# Section 1 - Project Description

## 1.1 Project

Laundry Management System utilizes a web application which uses internet to access.

## 1.2 Description

This software system will be a Web Laundry Management System for a local laundry room in an apartment building. This project will alert the users in real time about the laundry services completion and will provide availability of washers and dryers in the laundry room. This will enhance the time management and centralize the process by enabling the user to initiate the laundry process through the application itself. The application will provide an easy-to-use interface for the user to look for an available machine, start the laundry by paying through the e-wallet on the payment portal and then get alert when the laundry is completed.

## 1.3 Revision History

|  |  |  |
| --- | --- | --- |
| **Date** | **Comment** | **Author** |
| 09/16/2023 | Version 1.0 | Arpit Sharma |
| 10/23/2023 | Version 2.0 | Arpit Sharma |
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# Section 2 - Overview

## 2.1 Purpose

The purpose of this document is to present a detailed design description of the Laundry Management System. The purpose of this project is to track the availability of laundry services like washing and drying and notify the customers about the process completion. The user can also use the e-wallet to pay for the cost of the services. This document contains an explanation of the interfaces and the features of the system along with the application data and software components.

## 2.2 Scope

This software system will be a Web Laundry Management System for a local laundry room in an apartment building. This project will alert the users in real time about the laundry services completion and will provide availability of washers and dryers in the laundry room. This will enhance the time management and centralize the process by enabling the user to initiate the laundry process through the application itself. The application will provide an easy to use interface for the user to look for available machine, start the laundry by paying through the e-wallet on the payment portal and then get alert when the laundry is completed.

## 2.3 Technology Stack

Front-end - A server-rendered application like C#, ASP.NET Core MVC and Razor pages

Database – SQL lite

## 2.4 Requirements

### 2.4.1 Traceability Matrix

Cross reference this document with your requirements document and link where you satisfy each requirement.

|  |  |
| --- | --- |
| **SRS Requirement** | **SDD Module** |
| Use case 1 – 3.2.1 | SDD 6.1.3 |
| Use case 2 – 3.2.2 | SDD 6.1.3 |
| Use case 3 – 3.2.3 | SDD 6.1.4 |
| Use case 4 – 3.2.4 | Section 5 and SDD 6.1.3 |
| Use case 5 – 3.2.5 | Section 5 and SDD 6.1.3 |
| Use case 6 – 3.2.6 | Section 5 and SDD 6.1.3 |
| Use case 7 – 3.2.7 | SDD 6.1.4 |
| Use case 8 – 3.2.8 | Section 5 and SDD 6.1.3 |
| Use case 9 – 3.2.9 | Section 5 and SDD 6.1.3 |
| Use case 10 – 3.2.10 | SDD 6.1.4 |

# Section 3 - System Architecture

Given below is the overall system architecture diagram of the Laundry Management System.

It shows how the different actors interact with the application in specific ways.

The application accepts inputs and allows actors to administer the application by using a Web-browser based interface.

A diagram of a computer network

Description automatically generated

## 3.1 Admin User

* Admin user can add/modify/delete the user, washing machine and dryer machine information from the system.
* Admin user can only login using the admin credentials.

## 3.2 User

* A user is the person who uses the application for Laundry Management.
* The user can view/modify their own user information.
* The user can initiate washing/dryer process and get the notification of process completion.
* The user can add money to the e-wallet of the system using their payment information.
* The user’s account will lock if failed login 3 times.

## 3.3 Web server

* Web server hosts the Laundry Management System web application.
* It contains the front-end code and all the UI pages related to the application.
* It interacts with the backend database to send or receive data.

### 3.3.1 Admin’s visual interface

* It contains the edit/view/remove functionality of washing and dryer machines on the dashboard.
* It provides the edit/view/remove functionality of all the user information including payment and password information of all the users stored in the system.

### 3.3.2 User’s visual interface

* It contains the visibility only of the dryer and washing machines on the dashboard
* It contains the edit functionality of only the user details of the authenticated user.

