

Nicholas Mucks UCSC OOAD Project X

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Introduction

Although Wallymart has done well in physical stores, Wallymart needs to take on AmazingCo in the online e-commerce space. Wallymart has identified several areas that are crucial to a successful e-commerce site, which includes high quality customer reviews, large selection of products, and fast delivery. Wallymart would like to radically change the way their e-commerce store is designed today. The main goal is to design a web store complete with products, reviews, ordering capabilities, and delivery. Wallymart has decided to even own the delivery of the products and not outsource to USPS, UPS, etc. Part of this strategy is to enable more merchants on the platform to sell products directly to consumers using Wallymart for direct-to-consumer transactions.

System Overview and Design Considerations

What will be built

See [Use Cases and Requirements](#) for more information.

Project Scope

The scope of this project includes building the user interface, order process, merchant manager, notification system, and delivery system modules. For the proof of concept, the "databases" will be flat files.

Conventions

This document uses database to mean a flat file.

Constraints

For the initial proof of concept, no actual financial transactions will occur.

Risks

We will rely on merchants to provide sellable products to customers. If we cannot attract merchants to the platform, then we will have limited inventory for customers to purchase.

Dependencies

None.

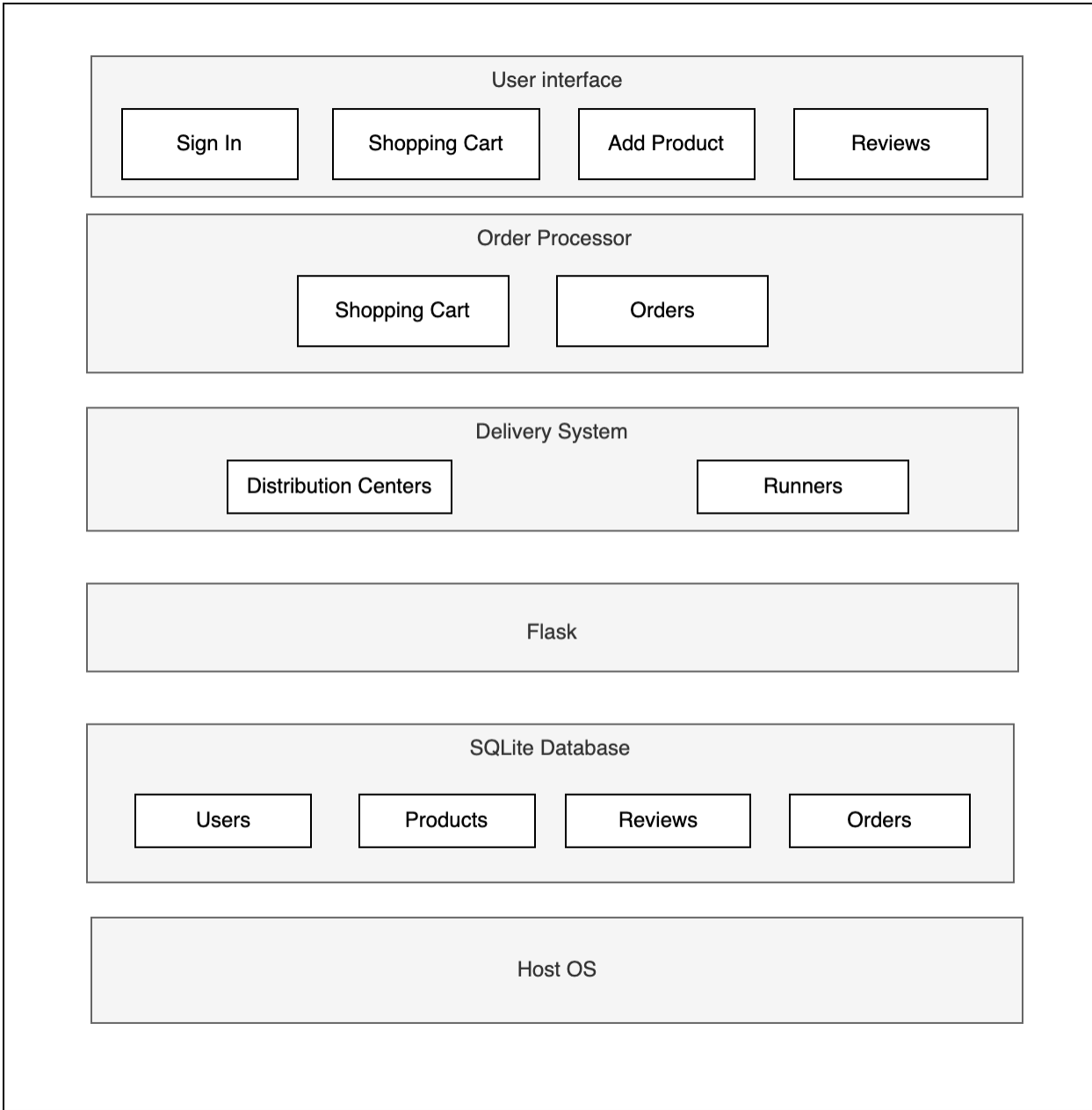
Assumptions

We need a distribution center in each state. This is an assumption because the population density in California is much greater than in Alaska.

