A Project Report

on

Enhanced QRCode Based Library Management System

Submitted in partial fulfillment of the requirements

for the award of the degree of

BACHELOR OF TECHNOLOGY

in

Computer Science & Engineering

by

J.TEJA	**174G1A0597**
K.SRAVANI	**174G1A0589**
P.VIJAY KUMAR	**174G1A05B3**
S.ZAIBA SULTHANA	**174G1A05B7**

Under the Guidance of

Dr.C.Sasikala, **M.Tech., Ph.D**

Associate Professor

DEPARTMENT OF COMPUTER SCIENCE & ENGINEERING

SRINIVASA RAMANUJAN INSTITUTE OF TECHNOLOGY: ANANTHAPURAMU

(Affiliated to JNUTA ,Accredited by NAAC with 'A' Grade &Approved by AICTE, New Delhi &

Accredited by NBA(CSE,ECE,EEE)

2020-2021

SRINIVASA RAMANUJAN INSTITUTE OF TECHNOLOGY: ANANTAPURAMU
(Affiliated to JNUTA ,Accredited by NAAC with 'A' Grade &Approved by AICTE, New Delhi & Accredited by NBA(CSE,ECE,EEE)
Rotarypuram Village, B K Samudram Mandal, Ananthapuramu-515701

DEPARTMENT OF COMPUTER SCIENCE & ENGINEERING

Certificate

This is to certify that a project report entitled ENHANCED QRCODE BASED LIBRARY MANAGEMENT SYSTEM is the bonafide work carried out by **J.TEJA** bearing Roll Number **174G1A0597, K.SRAVANI** bearing Roll Number **174G1A0589, P.VIJAY KUMAR** bearing Roll Number **174G1A05B3, S.ZAIBA SULTHANA** bearing Roll Number **174G1A05B7** in partial fulfillment of the requirements for the award of the degree of **Bachelor of Technology** in **Computer Science & Engineering** during the academic year 2020-2021.

Signature of the Guide

Dr.C.Sasikala, M.Tech., Ph.D
Associate Professor

Head of the Department

Dr.G.K.Narasimha Reddy,Ph.D
Professor & HOD

Date:

Place: Rotarypuram

EXTERNAL EXAMINAR

ACKNOWLEDGEMENT

The satisfaction and that accompany the successful completion of any task would be incomplete without the mention of people who made it possible, whose constant guidance and encouragement crowned our efforts with success. It is a pleasant aspect that we have now the opportunity to express my gratitude for all of them.

It is with immense pleasure that we would like to express my indebted gratitude to my Guide **Dr. C. Sasikala**, **M.Tech**, **Ph.D**, **Associate Professor**, **Computer Science & Engineering**, who has guided us a lot and encouraged us in every step of the project work. We thank her for the stimulating guidance, constant encouragement and constructive criticism which have made possible to bring out this project work.

We express our deep felt gratitude to **Dr. P. Chitralingappa, M.Tech, Ph.D, Associate Professor and Mrs. P.Soumya, M.Tech, Assistant Professor** project coordinator valuable guidance and unstinting encouragement enabled us to accomplish our project successfully in time.

We are very much thankful to **Dr. G. K. NARASIMHA REDDY, Ph.D**, **Professor and Head of the Department, Computer Science & Engineering,** for his kind support and for providing necessary facilities to carry out the work.

We wish to convey my special thanks to **Dr. C. Balakrishna**, **M.Tech, Ph.D, Principal, Srinivasa Ramanujan Institute of Technology** for giving the required information in doing our project work. Not to forget, we thank all other faculty and non- teaching staff, and my friends who had directly or indirectly helped and supported us in completing our project in time.

We also express our sincere thanks to management for providing excellent facilities.

Finally, we wish to convey our gratitude to our families who fostered all the requirements and facilities that we need.

Project Associates

DECLARATION

We, Ms. **J.TEJA** with reg no:**174G1A0597**, Ms. **K.SRAVANI** with reg no: **174G1A0589**, Mr**. P.VIJAY KUMAR** with reg no:**174G1A05B3**, Ms. **S.ZAIBA SULTHANA** with reg no:**174G1A05B7** students of **SRINIVASA RAMANUJAN INSTITUTE OF TECHNOLOGY**, **Rotarypuram**, hereby declare that dissertation entitled **"ENHANCED QRCODE BASED LIBRARY MANAGEMENT SYSTEM "** embodies the report of our project work carried out by us during IV year **Bachelor of Technology** in the Department of CSE, **SRINIVASA RAMANUJAN INSTITUTE OF TECHNOLOGY**, and this work has been submitted for the partial fulfillment of the requirements for the award of the **Bachelor of Technology** degree.

The results embodied in this project report have not been submitted to any other University of Institute for the award of any Degree or Diploma.

J.TEJA	Reg No:174G1A0597
K.SRAVANI	Reg No:174G1A0589
P.VIJAY KUMAR	Reg No:174G1A05B3
S.ZAIBA SULTHANA	Reg No:174G1A05B7

CONTENTS

LIST OF FIGURES

ABSTRACT

Library Auditing is a useful information management tool to improve library services. In the present scenario library plays a crucial role for any educational institution. It has been a major problem for the librarians for auditing books. Auditing is done by the employees manually which requires much time to count books, large in number. By this process they are getting health issues too. This application is developed by using Android studio. Application contains a QRCode Scanner which scans the QRCodes on the books. Continuous scanning of QRCodes that are passed on the books is done.

We are adding new features to the existing application like adjusting of these application to any devices, if we scan a QRCode which is present outside of library we will get the library information, generating QRCode within the application itself and those QRCodes are stored in gallery, and navigation enhancement will be done. We can also make a note of important information that is stored permanently in our application.It also provides the issuing and returning of books which is monitored by the admin. So that it becomes easier while auditing and it consists of an android application for continuous scanning of QR Codes that passed on the books. By these we will get the report in the excel sheet containing the missing books.

CHAPTER-1

INTRODUCTION

1.1 Motivation

Library management system, which aims in developing a computerized system to maintain the auditing of books in library. Library should try to keep up with digital worls with various technologies in this modern age.Library Audit is an inspection of various books of accounts by an auditor followed by physical checking of inventory to make sure that all departments are following a documented system of recording transactions. So the Library Audit is important for any institutional organization. The Auditor audits the books for every certain period of time to make a documented system of recording transactions.

Manual auditing is a time taking and financial problem for any institution. It also needs more manpower for auditing and it will not get an accurate result.. But smart auditing is an effective methodology for auditing of books..QRcodes are generated automatically by using UiPath ,Automation Tool.We will provide the book details in excel sheet then one by one QRCodes are generated and stored in one particular folder. It consists of an android application for continuous scanning of QR Codes that passed on the books After scanning all the books, the application gives an Excel sheet containing the missing books.When any visitors comes to our library then can track the library information easily by just scanning QRCode through any scanners.

1.2 Problem Definition

Library Audit is an inspection of various books of accounts by an auditor followed by physical checking of inventory to make sure that all departments are following a documented system of recording transactions. In the present scenario it has become an enormous problem for any educational institution. Auditing of books within a library is done manually within an organisation. They need to keep their efforts and search each and every book and note the status of books whether it is issued or return and finalized the result. We think that these method is much complex and results may not be that much accurate.Librarians need to keep their constant

effort on it.The android application entitled “QR Code Based Library Management System”. QRCode generation is done by using UIPath,Automation tool which generates QRCodes for all the books which are present in excel sheet.Details of books is stored in firebase database..Continuous scanning of books is done scans the QR Codes on the books and finally it gives an output of Excel sheet containing the missing books and it also provides the issuing and returning of books which is monitored by the admin.Application consists of employee and Admin module.Employee can scan QRCodes continuously that are passed on the books ,and employee can check issued books by their Id .There is a navigation enhancement to get from one activity to another activity.If we want to generate QRCodes for only two or three books then we can generate it from our application and those QRCodes are stored in gallery.To get the library information easily, if we just scan a particular QRCode we will automatically the download the particular document,we are using dynamic QRCode so if we need edit or update the document we can do it by QRInfoPoint website.

1.3 Objective of Project:

The objective of this project is to reduce the time, cost and manpower by developing an android application which uses QR Code scanning. Also the continuous scanning is an effective method to reduce time and 100% of accuracy, whereas other methods of scanning cannot give the accuracy. It does not have the problem of issued books. It has the details of issued books and it can be verified after returning.

QR Codes for all books are generated automatically by using an automation tool i.e. UiPath. An Android application which contains authentication and admin have the permission for the functionalities like issuing and returning of books whereas employees have the permission for only scanning of books for auditing. And the report of missing books is downloaded in a specified path in android mobile. These application is used to store important information and make a note of it and it stored permanently in our application .If any QRCode damages or need QRCode for two or three books then we can generate QRCode within our application and those are stored and saved in our gallery. These application is flexible to open in any mobile devices.

1.4 Limitations of Project

Limitations of project are:

- It requires an active internet connection.
- The app allows only authenticated users.
- Authentication can be done by manually and only for the Employees of the Library.
- Only Employees can scan the books and performs continuous scanning
- Only for admin having access of issuing and returning of books.
- We are scanning QRCode for getting library information,if you want to edit the document then only by using login credentials of user we can do edit it.

CHAPTER-2
LITERATURE SURVEY

2.1 Introduction

The importance of library system is because these systems are used as primary resource of information by many people.A library's role is always shaped on the institutions like schools, colleges and other professional and non-professional organizations, the needs of which it services. Mostly these services are inadequate for the role proposed for it at a particular level of education. The concept is gaining ground that libraries must match their objectives, and therefore, both libraries and their librarians must involve conscientiously in the exercise to improve their contribution to the education cause with more serious insight into development resulting from scrupulous planning.

Library audit is done manually by a group of employees within an organization. They need to keep their efforts and search each and every book and note the status of books whether it is issued or return and finalized the result.We think that these method is much complex and results may not be accurateThey used to search books one by one manually. It has been a major problem for librarians to audit the books. It takes more time to search for a book manually. By these methods, they will face many health issues and the result may not be accurate. Generally, to audit the library, the issuing of books and returning of books are closed and then they start the audit. They take the hardcopy of books and make it a mark one by one. Then they will get the list of missing books which are not marked.It is a time consuming process and we should stop issuing and returning of books and then take a hardcopy of booklist, then librarians should start auditing.They should check books by BookId, if a particular book should be issued or book should present in library.If the both cases were not there, then the books is missed in the library. These method makes the librarians feel discomfort and they may get many health issues too. The result may not be accurate when we use manual method.

As a part of monitoring the quality of various arms of the University system, the Internal Quality Assurance Cell (IQAC) of the University has embarked on a series of base-line studies. The Library Quality Audit is the first of the series. Libraries

continue to be a critical resource and ecosystem of academic activities for scholars and students. This is the reason why the first internal quality audit has focused on libraries. This report collects and presents a summary of basic data of our library system. A review of the study by eminent library professionals outside the system has been included in the audit.

So every educational institution needs an effective method of auditing for the library. It should decrease the man power needed for auditing. And there is a necessity of reducing the time taken for auditing. Accuracy of auditing should be provided. These properties make the audit an effective one. This also makes the possibility of auditing frequently.In these application we can perform auditing within a short period of time and reduce the time taking process.This application is permitted only for admin and employees.Generally if we look at normal procedure of auditing ,the librarians should maintain separate hardcopy and check each and every book is that book is issued to any person or book is missed in the library.So by making auditing in a smarter and effective way we are developing an application.

