

# **Requirements Specification**

## **AttendNet: A Petrol Station Digitization Project**

**March 12, 2019**

**Prepared for Ali's Oil  
By Fossil Files Digital Solutions**

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See Appendix B on pages B-2 to B-5 for details on DFD-2.

# Revision History

Name	Date	Reason for Changes	Version
Layout	February 26, 2019	Document layout	0.1
Draft	February 28, 2019	Initial drafting of RSD	0.2
Revised Draft	March 5, 2019	Requirement refinement	0.3
	March 9, 2019	Use Case & Storyboard addition	0.4
Final Draft	March 12, 2019	System diagram addition, final revisions to descriptions and requirements	0.9

# 1. Introduction

## 1.1 Purpose

This requirements specification document (version 0.9) has been written for the Petrol Station Digitization project at Ali's Oil in Sahiwal, Pakistan. AttendNet, the software solution system for the Petrol Station Digitization project, addresses issues regarding data security, data accessibility, task automation and income/expense traceability to improve company privacy, administrative support, attendant productivity, and theft investigation within the currently implemented system, respectively. The effects of AttendNet on the problem domain meet the overall client objective of improving efficiency and decreasing expenses.

## 1.2 Project Scope

The project scope encompasses systems used while logging transaction data, tracking inventory, managing customer debts, and performing quantitative analysis on data at the Ali's Oil petrol station and convenience store. AttendNet primarily acts as a secure and remotely accessible replacement for the current ledger-based system, where each ledger covers either transaction, inventory, or customer data for Ali's Oil.

## 1.3 Glossary

Term	Description
Ali's Oil	A petrol station, convenience store, and provider of basic automotive maintenance in Sahiwal, Pakistan
Attendant	A person employed at Ali's Oil
Inventory	All products owned by Ali's Oil available for immediate sale
Ledger	A book containing transaction, inventory, or customer data for Ali's Oil
Administrator	An employee of Ali's Oil and use class in AttendNet with the authority to configure the User Management system
Pakistan Oil and Gas Regulatory Authority	A state-owned corporation regulating nationwide prices on petroleum products
Product	A specific type of item sold by Ali's Oil
Transaction	Any exchange of goods or cash involving Ali's Oil

Unit	A product quantity of 1
------	-------------------------

## 1.4 References

- [1] "Petrol Station Digitization Request for Proposal Version 1.1", *Ali's Oil*, 2019. [Online]. Available: [https://img1.wsimg.com/blobby/go/49b7584f-fd30-4a54-9225-a1d0516c6a66/downloads/1d1sern19\\_447083.pdf](https://img1.wsimg.com/blobby/go/49b7584f-fd30-4a54-9225-a1d0516c6a66/downloads/1d1sern19_447083.pdf). [Accessed: 16- Jan- 2019]
- [2] Ze Shi Li, *Requirements Document Template*, 1st ed. 2019.
- [3] "Oil & Gas Regulatory Authority", *Ogra.org.pk*, 2019. [Online]. Available: <http://ogra.org.pk/>. [Accessed: 02- Feb- 2019]
- [4] Fossil Files Digital Solutions, 2019. *Documents*. [Online] Available: [https://seng321group3.github.io/designer-site/assets/documents/Ali\\_Oil\\_Requirements\\_Elicitation\\_Notes.pdf](https://seng321group3.github.io/designer-site/assets/documents/Ali_Oil_Requirements_Elicitation_Notes.pdf) [Accessed 2 Feb. 2019].

## 1.5 Overview

This requirements specification document consists of seven sections, each with a varying number of subsections that provide further detail regarding the topic discussed. Section 1 contains an outline of the AttendNet Petrol Station Digitization project and its scope, as well as a glossary of terms and references list. Section 2 elaborates on the problem domain with system features, attendant information, system environment factors and constraints on development. System features and their respective requirements are covered in Section 3, while Section 4 addresses user interface and software interface requirements. Performance requirements, security requirements and software quality attributes of AttendNet are outlined in Section 5. Section 6, System Specifications, details the subsystems of AttendNet through use cases, sequence diagrams, and user interface storyboards. System-wide diagrams like the context diagram (DFD-0), data-flow diagram 1 (DFD-1), entity relationship diagram (ERD), and use case model are displayed in Section 7.

## 2. Overall Description

### 2.1 Product Perspective

AttendNet is being developed to replace the existing finance and inventory management system at Ali's Oil. Currently, Ali's Oil's finances and inventory are being tracked with an entirely paper-based system. Each transaction is manually recorded into a table in a notebook, all inventory is

counted manually, and all business calculations are computed by hand. AttendNet will allow Ali's Oil to improve their efficiency by automatically tracking inventory, transactions and fuel prices.

As there are currently no electronic systems in place at Ali's Oil, AttendNet will not interface with any other internal systems. Any updates made to AttendNet, including adding new inventory or changing the price of a product, will be performed manually by attendants. The only external system that AttendNet will interact with is the Government of Pakistan Oil and Gas Regulatory Authority to receive updates on the price of fuel.

## 2.2 Product Features

The features of AttendNet include inventory management, metric reporting, transaction management, and customer debt management.

### *Inventory Management*

Information about any product sold at Ali's Oil, including the quantity of the product currently in stock, is tracked by the solution system. If the quantity of a product drops below a configured threshold, the system notifies attendants and administrators using AttendNet.

### *Metric Reporting*

Financial reports on Ali's Oil's sales, inventory, customer debt, and business expenses are generated by AttendNet.

### *Transaction Management*

A record of all transactions processed and all funds present at Ali's Oil are kept by AttendNet.

### *Customer Debt Management*

AttendNet tracks customer debt by keeping a record of the customer's contact information, amount owed, and history of transactions.

## 2.3 User Classes and Characteristics

Users of AttendNet include the attendants and the administrators of Ali's Oil. Attendants and administrators have limited technical knowledge and minimal experience working with computerized systems.

### *Attendant*

Each attendant's use of AttendNet can be the following (subject to administrator discretion):

- Authenticate an attendant session
- Invalidate an authenticated attendant session
- Add, view, or edit product information
- Add, view, or edit transaction information
- Add, view, or edit customer debt information
- View notifications

- Generate a Daily Transaction Report, Inventory Report, Customer Debt Report or Business Expense Report
- Remotely access AttendNet

*Administrator*

Each administrator's use of AttendNet is the following:

- Authenticate an administrator session
- Invalidate an authenticated administrator session
- Create or edit an attendant account
- Create or edit an administrator account
- Adjust permissions for individual attendants
- Remotely access AttendNet

Each attendant can be permitted to access aspects of AttendNet by an administrator. Unless given administrator privileges, attendants using AttendNet cannot access other administrator or attendant information and AttendNet permissions.

## 2.4 Operating Environment

AttendNet runs on any computer with a Windows 7 OS or more modern Windows OS at Ali's Oil. An Administrator may remotely access AttendNet through the internet using any computer with a Windows 7 OS at minimum (Windows 8, Windows Vista, Windows 10 are sufficient).

## 2.5 Design and Implementation Constraints

*Budget:* The project budget is equivalent to \$500 USD.

*Data retention:* Five years worth of financial data is capable of being stored by AttendNet.

*Language:* English and Urdu characters are supported by AttendNet.

*Software capability:* AttendNet must run on a Windows 7, 8, Vista, or 10 operating system.

*Training time:* An attendant unfamiliar with the system must learn to process transactions and monitor inventory with AttendNet within one hour of introduction to AttendNet.

## 2.6 Assumptions and Dependencies

*Price retrieval:* This project depends on the Government of Pakistan Oil and Gas Regulatory Authority providing fuel price changes for AttendNet to retrieve.

## 3. System Features

### 3.1 Inventory Management

#### 3.1.1 Description

Inventory consists of all products for sale in the Ali's Oil convenience store and at the Ali's Oil fuel pumps. AttendNet aids in the management of inventory by maintaining a representation of this inventory on a per-product basis within AttendNet itself. Each attendant may view and edit AttendNet's inventory records when necessary.

PRIORITY: High

#### 3.1.2 Functional Requirements

- FR-01:** Products within AttendNet are uniquely identifiable.
- FR-02:** Attendants can manually add products to AttendNet.
- FR-03:** Attendants can manually edit any of the following product-specific information:
  - Price per unit (e.g. \$4 per litre, \$0.99 per bag)
  - Product name
  - Product quantity
  - Notes
  - Low-quantity threshold
- FR-04:** All products and product-specific information (see **FR-03**) within AttendNet are available for attendant viewing.
- FR-05:** Recorded quantity of a product is automatically updated when a transaction attributed to a change in inventory is added to AttendNet (see **FR-14**).
- FR-06:** When a product quantity is updated to a value below a specified threshold, AttendNet generates a low-quantity notification warning attendants of low-quantity for that product (see **FR-25**).
- FR-07:** Prices for fuel products in AttendNet are automatically updated. (see **FR-25, FR-27**).

## 3.2 Metric Reporting

### 3.2.1 Description

Through AttendNet, each attendant may generate reports regarding trends in Ali's Oil inventory and transaction data for a specified timeframe. Reports are generated by the system through analysis of data contained within the system. Types of reports available from AttendNet are detailed in Section 3.2.2.

PRIORITY: Low

### 3.2.2 Functional Requirements

**FR-08:** Sales report is generated containing the following information about each product sold at the store:

- The quantity of the product sold
- The total cost of buying the quantity of sold product
- The revenue generated from sale of the quantity of sold product
- The total profit from selling the quantity of sold product
- The total profits generated over the date range

**FR-09:** Daily transaction report is generated containing the following information:

- Each item sold on the specified date
- The revenue generated from each item sold
- Each item bought by the store on the specified date
- The cost of each item bought
- A summary of items sold by category (petrol, food and drinks, etc.) and the total revenue generated from those sales
- A summary of items bought by the store, by category (petrol, food and drinks, etc.) and the total cost of those purchases

**FR-10:** Inventory report is generated containing the following information:

- A list of each product in the current inventory
- The quantity of each product in the current inventory
- The total value of the quantity of each product in the inventory
- A section containing all products that have a quantity below a threshold value specified by a system administrator

**FR-11:** Customer debt report is generated containing the following information:

- A list of customers who have outstanding debt to Ali's Oil

- The monetary amount of debt for each customer
- The date that the debt was created
- The total outstanding debt for all customers

- FR-12:** Business expense report is generated containing the following information:
- Payroll cost for each attendant
  - Total cost of buying inventory
  - Total cost of maintenance services
  - Total cost of miscellaneous business expenses which do not fall into other categories of business expenses mentioned in previous bullet points

### 3.3 Transaction Management

#### 3.3.1 Description

Transaction Management at Ali's Oil pertains to any exchange of goods or cash between Ali's Oil and external entities, such as customers or banks. The solution system aids the management of cash flow by maintaining records of individual transactions and the information associated with those transactions.

PRIORITY: Medium

#### 3.3.2 Functional Requirements

- FR-13:** Each transaction is uniquely identifiable.
- FR-14:** Attendants can manually add transactions to AttendNet.
- FR-15:** The total amount of cash on site can be viewed.
- FR-16:** Records of the total amount of cash on site after a transaction is added are automatically adjusted.
- FR-17:** The records of the physical amount of cash on site can be manually adjusted by an attendant.

## **3.4 Customer Debt Management**

### **3.4.1 Description**

If a customer requires a product that cannot be paid for immediately, the customer may be allowed to pay for that product at a later date. AttendNet aids in the management of customers who have accumulated debt with Ali's Oil.

PRIORITY: Medium

### **3.4.2 Functional Requirements**

- FR-18:** Each customer is uniquely identifiable.
- FR-19:** Customers are associated with the respective contact information and total amount of debt accrued.
- FR-20:** Attendants can manually add customers to AttendNet.
- FR-21:** Attendants can manually edit any of the following customer-specific information in AttendNet:
  - Customer name
  - Customer debt
  - Customer address
  - Customer business
  - Customer phone number
- FR-22:** All customers and customer-specific information are available for attendant viewing.

## **4. External Interface Requirements**

### **4.1 User Interfaces**

#### **4.1.1 Description**

Attendants may not have prior experience with software as all store records are currently hard copies. Integrating AttendNet will be minimally difficult.

#### **4.1.2 Functional Requirements**

- FR-23:** The interface is designed in such a manner that attendants are able to process transactions and adjust customer debts (see **FR-14, FR-20, FR-21**) with initial training from the administrator.

- FR-24:** When fuel prices are updated in AttendNet's inventory, (see **FR-08**, **FR-26**), a fuel-price-update notification is generated for viewing by any attendant in AttendNet.
- FR-25:** When the low-quantity limit of a product is reached (a product's quantity goes below a specified limit), a low-quantity notification for the attendant is created.

## 4.2 Software Interfaces

### 4.2.1 Description

To retrieve fuel prices regulated by a government body, AttendNet interfaces with an external website.

### 4.2.2 Functional Requirements

- FR-26:** Fuel product prices are retrieved from Pakistan Oil and Gas Authority.

## 4.3 Communication Interfaces

### 4.3.1 Description

AttendNet provides each administrator with the ability to access AttendNet when off Ali's Oil premises.

### 4.3.2 Functional Requirements

- FR-27:** AttendNet is remotely accessible through the internet.

## 5. Other Non-Functional Requirements

### 5.1 Performance Requirements

#### 5.1.1 Description

AttendNet performs certain functional requirements within a specified time frame.

## **5.1.2 Non-Functional Requirements**

- NFR-01:** The administrator can remotely access AttendNet within 10 seconds of attempted connection.
- NFR-02:** Funds are updated within 10 seconds of a transaction completing (see **FR-14**).
- NFR-03:** Product low-quantity notifications are generated within 10 seconds of the respective product quantity update (see **FR-07, FR-25**).
- NFR-04:** Metric reports (sales reports, inventory reports, customer reports and business expense reports) should be generated in under 30 seconds.
- NFR-05:** Fuel prices are retrieved from Government of Pakistan Oil and Gas Regulatory Authority in under 10 seconds from update by the Government of Pakistan Oil and Gas Regulatory Authority (see **FR-26**).
- NFR-06:** Fuel prices updates from Government of Pakistan Oil and Gas Regulatory Authority are retrieved every 6 hours (see **FR-26**).

## **5.2 Security Requirements**

### **5.2.1 Description and Priority**

AttendNet maintains the confidentiality of sensitive information regarding business operations by allowing the administrator to invoke attendant accessibility limitations.

### **5.2.2 Non-Functional Requirements**

- NFR-07:** The administrator can view and edit attendant profiles and permissions in AttendNet.
- NFR-08:** The attendant can view and edit inventory and product-specific information; add, view, and edit transactions; receive notifications regarding low inventory and fuel price changes; view financial reports; view and edit attendant profiles and permissions; and view and edit customer debt.
- NFR-09:** The attendant cannot view and edit attendant profiles and permissions without being granted access by an administrator.

## 5.3 Software Quality Attributes

### 5.3.1 Description

Ali's Oil largely depends on AttendNet for daily operations. Due to this, AttendNet possesses several key software quality attributes to ensure efficiency and success.

### 5.3.2 Non-Functional Requirements

**NFR-10:** AttendNet is user-friendly to those with little prior experience with software systems after initial training (see **FR-24**).

## 6. System Specifications

### 6.1 Inventory Management

Inventory is all products for sale in the Ali's Oil convenience store and at Ali's Oil fuel pumps. AttendNet assists in the management of inventory by maintaining a record of inventory on a per-product basis within AttendNet itself. Each attendant may view and edit AttendNet's inventory as required.

#### 6.1.1 Add Product

##### 6.1.1.1 Use Case: Add Product

This use case details the steps taken by an attendant to add a product and product information to the Inventory Management system.

Actors	Attendant
Preconditions	<ul style="list-style-type: none"><li>The Attendant has entered an authenticated session (see 6.2.1.1 Use Case: Authenticate Session).</li><li>Attendant has the privileges to edit the Inventory Management system as set by an Administrator (see 6.3.1.1 Use Case: Add Administrator or Attendant).</li><li>The entered product does not currently exist in the Inventory Management system.</li></ul>
Steps	<ol style="list-style-type: none"><li>An Attendant requests to enter the Inventory Management system.</li><li>The Attendant is presented with<ul style="list-style-type: none"><li>the option to add a product to the Inventory Management system,</li><li>a limited number of products stored in the Inventory Management system sorted in alphabetical order by product name,</li></ul></li></ol>

	<ul style="list-style-type: none"> <li>• the option to request more products be displayed, and,</li> <li>• for each product, the option to view all information associated with that product.</li> </ul> <ol style="list-style-type: none"> <li>3. The Attendant requests to add a product to the Inventory Management system.</li> <li>4. The Attendant is presented with the ability to enter information for a product and the option to save the product information in the Inventory Management system.</li> <li>5. The Attendant enters the following product information the respective fields:           <ul style="list-style-type: none"> <li>• product name</li> <li>• price per unit (e.g. \$1.99/kg)</li> <li>• quantity</li> <li>• low-quantity notification threshold</li> <li>• notes (optional)</li> </ul> </li> <li>6. The Attendant requests to save the entered product information.</li> <li>7. The Attendant is presented with confirmation that the product and its information was saved successfully in the Inventory Management system.</li> </ol>
Success Conditions	<ul style="list-style-type: none"> <li>• A product and its respective information have been added to the Inventory Management system.</li> </ul>
Alternate Paths	<p>6a.</p> <ol style="list-style-type: none"> <li>I. The Attendant is notified that the entered quantity for a product cannot be a negative value and of the correct format for a product quantity.</li> <li>II. The Attendant enters the quantity as a positive value.</li> <li>III. Continue with Step 6.</li> </ol> <p>6b.</p> <ol style="list-style-type: none"> <li>I. The Attendant is notified that the entered product price is not a valid denomination of rupees and of the correct format for a product price.</li> <li>II. The Attendant enters the price as a valid denomination of rupees.</li> <li>III. Continue with Step 6.</li> </ol>

#### 6.1.1.2 Sequence Diagram: Add Product

This sequence diagram illustrates the interactions that occur between an attendant and the system when an attendant adds a product to the Inventory Management system (see **Error! Reference source not found.**). The preconditions for this sequence diagram are that the attendant has entered an authenticated session in the system and has entered the Inventory Management system.

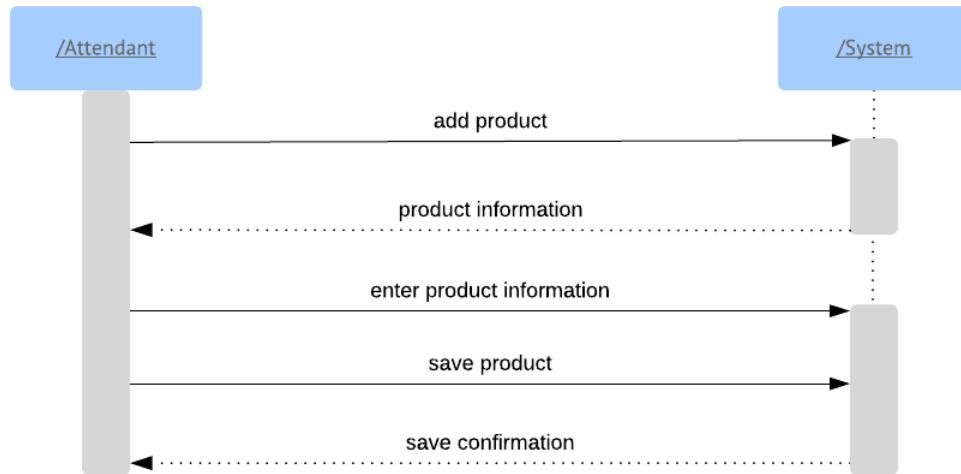
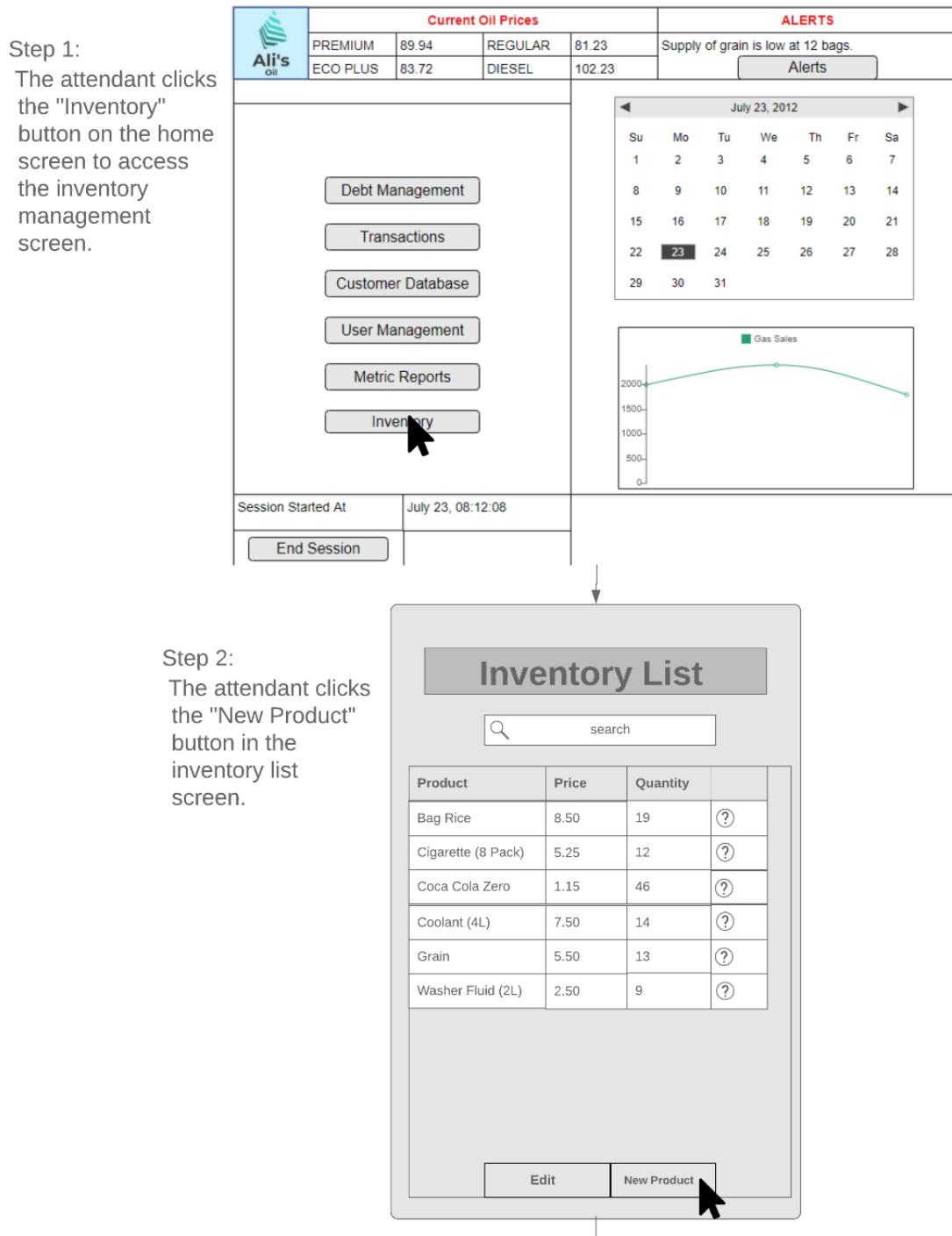


Figure 1: Sequence diagram for adding a product to the Inventory Management system

### 6.1.1.3 Storyboard: Add Product

The following storyboard details a scenario in which an attendant is adding a new product to the Inventory Management system (see Figure 2). A shipment of products has just been delivered. The shipment includes one-hundred 355 mL cans of Pepsi. An attendant wants to add the Pepsi to the inventory.



