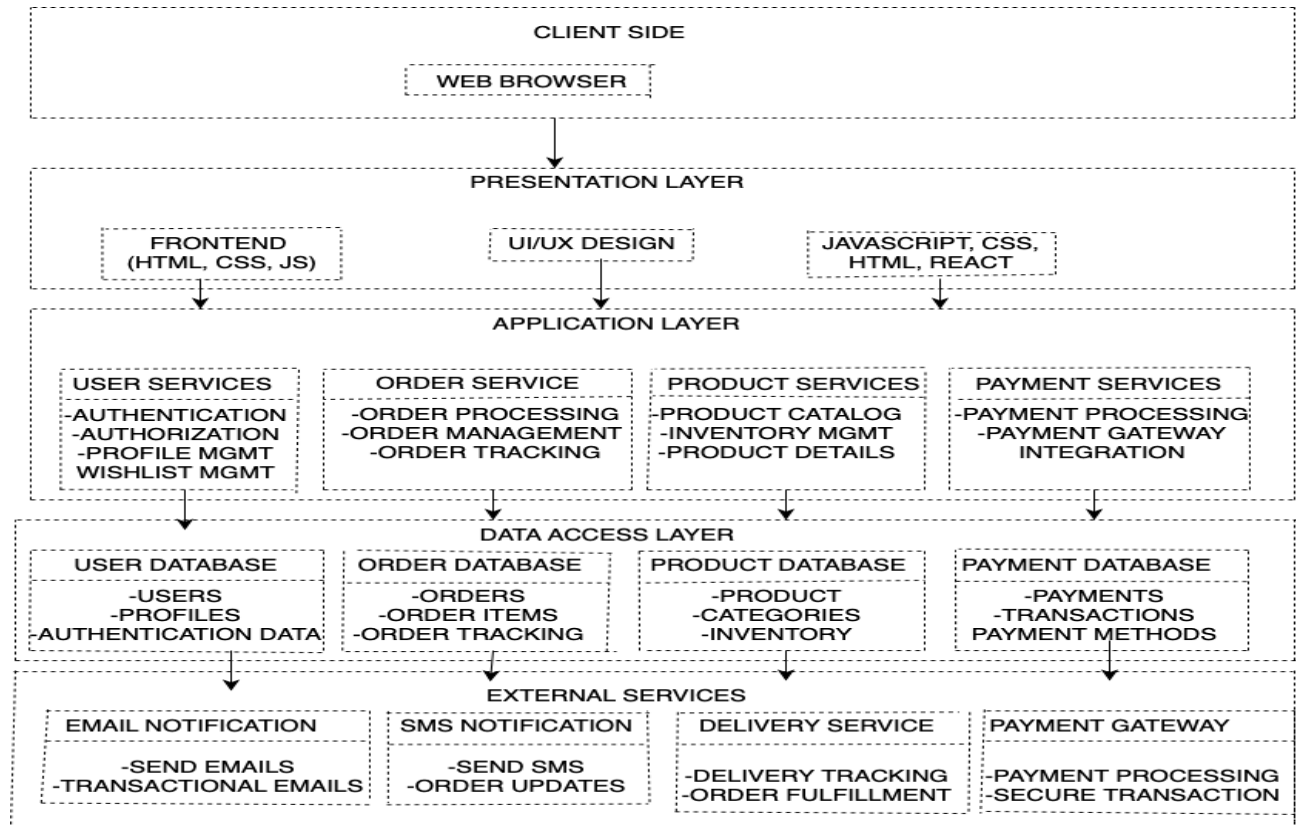
Summary of the sequence diagram -

- 1) The customer will browse products on the website.
- 2) After adding things to his cart, he may wish to inspect it.
- 3) He will proceed to checkout and provide shipping details.

