



An Undergraduate Internship Report on Quality Assurance At PayWell

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Attestation

The demonstration of the work that has been provided on this report, contains the sole participation of my own knowledge gathered and collected as a requirement for an Internship, over the course of time under the supervision of Md.Abu Sayed sir. To work for this organization and cope with the information that I have experienced and gained for the last few months, have been displayed through my own understanding and the information provided is organized by me and there is no scope left overturned for any plagiarism except for few references that has been made which is specified implicitly pointing to that frame or the format of this working. To also specify this report will not resemble to any other working provided by the previous works done by my fellow IUB participants or with any other participants of any other educational organization.

Signature

Date

Write Your Name Here

Name

Acknowledgement

I would like to express my appreciation to the Faculty of the School of Computer Science and Engineering for including internship credit in the curriculum of the undergraduate program and providing me with the opportunity to sample the taste of industry-oriented activities and the area of work that interests me. To be able to undergo the process of grooming in disguise of an Internship, that has been provided by IUB has been a complement to the future career advancement to myself and so has been to all the students that could avail this opportunity. I was able to grab this process of work as an Intern for PayWell that is an organized approach by CloudWell Limited as a QA and gained the most realistic firsthand experience to the real life. I would like to acknowledge my team lead, Mr. Faiyaz who has guided me to numerous advancement in this organization and helped me complement my work experience.

My appreciation goes to my supervisor Mr. Abu Sayed sir who has obliged me in guiding for the compilation of my report. Also it would not have been possible for me without the learnings that I have gained from the world class faculty members of the department of Computer Science and Engineering while pursuing this bachelor's degree from IUB.

Letter of Transmittal

May 01, 2021

Md. Abu Sayed Sir,
Internship Supervisor and Lecturer,
Department of Computer Science and Engineering,
Independent University, Bangladesh.
Subject: Submission of Internship Report.

Respected Sir,

To be able to work under your supervision, has been a great pleasure and I have been able to follow your guidance, and finally complete my Internship final report and submit it to you. I have worked for, PayWell as a QA intern and this report is submitted under this title. This submission of my report is a part of my course plan and a requirement for completing my degree and it goes by CEN-499[Internship Program]. The workings under this report contains on the manual testing on the application that I have done over there and a brief demonstration of that implication and the experience that I have gained. I would kindly urge for you to accept this report and oblige me yet again.

May I therefore pray and hope that you will be kind enough to be thorough with my report and provide your opinion on my demonstration.

Yours Sincerely,
Mehdi Hassan Tanveer
ID-1530884

Evaluation Committee

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Abstract

This Internship report outlines the brief work that I did and completed during my time at PayWell. This internship study outlines the events carried out at Paywell during the internship course. It was a real-world work environment in which I learned about various Quality Assurance techniques and technologies. My tutor and other experts provided me with a range of skills and experience. It also showed us how to work together in groups and be productive team members.

Here I was able to gain some knowledge on how a Software Development Life Cycle (SDLC) works and also learn few different techniques on the QA (Quality Assurance). Mainly on how the manual testing is done on an application and later on learn briefly about some automation testing techniques. To able to work as a member of a team I also learned how valuable team work can be. I tried my best to be an efficient team member and also to be able to work for this company helped me gain some first-hand practical life experience that can boost my career advancement.

The key goal is to focus on my accomplishments during the internship and to become acquainted with the realistic facets of the theoretical experience learned during the Undergraduate degree program. This paper is a component of my internship project that is required by the university as a partial fulfillment of the degree completion criteria.

Keywords— Quality Assurance, SDLC, manual testing

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Chapter 1

Introduction

1.1 Overview/Background of the Work

To complete the Bachelor of Science degree under Independent University of Bangladesh it is required for the students to complete a course of Internship program under a company or an organization following the field of related program. Therefore I have participated as a QA for the company which is called PayWell. This company is a one-stop online solution which currently is a retailer based platform. This company provides services like mobile top up solution to utility bills to travelling tickets, visa application fee and many more. There is a collector under whom the retailers from a place, state or region registers and after that gets access to use the application for availing the one stop solution that this company provides. Here in the company the interns are assigned to a group of 3 to maximum of 5 people for testing the bugs or the issues that the application of the company is having over rigorous inspection by multiple group of testers.. All the tests are not manual, there are few tastings that are done through Automation using various automation tools. The task for an intern like me was to inspect few specific functionality of the application and do it as a manual testing. It was to execute the test cases and make a report on the execution and find the defects or bugs and report it back to the team lead.

1.2 Objectives

As more and more digitization is being issued all over the country for the past few years. There have been some abrupt changes that have been brought and physical labor has been emphasized and tried to be reduced as much as possible. The target for PayWell has been to create a solution to this and try to provide with an application that will serve the purpose for an online stop solution. The user of this application can easily perform their tasks online and save their manual time. Sometimes the trivial everyday tasks for example like paying electricity bill, by going to Desco or the electric service provider office gets very hectic and problematic and also time consuming. So the aim is to reduce this situation as much as possible, making it available to pay the bill through the application using internet.

1.3 Scopes

- One-stop solution for retailers.
- System that has features like mobile top-up to utility bills to travel tickets and few other options like this .
- A system that will have transactions online without hassle .
- Internet bill payment option for few Internet service provider.
- E-commerce site transaction feature.
- Retailer summary for their bills and activities from the database.

1.4 Company Overview

CloudWell Limited's integrated retail strategy is represented by this organization which is PayWell. Their primary focus is on making payments easy for customer support organizations in the utility, telecoms, financial services, and other public sectors in Bangladesh. Their strategy is to make payments and services as simple as possible by delivering them via local shops through the internet. PayWell serves as a one-stop shop for multiple payment methods across a vast network of outlets. Their programs include charges for gas bills, utility bills, visa fees, transit tickets, among many other items.

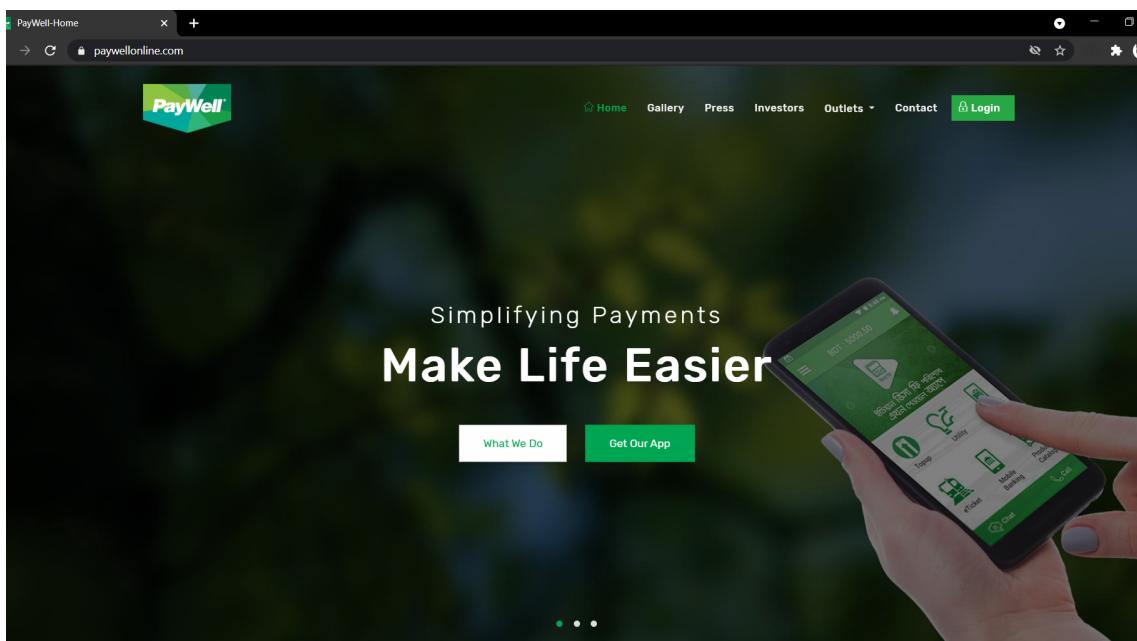


Figure 1.1: Paywell Web portal

The screenshot displays two pages from the PayWell website, both titled "PayWell-Home" and featuring the URL "paywellonline.com".

Top Page (Service Categories):

- Our Services**: A section titled "AWESOME FEATURES" containing six service icons:
 - Mobile Recharge**: Represented by a green triangle icon with a white phone receiver.
 - Electricity Bill**: Represented by a green triangle icon with a white lightbulb.
 - Water Bill**: Represented by a green triangle icon with a white water tap.
 - Gas Bill**: Represented by a green triangle icon with a white gas flame.
 - Visa Fee**: Represented by a green triangle icon with a white visa application form.
 - Tickets**: Represented by a green triangle icon with a white airplane.
- Logos for Operators:** Logos for various mobile operators including Telenor, Grameenphone, Robi, Airtel, and Teletalk are displayed below the "Mobile Recharge" section.
- Logos for Utilities:** Logos for DESCO, Dhaka WASA, and other utility companies are displayed below the "Electricity Bill" section.
- Logos for Other Services:** Logos for Karnaphuli Gas, Visa, and flight/ticket booking services are displayed below the "Gas Bill", "Visa Fee", and "Tickets" sections respectively.

Bottom Page (Detailed Services):

- Gas Bill**: A section with a green checkmark icon, showing a logo for Karnaphuli Gas and text indicating users can pay their monthly bill at PayWell outlets.
- Visa Fee**: A section with a green checkmark icon, showing a map of India and text indicating users need to pay visa application processing fees before submission.
- Tickets**: A section with a green checkmark icon, showing icons for a bus and a plane, and text indicating users can book flights from PayWell.
- Internet & DTH bill**: A section with a green checkmark icon, showing logos for Banglalion and Wi-Max, and text indicating users can pay their internet bills at PayWell outlets.
- E-commerce**: A section with a green checkmark icon, showing logos for Ajkerdeal.com and a storefront, and text indicating users can buy products offline at PayWell outlets.
- Mobile Financial Services**: A section with a green checkmark icon, showing a logo for MYCash and text indicating PayWell provides mobile financial services as a national distributor.

Figure 1.2: Paywell Web portal, service list

Their services include mobile recharge for the operators like Grameen phone, Robi, Banglalink and Airtel. The utility service contains Electricity Bills for Desco and likes as such, Gas Bill and Water Bill. There is also a service for Visa fee which only includes Indian Visa Fee payment and the service is not activated yet. The Tickets are for Bus travelling and train travelling for the companies that sale their tickets online. The ISP bill is currently available for Banglalion and also few online shopping stores are available.

1.4.1 Company Vision

The application for the company named as PayWell has been under working for its development of the application and making it available to run in all the system environment as much as possible in the country and trying to expand their services. The target is to be most user friendly and run the application with the least amount of bugs or errors. The company vision is to make their application most used in android and also be available for I'Os. The company is currently retailer based and thus have a fewer number of users. The vision is to make the application consumer based so that more number of users can be accustomed to the application and be benefited by it.

1.4.2 Competition and Limitation

At this moment Bkash is leading as a one-stop service provider and has been the bench mark for many companies that work for providing such services. Paywell is still a work in progress but their competition in the market is company named Dmoney, they are also a one-stop service based company but they have consumer based services too. The limitation for Paywell right now is that their application is available only in the android system as a mobile application. Also they are retailer base only. This company is also relatively new in the market and that is why they are currently working with a limited resources and yet to grow more as a company and as a team.

Chapter 2

Literature Review

2.1 Relationship with Undergraduate Studies

The relation to the field of work or the knowledge was first introduced to me about how a database can work was on CSE-303(Database Management), and in relation to that then I got the knowledge of how the application are designed for the User Interface in a form of Object Oriented Programming on CEN-305. Later on the knowledge of how the web applications are designed as a front end and back end programmers and their usage of the language of HTML (HyperText Markup Language), CSS(Cascading Style Sheets), JasvaScript, MySqL was introduced to me on CEN-455(Web Application Internet), then the process of how a Software Development Life Cycle works (SDLC) and the how the planning and testing cycle works on System Analysis and Design, CEN-405, where I also learned how to write test cases and the functionality requirements.

2.2 Related works

A one-stop-shop is an unified platform for providing e-services to consumers, or a single point of entry to electronic services and information provided by several public or private agencies[1]. One-stop-shops (OSSs) are not a new concept, but they are becoming increasingly popular as governments seek to address complaints about fragmentation in public service delivery. OSS changes are typically pushed as win-win solutions, claiming to provide seamless service at a lesser cost[2]. There are several advantages to using an Online-Stop-Solution, and they may be addressed since they are typically integrated, which means that numerous services are available in one location in a logical manner. Additionally, since the justification for service duplication is decreased, per unit delivery costs are decreased. In most circumstances, the employees and service can provide good results above[2]. A one-stop shop is one of several stage models that have a single interaction between the citizen and the government. The “One-Stop-Shop” has been widely adopted in government practice throughout the world because it is distinguished by an integrated front-end, which is utilized to acquire data from people in order to accomplish an integrated data collection[1].

In order to improve a system a good quality inspection is necessary. For improving the maintenance and find out any errors or bugs in the system Quality assurance is important.

All educational services should be of high quality. However, the innovative learning approach and networked technology that supports Distance Learning (DL) present additional quality concerns. It is difficult to gain a high reputation without well-developed quality management of the Open and Distance Learning offering and process, particularly network-based Open and Distance Learning (e-ODL). A quality assurance system (QAS) is made up of the policies, attitudes, activities, and processes that are required to guarantee that quality is maintained and improved[3]. The courses and degrees provided, as well as the learning materials, are subject to a quality assurance system includes, the personnel, technological innovation, methods of learning and products and services the organization's and management's structure[3].

The new issue for higher education institutions is quality assurance. There is a critical requirement to build a quality management system guarantee for postsecondary education. The first step in putting such a system in place is to identify its structure, components, qualities, and stakeholders. And should use the following qualities for each of these components: availability, usability, learning efficiency, performance, security, and potential for change[4].