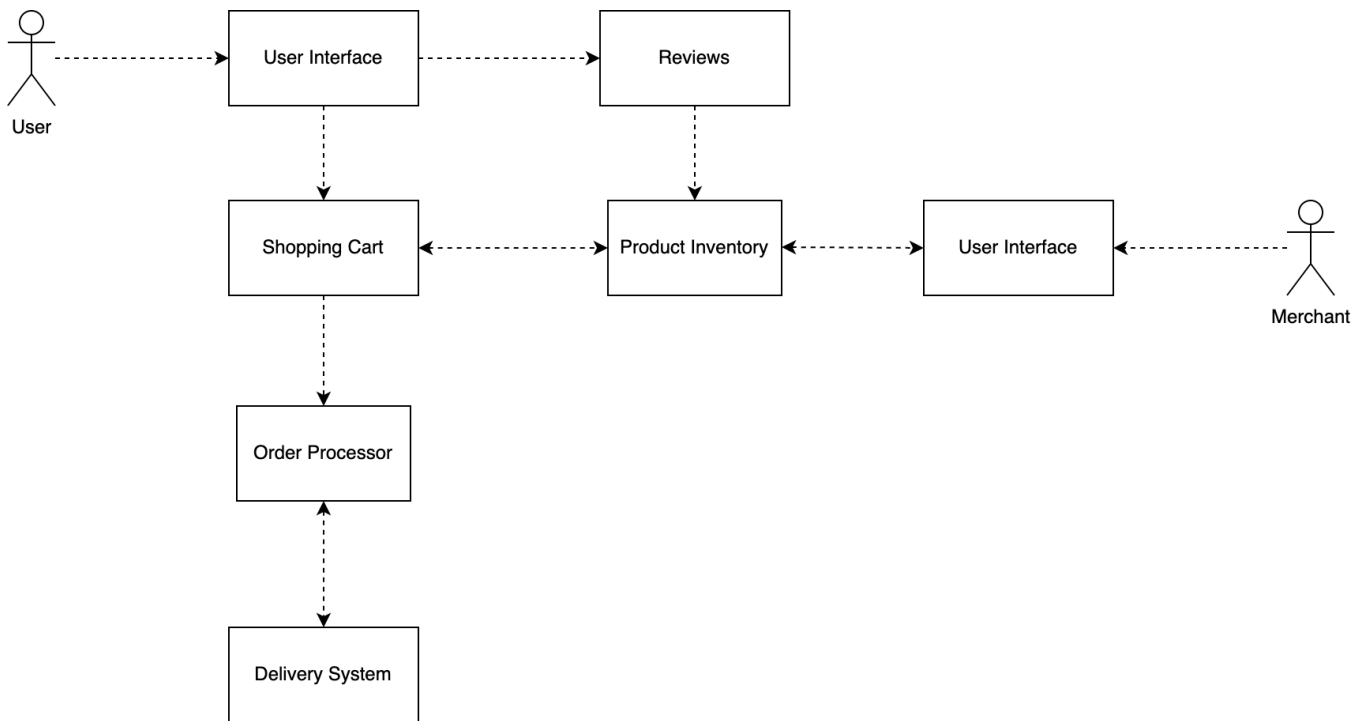
Architecture and System design

This system will rely on a flask and SQL Lite database architecture to distribute to clients. The main user interactions will occur on the user interface. The user interface drives order processing. Order processing acts like a controller for the application based on the users payment information and selected products.