## 3.4 Database

* It contains all the data of the system.
* It contains all the tables which are interconnected and shown in detail in Section 4.

## 3.5 User information

* It contains the User credentials information of the users and is used to authenticate the user while logging in.

# Section 4 – Application Data Components

Below is the class diagram/ER diagram which shows the table structure in the database and the relationship between them. It consists of the table details and data store information.

Note – E-wallet and User credentials table consists of sensitive user information.

All these tables are organized in the database and relate to each other as shown below.

A diagram of a machine

Description automatically generated

|  |
| --- |
| **Washing machine Table** |

|  |  |  |
| --- | --- | --- |
| **Field** | **Notes** | **Type** |
| ID | Unique Identifier from TABLE\_SEQ | DECIMAL |
| WMACHINE | The Name of the washing machine | VARCHAR |
| COST | The cost of using the machine | DECIMAL |
| AVAILABILITY | The availability of the machine (1=available, 0=unavailable) | BOOLEAN |

|  |
| --- |
| **Dryer machine Table** |

|  |  |  |
| --- | --- | --- |
| **Field** | **Notes** | **Type** |
| ID | Unique Identifier from TABLE\_SEQ | DECIMAL |
| DMACHINE | The Name of the dryer machine | VARCHAR |
| COST | The cost of using the machine | DECIMAL |
| AVAILABILITY | The availability of the machine (1=available, 0=unavailable) | BOOLEAN |

|  |
| --- |
| **User information Table** |

|  |  |  |
| --- | --- | --- |
| **Field** | **Notes** | **Type** |
| ID | Unique Identifier from TABLE\_SEQ | INTEGER |
| FIRST\_NAME | The First Name of the User | VARCHAR(50) |
| LAST\_NAME | The Last Name of the User | VARCHAR(50) |
| EMAIL | The Email address of the user | VARCHAR(100) |
| DATEOFBIRTH | The date of birth of the user | DATE |
| CARDNUMBER | The credit/debit card number of the user’s bank account | VARCHAR(16) |

|  |
| --- |
| **E\_wallet Table** |

|  |  |  |
| --- | --- | --- |
| **Field** | **Notes** | **Type** |
| ID | Unique Identifier from TABLE\_SEQ | DECIMAL |
| BALANCE | The balance in the e-wallet | INTEGER |
| CARDNUMBER | The credit/debit card number of the user’s bank account | VARCHAR(16) |

|  |
| --- |
| **User credentials Table** |

|  |  |  |
| --- | --- | --- |
| **Field** | **Notes** | **Type** |
| ID | Unique Identifier from TABLE\_SEQ | DECIMAL |
| EMAIL | The Email address of the user | VARCHAR(100) |
| PASWORD | The Password of the user associated with the email address | VARCHAR(100) |

# Section 5 – Application software component

Given below is the Application Software Components which shows the software components and the data flow.

## 5.1 Web Application Architecture

Below is the web application architecture. It shows different application software components used by the Laundry Management System and how they relate to each other.

A diagram of a computer network

Description automatically generated

* Users password is hashed securely
* Sensitive information is encrypted and then saved.
* The user session expires after 20 minutes
* All user inputs are sanitized and validated
* Use of HTTPS everywhere
* Account lockout after 3 failed login attempts

First tier –

1. Web browser – Internet explorer, chrome, firefox etc

It is used by the user to interact and access the application.

1. The Internet is used by the browser to access the application.
2. Security –
   1. The application must expire the user session after 20 minutes of logging in.
   2. Account lockout should occur after 3 failed login attempts.

Middle tier-

1. Web server – The application uses DotNET core MVC architecture, HTML, CSS, Javascript for the User interface. This is used to implement the application and host it on the server.
2. Security –
   1. The channel from user to application server and all other channels must be secure. Use of TLS V1.2 and above is recommended.
   2. All user input along with SQL queries must be processed after proper user input validation and sanitization. Parameterized queries should be implemented.

