***Software Engineering***

***Software Requirements Specification***

***(SRS) Document***

**[PIN Activated Gas Pump]**

**[2/14/2023]**

**[V1]**

**By:**

**William Vaughan**

**Grayson Williams**

**[Honor Code]**

**Table of Contents**

[1. Introduction 3](#_Toc126197756)

[1.1. Purpose 3](#_Toc126197757)

[1.2. Document Conventions 3](#_Toc126197758)

[1.3. Definitions, Acronyms, and Abbreviations 3](#_Toc126197759)

[1.4. Intended Audience 4](#_Toc126197760)

[1.5. Project Scope 4](#_Toc126197761)

[1.6. Technology Challenges 4](#_Toc126197762)

[1.7. References 4](#_Toc126197763)

[2. General Description 4](#_Toc126197764)

[2.1. Product Perspective 4](#_Toc126197765)

[2.2. Product Features 4](#_Toc126197766)

[2.3. User Class and Characteristics 5](#_Toc126197767)

[2.4. Operating Environment 5](#_Toc126197768)

[2.5. Constraints 5](#_Toc126197769)

[2.6. Assumptions and Dependencies 5](#_Toc126197770)

[3. Functional Requirements 5](#_Toc126197771)

[3.1. Primary 5](#_Toc126197772)

[3.2. Secondary 5](#_Toc126197773)

[4. Technical Requirements 6](#_Toc126197774)

[4.1. Operating System and Compatibility 6](#_Toc126197779)

[4.2. Interface Requirements 6](#_Toc126197780)

[4.2.1. User Interfaces 6](#_Toc126197781)

[4.2.2. Hardware Interfaces 6](#_Toc126197782)

[4.2.3. Communications Interfaces 6](#_Toc126197783)

[4.2.4. Software Interfaces 6](#_Toc126197784)

[5. Non-Functional Requirements 6](#_Toc126197785)

[5.1. Performance Requirements 6](#_Toc126197786)

[5.2. Safety Requirements 7](#_Toc126197787)

[5.3. Security Requirements 7](#_Toc126197788)

[5.4. Software Quality Attributes 7](#_Toc126197789)

[5.4.1. Availability 7](#_Toc126197790)

[5.4.2. Correctness 7](#_Toc126197791)

[5.4.3. Maintainability 7](#_Toc126197792)

[5.4.4. Reusability 7](#_Toc126197793)

[5.4.5. Portability 7](#_Toc126197794)

[5.5. Process Requirements 7](#_Toc126197795)

[5.5.1. Development Process Used 7](#_Toc126197796)

[5.5.2. Time Constraints 7](#_Toc126197797)

[5.5.3. Cost and Delivery Date 7](#_Toc126197798)

[5.6. Other Requirements 7](#_Toc126197799)

[5.7. Use-Case Model Diagram 8](#_Toc126197800)

[5.8. Use-Case Model Descriptions 8](#_Toc126197801)

[5.8.1. Actor: Admin (William Vaughan) 8](#_Toc126197802)

[5.8.2. Actor: User (Greyson Williams) 8](#_Toc126197803)

[5.8.3. Actor: Truck Driver (???/William) 8](#_Toc126197804)

[5.9. Use-Case Model Scenarios 8](#_Toc126197805)

[5.9.1. Actor: Admin (William Vaughan) 8](#_Toc126197806)

[5.9.2. Actor: User (Greyson Williams) 9](#_Toc126197807)

[5.9.3. Actor: Truck Driver (???/William) 9](#_Toc126197808)

[6. Design Documents 9](#_Toc126197809)

[6.1. Software Architecture 9](#_Toc126197810)

[6.2. High-Level Database Schema 9](#_Toc126197811)

[6.3. Software Design 9](#_Toc126197812)

[6.3.1. State Machine Diagram: Admin (William Vaughan) 9](#_Toc126197813)

[6.3.2. State Machine Diagram: User (Greyson Williams) 9](#_Toc126197814)

[6.3.3. State Machine Diagram: Truck Driver (???/William) 9](#_Toc126197815)

[6.4. UML Class Diagram 9](#_Toc126197816)

[7. Scenario 10](#_Toc126197817)

[7.1. Brief Written Scenario with Screenshots 10](#_Toc126197818)

# Introduction

## Purpose

The goal is to implement a simple gas pump control program for use in a fleet environment.