- [1]U.Narmadhaa,P. Pavithra, M.Tharuneswari, S. Sowmiya, Nagarajan. "Enhanced QR-code based application for library management system using android". International Journal on Applications in Information and Communication Engineering Volume 3: Issue 1: February 2017, pp 46-49.

  Concluded:A QR code consists of black squares arranged in a square grid on a white background, which can be read by an imaging device such as a camera, until the image can be appropriately interpreted. The required data is then extracted from patterns that are present in both horizontal and vertical components of the image

- [2]Lambodara Parabhoi, Nivedita Bhattacharjya, Rupashree Dhar "Use of QR Code in Library" researchgate.net/publication/318259063 January 2017

  Concluded: Libraries are now being very challenged by the development of various technologies. In this present era, the new technology like QR code demands the changes of information handling in the library. The user would have easy access to most current and necessary information related to the library by using QR code.

There are some disadvantages by doing manually.

- Existing system requires more manpower for auditing.

- More time is necessary to complete the auditing.
- Results may not be accurate.
- Maintenance of Hard Copy is required

2.1.1 Enhanced QR Code Based Library Management System

The proposed system is "Enhanced QR Code Based Library Management System". It is an android application. This application requires an Active Internet Connection to fetch the information. It provides authentication for the employees in the library. This application allows the specified persons who are employees in the library.

The list of books and the details of it are stored in the Firebase cloud. The Details of books is taken from excel sheet and the data is converted to json data which is in the form of objects and lists. It is uploaded to firebase cloud. Real time database is used in the firebase to upload files.

The json formatted data is stored in the Firebase cloud. The status of books are also updated in the Firebase itself. The book's details consist of book id, book name, author etc. And it also contains the attributes like status for the scanned status and issued for to which it has issued.If any new employee wants to scan books then the employee details of username and password should in Firebase database.

This application uses Firebase authentication. The authentication contains two types of categories. They are the admin and the employees. The employees have the only access for scanning of books for the audit. Admin has access to everything. He/she has access to scanning of books, issuing of books and return of books. The admin can check the issued books to whom it was issued. He/She can check it using the book id or the student id. Admin can only have the access of reseting the status scanned books. Admin can only access of issuing and returning of books .If any new employee want to scan the books then they should inform to admin .So that admin will store their login credentials in firebase database, then they can has authority of scanning of books.We are having reset option in our application, by using these we can clear all the status which we has done and start new auditing of the books.

2.2 Software Development Tool

2.2.1 Introduction to Java

Java is a programming language. It is a high level, robust, object-oriented and secure programming language.James Gosling is the Father of Java and is created from Sun Microsystems (Sun) in 1991. The first publicly available version of Java (Java 1.0) was released in 1995. Sun Microsystems was acquired by the Oracle Corporation in 2010. Before Java, its name was Oak. Since Oak was already a registered company, so James Gosling and his team changed the Oak name to Java. Over time new enhanced versions of Java have been released. The current version of Java is Java 1.7 which is also known as Java 7. From the Java programming language the Java platform evolved. The Java platform allows software developers to write program code in other languages than the Java programming language and still runs on the Java virtual machine. The Java platform is usually associated with the Java virtual machine and the Java core libraries.

2.2.1.1 History of Java

The history of Java is very interesting. Java was originally designed for interactive television, but it was too advanced technology for the digital cable television industry at the time. The history of Java starts with the Green Team. Java team members (also known as Green Team), initiated this project to develop a language for digital devices such as set-top boxes, televisions, etc. However, it was suited for internet programming. Later, Java technology was incorporated by Netscape.The principles for creating Java programming were "Simple, Robust, Portable, Platform-independent, Secured, High Performance, Multithreaded, Architecture Neutral, Object-Oriented, Interpreted, and Dynamic". James Gosling and his team members started the project in the early '90s. Currently, Java is used in internet programming, mobile devices, games, e-business solutions, etc. There are given significant points that describe the history of Java.

2.2.1.2 Java Virtual machine

The Java virtual machine (JVM) is a software implementation of a computer that executes programs like a real machine. The Java virtual machine is written specifically for a specific operating system, e.g. for Linux a special implementation is

required as well as for Windows.

2.2.1.3 Java Runtime Environment vs. Java Development Kit

A Java distribution comes typically in two flavors, the Java Runtime Environment(JRE) and the Java Development Kit (JDK).The Java runtime environment (JRE) consists of the JVM and the Java class libraries and contains the necessary functionality to start Java programs. The JDK contains in addition the development tools necessary to create Java programs. The JDK consists therefore of a Java compiler, the Java virtual machine, and the Java class libraries.

2.2.1.4 Characteristics of Java

The target of Java is to write a program once and then run this program on multiple operating systems.

Java has the following properties:

- **Platform independent:**
  - Java programs use the Java virtual machine as an abstraction and do not access the operating system directly. This makes Java programs highly portable. A Java program (which is standard compliant and follows certain rules) can run unmodified on all supported platforms, e.g. Windows or Linux.

- **Object-orientated programming language:**
  - Except the primitive data types, all elements in Java are objects.
  - Everything in Java is an object. Object-oriented means we organize our software as a combination of different types of objects that incorporates both data and behavior.

- **Strongly-typed programming language:**
  - Java is strongly-typed, e.g. the types of the used variables must be predefined and conversion to other objects is relatively strict.

- **Interpreted and compiled language:**
  - Java source code is transferred into the byte code format which does not

depend on the target platform. These byte code instructions will be interpreted by the Java Virtual machine (JVM). The JVM contains a so-called Hotspot-Compiler which translates performance critical byte code instructions into native code instructions.

- **Automatic memory management:**
  - Java manages the memory allocation and deallocation for creating new objects. The program does not have direct access to the memory. The so-called garbage collector deletes automatically objects to which no active pointer exists.
- **Portable**
  - Java is portable because it facilitates you to carry the Java bytecode to any platform. It doesn't require any implementation.
- **Robust**
  - There is automatic garbage collection in java which runs on the Java Virtual Machine to get rid of objects which are not being used by a Java application anymore.
- **Multi-threaded**
  - A thread is like a separate program, executing concurrently. We can write Java programs that deal with many tasks at once by defining multiple threads.It shares a common memory area. Threads are important for multi-media, Web applications, etc.

2.2.2 Android

Android is a software platform and powerful operating system for mobile devices. It supports large number of applications on smartphones. Android is available as open source. These application are more comfortable and advanced for users.It allows developers to write managed code in the Java language, controlling the device via Google-developed Java libraries Android SDK was released by Open Handset Alliance in the month of November of the year 2007. The goal of android project is to create a successful real-world product that improves the mobile experience for end users.Android has

got millions of apps available that help you manage your life one or more another way and it is available at low cost in the market for that reason an Android is more popular. Android development supports the full java programming language .Even other packages that are API and JSE are not supported. The first version 1.0 of Android Software Development Kit(SDK) was released in 2008 and latest version is JellyBean. Android is actually developed using the kernel of Linux 2.6.

2.2.2.1 Features of Android

The features of Android are:

➢ Near Field Communication

➢ Alternate Keyboards

➢ Widgets

➢ Automation

➢ Storage

➢ Multilanguage support

➢ Screen Capture

➢ Custom Home Screen

➢ Wireless App Downloads

➢ Connectivity

➢ Messaging

➢ Optimized graphics

➢ Multi-touch

➢ Streaming media support

2.2.2.2 Versions of Android

The code names of Android ranges from A to N at present like Aestro, Blender, Cupcake, Donut, Eclair, Froyo, Gingerbread, Honeycomb, Ice Cream Sandwich, Jelly Bean, KitKat, Lollipop, Marshmallow, and Nougat and in Upcoming version Orio. Version of android show in Figure 2.2.2 as follows. For developed our application we are used the version is Jelly Bean.For every version we will have an API level.For these Jelly Bean API level is 17,18 and 19.

Figure 2.2.2:Version of Android

2.2.3 Architecture of Android OS:

Android architecture contains different number of components to support any android device needs. Android software contains an open-source Linux Kernel having collection of number of C/C++ libraries which are exposed through an application framework services.Among all the components Linux Kernel provides main functionality of operating system functions to smartphones and Dalvik Virtual Machine (DVM) provide platform for running an android application.

Android architecture or Android software stack is categorized into five parts:

1.linux kernel

2. Native libraries (middleware),

3. Android Runtime

4. Application Framework

5. Applications

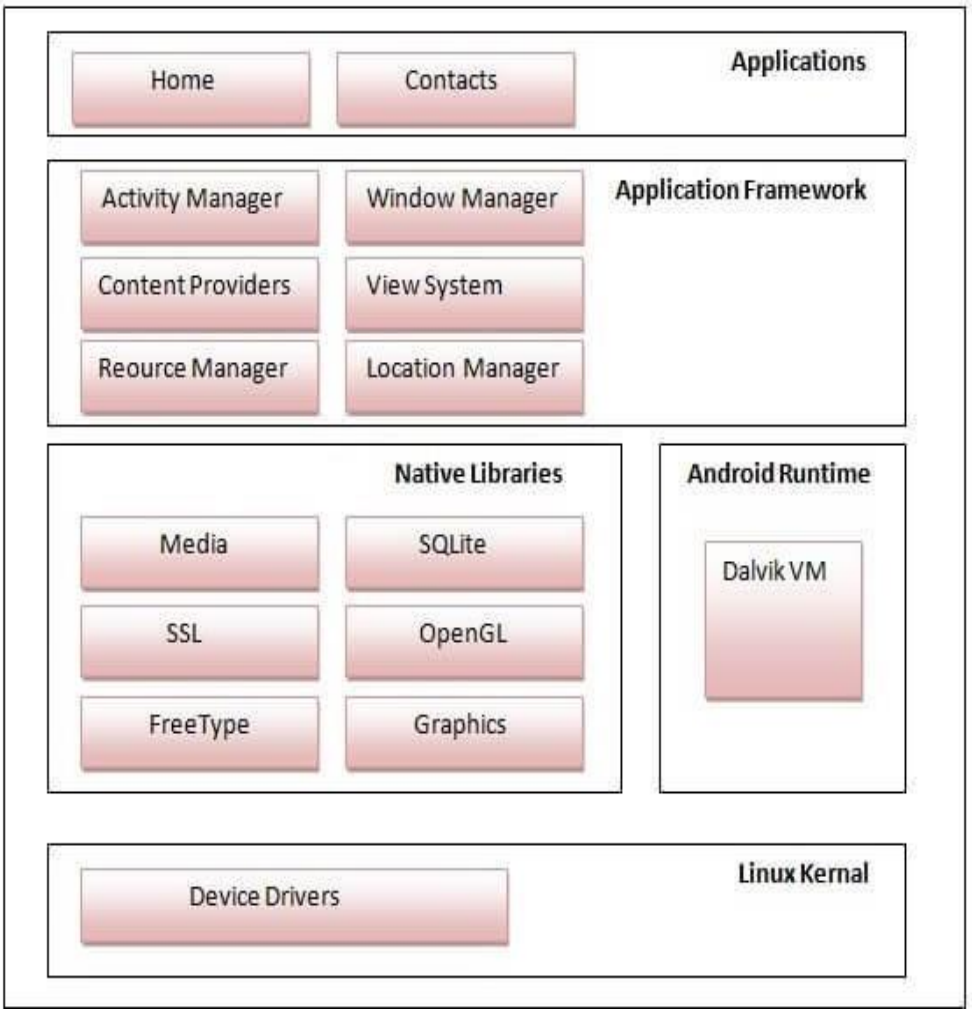

Figure 2.2.3: Architecture of Android OS

1) Linux kernel

Android uses the powerful linux kernel and it supports a wide range of hardware drivers.It is the heart of android architecture that exists at the root of android architecture. Linux kernel is responsible for device drivers, power management, memory management, device management and resource access.