**Step 3:**  
The attendant enters the product name, price, and quantity. When finished, the attendant clicks the "Submit" Button

New Product in Inventory

Product Name

Price  per

Quantity Available

Low Inventory Threshold

Notes

#### Alternate Path

**Step 3a:**  
The attendant makes an error by entering a negative value into the "Quantity Available" field or by entering a price in the incorrect format. In this case, the price has the '#' included, which is not allowed. The attendant clicks the "Submit" button to save the changes.

New Product in Inventory

Product Name

Price  per

Quantity Available

Low Inventory Threshold

Notes

↓

**New Product in Inventory**

Product Name

Alert

Alert

"Quantity Available" value cannot be negative. Price is not a number.

↓

**New Product in Inventory**

Product Name

Price  per

Quantity Available

Low Inventory Threshold

Notes

### Step 3b:

An alert is shown to the attendant with the error messages stating that the product quantity cannot be negative, and that the price is not a number. The attendant clicks the "OK" button to return close the alert and fix the mistakes.

### Step 3c:

The attendant changes the price to the correct format and changes the quantity available to be a positive integer. The attendant clicks the "Submit" button to save the changes.

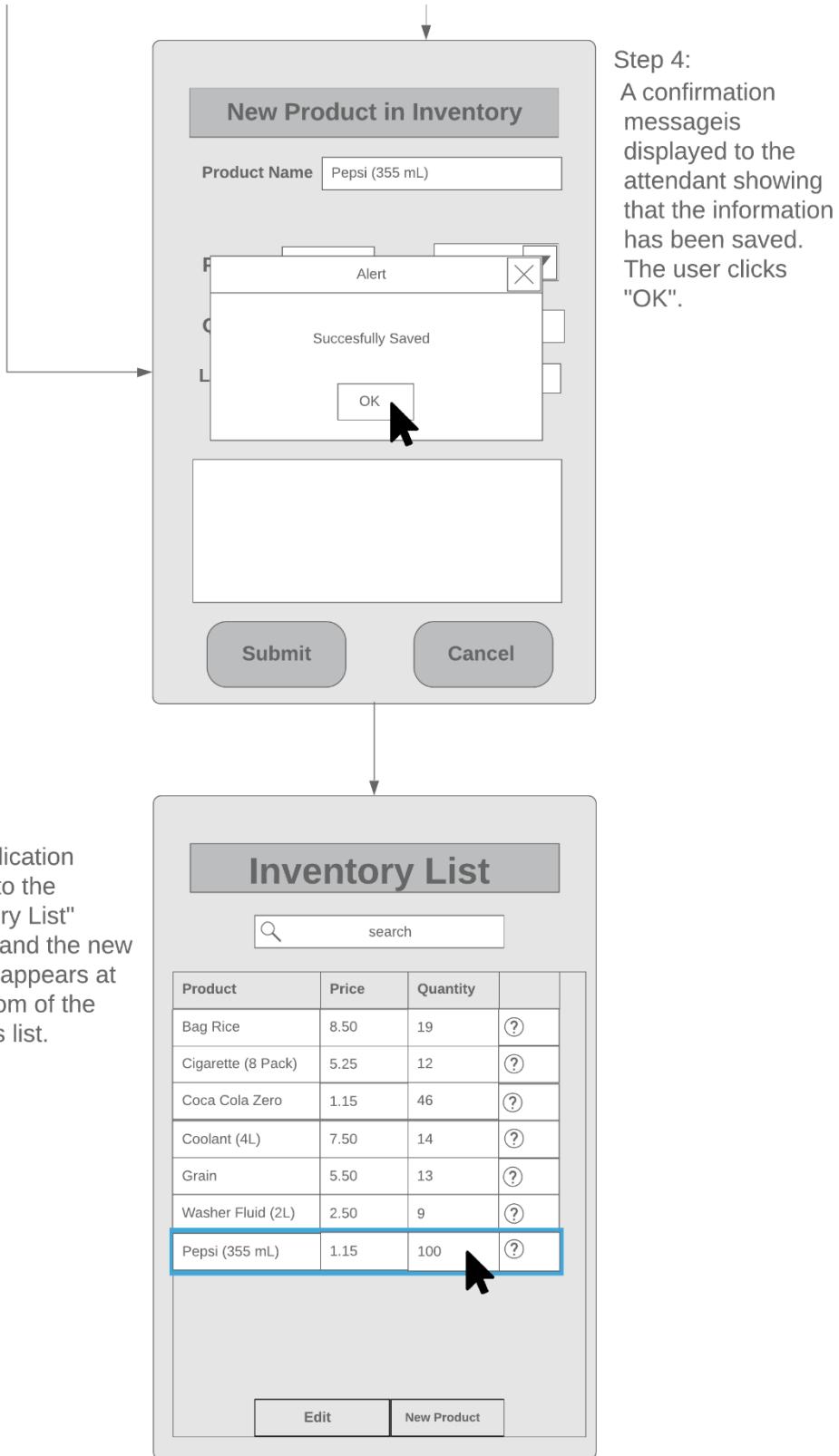


Figure 2: Storyboard for adding a product to the Inventory Management system

## 6.1.2 Edit Product

### 6.1.2.1 Use Case: Edit Product

This use case details the steps taken by an attendant to edit the product information currently stored in the Inventory Management system for a product.

Actors	Attendant
Preconditions	<ul style="list-style-type: none"><li>• The Attendant has entered an authenticated session (see 6.2.1.1 Use Case: Authenticate Session).</li><li>• The Attendant has editing privileges for the Inventory Management system as set by an Administrator (see 6.3.1.1 Use Case: Add Administrator or Attendant).</li><li>• The product information to be edited is associated with a product currently existing in the Inventory Management system.</li></ul>
Steps	<ol style="list-style-type: none"><li>1. An Attendant requests to enter the Inventory Management system.</li><li>2. The Attendant is presented with<ul style="list-style-type: none"><li>• the option to add a product to the Inventory Management system,</li><li>• a limited number of products stored in the Inventory Management system sorted in alphabetical order by product name,</li><li>• the option to request more products be displayed, and,</li><li>• for each product, the option to view all information associated with that product.</li></ul></li><li>3. The Attendant requests to view all information associated with a specific product.</li><li>4. The Attendant is presented with information associated with the chosen product and the option to edit information for the chosen product.</li><li>5. The Attendant requests to edit product information for the chosen product.</li><li>6. The Attendant is presented with the ability to edit information associated with the chosen product.</li><li>7. For each of the following product information fields, the Attendant enters a value if the existing saved value for the respective field needs to be changed:<ul style="list-style-type: none"><li>• product name</li><li>• price per unit (e.g. \$1.99/kg)</li><li>• quantity</li></ul></li></ol>

	<ul style="list-style-type: none"> <li>• low-quantity notification threshold</li> <li>• notes (optional)</li> </ul> <p>8. The Attendant requests to save the entered product information.</p> <p>9. The Attendant is presented with confirmation that the product information was entered successfully.</p>
Success Conditions	<ul style="list-style-type: none"> <li>• Any information associated with a product that underwent a change of value has been updated in the respective Inventory Management system record.</li> </ul>
Alternate Paths	<p>7a.</p> <ul style="list-style-type: none"> <li>I. The Attendant enters a negative value for the product quantity.</li> <li>II. The Attendant is notified that the entered quantity for a product cannot be a negative value and of the correct format for a product quantity.</li> <li>III. The Attendant enters the quantity as a positive value.</li> <li>IV. Continue with Step 7.</li> </ul> <p>7b.</p> <ul style="list-style-type: none"> <li>I. The Attendant enters an invalid denomination of rupees for the product price.</li> <li>II. The Attendant is notified that the entered product price is not a valid denomination of rupees and of the correct format for a product price.</li> <li>III. The Attendant enters the price as a valid denomination of rupees.</li> <li>IV. Continue with Step 7.</li> </ul>

### 6.1.2.2 Sequence Diagram: Edit Product

This sequence diagram illustrates the interactions that occur between an attendant and the system when an attendant edits the product information stored in the Inventory Management system for a product (see Figure 3). The preconditions for this sequence diagram are that the attendant has entered an authenticated session in the system and has entered the Inventory Management system.

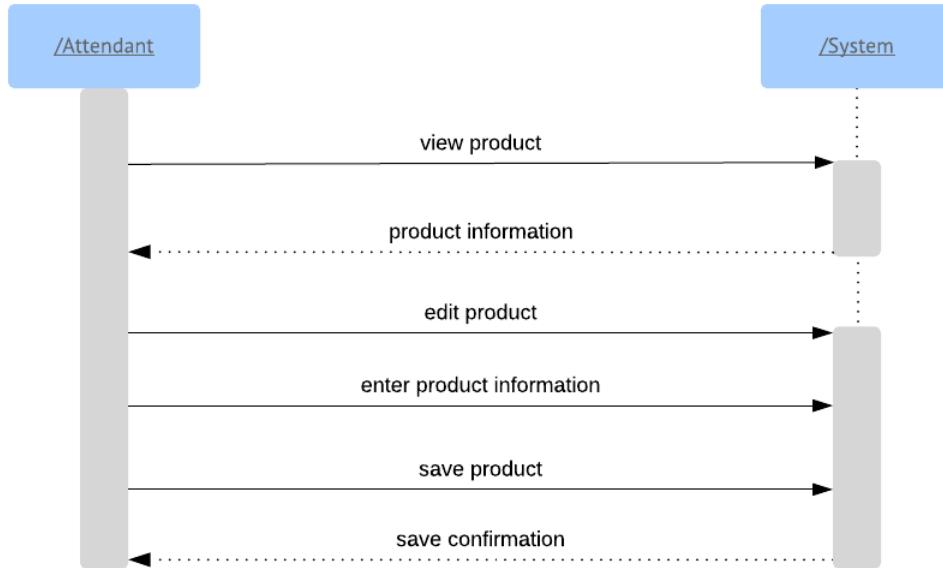
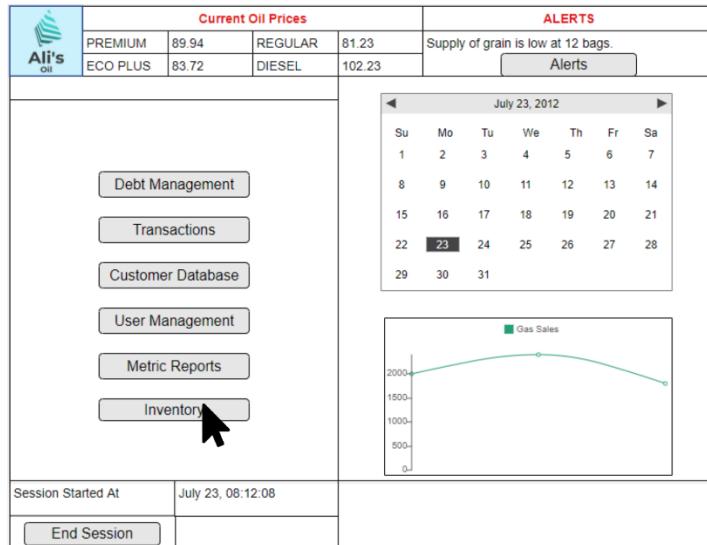


Figure 3: Sequence diagram for editing a product in the Inventory Management system

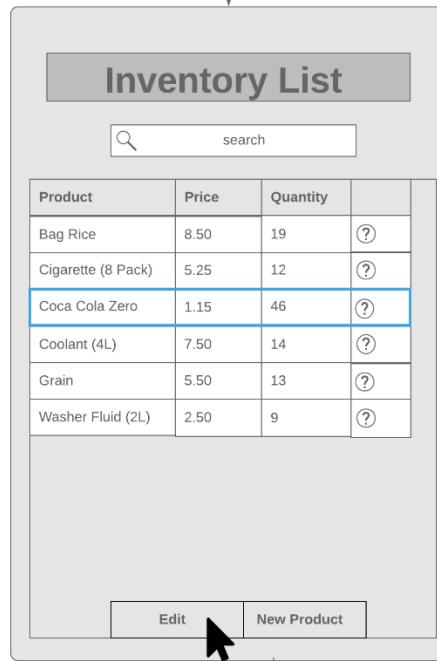
### 6.1.2.3 Storyboard: Edit Product

The following storyboard details a scenario in which an attendant is updating the information associated with Coca Cola Zero (see Figure 4). Customer demand for Coca Cola Zero has increased. An attendant wants to increase the low inventory threshold for Coca Cola Zero so that an order can be made earlier than usual.

Step 1:  
The attendant clicks the "Inventory" button on the home screen to access the inventory management screen.



Step 2:  
The attendant clicks the "Edit" button in the inventory list screen.



Step 3:  
The attendant  
enters the updated  
threshold in the  
"Low Inventory  
Threshold" input  
field and then  
clicks the "Submit"  
button.

**Edit Product in Inventory**

Product Name

Price  per

Quantity Available

Low Inventory Threshold

Notes

#### Alternate Path

Step 3a:  
The attendant makes an  
error by entering a  
negative value into the  
"Low Inventory  
Threshold" input field.  
The attendant clicks the  
"Submit" button to save  
the changes.

**New Product in Inventory**

Product Name

Price  per

Quantity Available

Low Inventory Threshold

Notes

↓

### New Product in Inventory

Product Name

Alert

"Low Inventory Threshold" value cannot be negative.

↓

### New Product in Inventory

Product Name

Price  per

Quantity Available

Low Inventory Threshold

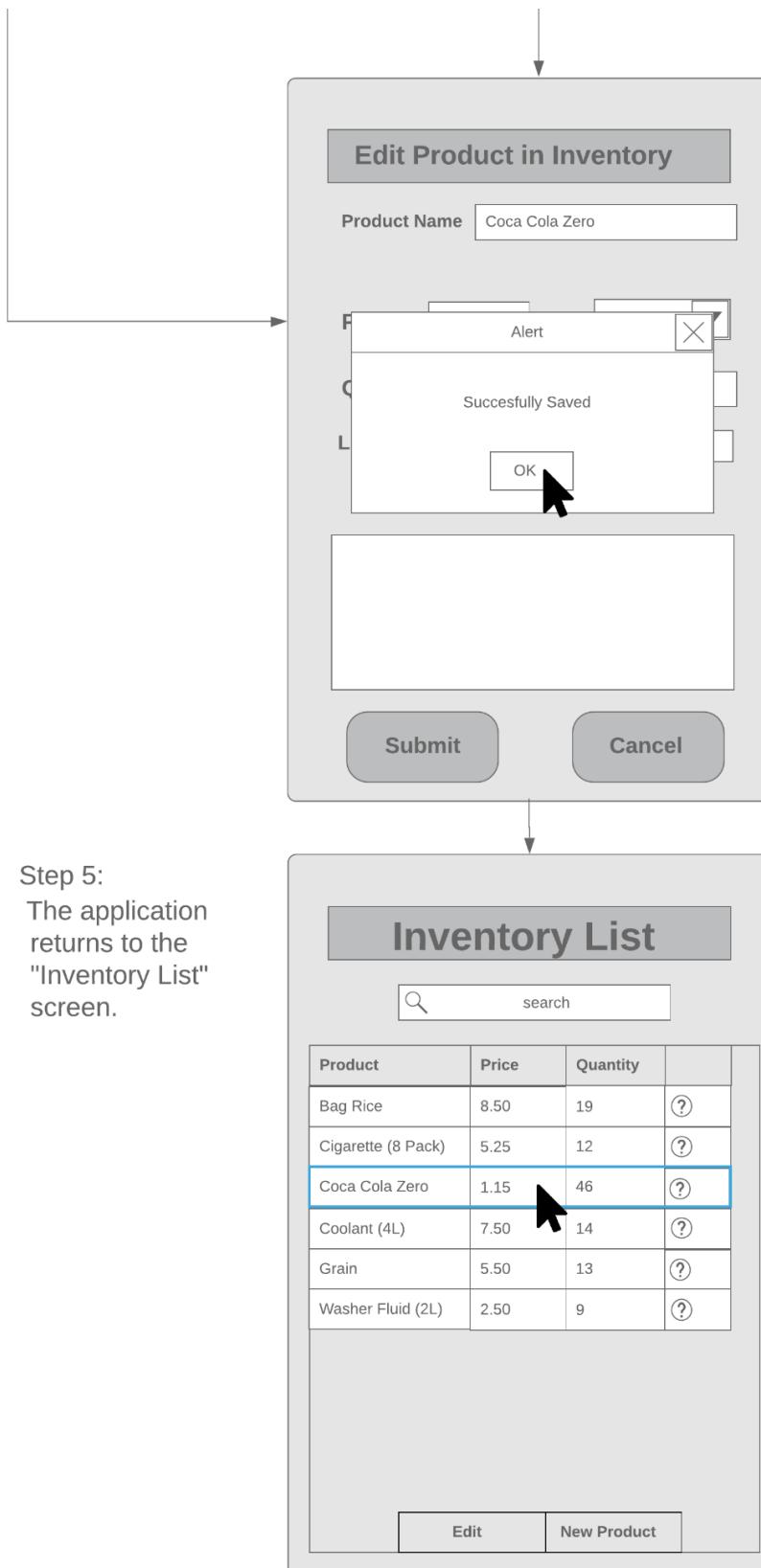
Notes

Step 3b:

An alert is shown to the attendant with the error messages stating that the low inventory threshold value cannot be negative. The attendant clicks "OK" to close the alert and fix the mistakes.

Step 3c:

The attendant changes low inventory threshold to be positive and then clicks the "Submit" button to save the changes.



**Step 4:**  
A confirmation message is displayed to the attendant showing that the information has been saved. The user clicks "OK".

**Step 5:**  
The application returns to the "Inventory List" screen.

Figure 4: Storyboard for editing a product in the Inventory Management system

## 6.1.3 View Product

### 6.1.3.1 Use Case: View Product

This use case details the steps taken by an attendant to view the product information currently stored in the Inventory Management system for a product.

Actors	Attendant
Preconditions	<ul style="list-style-type: none"><li>The Attendant has entered an authenticated user session (see 6.2.1.1 Use Case: Authenticate Session).</li><li>The Attendant has viewing privileges for the Inventory Management system as set by an Administrator (see 6.3.1.1 Use Case: Add Administrator or Attendant).</li></ul>
Steps	<ol style="list-style-type: none"><li>An Attendant requests to enter the Inventory Management system.</li><li>The Attendant is presented with<ul style="list-style-type: none"><li>a limited number of products stored in the Inventory Management system sorted in alphabetical order by product name,</li><li>the option to request more products be displayed, and,</li><li>for each product, the option to view all information associated with that product.</li></ul></li><li>The Attendant requests to view all information about a specific product.</li><li>The Attendant is presented with the following recorded values for the chosen product:<ul style="list-style-type: none"><li>product name</li><li>price per unit (e.g. \$1.99/kg)</li><li>quantity</li><li>low-quantity notification threshold</li><li>notes</li></ul></li></ol>
Success Conditions	<ul style="list-style-type: none"><li>The Attendant views all product information associated with a specific product in the Inventory Management system.</li></ul>

### 6.1.3.2 Sequence Diagram: View Product

This sequence diagram illustrates the interactions that occur between an attendant and the system when an attendant views the product information stored in the Inventory Management system for a product (see Figure 5: Sequence diagram for viewing a product in the Inventory Management systemFigure 5). The preconditions for this sequence diagram are that the attendant has entered an authenticated session in the system and has entered the Inventory Management system.

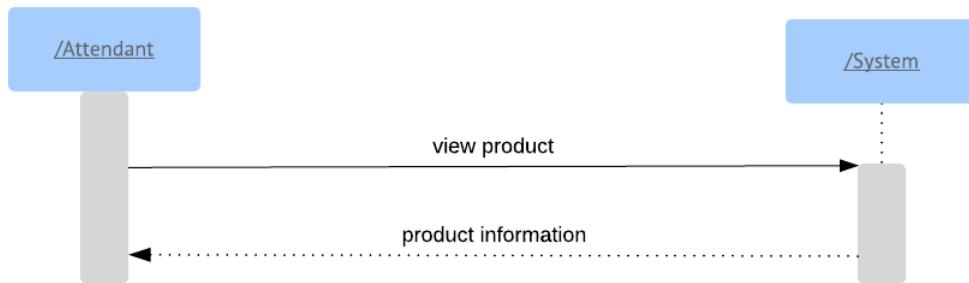


Figure 5: Sequence diagram for viewing a product in the Inventory Management system

### 6.1.3.3 Storyboard: View Product

The following storyboard details a scenario in which an attendant is viewing the information associated with Coca Cola Zero (see Figure 6). Summer is approaching and demand for Coca Cola Zero is going to increase. An attendant wants to check the low inventory threshold for Coca Cola Zero to ensure it is high enough. The attendant wants to see the threshold value but not edit any information.

Step 1:  
The attendant clicks the "Inventory" button on the home screen to access the inventory management screen.

Current Oil Prices		ALERTS																																											
PREMIUM	89.94	REGULAR	81.23																																										
ECO PLUS	83.72	DIESEL	102.23																																										
		Supply of grain is low at 12 bags. Alerts																																											
<div style="display: flex; align-items: center;"> <span style="font-size: 2em;">◀</span> <span style="margin: 0 10px;">July 23, 2012</span> <span style="font-size: 2em;">▶</span> <table border="1" style="margin-left: 10px; border-collapse: collapse; text-align: center;"> <tr><td>Su</td><td>Mo</td><td>Tu</td><td>We</td><td>Th</td><td>Fr</td><td>Sa</td></tr> <tr><td>1</td><td>2</td><td>3</td><td>4</td><td>5</td><td>6</td><td>7</td></tr> <tr><td>8</td><td>9</td><td>10</td><td>11</td><td>12</td><td>13</td><td>14</td></tr> <tr><td>15</td><td>16</td><td>17</td><td>18</td><td>19</td><td>20</td><td>21</td></tr> <tr><td>22</td><td>23</td><td>24</td><td>25</td><td>26</td><td>27</td><td>28</td></tr> <tr><td>29</td><td>30</td><td>31</td><td></td><td></td><td></td><td></td></tr> </table> </div>				Su	Mo	Tu	We	Th	Fr	Sa	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31				
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<div style="display: flex; justify-content: space-between;"> <div style="flex: 1;"> <div style="border: 1px solid #ccc; padding: 5px; margin-bottom: 5px;">Debt Management</div> <div style="border: 1px solid #ccc; padding: 5px; margin-bottom: 5px;">Transactions</div> <div style="border: 1px solid #ccc; padding: 5px; margin-bottom: 5px;">Customer Database</div> <div style="border: 1px solid #ccc; padding: 5px; margin-bottom: 5px;">User Management</div> <div style="border: 1px solid #ccc; padding: 5px; margin-bottom: 5px; background-color: #f0f0f0; color: black; position: relative;"> <span style="position: absolute; left: -5px; top: -5px; width: 10px; height: 10px; background-color: black; opacity: 0.5;"></span> <span style="position: absolute; left: 0; top: 0; font-size: 2em;">M</span> <span style="position: absolute; left: 5px; top: 5px; font-size: 0.8em;">etric Reports</span> </div> <div style="border: 1px solid #ccc; padding: 5px; margin-bottom: 5px;">Inventory</div> </div> <div style="flex: 1; text-align: right;"> <span style="border: 1px solid #ccc; padding: 2px 10px; margin-bottom: 5px;">Gas Sales</span> </div> </div>																																													
Session Started At		July 23, 08:12:08																																											
<input type="button" value="End Session"/>																																													

Step 2:  
The attendant finds the product in the inventory list screen and clicks the "?" button in the product row.

**Inventory List**

Product	Price	Quantity	
Bag Rice	8.50	19	<input type="button" value="?"/>
Cigarette (8 Pack)	5.25	12	<input type="button" value="?"/>
Coca Cola Zero	1.15	46	<input type="button" value="?"/>
Coolant (4L)	7.50	14	<input type="button" value="?"/>
Grain	5.50	13	<input type="button" value="?"/>
Washer Fluid (2L)	2.50	9	<input type="button" value="?"/>

Step 3:  
The attendant checks the low inventory threshold. It appears to be the right value. The attendant clicks "OK" to exit and return to the inventory list screen shown in Step 1.