- 4) He will next choose the payment method and enter the payment information.
- 5) The website will then process the payment.
- 6) Then he will receive confirmation of the payment.
- 7) He will receive the order confirmation.
- 8) Then, the website updates the inventory.
- 9) The website will assign delivery workers to perform the deliveries.
- 10) Delivery workers will receive a notification.
- 11) Delivery professionals will prepare the order for delivery.
- 12) The delivery person will deliver the order to the consumer.
- 13) When the order is delivered, the website updates the order status.
- 14) The consumer will receive the order.
- 15) The customer can then leave a review regarding their online ordering experience.

Architecture diagram

Our Architecture diagram gives a visual representation of the current process.



Introducing Walmart AI

The proposed approach will be the same as the current process; we are simply adding a few more layers to the online ordering system using Walmart AI, which will simplify the processes required to make an order online. Walmart AI is more of a voice command AI; you may completely communicate with the Walmart AI to place your purchase for delivery. It is convenient for folks.

Walmart AI will help to simplify the processes required to place an order online manually, and it will function in such a way that it will assist the company with online orders via AI voice command.

The enhancement is directly related to the customer; as soon as the customer logs into his Walmart account, he can choose to speak to the Walmart AI function, and assuming the customer's shipping and payment information is already in the Walmart account, it will work quickly in a few steps for the customer to place an online order.

This will save customers time. In the analytical section, we don't need to make many modifications compared to the preceding ER entities and UML entities and sequence. There will be some new entities, which will be brought over to the UML diagram and the process of how the Walmart AI interacts with the online ordering system. We shall depict the flow in our sequence diagram. Of course, introducing Walmart AI will necessitate a significant amount of coding as well as some changes to the architecture and software that Walmart now uses, but it will benefit customers by making online ordering more convenient.

Flow of the Walmart AI processing

- Click on the Walmart AI button in your walmart account.
- AI will greet the user.
- And then AI will inquire what to order.
- The user will "announce the order to the AI bot".
- The bot will add items to the basket, declare the order, and confirm.
- And the user "confirms".
- The bot will ask the permission to use the card (already filled the payment information in the walmart account)
- Once the payment is successful, the Bot will confirm the payment with the user
- Then the bot will give the order confirmation, and provide the tracking number or the estimated delivery time.

Entities -

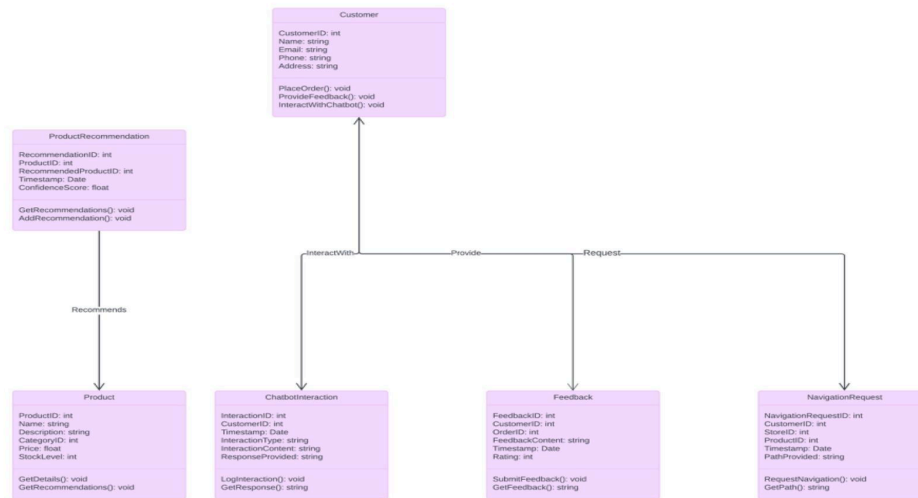
We have mentioned the additional entities with the entities we have in the current process.