## Document Conventions

The purpose of this Software Requirements Document (SRD) is to describe the client-view and developer-view requirements for the PIN Gas Pump (PGP). Client-oriented requirements describe the system from the client’s perspective. These requirements include a description of the different types of users served by the system. Developer-oriented requirements describe the system from a software developer’s perspective. These requirements include a detailed description of functional, data, performance, and other important requirements.

## Definitions, Acronyms, and Abbreviations

|  |  |
| --- | --- |
| Java | A programming language originally developed by James Gosling at Sun Microsystems. We will be using this language to build the Restaurant Manager. |
| CSV | Comma Separated Values file, used for storing data |
| SpringBoot | An open-source Java-based framework used to create a micro Service. This will be used to create and run our application. |
| Spring Web | Will be used to access the remote API. This is one of the dependencies of our system. |
| IntelliJ | An integrated development environment (IDE) for Java. This is where our system will be created. |
| API | Application Programming Interface. This will be used to implement a function within the software where the estimated price of delivered fuel is calculated. |
| PIN | Personal Identification Number |

## Intended Audience

Document is intended for dev team and management; however, section 5.8 and 5.9 can be used by marketing to explain software functions to customers.

## Project Scope

The goal of the software is to provide a robust, simple pump control system for use in off grid fleet environments. This includes construction, oil fields, military, farms, and other harsh environments. This requires a simple system that requires little to no maintenance and can run off of a small solar array or generator. An interface with high legibility and contrast is also required due to possible use in low visibility conditions. Additionally, where an internet connection is available, a fuel truck driver can get an estimate of the cost for delivered fuel.

## Technology Challenges

Possibly the implementation of a Text or Graphics Based Interface (TUI or GUI). This may or may not be included based on time constraints. While not a concern in the first release, future version that are intended for use in integrated firmware applications would prioritize low power usage.

## References

Alred, F., Brusaw, C., and Oliu, W. (2003). Handbook of Technical Writing (7th ed.). Boston: Bedford/St. Martin’s.

# General Description

## Product Perspective

PGP is a pump control system that is intended to be used in varied environments where a simple, robust system is required.

## Product Features

The product features include the ability for fleet operators to create simple profiles to keep track of fuel use and the ability for administrators to manipulate those profiles. Normal users can access the pump and view lifetime fuel use through a simple PIN system. Fuel tanker truck drivers can also access the system to add fuel to the storage tank. Admins can add and remove users, check storage tank level, and enable or disable the pump. Possible additions include: low tank alerts for admin, capability to manage multiple pumps.

## User Class and Characteristics

The software is intended to be used with minimal to no training. Basic users only have access to between two and four options after entering their PIN including pumping gas and checking lifetime gas pumped. Tanker drivers would only have access to add gas to the tank and check lifetime gas added. Admins will have access to five options including adding and removing users, turning the pump on and off, checking tank level, and pumping gas.

## Operating Environment

The software is intended to be used in a simple, inexpensive system running a stripped down Windows or Linux OS. Ideally, a bootup script would automatically enable the program when the system is switched on.

In the future, the program could be redeveloped to work in a low power microcontroller based system.

## Constraints

Other than the deadline, possibly the implementation of a GUI.

## Assumptions and Dependencies

The software will be dependent on Spring Web framework to create and execute the text based architecture that will be developed within IntelliJ. The application will also use //gas price api not picked yet// to estimate the cost for when fuel is delivered.

# Functional Requirements

[Statements of services the system should provide, how the system should react to particular inputs and how the system should behave in particular situations.]

## Primary

* FR0: The system will allow the user to pump a predetermined amount of gas.
* FR1: The system will allow the user to check how much gas they have pumped in total
* FR2: The system will allow a tanker truck diver to add gas to the storage tank
* FR3: The system will allow a tanker truck diver to estimate the cost of the added gas after adding
* FR4: The system will allow a tanker truck diver to check the total amount of gas that has been added in total
* FR5: The system will allow an admin to add or remove users from the system
* FR6: The system will allow an admin to enable or disable the pump
* FR7: The system will allow an admin to check the amount of gas in the storage tank

## Secondary

* PIN access for authorized users only.
* API access to retrieve fuel price

# Technical Requirements



## Operating System and Compatibility

The application will be compatible with any operating system that is able to run a Java based program.

## Interface Requirements

### User Interfaces

Will be primarily text based but a GUI is a possibility.

### Hardware Interfaces

A standard keyboard for the admin, although a nine digit keypad is all that a normal user or truck driver needs.

### Communications Interfaces

A normal internet connection to access the API, but it is not strictly required as the program will run without one.