**Product in Inventory**

Product Name	<input type="text" value="Coca Cola Zero"/>
Price	<input type="text" value="1.15"/> per <input type="text" value="unit"/> <input type="button" value="▼"/>
Quantity Available	<input type="text" value="46"/>
Low Inventory Threshold	<input type="text" value="14"/>
<b>Notes</b>	
<input type="text"/>	
<input type="button" value="OK"/>	

Figure 6: Storyboard for viewing a product in the Inventory Management system

## 6.2 User Authentication

Sensitive data essential to operations at Ali's Oil must be secure within AttendNet. To ensure confidentiality, integrity and availability, AttendNet has a user authentication system to safeguard this data from potential intruders and eliminate security vulnerabilities.

### 6.2.1 Authenticate Session

#### 6.2.1.1 Use Case: Authenticate Session

This use case describes the steps an administrator or attendant would take to start an authenticated session. An administrator or attendant must authenticate their session before being able to access the system.

Actors	Administrator or Attendant
Preconditions	<ul style="list-style-type: none"><li>The Administrator or Attendant exists in the User Management system (see 6.3.1.1 Use Case: Add Administrator or Attendant).</li><li>The Administrator or Attendant is not in an authenticated session.</li></ul>
Steps	<ol style="list-style-type: none"><li>An Administrator or Attendant requests to enter an authenticated user session.</li><li>The Administrator or Attendant is presented with the ability to enter a name and personal identification number (PIN).</li><li>The Administrator or Attendant enters the following information:<ul style="list-style-type: none"><li>administrator or attendant name</li><li>personal identification number (PIN)</li></ul></li><li>The Administrator or Attendant is presented with confirmation that an authenticated user session with privileges associated with the information entered in Step 3 has been instantiated.</li></ol>
Success Conditions	<ul style="list-style-type: none"><li>The Administrator or Attendant has entered an authenticated session.</li></ul>
Alternate Paths	<p>3a.</p> <ol style="list-style-type: none"><li>The Administrator or Attendant enters a name and personal identification number (PIN) unassociated with any one Attendant or Administrator account in the User Management system.</li><li>The Attendant is notified that the entered information was invalid for entering an authenticated session.</li><li>Continue with Step 3.</li></ol>

#### 6.2.1.2 Sequence Diagram: Authenticate Session

This sequence diagram illustrates the interactions that occur between an attendant and the system when an attendant starts an authenticated session to access the system (see Figure 7). The preconditions for this sequence diagram are that the attendant has an account in the User Management system and is not in an authenticated session.

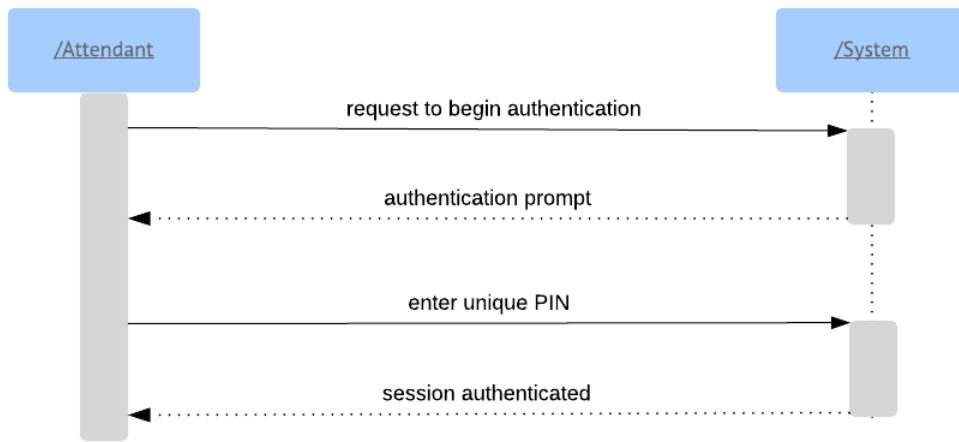
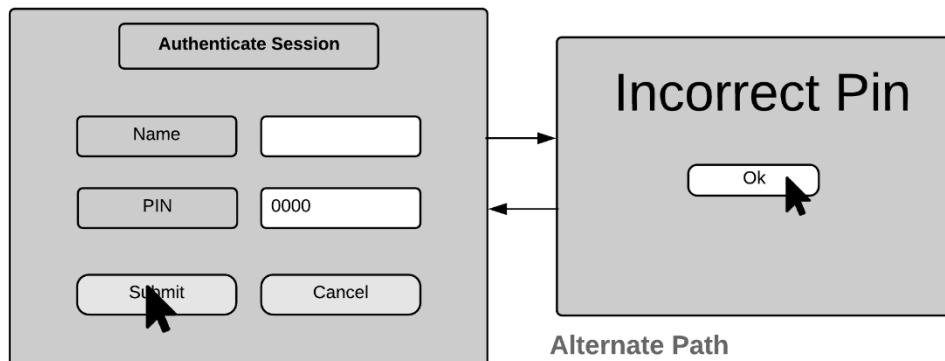


Figure 7: Sequence diagram for authenticating a session

### 6.2.1.3 Storyboard: Authenticate Session

The following storyboard details a scenario in which an attendant is authenticating a session (see Figure 8Figure 6). A customer wants to make a purchase. An attendant needs to access the application in order to complete the transaction.

**Step 1:**  
The attendant enters his/her username and PIN and clicks the "Submit" button to gain access to the application.



#### Alternate Path

**Step 1a:**  
The attendant makes an error by entering the incorrect PIN. An error message is displayed stating that the PIN is incorrect. The attendant clicks the "OK" button to exit the message and enter the correct PIN.

**Step 2:**  
The attendant is authenticated and granted access to the application.

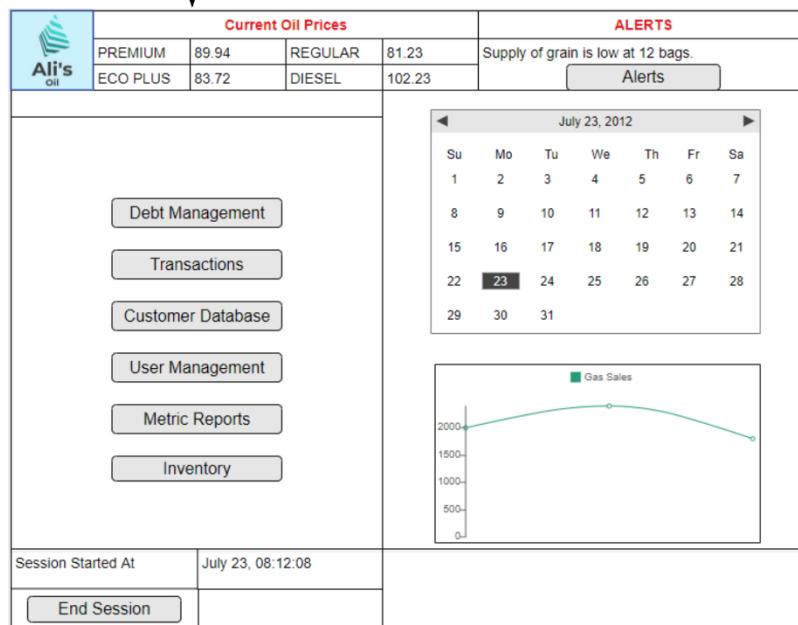


Figure 8: Storyboard for authenticating a session

## 6.2.2 Invalidate Session

### 6.2.2.1 Use Case: Invalidate Session

The use case below describes the steps an administrator or attendant will take to invalidate an active session. The administrator or attendant will not be able to access the system until a session is authenticated again (see 6.2.1.1 Use Case: Authenticate Session).

Actors	Administrator or Attendant
Preconditions	<ul style="list-style-type: none"><li>The Administrator or Attendant is in an authenticated session (see 6.2.1.1 Use Case: Authenticate Session).</li></ul>
Steps	<ul style="list-style-type: none"><li>An Administrator or Attendant requests to invalidate their session.</li><li>The Administrator or Attendant is presented with a confirmation that their session has been invalidated.</li></ul>
Success Conditions	<ul style="list-style-type: none"><li>The Administrator or Attendant session has been invalidated.</li></ul>

### 6.2.2.2 Sequence Diagram: Invalidate Session

This sequence diagram illustrates the interactions that occur between an administrator or attendant and the system when an administrator or attendant invalidates an authenticated session (see Figure 9). As a precondition for this sequence diagram, the administrator or attendant must be in an existing authenticated session.

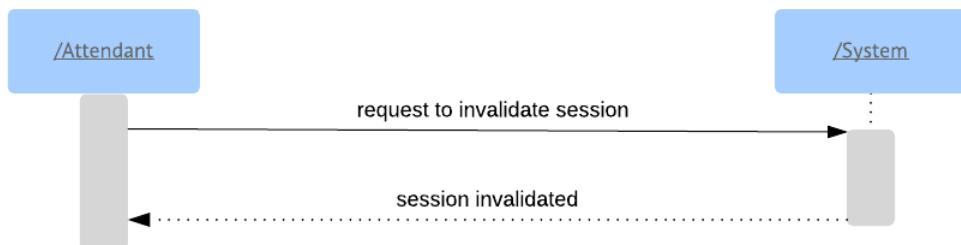
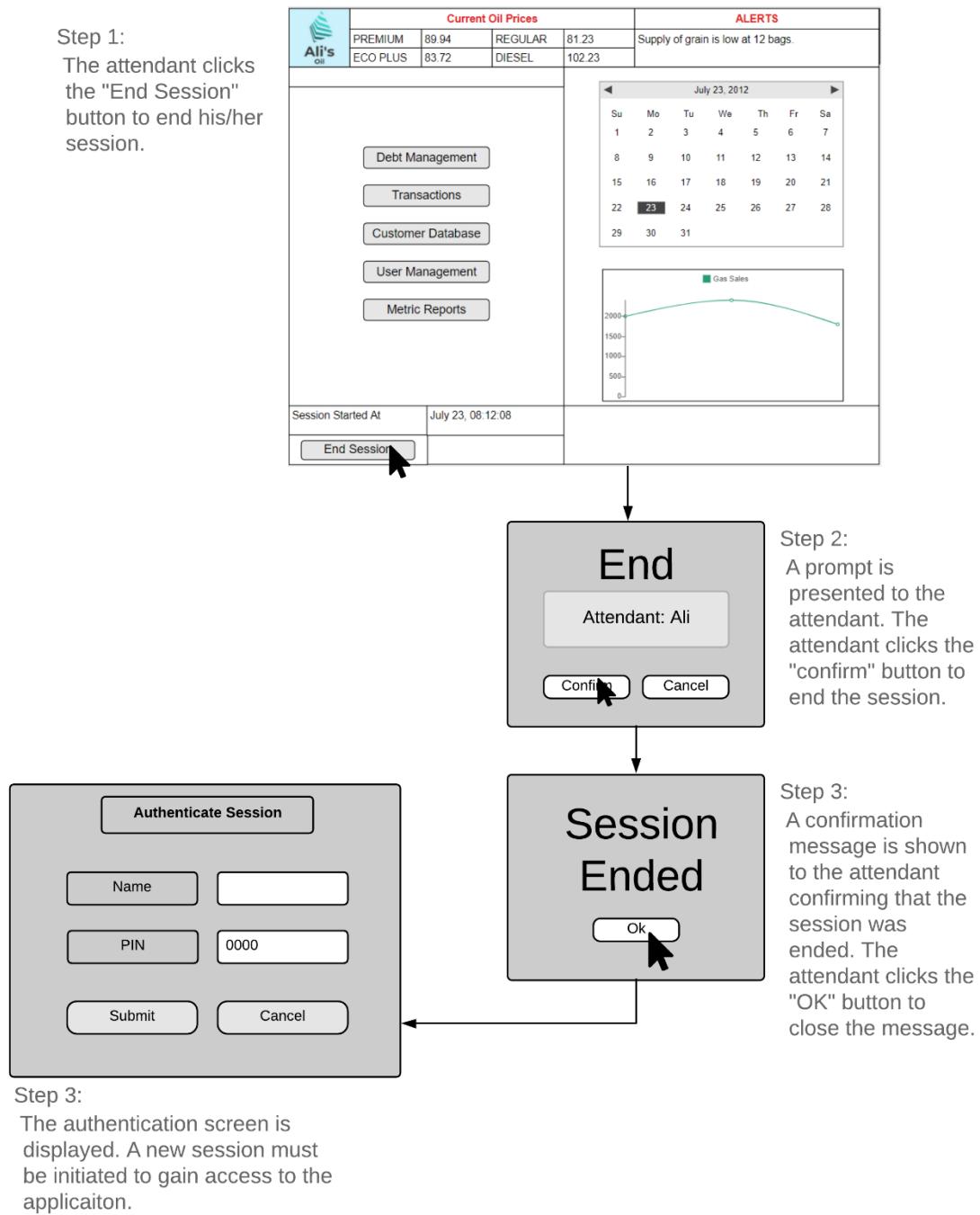


Figure 9: Sequence diagram for invalidating a session

### 6.2.2.3 Storyboard: Invalidate Session

The following storyboard details a scenario in which an attendant is viewing the information associated with Coca Cola Zero (see Figure 10Figure 6). The attendant wants to take a break. The attendant wants to lock the application so that no unauthorized users can gain access to it.



## 6.3 User Management

A discretionary access control authentication system containing two user classes, administrators and attendants, must be provided by AttendNet. To accommodate the fluctuating number of attendants and administrators, a user management system must also be provided by AttendNet.

### 6.3.1 Add Administrator or Attendant

#### 6.3.1.1 Use Case: Add Administrator or Attendant

This use case describes the steps an administrator would take to add an administrator or an attendant account to the User Management system.

Actors	Administrator
Preconditions	<ul style="list-style-type: none"><li>The Administrator has entered an authenticated user session (6.2.1.1 Use Case: Authenticate Session).</li></ul>
Steps	<ol style="list-style-type: none"><li>An Administrator requests to enter the User Management system.</li><li>The Administrator is presented with all Administrator and Attendant accounts in the User Management system and the option to add an Administrator or an Attendant to the User Management system.</li><li>The Administrator requests to add an Administrator or Attendant to the User Management system.</li><li>The Administrator is presented with the ability to enter information for an Administrator or Attendant and save that information in the User Management system.</li><li>The Administrator enters the following information for the Administrator or Attendant account:<ul style="list-style-type: none"><li>name</li><li>personal identification number (PIN)</li></ul><p><i>IF</i> entering Attendant information, the Administrator also assigns one of the values “none”, “view only”, or “view and edit” to each of the following Attendant information fields:</p><ul style="list-style-type: none"><li>Inventory Management</li><li>Transaction Management</li></ul></li></ol>

	<ul style="list-style-type: none"> <li>• Customers Debt Management</li> <li>• Metric Reporting</li> </ul> <p>6. The Administrator requests to save the entered Administrator or Attendant and information associated with the entered Administrator or Attendant in the User Management system.</p> <p>7. The Administrator is presented with confirmation that the entered Administrator or Attendant account and information associated with the entered Administrator or Attendant account has been saved in the User Management system.</p>
Success Conditions	<ul style="list-style-type: none"> <li>• The Administrator or Attendant account has been saved in the User Management system.</li> </ul>

### 6.3.1.2 Sequence Diagram: Add Administrator or Attendant

This sequence diagram illustrates the interactions that occur between an administrator and the system when an administrator adds an attendant or an administrator account to the User Management system (see Figure 11). The preconditions for this sequence diagram are that the administrator has entered an authenticated session in the system and has entered the User Management System.

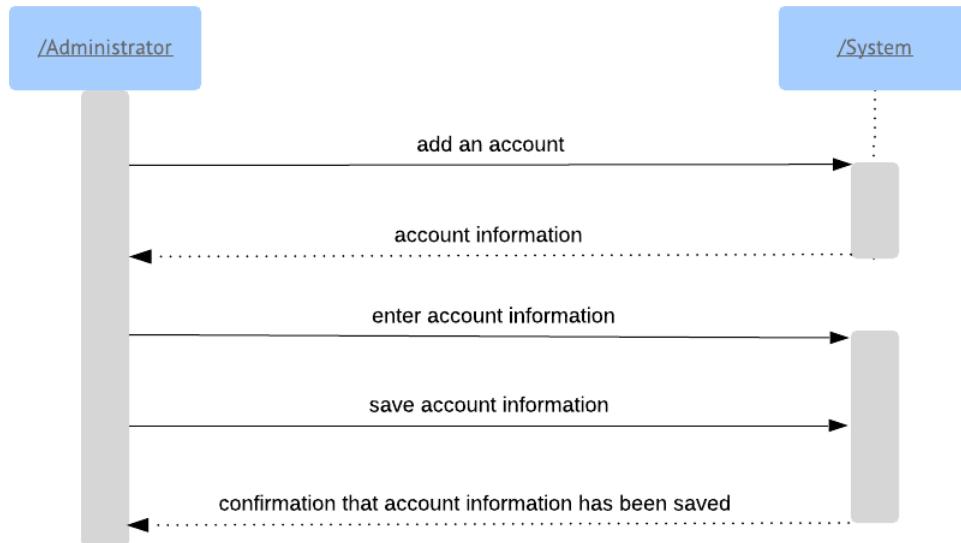


Figure 11: Sequence diagram for adding an attendant or administrator to the User Management system

### 6.3.1.3 Storyboard: Add Administrator or Attendant

The following storyboard details a scenario in which an administrator is adding a new user to the User Management System (see Figure 12). A new employee named John has been hired. A manager must create a user account John to use the system. The manager wants to give John permission to manage transactions and inventory.

Step 1:  
The manager clicks the "User Management" button to enter the user management screen.

Current Oil Prices				ALERTS																																																
Ali's oil	PREMIUM	89.94	REGULAR	81.23	Supply of grain is low at 12 bags.																																															
	ECO PLUS	83.72	DIESEL	102.23																																																
				<div style="display: flex; justify-content: space-between;"> <div style="flex: 1;"> <p><a href="#">Debt Management</a></p> <p><a href="#">Transactions</a></p> <p><a href="#">Customer Database</a></p> <p><a href="#">User Management</a></p> <p><a href="#">Metric Reports</a></p> </div> <div style="flex: 1; text-align: center;"> <p>July 23, 2012</p> <table border="1" style="margin: auto;"> <tr><td>Su</td><td>Mo</td><td>Tu</td><td>We</td><td>Th</td><td>Fr</td><td>Sa</td></tr> <tr><td>1</td><td>2</td><td>3</td><td>4</td><td>5</td><td>6</td><td>7</td></tr> <tr><td>8</td><td>9</td><td>10</td><td>11</td><td>12</td><td>13</td><td>14</td></tr> <tr><td>15</td><td>16</td><td>17</td><td>18</td><td>19</td><td>20</td><td>21</td></tr> <tr><td>22</td><td>23</td><td>24</td><td>25</td><td>26</td><td>27</td><td>28</td></tr> <tr><td>29</td><td>30</td><td>31</td><td></td><td></td><td></td><td></td></tr> </table> <div style="text-align: center; margin-top: 10px;"> <p>Gas Sales</p> <p>2000 1500 1000 500 0</p> </div> </div> </div>							Su	Mo	Tu	We	Th	Fr	Sa	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31				
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Session Started At		July 23, 08:12:08																																																		
<a href="#">End Session</a>																																																				

Step 2:  
The manager clicks the "Add User" button in the user management screen.

### Manage Users

search

User	Class
Chad	Attendant
Ali	Attendant
Brett	Administrator
Jessica	Attendant

[Edit](#)
[Add User](#)

Step 3:

The manager enters the new username and PIN in the appropriate input fields. Then the manager checks the "Full" box for inventory and transaction management to give John the permissions required to manage transactions and inventory. Finally, the manager clicks the "Save" button to create the new user.

↓

Add User

Attendant Account	▼
Name	John
PIN	4321

Permission	View	Edit	Full
Inventory Management	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Transaction Management	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Customer Debt Information	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Generate Reports	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

**Save**      **Cancel**

Step 4:

The manager is shown a confirmation message stating that the user was successfully created. The manager clicks OK to the user management screen.

↓

Add User

Attendant Account	▼
Name	John
PIN	4321

Alert

User "John" Successfully Created

**OK**

Customer Debt Information	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Generate Reports	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>

**Save**      **Cancel**

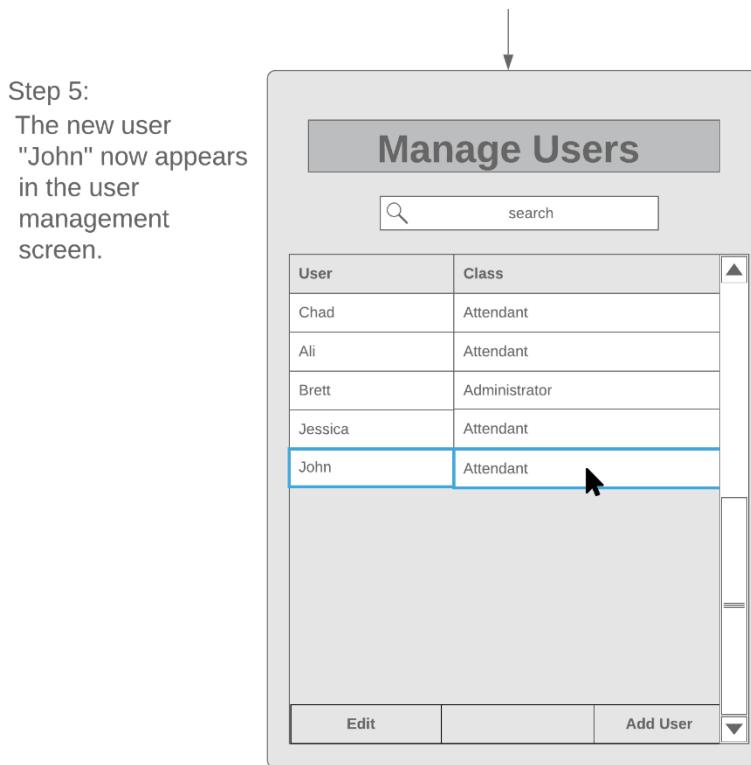


Figure 12: Storyboard for adding an attendant or administrator to the User Management system

### 6.3.2 Edit Administrator or Attendant

#### 6.3.2.1 Use Case: Edit Administrator or Attendant

The following use case details the steps required for an administrator to modify an existing administrator or an existing attendant account in the User Management system.

Actors	Administrator
Preconditions	<ul style="list-style-type: none"> <li>• The Administrator is in an authenticated user session (6.2.1.1 Use Case: Authenticate Session).</li> <li>• The Administrator or Attendant account to be edited exists in the User Management system.</li> </ul>
Steps	<ol style="list-style-type: none"> <li>1. An Administrator requests to enter the User Management system.</li> <li>2. The Administrator is presented with all Administrator and Attendant accounts in the User Management system and the option to view all information associated with an Administrator or an Attendant account in the User Management system.</li> </ol>

	<p>3. The Administrator requests to view all information associated with an Administrator or an Attendant account.</p> <p>4. The Administrator is presented with all information associated with the Administrator or Attendant account selected in Step 3 and the option to edit the Administrator or Attendant account.</p> <p>5. The Administrator requests to edit the Administrator or Attendant account.</p> <p>6. The Administrator is presented with the ability to edit the Administrator or Attendant account.</p> <p>7. The Administrator edits any of the following information associated with the Administrator or Attendant account:</p> <ul style="list-style-type: none"> <li>• administrator or attendant name</li> <li>• personal identification number (PIN)</li> </ul> <p><i>IF</i> editing Attendant information, the Administrator also edits the access to any one of the subsystems to “none”, “view only”, or “view and edit” access. The subsystems are as follows:</p> <ul style="list-style-type: none"> <li>• Inventory Management</li> <li>• Transaction Management</li> <li>• Customers Debt Management</li> <li>• Metric Reporting</li> </ul> <p>8. The Administrator requests to save the edited Administrator or Attendant account.</p> <p>9. The Administrator is presented with confirmation that the edited Administrator or Attendant account has been updated in the User Management system.</p>
Success Conditions	<ul style="list-style-type: none"> <li>• The Administrator or Attendant account is updated and saved in the User Management system to reflect the changes made by the Administrator.</li> </ul>

### 6.3.2.2 Sequence Diagram: Edit Administrator or Attendant

This sequence diagram illustrates the interactions that occur between an administrator and the system when an administrator edits an existing attendant or administrator account in the User Management system (see Figure 13). The preconditions for this sequence diagram are that the administrator has entered an authenticated session in the system and has entered the User Management System.

