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BDBL HR & Payroll Management (Mobile Application)

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Independent University, Bangladesh

Department of Computer Science & Engineering

Internship Report on

BDBL HR & Payroll Management

(Mobile Application)

at

OPUS Technology Limited

Submitted by

Nabil Akhunjee, 1720430

Submitted to

Ms. Ajmiri Sabrina Khan, Lecturer

Department of Computer Science and Engineering

Independent University, Bangladesh

24 January 2023

Autumn 2022

Attestation

I, Nabil Akhunjee, certify that all the work is done by me and completely original. Any resources used are acknowledged with references. This report is submitted in fulfillment of the internship requirement for the Bachelor of Science in Computer Science degree at Independent University, Bangladesh. The report has been completed under the guidance of Ms. Ajmiri Sabrina Khan (internal supervisor), Mr. Ashfaq Mahmud (organizational supervisor). It has been constructed to serve as documentation for my internship experience at Opus Technology Ltd.

Sincerely,



Nabil Akhunjee
ID# 1720430
1720430@iub.edu.bd

Acknowledgement

I would like to start by appreciating Almighty Allah for giving me strength and perseverance to complete this report.

I am grateful to my internal supervisor Ms. Ajmiri Sabrina Khan, Lecturer, Independent University, Bangladesh. She had provided me with the necessary guidance and suggestions to complete this internship report.

I am also thankful to my organizational supervisor and project manager Mr. Ashfaq Mahmud, senior app developer Mr. Farhad Hossen as well as everyone from Opus Technology Ltd who assisted me in adapting in a professional environment and completing my internship successfully.

Lastly, I appreciate Independent University, Bangladesh and all of the respected faculty and staff members who were the essential part of my bachelor degree in Computer Science.

Letter of Transmittal

24 January 2023
Ms. Ajmiri Sabrina Khan
Lecturer
Department of Computer Science and Engineering
Independent University, Bangladesh
Bashundhara R/A, Dhaka 1229, Bangladesh

Subject: Submission of the internship report.

Good day,
I am immensely thankful for the opportunity to submit the internship report on 'BDBL HR & Payroll Management App'. This report is based on the project I worked on during my internship period at Opus Technology Ltd. Throughout my internship I achieved various relevant skills and implemented them professionally.

I have made significant effort while preparing this report and I believe the purpose of this report is served feasibly. I appreciate your cooperation and providing me the opportunity to submit my report.

Sincerely,
Nabil Akhunjee
ID# 1720430
1720430@iub.edu.bd

Evaluation Committee



Signature

Name Mr. Sanzar Adnan Alam

Internal Examiner-1 / Panel Member-1



Signature

Name Mr. Sarwar Shahidi

External Examiner-2 / Panel Member-2

Signature

Name

Ajmiri Khan

Supervisor of the intern

Signature

Name Dr. Mahady Hasan

Head, Department of Computer Science & Engineering

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Chapter 1: Introduction

1.1 Overview

Opus Technology Ltd is a leading Software Development and IT consulting service provider globally. Combining unparalleled experience, domain expertise, best practices & comprehensive capabilities across various industries & business functions, it collaborates with customers to help them effectively address their operational challenges & grow their businesses stronger.

The project “BDBL HR & Payroll Management” is a mobile app for android and iOS. This app is being developed for Bangladesh Development Bank Limited (BDBL) to maintain Employee attendance, salary and performance easily. Also, employees can apply for leave and employers can manage through this application.

1.2 Objectives

- Employees can submit attendance and the time and location of the employee will be stored on the database. Employees can select the reason for being late as well where it applies.
- Employees can apply for leave and check the status of their application through the notification system.
- Employers can view the list of employees and their designations, as well as their attendance time and performance.
- Employers can manage applications submitted by the employees and update their status.
- Employers can manage payroll and generate pdf according to the need.