### Software Interfaces

We will use Spring Boot for API access and possibly javaFX to help build the frontend, as well as a CSV file for the backend database functionality.

# Non-Functional Requirements

## Performance Requirements

* NFR0(R): The local copy of the user CSV file will consume less than 5 MB of memory
* NFR1(R): The system (including the local copy of the user CSV file) will consume less than 50MB of memory

## Safety Requirements

[List out any safeguards that need to be incorporated as a measure against any possible harm the use of the software application may cause.]

## Security Requirements

* NFR4(R): The system will only be usable by authorized users.

## Software Quality Attributes

### Availability

24/7, as long as there is a power supply, it can function.

### Correctness

Not doing any complex math or algorithms so not an issue.

### Maintainability

None needed as software is intended to be used in an isolated environment. Any future upgrades would be introduced as a whole new stand-alone hardware unit.

### Reusability

Very reusable, code is meant to be easy to upgrade and add functionality to.

### Portability

Very portable, anything running Java can run the software.

## Process Requirements

### Development Process Used

Agile

### Time Constraints

Must be finished by April 18, 2023

### Cost and Delivery Date

April 18, 2023

## Other Requirements

TBD

## Use-Case Model Diagram

Diagram

Description automatically generated

## Use-Case Model Descriptions

### Actor: Admin (William Vaughan)

* **Add User**: Add a user with a PIN, name, and login type
* **Pump Status**: Turn pump on and off
* **Check Tank Level**: Check tank level

### Actor: User (Greyson Williams)

* **Pump Gas**: Dispense gas
* **Check Total Gas**: Check lifetime gas use
* **Check Tank Level**: Check tank level

### Actor: Tanker Driver (???)

* **Add Gas**: Add gas to storage tank and estimate cost

## Use-Case Model Scenarios

### Actor: Admin (William Vaughan)

* **Use-Case Name**: Login
  + **Initial Assumption**: User has entered PIN and is presented with the relevant menu.
  + **Normal**: User will enter a PIN and will be presented with a menu that matches their user role.
  + **What Can Go Wrong:** User’s PIN is not accepted because csv is broken or not stored properly to array.
  + **Other Activities**: none
  + **System State on Completion**: User is logged in
* **Use-Case Name**: Add User
  + **Initial Assumption**: User has selected option and entered required information.
  + **Normal**: User enters a PIN with at least four digits, user then enters a name, and then chooses a user role.
  + **What Can Go Wrong**: Entered PIN has less than four digits, PIN is not a number, user role selection is not 1,2, or 3.
  + **Other Activities**: none
  + **System State on Completion**: Return to admin menu
* **Use-Case Name**: Pump Control
  + **Initial Assumption**: User has selected option and will turn pump on or off.
  + **Normal**: User is shown current pump status and can change to on/off.
  + **What Can Go Wrong**: User enters something other than “y” or “n”.
  + **Other Activities**: none
  + **System State on Completion**: Return to admin menu
* **Use-Case Name**: Check tank level
  + **Initial Assumption**: User has logged into the system and is checking amount of gas in storage tank.
  + **Normal**: User selects option from menu and amount in gallons is displayed until enter is pressed.
  + **What Can Go Wrong**: nothing
  + **Other Activities**: None
  + **System State on Completion**: Return to user menu

### Actor: User (Greyson Williams)

* **Use-Case Name**: Login
  + **Initial Assumption**: User has entered PIN and is presented with the relevant menu.
  + **Normal**: User will enter a PIN and will be presented with a menu that matches their user role.
  + **What Can Go Wrong:** User’s PIN is not accepted because csv is broken or not stored properly to array.
  + **Other Activities**: none
  + **System State on Completion**: User is logged in
* **Use-Case Name**: Dispense Gas
  + **Initial Assumption**: The user has requested gas.
  + **Normal**: User will enter an amount in gallons to be dispensed and amount will be logged to csv file. If pump is disabled, a warning will be displayed.
  + **What Can Go Wrong**: Gas amount is not in proper format (whole number or decimal)
  + **Other Activities**: none
  + **System State on Completion**: Log-out back to PIN menu
* **Use-Case Name**: Check tank level
  + **Initial Assumption**: User has logged into the system and is checking amount of gas in storage tank.
  + **Normal**: User selects option from menu and amount in gallons is displayed until enter is pressed.
  + **What Can Go Wrong**: nothing
  + **Other Activities**: None
  + **System State on Completion**: Return to user menu