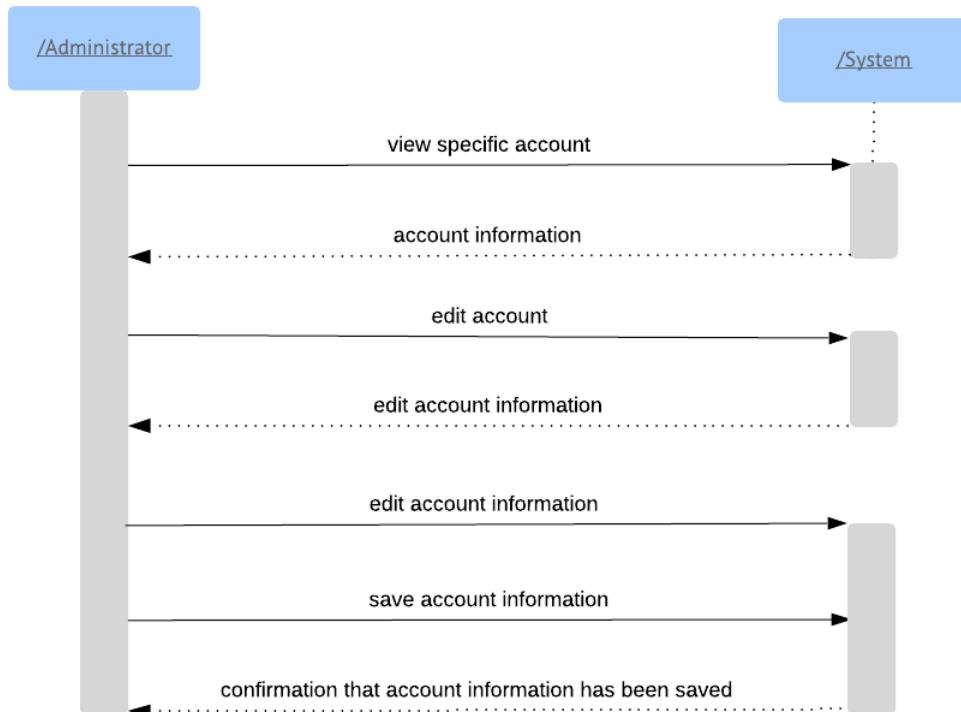
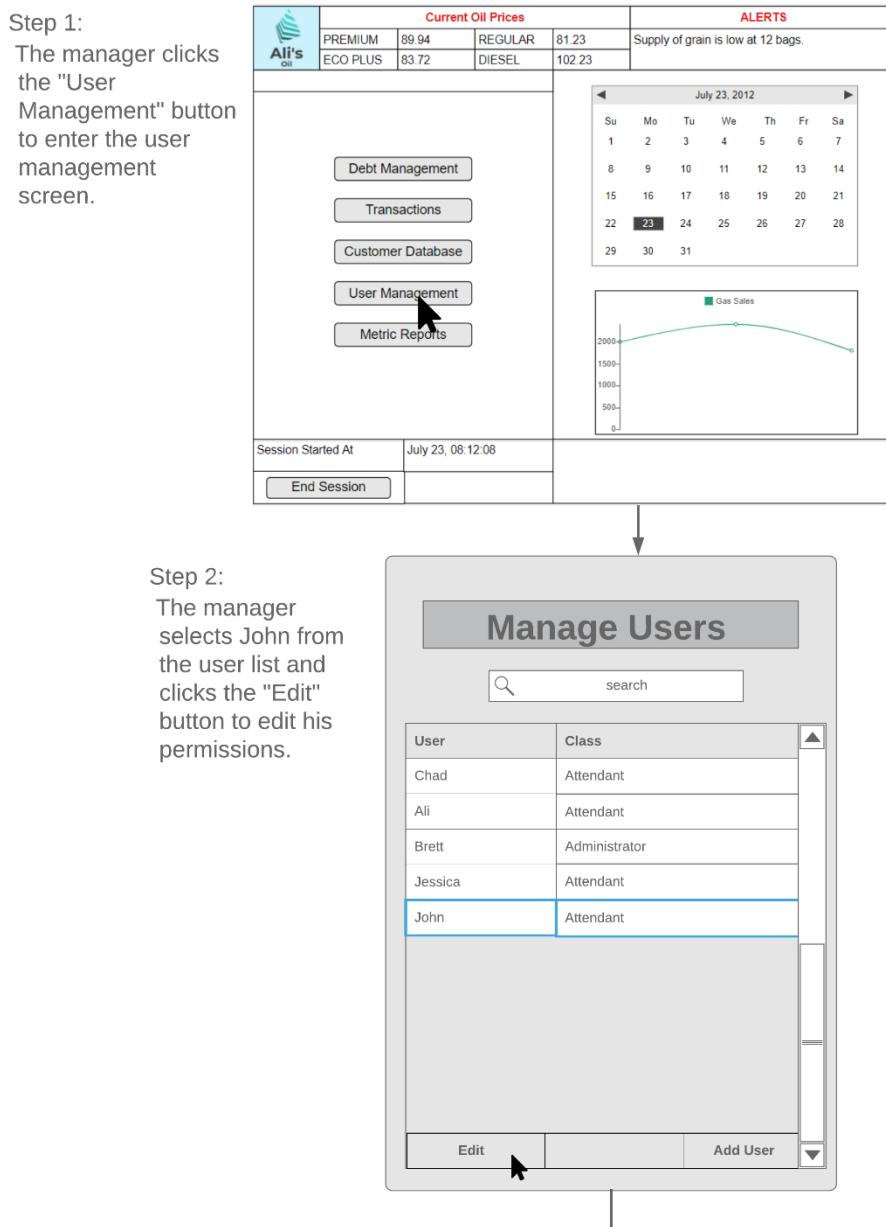


Figure 13: Sequence diagram for editing an administrator or attendant account

### 6.3.2.3 Storyboard: Edit Administrator or Attendant

The following storyboard details a scenario in which an administrator is updating the information associated with a user account (see Figure 14). A manager has a lot of work and wants to delegate the work of generating reports to an attendant. The manager decides that an employee named "John" should be the one to generate reports. The manager changes John's permissions to enable full permissions for reports.



↓

**Add User**

Attendant Account	<input type="button" value="▼"/>																				
Name	<input type="text" value="John"/>																				
PIN	<input type="text" value="4321"/>																				
<table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="text-align: left;">Permission</th> <th style="text-align: center;">View</th> <th style="text-align: center;">Edit</th> <th style="text-align: center;">Full</th> </tr> </thead> <tbody> <tr> <td>Inventory Management</td> <td style="text-align: center;"><input type="checkbox"/></td> <td style="text-align: center;"><input type="checkbox"/></td> <td style="text-align: center;"><input checked="" type="checkbox"/></td> </tr> <tr> <td>Transaction Management</td> <td style="text-align: center;"><input type="checkbox"/></td> <td style="text-align: center;"><input type="checkbox"/></td> <td style="text-align: center;"><input checked="" type="checkbox"/></td> </tr> <tr> <td>Customer Debt Information</td> <td style="text-align: center;"><input type="checkbox"/></td> <td style="text-align: center;"><input type="checkbox"/></td> <td style="text-align: center;"><input type="checkbox"/></td> </tr> <tr> <td>Generate Reports</td> <td style="text-align: center;"><input type="checkbox"/></td> <td style="text-align: center;"><input type="checkbox"/></td> <td style="text-align: center;"><input checked="" type="checkbox"/></td> </tr> </tbody> </table>		Permission	View	Edit	Full	Inventory Management	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	Transaction Management	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	Customer Debt Information	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Generate Reports	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Permission	View	Edit	Full																		
Inventory Management	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>																		
Transaction Management	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>																		
Customer Debt Information	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>																		
Generate Reports	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>																		

↓

**Add User**

Attendant Account	<input type="button" value="▼"/>								
Name	<input type="text" value="John"/>								
PIN	<input type="text" value="4321"/> Alert <input type="button" value="X"/>								
<div style="border: 1px solid #ccc; padding: 5px; width: fit-content; margin: auto;">           User "John" Successfully Updated         </div>									
<input type="button" value="OK"/>									
<table border="1" style="width: 100%; border-collapse: collapse;"> <tbody> <tr> <td style="width: 15%;">Customer Debt Information</td> <td style="width: 85%; text-align: center;"><input type="checkbox"/></td> <td style="width: 85%; text-align: center;"><input type="checkbox"/></td> <td style="width: 85%; text-align: center;"><input type="checkbox"/></td> </tr> <tr> <td>Generate Reports</td> <td style="text-align: center;"><input type="checkbox"/></td> <td style="text-align: center;"><input type="checkbox"/></td> <td style="text-align: center;"><input type="checkbox"/></td> </tr> </tbody> </table>		Customer Debt Information	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Generate Reports	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Customer Debt Information	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>						
Generate Reports	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>						

**Step 3:**

The manager checks the "Generate Reports" checkbox and then clicks the "Save" button to save the changes.

**Step 4:**

The manager is shown a confirmation message stating that the user was successfully updated. The manager clicks OK to exit the user management screen and return to the user list.

Figure 14: Storyboard for editing an administrator or attendant account

## 6.4 Notifications

Ali's Oil productivity relies upon attendant efficiency. To ensure attendant efficiency, a notification system triggered on events such as low inventory for a product or a fuel price update from Government of Pakistan Oil and Gas Regulatory Authority must be provided by AttendNet.

### 6.4.1 View Notification

#### 6.4.1.1 Use Case: View Notification

The Notification system notifies attendants that a product in the Inventory Management system is below the low-quantity threshold or, that the current price of fuel in the Inventory Management system has been changed.

Actors	Attendant
Preconditions	<ul style="list-style-type: none"><li>• The recorded quantity for a product in the Inventory Management system is a value below the same product's specified low-quantity threshold <i>OR</i> the recorded price for a fuel product in the Inventory Management system has been changed.</li><li>• The system has generated a low-quantity notification for a product designated as being of low-quantity <i>OR</i> the system has generated a fuel-price-update notification for a fuel product with a price that has been changed.</li></ul>
Steps	<ol style="list-style-type: none"><li>1. An Attendant requests to enter the Notifications system.</li><li>2. The Attendant is presented with<ul style="list-style-type: none"><li>• a limited amount of notifications ordered by time of creation,</li><li>• the option to request more notifications be displayed, and,</li><li>• for each notification, the option to view all information associated with that notification.</li></ul></li><li>3. The Attendant requests to view all information associated with a specific notification.</li><li>4. The Attendant is presented with the time of creation for the chosen notification, as well as the message that notification contains.</li></ol>

Success Conditions	<ul style="list-style-type: none"> <li>• The Attendant has viewed the information associated with a fuel-price-update notification or a low-quantity notification.</li> </ul>
--------------------	---

#### 6.4.1.2 Sequence Diagram: View Notification

This sequence diagram illustrates the interactions that occur between an attendant and the system when an attendant views a notification in the Notifications system (see Figure 15). The preconditions for this sequence diagram include the attendant having entered an authenticated session, as well as a product in the Inventory Management system having reached its low-quantity threshold or the recorded price for a fuel product in the Inventory Management system having been changed.

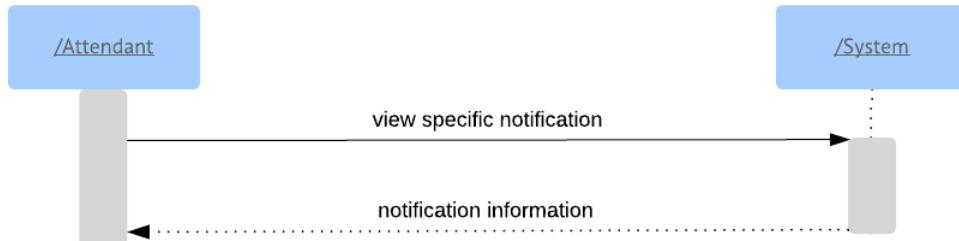
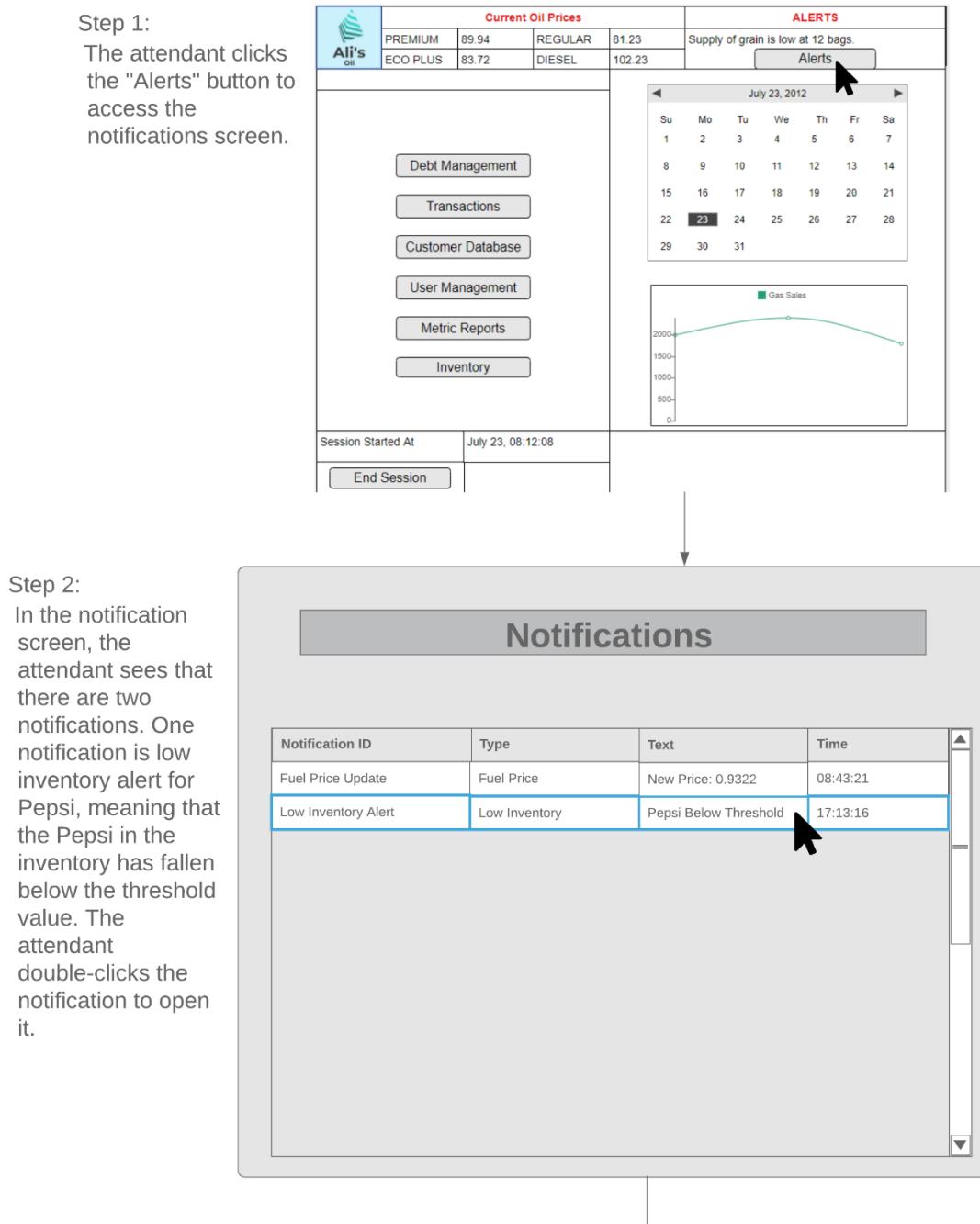


Figure 15: Sequence diagram for viewing a notification in the Notifications system

#### 6.4.1.3 Storyboard: View Notification

The following storyboard details a scenario in which an attendant is viewing a notification (see Figure 16). An attendant wants to ensure that no products are in short supply. The attendant goes into the system notifications to check if the system has given a warning notification for any products that has fallen below the low inventory threshold.



Step 3:  
The attendant sees  
that the notification  
date is from the  
current day. The  
attendant clicks  
cancel to exit the  
notification and  
return to the  
notifications screen.

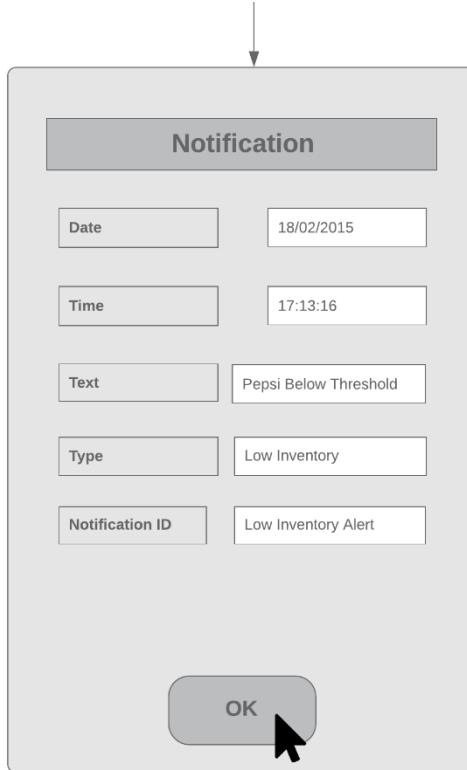


Figure 16: Storyboard for viewing a notification in the Notifications system

## 6.5 Transaction Management

Ali's Oil records all transactions that take place. To ensure all transactions are recorded correctly and consistently, transaction management must be provided by AttendNet.

### 6.5.1 Add Transaction

#### 6.5.1.1 Use Case: Add Transaction

To facilitate record-keeping of transactions in the system, the user must enter the transaction information into the Transaction Management system.

Actors	Attendant
Preconditions	<ul style="list-style-type: none"> <li>The Attendant has entered an authenticated session (see 6.2.1.1 Use Case: Authenticate Session).</li> <li>The Attendant has privileges to edit the Transaction Management system as specified by an Administrator (see 6.3.1.1 Use Case: Add Administrator or Attendant).</li> </ul>

Steps	<ol style="list-style-type: none"> <li>1. An Attendant requests to enter the Transaction Management system.</li> <li>2. The Attendant is presented with <ul style="list-style-type: none"> <li>• the option to add a transaction to the Transaction Management system,</li> <li>• a limited number of transactions stored in the Transaction Management system sorted in order by creation date,</li> <li>• the option to request more transactions be displayed, and,</li> <li>• for each transaction, the option to view all information associated with that transaction.</li> </ul> </li> <li>3. The Attendant requests to add a transaction to the Transaction Management system.</li> <li>4. The Attendant is presented with the ability to enter information for a transaction and the option to save the transaction in the Transaction Management system.</li> <li>5. The Attendant enters the following transaction information: <ul style="list-style-type: none"> <li>• amount paid</li> <li>• amount given in change</li> <li>• product(s) sold (optional)</li> <li>• for each entered product, the quantity exchanged</li> <li>• customer name (optional)</li> <li>• notes (optional)</li> </ul> </li> <li>6. The Attendant requests to save the information in the Transaction management system.</li> <li>7. The Attendant is presented confirmation that the transaction was saved in the Transaction Management system.</li> </ol>
Success Conditions	<ul style="list-style-type: none"> <li>• A record of the entered transaction exists within the Transaction Management system.</li> <li>• The quantity recorded in the Inventory Management system for each product specified in the entered transaction has been changed to reflect the respective quantity exchanged for each product.</li> </ul>
Alternate Paths	5a.

	<ul style="list-style-type: none"> <li>I. The Attendant enters invalid denominations of rupees for amount paid <i>AND/OR</i> amount given in change.</li> <li>II. The Attendant is notified that the values entered for amount paid <i>AND/OR</i> amount given in change is not a valid denomination of rupees and of the correct format for an amount paid and amount given in change.</li> <li>III. The Attendant enters the amount paid <i>AND/OR</i> the amount given in change as a valid denomination of rupees.</li> <li>IV. Continue with Step 5.</li> </ul>
5b.	<ul style="list-style-type: none"> <li>I. The Attendant enters values for the amount paid and amount given in change and the sum of the value entered for amount paid, the value entered for amount given in change, and the calculated monetary value of the total product exchanged does not equal zero, but a customer name has not been entered.</li> <li>II. The Attendant is notified that a customer debt must be updated, but a customer name has not been entered.</li> <li>III. The Attendant enters a customer name.</li> <li>IV. Continue with Step 5.</li> </ul>
5c.	<ul style="list-style-type: none"> <li>I. The Attendant enters a customer name that is associated with multiple different customer records in the Customer Debt Management system.</li> <li>II. The Attendant is presented with the address associated with each duplicate customer name in the Customer Debt Management system.</li> <li>III. The Attendant selects the correct customer information from the customer information displayed.</li> <li>IV. Continue with Step 5.</li> </ul>

### 6.5.1.2 Sequence Diagram: Add Transaction

This sequence diagram illustrates the interactions that occur between an attendant and the system when an attendant adds a transaction to the Transaction Management system (see Figure 17). The preconditions for this sequence diagram are that the attendant has entered an authenticated session in the system and has entered the Transaction Management system.