- 1) Customer**
- 2) Product Recommendation**
- 3) Product**
- 4) Chatbot interaction**
- 5) Feedback navigation request**

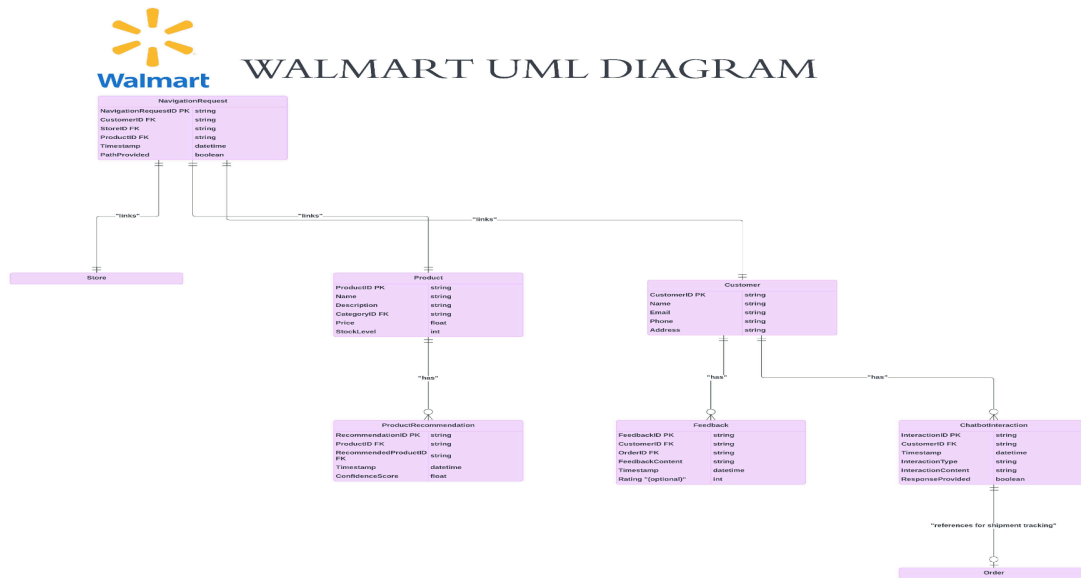
Entity Relationship diagram for the proposed process -



WALMART ER DIAGRAM



UML diagram for the proposed process -



SQL code for the proposed process -

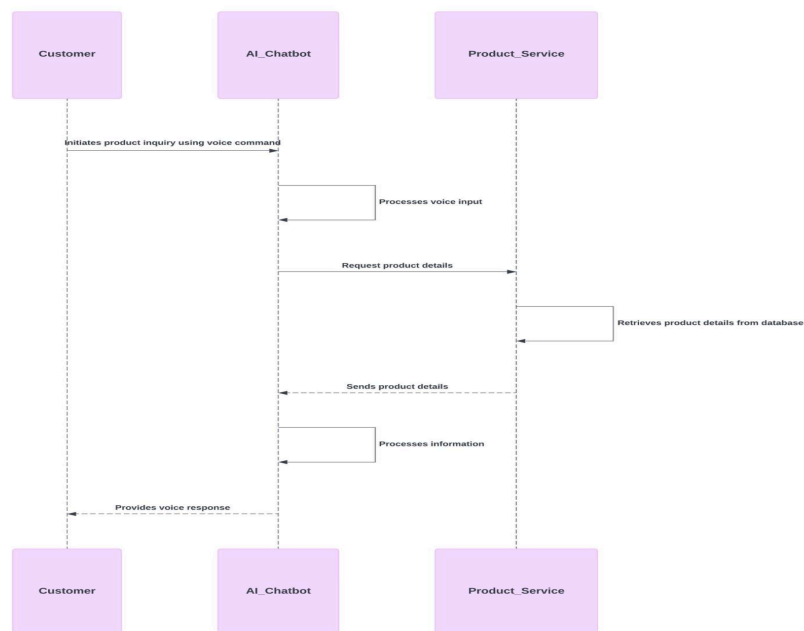
```
CREATE TABLE `NavigationRequest` (  
  `NavigationRequestID` PK` string,  
  `CustomerID` FK` string,  
  `StoreID` FK` string,  
  `ProductID` FK` string,  
  `Timestamp` datetime,  
  `PathProvided` boolean  
);  
  
CREATE TABLE `Customer` (  
  `CustomerID` PK` string,  
  `Name` string,  
  `Email` string,  
  `Phone` string,  
  `Address` string  
);  
  
CREATE TABLE `Store` (  
  
);  
  
CREATE TABLE `Product` (  
  `ProductID` PK` string,  
  `Name` string,  
  `Description` string,  
  `CategoryID` FK` string,  
  `Price` float,  
  `StockLevel` int  
);  
  
CREATE TABLE `Feedback` (  
  `FeedbackID` PK` string,  
  `CustomerID` FK` string,  
  `OrderID` FK` string,  
  `FeedbackContent` string,  
  `Timestamp` datetime,  
  `Rating "(optional)"` int  
);  
  
CREATE TABLE `ChatbotInteraction` (  
  `InteractionID` PK` string,  
  `CustomerID` FK` string,  
  `Timestamp` datetime,  
  `InteractionType` string,  
  `InteractionContent` string,  
  `ResponseProvided` boolean  
);  
  
CREATE TABLE `Order` (  
  
);  
  
CREATE TABLE `ProductRecommendation` (  
  `RecommendationID` PK` string,  
  `ProductID` FK` string,  
  `RecommendedProductID` FK` string,  
  `Timestamp` datetime,  
  `ConfidenceScore` float  
);
```