Paywell provided a QA testing environment and their own devices to carry out the tasks. They have an office environment where the team are divided according to their works and segments. For the QA the project manager would assign a team lead and let the lead select a tem and perform a specific detailed task. The lead would assign individual tasks to all the members and give a time span to carry out the testing and report back the findings or the analysis on the task. Each member had to test the functionality of the application and make test case on their results and report back to the team lead. The manual testing was on the bases of creating the test cases manually. The next step after the internship or to secure a permanent placement on the company was to learn the automation testing using certain tools.

Chapter 3

Project Management & Financing

3.1 Work Breakdown Structure

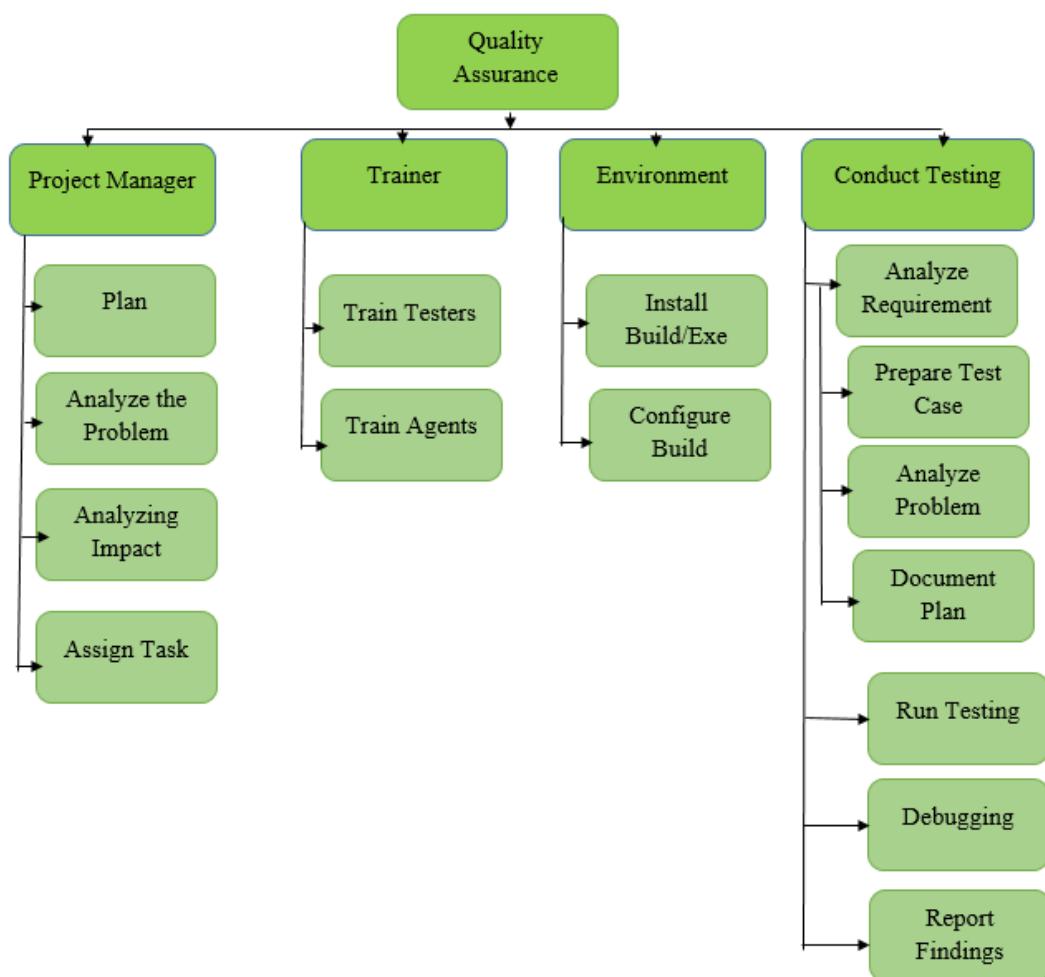


Figure 3.1: Work Breakdown Strcuture, Paywell

Work Breakdown Structure (WBS) is a multi-leveled arrangement with the items that the project will create or the outcomes that it will provide. Here a top-down approach is used to display Work Breakdown Structure (WBS). For this extension, a work breakdown structure (WBS) was created. This will help in keeping it straightforward and of a high quality and to get the whole project into sync. Here the roles or tasks performed or a brief step by step approach under a team is given. Project manager has to plan, analyze the problem and the impact and then has to assign the task accordingly. The trainer has to train the testers and agents to carry out their tasks. The QA system needs an environment for the test cases that needs to be executed. The test is then conducted and for that analyzing the case, prepare the test case and sometimes it is documented. The test is then ran and debugged and reported.

3.2 Process/Activity wise Time Distribution

Many of the project's operations are listed on the Work Breakdown Structure. To ensure compatibility with other developers, we work with a flow of definite time scales to complete those operations. My project manager sets the time and another developer working alongside the project and the days of time are allocated in the table for the latest duties or tasks.

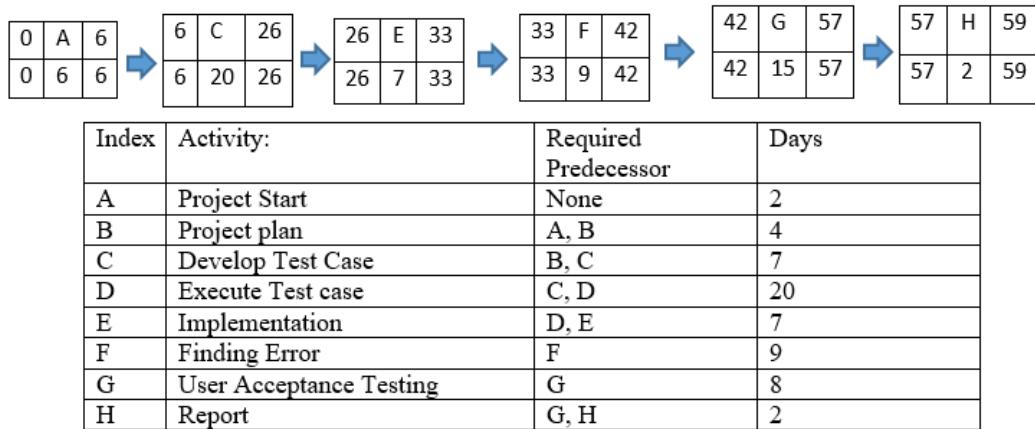


Table 3.1: Process/Activity wise Time Distribution

The table above exists with the data of how the time is divided for the task to complete or have a sprint. The number of days are stated along with each activity's duration above each node in the table. To get the overall time of each path, sum the time of each node. The crucial path is the one that lasts the longest.

3.3 Gantt Chart

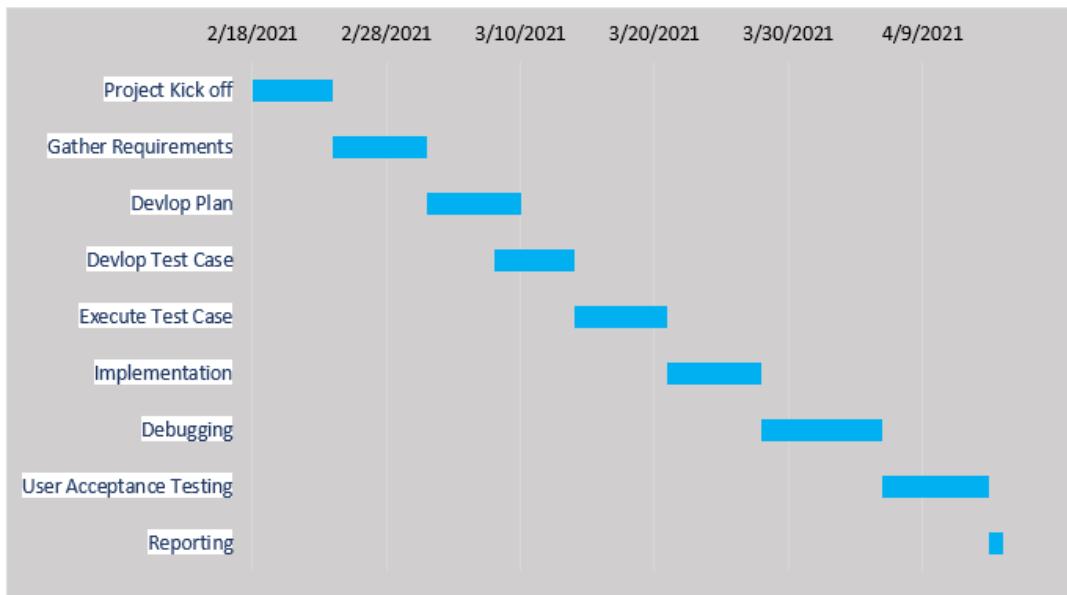


Figure 3.2: Gantt Chart

This chart contains the data for the starting date of a project and the step by step time duration for completing each milestone and then starting another the project is completed and the report is given back after all the testing.

3.4 Process/Activity wise Resource Allocation

| No: | Activity: | Days: | Work Rate: |
|--------|-----------------|----------------|------------|
| 1 | Project Manager | 2 | 3% |
| 2 | Training | 4 | 7% |
| 3 | Environment | 20 | 34% |
| 4 | Testing | 31 | 53% |
| 5 | Reporting | 2 | 3% |
| Total: | | Total: 59 days | 100% |

Figure 3.3: Process/Activity wise Resource Allocation

The Project Manager analyses the task and formulates plan to be executed as it is then assigned to a team. The task is to first analyse the case or the scenarios that needs to be

executed. In training the smoke test and sanity testings are done where it is checked that is the software able to run or executed. Then the environment is where the build can run easily without any delay. The testing is done along with test case and then the debugging is done and the UAT is done. All the reporting is collected and then given back with all the results.

3.5 Estimated Costing



Figure 3.4: Estimated Costing

The company invests more on the developers for updating more and more functional requirement after analyzing the market demand and trying to match the customer requirement. That is why it requires more budget for the maintenance of the system and launching the application into more platforms. Those budgets are not included in this estimated cost. To do manual testing usually is more cost efficient and as all the testing work is done by human labor it requires less investment. But for performing the automation testing the initial investment is much higher as the tools that are required is more expensive. But in the longer run the expense is covered and gets more efficient.

Chapter 4

Methodology

The Software Development Life Cycle consists of the system testing of a software that has multiple level of steps. After all the market analyzing when finally a company go for making a product or a project. The developers work on their code and perform the Unit testing and the integrated testing and combine them as a build file (White Box testing) and then provides this executable file to the tester for them to debug the system of the program that is tested by the QA and then after the testing it is later on provided to the User Acceptance Testers, these two type of testers are visually impaired (Black Box testing) to the code but they can check the functionality of the application or the executable file and provide their report on the test cases back to the developers. The developers then again to fix on the bugs and improve the quality of the product and the same procedure is followed again until all the problem are resolved.

There is a life cycle for the QA process:

Plan - The organization should plan and define process-related goals, as well as identify the procedures needed to produce a high-quality end result.

Do - Process development and checking, as well as "do" modifications to the systems.

Check - Process monitoring, process modification, and assessment of whether or not the systems follow the predetermined goals.

Act - Carry out the measures required to change the procedures.

To guarantee that the product is designed and delivered correctly, an organization must use Quality Assurance. This aids in the reduction of complications and defects in the finished product.

4.1 Agile Software Development

The SDLC has a testing phase and this phase also has a Software testing Life Cycle (STLC) and this testing method follows the Agile development process. Agility in software development can be described as the agile, adaptable, and quick-response design of the software development process. In Agile architecture, in the software industry, shifted development from a process-oriented to a people-oriented model.



Figure 4.1: Single Iteration of Agile Development Process

Quality assurance is a part of Agile software development and it is one of the most important part to attain better quality of the software and have less errors in the system.

Chapter 5

Body of the Project

Static Testing:

In software testing, it is often referred to as verification. Verification is another process for reviewing records and archives. Verification is the method of determining whether or not we are designing the product correctly, i.e., to validate the specifications we have and to ensure that we are developing the product appropriately.

Dynamic Testing:

In software testing, it is often referred to as validation. Validation is a complex procedure that involves checking the actual product. Validation is the method of determining if we are designing the right product, i.e., if the product we have created is correct or not.

Black Box Testing:

Black box testing, also known as behavioral testing, is a program testing process in which the internal structure/design/implementation of the object being evaluated is unknown to the tester. This measurements may be functional or non-functional, but they are normally functional. This technique is named for the fact that the software program seems to the tester to be a black box, with no way of seeing inside.

5.1 Work Description

Quality assurance, also known as QA testing, is characterized as an operation that ensures a company by that they can provide the best possible product or service to consumers. QA is concerned with optimizing procedures in order to provide quality products to customers. A company must ensure that its operations are reliable and successful in accordance with the quality requirements established for software products.

The interns duties at PayWell were to execute the functionality tests as per the criteria and as delegated. This necessitated expertise and skills in various SDLCs, as well as an understanding of test principles, testing types such as black box testing that means the manual testing or the Automation testing and also perform the User Acceptance testing as it is performed for the company by their own employee as of yet, error detection and also bug tracking and reporting back to the team lead.

5.1.1 Manual Testing:

Manual checking is the method of manually testing applications to identify flaws. The tester's viewpoint should be that of the end user, and he or she should ensure that all of the functionality function as specified in the requirement paper. Testers carry out the test cases during this phase and produce the reports by hand, without the use of any automated software.

For a QA analyzing of the System that fall under the Black box testing the requirement or the tasks are (Manual Testers):

- Understand the requirements – The tester will analyzes the whole trajectory of the application and devices the input and formulates the output.
- Write test cases- The tester then write some test cases that matches with the analysis that he/she has done.
- Execute test case- The tester then tests the system and matches the test case and executes each and every functionality of the build.
- Defects- the tester then finds the defects form the system and report them to the developer.
- Review- The tester then participate team meeting where the issue are discussed.

5.1.2 Monkey Testing

At paywell we did the monkey testing process because:

- No documentation required
- No planning necessary
- Informal Testing
- Testers doesn't know Application Functionality
- Random Testing
- The intension for the testing is to break the application and find out as much as defects possible.