1.3 Scopes

- Sign In — Employees and Employers can sign in with their user id and password
- Dashboard — Once signed in, the app will traverse to Dashboard. For employers, there will be options for HRM, Payroll, Attendance, Leave application, Profile. Some options will be limited for employees.
- HRM page — Employers can view active employees and observe attendance and leave applications.
- Payroll page — Employers can maintain Payroll Report, Staff Loan Report, Salary Certification, PF Statement
- Attendance page — On this page, the user needs to allow location permission and enable the device location system. Late reason will be available for late submissions.
- Leave application page — To apply for leave and check status of the application
- Profile page — Shows details of employee.
- Auto Sign Out — If the app is not used for more than a minute, it will be signed out automatically.

Chapter 2: Literature review

2.1 Relationship with undergraduate studies

The app is being developed using Flutter framework, which uses Dark programming language. We are using the MVC (Model View Controller) pattern which is related to Object Oriented Programming. The System Analysis and Design course taught us about the Software Development Life Cycle, which made planning and understanding the early development stage easier.

The Mobile Application Development course helped me a lot to get into android development, which played a vital role in getting an opportunity for the internship as an application developer. I have done several projects and one team project, which are helping with my internship project.

Use of Rest API and MySQL, local database taught on Web Applications Development and Database Management System, also coming in handy.

2.2 Related works

The project I am working on is an HR and Payroll Management Application. There is a similar application being used in my organization called Opus ERP System. The key difference is that on my project there will be no local database, all data will be stored on BDBL's server only. So, the app will only be able to be used under active internet connection, where OpusERP saves some required data locally and the app works offline with limited options. Also, on my project there will be an option to generate reports based on employer's requirement and save them as pdf format.

Chapter 3: Project Management and Financing

3.1 Work Breakdown Structure

Work breakdown structure (WBS) is a method which is used to organize a multi-step project by dividing the steps into multiple parts and maintaining the project efficiently.

A brief overview of our project WBS—

- Requirement Analysis
    - Point out the company's requirements
    - Planning
- UI/UX Design
    - System Architecture
    - UML Diagram
    - Rich Picture
    - Polish UI for better experience
- Development
    - Setting relevant SDK and Tools
    - Git repository
    - Development of both Frontend & Backend
    - Set up Database Server
    - Initial features
- Testing
    - Testing core mechanism
    - Observing UI
    - Identify & fix bugs
    - Client feedback
- Deployment
    - Preview version
    - Review & Approve by client
    - Deploy & Release

3.2 Process/Activity wise Time Distribution

The approximate time allocation for the project:

- Requirement Analysis — 2 Weeks
- UI/UX Design — 2 Weeks
- Development — 4 Weeks
- Testing — 3 Weeks
- Deployment — 1 Week

3.3 Gantt Chart

Gantt chart is used for visualizing the project steps and schedules across the development timeline. The list of activities and Timescale is on the left side and on the top of the chart, respectively.