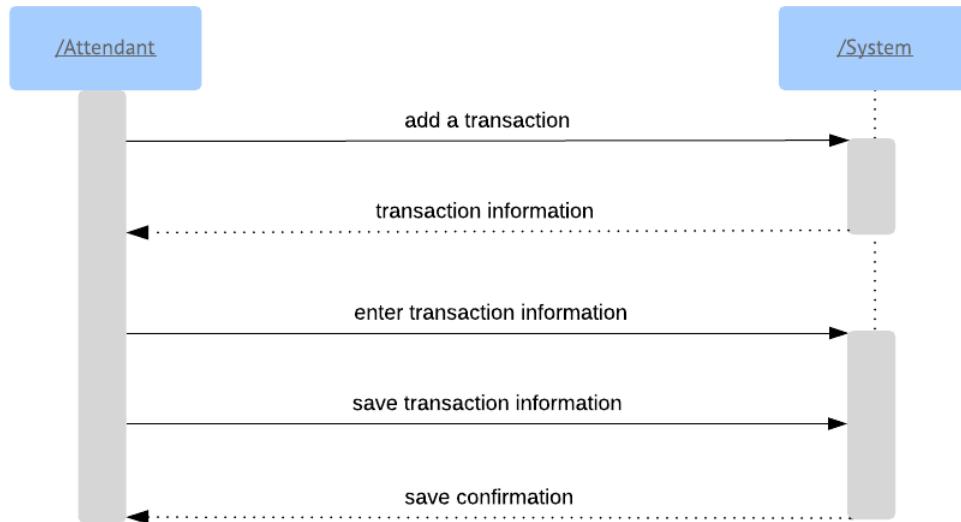
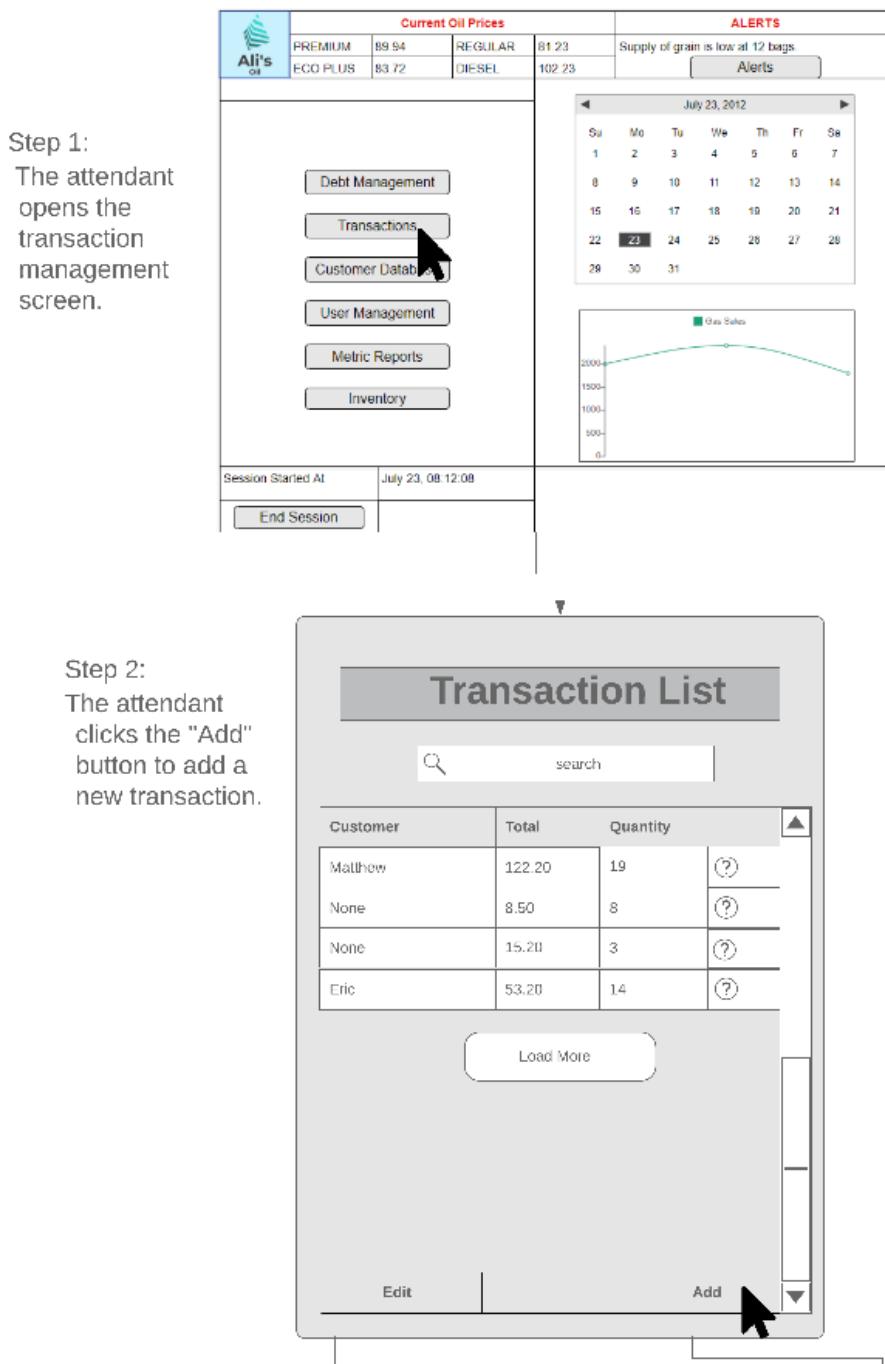


Figure 17: Sequence diagram for adding a transaction to the Transaction Management system

### 6.5.1.3 Storyboard: Add Transaction

The storyboard below details a scenario in which a customer purchases goods from Ali's Oil (see Figure 18). An attendant processes the transaction by entering transaction details into the Transaction Management system user interface and submitting it for storage. The process details the navigation of views, and the fields to be entered by the attendant.



Step 3:  
 The attendant selects the products that the customer wishes to purchase. The total cost is shown in the "Total" field, which 2.25 in this case. The customer pays in full with cash. The attendant clicks the "Submit" button to complete the transaction.

**New Transaction**

Product	Units	Price
Coca Cola Zero ▼	1	1.15
Lays ▼	1	1.10

[Add Another Product](#)

**Customer Name**

Total	Cash	Change	Debt
2.25	2.25	0.00	0.00

**Notes**

**New Transaction**

Product	Units	Price
Coca Cola Zero ▼	1	1.15
Lays ▼	1	1.10

[Add Another Product](#)

**Customer Name**

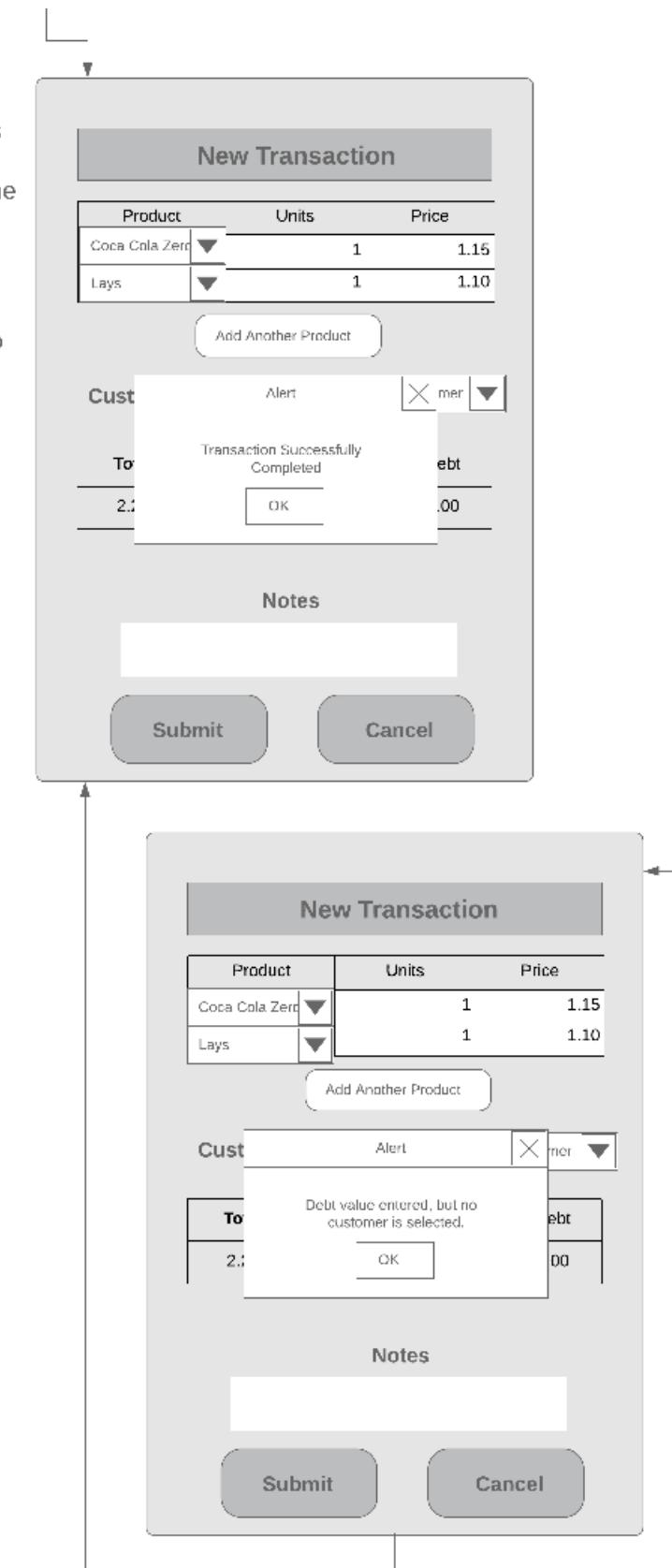
Total	Cash	Change	Debt
2.25	0	0.00	2.25

**Notes**

### Alternate Path

Step 3a:  
 The attendant makes an error, where there is a customer debt value, but no customer selected.

**Step 4:**  
 An alert appears telling the attendant that the transaction was successfully completed. The attendant clicks "OK" to return to the transaction list screen.



**Alternate Path**  
**Step 3b:**  
 The attendant is presented with an alert that the transaction has not been completed, and the attendant needs to enter a customer name.

↓

### New Transaction

Product	Units	Price
Coca Cola Zero	1	1.15
Lays	1	1.10

[Add Another Product](#)

**Customer Name**

Total	Cash	Change	Debt
2.25	2.25	0.00	0.00

**Notes**

[Submit](#)
[Cancel](#)

**Step 5:**  
The completed transaction now appears at the top of the transaction list screen because it is the most recently completed transaction.

#### Alternate Path

**Step 3c:**  
The attendant completes the "Customer Name" entry and selects "submit". Proceed with step 4.

↓

### Transaction List

▲

Customer	Total	Quantity	?
Eric	53.20	14	?
Matthew	122.20	19	?
None	8.50	8	?
None	15.20	3	?

[Load More](#)

[Edit](#)
[Add](#)
▼

Figure 18: Storyboard for adding a transaction to the Transaction Management system

## 6.5.2 Edit Transaction

### 6.5.2.1 Use Case: Edit Transaction

Due to human error or for other unexpected reasons, a transaction record stored in the Transaction Management system may need editing. In this situation, an attendant may edit the information associated with a previously completed transaction.

Actors	Attendant
Preconditions	<ul style="list-style-type: none"><li>• The Attendant has entered an authenticated session (see 6.2.1.1 Use Case: Authenticate Session).</li><li>• The Attendant has editing privileges for the Transaction Management system as set by an Administrator (see 6.3.1.1 Use Case: Add Administrator or Attendant).</li></ul>
Steps	<ol style="list-style-type: none"><li>1. An Attendant requests to enter the Transaction Management system.</li><li>2. The Attendant is presented with<ul style="list-style-type: none"><li>• the option to add a transaction to the Transaction Management system,</li><li>• a limited number of transactions stored in the Transaction Management system sorted in order by creation date,</li><li>• the option to request more transactions be displayed, and,</li><li>• for each transaction, the option to view all information associated with that transaction.</li></ul></li><li>3. The Attendant requests to view all information associated with a transaction.</li><li>4. The Attendant is presented with all information associated with the transaction selected in Step 5 and the option to edit that transaction.</li><li>5. The Attendant requests to edit the transaction.</li><li>6. For each of the following transaction information fields, the Attendant enters a value if the existing saved value for the respective field needs to be changed:<ul style="list-style-type: none"><li>• amount paid</li><li>• amount given in change</li><li>• product(s) sold (optional)</li><li>• for each entered product, the quantity exchanged</li></ul></li></ol>

	<ul style="list-style-type: none"> <li>• customer name (optional)</li> </ul> <p>7. The Attendant requests to save the transaction in the Transaction Management system.</p> <p>8. The Attendant is presented with confirmation that the transaction and its associated information was saved in the Transaction Management system successfully.</p>
Success Conditions	<ul style="list-style-type: none"> <li>• The transaction information for the transaction has been saved in the Transaction Management system.</li> <li>• If the change(s) made to the transaction information included product information, the respective product information associated with the transaction has been updated in the Inventory Management system.</li> <li>• If a customer is associated with the transaction and the change(s) made to the transaction information resulted in a different contribution to that customer debt, the respective customer debt has been updated in the Customer Debt Management system.</li> </ul>
Alternate Paths	<p>8a.</p> <ul style="list-style-type: none"> <li>I. The Attendant enters invalid denominations of rupees for amount paid <i>AND/OR</i> amount given in change.</li> <li>II. The Attendant is notified that the values entered for amount paid <i>AND/OR</i> amount given in change is not a valid denomination of rupees and of the correct format for an amount paid and amount given in change.</li> <li>III. The Attendant enters the amount paid <i>AND/OR</i> the amount given in change as a valid denomination of rupees.</li> <li>IV. Continue with Step 5.</li> </ul> <p>8b.</p> <ul style="list-style-type: none"> <li>I. The Attendant enters values for the amount paid and amount given in change and the sum of the value entered for amount paid, the value entered for amount given in change, and the calculated monetary value of the total product exchanged</li> </ul>

	<p>does not equal zero, but a customer name has not been entered.</p> <p>II. The Attendant is notified that a customer debt must be updated, but a customer name has not been entered.</p> <p>III. The Attendant enters a customer name.</p> <p>IV. Continue with Step 5.</p>
	<p>8c.</p> <p>I. The Attendant enters a customer name that is associated with multiple different customer records in the Customer Debt Management system.</p> <p>II. The Attendant is presented with the business name and address associated with each duplicate customer name in the Customer Debt Management system.</p> <p>III. The Attendant selects the correct customer information from the customer information displayed.</p> <p>IV. Continue with Step 5.</p>

### 6.5.2.2 Sequence Diagram: Edit Transaction

This sequence diagram illustrates the interactions that occur between an attendant and the system when an attendant edits a transaction in the Transaction Management system (see Figure 19). The preconditions for this sequence diagram are that the attendant has entered an authenticated session in the system and has entered the Transaction Management system.

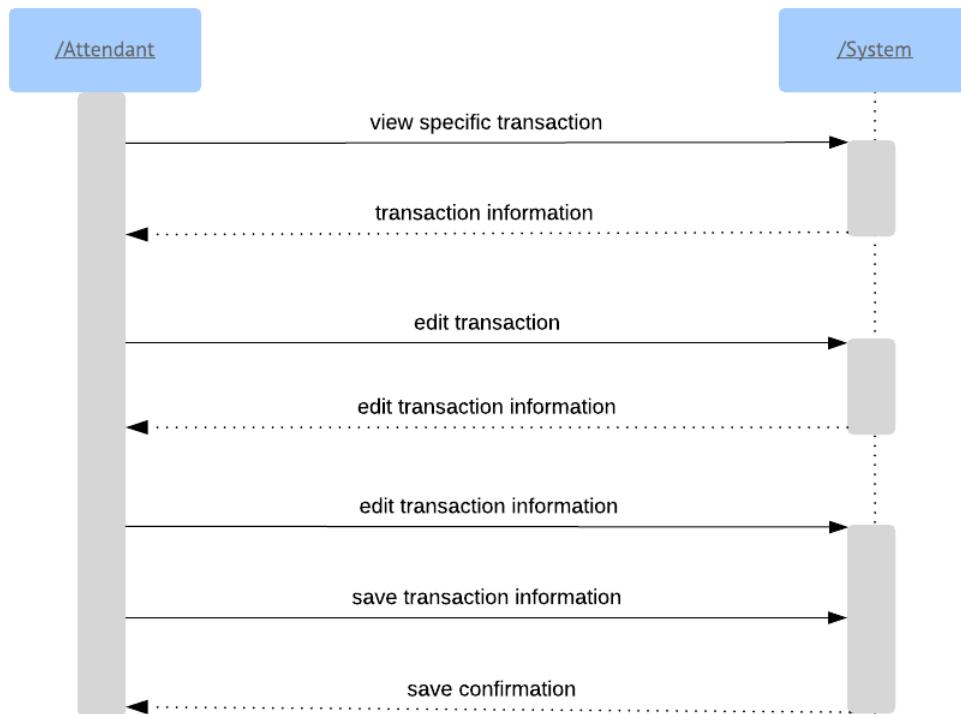
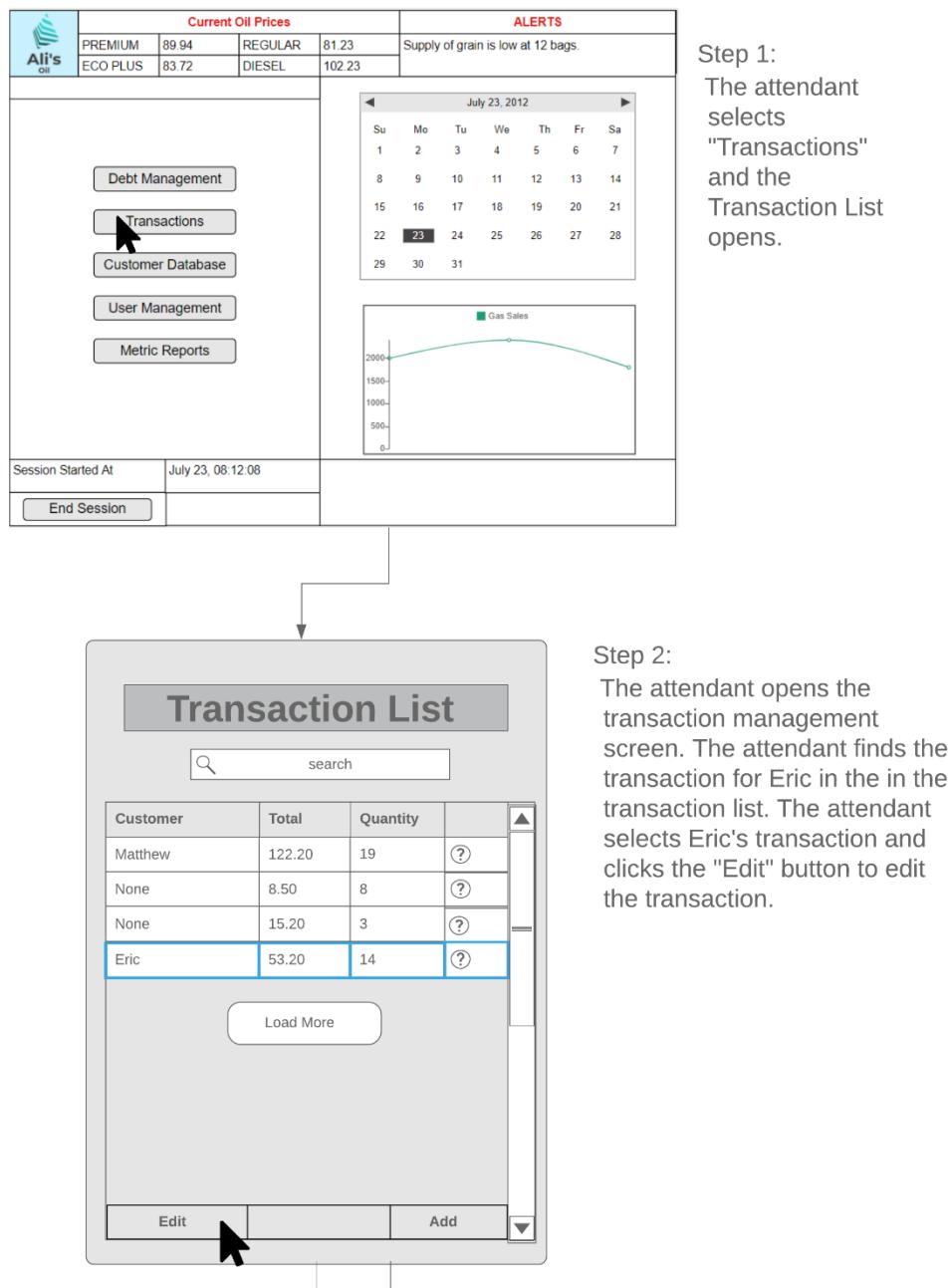
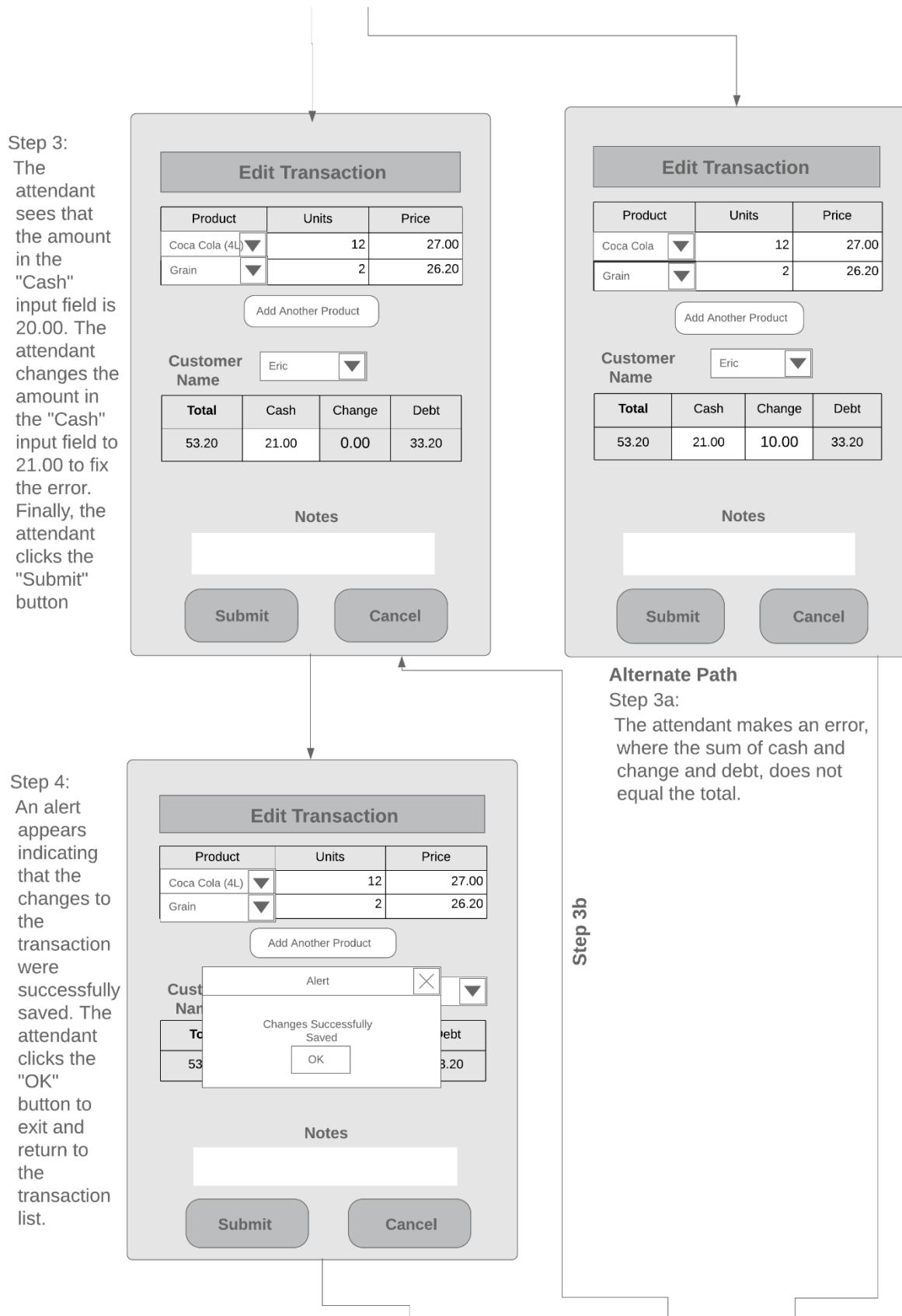


Figure 19: Sequence diagram for editing a transaction in the Transaction Management system

### 6.5.2.3 Storyboard: Edit Transaction

The following storyboard details a scenario in which an attendant is updating the information associated with a transaction (see Figure 20). A customer named "Eric" has made a purchase within the last 5 minutes. The attendant who completed the transaction realizes that the amount paid by the customer has been entered into the system incorrectly. The attendant wrongly entered that the customer paid 20.00 for the purchase, when the customer paid 21.00. The attendant wants to fix this error. The attendant must apply the fix by editing the transaction.