5.1.3 Adhoc Testing

At paywell we also did the adhoc testing process where:

- No documentation required
- No planning necessary
- Informal Testing
- Testers should know Application Functionality
- Random Testing
- The intension for the testing is to break the application and find out as much as defects possible.

5.1.4 Software Testing Life Cycle

| SNO. | Phase | Input | Activities | Responsibility | Out Come |
|------|---------------------------------------------------------------------|---------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------|-----------------------|
| 1. | Test Planning: -What to test? -How to test? -When to test? | -Project Plan. -Functional Requirement. | -Identify the resources. -Team formation. -Test Estimation. -Preparation of the test plan. -Reviews on Test Plan. -Test plan sign off. | -Test Lead/Team Lead (70%) -Test Manager (30%) | -Test Plan document. |
| 2. | Test Designing | -Project Plan. -Functional Requirements. -Test Plan. Design Documents -Use Case | -Preparation of test scenarios. -Preparation of test cases. -Traceability Matrix. -Test case sign off. | -Team lead (30%) -Test Engineers (70%) | -Test Cases. |
| 3. | Test Execution | -Functional Requirements. -Test plan. -Test case. -Build/exe form team. | -Executing test cases. -Preparation of test report. -Identifying Defects. | -Team lead (10%) -Test Engineers (90%) | -Status /Test Report. |
| 4. | Defect Reporting & Tracking | -Test case. -Test Reports. | -Preparation of defect report. -Reporting defects to the developers. | -Team lead (10%) -Test engineers (90%) | -Defect Report. |
| 5. | Test sign off | -Test reports. -Defect reports. | -Analyzing reports. -Evaluating Criteria. | -Team Lead (70%) -Test Engineers (30%) | -Test Summary. |

Table 5.1: Software Testing Life Cycle Breakdown

The application for Paywell is still not at full scale or has not yet reached the optimum solution and therefore the software for it must go through a Software testing Life Cycle where the Quality Assurance has the major role. A requirement analysis is done, then Test panning, then Test case development and after that the environment setup is done. The test is executed and after the result closure is reported. For the testing life cycle. Firstly need to prepare the test plan for the system. In this plan the resource needs to be allocated from where the information can be collected. Creating an appropriate test environment where the system can run smoothly. Then fix a schedule for checking the functionality of the system. Then before checking the functionality and after checking the functionality design a test case. Document the whole process of testing. While checking the functionality check for errors or defects. If defects or bugs found then document it and report it to the developer. The developer will then try to fix the bug and verify if the bug is actually and needs to be fixing. If the bug found then fixing it. The developer will then give back the build again after fixing. Writing all the summary of the test and report. After the fixing the bug the report is then closed.

5.2 System Analysis

5.2.1 Six Element Analysis

| Process | Human | Non-Computing Hardware | Computing Hardware | Software | Database | Connectivity |
|--------------------------------|-----------------------------------------------------------------------------------------------|------------------------|--------------------|---------------------------------|-----------------------------------|--------------|
| Registration | Provide user name and Retailer information including picture and mobile number and password | N/A | Mobile/PC/Laptop | PayWell Application/ Web Portal | PayWell Database (Retailer Table) | Internet |
| Login | Provide User name and password | N/A | Mobile/PC/Laptop | PayWell Application/ Web Portal | PayWell Database (Retailer Table) | Internet |
| Approve Registration | Admin logs in and checks the database for the information and approve as user valid account | N/A | Mobile/PC/Laptop | PayWell Application/ Web Portal | PayWell Database (Retailer Table) | Internet |
| View User/Merchant Information | Admin logs in and checks the database and edits then information the user account information | N/A | Mobile/PC/Laptop | PayWell Application/ Web Portal | PayWell Database (Retailer Table) | Internet |
| Edit/Delete User Information | Admin can edit the account information for any user, employee account | N/A | Mobile/PC/Laptop | PayWell Application/ Web Portal | PayWell Database (Retailer Table) | Internet |
| Make Online Payment | User logs into the account and if the user has balance can make online transactions | N/A | Mobile/PC/Laptop | PayWell Application/ Web Portal | PayWell Database (Retailer Table) | Internet |

Table 5.2: Six Element Analysis

5.2.2 Feasibility Analysis

This study analyses the system in such a way that it maintains and formulates its resources in such a way that matches with the customer requirements, giving the company itself the most satisfactory output to its availability of the resources and be more cost efficient in its system advancement. This analysis consists of three part segmentation and this report may have valuable insights that the company will go through and analyze if necessary utilize it. The three part segmentation are:

- Economic feasibility- To run the company app into more systems other than the android and be an efficient mobile application. It requires a huge budget for the company to approach that stage. Pursuing this feat will exceed the current funding. But the application for Paywell is free to download from playstore for android.
- Operational feasibility- Paywell is currently available only as a mobile phone application and also runs only on android system. As the company is growing this system adaption will also expand into many other platforms and versions.
- Technical feasibility- to overcome the quality of the software the development life cycle need to have more and more testing. As the company is yet to grow they provide quality QA environment to their own premises.

5.2.3 Problem Solution Analysis

| Problem | Analysis | Solution | Constraints |
|--------------|-----------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------|---------------------|
| Platform | The application runs only on android at the moment. | Develop more suitable application that can run on multiple platforms. | Internet connection |
| Data Breach | The information provided by the merchant can be breached if the database is not secured. | Paywell has been marinating their own data base and inputs the users manually so that there can be more security | Internet connection |
| Tester Error | While testing for the functionality of the application sometimes there can be a mistake in the test cases | Assign more testing team for the same functionality of the application and check if their defect finding matches | QA environment |
| Registration | The registration process is still under development because one cannot register themselves. | Paywell needs to give access to the users for doing their registration | Internet connection |

Table 5.3: Problem Solution Analysis

5.2.4 Effect and Constraints Analysis

The user of the account or permissible for registering are only retailers as the company is still working on as a retailer based currently, and later on move to the consumer based. The user are merchants and they need to provide the picture of them with their shops and if they are not able to provide the picture of the shop the validity of being a retailer is reduced and that results to be not accepted. There is a collector for a group of users under a territory and they all report to the collector for the requirement of the guidelines and the collectors work as a via or medium for the company which also a process that sometimes result to miscommunication. The market expansion has also been reduced as the current pandemic situation is still at large and as a result the number of users are reduced to minimal.

5.3 System Design

5.3.1 Rich Picture

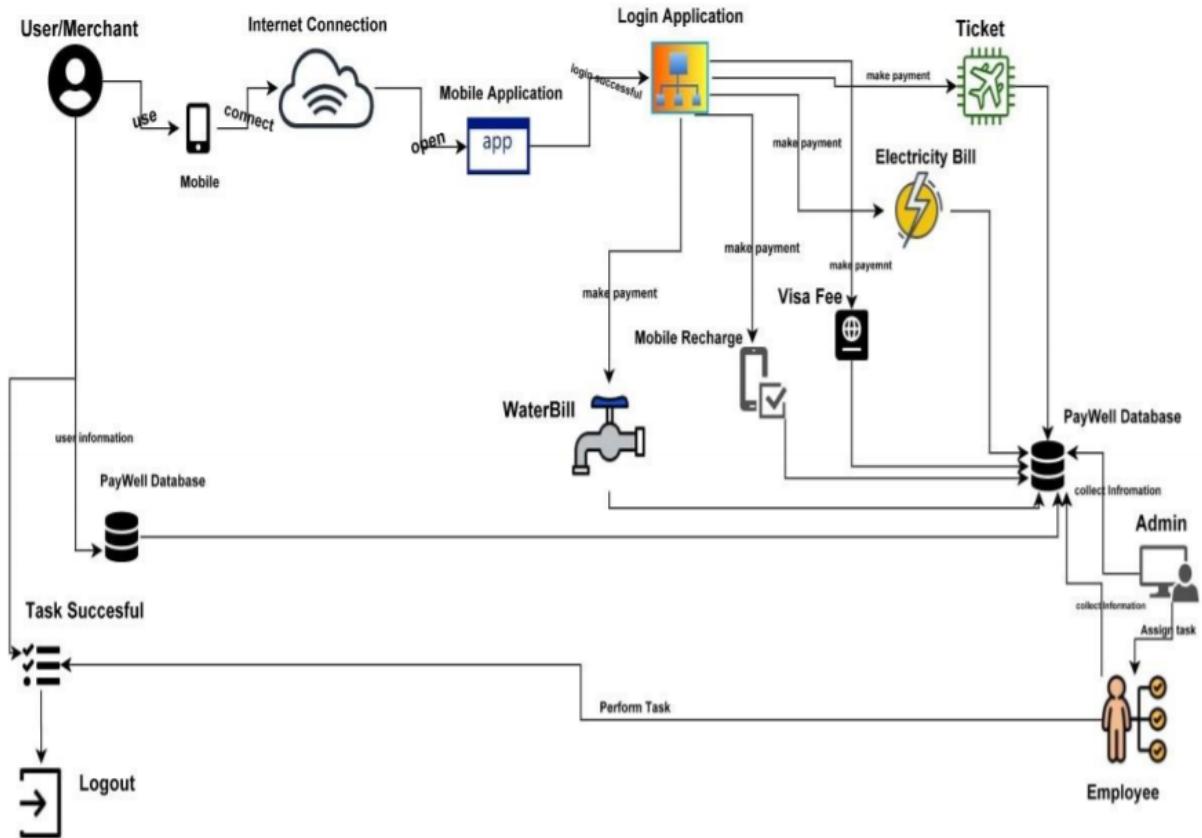


Figure 5.1: Rich Picture of the System

This is the rich picture containing the process of the system of the application of PayWell. First the user connects to internet with their mobile and perform the login and then do the necessary task that they require for example if they want to buy tickets from an agency and make payment to that agency. Another task can be pay the water bill, or electricity bill. Another task can be mobile recharge. After the task is performed the information is collected to the database of the company. The admin will have access to that data and after viewing the pending task the admin then assigns the task to employee to make connection of the user to the payment source after successful connection the task is carried out and if the user sees their operation is performed they can logout.

5.3.2 UML Diagrams

Use Case Diagram

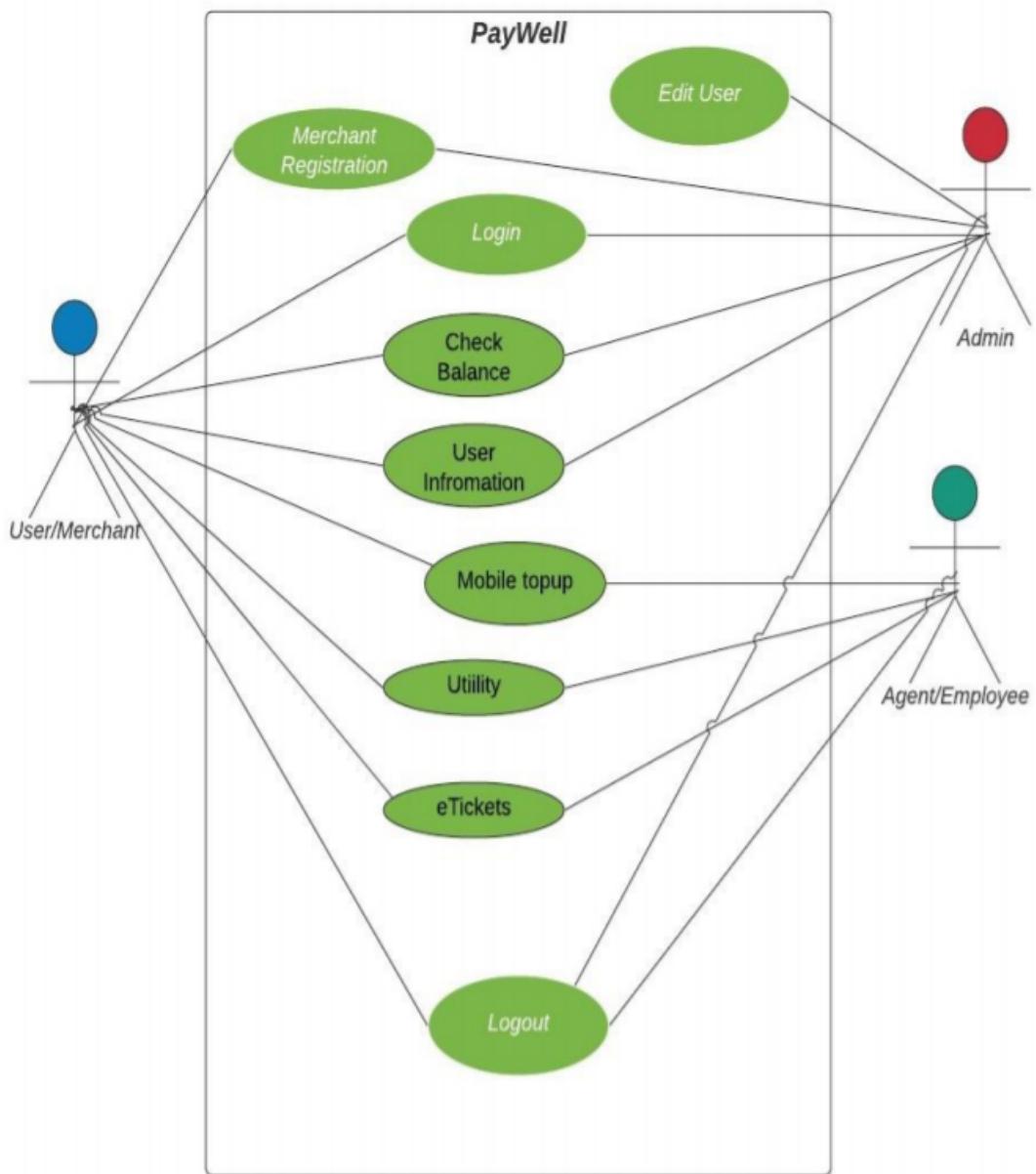


Figure 5.2: Use Case Diagram for the System

The use case diagram for the system shows the activity that can be done by the User, Admin and the Employee. The user can register, login, check balance and perform check balance and if appropriate balance can avail the services for the company application. The employee can check and track the activities and information of the user. Admin can add user, delete or edit user