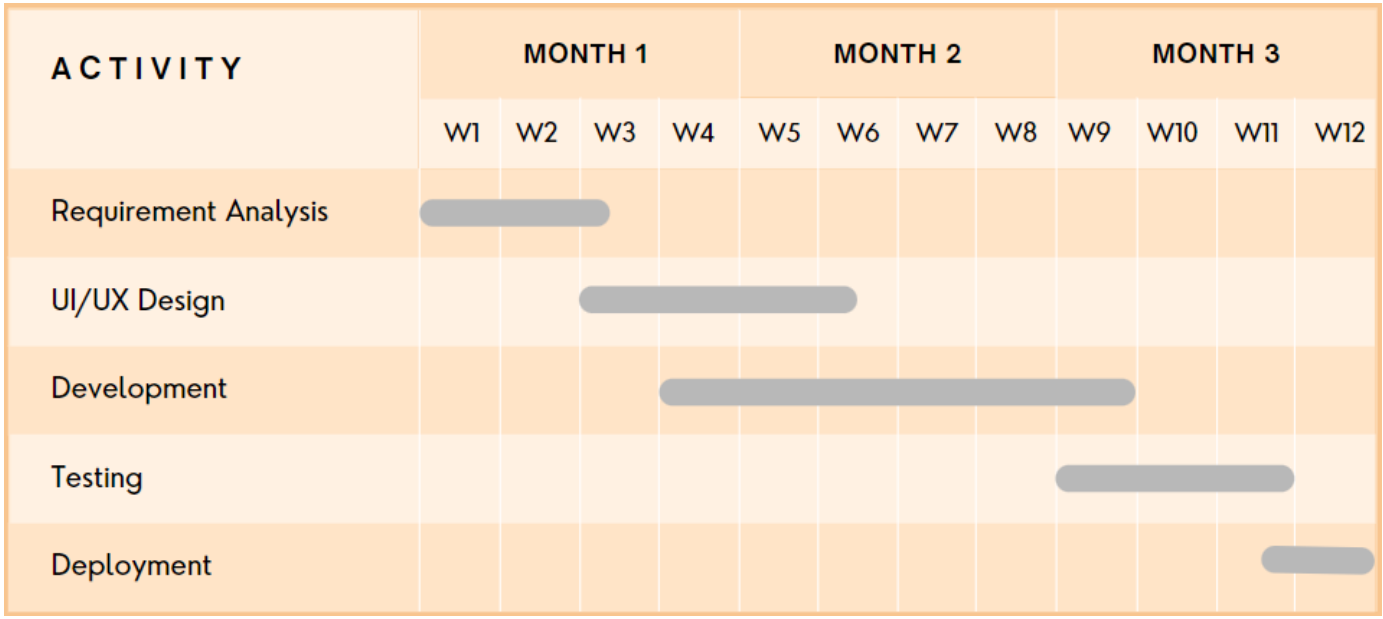

Figure 3.3: Gantt Chart

3.4 Process/Resource wise Resource Allocation

- **Requirement Analysis:** In this stage, we observed and discussed the requirements and expected functionalities of the application.
- **UI/UX Design:** The designer proposed the UI design of the application and I replicated the design on Flutter using Dart language.
- **Development:** We are developing the core structure of the application. After that, we will connect it with the database server.
- **Testing:** Once the application is nearly complete, we will test if the application works as expected or not. The client will review and approve the app at this stage.
- **Deployment:** Once the application works correctly, and the client approved, we will release the application to use for the users.

Chapter 4: Methodology

The systems development life cycle (SDLC) is a phase in project management which classifies different stages through specific methodologies and user activities. Out of many great methodologies, we chose Agile methodology for its simplicity and effectiveness.

Agile methodology involves continuous development, improvement with team participation and early stage delivery. With this approach, we can react quickly based on client requirements while sticking to the original development plan.