Sequence diagram for the proposed process -

We have made two sequence diagrams one with the shipment tracking and Product Inquiry.



Sequence Diagram for Product Inquiry:



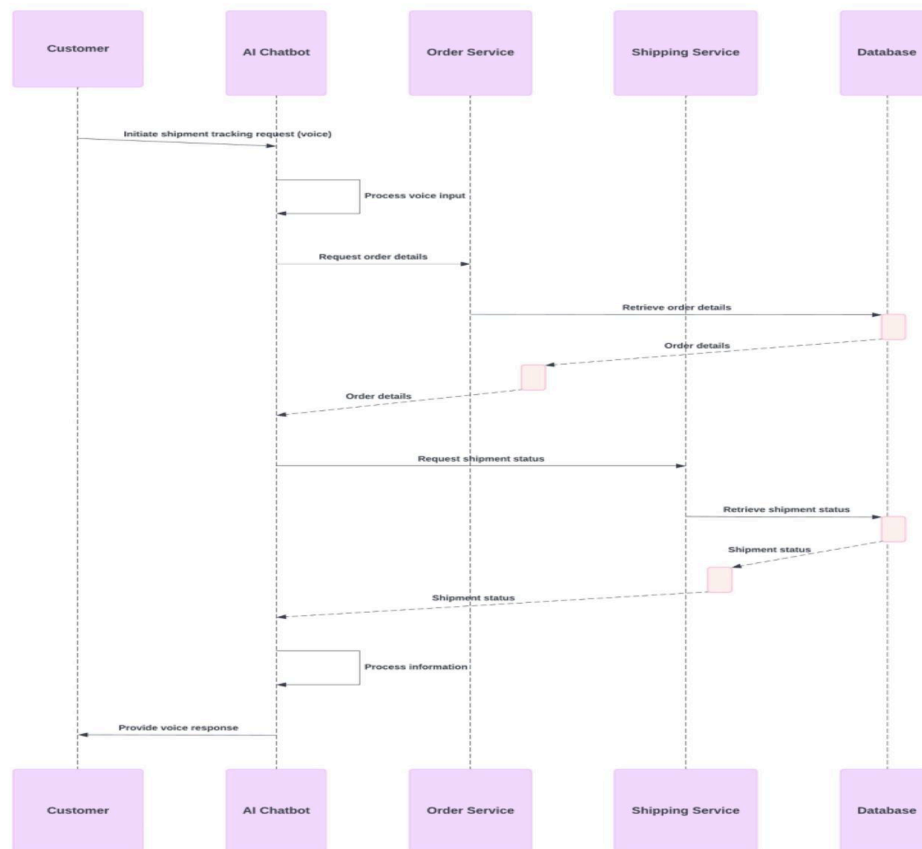
Summary for Sequence Diagram for product inquiry.