Step 5:  
The transaction editing page closes  
and the user is  
returned to the  
transaction list  
screen showing the  
updated transaction

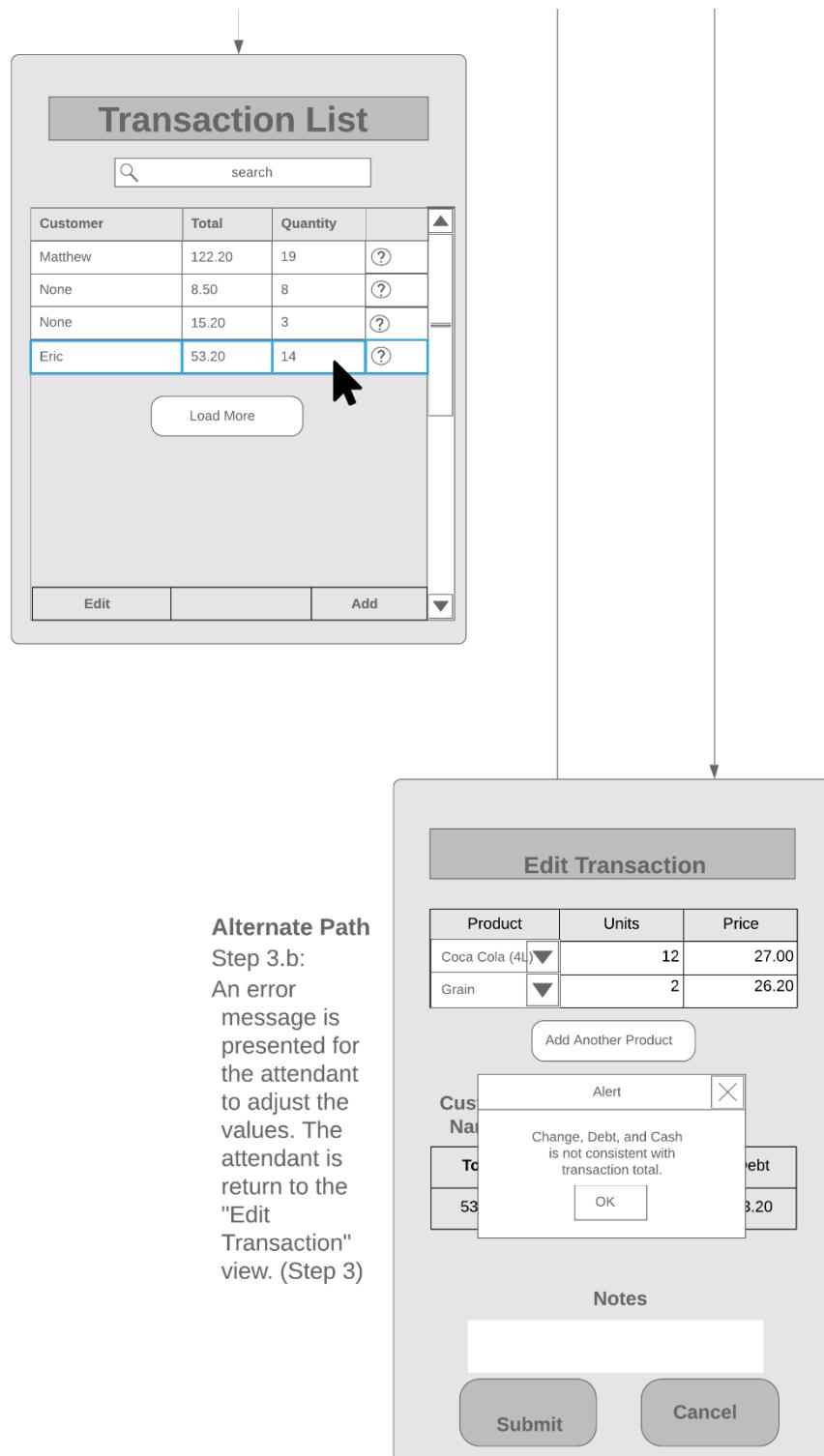


Figure 20: Storyboard for editing a transaction in the Transaction Management system

## 6.6 Customer Debt Management

Ali's Oil allows for customers to pay for products at later dates if they cannot be paid for immediately. The management of customer debt must be allowed by AttendNet.

### 6.6.1 Add Customer

#### 6.6.1.1 Use Case: Add Customer

This use case details the interactions between an attendant and the AttendNet system when adding a customer to the Inventory Management system.

Actors	Attendant
Preconditions	<ul style="list-style-type: none"><li>• The entered customer does not currently exist in the Customer Debt Management system.</li><li>• The Attendant has entered an authenticated session (see 6.2.1.1 Use Case: Authenticate Session).</li><li>• The Attendant has editing privileges for the Customer Debt Management system as set by an Administrator (see 6.3.1.1 Use Case: Add Administrator or Attendant).</li></ul>
Steps	<ol style="list-style-type: none"><li>1. An Attendant requests to enter the Customer Debt Management system.</li><li>2. The Attendant is presented with<ul style="list-style-type: none"><li>• the option to add a customer to the Customer Debt Management system,</li><li>• a limited number of customers stored in the Customer Debt Management system sorted in alphabetical order by customer name,</li><li>• the option to request more customers be displayed, and,</li><li>• for each customer, the option to view all information associated with that customer.</li></ul></li><li>3. The Attendant requests to add a customer to the Customer Debt Management system.</li><li>4. The Attendant is presented with the ability to enter information for a customer and save that information in the Customer Debt Management system.</li><li>5. The Attendant enters the following information:<ul style="list-style-type: none"><li>• customer name</li><li>• customer contact information</li></ul></li></ol>

	<ul style="list-style-type: none"> <li>• customer address</li> <li>• notes (optional)</li> </ul> <p>6. The Attendant requests to save the customer information in the Customer Debt Management system.</p> <p>7. The Attendant is presented with confirmation that the customer and associated customer information has been saved in the Customer Debt Management system.</p>
Success Conditions	<ul style="list-style-type: none"> <li>• A customer and associated customer information for that customer has been saved in the Customer Debt Management system.</li> </ul>

#### 6.6.1.2 Sequence Diagram: Add Customer

This sequence diagram illustrates the interactions that occur between an attendant and the system when an attendant adds a transaction to the Customer Debt Management system (see Figure 21). The preconditions for this sequence diagram are that the attendant has entered an authenticated session in the system and has entered the Customer Debt Management system.

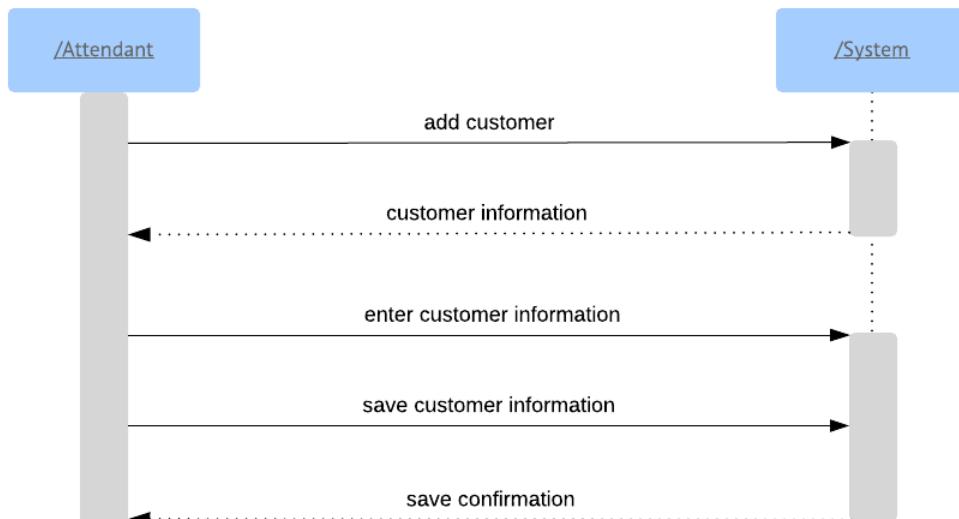
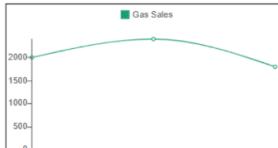


Figure 21: Sequence diagram for adding a customer to the Customer Debt Management system

### 6.6.1.3 Storyboard: Add Customer

The following storyboard details a scenario in which an attendant is adding a new customer to the Customer Debt Management system (see Figure 22). The attendant wishes to add a new customer, named Jason, to the customer database. This scenario follows the process of adding a new customer.

Current Oil Prices			ALERTS																																														
	PREMIUM	89.94	REGULAR	81.23																																													
	ECO PLUS	83.72	DIESEL	102.23																																													
<div style="border: 1px solid #ccc; padding: 5px; margin-bottom: 10px;"> <a href="#">Debt Management</a>  <a href="#">Transactions</a>  <a href="#">Customer Database</a> <span style="color: #0070C0;">(Mouse Over)</span>  <a href="#">User Management</a>  <a href="#">Metric Reports</a> </div> <div style="border: 1px solid #ccc; padding: 5px; margin-bottom: 10px;"> <span style="font-size: small;">Su Mo Tu We Th Fr Sa</span>  <table border="1" style="margin-left: auto; margin-right: auto; border-collapse: collapse; font-size: small;"> <tr><td>1</td><td>2</td><td>3</td><td>4</td><td>5</td><td>6</td><td>7</td></tr> <tr><td>8</td><td>9</td><td>10</td><td>11</td><td>12</td><td>13</td><td>14</td></tr> <tr><td>15</td><td>16</td><td>17</td><td>18</td><td>19</td><td>20</td><td>21</td></tr> <tr><td>22</td><td>23</td><td>24</td><td>25</td><td>26</td><td>27</td><td>28</td></tr> <tr><td>29</td><td>30</td><td>31</td><td></td><td></td><td></td><td></td></tr> </table> <div style="border: 1px solid #ccc; padding: 5px; margin-top: 10px;">  <p>Gas Sales</p> <p>2000 1500 1000 500 0</p> </div> </div> <tr> <td>Session Started At</td> <td colspan="4">July 23, 08:12:08</td> </tr> <tr> <td colspan="5"> <input type="button" value="End Session"/> </td> </tr>					1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31					Session Started At	July 23, 08:12:08				<input type="button" value="End Session"/>				
1	2	3	4	5	6	7																																											
8	9	10	11	12	13	14																																											
15	16	17	18	19	20	21																																											
22	23	24	25	26	27	28																																											
29	30	31																																															
Session Started At	July 23, 08:12:08																																																
<input type="button" value="End Session"/>																																																	

Step 1:  
The attendant clicks "Customer Database" to enter the customer database.

Step 2:  
The attendant clicks the "Add Customer" button in the customer debt management screen.

## Customer Debt Management

search

User	Notes
Matt	
Ali	
John	
Emily	

Edit
Add Customer
(Mouse Over)

Step 3:

The attendant enters Jason's information into the appropriate input fields and clicks the "Submit" button to save the changes.

Add Customer

Name: Jason

Phone Number: (250) 123-4567

Address: 123 Fake Street

Notes

Remove Cancel Submit

Step 4:

An alert is shown to the attendant indicating the new user name "Jason" was successfully created. The attendant clicks the "OK" button to exit and return to the management screen.

Add Customer

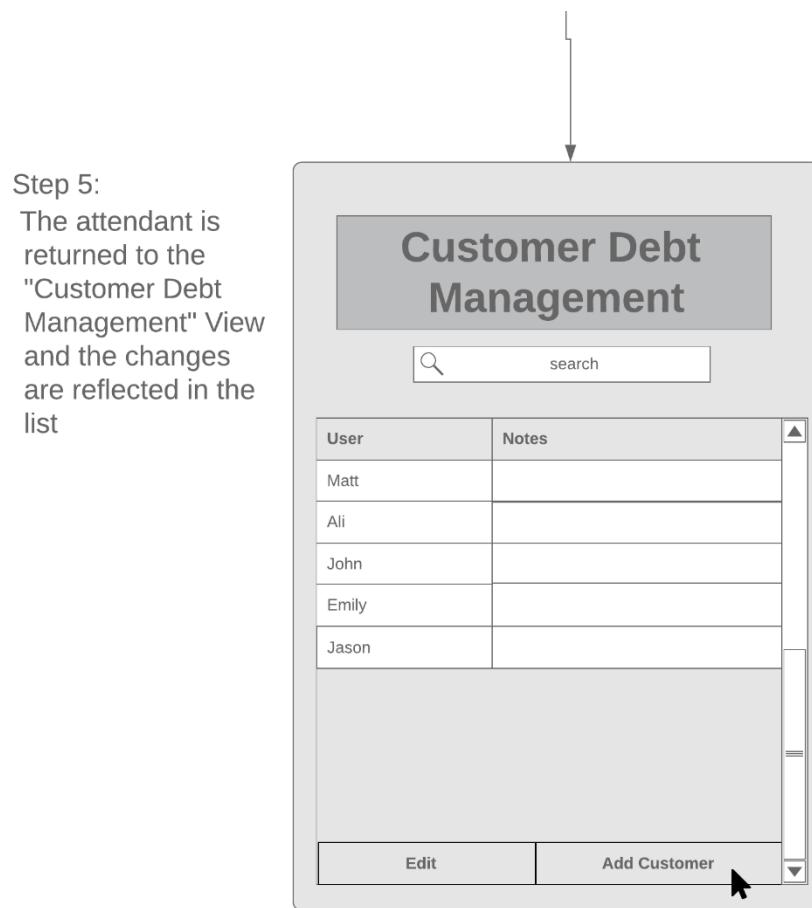
Name: Jason

Phone Number: (250) 123-4567

User Successfully Created

OK

Remove Cancel Submit



*Figure 22: Storyboard for adding a customer to the Customer Debt Management system*

## 6.6.2 View Customer

### 6.6.2.1 Use Case: View Customer

Allows an attendant to view the debt and contact information associated with an existing customer.

Actors	Attendant
Preconditions	<ul style="list-style-type: none"> <li>The customer exists in the Customer Debt Management system (see 6.6.1.1 Use Case: Add Customer).</li> <li>The Attendant has entered an authenticated session (see 6.2.1.1 Use Case: Authenticate Session).</li> <li>The Attendant has viewing privileges for the Customer Debt Management system as set by an</li> </ul>

	Administrator (see 6.3.1.1 Use Case: Add Administrator or Attendant).
Steps	<ol style="list-style-type: none"> <li>1. An Attendant requests to enter the Customer Debt Management system.</li> <li>2. The Attendant is presented with           <ul style="list-style-type: none"> <li>• a limited number of customers stored in the Customer Debt Management system sorted in alphabetical order by customer name,</li> <li>• the option to request more customers be displayed, and,</li> <li>• for each customer, the option to view all information associated with that customer.</li> </ul> </li> <li>3. The Attendant requests to view information associated with a specific customer.</li> <li>4. The Attendant is presented with information associated with the customer they had previously selected in step 3.</li> </ol>
Success Conditions	<ul style="list-style-type: none"> <li>• The Attendant is provided with information regarding a specific customer.</li> </ul>

### 6.6.2.2 Sequence Diagram: View Customer

This sequence diagram illustrates the interactions that occur between an attendant and the system when an attendant views a customer's profile in the Customer Debt Management system (see Figure 23). The preconditions for this sequence diagram are that the attendant has entered an authenticated session in the system and has entered the Customer Debt Management system.

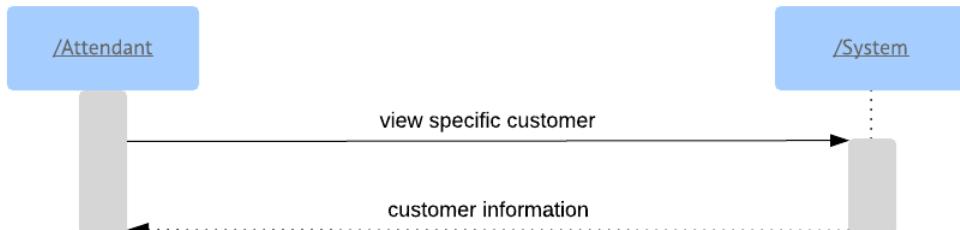
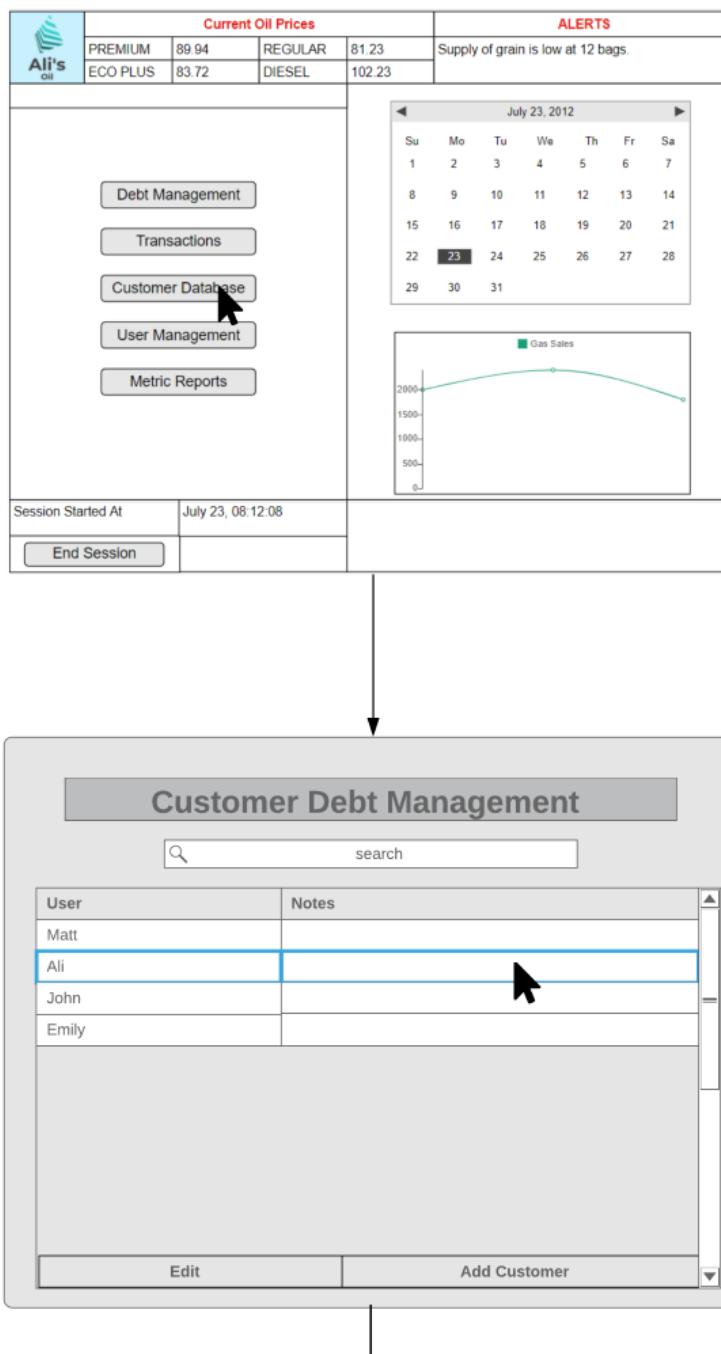


Figure 23: Sequence diagram for viewing a customer's profile in the Customer Debt Management system

### 6.6.2.3 Storyboard: View Customer

The following storyboard details a scenario in which an attendant is viewing the information associated with a customer in the Customer Debt Management system (see Figure 24). An attendant wishes to check the contact information of a customer to ensure that their new address is listed in the database.

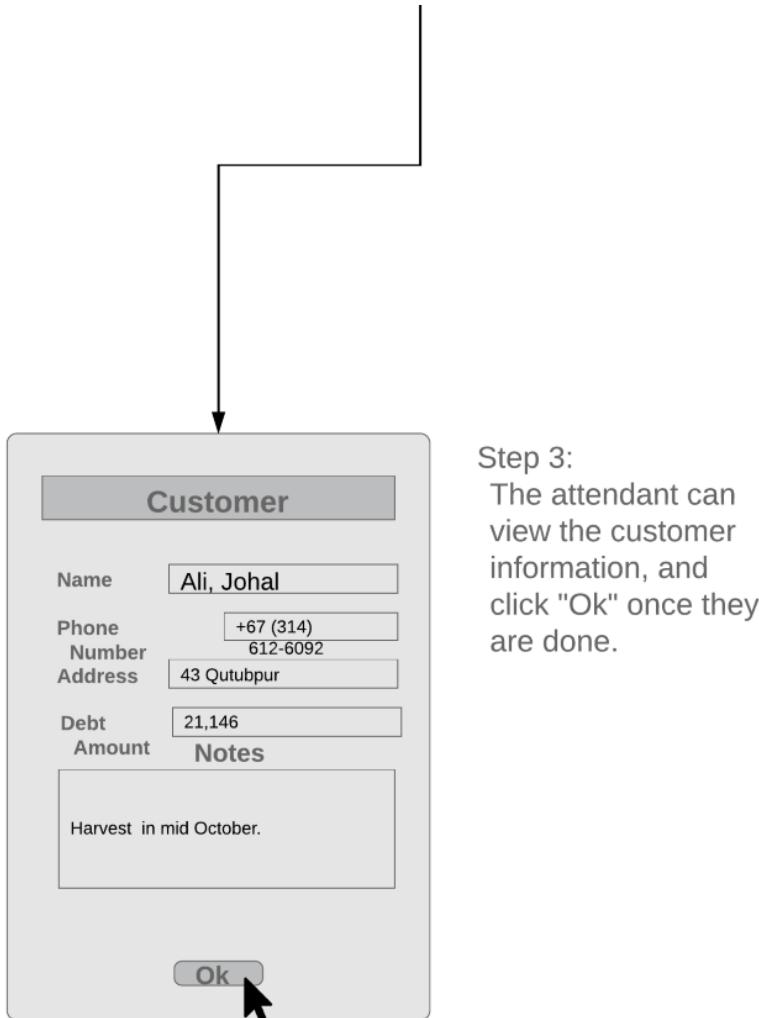


#### Step 1:

The attendant clicks on "Customer Database" to open the customer list view.

#### Step 2:

The attendant selects a customer they wish to view the information of. The customer is highlighted blue, and the customer information view is opened.



### Step 3:

The attendant can view the customer information, and click "Ok" once they are done.

Figure 24: Storyboard for viewing a customer's profile in the Customer Debt Management system

### 6.6.3 Edit Customer

#### 6.6.3.1 Use Case: Edit Customer

Allows an attendant to edit information associated with an existing customer in the debt management system. This does not include modifying the debt associated with a customer.

Actors	User
Preconditions	<ul style="list-style-type: none"> <li>The customer exists in the Customer Debt Management system (see 6.6.1.1 Use Case: Add Customer).</li> <li>The Attendant has entered an authenticated session (see 6.2.1.1 Use Case: Authenticate Session).</li> </ul>

	<ul style="list-style-type: none"> <li>• The Attendant has Customer Debt Management system editing privileges as set by an Administrator (see 6.3.1.1 Use Case: Add Administrator or Attendant).</li> </ul>
Steps	<ol style="list-style-type: none"> <li>1. An Attendant requests to access the Customer Debt Management system.</li> <li>2. The Attendant is presented with <ul style="list-style-type: none"> <li>• the option to add a customer to the Customer Debt Management system,</li> <li>• a limited number of customers stored in the Customer Debt Management system sorted in alphabetical order by customer name,</li> <li>• the option to request more customers be displayed, and,</li> <li>• for each customer, the option to view all information associated with that customer.</li> </ul> </li> <li>3. The Attendant requests to view all information associated with a customer.</li> <li>4. The Attendant is presented with all information associated with the customer selected in Step 2 and the option to edit information associated with that customer.</li> <li>5. The Attendant requests to edit information associated with the customer.</li> <li>6. The Attendant is presented with the ability to edit any of the following information associated with the customer: <ul style="list-style-type: none"> <li>• customer name</li> <li>• customer contact information</li> <li>• customer address</li> <li>• notes</li> </ul> </li> <li>7. The Attendant requests to save the customer information in the Customer Debt Management system.</li> <li>8. The Attendant is presented with confirmation that the customer and associated customer information has been saved in the Customer Debt Management system.</li> </ol>
Success Conditions	<ul style="list-style-type: none"> <li>• The customer and all information associated with that customer has been saved in the Customer Debt Management system.</li> </ul>

### 6.6.3.2 Sequence Diagram: Edit Customer

This sequence diagram illustrates the interactions that occur between an attendant and the system when an attendant edits a customer's profile in the Customer Debt Management system (see Figure 25). The preconditions for this sequence diagram are that the attendant has entered an authenticated session in the system and has entered the Customer Debt Management system.