2) Native Libraries

On the top of linux kernel, there are **Native libraries** such as WebKit, OpenGL, FreeType, SQLite,Media,C runtime library (libc) etc.The WebKit library is responsible for browser support, SQLite is for database, FreeType for font support, Media for playing and recording audio and video formats. These libraries are used to play and record audio and video. The SQLite is a database that is useful for the storage

and sharing of application data. The SSL libraries are responsible for internet security etc.

3) Android Runtime

In android runtime, there are core libraries and DVM (Dalvik Virtual Machine) which is a kind of java virtual machine and it is specially desined and optimised for android.It is responsible to run android application. DVM is like JVM but it is optimized for mobile devices. It consumes less memory and provides fast performance.

4) Android Framework

On the top of Native libraries and android runtime, there is android framework. Android framework includes Android API's such as UI (User Interface), telephony, resources, locations, Content Providers (data) and package managers. It provides a lot of classes and interfaces for android application development.

5) Applications

On the top of android framework, there are applications. All applications such as home, contact, settings, games, browsers are using android framework that uses android runtime and libraries. Android runtime and native libraries are using linux kernal.

2.2.4 Components of Android

The user interface of the component is determined by the Views. For the communication among these basic components we use Intents and Intent filters which play crucial roles during app development.The components of android are

1.Activity

2. .Broadcast Receiver

3.Service

4. Intent

5.Content Provider

Figure 2.2.4: Structure of Android Components

- **Activity**

Activity is, fundamentally, an object that has a lifecycle. An Activity is a chunk of code that does some work. if necessary, that work can include displaying a UI to the user. It doesn't have to, though-some Activities never display UIs. Typically, we will designate one of our application's Activities as the entry point to our application.

- **Broadcast Receiver :**

Broadcast Receiver is yet another type of component that can receive and respond to any broadcast announcements.

- **Service :**

A Service is a body of code that runs in the background. It can run in its own process, or in the context of another application's process, depending on its needs.

Other components "bind" to a Service and invoke methods on it via remote procedure calls.

An example of a Service is a media player; even when the user quits the media-selection UI, she probably still intends for her music to keep playing. A Service keeps the music going even when the UI has completed.

- **Intent:**

  Intent is used to invoke components. It is mainly used to:

- Start the service
- Launch an activity
- Display a web page
- Display a list of contacts
- Broadcast a message
- Dial a phone call etc.

- **Content Provider:**

Content Provider is a data storehouse that provides access to data on the device; the classic example is the Content Provider that's used to access the user's list of contacts. Our application can access data that other applications have exposed via a Content Provider, and we can also define our own Content Providers.

CHAPTER-3
ANALYSIS

3.1 Introduction

Android is a mobile operating system developed by Google, based on a modified version of the Linux kernel and other open source software and designed primarily for touch screen mobile devices such as smart phone and tablets.

Since Android devices are usually battery-powered, Android is designed to manage processes to keep power consumption at a minimum. When an application is not in use the system suspends its operation so that, while available for intermediate use rather than closed, it does not use battery power or CPU resources. Android manages the application stored in memory automatically: when memory is low, the system will begin invisibly and automatically closing inactive processes, starting with those that have been inactive for the longest amount of time.

Android devices incorporate many optical hardware components, including video cameras, GPS, orientation sensors, dedicated gaming controls, accelerometers, gyroscopes, barometers, magnetometers, proximity sensors, thermometers and touch screens. Some hardware components are not required, but became standard in certain classes of devices, such as smart phones, and additional requirements apply if they are present. Some other hardware was initially required, but those requirements have been relaxed or eliminated altogether. For example, as Android was developed initially as a phone OS, hardware such as microphones were required, while over time the phone function became optional. Android used to require an autofocus camera, which was relaxed to a fixed-focus camera if present at all, since the camera was dropped as a requirement entirely when Android started to be used on set-top boxes.

Android's source code is released by Google under an open source license, and its open nature has encouraged a large community of developers and enthusiasts to use the open-source code as a foundation for community-driven projects, which deliver updates to older devices, add new features for advanced users or bring Android to devices originally shipped with other operating systems. These community-developed releases often bring new features and updates to devices faster

than through the official manufacturer/carrier channels, with a comparable level of a quality, provide continued support for older devices that no longer receive official updates; or bring Android to devices that were officially released running other operating systems, such as the HP Touchpad.

3.2 Software Requirement Specification

Software Requirement Specification (SRS) is the starting point of the software development activity. It is a complete description of the behavior of a system which is to be developed. The SRS document enlists all necessary requirements for project development. To derive the requirements we need to have a clear and thorough understanding of the product which is to be developed. This is prepared after detailed communication with the project team and the customer.

A SRS is a comprehensive description of the intended purpose and environment for software under development. The SRS fully describes what the software will do and how it will be expected to perform.

An SRS minimizes the time and effort required by developers to achieve desired goals and also minimizes the development cost. A good SRS defines how an application will interact with system hardware, other programs and human users in a wide variety of real-world situations.

Characteristics of SRS:

- **Correct** - An SRS is correct if, and only if, every requirement stated therein is one that the software shall meet. Traceability makes this procedure easier and less prone to error.

- **Unambiguous** - An SRS is unambiguous if, and only if, every requirement stated therein has only one interpretation. As a minimum, this requires that each characteristic of the final product be described using a single unique term.

- **Verifiable** – It is verifiable if there exists some finite cost-effective process with which a person or machine checks whether a software product meets requirements.

- **Consistent** - Consistency refers to internal consistency. If an SRS does not agree with some higher-level document, such as a system requirements specification, then it is not correct. An SRS is internally consistent if, and only if, no subset of individual requirements described in its conflict.

- **Modifiable** – SRS is said to be modifiable if its structure and style are such that any changes to the requirements can be made easily, completely and consistently while retaining the structure and style.

- **Traceable** – SRS is said to be traceable if the origin of each of its requirements is clear and it facilitates the referencing of each requirement in future enhancement.

- **Ranked for importance or stability** – SRS is ranked for importance or stability if each requirement in it has an identifier to indicate either the importance or stability of that particular requirement.

3.2.1 User Requirements

The software requirements specification is produced at the culmination of the analysis task. The function and performance allocated to the software as a part of system engineering and refined by establishing a complex information description, detailed functional and behavioral description, and indication of performance requirements and design constraints, appropriate validation criteria and other data pertinent to requirements.

The major requirement included in this application is to detect the duplicate data. This is the highest level abstraction of the requirement, this to be converted into lower level requirement language in detail.

3.2.2 Development Requirements

- Operating Systems-Windows 7/8/10(64-bit)
- Platform-Android Studio 3.3, UiPath
- Programming in- JavaExtensible Markup Language(XML)

3.2.3 Implementation Requirements

- RAM Capacity :8GB
- Android Phone(JellyBean)

3.3 Android Installation Procedure

Setting up an Android development environment takes some time at first. It helps to make sure you don't do anything wrong to save yourself from the agony of doing the whole process again.

We required to have Windows XP or later, or Mac OS X 10.5.8 or a later version to start the Android application development process. Then, there are four tools that we will need and they are available on the Internet for free:

1.Java JDK5 or JDK6

2.Android SDK

Step 1: Setup Java Development Kit (JDK)

We can download the JDK and install it, which is pretty easy. After that, we just have to set PATH and JAVA_HOME variables to the folder where we have **java** and **javac.**

Note for Windows Users: If you installed the JDK in C:\jdk1.6.0_15 then we will have to add the following two lines in your command prompt

C:\autoexec.bat file.

SetPATH=C:\jdk1.6.0_15\bin;%PATH%

set JAVA_HOME=C:\jdk1.6.0_15

Step 2: Downloading and setting up Android Studio

Google provides Android Studio for the Windows, Mac OS X, and Linux platforms. You can download the software from the Android Studio homepage. (You'll also find the traditional SDKs, with Android Studio's command-line tools, available from the Downloads page.)

Installing Android studio:

Launched android-studio-bundle-143.2821654-windows.exe to start the installation process. The installer responded by presenting the Android Studio Setup dialog box shown below.

Figure.3.3.1: Set up Android Studio

Clicking Next took me to the following dialog box, which gives you the option to decline installing the Android SDK (included with the installer) and an Android Virtual Device.

Figure.3.3.2: Do you want to install the Android SDK and AVD

Choose to keep the default settings. After clicking Next, you'll be taken to the license agreement dialog box. Accept the license to continue the installation.

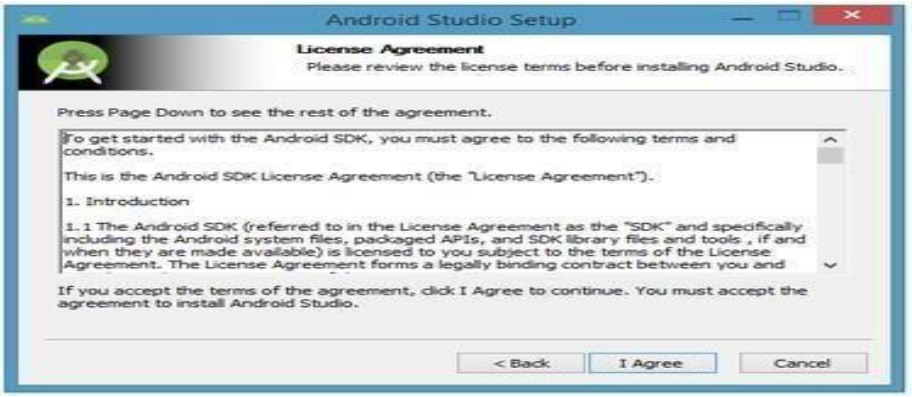

Figure.3.3.3: Accept the license agreement to continue installation

The next dialog box invites you to change the installation locations for Android

Studio and the Android SDK.

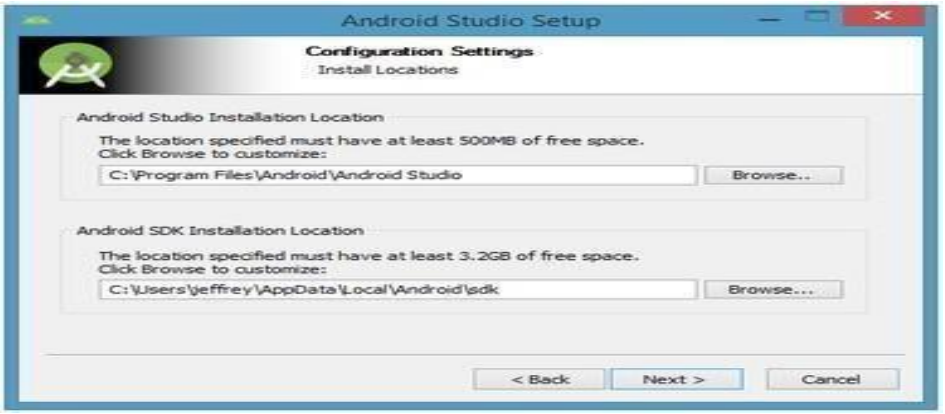

Figure.3.3.4: Set the Android Studio and Android SDK installation locations

Change the location or accept the default locations and click Next. The installer defaults to creating a shortcut for launching this program, or you can choose to decline. I recommend that you create the shortcut, and then click the Install button to begin installation.