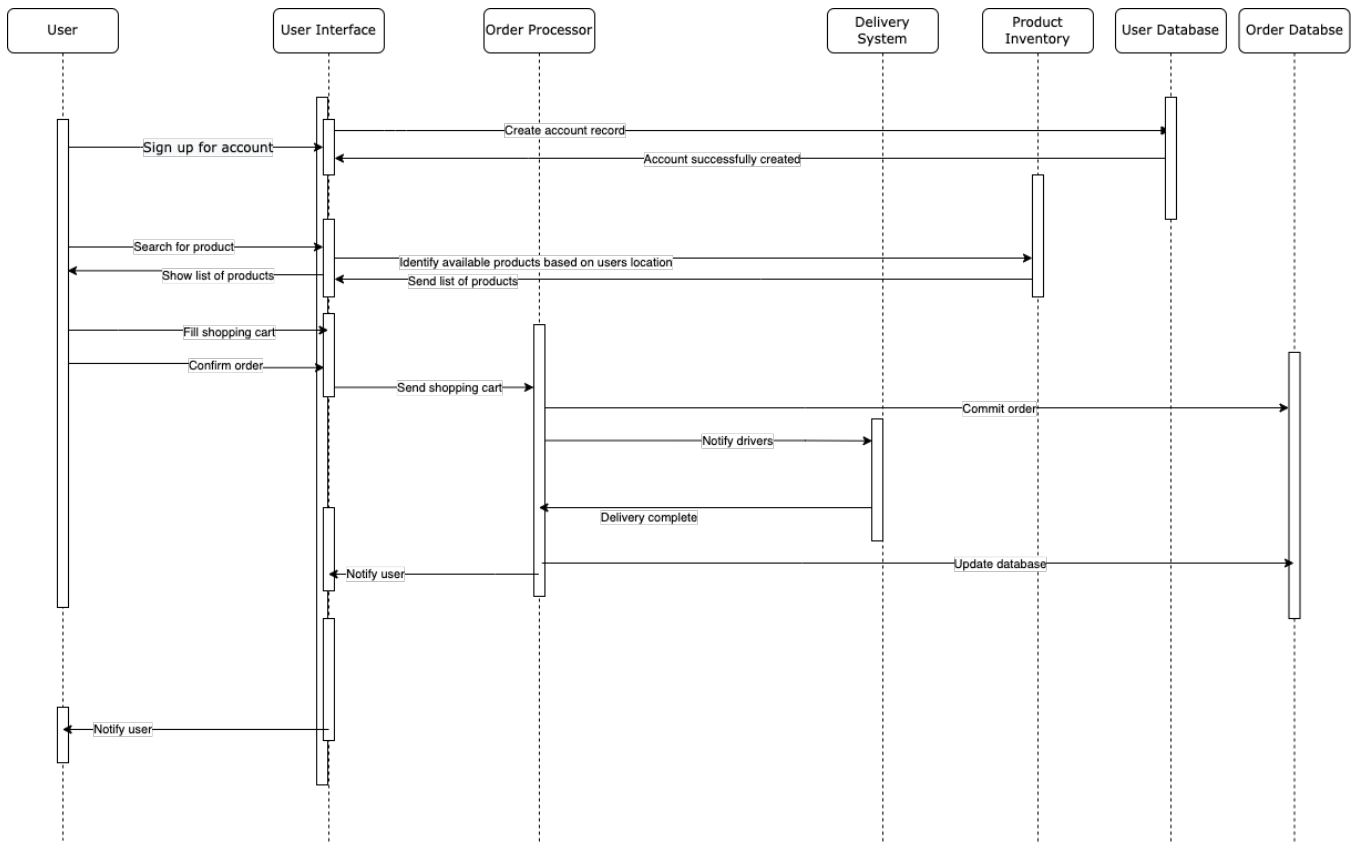
Architecture overview



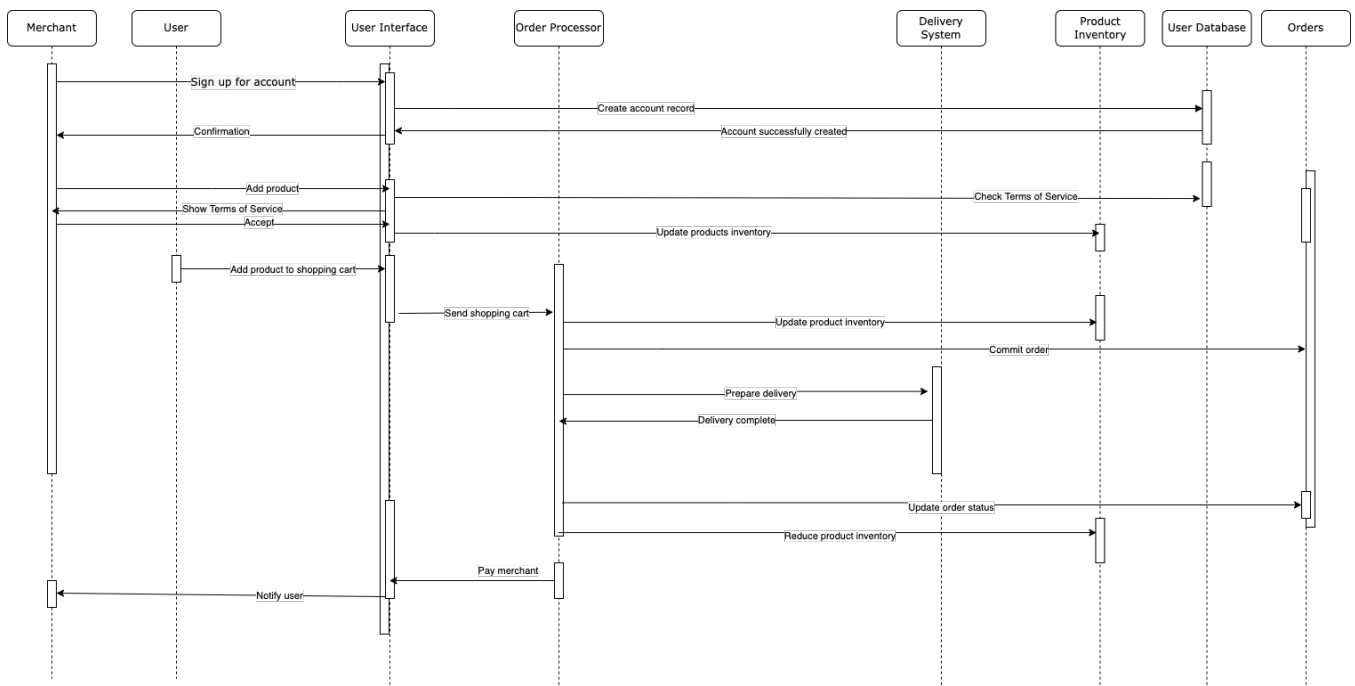
Architecture flow diagram



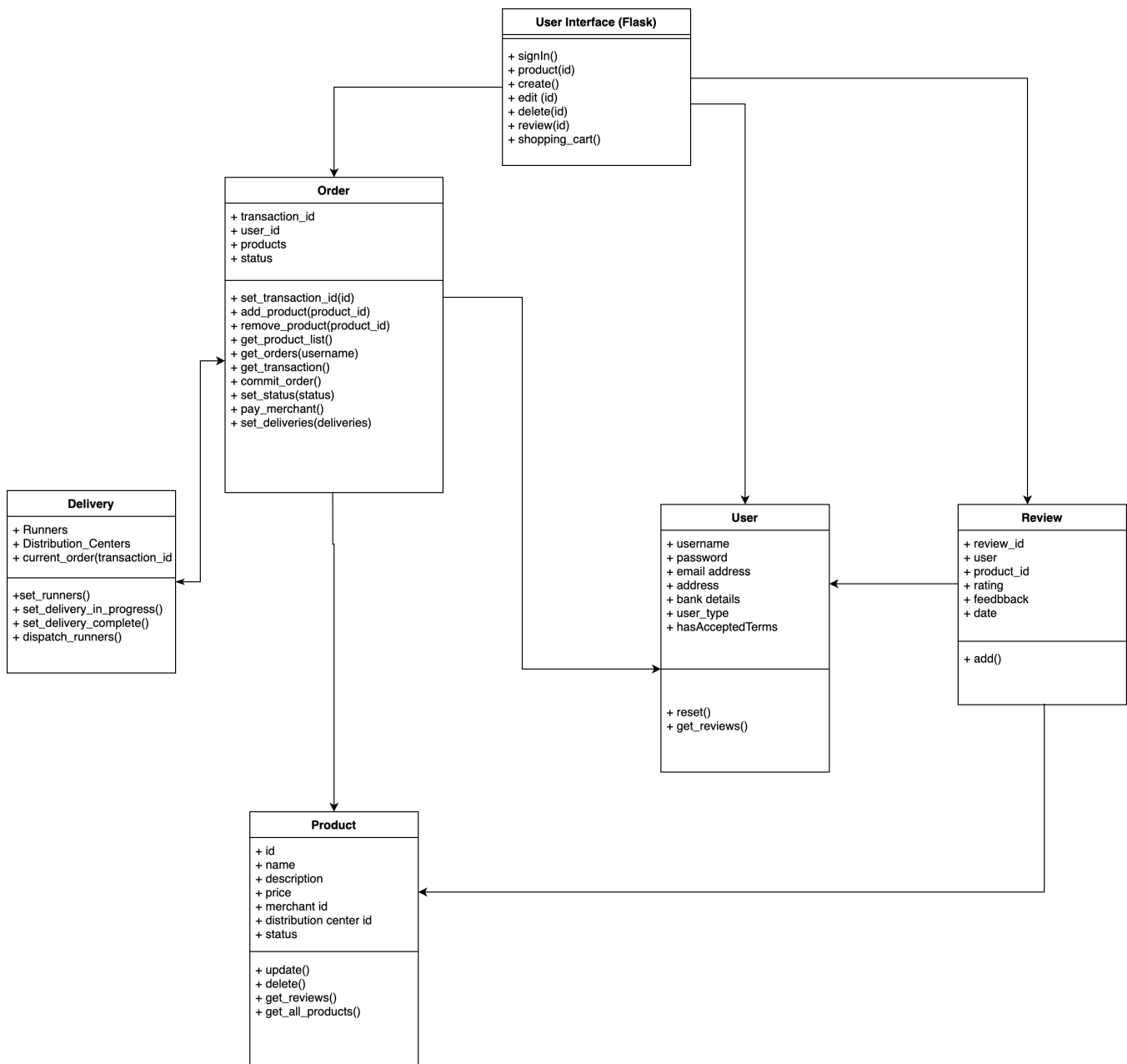
Sequence of a user purchasing a product



Sequence of a merchant adding a product and getting paid when it is sold



UML class diagram



Subsystem and Feature Design

| Feature | Module Mapping |
|----------------------------------|--|
| Creating an account on Wallymart | <ul style="list-style-type: none"> • User Interface • User database |
| Product Inventory | <ul style="list-style-type: none"> • User interface • Product database |

| | |
|-----------------------------|--|
| Order processor | <ul style="list-style-type: none"> • User interface • Product database • User database • Order Processor |
| Delivery system | <ul style="list-style-type: none"> • Order • Delivery |
| Reviews | <ul style="list-style-type: none"> • User interface • Reviews component • User database • Product database |
| Merchant payment processing | <ul style="list-style-type: none"> • Delivery System • Notification System • Merchant Manager • Product database • Merchant database • Review system |

Use Cases and Requirements

Use case 1: Creating an account on Wallymart

Brief

WallyMart has two types of accounts: users and merchants.