Entity Relationship Diagram

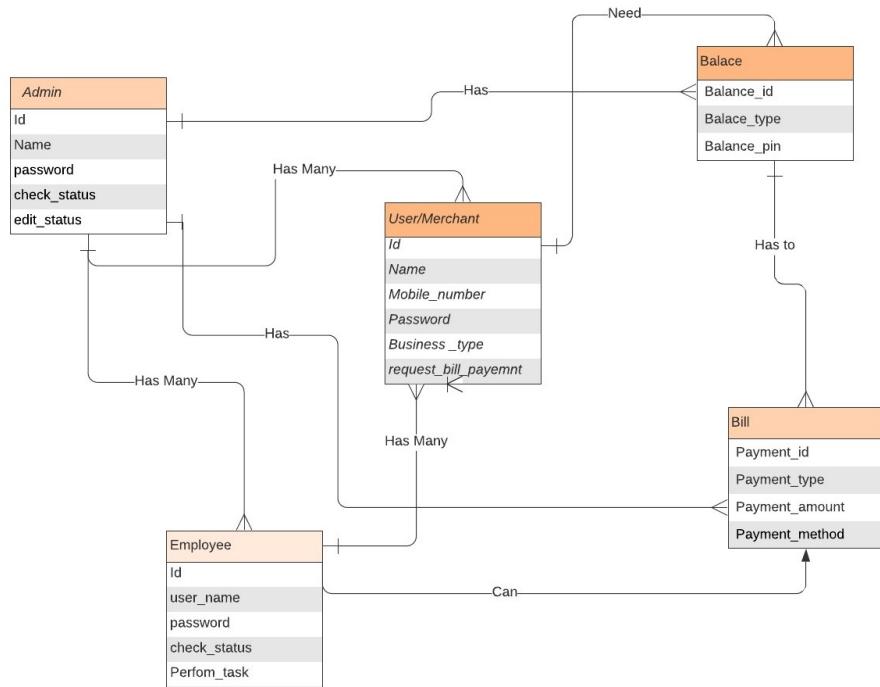


Figure 5.3: Entity Relationship Diagram for the System

The entity relationship diagram shows the relationship between the Admin, User and the employee. There can be many different user for the application. The user will have a unique identification number, password and mobile number. Also as the application is retailer based every merchant will have a retail store, The user and the employee has the ability to perform task and pay the bill, The admin can check balance and every user will have an individual balance.

Activity Diagram

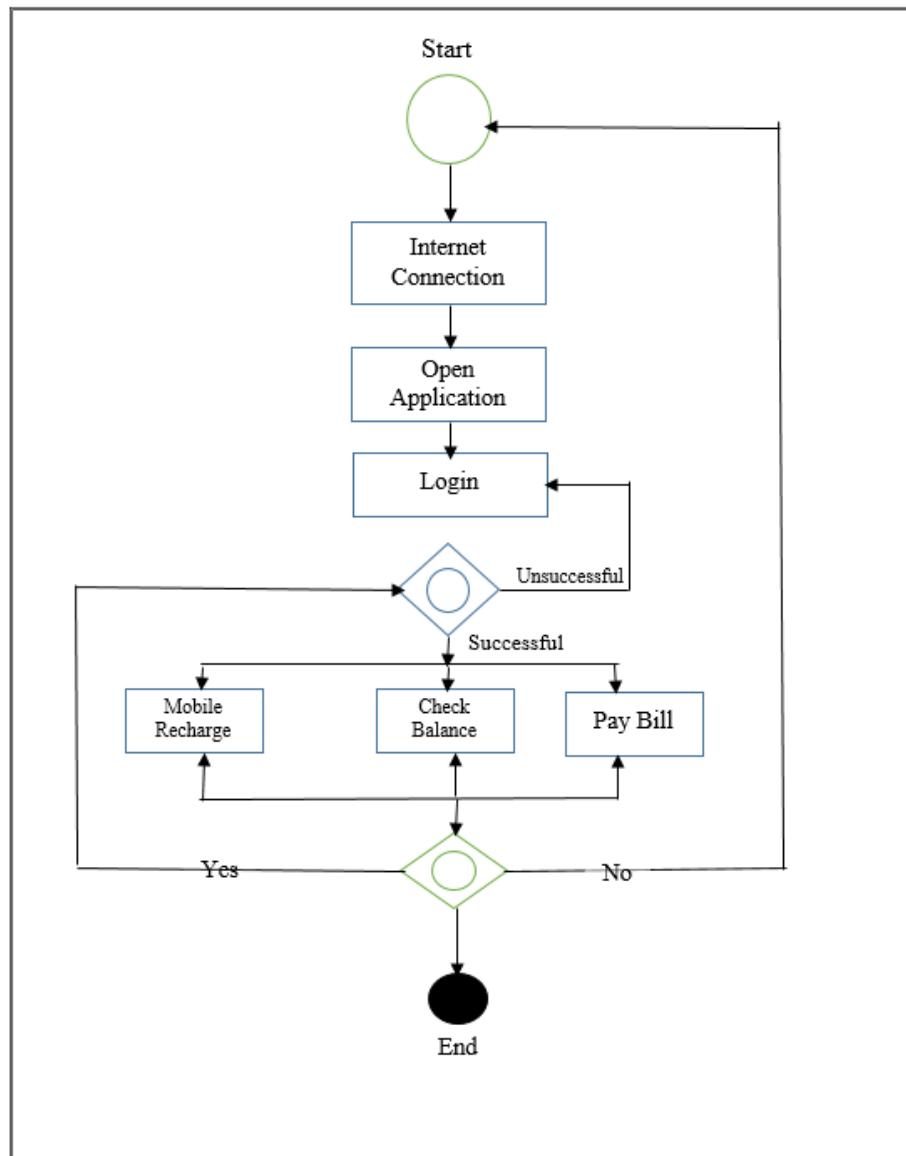


Figure 5.4: User/Merchant Login

User/Merchant:

- Connects Mobile to the internet.
- Opens the Paywell Application.
- Tries to login.
- Successful login will require correct user name and password.
- If the login is not successful the user will have to provide the correct information again.
- If the login in is successful the user can then perform.
- Paying the utility bills or a mobile recharge.
- After the task perform user can simply logout or close the application.
- End Task.

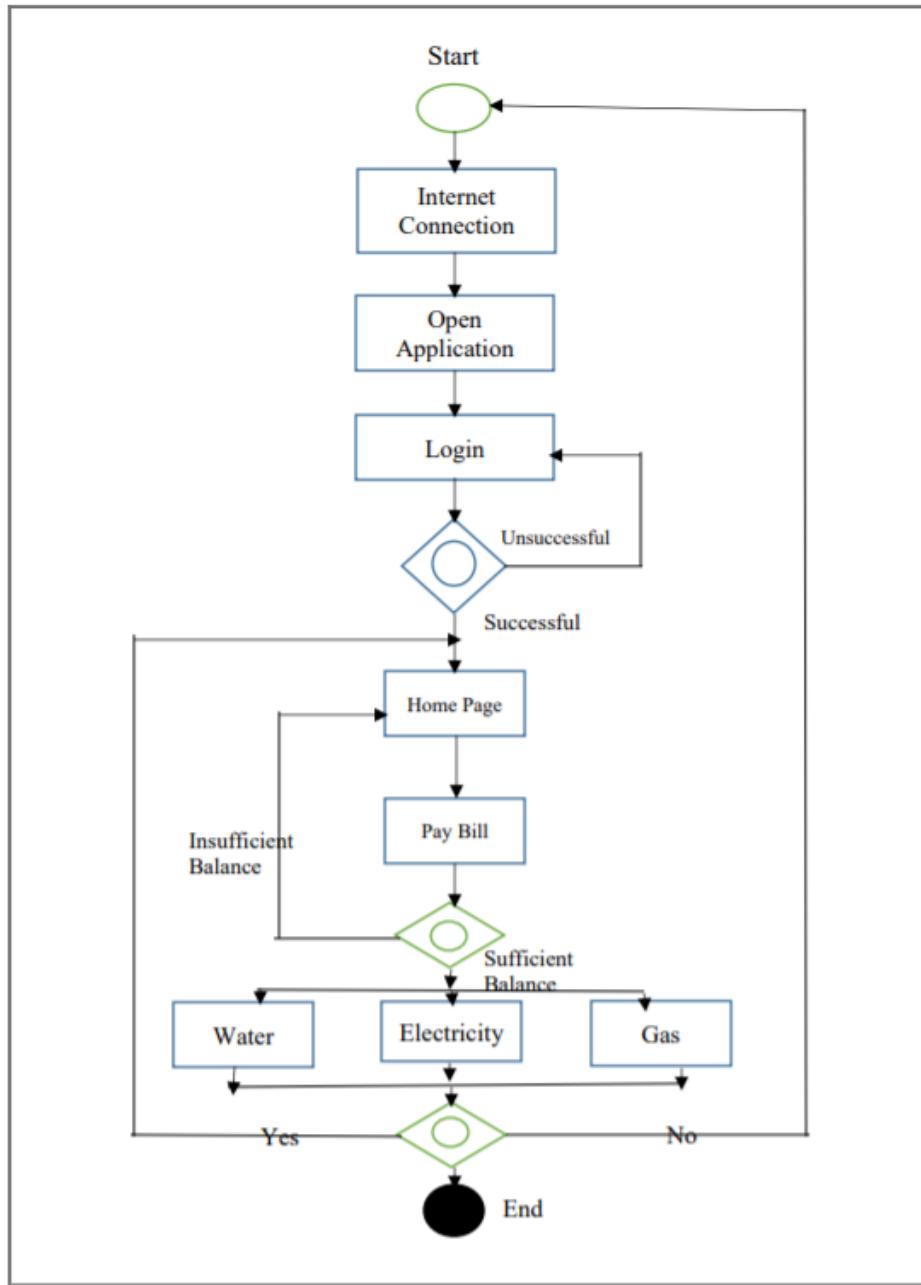


Figure 5.5: User/Merchant Pay Bill

User/Merchant Pay Bill:

- Connect the device to the internet.
- Open the mobile application.
- Perform the login operation.
- If the login is not successful then try again.
- After successful login homage option.
- From there pay bill.
- Select the option to pay bill.
- Electricity, water and gas bill.
- If enough balance bill payment successful.
- If not enough balance take to home page.
- After task successful, end task or logout.

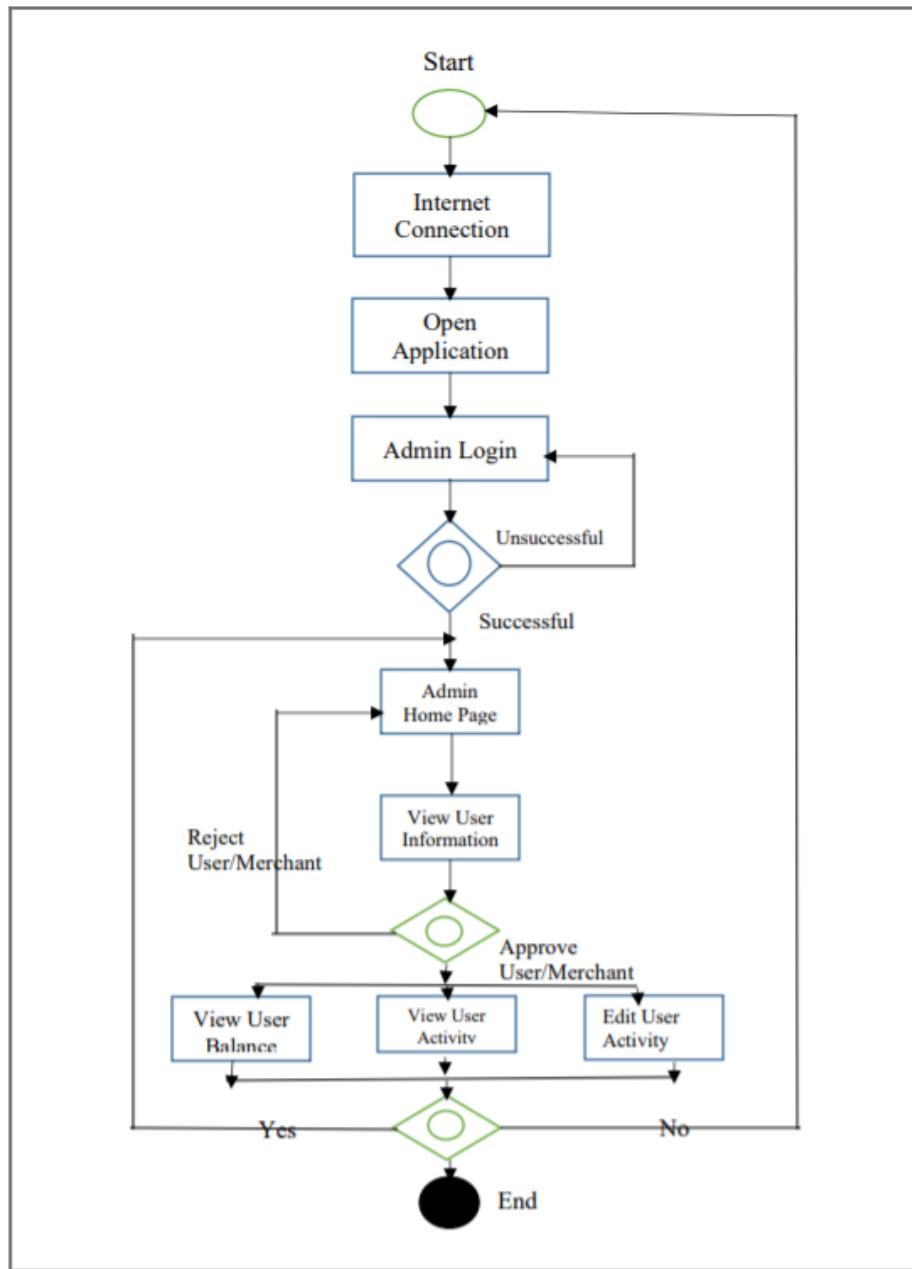


Figure 5.6: Admin Login activity

Admin Login activity

- Connect device to the internet.
- Open application.
- Perform login.
- After successful login.
- Admin homepage.
- View User/Merchant information.
- Approve User.
- Reject User.
- View User balance.
- View User Activity.
- Edit User activity.
- End task.