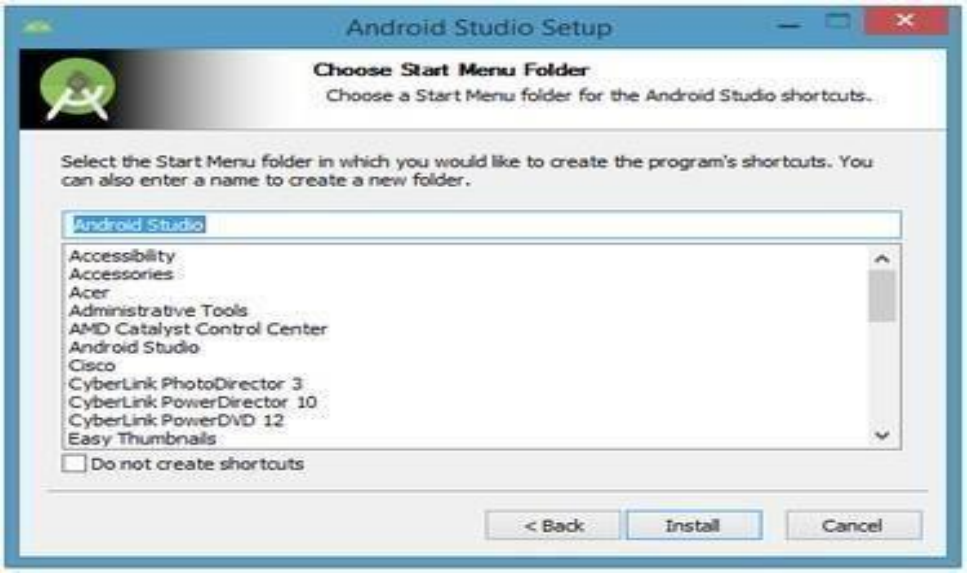

Figure.3.3.5: Create a new shortcut for Android Studio

The resulting dialog box shows the progress of installing Android Studio and the Android SDK. Clicking the Show Details button will let you view detailed information about the installation progress.

The dialog box will inform you when installation has finished. When you click Next, you should see the following:

Figure.3.3.6:Leave the Start AndroidStudio checkbox checked to run this software

To complete your installation, leave the Start Android Studio box checked and click Finish.

Running Android Studio

Android Studio presents a splash screen when it starts running:

Figure 3.3.7: Android Studio's start screen

On your first run, you'll be asked to respond to several configuration- oriented dialog boxes. The first dialog box focuses on importing settings from any previously installed version of Android Studio.

Figure.3.3.8: Import settings

If you're like me, and don't have a previously installed version, you can just keep the default setting and click OK. Android Studio will respond with a slightly enhanced version of the splash screen, followed by the Android Studio Setup Wizard dialog box:

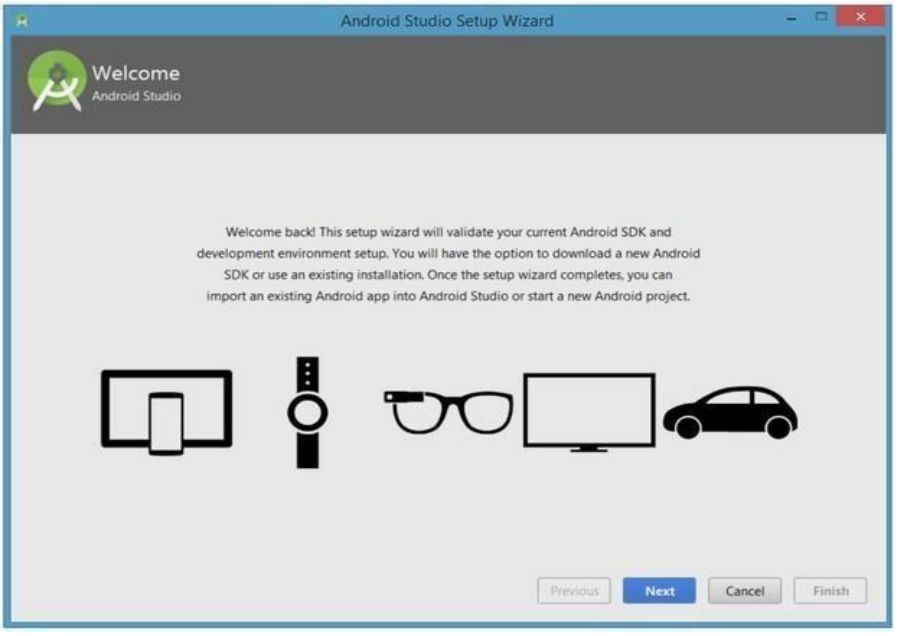

Figure.3.3.9: Validate your Android SDK and development environment setup

When you click Next, the setup wizard invites you to select an installation type for your SDK components. For now I recommend you keep the default standard setting.

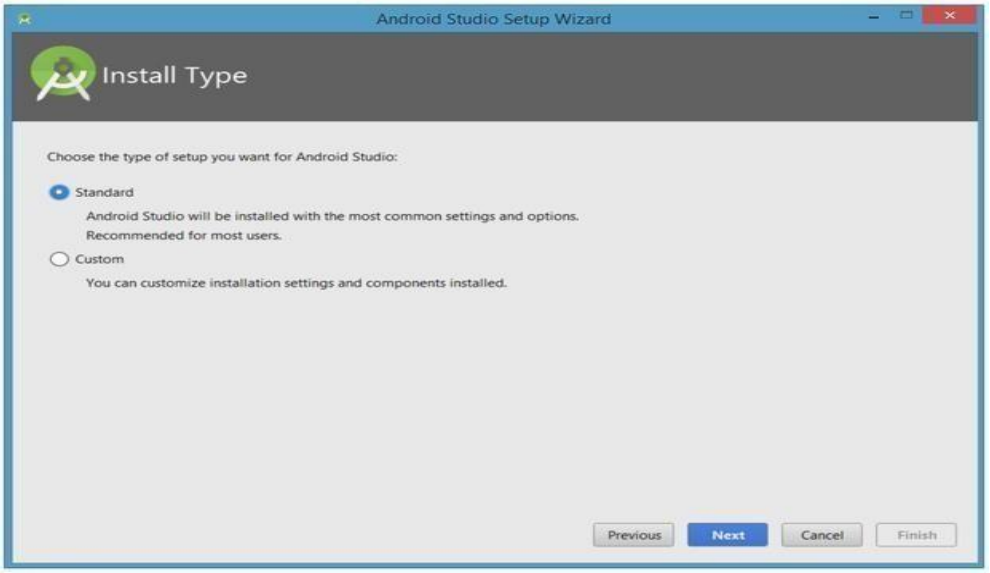

Figure.3.3.10: Choose an installation type

Click Next and verify your settings, then click Finish to continue.

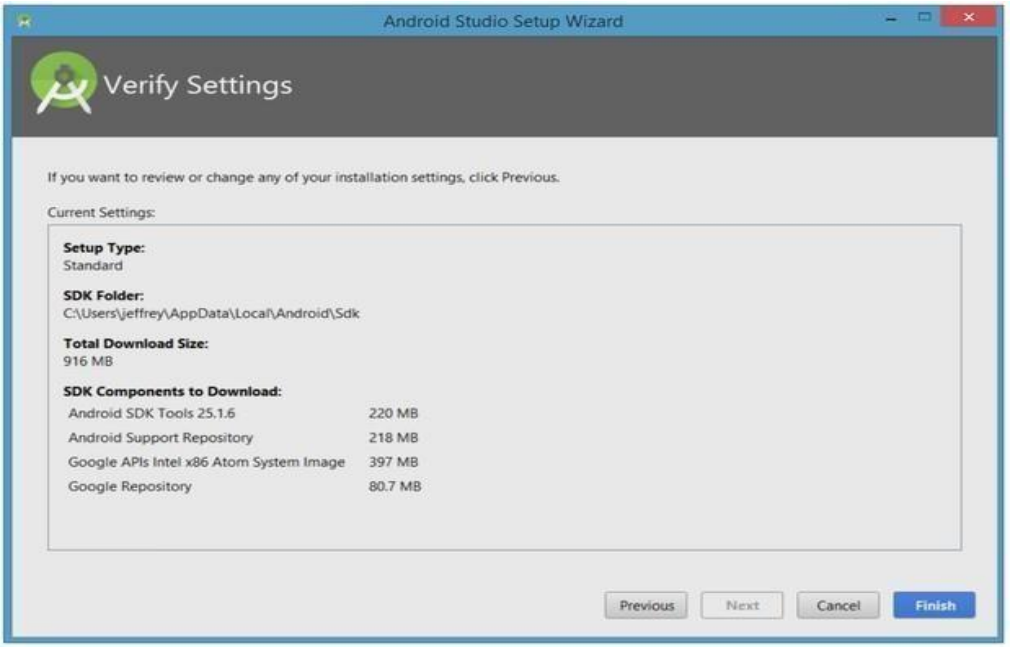

Figure.3.3.11: Review settings

The wizard will download and unzip various components. Click Show Details if you want to see more information about the archives being downloaded and their contents.

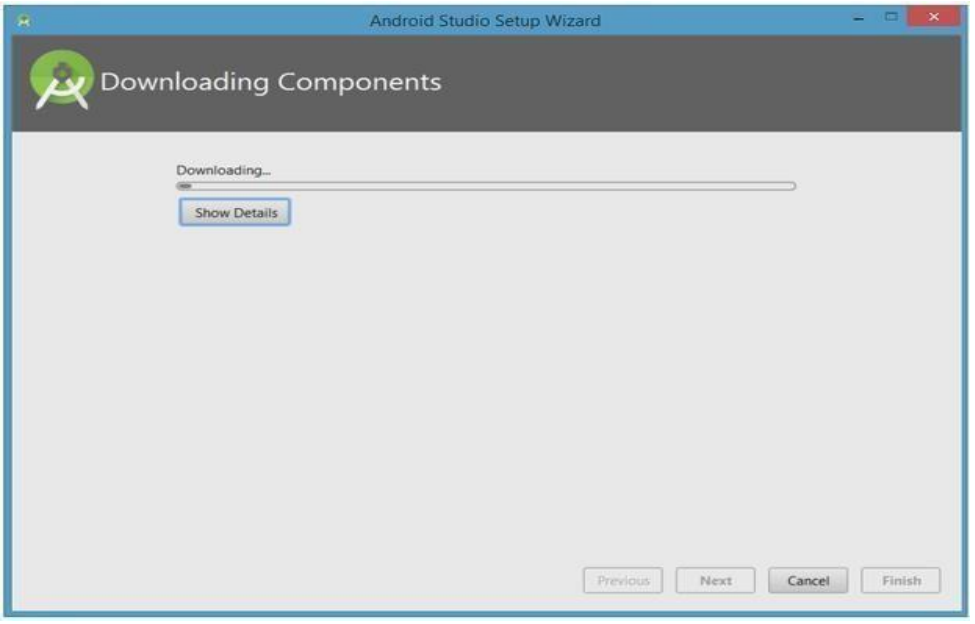

Figure.3.3.12: The wizard downloads and unzips Android Studio components

Finally, click Finish to complete the wizard. You should see the Welcome to Android Studio dialog box:

Figure.3.3.13: Welcome to Android Studio

You'll use this dialog to start up a new Android Studio project, work with an existing project, and more. You can access it anytime by double-clicking the Android Studio shortcut on your desktop.