- A user can click the Sign Up button on any page to sign up for an account. The sign up form requires a username, password, email address, address, and payment details. After submitting the information, the user database is updated with a new user profile. The user can make changes to their user profile by accessing the My Account page. The user cannot change their username.
- A merchant can click the Sign Up button on any page to sign up for an account. The sign up form requires a username, password, email address, delivery center, and bank details. After submitting the information, the merchant database is updated with a new user profile. The merchant can make changes to their user profile by accessing the My Account page. The merchant cannot change their username.

Fully dressed

| Name | Creating an account on Wallymart |
|----------------|----------------------------------|
| Scope | Business |
| Level | User goal |
| Primary Actor | Unregistered user |
| Stakeholder(s) | Wallymart product owner |
| Preconditions | None |
| Postconditions | User database is updated |

| | |
|-----------------------|--|
| Main Success Scenario | <ol style="list-style-type: none"> 1. A user can click the Sign Up button on any page to sign up for an account. 2. A user chooses the type of user: User or merchant. 3. A Sign Up form appears. <ol style="list-style-type: none"> a. If user, the sign up form requires a username, password, email address, address, and payment details. b. If merchant, the sign up form requires a username, password, email address, delivery center, and bank details. 4. After submitting the information, the user or merchandise database is updated with a new user profile. |
| Extensions | 4A A database error occurs. |

Requirements

- **UC1REQ001:** The user interface must provide a process for users to sign up for a new account.
- **UC1REQ002:** The user interface must provide a process for merchants to sign up for a new account.
- **UC1REQ003:** The user interface must update the user database when a user signs up for an account.
- **UC1REQ004:** The user interface must update the merchant database when a merchant signs up for an account.
- **UC1REQ005:** The user interface must provide a process for users and merchants to update their account settings.

Use case 2: Product Inventory

WallyMart works with local stores and online retailers for its product inventory. It purchases products at a wholesale prices and increases the markup 25%. These local stores and online retailers can add products to the Wallymart product inventory by registering as a merchant and uploading the product descriptions. After registering for an account, a merchant can add products to the Wallymart product inventory. Once a merchant adds products to the site, they must agree to the Terms of Service before those products are available to sell to customers. Wallymart does not pay the merchant for the products until they are sold on the site to customers. It is the merchant's responsibility to deliver products to the distribution center in their state. A merchant with more than five bad product reviews is prohibited from selling products on the site.

The Product Inventory maintains a count of all products in all distribution centers across the United States. When a product runs low, WallyMart notifies the merchant. Each product has the following details: Name, Description, Price, Picture. Since WallyMart may have the same product sold by different merchants, the system also maintains this information merchant, State (Distribution Center), Reviews.

| Name | Use case 2: Product Inventory |
|-----------------------|--|
| Scope | System |
| Level | Business goal |
| Primary Actor | System |
| Stakeholder(s) | Wallymart product owner |
| Preconditions | A merchant has registered products and accepted terms of service. |
| Postconditions | Order processor is updated with product inventory for each distribution center. |
| Main Success Scenario | <ol style="list-style-type: none"> 1. A merchant attempts to add a new product. 2. A screen appears for them to insert product details. 3. The merchant clicks Add Product. 4. The product inventory is updated with a pending delivery status. 5. The merchant drops off the product at a distribution center. 6. The product inventory is updated for that distribution center. 7. The Order processor is updated so that users in those states can see the product on the e-commerce site. |
| Extensions | 7A. merchant never drops off product. |

Requirements

- **UC2REQ001:** The user interface must provide a process for merchants to add products to the inventory.
- **UC2REQ002:** When a merchant adds a product on the user interface, the system updates the product inventory to reflect the change, but the product cannot be sold until the merchant registers the product at a distribution center. The product status must be pending.
- **UC2REQ003:** A product with a status of available must be appear on the user interface to users to buy.