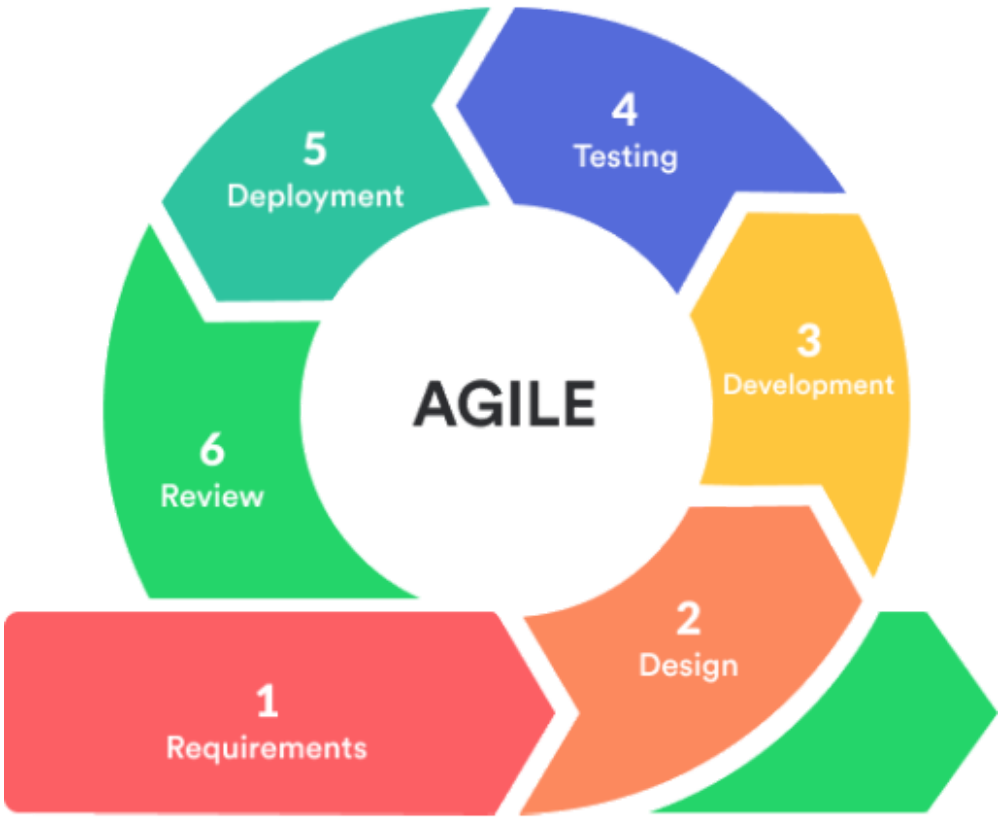

Figure 4.1: Stages of Agile methodology

Some principles of Agile Methodology—

- Satisfy clients by delivering project on early stage
- Continuous development in small increments regularly
- Able to implement any changes to the project during any stage of development
- Client cooperation over contract negotiation

(Rog, 2021)

Chapter 5: Body of the Project

5.1 Work Description

The web version and database is being developed by other team members. My job is to develop the mobile version of the application. We used the Flutter framework, which is cross-platform so we can develop for both Android and IOS at the same time. We have developed a frontend that is smooth and user friendly. On the backend we have used API calls for CRUD operations (Create, Read, Update and Delete) on the database. Dart Programming Language is used on both Frontend and Backend.

5.2 Requirement Analysis

We arranged a meeting with the client and discussed the project's basic requirements. The functions of the application to develop. Understanding the client expectations from the project. The importance of each function and the scope of the project.

After that, we designed a basic frontend and developed a proposed prototype. In another meeting we have updated the proposed application and finalized the requirements. (Rana, 2020)

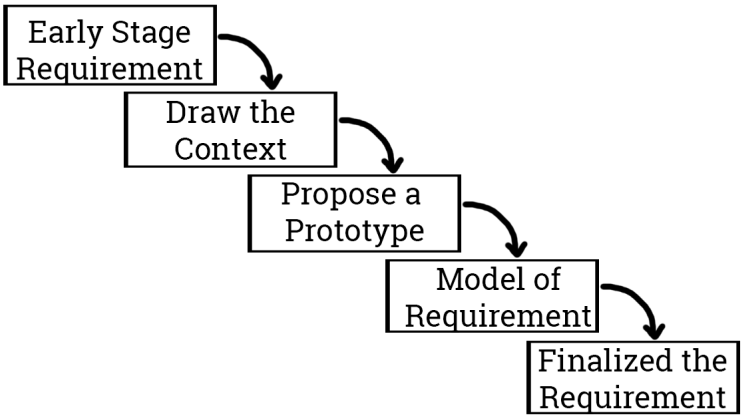

Figure 5.2: Requirement Analysis

5.3 System Analysis

System Analysis is the process of monitoring the system for development, where it requires specific observations based on the architectural design of the project.

5.3.1 Six Element Analysis

Process	Human	Non Computing Hardware	Computing Hardware	Software	Database	Network
Login	Admin, Employee	N/A	Mobile (Android or IOS)	Mobile Application	MySQL	Internet
View Users	Admin	N/A	Mobile (Android or IOS)	Mobile Application	MySQL	Internet
Apply Attendance	Admin, Employee	N/A	Mobile (Android or IOS)	Mobile Application	MySQL	Internet
Apply Leave	Admin, Employee	N/A	Mobile (Android or IOS)	Mobile Application	MySQL	Internet
View Own Statements	Admin, Employee	N/A	Mobile (Android or IOS)	Mobile Application	MySQL	Internet
View Any User's Statements	Admin	N/A	Mobile (Android or IOS)	Mobile Application	MySQL	Internet