Starting a new project

From our setup so far, you should still have Android Studio running with the Welcome to Android Studio dialog box. From here, click Start a new Android Studio

project. Android Studio will respond with the Create New Project dialog box as :

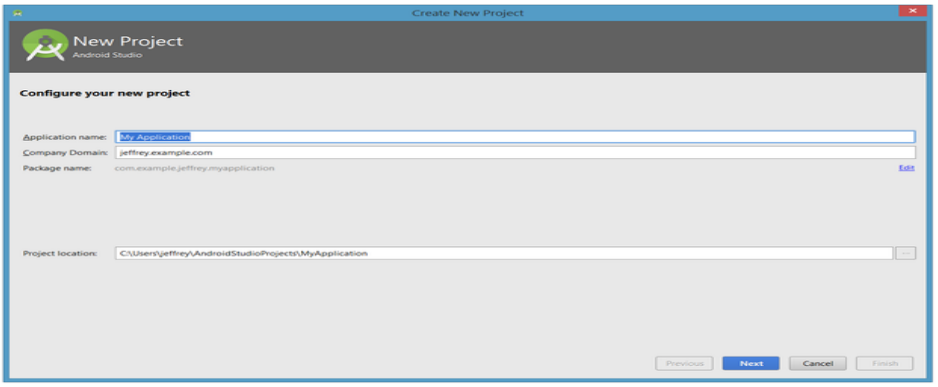

Figure 3.3.14:Create a new project

Enter *W2A* (Welcome to Android) as the application name as the company domain name. You should then see C:\Users\jeffrey\AndroidStudioProjects\W2A as the project location. Click Next to select your target devices.

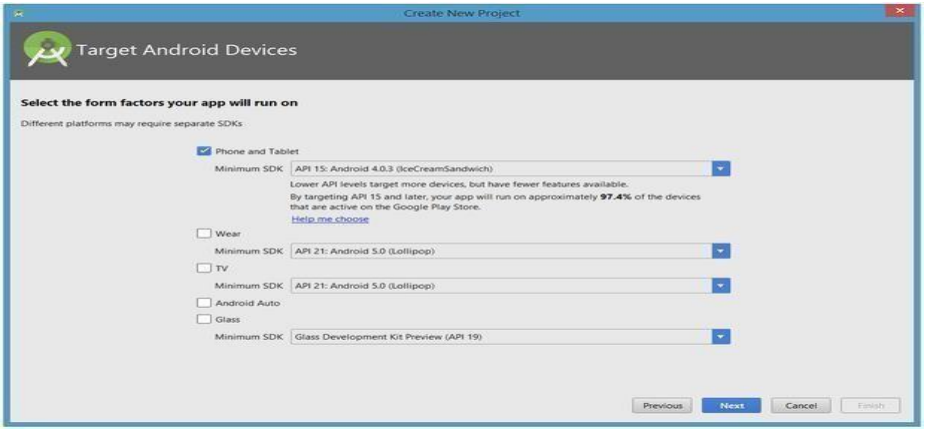

Figure.3.3.15: Select your target device categories

Android Studio lets you select form factors, or categories of target devices, for every app you create. I would have preferred to keep the default API 15: Android 4.0.3 (IceCreamSandwich) minimum SDK setting (under Phone and Tablet), which is supported by my Amazon Kindle Fire HD tablet. Because Android Studio doesn't currently support this API level (even when you add the 4.0.3 system image via the SDK Manager), I changed this setting to API 14: Android 4.0 (IceCreamSandwich), which is also supported by my tablet.

Click Next, and you will be given the opportunity to choose a template for

your app's main activity. For now, we'll stick with Empty Activity.

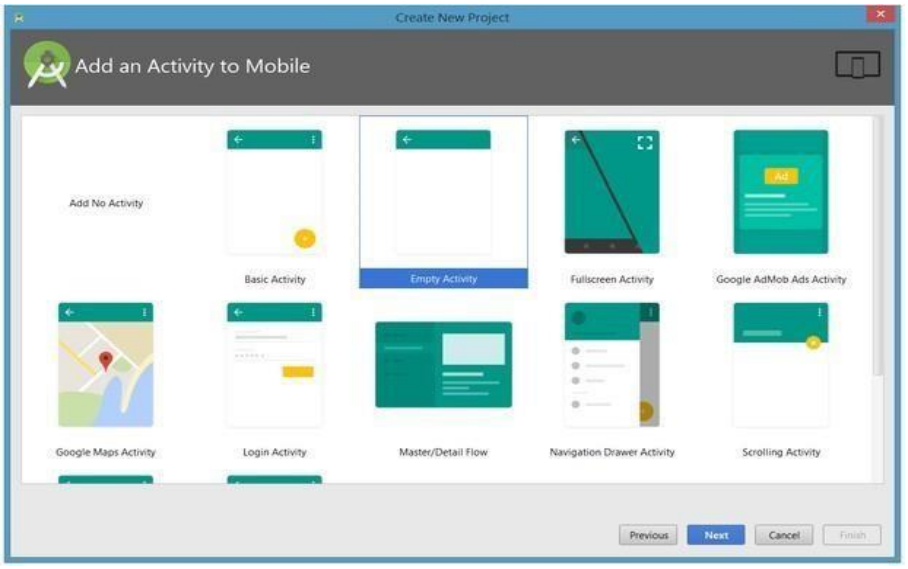

Figure.3.3.16: Specify an activity template

Next, you'll customize the activity:

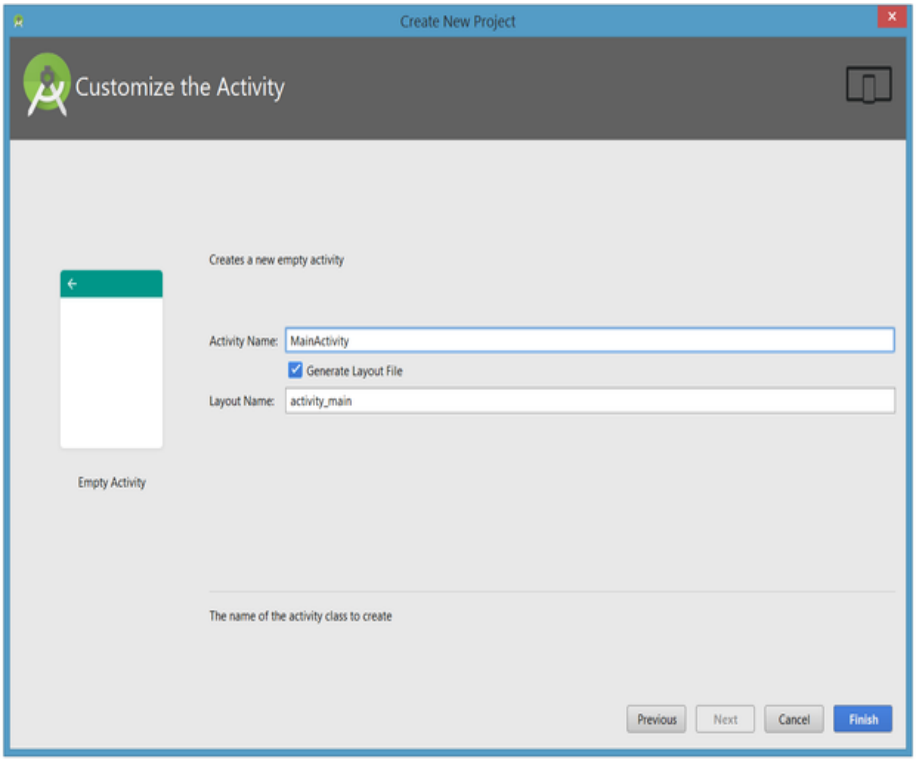

Figure.3.3.17: Customize your activity

Enter *W2A* as the activity name and *main* as the layout name and click Finish to complete this step. Android Studio will respond that it is creating the project, and then take you to the project workspace.

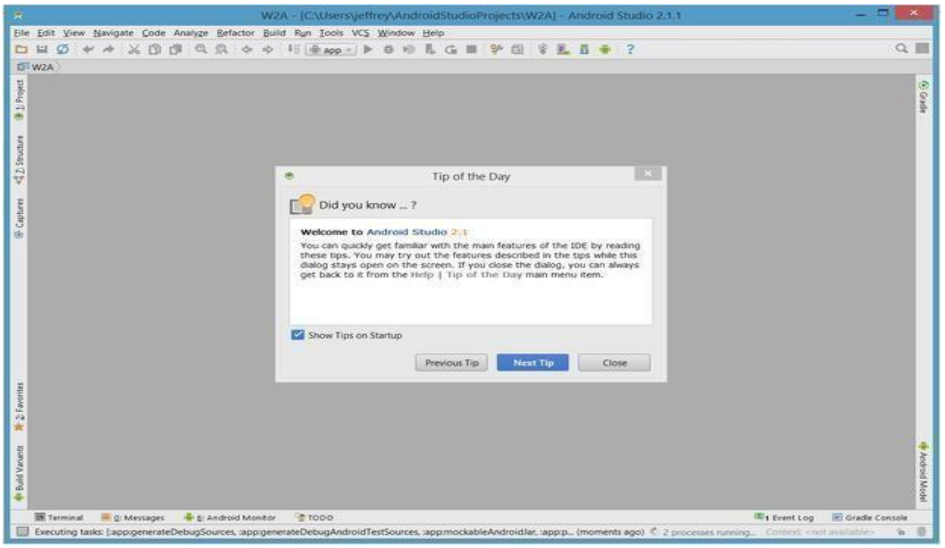

Figure.3.3.18: Android Studio workspace

The project workspace is organized around a menu bar, a tool bar, a work area, additional components that lead to more windows (such as a Gradle Console window), and a status bar. Also note the Tip of the Day dialog box, which you can disable if you like.

The project and editor windows

When you enter the project workspace, W2A is identified as the current project, but you won't immediately see the project details. After a few moments, these details will be appearing in two new windows.

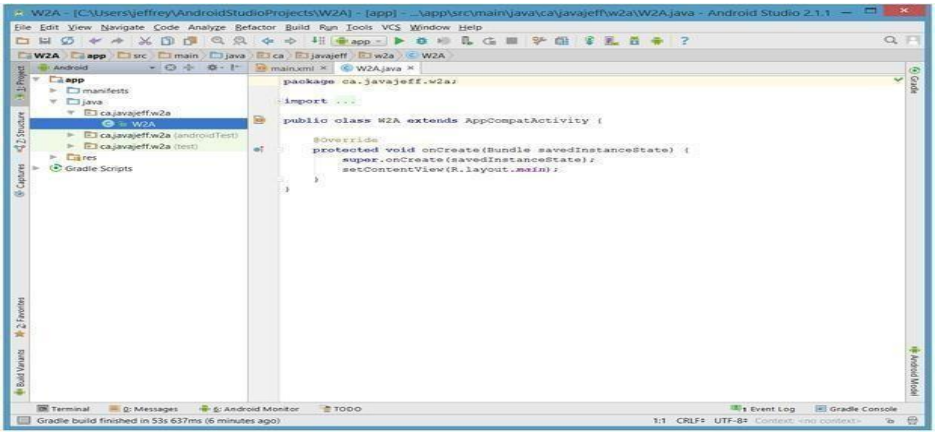

Figure.3.3.19: The project and editor windows

3.4 UiPath Installation Procedure

3.4.1 The Windows Installer (.msi)

The UiPath Platform installer enables you to install the entire UiPath suite. However, please note that the UiPath Orchestrator component is not displayed if you do not launch the installer as an administrator from the command line and if IIS 7+ is not installed on the machine.

