Vending Machine

Software Requirements Specification

Istation Programmer Assessment

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# Introduction

This section provides an introduction of the project and discusses its scope and purpose as well as solidifying some key definitions that will be used throughout the document.

## Document Purpose

The purpose of this document is to present a detailed description of the features and requirements for the Vending Machine project. This is accomplished by describing both functional and nonfunctional requirements of the project, its use cases that define the user interactions with the system and the expected outcome for each respective interaction. Furthermore, this document establishes the system’s expected quality attributes and the various properties provided by the system itself and the interacting actors.

This document is targeted at the users, project management, and the system developers.

## Project Scope

The Vending Machine project is an interactive command line access simulation of the logic behind a basic vending machine. It can be considered to behave just as a physical vending machine would including but not limited to monetary transactions, item selection and delivery, machine administration and more.

Definitions, Acronyms, and Abbreviations

|  |  |
| --- | --- |
| **Term** | **Definition** |
| OP | Order processing |
| AM | Administration |
| UC | Use case |
| MSS | Main success scenario |

## Referenced Documents

IEEE Software Engineering Standards Committee, “IEEE Std 830-1998, IEEE Recommended  
Practice for Software Requirements Specifications”, October 20, 1998.

## Document Overview

This SRS document is meant to record and provide details of this virtualized vending machine platform. The document covers who interacts with the platform and what they wish to accomplish with it. It also covers more specific requirements such as performance and reliability requirements. Features are listed and detailed in what they should accomplish for the one using them.

# Overall System Description

This section provides a background for the systems’ functional requirements, which are provided in detail in Section 3. It does not state what the specific requirements are but rather provides an overview.

## Product Functional Categories

The system describes several functional categories, with respective function(s) provided by the platform.

|  |  |
| --- | --- |
| **Order Processing** | **Relates to item selection, transaction processing and dispensing.** |
| **Features**: | Item summary |
|  | Item selection |
|  | Order/Transaction processing |
|  | Item dispensing |

|  |  |
| --- | --- |
| **Administration** | **Includes all administrative features available to the vending machine administrative operator.** |
| **Features**: | Item management (Includes refilling, adding and or removing items available to customer(s)) |
|  | Machine fund withdrawal |
|  | Machine health check |

## User (Actor) Characteristics

|  |  |
| --- | --- |
| **Customer** | **A customer is an actor who wishes to have a monetary transaction with the vending machine in exchange for an offered item. All actors are assumed to be customers by default. A customer can access administrative operations by entering the appropriate menu and entering the correct administrator key.** |
| **Actor’s Goals:** | View Items |
|  | See updated balance |
|  | Insert funds |
|  | Select item(s) |
|  | Cancel transaction |
|  | Finalize transaction (Triggers change calculations if applicable) |
|  | Make multiple transactions |

|  |  |
| --- | --- |
| **Machine Administrative Operator** | **A machine administrative operator has root access over all available options on the machine. This includes adding and or removing items, modifying items, withdrawing machine funds and running machine health checks.** |
| **Actor’s Goals:** | View item(s) |
|  | Add item |
|  | Remove item |
|  | Modify item prices |
|  | Withdraw machine funds |
|  | Run health checks |

## Constraints

One large constraint to this project is the fact that only one transaction/customer can operate the machine at a time. Another constraint to the system is that it must be continuously maintained. As customer transactions are processed, item stock will drop potentially affecting sales if item stock runs too low. Moreover, the machine only has limited space for customer funds. If machine funds are not actively groomed, fund space may run out.

## Assumptions and Dependencies

Requirements and use cases in the following sections assume that:

* The machine only takes cash payments.
* The machine is actively maintained.
  + This includes item stock and funds.

The system is dependent on:

* Continuous maintenance by administrative operator.

# Specific Requirements

This section defines the system requirements which are split into the following different categories: external and user interfaces, functional requirements, non-functional requirements, use cases and system quality attributes.

## External & User Interfaces

This section describes the interface that will be provided by this system. For this project, there exists only one type of interface to consider: Command line / Console Interface

## Functional Requirements

This section presents the system’s functional requirements.