5.3.2 Feasibility Analysis

A Feasibility Study is conducted to determine which system will be better to fulfill the performance requirements. It involves conducting initial assessment of the project and deciding whether the planned project will be beneficial to the organization or not. The decisions of our project were taken into consideration on following feasibility studies—

- **Technical feasibility**: This feasibility considers both hardware and software needs. Along with this, the study examines technical skills and capabilities of the technical team of the project. We have all the software and hardware requirements available to us and our technical team is capable of developing the project.
- **Economic Feasibility**: Here we determine the cost and benefits of the project. A detailed cost of the project was generated.
- **Legal Feasibility**: At the beginning of the project, all legal constraints were assessed to ensure that it wouldn't meet legal requirements.
- **Operational Feasibility**: Our application needs to be working on all the android and IOS devices. We have to ensure that the user experience is optimal in different screen sizes. Also, users will use the application from anywhere using the internet. The project has to satisfy these needs.
- **Schedule Feasibility**: We have to maintain a schedule to ensure accomplishment of the project based on client requirements.

(Asana, 2022)

5.3.3 Problem Solution Analysis

As a native android developer, I had to learn the Flutter framework before starting to work on this project. The project is created based on the MVC architecture. As I am familiar with MVVM architecture already, I have learned the MVC architecture in no time. The Dart language on Flutter is familiar with Kotlin, so it was not hard to understand. We also maintain the project on GitHub. Hence, I had to become efficient on maintaining projects on git. I have learnt and still learning while contributing to the project. The courses of university and online resources helped a lot on this journey.

5.3.4 Effect and Constraints Analysis

We need to provide services to the clients as flexible as possible. We have faced some limitations during the project development. Time constraints, we have to complete the project in a limited time. It was not easy to maintain time while the client was demanding minor changes in the requirements. Also, we have to complete the project on a fixed budget.