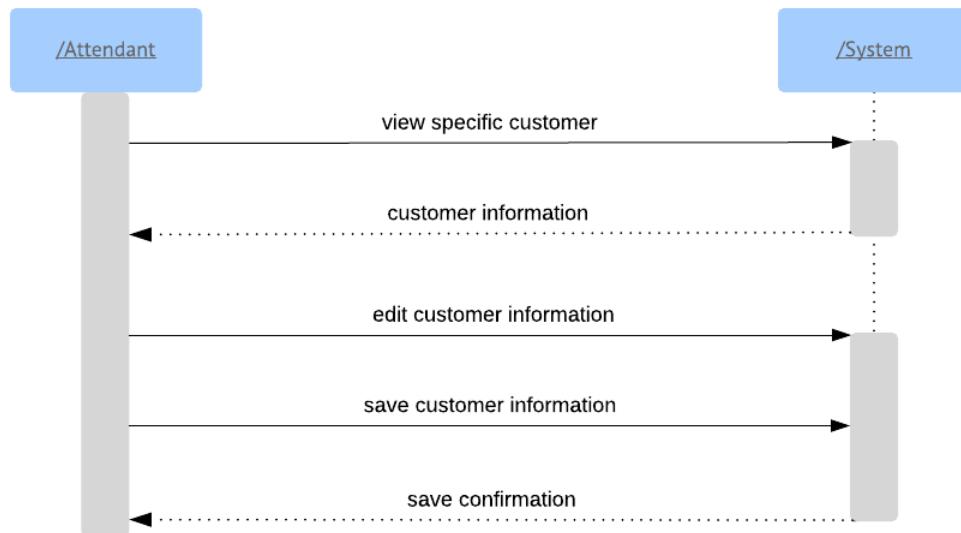
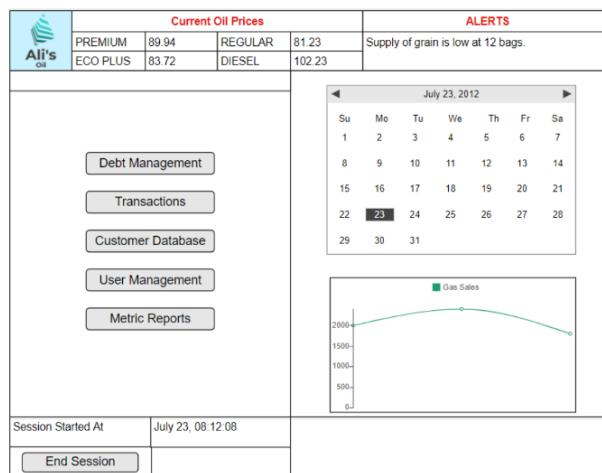


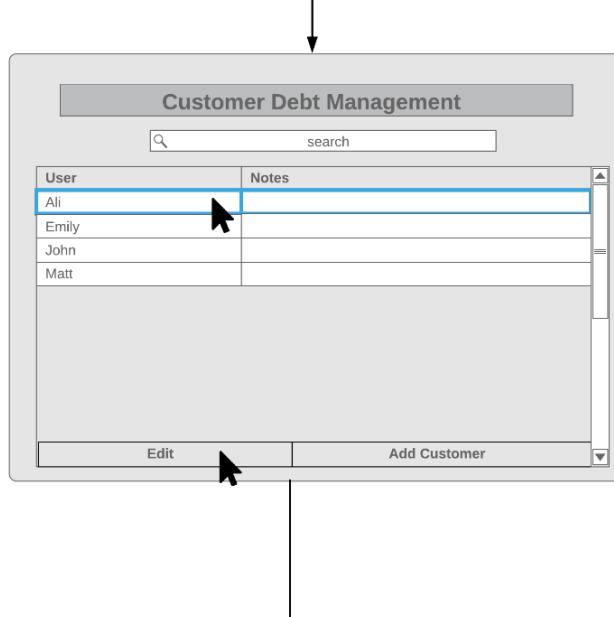
Figure 25: Sequence diagram for editing a customer's profile in the Customer Debt Management system

### 6.6.3.3 Storyboard: Edit Customer

The following storyboard details a scenario in which an attendant is updating the information associated with a customer in the Customer Debt Management (see Figure 26). A customer has obtained a new cell phone, and the customer's contact information needs to be updated to reflect changes.



**Step 1:**  
The user selects  
"Customer  
Database".



**Step 2:**  
The user selects the  
customer they wish  
to edit, and the  
customer view  
opens. To edit the  
fields, they select  
edit.

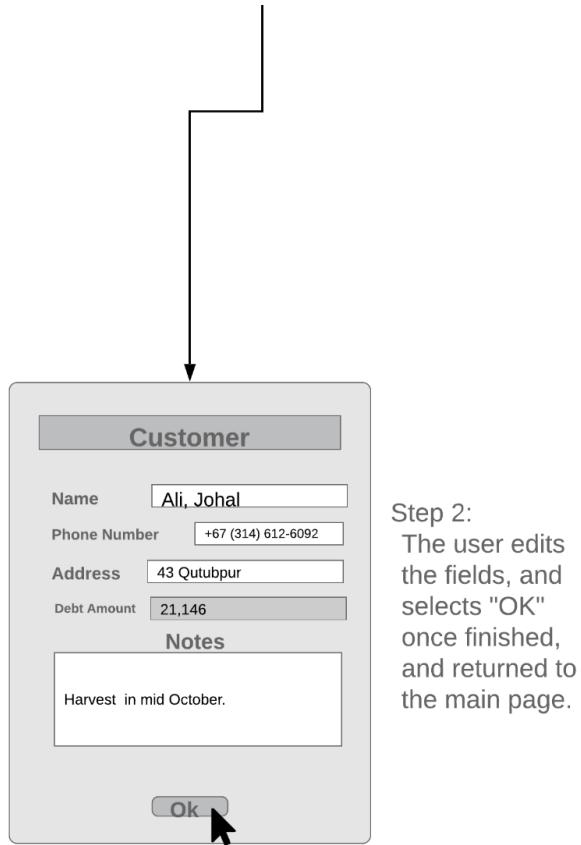


Figure 26: Storyboard for editing a customer's profile in the Customer Debt Management system

## 6.7 Metric Reporting

Operations at Ali's Oil are generalized by metric reports. To ensure attendants can view these reports, generation of metric reports must be allowed by AttendNet.

### 6.7.1 Generate Metric Report

#### 6.7.1.1 Use Case: Generate Metric Report

The Metric Reporting system allows attendants to create metric reports.

Actors	Attendant
Preconditions	<ul style="list-style-type: none"> <li>The Attendant has entered an authenticated session using their PIN (see 6.2.1.1 Use Case: Authenticate Session)</li> <li>The Attendant has Metric Reporting report viewing and editing privilege as specified by an Administrator (see 6.3.1.1 Use Case: Add Administrator or Attendant).</li> </ul>

Steps	<ol style="list-style-type: none"> <li>1. An Attendant requests to enter the Metric Reporting system.</li> <li>2. The Attendant is presented with the option to generate a metric report.</li> <li>3. The Attendant requests to generate one of the following metric reports: <ul style="list-style-type: none"> <li>• Sales Report</li> <li>• Daily Transaction Report</li> <li>• Inventory Report</li> <li>• Customer Debt Report</li> <li>• Business Expense Report</li> </ul> </li> <li>4. The Attendant is presented with the report requested in Step 3.</li> </ol>
Success Conditions	<ul style="list-style-type: none"> <li>• The metric report that was requested is displayed to the Attendant.</li> <li>• The metric report contains the information listed in 3.2.2 Functional Requirements</li> </ul>
Alternate Paths	<p>3a.</p> <ol style="list-style-type: none"> <li>I. The Attendant is notified that a date range is required to generate the chosen metric report.</li> <li>II. The Attendant enters a date range for the chosen metric report.</li> <li>III. Continue with Step 3.</li> </ol> <p>3b.</p> <ol style="list-style-type: none"> <li>I. The Attendant is notified that a date is required to generate the chosen metric report.</li> <li>II. The Attendant enters a date</li> <li>III. Continue with Step 3.</li> </ol>

#### 6.7.1.2 Sequence Diagram: Generate Metric Report

This sequence diagram illustrates the interactions that occur between an attendant and the system when an attendant generates a metric report (see Figure 27). The preconditions for this sequence diagram are that the attendant has entered an authenticated session in the system and has entered the Metric Reporting system.

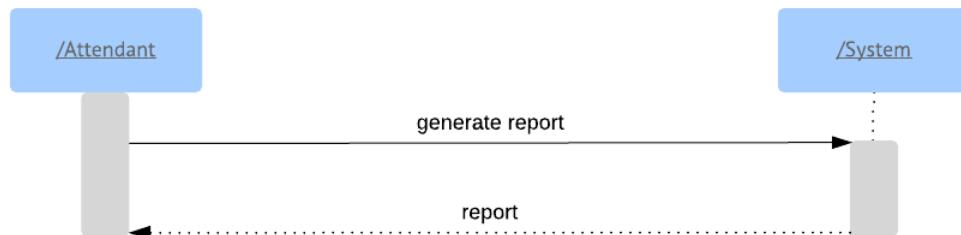
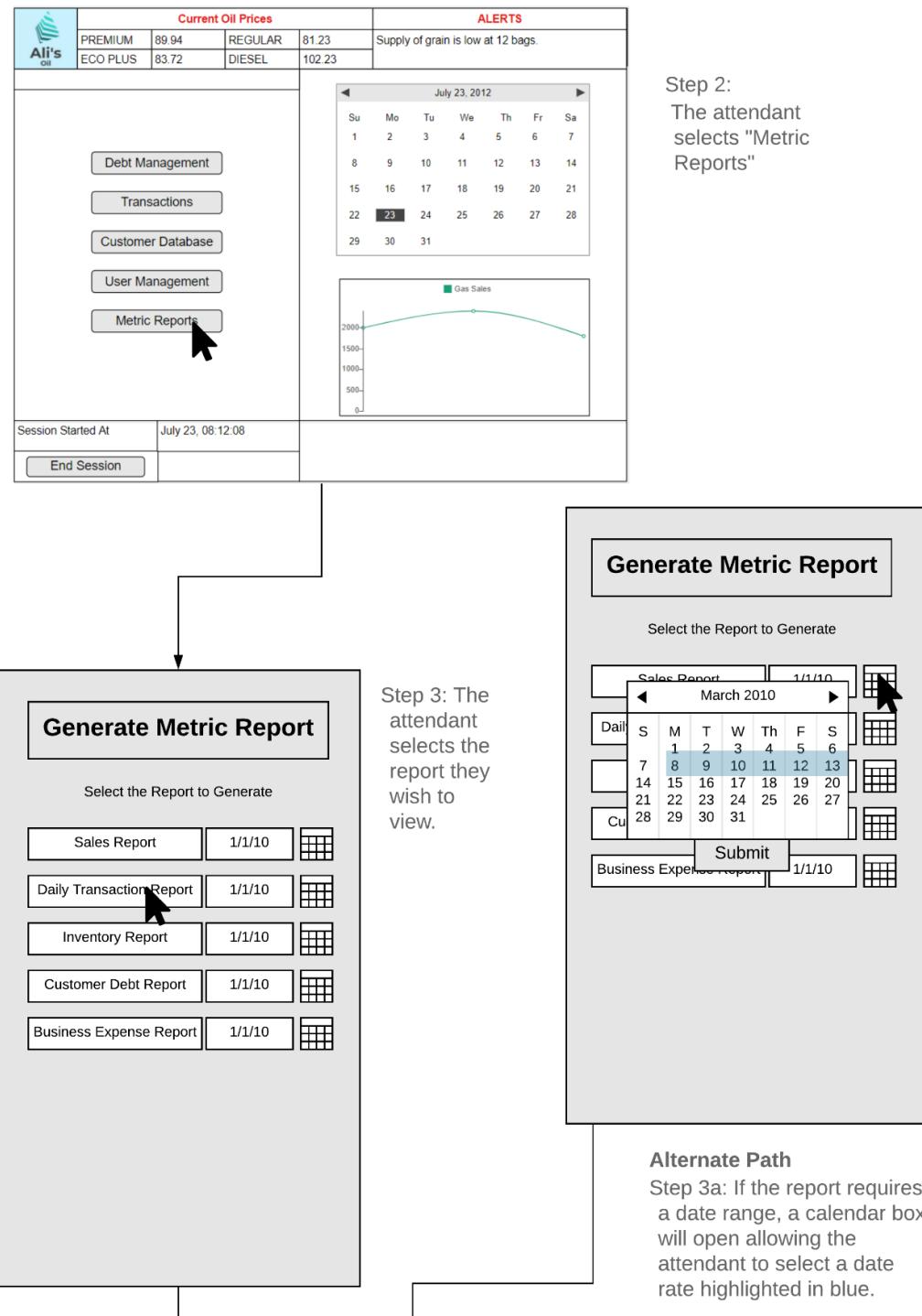


Figure 27: Sequence diagram for generating a metric report

### 6.7.1.3 Storyboard: Generate Metric Report

The following storyboard details a scenario in which an attendant is generating a metric report in the Metric Reporting system (see Figure 28). An attendant wishes to obtain a “Daily Transaction Report” for July 23. This process follows the generation of that report.



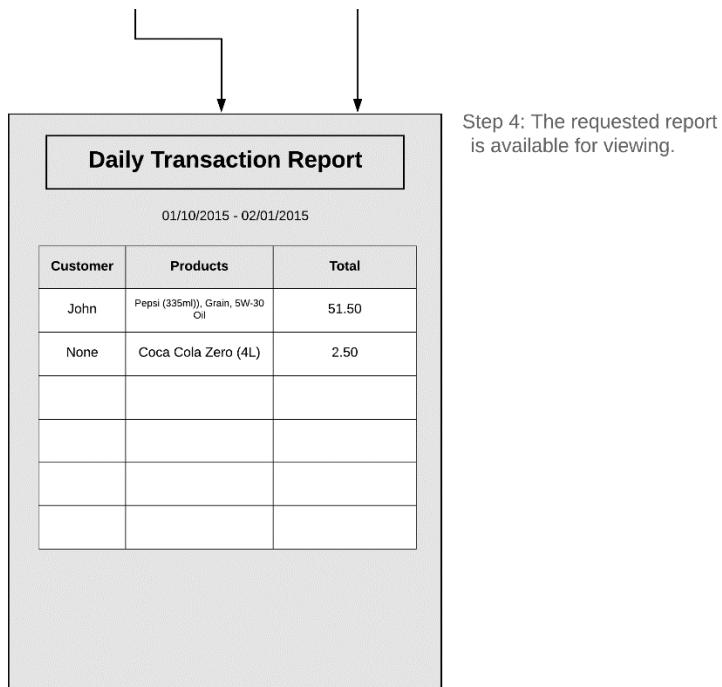


Figure 28: Storyboard for generating a metric report

# 7. System Diagrams

## 7.1 Data-Flow Diagrams

### 7.1.1 Context Diagram (DFD-0)

DFD-0 provides an overview of the movement and processing of data between external entities and the AttendNet system. Each edge represents a piece of data written to or read from the system.

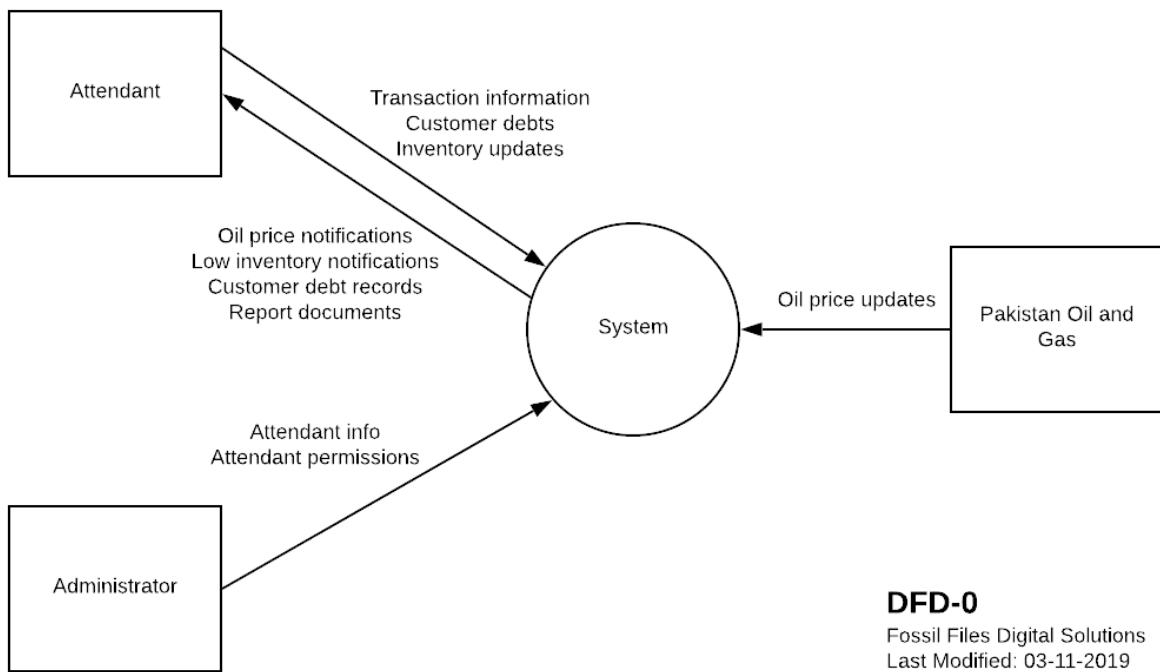
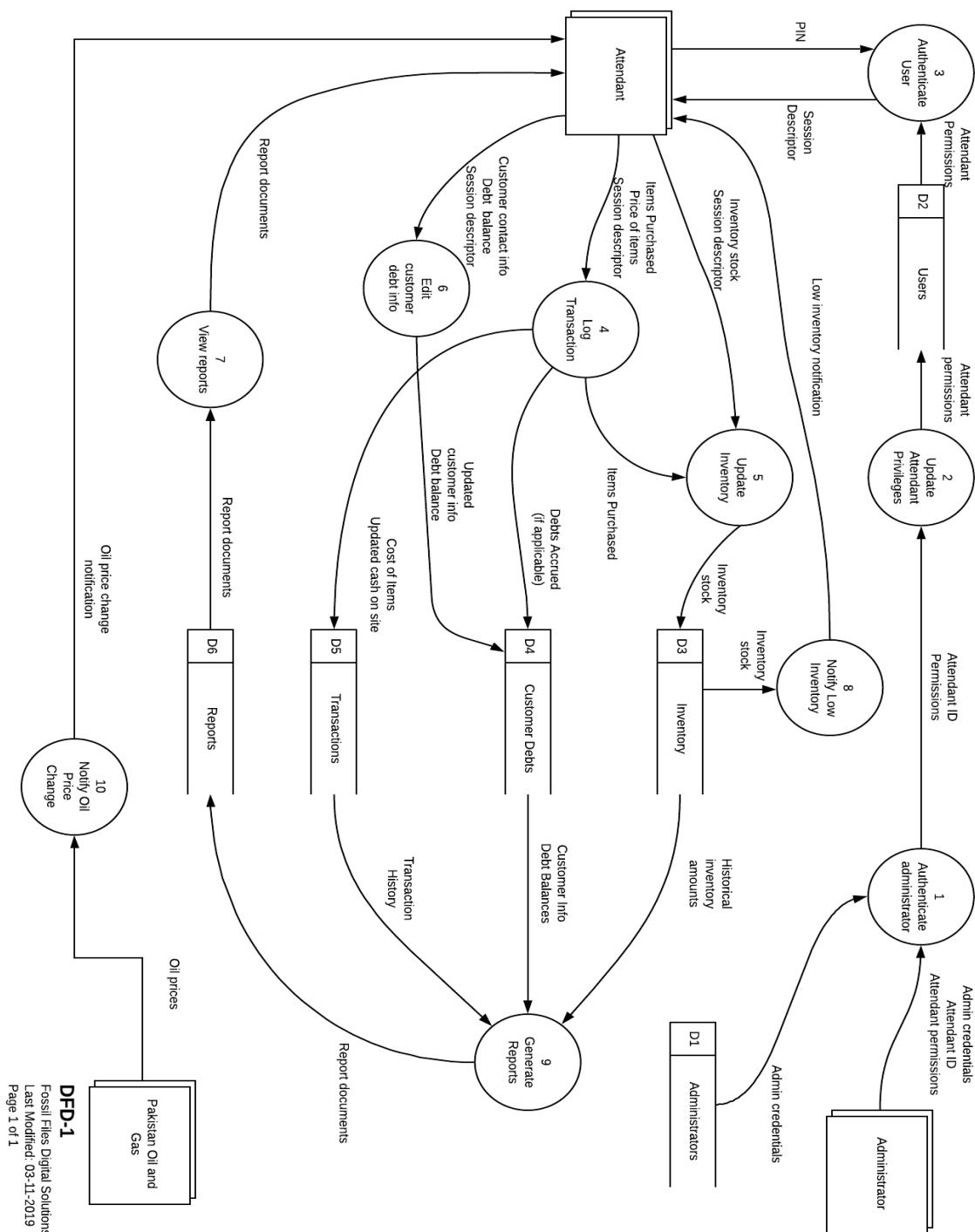


Figure 29: Data-Flow Diagram Level 0, system context diagram

## 7.1.2 Data-Flow Diagram Level 1 (DFD-1)

DFD-1 elaborates upon the context diagram detailed in Section 7.1.1. Each process in the system, external entity outside of the system, and datastore is displayed, as well as the flow of data between these elements. Numbers in the processes represent the chronological order of data flow.



*Figure 30: Data-Flow Diagram level 1*

### **7.1.3 Data-Flow Diagram Level 2 (DFD-2)**

DFD-2 provides the highest-fidelity information regarding the data flow between processes, entities, and datastores within the AttendNet domain. Each process represents a sub-task of a process illustrated in DFD-1. The Data-Flow Diagram Level 2 is broken up into four separate pages. See Appendix B for diagram.

## **7.2 Entity Relationship Diagram (ERD)**

The Entity Relationship Diagram provided on the following page represents the database structure for AttendNet. Each entity displayed in the diagram corresponds with an existing physical body or logical idea within the problem domain of the system. Listed in each entity is all data associated with the entity, along with an indication of it being a primary key, foreign key, or neither. The Data Dictionary, or DD, is provided inside of the diagram in the form of data types aside respective field names within the entities (e.g. “{alphanumeric}<sup>12</sup>”). This method was used to be clear and concise (see Figure 31).