- **UiPath Studio** - Installs Studio. This option is enabled by default.
- **UiPath Robot** - Installs the Robot on the local hard drive. This option is enabled by default and cannot be disabled.
- **Register as Windows Service** - Installing the Robot as a Windows Service or in a user mode. By default, the Robot is installed as a Windows Service.
- **Install local activities feed** - Installs the activities feed locally, in the %localappdata%\UiPath\Activities folder. This option is enabled by default. Having the activities packages locally is useful if you do not intend to connect your Robot to Orchestrator, or you want to have a better control of the activities used in an automation project.
- **Automatically start client** - Running the Robot at Windows startup. This option is disabled by default.

- **Java Bridge** - Install the UiPath Java Bridge for better integration and automation regarding Java applications. This option is disabled by default. Please note that installing the Java Bridge may cause the installation to last longer than usual.

To change the default installer settings, click the button  next to each feature and select one of the following options:

- **Will be installed on the local hard drive** - helps you install the corresponding feature on the local hard drive.
- **Entire feature will be installed on the local hard drive** - installs the corresponding feature on the local hard drive, along with all its sub-features.
- **Entire feature will be unavailable** - does not install the corresponding feature.

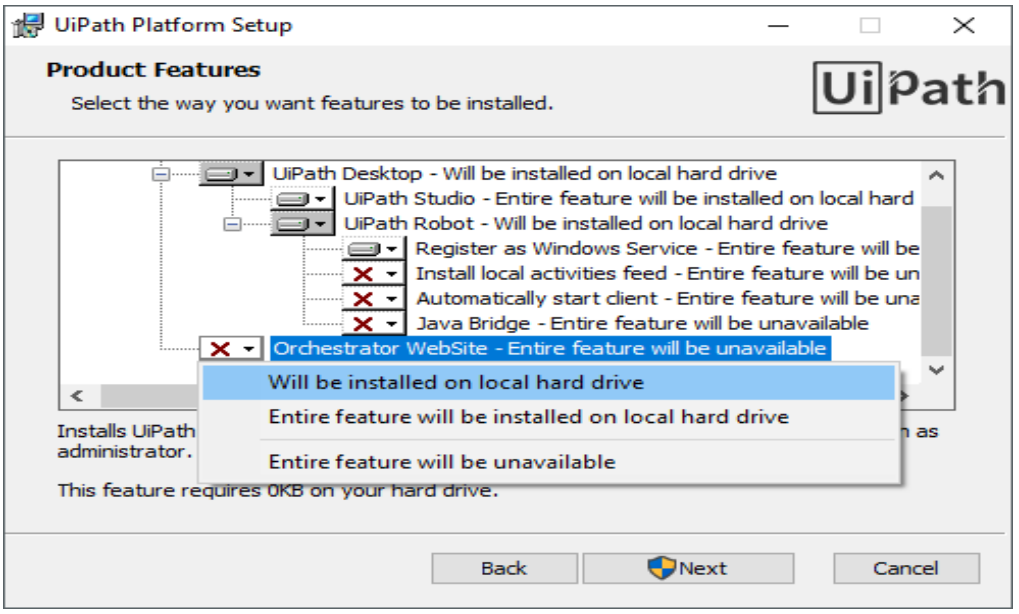

Figure.3.4.1: required features to be installed

3.4.2 exe Installer - User Mode Installation

The .exe file enables you to install Studio and a user-mode Robot. The installation path and all other advanced options are already configured to help you get Studio up and running right away

3.4.3 Licensing

After installing and running Studio for the first time, the user is prompted with a license activation wizard, where he is presented.

Figure.3.4.2: Welcome to UiPath Studio

- **Start Free -** A free Community license can be requested, lasting for a limited period of time, which is renewable. This option can only be activated online. The Robot that comes with the Community Edition Studio can only be connected to the UiPath Orchestrator Community Edition, under your own tenant.
- **Activate License** - If the user has an enterprise license code, Studio can be activated by selecting this option. This type of license activates the **Enterprise Edition** of Studio. For computers running in a closed network or with no internet access, Studio can be licensed offline, as explained here.
- **View License** - The licensing terms can be reviewed at all times by selecting this option.

3.4.4 Activating Your License While Installing

The UiPath suite can be activated while running the UiPath Platform installer,using the Command Prompt. To perform this action, you must run it with the CODecommand, followed by the license code.

For example:C:\UiPathPlatform.msi CODE=1234567890

Also, for an unattended installation, there are some silent parameters that you can use:

o /quiet - Quiet mode, no user interaction

o /passive- Unattended mode - progress bar only

o /q[n|b|r] - Sets user interface level

- n - No UI
- b – Basic UI
- r - Reduced UI

For Example:

C:\UiPathPlatform.msi CODE=1234567890 /passive installs all the default features and activates your license, showing a progress bar.

3.4.4 Activating Your License After Installation

After performing a normal installation, you can automatically license your product from the Command Prompt. You can use the following command C:\ProgramFiles(x86)\UiPathPlatform\UiPath\regutil.exeactivate/email=documentation@uipath.com/code=1234567890 in these we know,where /email is your valid

email address, and /code is the license code you wish to utilize.

3.4.5 Installing the Chrome ExtensionFrom UiPath Studio

1. In the **Setup** ribbon tab, from the **Setup Extensions** menu, select **Chrome**. The Chrome Web Store is opened in Google Chrome.

Figure.3.4.3: Setup the Extensions of UiPath

2. Click the **Add to Chrome** button. A confirmation dialog box is displayed.

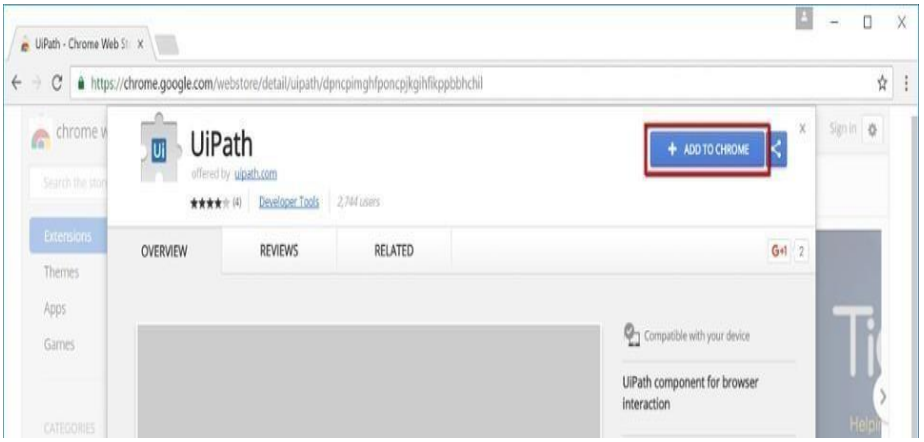

Figure.3.4.4: Chrome button is added to Extension

2. Click the **Add extension** button. The extension is now installed.

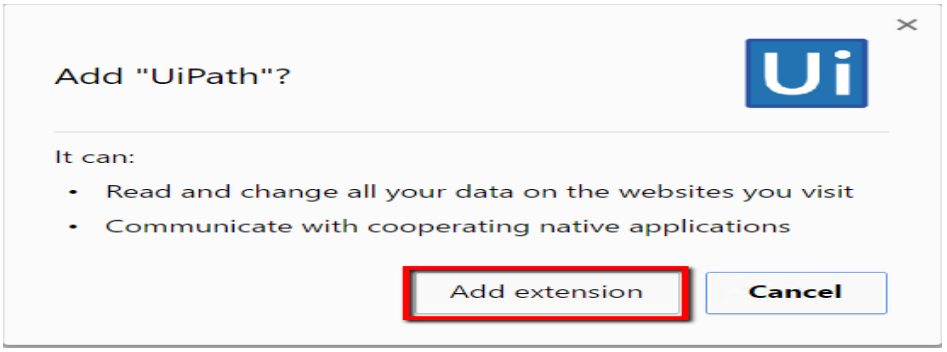

Figure.3.4.5: Extension installed

Please note that file access is disabled by default. To enable it:

1. Click the **Side Navigation Bar** > **More Tools** > **Extensions**.
   The chrome://extensions/ page is displayed.
2. In the chrome://extensions/ page, navigate to the UiPath extension.
3. Under the UiPath Extension, select the **Allow access to file URLs** check box.

Figure.3.4.6: Giving access to fileURLs

1. Click the **Windows Start** button and type cmd in the search field.
2. Right click on **Command Prompt** and run it as administrator.
3. Change the directory to the **UiPath** installation folder (cd C:\Program Files (x86)\UiPath Platform\UiPath).

4. Run the SetupExtensions file by typing SetupExtensions.exe /chrome. The Chrome Web Store is opened in Google Chrome.

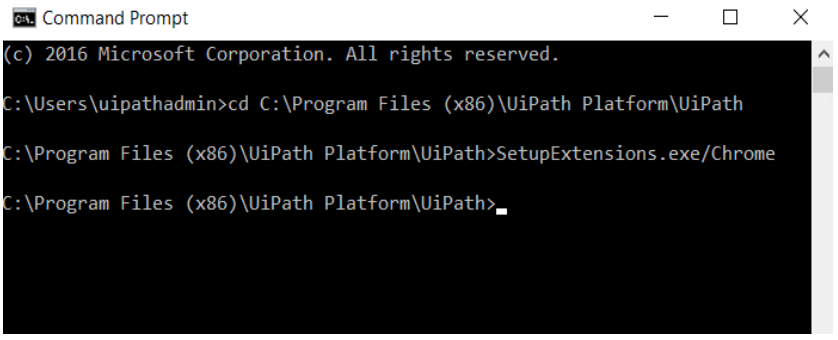

Figure.3.4.7: Setup the extensions by using Command Prompt

5. Click the **Add to Chrome** button. A confirmation dialog box is displayed.

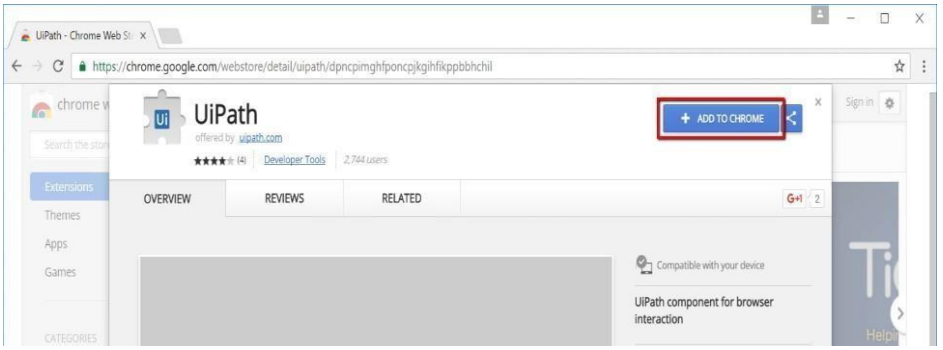

Figure.3.4.8: Chrome button is added to Extension

6. Click the **Add extension** button. The extension is now installed.

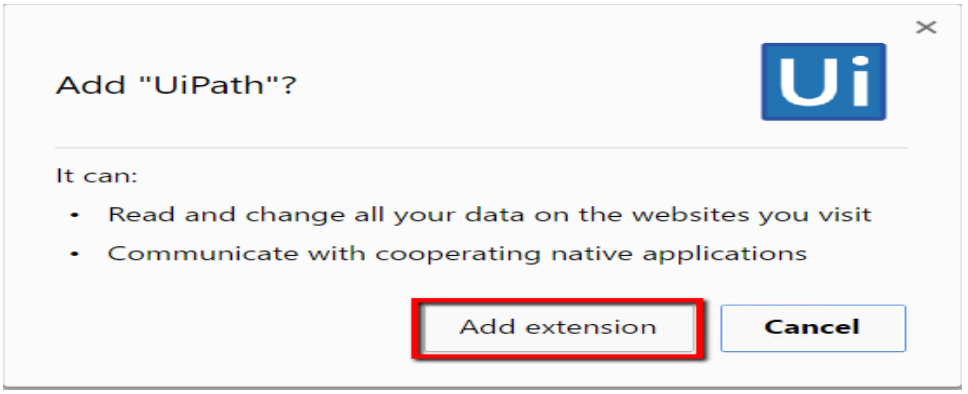

Figure.3.4.9: Extension installed by using Command Prompt

Please note that file access is disabled by default.This is required when automating HTML pages loaded from the disk (saved locally). To enable it:

1. In Chrome, click the **Side Navigation Bar** > **More Tools** > **Extensions**. The chrome://extensions/ page is displayed.
2. In the chrome://extensions/ page, navigate to the UiPath extension.
3. Under the UiPath Extension, select the **Allow access to file URLs** check box.