5.4 System Design

5.4.1 Rich Picture

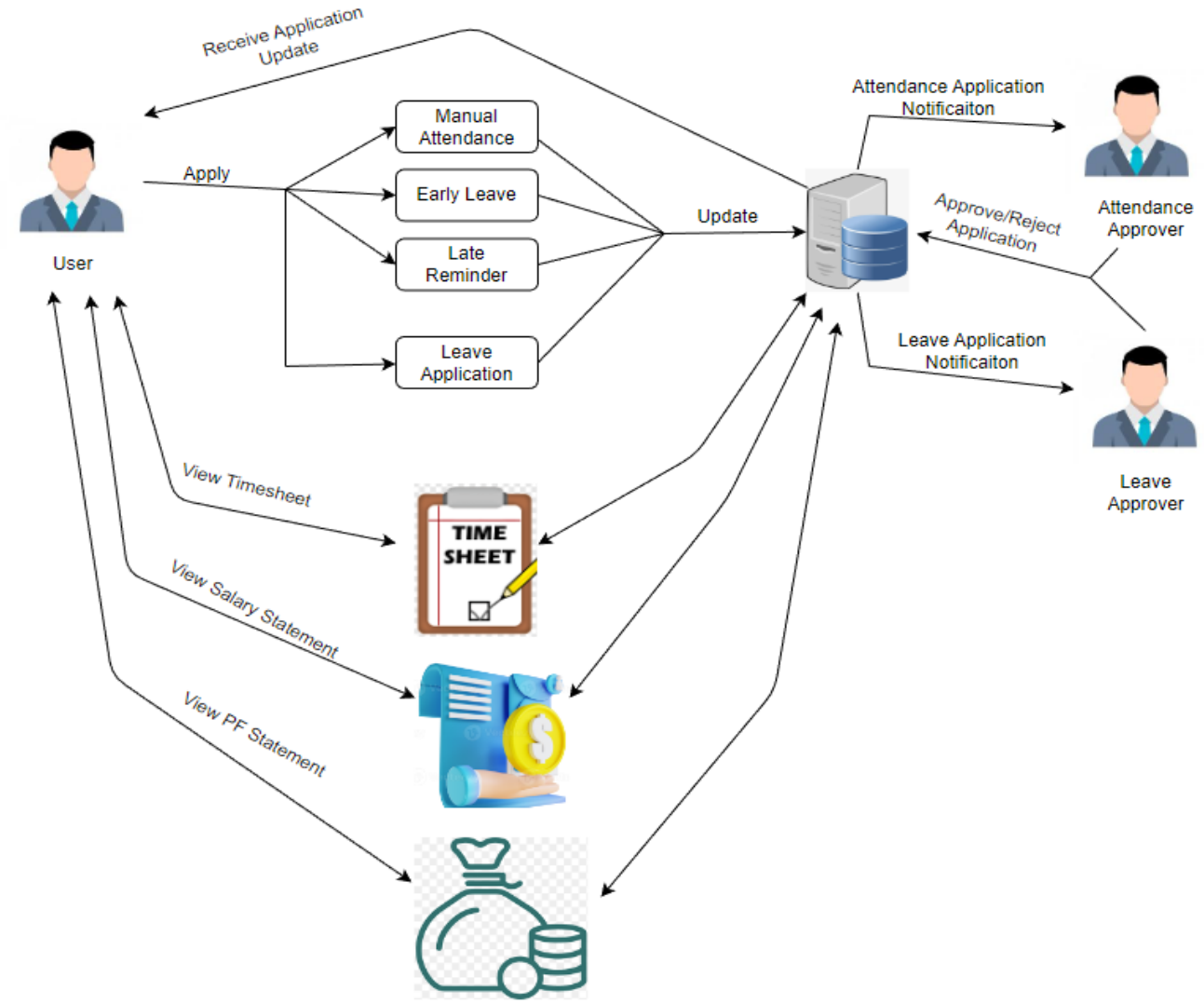

Figure 5.4.1: Rich Picture

5.4.2 UML Activity Diagram

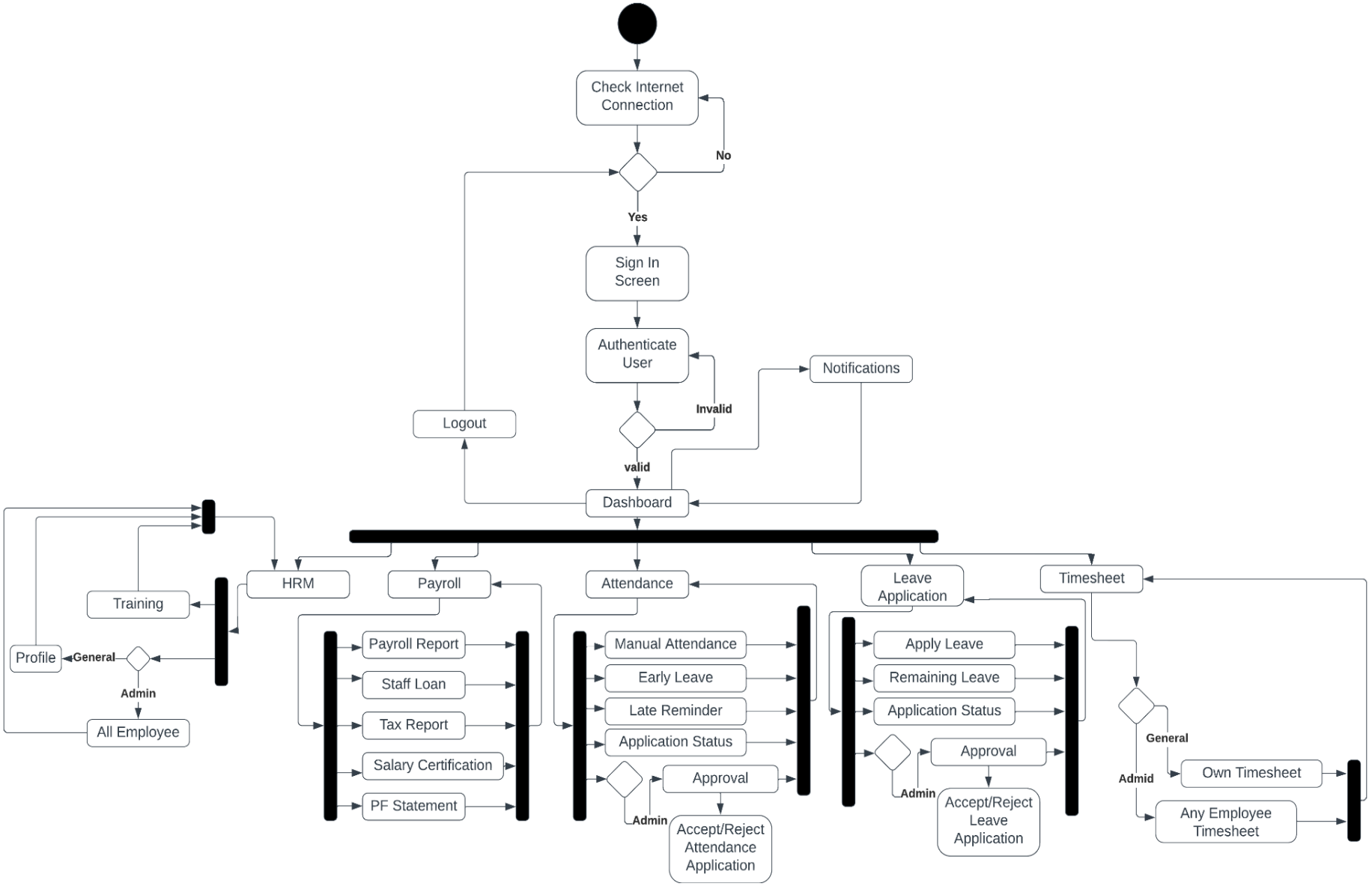

Figure 5.4.2: UML Activity Diagram

5.4.3 Functional and Non-Functional Requirements

5.4.3.1 Functional Requirements

- Sign in: User can sign in to their account using correct credentials
- Attendance: Users can apply Manual Attendance, Late Attendance, Early Leave through the app
- Leave: Users can apply Leave Application
- Approval: Head of Department can approve attendance & leave applications
- Notification: Notify of applied applications and updated status
- Timesheet: Users can view their timesheet
- Profile: Users can view their own profile. In Future there will be an option to edit information.
- Report: All relevant reports should generate in pdf format correctly

5.4.3.2 Non-Functional Requirements

- Operating System: Application will be available on both Android and IOS
- Performance: The application will be optimized to load properly in time
- Availability: Server will be online all the time even on weekends
- Security: All users information will be secured
- Reliability: Any bug or feedback from users will be fixed by developers
- Future Support: Developers will support the application to implement future planned options

6 Result and Analysis

6.1 Results

The goal of this project is to maintain HR Management. As the major part of the application has been developed, now we can analyze if it works correctly and the user experience is satisfactory. One of the main options of the app is to maintain attendance of the employees. We have to make sure, submitted attendance is sent to the employee's head of department. And accepting & rejecting attendance needs to work correctly. In the same way, employees can apply Early Leave and Late Reminder through the app. Another vital function of the application is to maintain leave applications. Employees can submit a leave application and their head of department can update the application. Notification is sent to all submissions and approvals to the corresponding employee. Also, employees can check their timesheet of attendance and status of their application of attendance and leave.

6.2 Analysis

We have posted some dummy attendance to check if the notifications of the applications are sent to the correct department. Once the department updated the application, it should notify the corresponding employee. Leave application also works the same way. Application submissions, status update, notification system, all works as intended. Employees can view their timesheet and check their application status correctly. Some HR options which are supposed to be available only for the head of the department are showing on Employees profile as well. We need to fix it before launching the application. We have sent the alpha version of the app to the client. Client seemed confused about where to find some options. So, we need to improve the interface to be more user friendly.

7 Engineering Problem Analysis

7.1 Sustainability of the project

Any software needs to develop in a manner so that it can be maintained and updated, based on situation and client requirements. We should update to the latest framework and package to ensure staying up to date with the new features.

7.1.1 Community Sustainability

Once the app is launched, Employees will be able to submit attendance, leave applications through the app. It will save time as well as will be easier to maintain by the department. Also, the status of the applications will be visible to the corresponding employees, so they won't need to ask their head about the applications status. Individual Timesheet, Salary Statement, Remaining Leave is available on the app as well which can be managed and filtered according to the user. Hence, the users can get relevant information from the app easily which will be community sustainable.