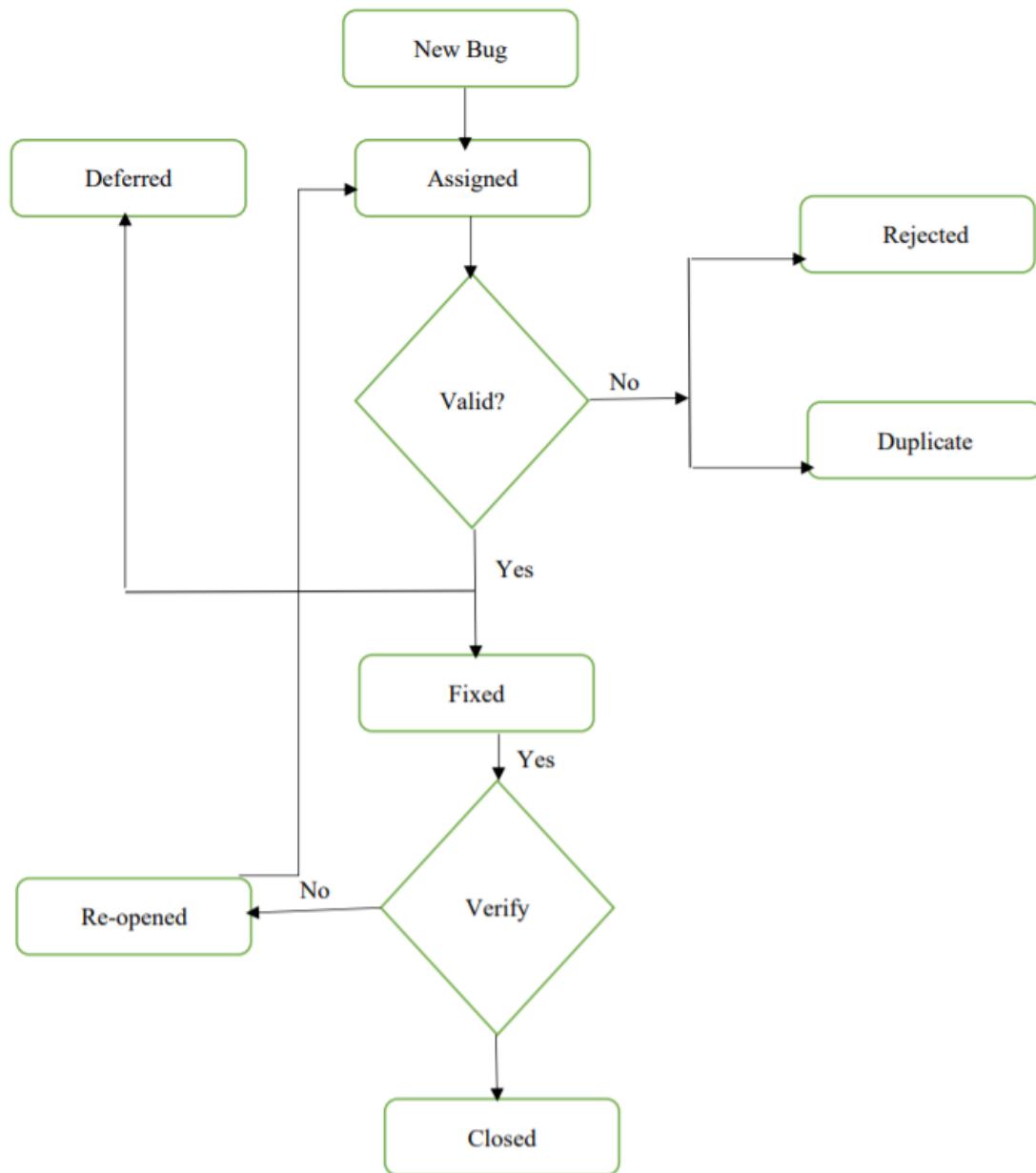
Flow Chart

Figure 5.7: Defect/Bug Life-Cycle

If any new bug or defect is found in the system while testing:

- The task is assigned to a developer to verify if the bug actually exist and what error it is giving.
- If the bug is not valid then the bug testing is declined or a duplicate is created.
- If the bug is valid then the developer will try fixing the bug by coding and solving the issue.
- If not fixed immediately the issue is deferred and kept to be resolved later.
- If not then it is fixed immediately and send for verification.
- If it's verified that it's fixed then the report is closed.
- If the bug is found to be still existing.
- Then the project is reopened again.

5.3.3 Functional and Non-Functional Requirements

Functional Requirements

| Name of the Function: Login | | |
|---------------------------------------------------------------|-------------------------------------------------------------------------------|---------------------------------------------------|
| Input: User/Merchant, Employee/Agent, Admin | Process: Has to provide Username, Password & Security Question/Answer. | Output: Will be able to enter to homepage. |
| Precondition: Mobile/Device connected to the internet. | | |
| Post-condition: Will be able to enter homepage. | | |
| Alternative: N/A | | |

Table 5.4: Login

| Name of the Function: Registration | | |
|------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------|
| Input: User/Merchant, Employee/Agent | Process: Has to fill up a form where need to provide Username, Password & Security Question/Answer, also business type and retailer information. | Output: An account will be created on that user name and password. |
| Precondition: Mobile/Device application downloaded from android play-store. | | |
| Post-condition: Will be able to enter homepage. | | |
| Alternative: Provide information to the company directly via email. | | |

Table 5.5: Registration

| Name of the Function: Check Balance | | |
|---------------------------------------------------------------------|----------------------------------------------------------|-------------------------------------------------------|
| Input: User/Merchant, Employee/Agent, Admin | Process: Click for check balance on the homepage. | Output: Will be able to see available balance. |
| Precondition: Mobile/Device connected to the internet. | | |
| Post-condition: Will be able to see the amount in taka. | | |
| Alternative: Request balance receipt from company via email. | | |

Table 5.6: Check Balance

| Name of the Function: Mobile Top-up | | |
|-------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------|----------------------------------------------------|
| Input: User/Merchant, Employee/Agent | Process: Has to provide Username, Password & Security Question/Answer, then from homepage click mobile top-up | Output: Will be able to have mobile top-up. |
| Precondition: Have to have sufficient balance. | | |
| Post-condition: Will be able to have top-up. | | |
| Alternative: N/A | | |

Table 5.7: Mobile Top-up

| Name of the Function: Utility Bill | | |
|-------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------|
| Input: User/Merchant, Employee/Agent | Process: Has to provide Username, Password & Security Question/Answer, then from homepage click utility bill. | Output: Will be able to pay gas, water, electricity bill. |
| Precondition: Have to have sufficient balance. | | |
| Post-condition: Will be able to have top-up. | | |
| Alternative: Call agent and pay bill. | | |

Table 5.8: Utility Bill

| Name of the Function: eTickets | | |
|------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------|
| Input: User/Merchant, Employee/Agent | Process: Has to provide Username, Password & Security Question/Answer, then from homepage click bus ticket. | Output: Will be able to buys bus, train tickets. |
| Precondition: Have to have available seats. | | |
| Post-condition: Will be able to book tickets. | | |
| Alternative: N/A | | |

Table 5.9: eTickets

| Name of the Function: View User Information | | |
|-------------------------------------------------------------|------------------------------------------------------------------------------------------------------------|----------------------------------------------------------|
| Input: Admin | Process: Has to provide Username, Password & Security Question/Answer, click view user information. | Output: Will be able to see the user information. |
| Precondition: Mobile device connected to internet | | |
| Post-condition: Will be able to see user information | | |
| Alternative: N/A | | |

Table 5.10: View User Information

| Name of the Function: Edit User Information | | |
|--------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------|
| Input: Admin | Process: Has to provide Username, Password & Security Question/Answer, click view user information, click edit information. | Output: Will be able to edit/add/delete user information. |
| Precondition: Mobile device connected to internet | | |
| Post-condition: Will be able to edit user information | | |
| Alternative: N/A | | |

Table 5.11: Edit User Information

Non-Functional Requirements

- Usability Requirements:

The interface for all the users admin/agent/merchant for all of them should be very easy to understand and perform task.

- Space Requirements:

The application needs only 33mb of space and a 2 GB RAM in a mobile phone.

- Performance Requirements:

The application can be downloaded for android system free, only from google play store.

- Portability requirement:

The application can be opened through web portal from any browser.

- Security Requirements:

The application needs a valid mobile phone number and valid retailer information only. All the information are stored in Paywell own database and has access to that only themselves.

- Response Time:

The application is very easily available and works very fast if the internet speed is good.

- User Interface:

The application is very easy and user friendly and well guided with references and pointing by pictures.

5.4 Product Features

5.4.1 Input

The main objective for the company application is to make it very user friendly and have a standard GUI so that it can be attractive. The application is also tried to be made as cost effective as possible. It is available as a mobile application that can be downloaded from play-store free and also currently been worked for the I'Os platform for the future versions.

The QA automation testing is performed to check the functionality from the web portal of the company website itself. Java programming language is used for the automation as Selenium Web driver has an option for Java programming. Here is a synopsis of an automation performed for launching the Web browser, then go to the login page and provide all the necessary information and perform a mobile top-up with that user account.

Code:

```
package co.paywell;

import java.util.concurrent.TimeUnit;

import org.openqa.selenium.By;
import org.openqa.selenium.JavascriptExecutor;
import org.openqa.selenium.WebDriver;
import org.openqa.selenium.WebElement;
import org.openqa.selenium.chrome.ChromeDriver;
import org.openqa.selenium.interactions.Actions;

public class LaunchBrowser {

    public static WebDriver driver = null;

    public static void main(String[] args) throws
InterruptedException{
        //---->Setup Chromedriver<-----\
        System.setProperty("webdriver.chrome.driver",
"D:\\Java_Pro\\FirstProject\\Driver\\chromedriver.exe");
        driver = new ChromeDriver();
        driver.manage().timeouts().implicitlyWait(15,
TimeUnit.SECONDS);

        driver.navigate().to("https://www.paywellonline.com/");
        driver.manage().window().maximize();
        String title = driver.getTitle();

        if(title.equalsIgnoreCase("Amazon.in"))
            System.out.println("Title Matches!");
        else
            System.out.println(title);
    }
}
```

```

    //---->Go to Login Page<-----\\
    driver.findElement(By.xpath("//*
[@id=\"navbarSupportedContent\"]/ul/li[7]/a")).click();
    driver.manage().timeouts().implicitlyWait(15,
TimeUnit.SECONDS);

    //---->Input Login Information<-----\\
    driver.findElement(By.xpath("//*
[@id=\"phone\"]")).sendKeys("*****");
    driver.findElement(By.xpath("//*
[@id=\"pin\"]")).sendKeys("****");

    //---->Get Text of Security Question<-----\\
    String tagname = " ";
    tagname = driver.findElement(By.xpath("//*[@id=\"login-
form\"]/div/div[4]/label")).getText();
    System.out.println(tagname);

    char[] ch = new char[tagname.length()];
    int x=0;
    int y=0;

    //---->Extract First Value of Security Question<-----\\
    for (int i = 20; i < 21; i++) {
        ch[i] = tagname.charAt(i);
        x = Integer.parseInt(String.valueOf(ch[20]));
        System.out.println(x);
    }

    //---->Extract Second Value of Security Question<-----\\
    for (int j = 22; j < 23; j++) {
        ch[j] = tagname.charAt(j);
        y = Integer.parseInt(String.valueOf(ch[22]));
        System.out.println(y);
    }

    //---->Add Both the Values and Login<-----\\
    int z= x+y;
    System.out.println(z);

    driver.findElement(By.xpath("//*
[@id=\"securityAnswer\"]")).sendKeys(String.valueOf(z));
    driver.findElement(By.xpath("//*[@id=\"btnLogin\"]")).click();

    driver.manage().timeouts().implicitlyWait(15,
TimeUnit.SECONDS);

```

```
//---->Single Topup<-----\\

driver.findElement(By.xpath("//html/body/section[3]/div/div[2]/div/div[3]/div/a/div/div/h5")).click();
    driver.findElement(By.xpath("//*[@id=\"mobile_nol\"]")).sendKeys("01621808744");
        driver.findElement(By.xpath("//*[@id=\"operator\"]")).click();
        driver.findElement(By.xpath("//*[@id=\"operator\"]/option[5]")).click();
            driver.findElement(By.xpath("//*[@id=\"amount1\"]")).sendKeys("1");
                driver.findElement(By.xpath("//*[@id=\"checkRechrgList\"]")).click();
                    driver.findElement(By.xpath("//*[@id=\"chkRechrgModal\"]/div/div/div[3]/button[1]")).click();

//---->Bulk Topup<-----\\
driver.findElement(By.xpath("//*[@id=\"topupdifferbulk\"]")).click();

    }
```

5.4.2 Output

The output for the automation testing was recorded and attached for the visual understanding.