Use case 3: Order processor

A user can log on to the Wallymart site to view available products and enter search criteria to find a product. The products are listed alphabetically. The user can see reviews of existing products. When the user chooses a product, they add it to their shopping car. After choosing a variety of products, they can go to their shopping cart to see all items that they want to purchase. The user can optionally remove products from their shopping cart. To purchase the products, they click the Buy Products button. A Review Order message appears. When they confirm the order and purchase completes, the Order processor creates the a new order for the selected products based on the user payment details and notifies the delivery system.

| Name | Use case 3: Order processor |
|-----------------------|---|
| Scope | Business |
| Level | User goal |
| Primary Actor | User |
| Stakeholder(s) | Wallymart product owner |
| Preconditions | A user has registered for an account |
| Postconditions | None |
| Main Success Scenario | <ol style="list-style-type: none"> 1. A sign in page is presented to the user. 2. The user logs on to the Wallymart site. 3. A search bar appears. 4. A user types in search criteria. 5. The products are listed alphabetically. 6. The user clicks a product to update the shopping cart. 7. The user clicks View Cart to see all items in their cart. <ol style="list-style-type: none"> a. The user clicks Remove item to remove the product from the cart. 8. The user clicks Buy Products button to confirm order. 9. A Review Order message appears. 10. The user clicks Confirm Order. 11. The Order processor creates the a new order for the selected products based on the user payment details. 12. The Order processor notifies the Notification System. |
| Extensions | <p>11A. The product is no longer available when the user confirms order.</p> <p>11B. The users payment details are no longer valid.</p> |

Requirements

- **UC3REQ001:** A database (or flat file) must maintain the user account information.
- **UC3REQ002:** The user interface must provide a username and password field.
- **UC3REQ003:** If the user type a valid username/password combination, then the user interface should show a list of products.
- **UC3REQ004:** When a user selects a product, the product should appear in their shopping cart.
- **UC3REQ005:** The Shopping Cart user interface should show a list of products.
- **UC3REQ006:** The Shopping Cart user interface must show a Buy Products button.
- **UC3REQ007:** A confirmation message must appear before committing a purchase.
- **UC3REQ008:** The Order Processor must process the users payment details.
- **UC3REQ009:** The Order Processor must send a message to the Notification System to notify downstream systems like the Delivery System of the new order.

Use case 4: Delivery system

The delivery system collects information about the product inventory and existing orders to deliver products to customers. The delivery system is immediately notified when an order is made. Wallymart has 50 distribution centers in the United States -- one in each state. The delivery system relies on the customer delivery address to calculate which delivery center to process the order. Distributions centers have product inventory based on the merchants in the state. If a distribution center does not have a product in an order, then the distribution center notifies adjacent distribution centers to send products to the other distribution center within 24 hours, and the customer is notified of a potential delay. The delivery system also manages the runners who pickup deliveries from the distribution centers. These runners perform two tasks: 1) pickup and deliver products between distribution centers 2) pick up and deliver products from distribution centers to customers.

| Name | Use case 4: Delivery system |
|----------------|-----------------------------|
| Scope | System |
| Level | System goal |
| Primary Actor | System |
| Stakeholder(s) | Wallymart product owner |
| Preconditions | An order is made. |
| Postconditions | None |

| | |
|-----------------------|--|
| Main Success Scenario | <ol style="list-style-type: none"> 1. The delivery system receives an update to its queue from the Order processor via the Notification System. 2. The delivery system checks product inventory in the distribution center of user in the order. <ol style="list-style-type: none"> a. If inventory exists, notify runners to delivery product from distribution center to user address. b. If the inventory does not exist, notify adjacent distribution centers and request a runner to send products and notify customer of potential delay. 3. When a product exists at distribution center, the runner acquires product and delivers it to the user's delivery address. |
| Extensions | <p>2A. The selected product is not available anywhere.</p> <p>3A. The product is damaged while in transit.</p> |