Figure.3.4.10: Giving Access to file URLs

CHAPTER-4

DESIGN

4.1 Introduction

System design is the solution to the creation of a new system. This phase is composed of several systems. This phase focuses on the detailed implementation of the feasible system. Its emphasis on translating design specifications to performance specification is system design. System design has two phases of development: logical and physical design.

During the logical design phase the analyst describes inputs (sources), outputs (destinations), databases (data stores) and procedures (data flows) all in a format that meets the user's requirements. The analyst also specifies the user needs and at a level that virtually determines the information flow into and out of the system and the data resources. Here the logical design is done through data flow diagrams and database design.

The physical design is followed by physical design or coding. Physical design produces the working system by defining the design specifications, which tell the programmers exactly what the candidate system must do.

The programmers write the necessary programs that accept input from the user, perform necessary processing on accepted data through call and produce the required report on a hard copy or display it on the screen.

4.2 System Architecture

4.2.1 Architectural Design:

3-Tier architecture is also called layered architecture. Some people called it n-tier architecture. Layer architectures are essentially objects and work in an object oriented environment. 3-tier architecture is a very well-known architecture in the world of software development, it doesn't matter whether you are developing web based application or desktop based, it is the best architecture to use.

3-Tier architecture consists of

1) UI or Presentation Layer
2) Business Access Layer or Business Logic Layer
3) Data Access Layer

1) Presentation Layer:

- Presentation layer consists of pages like .java or desktop based form where data is presented to users or getting input from users.

2) Business Logic layer or Business Access Layer:

- Business logic layer contains all of the business logic. Its responsibility is to validate the business rules of the component and communicate with the Data Access Layer. Business Logic Layer is the class in which we write functions that get data from Presentation Layer and send that data to database through Data Access Layer.

3) Data Access Layer:

- Data Access Layer is also the class that contains methods to enable the business logic layer to connect the data and perform desired actions. These desiredactions can be selecting, inserting, updating and deleting the data. DAL accepts the data from BAL and sends it to the database or DAL gets the data from the database and sends it to the business layer. In short, its responsibility is to communicate with the backend structure.

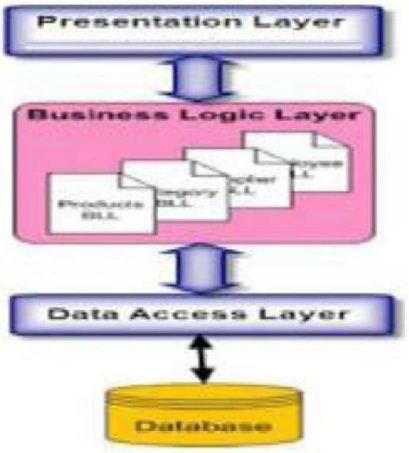

Figure 4.1: Illustration of 3-Tier Architecture with Diagram.

4.3 Data Flow Diagrams

In Software engineering DFD(data flow diagram) can be drawn to represent the system of different levels of abstraction. It is a traditional way to visualize the information flows within a system. A neat and clear DFD can depict a good amount of the system requirements graphically. It can be manual, automated, or a combination of both. It shows how information enters and leaves the system, what changes the information and where information is stored. The purpose of a DFD is to show the scope and boundaries of a system as a whole. It may be used as a communications tool between a systems analyst and any person who plays a part in the system that acts as the starting point for redesigning a system.Higher level DFDs are partitioned into low levels-hacking more information and functional elements. Levels in DFD are numbered 0, 1, 2 or beyond. Here, we will see mainly 3 levels in the data flow diagram, which are: 0-level DFD, 1-level DFD, and 2-level DFD.

4.3.1 Level-0 DFD

It is also known as context diagram. It's designed to be an abstraction view, showing the system as a single process with its relationship to external entities. It represents the entire system as a single bubble with input and output data indicated by incoming/outgoing arrows.

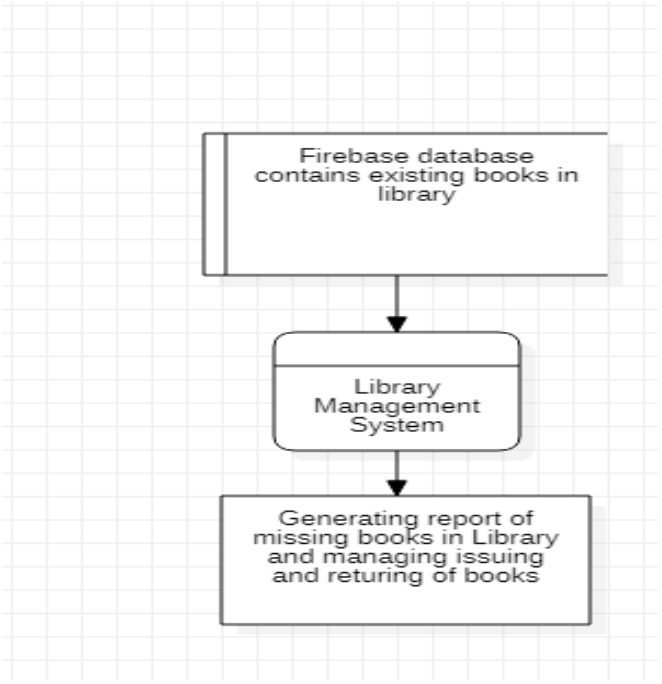

Figure4.3.1:Level-0 DFD Diagram

4.3.2 Level-1 DFD

In 1-level DFD, context diagram is decomposed into multiple bubbles/processes.in this level we highlight the main functions of the system and break down the high level process of 0-level DFD into sub-processes.This level-1 DFD describe the features that are present within these system.In these diagram, we will symbols used are data store,process,external entity and data flow.

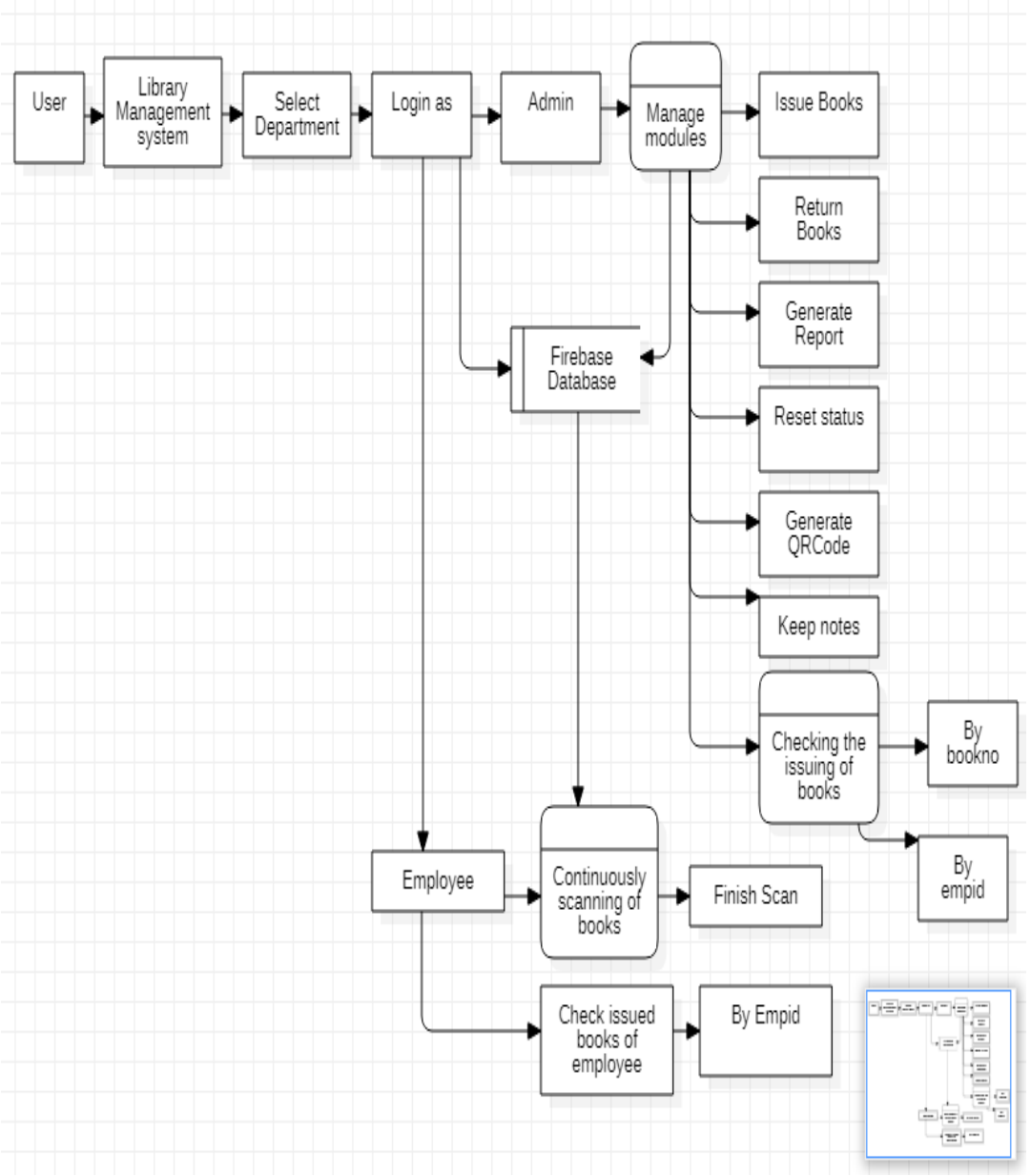

Figure.4.3.2:Level-1 DFD

4.4 Activity Diagram

An activity diagram visually presents a series of actions or flow of control in a system similar to a flowchart or a data flow diagram.It is another important behavioral diagram in UML diagram to describe dynamic aspects of the system. Activity diagram is essentially an advanced version of flow chart that modeling the flow from one activity to another activity.It also describes the dynamic aspects of the system. These are often used in business process modeling. The basic purposes of activity diagrams is similar to other four diagrams. It captures the dynamic behavior of the system. Other four diagrams are used to show the message flow from one object to another but activity diagram is used to show message flow from one activity to another.Activity is a particular operation of the system. Activity diagrams are not only used for visualizing the dynamic nature of a system, but they are also used to construct the executable system by using forward and reverse engineering techniques.