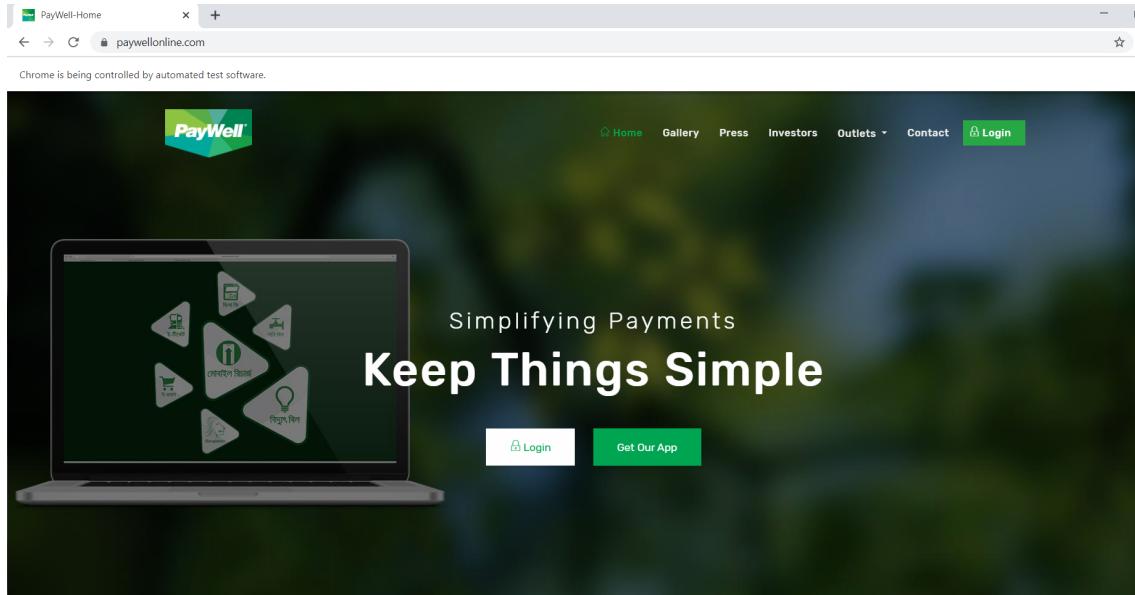


Figure 5.8: PayWell Web page

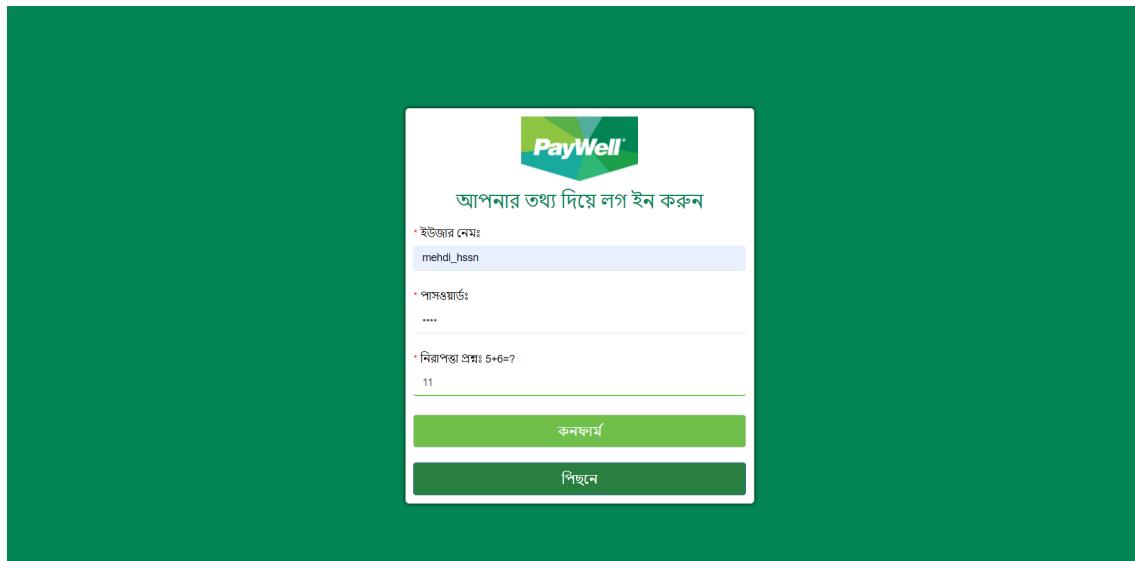


Figure 5.9: PayWell Login

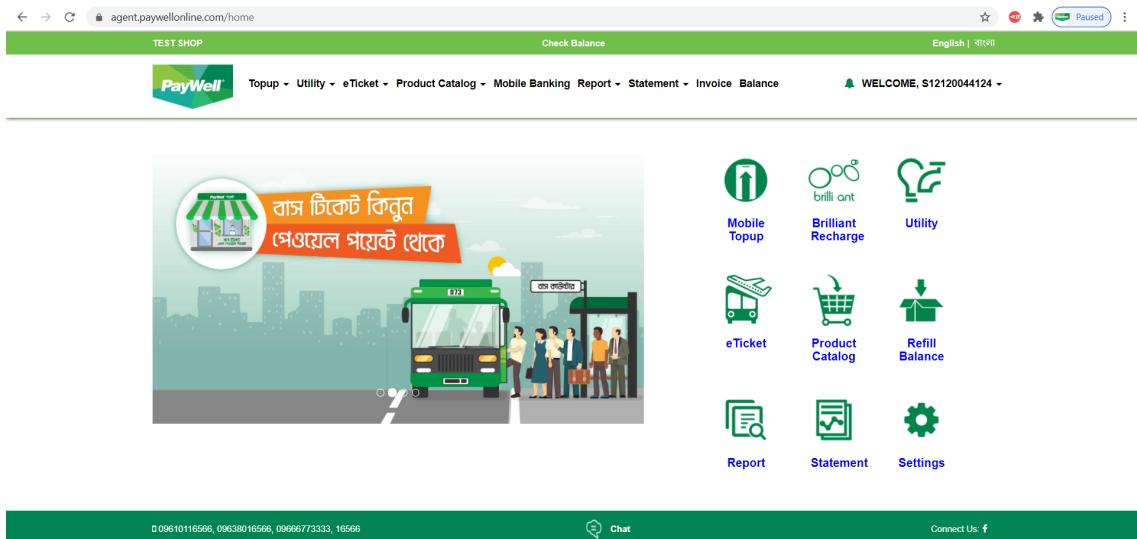


Figure 5.10: PayWell Agent Homepage

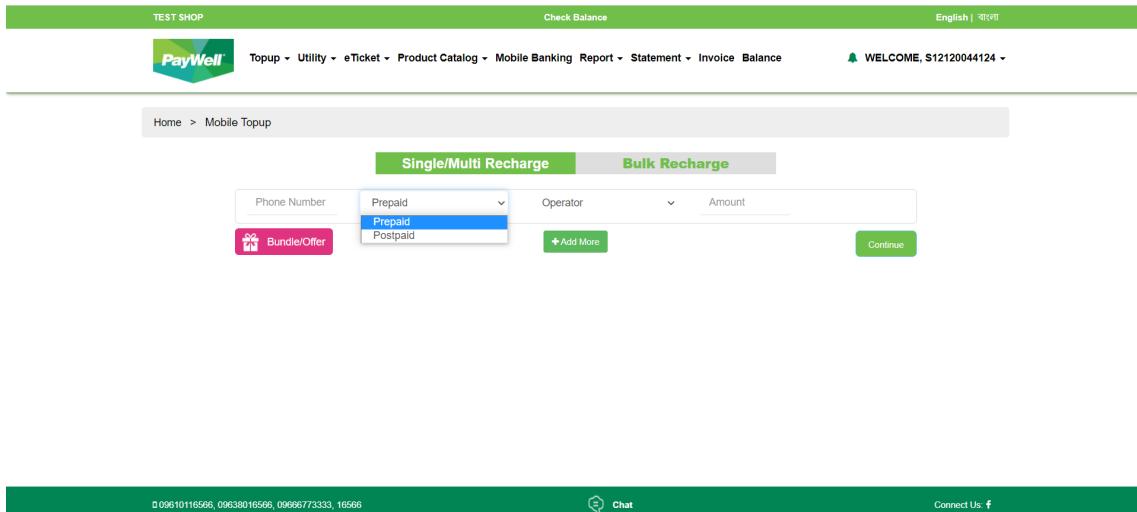


Figure 5.11: Top-Up Method

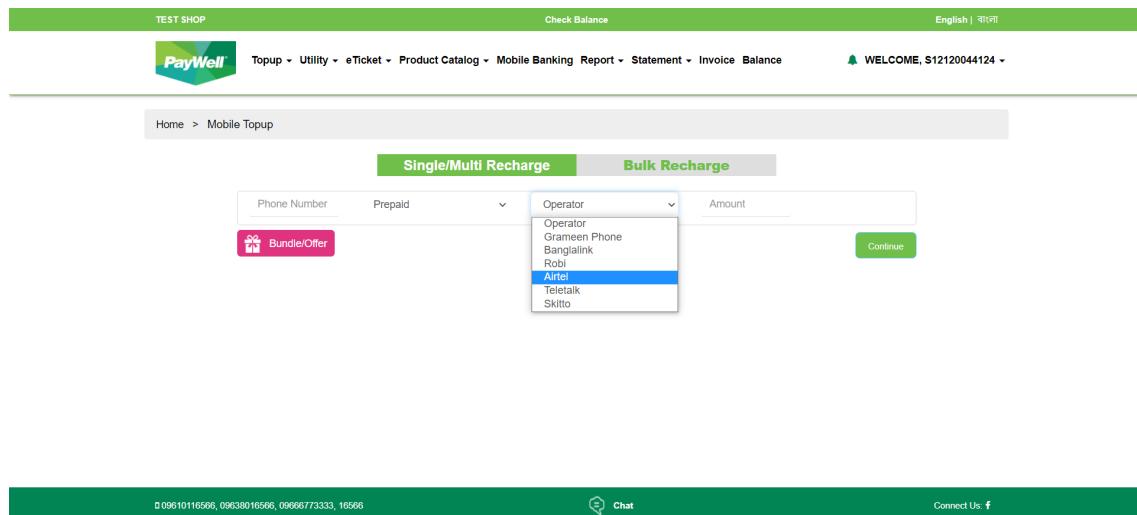


Figure 5.12: Top-Up Method

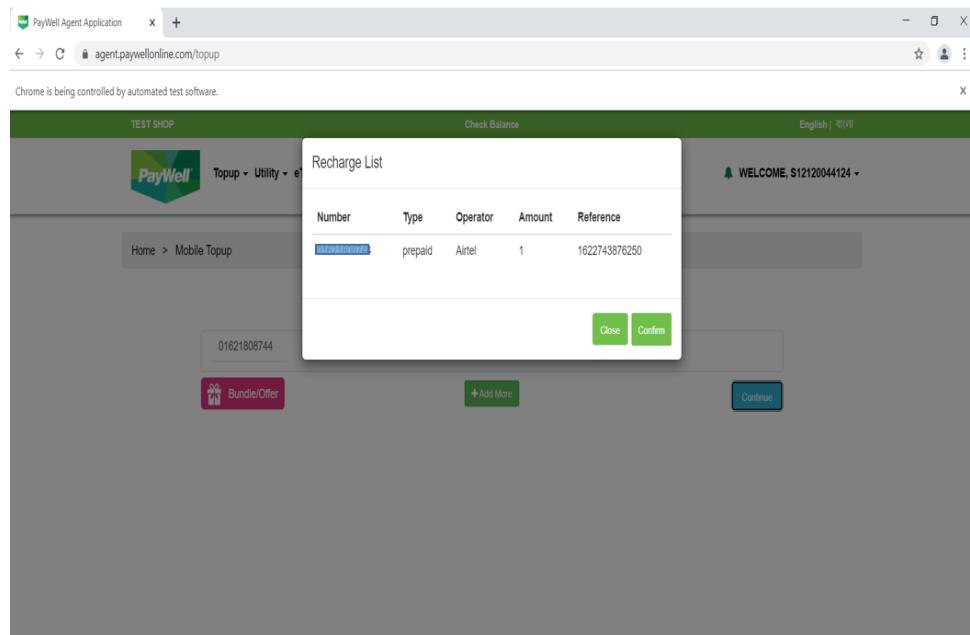


Figure 5.13: Recharge

Also some other functionality output of the project from the mobile application is displayed.



Figure 5.14: eTicket

There is an eTicket service for the users too. This consist of two medium of transportation one is Bus and the other is plane. The region of travel is limited inside the country. The user can choose any means for transportation ticket and that can booked online.

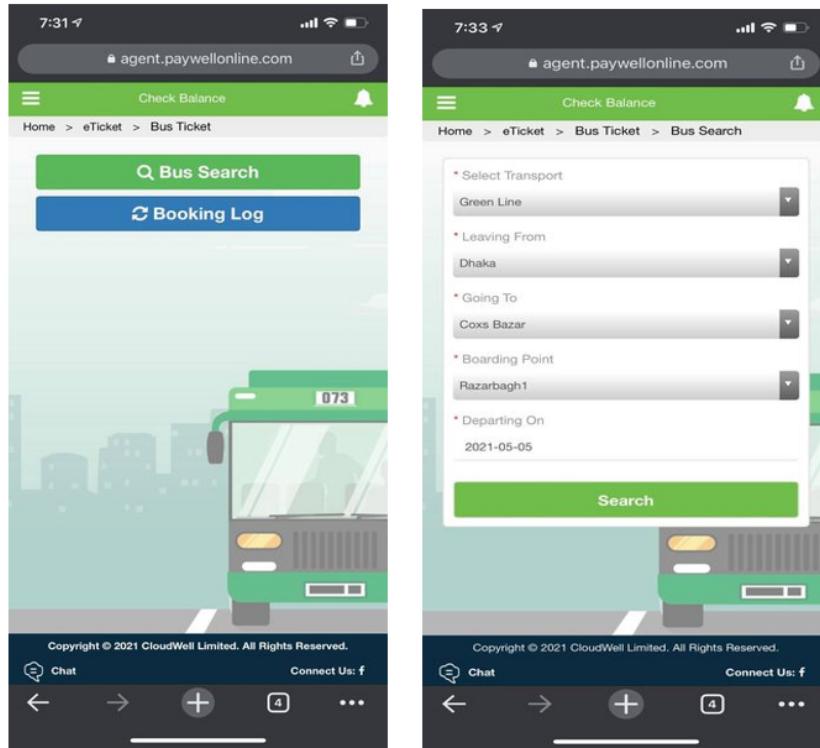


Figure 5.15: Bus List

If the Bus tickets is selected, there will be an option to select a Bus service operator as a search option. A list of options will be provided. The operator of the Bus name will be mentioned as for the preference for the user. The field for location can be selected from where the pick off will take place and also the drop off location can be specified. After providing these information a date is selected and the option for the Bus on that date will be shown with other information.