- Customer initiates product inquiry using voice command.
- AI chat bot processes voice input and requests required product details

- Product_Service retrieves product details from the database.
- Product_Service sends product details to AI chatbot
- AI chatbot processes information and provides voice response to customer



Sequence Diagram for Shipment Tracking:



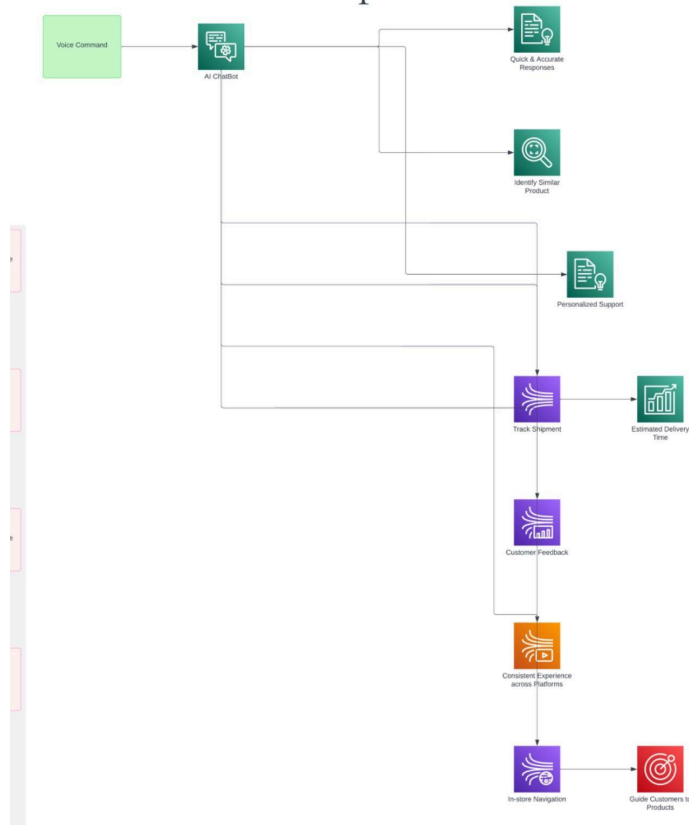
Summary for Sequence Diagram for Shipment tracking-

- Customer initiates shipment tracking request (voice command).
- AI chatbot processes voice input and requests order details to order service

- Order Service retrieves order details from the database.
- Database provides order details to the AI chatbot to confirm the order details.
- AI chatbot requests for shipment status to shipping service
- Shipping service retrieves shipment status from the database.
- Database sends shipment status to AI chatbot via shipping service
- AI chatbot provides voice response to the customer.

Architecture diagram for the proposed process -

Architecture Diagram for Walmart AI Chatbot with Voice Command Components:



Conclusion -We have closely examined Walmart's current online ordering process and have improved it so that, with the help of our Walmart AI, you can reduce the number of steps required for online ordering, which can save time and be more convenient. This report primarily focuses on online ordering to the delivery of items.

In order to minimize the steps required to place an online order, we deliberately changed the online ordering portion, retaining all of the existing entities and only creating a new layer of entities on top of them with introducing Walmart AI.