Third tier –

1. Database – The application uses SQL Lite for storing the data.
2. It is the backend of the application where all the tables and data is stored.
3. Security –
   1. The password hashing algorithm should be secure, use of Becrypt or Argon2 is recommended.
   2. Card details of users must be encrypted and then stored in the database.

## 5.2 Application user interaction diagram

A diagram of a machine

Description automatically generated

**Application user interaction architecture**

1. The User sign up and the information is saved in the User credential table and User information table.
2. The user sign in using the credentials created and is authenticated using the user credentials table.
3. The user can access the Dashboard page which contains the information about the available washing and dryer machines in the laundry room by accessing the washing machine table and dryer machine table.
4. The user can initiate the washing and dryer tasks by selecting the available machines.
5. The user can goto the profile page.
6. The user can edit the user information and add money to the e-wallet.
7. The user will get notified using a pop up once washing/dryer in finished.
8. The admin can view/edit/delete all the machines information from the respective tables.
9. The admin can view/edit/delete all the users information from the user information and credentials table.

# Section 6 - User Interface Design

## 6.1 User Interface Design Overview

### 6.1.1 Sign in/Login Page

* This is the first page which comes up when any user tries to access the Laundry Management System web application.
* It contains login and sign up functionalities.
* It authenticates the user by verifying the credentials with the User credentials table and then moves to the Dashboard page

A person and person doing laundry

Description automatically generated

### 6.1.2 Sign up Page

* This is mandatory for any new user.
* This is not required for any user who has already sign up.
* It creates and saves the user information in the user information table.
* After signing up, the user can login to the web application.

A screenshot of a laundry system

Description automatically generated

### 6.1.3 Dashboard Page (User)

* It displays the information about the availability of washing and dryer machines.
* The user can initiate washing and dryer tasks using the selected available machines.
* The user can sign out.
* The user can access the profile page.
* The admin user can edit/delete the washing/dryer machine information.
* The user will get notified using a pop up once washing/dryer in finished.

A screenshot of a computer

Description automatically generated

### 6.1.4 Profile Page (User)

* The user can view and edit their own user information. This change reflects in the user information table.
* The user can add money to the E-wallet of the system by entering the value and selecting add money field
* The admin user can view all the users and edit/delete all the related user information.

A screenshot of a computer

Description automatically generated

# Section 7 – Test cases

The test cases of the application tests the functionalities of user and admin user actors.

## 7.1 Application login

* Test if user can login the application.
* Test if admin can login the application.
* Test if account is locked out after 3 failed login attempts.
* Test if account session is expired after 20 minutes.

## 7.2 Sign Up

* Test if new user can sign up the application.

## 7.3 Washing initiation

* Test if user can select the available machine and initiate the washing.
* Test if user cannot select the unavailable machine.

## 7.4 Dryer initiation

* Test if user can select the available machine and initiate the dryer.
* Test if user cannot select the unavailable machine.

## 7.5 Edit user information

* Test if the user can edit the user information in the profile section and save it.
* Test if admin can edit/delete the user information of any user.

## 7.6 Add money to E-wallet

* Test if the user can enter the money and add the money to e-wallet.
* Test if the transaction fails when there are insufficient funds in the account.

# Section 8 – References

Draw.io (https://app.diagrams.net/)

MockPlus (https://rp.mockplus.com/)

# Section 9 Glossary

|  |  |
| --- | --- |
| **Term** | **Definition** |
| Washer | The machine used to wash clothes |
| Dryer | The machine used to dry the washed clothes |
| User | The person who will use the system to perform laundry services |
| Admin User | User with admin privileges, who can create, update, delete anything in the system |
| Payment Details | The credit/debit card details of the user using the laundry management system |
| E-Wallet | A database containing the money which user has added using the payment details |
| Availability | It shows the machines which are idle, i.e. available to use. |
| Cost | The amount deducted from the user account to use the laundry service like washing or drying. |
| PII | Personally Identifiable Information of the user like email id, phone number, name, date of birth etc. |