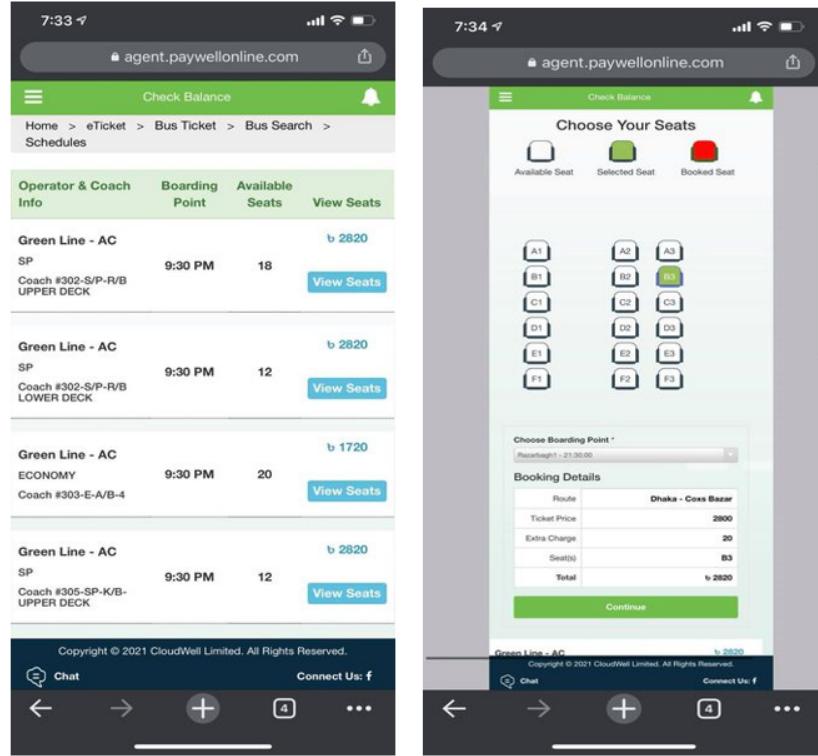


Figure 5.16: Bus List and Seat Availability

After the details of preference provided by the user a list of Bus service available for that company with the timing to leave and arrive and also with price will be displayed. A selecting option as to view seats is given, if the user finds the timing and price suitable can then look into the seating arrangement of the Bus. The available seat in the Bus is shown after with the interior view of the bus and the user can rethink or confirm the seat and Book the ticket.

5.4.3 Architecture

The one-stop solution application for Paywell is constructed with the Client-server architecture because the system for this application is distributed. This architecture takes request and provides service over a network also the jobs are done independently by the components.

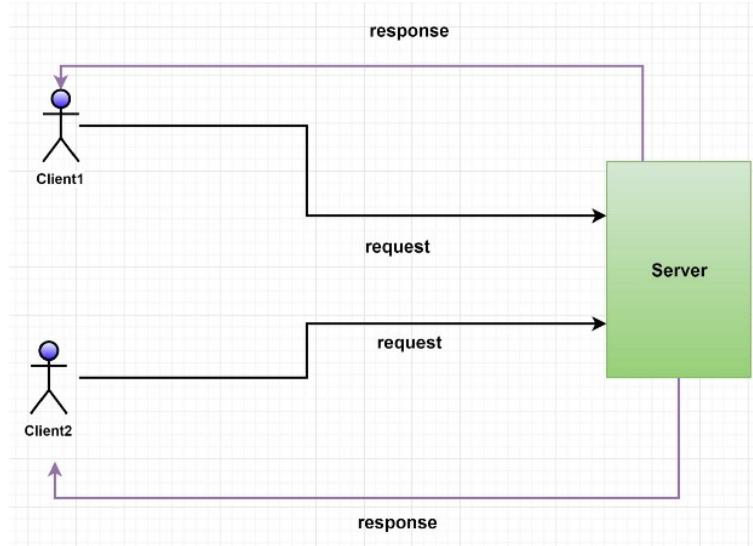


Figure 5.17: Client Server Model

Client – A piece of software or application that takes the input from the user and sends requests to the servers.

Server – A piece of software that receives and processes requests from clients and send response according to request.

Load balancer – It is responsible for distributing incoming network traffic or requests across a group of backend servers to optimize server usage and prevents any individual server from becoming overloaded with requests.

Middleware– It is a set of drivers, API's and software component which improve the connection between server and client.

IP Address – IP Address stands for internet protocol address, It is the address of network hardware. It helps in connecting servers and clients.

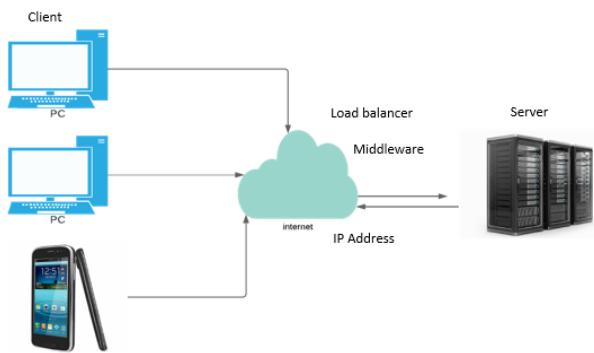


Figure 5.18: Client Server Architecture

Basic flow in the client-server architecture:

- Client requests data from the server
- Load balancer receives the request and routes the request to the appropriate server
- Server processes the requesting client
- Server queries the appropriate database for some data
- Database returns the queried data back to the server
- The server processes the data and sends the data back to the client
- This process repeats.

Chapter 6

Results & Analysis

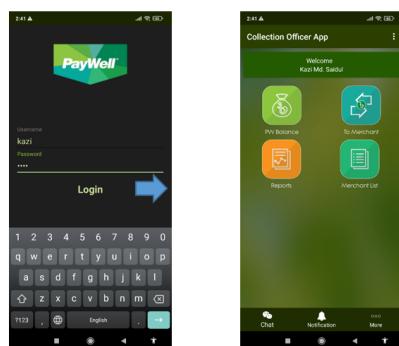
The company application is already launched but not on full scale with the optimum potential of the system. Many features are yet to be added and worked on. As this application needs maintenance the company has workers performing all the Quality Assurance themselves. The User Acceptance Test (UAT) is performed by the company itself too. The application to be more effective and with less errors the testing is done. The functionality test are done with occupying a considerate amount of time period. While working on the internship many test cases were performed by me, and one of the UAT is displayed here. It contains the test case executions and the analysis with the result and screenshots. This testing was executed on the collector application with the mobile phone provided by the company, conducting the execution as a collector (User) for the application.

1. Test Name: CO app

Description: Login to CO app

Steps:

| Steps | Test Steps | Expected Result | Actual Result | Test Status |
|-------|---------------------------------------------|--------------------------------|---------------------------|-------------|
| 1 | Navigate to Login page | Should show login page | Shows login page | Pass |
| 2 | Input correct username and correct password | Should login and show homepage | Logins and shows homepage | Pass |



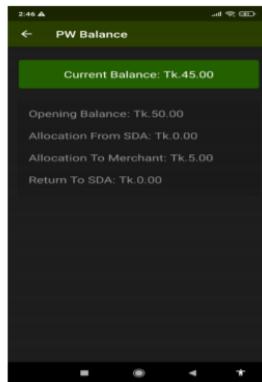
The data findings has two steps performed for the login. To navigate upon click the expected result matches with the actual result where the login page is shown and there is no defect. After using a correct name and password the login home page is shown so there is no error.

2. Test Name: PW Balance

Description: Functionality of PayWell Balance

Steps:

| Steps | Test Steps | Expected Result | Actual Result | Test Status |
|-------|---------------------------------|----------------------------------|----------------------------|-------------|
| 1 | Click on PayWell Balance button | Should show PayWell Balance page | Shows PayWell Balance page | Pass |



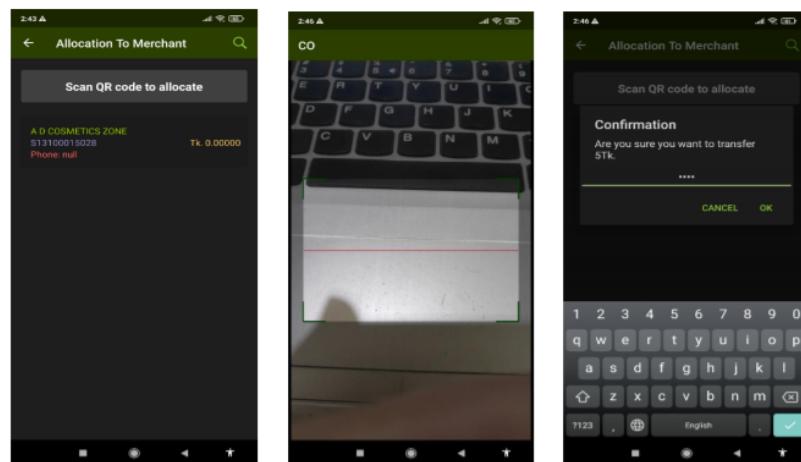
The second execution was done for checking the Paywell Balance. The functionality for this testing showed no error as the Balance page was shown after requested to be shown. Here the current balance is 45tk for ths current user. If the Balance shows 0, that means the user have no balance.

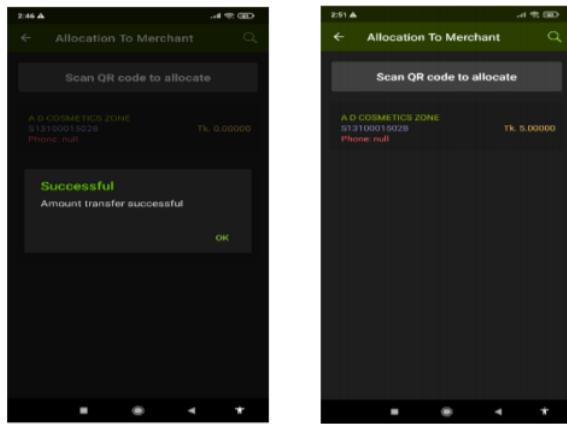
3. Test Name: To Merchant

Description: Functionality of Allocating to Merchant

Steps:

| Steps | Test Steps | Expected Result | Actual Result | Test Status |
|-------|-----------------------------------------|--------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------|-------------|
| 1 | Click on To Merchant button | Should show Allocation To Merchant page | Shows Allocation To Merchant page | Pass |
| 2 | Click on Scan QR cod to allocate button | Should open camera to scan QR code | Opens camera to scan QR code | Pass |
| 3 | Click on any merchant to allocate | Should ask for amount | Asks for amount | Pass |
| 4 | Input amount 5 and then click on Ok | Should ask for PIN number | Asks for PIN number | Pass |
| 5 | Input PIN number and click on OK | Should complete the allocation process successfully and the input amount should be added to the Merchant's balance | Completes allocation process successfully and the input amount should be added to the Merchant's balance | Pass |





The next check is performed on merchant allocation. After clicking the Merchant button the result showed no error. The Scar QR and the pin input was also checked and no defect was shown so this test passed.

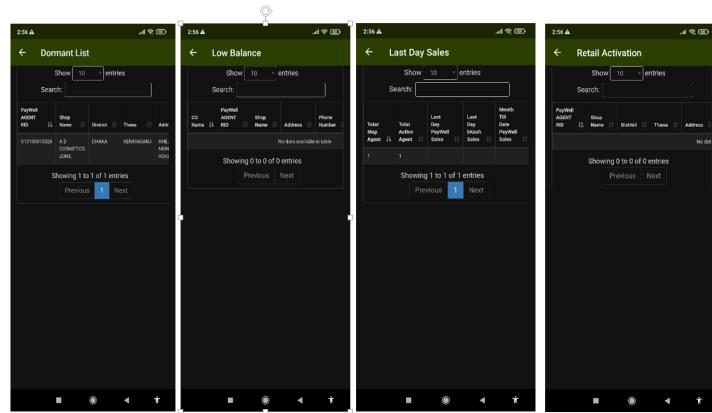
4. Test Name: Report Statements

Description: Check whether all the statements and reports work properly

Steps:

| Steps | Test Steps | Expected Result | Actual Result | Test Status |
|-------|----------------------------|------------------------------|-----------------------------------------|-------------|
| 1 | Click on 'Reports' | Should open Reports page | Opens Reports page | Pass |
| 2 | Click on 'Dormant List' | Should show Dormant List | Shows Dormant List | Pass |
| 3 | Click on 'Low Balance' | Should show Low Balance List | Shows Low Balance Table but no Data | Fail |
| 4 | Click on 'Last Day Sale' | Should show Last Day Sale | Shows Last Day Sale table but no data | Fail |
| 5 | Click on 'Activation List' | Should show Activation List | Shows Activation List table but no data | Fail |

The next check was performed for the reports and statements. After clicking the Reports it opened the report page so no error. The dormant list was also shown upon click. After clicking low balance the expected result was to show a balance list page. Here the list was shown but no data appeared, this indicates that error has been found And therefore this was documented and screenshot ate taken for visual demonstration. The last daily sale also showed a table but without any data and therefore listed as error. For the activation list similar findings surfaced and another defect. All of these defects are recorded to report back to the team lead.



5. Test Name: Notification

Description: Check whether you get notification after returning

Steps:

| Steps | Test Steps | Expected Result | Actual Result | Test Status |
|-------|-------------------------|---------------------------|-------------------------------------------------|-------------|
| 1 | Click on 'Notification' | Should show notifications | Shows No Data Found as there is no notification | Pass |

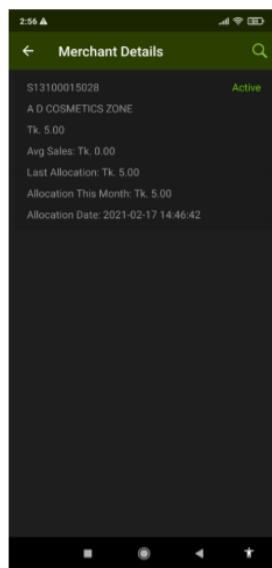
No screenshots were taken as for this user the notification was empty and noting to show but there were no error found.