### Use-Case Name: Check total gas dispensed

* + **Initial Assumption**: User has logged into the system and is checking amount of gas in dispensed over user’s lifetime.
  + **Normal**: User selects option from menu and amount in gallons is displayed until enter is pressed.
  + **What Can Go Wrong**: nothing
  + **Other Activities**: none
  + **System State on Completion**: Return to user menu

### Actor: Tanker Driver (???)

* **Use-Case Name**: Login
  + **Initial Assumption**: User has entered PIN and is presented with the relevant menu.
  + **Normal**: User will enter a PIN and will be presented with a menu that matches their user role.
  + **What Can Go Wrong:** User’s PIN is not accepted because csv is broken or not stored properly to array.
  + **Other Activities**: none
  + **System State on Completion**: User is logged in

### Use-Case Name: Add Fuel

* + **Initial Assumption**: User has chosen option and entered an amount of fuel to add to storage tank.
  + **Normal**: User will enter amount in gallons and will be presented with an estimated cost for delivered fuel.
  + **What Can Go Wrong**: User enters something that is not a number, user enters an amount greater than what can be stored.
  + **Other Activities**: none
  + **System State on Completion**: logout back to PIN menu

# Design Documents

## Software Architecture

## High-Level Database Schema

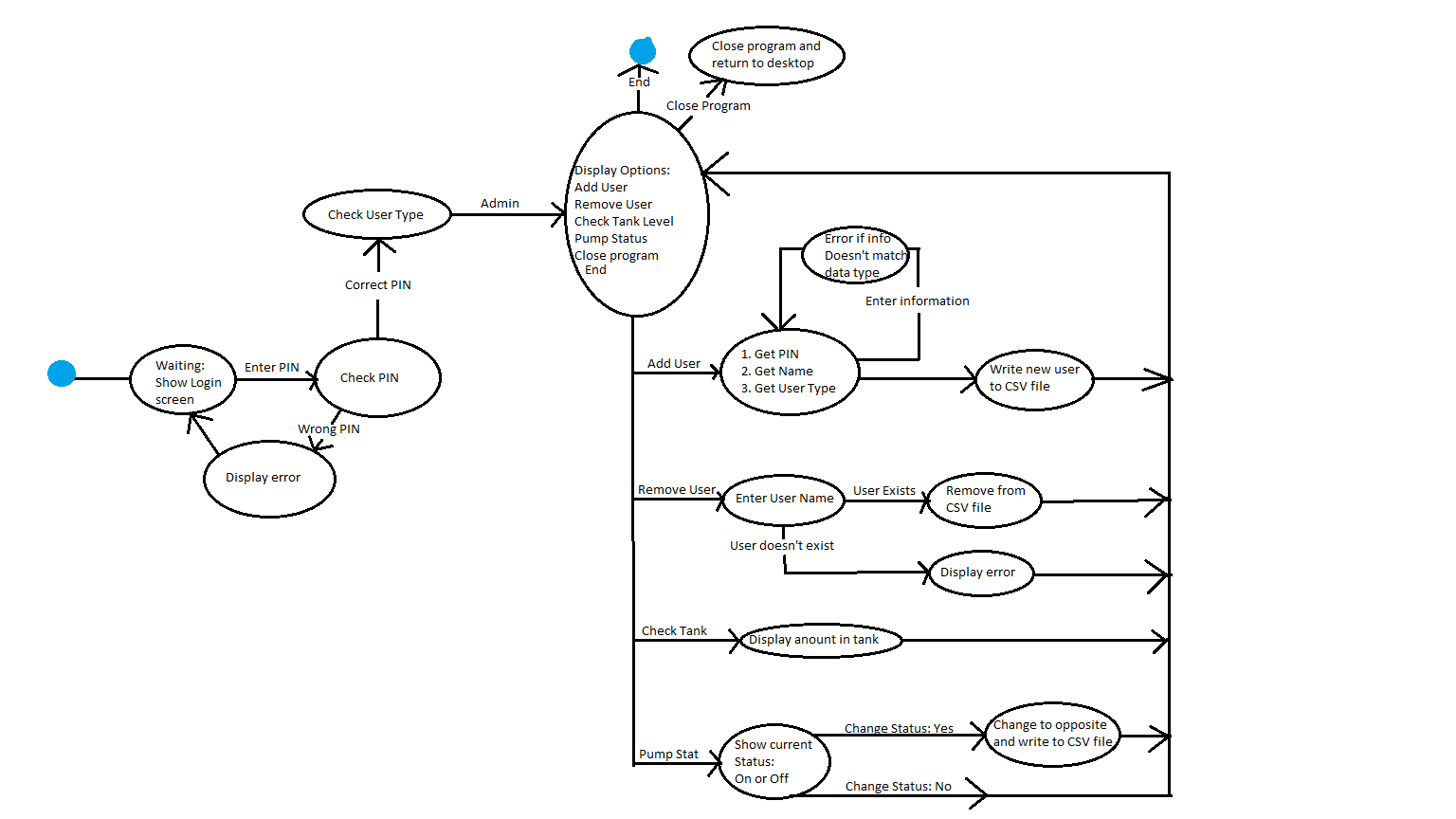
The data is stored in a CSV file for ease of editing. The first two entries are for the storage tank and pump status, all following entries are for users. The file itself is set up with four columns with a newline (\n) at the end to define a new row. An example follows:

PIN, Name, Usertype, Gas amount (either added or used)\n

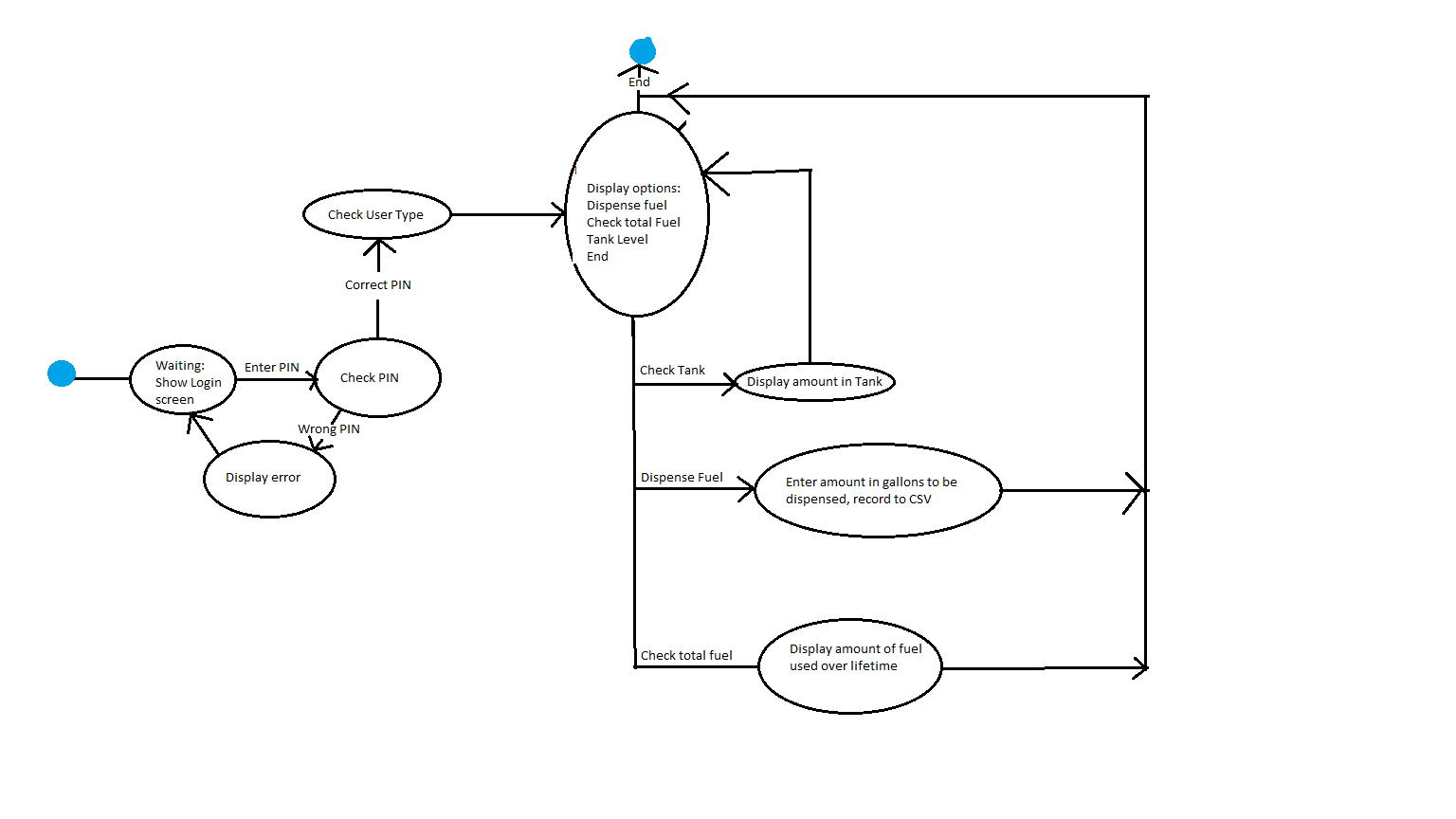
The CSV file is pulled into the program as a 2d array where it is edited and written straight back to the file.