### Formal Requirements

|  |  |
| --- | --- |
| **[Order Processing]** | |
| OP1 | The system shall allow users to view all items offered. |
| OP1 | The system shall allow users to select a specific item. |
| OP2 | The system shall allow users to view a specific item. |
| OP3 | The system shall allow users to add an item to their cart. |
| OP4 | The system shall allow users to add funds. |
| OP5 | The system shall allow users to cancel the transaction and retrieve their unused funds. |
| OP6 | The system shall require users to finalize a transaction before dispensing items. |
| OP7 | The system shall allow users to make multiple transaction. |
| OP8 | The system shall allow users to enter administrative console after successful authentication in case of machine administrative operators. |

|  |  |
| --- | --- |
| **[Administration]** | |
| AM1 | The system shall allow administrative users to view items. |
| AM2 | The system shall allow administrative users to add items. |
| AM3 | The system shall allow administrative users to modify item prices. |
| AM4 | The system shall allow administrative users to remove items. |
| AM5 | The system shall allow administrative users to withdraw machine funds |
| AM6 | The system shall allow administrative users to run health checks. |

## Non-Functional Requirements

This section describes the system’s non-functional requirements which cover the necessities for overall platform performance, redundancy and other important qualities.

|  |  |
| --- | --- |
| **ID** | **Definition** |
| NF1 | The system shall take less than 1 second to respond to user interaction. |
| NF2 | The system shall verify legal tender. |
| NF3 | The system shall automatically prompt for admin reverification on inactivity. |

## Fully Dressed Use Case Documents

This section provides a list of 13 use cases that encompass the systems’ most critical requirements as defined in the above section(s). Each use case defines an actors’ interaction with the platform and the systems’ respective response. Fully dressed use case definitions can be found in Appendix A (Note: Only first 5 use cases fully dressed for simplicity).

|  |  |
| --- | --- |
| **Use Case ID** | **Use Case Description** |
| UC1 | User views all items |
| UC2 | User selects a specific item |
| UC3 | User adds item to cart |
| UC4 | User adds funds |
| UC5 | User finalizes transaction |
| UC6 | User cancels transaction |
| UC7 | User makes multiple transactions |
| UC8 | User enters administrative key |
| UC9 | Administrative user adds an item |
| UC10 | Administrative user modifies an item’s price |
| UC11 | Administrative user removes an item |
| UC12 | Administrative user withdraws machine funds |
| UC13 | Administrative user runs a health check |

# Supporting Information

### Appendix A: Use Cases

#### Use Case 1 – View all items

|  |  |
| --- | --- |
| **Use Case ID** | UC1 |
| **Use Case Name** | View all items |
| **Primary Actor** | User |
| **Actor’s Goal** | User views all items available |
| **Business Value** | Critical |

**Description**

A main menu selection allows a user to view all items available in the vending machine.

**Main Success Scenario**

|  |  |  |
| --- | --- | --- |
| **Step** | **Actor Action** | **System Response** |
| **1** | User navigates to main menu | System displays main menu |
| **2** | User selects “View all items” option | System displays all available items and characteristics regarding the item. |

**Alternative Success Scenario 1: Invalid menu selection**

**Trigger Condition**: In step 2 of MSS, if user makes an invalid menu selection, appropriate error message will be displayed and menu prompt will be retried.

|  |  |  |
| --- | --- | --- |
| **Step** | **Actor Action** | **System Response** |
| **1** | User makes invalid menu selection | System displays error message and prompts user to retry selection. A log entry will be made noting incident for analytics/system improvement purposes. |
| **2** | User retries input and successfully chooses the “View all items” option. | System displays all available items and characteristics regarding the item. |

#### Use Case 2 – Item selection

|  |  |
| --- | --- |
| **Use Case ID** | UC2 |
| **Use Case Name** | Item selection |
| **Primary Actor** | User |
| **Actor’s Goal** | User selects a specific item |
| **Business Value** | Critical |

**Description**

A main menu selection allows a user to select an item from the vending machine and view detailed item properties.

**Main Success Scenario**

|  |  |  |
| --- | --- | --- |
| **Step** | **Actor Action** | **System Response** |
| **1** | User navigates to main menu | System displays main menu |
| **2** | User selects “Select an item” option | System displays a menu selection of all available items. |
| **3** | User selects an option from list | System displays detailed properties for that item. |

**Alternative Success Scenario 1: Invalid menu selection**

**Trigger Condition**: In step 2 of MSS, if user makes an invalid menu selection, appropriate error message will be displayed and menu prompt will be retried.

|  |  |  |
| --- | --- | --- |
| **Step** | **Actor Action** | **System Response** |
| **1** | User makes invalid menu selection | System displays error message and prompts user to retry selection. A log entry will be made noting incident for analytics/system improvement purposes. |
| **2** | User retries input and successfully selects an option from list | System displays detailed properties for that item. |

#### Use Case 3 – Add item to cart

|  |  |
| --- | --- |
| **Use Case ID** | UC3 |
| **Use Case Name** | Add item to cart |
| **Primary Actor** | User |
| **Actor’s Goal** | User adds item to cart |
| **Business Value** | Critical |

**Description**

A main menu selection allows a user to add an item to their cart. Note: User can add as many items to cart as needed given there is enough stock in the vending machine to fulfill order.