In this report, we have included the current process and the proposed process,

Current process has the following :

Entity relationship diagram

UML diagram

Sequence diagram

Architecture diagram

Proposed process:

Entity relationship diagram

UML diagram

Sequence diagram

Architecture diagram

Elicitation plan and Documentation

Timeline	Plan
Week 1-4:Preliminary Research and Stakeholder Identification	<ul style="list-style-type: none"> • Identify Key Stakeholders: Identify and list stakeholders such as management, IT staff, end-users (store managers, inventory managers), suppliers, and customers. • Conduct Preliminary Research: Conduct research to understand current pain points, business processes, and potential areas for improvement.

Week 5-8: Requirements Analysis and Prioritization	<ul style="list-style-type: none"> • Analyze Requirements: Analyze gathered data to identify patterns, common themes, and unique requirements. Categorize requirements into functional and non-functional. • Prioritize Requirements: Use prioritization techniques such as MoSCoW (Must have, Should have, Could have, Won't have) to rank requirements based on business impact, feasibility, and stakeholder importance.
Week 9-12: Validation and Documentation	<ul style="list-style-type: none"> • Validate Requirements: Review and validate requirements with stakeholders to ensure accuracy, completeness, and alignment with business goals. • Document Requirements: Prepare comprehensive documentation of final requirements, including use case diagrams, functional specifications, and non-functional requirements. Obtain stakeholder sign-off on the documented requirements.

Functional Requirements

Customer Management:

- The system should allow adding, updating, and deleting customer records.
- The system should track customer purchase history and preferences, enabling personalized marketing and customer relationship management.

Inventory Management:

- The system should manage product stock levels and reorder points.
- The system should provide real-time inventory tracking and alerts for low stock levels, ensuring optimal inventory levels and preventing stockouts.

Order Processing:

- The system should facilitate order creation, updating, and tracking.
- The system should generate invoices and order confirmations, streamlining the sales process and improving customer service.

Supplier Management:

- The system should maintain supplier information and track supplier performance.
- The system should handle supplier orders and delivery schedules, ensuring timely restocking and efficient supply chain operations.

Non-Functional Requirements

Performance:

- The system should support high-volume transactions with minimal latency.
- The system should provide real-time data processing and reporting, ensuring timely and accurate decision-making.

Security:

- The system should ensure data encryption in transit and at rest, protecting sensitive information from unauthorized access and breaches.
- The system should implement role-based access control, ensuring that only authorized personnel have access to specific data and functionalities.

Usability:

- The system should have an intuitive and user-friendly interface, reducing the learning curve and increasing user adoption.
- The system should provide training modules and user documentation, supporting users in effectively utilizing the system.

Peer review -

1. Nikhil Sunka

1. **Role:** Team Leader / Research specialist

2. **Contributions:**

- In my capacity as the team's leader, I discussed numerous tasks with the group and split the work as needed to make sure the report was well-formatted.
- Independent completion - I worked on the Background, Introduction, the steps of the current online ordering system, and the entire Current process of walmart like the entities, Entity relationship diagram, UML diagram, Sequence diagram, Architecture diagram, Coming up with the idea of Walmart AI, Introducing Walmart AI theory part, Flow of the Walmart AI processing, conclusion, also some of the elicitation plan and documentation, Wrote the entire SQL code for the previous report and made necessary changes required in the SQL code for the current process.
- Enhancement Idea - I worked solely on the enhancement idea with keeping in mind about the online ordering system (steps) to reduce the steps with introducing the Walmart AI.
- Report Editing: Making sure the report aligns with the instructions given, Like the Font, Font size, and the flow of the report.
- **Other work:** structure adjustment, Report editing.

3. Challenges Faced:

- I faced critical challenges in understanding the project. I believe that our previous report was not sufficient and we had to make some major changes. I figured that during our presentation, and also changed 80% of the report.
- Challenges included - Coming up with an entire new enhancement idea which is related to walmart current system, ie for our report is online ordering system and from there i took off with the idea of reducing the steps in current online ordering system, and introducing the Walmart AI, which can be used by voice command to reduce the steps of online ordering and save time.
- I feel like we could have done more, but with the limited time we had after the presentation, we gave our best to the report.