7.1.2 Financial Sustainability

The main focus of the project is to manage corresponding tasks easily while saving time. Although the app won't be profitable directly for BDBL, in the long run they will be benefited by saving time, completing management jobs efficiently and cheap maintenance.

7.1.3 Organizational Sustainability

We will still support the project once it is launched. All functions of the app need to work as intended. If there's any issue we will figure out the problem and solve it as soon as possible. We will also improve the user interface based on feedback to ensure a better experience. Once the app is stable and performs as intended, we will add new features as planned in the future.

7.2 Addressing Ethics and Ethical Issues

While developing and maintaining the features of the app, it is also crucial to secure user's data. We believe that the application complies with all applicable codes of conduct for application release and development, which have been taken into serious consideration. Such as,

- Data Security: The app doesn't store any data locally. Rest API is used to communicate with the database to fetch relevant information. The app provides an auto logout system, where if the app is logged in and idle for some time, it will log out automatically to ensure other third person won't be able to mess with the app.
- Data Storage: All data is stored in BDBL's own live server as well as on our local server. SQL Database is backup ideally to ensure no data loss.
- User Data: The system will collect only user data relevant to the company. We also encrypt sensitive data to ensure security data safety.
- Sharing User Data: The database is stored on BDBL internal servers. Only BDBL employees will use both the app and the web version. Hence, no data is shared with third parties.

(Thomson & Schmoldt, 2001)

8 Lesson Learned

8.1 Problems Faced During this Period

- Senior developer used the GetX state management system for the development, Which I was not familiar with.
- The app fetches all data from the BDBL server through Rest API. The server works under BDBL IP address only, which was a problem as we were not under the BDBL network while developing.
- We had to collect all the required API from the dotnet developer which was a lengthy process.
- We were using Google location service to fetch user's location. Google location was not working properly on Huawei devices, as Huawei doesn't have Google Maps support.
- Our test server was hosted on Linux, for which we had issues to test pdf report generations, as the pdf generator library was not supported by Linux.

8.2 Solutions of those Problems

- Since the project was developed using Getx State Management System, I had to get familiar with Getx and MVC pattern from Flutter GetX documentation and other relevant online resources.
- While developing the application, we need to test if the app is functioning as intended. But the server was only available under BDBL IP. Our network engineer assisted us with hosting a temporary test server, with what we could test the app.
- Our project manager introduced us to the dotnet developer and helped to collect required APIs.
- To work location services on Huawei Devices, we need to use another package that supports Huawei location service.
- Since the pdf reports were not generating on our test server, we had to use Any Desk software to connect into BDBL Computer for testing purposes.

9 Future Works & Conclusion

9.1 Future Works

The vital functions of the application have been developed to serve the BDBL HR Management System properly. Still there are other options planned for the future according to the requirements. Such as,

- Add new Employee details from the application
- Edit option for employee to update their profile details
- Option to add mobile number with OTP verification, so employees can sign in with mobile number as well instead of employee code.
- Chart for relevant reports
- Adding Bengali language option

9.2 Conclusion

Working with the project BDBL HR Management was a marvelous experience. During my internship period, I learned a lot about the professional work environment and improved communication skills to overcome problems. Gained knowledge about Flutter framework, various useful packages and software development mvc pattern. I learned about using the Rest API on the Flutter project effectively. My senior also trained me on code optimization which really boosted the app performance. Throughout my internship, I observed how software lifecycle works in real life, how to work with others on a single project and version control using git. The project manager and senior developer assisted me a lot to complete the project and make my internship experience momentous.

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Internship Report on

BDBL HR & Payroll Management

(Mobile Application)

by

Nabil Akhunjee

ID: 1720430

Autumn, 2022

Consent from Supervisor

The student modified the internship final report as per the recommendations made by his/her academic supervisor and/or panel members during and/or before final viva, and the department can use this version for archiving as well as the OBE course material for CSE499.

Ms. Ajmiri Sabrina Khan, Lecturer
Department of Computer Science and Engineering
Independent University, Bangladesh