**Main Success Scenario**

|  |  |  |
| --- | --- | --- |
| **Step** | **Actor Action** | **System Response** |
| **1** | User performs steps in UC2 | Item is selected by user and an option to add item to cart is displayed |
| **2** | User selects “Add item to cart” | Success message displayed and item is added to the user’s cart. |

**Alternative Success Scenario 1: Invalid menu selection**

**Trigger Condition**: In step 2 of MSS, if user makes an invalid menu selection, appropriate error message will be displayed and menu prompt will be retried.

|  |  |  |
| --- | --- | --- |
| **Step** | **Actor Action** | **System Response** |
| **1** | In step 2 of MSS, user makes invalid menu selection | System displays error message and prompts user to retry selection. A log entry will be made noting incident for analytics/system improvement purposes. |
| **2** | User retries input and successfully selects “Add item to cart” | Success message displayed and item is added to the user’s cart. |

**Alternative Success Scenario 2: Out of stock**

**Trigger Condition**: In step 1 of MSS, if item selected is out of stock, “Add item to cart” option will not be available .

|  |  |  |
| --- | --- | --- |
| **Step** | **Actor Action** | **System Response** |
| **1** |  | Without making the “Add item to cart” option available, system will return to main menu after displaying item properties. |

#### Use Case 4 – Add funds

|  |  |
| --- | --- |
| **Use Case ID** | UC4 |
| **Use Case Name** | Add funds |
| **Primary Actor** | User |
| **Actor’s Goal** | User adds funds |
| **Business Value** | Critical |

**Description**

A main menu selection allows a user to add funds for their transaction(s). Note: For simplicity, user can select from available menu choices that displays money input options with a maximum balance of $20 at one time.

**Main Success Scenario**

|  |  |  |
| --- | --- | --- |
| **Step** | **Actor Action** | **System Response** |
| **1** | User navigates to main menu | System displays main menu |
| **2** | User selects “Add funds” option | System will display appropriate menu allowing user to insert funds as needed. |
|  | User selects an option from funds menu. | System adds selected funds to user balance and displays menu again (User can exit at any time). |

**Alternative Success Scenario 1: Invalid menu selection**

**Trigger Condition**: In step 1 or 2 of MSS, if user makes an invalid menu selection, appropriate error message will be displayed and menu prompt will be retried.

|  |  |  |
| --- | --- | --- |
| **Step** | **Actor Action** | **System Response** |
| **1** | User makes invalid menu selection | System displays error message and prompts user to retry selection. A log entry will be made noting incident for analytics/system improvement purposes. |
| **2** | User retries input and successfully chooses an option. | System successfully adds funds to user balance and or displays funds menu. |

#### Use Case 5 – Finalize transaction

|  |  |
| --- | --- |
| **Use Case ID** | UC5 |
| **Use Case Name** | Finalize transaction |
| **Primary Actor** | User |
| **Actor’s Goal** | User finalizes transaction |
| **Business Value** | Critical |

**Description**

A main menu selection allows a user to finalize their transaction. This option will only be available if user has selected a(n) item(s). If items have been selected but no/not enough funds have been inserted, appropriate message will be displayed.

**Main Success Scenario**

|  |  |  |
| --- | --- | --- |
| **Step** | **Actor Action** | **System Response** |
| **1** | User navigates to main menu | System displays main menu |
| **2** | If available, user selects “Finalize Transaction” option | System will update user balance (return change if applicable), dispense items, and display main menu. |

**Alternative Success Scenario 1: Invalid menu selection**

**Trigger Condition**: In step 1 or 2 of MSS, if user makes an invalid menu selection, appropriate error message will be displayed and menu prompt will be retried.

|  |  |  |
| --- | --- | --- |
| **Step** | **Actor Action** | **System Response** |
| **1** | User makes invalid menu selection | System displays error message and prompts user to retry selection. A log entry will be made noting incident for analytics/system improvement purposes. |
| **2** | User retries input and successfully chooses an option. | System will update user balance (return change if applicable), dispense items, and display main menu. |