Requirements

- **UC4REQ001:** The Notification System must notify the Delivery System of a new order.
- **UC4REQ002:** The Delivery System queries the product list to make sure that the product exists.
- **UC4REQ003:** If a product is available, the Delivery System notifies the runner to pick up the order and deliver it to the delivery address in the user record.
- **UC4REQ004:** After delivery the Delivery System should update the user record with the delivery history.
- **UC4REQ005:** If a product is not available, the Delivery System sends a notification to the Notification System.
- **UC4REQ006:** If a product is not available, the Notification System must notify user of the delay.
- **UC4REQ007:** If a product is not available, the Notification System must notify the distribution centers to request product and the distribution centers should return a notification with a product inventory status.
- **UC4REQ008:** If a product is not available, the Delivery System notifies a runner to pick up the order from the distribution center and return it to current distribution center.
- **UC4REQ009:** If a product is not available and is then delivered to the current distribution center, then the order should be processed like an available product order (UC4REQ003).

Use case 5: Reviews

A customer can submit a review only after receiving a product. The review consists of a ranking and the ability to provide content or upload photos/videos. They can also edit a review by going to the My Account page. If a merchant sells more than five products with a bad review, WallyMart suspends all products from that merchant.

| Name | Use case 5: Reviews |
|-----------------------|--|
| Scope | Business |
| Level | User goal |
| Primary Actor | User |
| Stakeholder(s) | Wallymart product owner |
| Preconditions | The Order processor has a record of the user having ordered the product. |
| Postconditions | None |
| Main Success Scenario | <ol style="list-style-type: none"> 1. A user goes to their My Account page and clicks Reviews. 2. The user is presented with their order history. If a product has not yet been reviewed, the user sees a Add Review option. 3. The user clicks Add Review. 4. The user interface shows an option to add text and rank the product. 5. The user clicks Submit. 6. The review is added to the product and other users can see the review. |
| Extensions | |

Requirements

- **UC5REQ001:** A My Account menu option should appear on the user interface of every page.
- **UC5REQ002:** The My Account page should include an option to see reviews.
- **UC5REQ003:** The user interface must query the products and user databases (or flat files) to know what the user has reviewed.
- **UC5REQ004:** When a user clicks Add Review, an interface should appear to allow the user to add content.
- **UC5REQ005:** When a user submits a review, the products and user databases (or flat files) should be updated with the review content.
- **UC5REQ006:** Any user can see the reviews of other users.
- **UC5REQ007:** A user cannot review a product more than once.

Use case 6: Merchant payment processing

Merchant payment processing occurs when a user purchases a product. After Wallymart processes the order and delivers a product to customers, a payment is issued to the merchant based on the price of those products minus the markup received by Wallymart. The payment is issued to the bank details of the merchandise.

| Name | Use case 5: Reviews |
|-----------------------|--|
| Scope | System |
| Level | User goal |
| Primary Actor | User |
| Stakeholder(s) | Wallymart product owner |
| Preconditions | A user triggers the purchase of a product and the product is delivered to the user. |
| Postconditions | None |
| Main Success Scenario | <ol style="list-style-type: none">1. The Merchant Manager calculates the payment to the merchant based on the price of those products minus the markup received by Wallymart.2. The payment is issued to the bank details of the merchandise. |
| Extensions | |

Requirements

- **UC6REQ001:** After a product is delivered, the Delivery System should update the user and merchant databases (or flat files) with the record.
- **UC6REQ002:** After a product is delivered, the Delivery System should send a notification to the Notification System about the order update.
- **UC6REQ003:** After a product is delivered, the Notification System should send an update the user interface with order update.
- **UC6REQ004:** The Merchant Manager should calculate the payment to the merchant.
- **UC6REQ005:** The Merchant Manager should send payment to the merchant based on their account information.

Glossary

User:

A person who buys products on the platform.

Merchant:

A person who sells products on the platform.