## Software Design

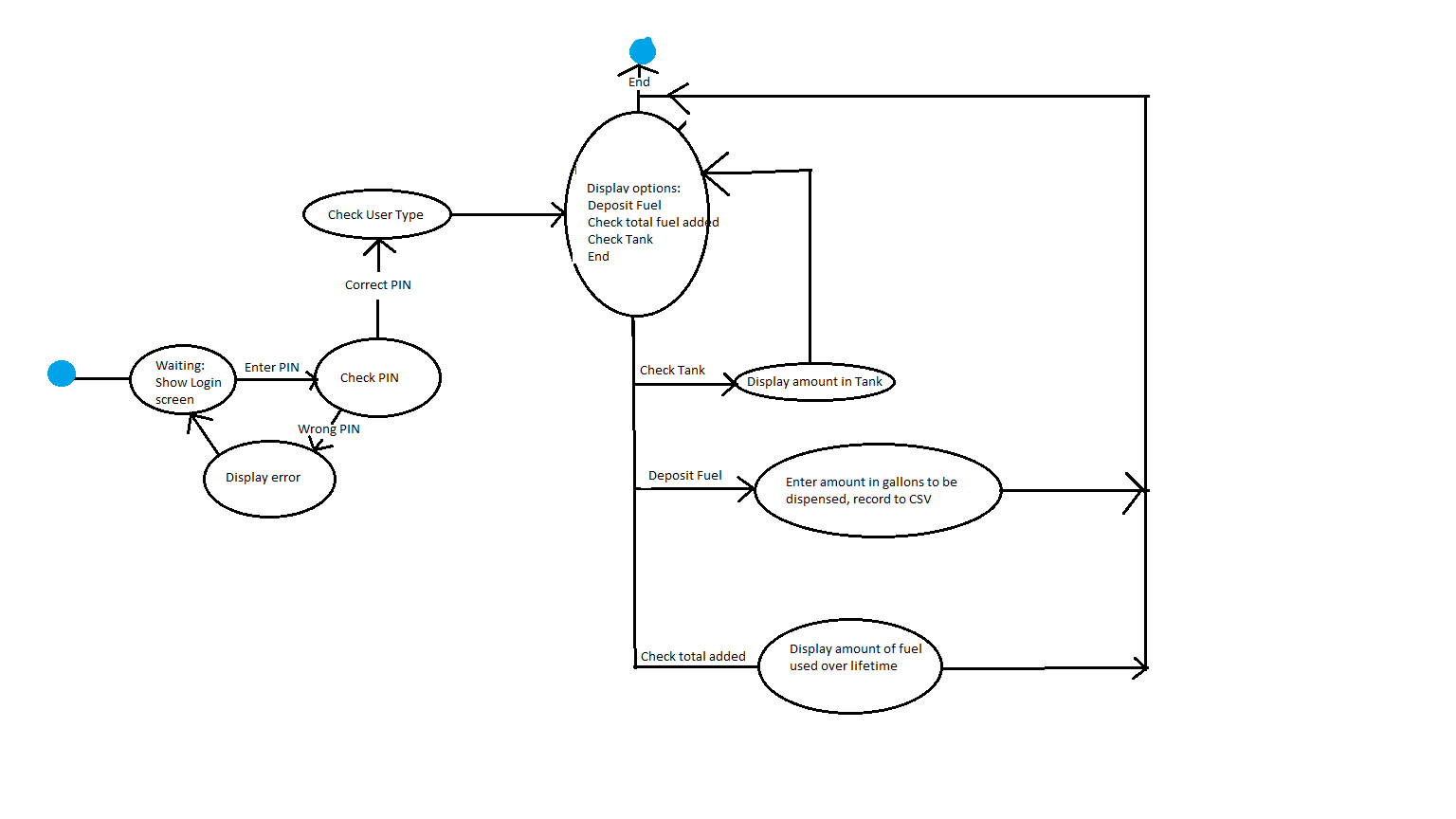
### State Machine Diagram: Admin (William)



### State Machine Diagram: User (Greyson)



### State Machine Diagram: Actor Name (???/William)



## UML Class Diagram

# Scenario

## Brief Written Scenario with Screenshots