6. Test Name: Merchant List

Description: Show details about Merchant

Steps:

| Steps | Test Steps | Expected Result | Actual Result | Test Status |
|-------|--------------------------|----------------------------------------------------------------|----------------------------------------------------------|-------------|
| 1 | Click on 'Merchant List' | Should open Merchant List page and show details about merchant | Opens Merchant List page and show details about merchant | Pass |



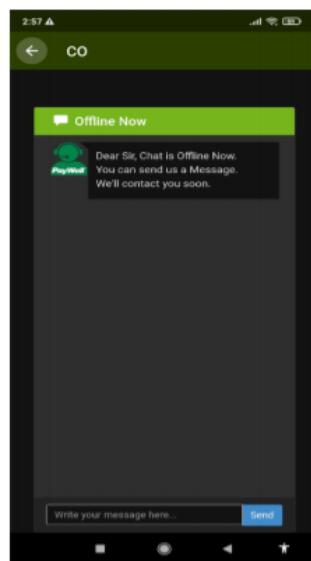
The merchant list had no functionality error as the expected result matched with the actual result. Upon clicking the Merchant list page was shown with the details of that merchant.

7. Test Name: Chat

Description: Check whether you can send message and get message

Steps:

| Steps | Test Steps | Expected Result | Actual Result | Test Status |
|-------|-----------------|----------------------|----------------|-------------|
| 1 | Click on 'Chat' | Should open chat box | Opens chat box | Pass |
| 2 | Send message | Should send message | Sends message | Pass |



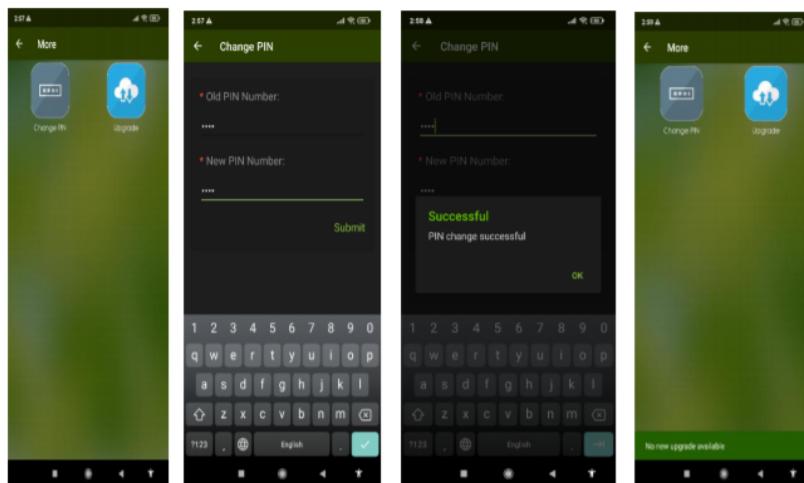
After clicking chat a chat box opened showing a message for the user and guiding to an information. So no functionality defect was found.

8. Test Name: More Option

Description: Check the functionality of all the functions under More Option

Steps:

| Steps | Test Steps | Expected Result | Actual Result | Test Status |
|-------|------------------------------------------------|------------------------------------|----------------------------------|-------------|
| 1 | Click on 'More' | Should open More page | Opens More page | Pass |
| 2 | Click on 'Change PIN' | Should ask for Old PIN and New PIN | Asks for Old PIN and New PIN | Pass |
| 3 | Input Old PIN and New PIN then click on Submit | Should change the PIN | Changes the PIN | Pass |
| 4 | Click on 'Upgrade' | Should show upgrade if available | Shows 'No New Upgrade Available' | Pass |



For the more option several functionality check was performed. The more button gave the expected result and opened the more page. The change pin asked for the old pin and new pin as expected to the actual result. The upgrade button showed no upgrade available as currently there is no latest update given.

Analysis

These results and data findings are documented with the details in a table. The table consists the steps with the sequence. The expected result from the action and the Actual result. The status information is given as pass or fail here. If any defect is found it is given as a failure. Usually a priority is given but here, after this report is submitted to the team lead. The lead then decides after analyzing the report the priority to solve the defect and inform the developers addressing the defect and asking for the solution. After analyzing this test report the issue addressed was minimal as one few functionality defect was found. These issues are currently being solved and on the next build we will have to check for that.

Load Testing

Thread Sample: 1 User

T/S: 2

Input Successful Rate: 100%

| Label | Samples | Average | Min | Max | Std. Dev. | Error % | Throughput | Received KB/sec | Sent KB/sec | Avg.Bytes |
|-----------------------------------------------------|---------|---------|------|------|-------------|---------|-------------|-----------------|-------------|-----------|
| https://pwldtest.paywellonline.com/login_action.php | 1 | 1628 | 1628 | 1628 | 0 | 0 | 0.614250614 | 249.8632333 | 2.678348626 | 416540 |
| https://pwldtest.paywellonline.com/admin/home.php | 1 | 18 | 18 | 18 | 0 | 0 | 55.5555556 | 261.9357639 | 218.9127604 | 4828 |
| Test | 1 | 1646 | 1646 | 1646 | 0 | 0 | 0.354987575 | 146.074614 | 2.94667421 | 421368 |
| TOTAL | 3 | 1097 | 18 | 1646 | 763.2392955 | 0 | 1.064962726 | 292.1492279 | 5.89334842 | 280912 |

Thread Sample: 10 Users

T/S: 0.8

Input Successful Rate: 100%

| Label | Samples | Average | Min | Max | Std. Dev. | Error % | Throughput | Received KB/sec | Sent KB/sec | Avg.Bytes |
|-----------------------------------------------------|---------|---------|-----|-----|-------------|---------|-------------|-----------------|-------------|-------------|
| https://pwldtest.paywellonline.com/login_action.php | 10 | 355 | 288 | 424 | 32.21319605 | 0 | 8.41028932 | 3421.171941 | 36.67242693 | 416540 |
| https://pwldtest.paywellonline.com/admin/home.php | 10 | 16 | 9 | 24 | 5.589275445 | 0 | 1.292824822 | 6.986051632 | 5.09428531 | 5533.4 |
| Test | 10 | 371 | 297 | 448 | 35.92840102 | 0 | 1.122712473 | 462.7608114 | 9.319390648 | 422073.4 |
| TOTAL | 30 | 247 | 9 | 448 | 166.0528698 | 0 | 3.36813742 | 925.5216227 | 18.6387813 | 281382.2667 |

Thread Sample: 50 Users

T/S: 0.3

Input Successful Rate: 98%

| Label | Samples | Average | Min | Max | Std. Dev. | Error % | Throughput | Received KB/sec | Sent KB/sec | Avg.Bytes |
|-----------------------------------------------------|---------|---------|-----|------|-------------|---------|-------------|-----------------|-------------|-------------|
| https://pwldtest.paywellonline.com/login_action.php | 50 | 1994 | 532 | 6488 | 1025.786185 | 0.14 | 7.206687806 | 2904.428904 | 30.92879567 | 412691 |
| https://pwldtest.paywellonline.com/admin/home.php | 50 | 19 | 0 | 32 | 6.511558953 | 0.16 | 3.796218966 | 45.22942805 | 13.68633326 | 12200.28 |
| Test | 50 | 2014 | 542 | 6517 | 1027.526035 | 0.3 | 3.294241666 | 1366.889217 | 26.01440767 | 424891.28 |
| TOTAL | 150 | 1342 | 0 | 6517 | 1256.459131 | 0.2 | 9.882724997 | 2733.778433 | 52.02881535 | 283260.8533 |

Thread Sample: 100 Users

T/S: 0.16

Input Successful Rate: 87%

| Label | Samples | Average | Min | Max | Std. Dev. | Error % | Throughput | Received KB/sec | Sent KB/sec | Avg.Bytes |
|-----------------------------------------------------|---------|---------|-----|------|-------------|---------|-------------|-----------------|-------------|-------------|
| https://pwldtest.paywellonline.com/login_action.php | 100 | 4368 | 712 | 8932 | 1753.168477 | 0.22 | 10.69976461 | 4011.988229 | 43.27480088 | 383959.47 |
| https://pwldtest.paywellonline.com/admin/home.php | 100 | 95 | 0 | 4233 | 440.907954 | 0.24 | 6.731287022 | 271.0288956 | 22.07625496 | 41230.39 |
| Test | 100 | 4463 | 713 | 8952 | 1690.801733 | 0.41 | 6.037189085 | 2506.788654 | 44.21704497 | 425189.86 |
| TOTAL | 300 | 2975 | 0 | 8952 | 2488.638523 | 0.29 | 18.11156725 | 5013.577308 | 88.43408993 | 283459.9067 |

Thread Sample: 200 Users

T/S: 0.14

Input Successful Rate: 81.5%

| Label | Samples | Average | Min | Max | Std. Dev. | Error % | Throughput | Received KB/sec | Sent KB/sec | Avg.Bytes |
|-----------------------------------------------------|---------|---------|-----|-------|-------------|-------------|-------------|-----------------|-------------|-------------|
| https://pwldtest.paywellonline.com/login_action.php | 200 | 6929 | 171 | 19418 | 4056.968567 | 0.485 | 9.922603691 | 3224.092121 | 35.56691401 | 332722.18 |
| https://pwldtest.paywellonline.com/admin/home.php | 200 | 711 | 0 | 7715 | 1796.490213 | 0.255 | 7.680786513 | 663.8458778 | 24.12862077 | 88503.72 |
| Test | 200 | 7641 | 814 | 19439 | 3444.479455 | 0.605 | 7.214226455 | 2967.59671 | 48.52187263 | 421225.9 |
| TOTAL | 600 | 5094 | 0 | 19439 | 4494.975888 | 0.448333333 | 21.64267936 | 5935.19342 | 97.04374527 | 280817.2667 |

Thread Sample: 500 Users

T/S: .148

Input Successful Rate: 76.8%

| Label | Samples | Average | Min | Max | Std. Dev. | Error % | Throughput | Received KB/sec | Sent KB/sec | Avg.Bytes |
|-----------------------------------------------------|---------|---------|-----|------|-------------|-------------|-------------|-----------------|-------------|------------|
| https://pwldtest.paywellonline.com/login_action.php | 500 | 527 | 0 | 8133 | 961.3307017 | 0.26 | 7.058736393 | 2466.659482 | 25.16493626 | 357328.12 |
| https://pwldtest.paywellonline.com/admin/home.php | 500 | 87 | 0 | 1661 | 177.4021034 | 0.34 | 6.85617124 | 621.6747034 | 19.88183871 | 92849.912 |
| Test | 500 | 614 | 0 | 8133 | 950.4170761 | 0.538 | 6.734006734 | 2960.451073 | 43.50086806 | 450178.032 |
| TOTAL | 1500 | 409 | 0 | 8133 | 820.2605054 | 0.379333333 | 20.20174812 | 5920.822405 | 87.00056439 | 300118.688 |

Analysis

The load testing is performed to check the efficiency of the usage of the application upon the user. Here the thread samples are the number of users and it is checked that on an average how much user can be active without the application or the server giving no error. For 1 user to 50 users the performance was very high as it was around 98 to 100 percent without any error. For every 100 users there was an error for 13 users as the number of users increased the error percentage also increased. From 500 users to 3000 users active at a time the error percentage was in the range of 70. The overall result was stipulated the application server has an input success rate of 94.5 percent. The outcome was summarized as a satisfactory result.

Chapter 7

Project as Engineering Problem Analysis

7.1 Social and Environmental Effects and Analysis

This company's main focus is to create a very user friendly one-stop virtual solution that will exist with features that includes paying all the necessary utility bill and expenditure of this sorts online through this application. Though this are trivial tasks that includes to our daily lives but often small to big organization find it quite a hassle to do this type of necessary tasks. Day by day everything is getting digitized and this venture follows the digital protocol that saves the time in performing this tasks very easily just by logging into to the application and selecting the bill to pay or buy tickets and getting the task complete in a very short time. Also given the current situation and the world is under the global pandemic. It is very tough or risky for the elderly people and also now days the younger people are at risk to get infected too. In this dire situation maximum companies has shifted their work online and which include some utility bill payments too. So this application will be there to solve this kind of situation where it will be easier for the customers to be able to easily pay the bills online through this application.

7.2 Addressing Ethics and Ethical Issues

The only purpose to collect the merchant/user data is to give them access to the application. The user/merchant provides their user name, their mobile number and their retail business type and their name and registration number. The data is reserved as confidential and the database is restricted to the admin and few of the employees. The data is used to give the user the access to their profile activation. The user has the right at all times to close the account and by closing the account it will delete their information form the company database. Upon the request of the user or the deletion of the profile. If the user asks their data to be removed the company then deletes their data and account activation along with other details. So there is no ethical hazard or any risk of information miss use.

Chapter 8

Future Work & Conclusion

8.1 Future Works

Paywell is right now working on their application and testing for new features by analyzing the market demand and constantly taking reviews and suggestions from the clients that are already affiliated with the company. Their aim is to launch the application into IO's system. The application Graphical User Interface (GUI) is been worked on too. In making the application more user friendly and more easy to use. By adding more features that also act as guides while surfing through the application. The company application and the one-stop solution services is currently based on the retailer market based only. The future works will majorly include the application be consumer based too and make it more user friendly and available in maximum platform. Right now they have limited employees but few of them are vastly experienced and the company is under good hands.

8.2 Conclusion

Though the work has been brief and also the situation is not in the favor as the Covid-19 plague is still on the go. The company limitations were vastly acting. Most of the field related work has been restricted to minimal. But amidst all the obstacle it was a pleasure for me to work for Paywell and work on my report which includes a lot of hard work and sleepless nights.

Working at Paywell provides the intern with the following benefits:

- Community work experience.
- Development of organizational, administrative, and entrepreneurship skills, in the advancement of any specialist and employee's career
- The value of time and punctuality.
- Time management skills.
- Time dedication when doing every task.

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