4. Overcoming Challenges:

- We established a group where all team members could share their thoughts and decide what to write for the report. This allowed everyone to participate in the decision-making process.
- The most challenging part to overcome for me was to make sure the report is up to our needs, and we have the report as per your requirements needed to complete and achieve the report goals.
- Bringing an entirely new idea and the way of thinking to complete the report as per the required need of CA1.

5. Lessons Learned:

- Dividing the tasks as per to the individual strengths and expertise to have a more perfect workflow and maximum productivity.

- Next time, probably Choose a company with less complex infrastructure or the way they operate (current process) to work with for a report, so that it can help us to do more research and explore what else we can do differently.
- Time management and the ability to adapt the report to new concepts and recommendations.

2. Simran shruthi

1. Role: Research Specialist

2. Contributions -

Document Editor: I managed and edited all project documentation to ensure clarity, coherence, and comprehensive coverage of our project scope.

Diagrams: I was responsible for creating all the necessary diagrams, including the Entity Relationship diagram, UML diagram, Sequence diagram, and Architecture Diagram.

Proposed Process: I developed and documented both the functional and non-functional requirements for the proposed AI chatbot system.

SQL Code: I wrote the entire SQL code for the Proposed Process and made necessary modifications to the SQL code for the current process to ensure it met existing system requirements.

3. Challenges Faced:

Understanding Diverse Requirements: One of the biggest challenges I faced was understanding the various requirements for the AI chatbot from different perspectives and sources.

Diagram Integration: Creating comprehensive and accurate diagrams that clearly represented the proposed system while ensuring they were easy to understand was challenging.

Balancing Detail and Clarity: Ensuring that the documentation was detailed enough for technical purposes while remaining clear and accessible for all stakeholders was a difficult balance to maintain.

SQL Code Modifications: Modifying the existing SQL code to meet current process needs while writing new SQL code for the proposed process was time-consuming and required careful attention to detail.

4. Overcoming Challenges:

- **Focused Research and Collaboration:** To understand diverse requirements, I conducted thorough research and collaborated closely with my team members, ensuring we had a clear and unified understanding of the project's goals.
- **Iterative Diagram Development:** I developed the diagrams iteratively, regularly reviewing and refining them based on feedback to ensure accuracy and clarity.
- **Clear Documentation Practices:** I adhered to clear and consistent documentation practices, regularly reviewing the documents to ensure they were comprehensive and easy to understand.
- **Careful SQL Code Development:** I approached the SQL code development methodically, testing each part thoroughly to ensure it met the requirements and functioned correctly within the system.

5. Lessons Learned:

Importance of Clear Communication: Clear and consistent communication is crucial for understanding project requirements and ensuring all stakeholders are on the same page.

Value of Iteration: Iterative development and regular reviews are valuable practices for improving the accuracy and clarity of project artifacts.

Balancing Detail and Clarity: It's essential to balance the level of detail and clarity in documentation to make it useful for both technical and non-technical stakeholders.

3. Aishwarya

1. **Role:** Research Specialist
2. **Contributions:** Document Editor, enhancement idea of walmart AI chat bot, loyalty program idea. Report editing and structure adjustment. Wrote summary for sequence of product inquiry and shipment tracking.

3. Challenges Faced: I faced challenges in understanding the project. Finding ideas for the enhancement in such a complex organization. Understanding the current working of walmart and learning about the working structure of walmart online ordering system.

4. Overcoming Challenges: Learning about the working of walmart organization and their mottos for employees and customers. Ensuring the idea of enhancements fits well in the walmart current online ordering platform. Refining my enhancement idea through team feedback.

5. Lessons Learned:

Effective Communication: Key for presenting technical information.

Collaboration: Peer feedback ensures project success.

Attention to Detail: Reviewing all the database and working models ensuring there are no errors in the enhanced proposed online ordering model.

Ensuring effective working of all the functions of AI chatbot.