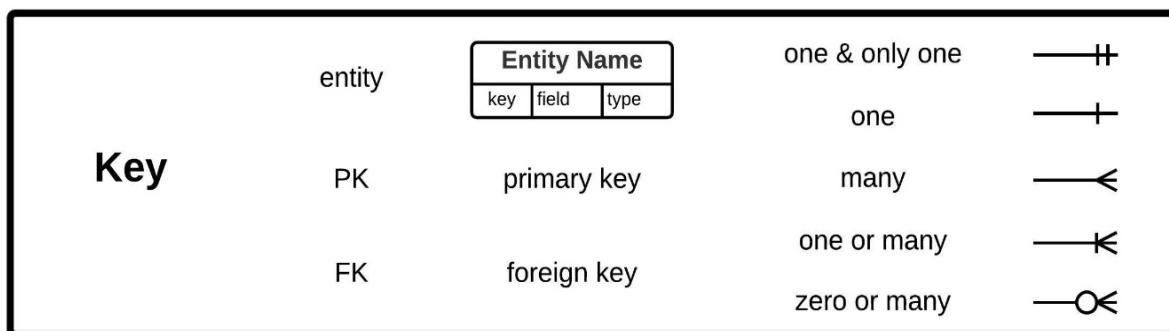
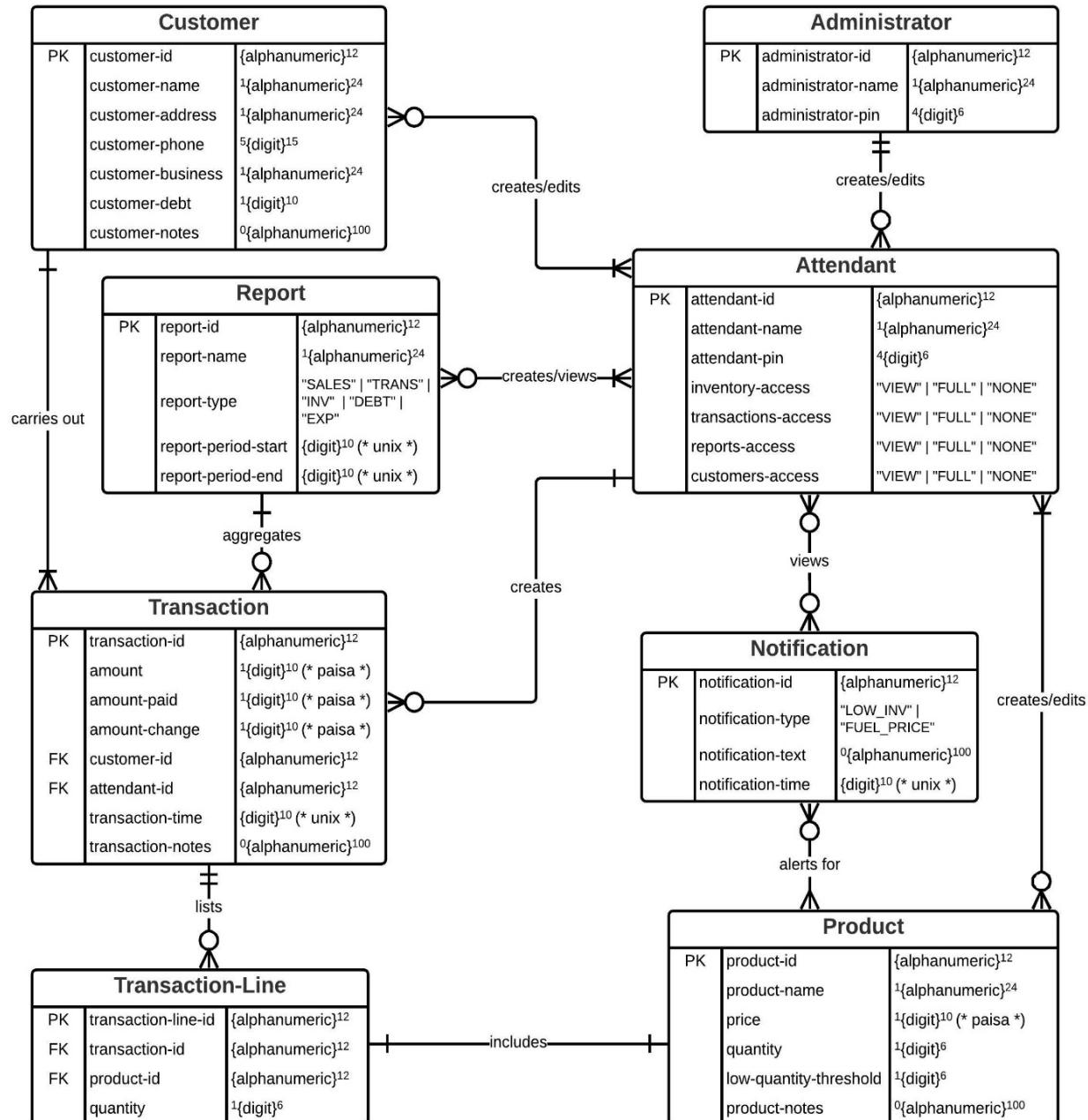


Figure 31: Entity Relationship Diagram

## 7.3 Use Case Model

The system-level use case model displayed below details the key interactions that AttendNet's two primary user groups, attendants and administrators, have with the AttendNet system. Each use case shown pertains to a use case in Section 6 of this document, where they are discussed in further detail.

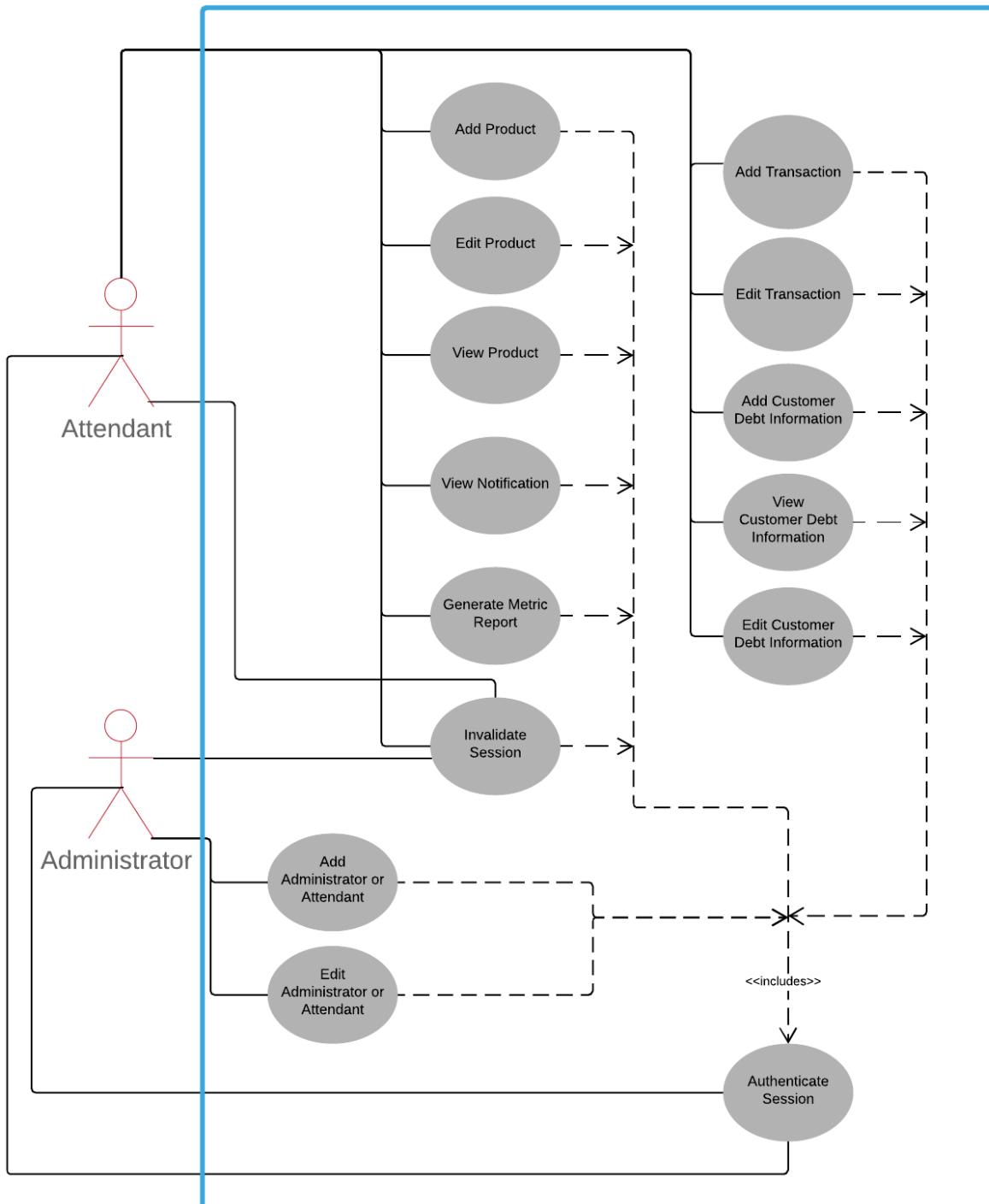


Figure 32: Use case model for the AttendNet system

# Appendix A: Changelog

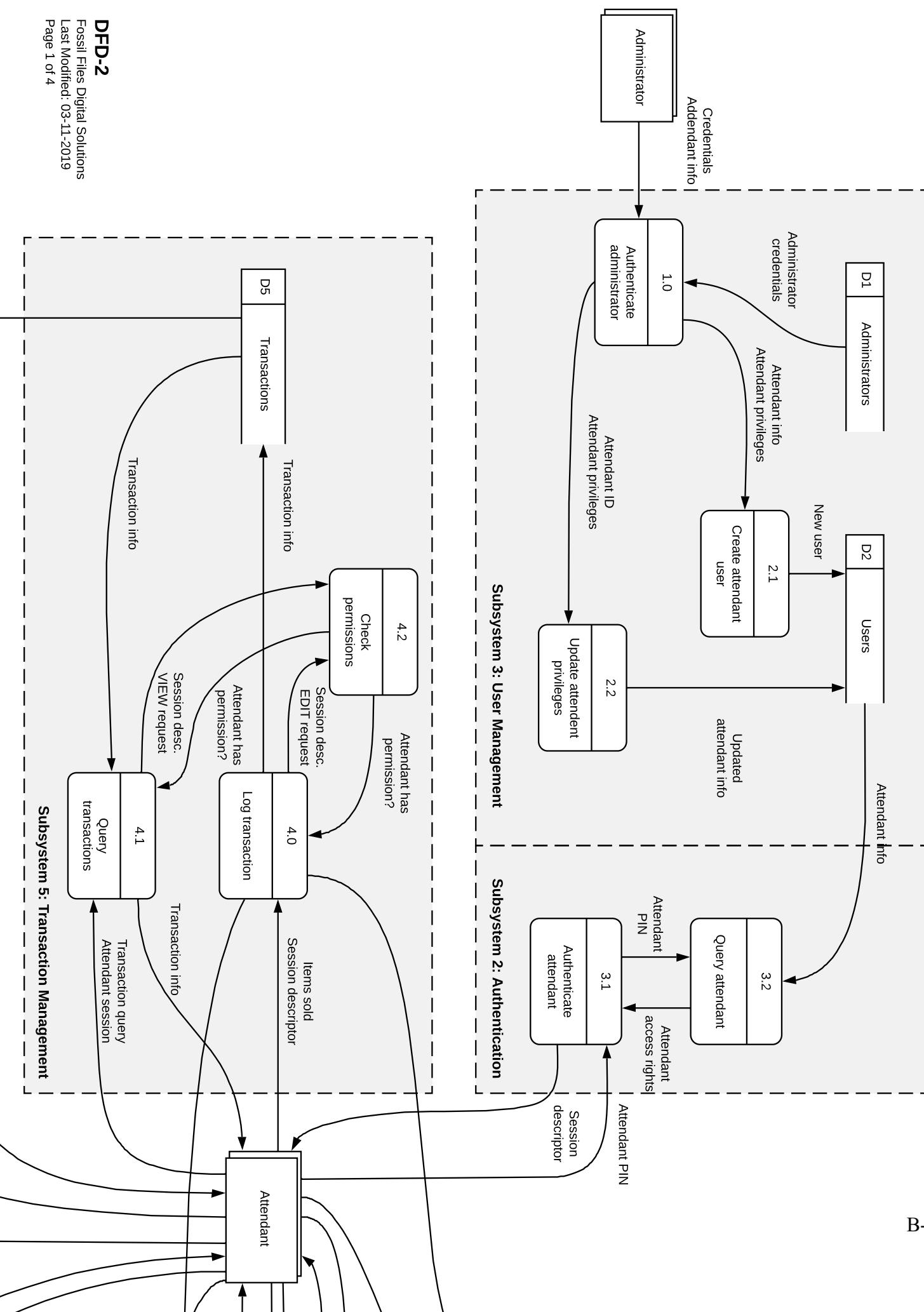
- **All Sections**
  - Named solution system AttendNet – added references to AttendNet
- **1.1 Project Purpose**
  - Project purpose description was changed (previously discussed project scope)
- **1.2 Project Scope**
  - Overall client objective was changed from “increasing profit and decreasing expenses” to “improving efficiency and decreasing expenses”
  - Project scope description was changed (previously discussed project purpose)
- **1.3 Glossary**
  - Added definition of “Ledger”
  - Changed Pakistan State Oil to Pakistan Oil and Gas Regulatory Authority
- **1.5 Overview**
  - Added description of Section 6, System Specifications, and Section 7, System Diagrams
- **2.3 User Classes and Characteristics**
  - Changed Cash Flow Management heading to Transaction Management
- **2.3 User Classes and Characteristics**
  - Changed “Employee” and “Manager” user classes to “Attendant” and “Administrator”
  - Moved inventory management and notification features from administrator to attendants
  - Added “Adjust permissions for individual employees” as administrator feature
  - Removed “and other expenses” from administrator financial report features
  - Changed “the employee cannot view reports on the system that contain long-term financial information” to “the employee cannot view reports on the system that contain financial information”
- **2.4 Operating Environment**
  - Clarified what “common laptops” and “remote access” means
- **2.5 Design and Implementation Constraints**
  - Updated Language constraint to “English and Urdu characters are supported by AttendNet.”
- **3.1 Inventory Management**
  - Defined “product-specific information” in FR-03
  - Updated priority
- **3.2 Metric Reporting**
  - Refactored requirements FR-08, FR-09, FR-10, FR-11, FR-12, FR-13, FR-14, and FR-15 into FR-08, FR-09, FR-10, FR-11, and FR-12 to explain layout of reports

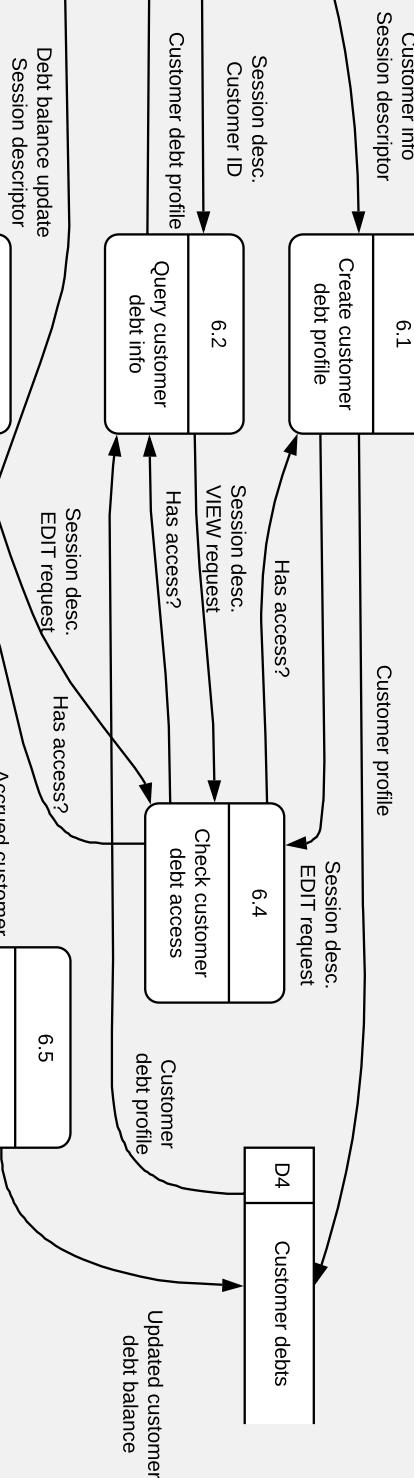
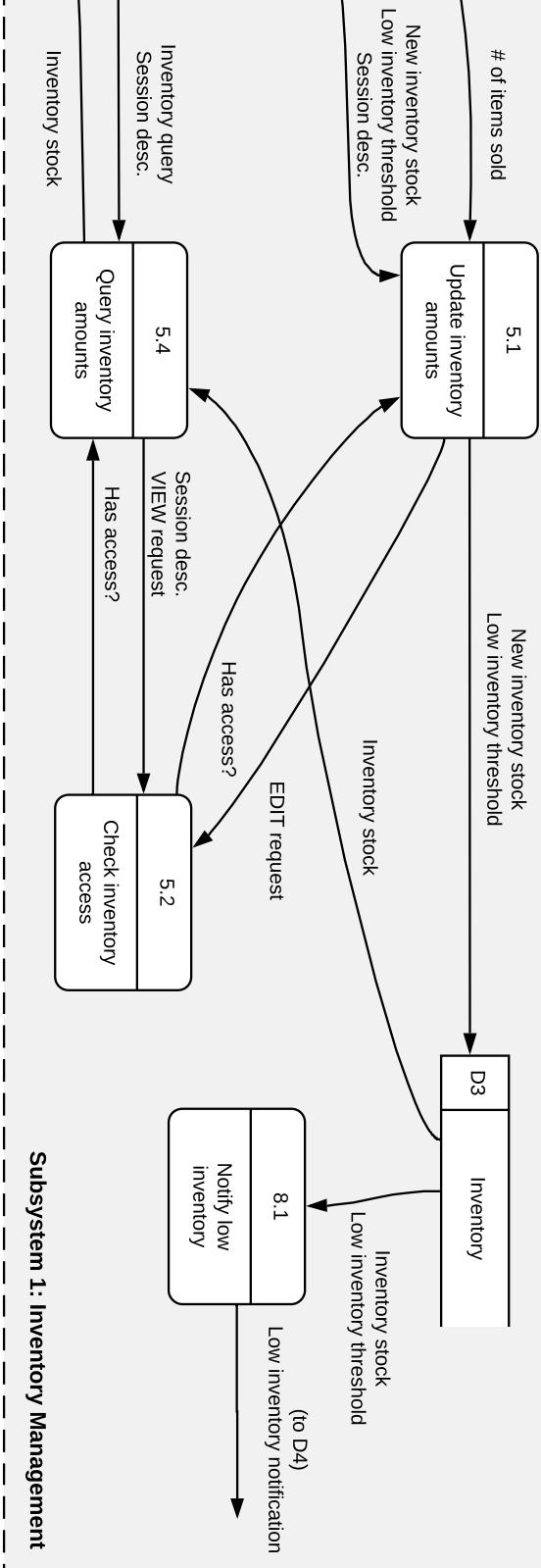
- Updated description and priority
- **3.3 Cash Flow Management (Transaction Management)**
  - Changed section name from Cash Flow Management to Transaction Management
  - Updated description and priority
- **3.4 Customer Debt Management**
  - Defined “customer-specific information”
  - Updated priority
- **4.1 User Interfaces**
  - Specified who receives notifications in FR-26
  - Deleted what was previously FR-24
- **4.2 Software Interfaces**
  - Specified that oil prices are retrieved at approximately 6 hour intervals
- **4.3 Communication Interfaces**
  - FR-28 updated from “computer network” to “Internet”
- **5.1 Performance Requirements**
  - NFR-01, NFR-02, and NFR-03 updated from “10 minutes” to “10 seconds”
  - NFR-06 added
  - Changed Pakistan State Oil to Pakistan Oil and Gas Regulatory Authority in NFR-05 and NFR-06
- **5.2 Security Requirements**
  - Expanded to 3 requirements (NFR-07, NFR-08, and NFR-09)
- **5.3 Software Quality Attributes**
  - Removed NFR-07: “The system is portable.”

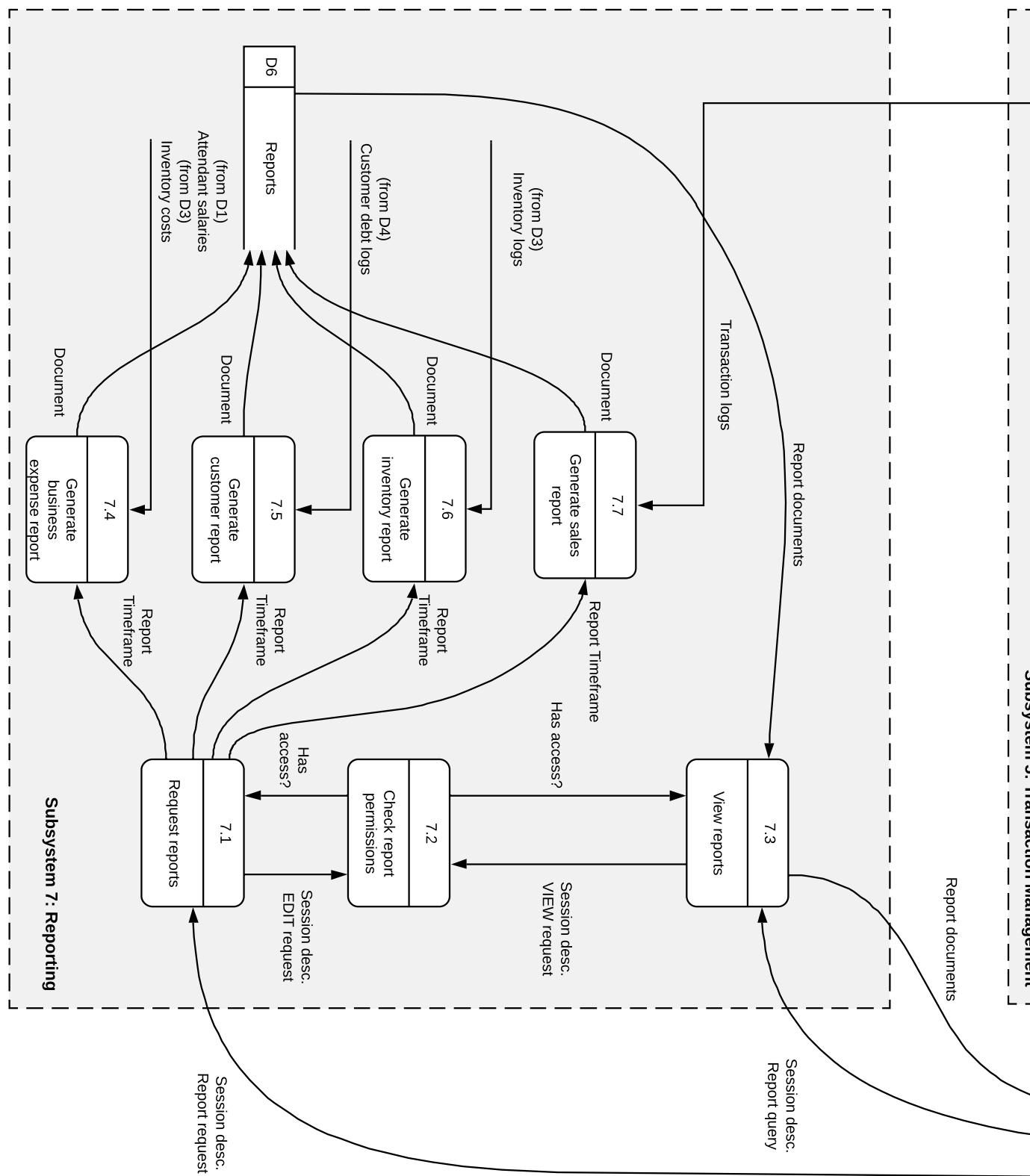
## **Appendix B: DFD-2**

DFD-2 is separated onto the next 4 pages; it should be re-assembled to get the full diagram as displayed below based on page number.

<b>B-2</b>	<b>B-3</b>
<b>B-4</b>	<b>B-5</b>







B-5