4.4.1 Generating QRCodes for all the books

In this diagram,we are generating QRCodes for all the books which are present in excel sheet.To generate the QRCodes we should provide the input path of excel sheet in which details of books are present and then will generate QRCode using www.qrcodegenerator.com and provide the output path where the generated QRCode has to be stored.

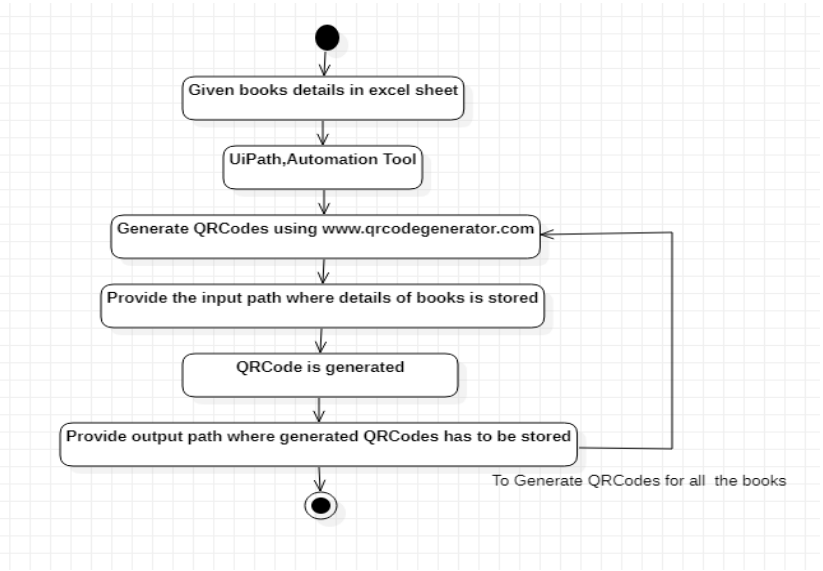

Figure.4.4.1:Generating QRCodes for all the books present in excel sheet

4.4.2 Creating QRCodes by usimg QR InfoPoint

By these we can understand how we can link the QRCode with the document.By using website www.qrinfopoint.com.First we should login using login credentials. Provide title and upload document which we wanted to get after scanning the QRCode.

Here we are using Dynamic QRCode,in these we can edit the document which is linked with QRCode and it remains the same QRCode eventhough we can the document.Where as,in static QRCode we can not edit the document,if we want to edit then we should create QRCode and then should upload it.We should download it and save at one location.And then by using scaneer we can scan it that we will download the document.

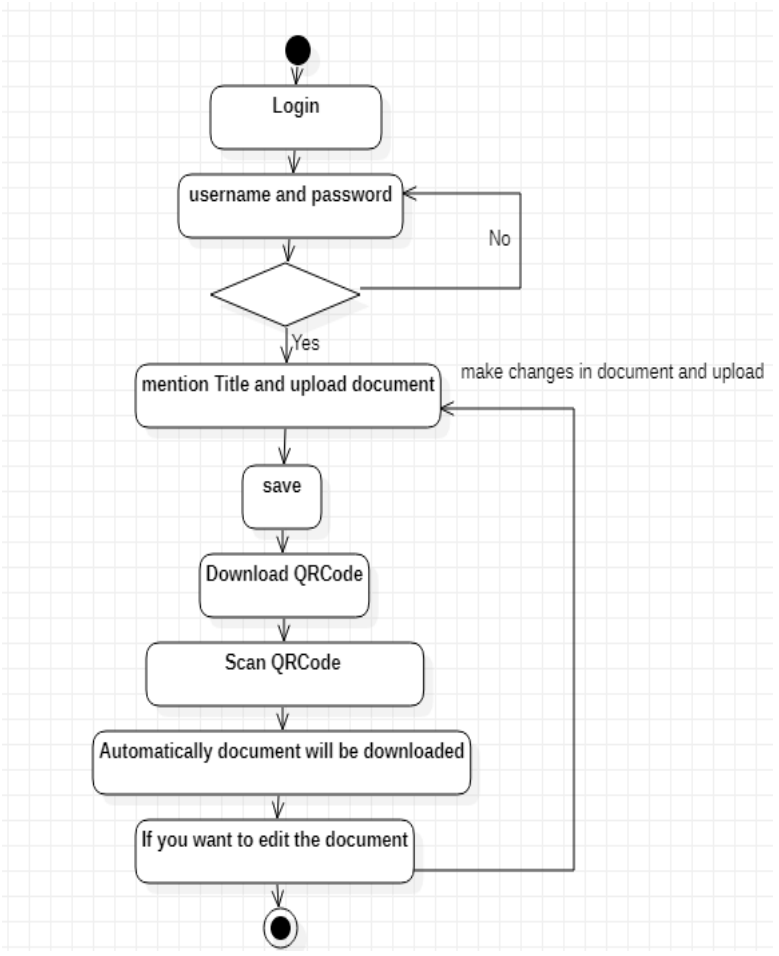

Figure.4.4.2 Creating QRCodes by using QRInfoPoint website

4.5 Module Design and Organization

The Authentication for the application is provided by Firebase authentication. The authentication provides Admin module and Employee module.

4.5.1 Admin Module

Admin has access to more properties than the Employee module. Admin has the access to issuing of books and returning of books. Report of audit can be obtained by the admin by downloading the report after the scanning of books. Report is an excel sheet containing details of missing books. Admin can reset the status of scanning for auditing next time. Admin can get the details of books by using book number or employee id. If any QRCode damages or generate QRCode for two or three books,in that cases we can generate it in our application itself and it is saved in our gallery.After completing of auditing we should note an information that how many books are missed in library,on which day the auditing was done,to maintain all these we can adding KeepNotes feature to these application.We can note an important information and it is stored permanently in our application.If we want to delete that note we can delete it.

4.5.2 Employee Module

Employee module has access to scanning books for the auditing. Scanning can be done.We can scan books continuously.It just take 2 seconds to scan QRCodes which is present on the books. After scanning all the available books, employees click on the finish button .Employee can check issued books by using EmpId,by these,will get information how many books that particular Employee has been taken.

CHAPTER-5

IMPLEMENTATION

5.1 Introduction

After designing the new system, the whole system is required to be converted into computer understanding language. Coding the new system into computer programming language does this.

It is an important stage where the defined procedures are transformed into control specifications by the help of a computer language. This is also called the programming phase in which the programmer converts the program specifications into computer instructions, which we refer to as programs. The programs coordinate the data movements and control the entire process in a system.

It is generally felt that the programs must be modular in nature. This helps in fast development, maintenance and future change, if required.

The validity and proper functionality of all the modules of the developed application is assured during the process of implementation. Implementation is the process of assuring that the information system is operational and then allowing the user to take over its operation for use and evaluation.

Implementation is the stage in the project where the theoretical design is turned into a working system. The implementation phase constructs, installs and operates the new system. The most crucial stage in achieving a new successful system is that it works effectively and efficiently.

5.2 Explanation of Key Functions

5.2.1. Firebase

Firebase is a mobile and web application development platform developed by Firebase, Inc. in 2011, then acquired by Google in 2014.As of October 2018, the Firebase platform has 18 products, which are used by 1.5 million apps.

Firebase is a mobile platform that helps you quickly develop high-quality apps, grow your user base, and earn more money. Firebase is made up of complementary features that you can mix-and-match to fit your needs, with Google Analytics for Firebase at the core. You can explore and integrate Firebase services in your app directly from Android Studio using the Assistant window.

5.2.1.1 Services of Firebase

➢ **Analytics**

- **Firebase Analytics**

  Firebase Analytics is a cost-free app measurement solution that provides insight into app usage and user engagement.

➢ **Develop**

- **Firebase Cloud Messaging**

  Formerly known as Google Cloud Messaging (GCM), Firebase Cloud Messaging (FCM) is a cross-platform solution for messages and notifications for Android, iOS, and web applications, which as of 2016 can be used at no cost.

- **Firebase Authentication**

  Firebase Auth is a service that can authenticate users using only client-side code. It supports social login providers Facebook, GitHub, Twitter and Google (and Google Play Games). Additionally, it includes a user management system whereby developers can enable user authentication with email and password login stored with Firebase.

- **Realtime database**

Firebase provides a realtime database and backend as a service. The service provides application developers an API that allows application data to be synchronized across clients and stored in Firebase's cloud.

The database is also accessible through a REST API and bindings for several JavaScript frameworks such as AngularJS, React, Ember.js and Backbone.js. The REST API uses the Server-Sent Events protocol, which is an API for creating HTTP connections for receiving push notifications from a server. Developers using the

realtime database can secure their data by using the company's server-side-enforced security rules. Cloud Firestore which is Firebase's next generation of the Realtime Database was released for beta use.

- **Firebase Storage**

  Firebase Storage provides secure file uploads and downloads for Firebase apps, regardless of network quality. The developer can use it to store images, audio, video, or other user-generated content. Firebase Storage is backed by Google Cloud Storage.

- **Firebase Hosting**

  Firebase Hosting is a static and dynamic web hosting service that launched on May 13,2014. It supports hosting static files such as CSS, HTML, JavaScript and other files, as well as support through Cloud Functions. The service delivers files over a content delivery network(CDN) through HTTP Secure (HTTPS) and Secure Sockets Layer encryption (SSL). Firebase partners with Fastly, a CDN, to provide the CDN backing Firebase Hosting. The company states that Firebase Hosting grew out of customer requests; developers were using Firebase for its real-time database but needed a place to host their content.

- **ML Kit**

  ML Kit is a mobile machine learning system for developers launched on May 8, 2018 in beta during the Google I/O 2018. ML Kit API's feature a variety of features including text recognition, detecting faces, scanning barcodes, labelling images and recognizing landmarks. It is currently available for iOS or Android developers. You may also import your own TensorFlow Lite models, if the given API's aren't enough. The API's can be used on-device or on cloud.

➢ **Stability**

- **Crashlytics**

  Crash Reporting creates detailed reports of the errors in the app. Errors are grouped into clusters of similar stack traces and triaged by the severity of impact on app users. In addition to automatic reports, the developer can log custom events to help capture the steps leading up to a crash. Before acquiring Crashlytics, Firebase was using its own Firebase Crash Reporting.

5.3 Implementation

After testing the application we get the following results which are available in the form of screenshots as below.

Snapshot1: It is the splash screen of an application when launched. Splash time is 2 seconds.

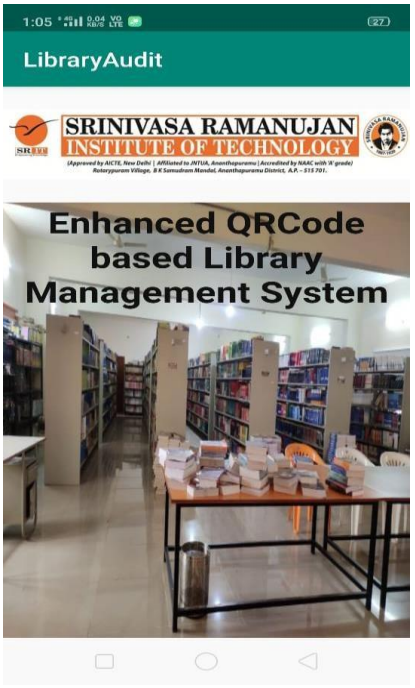

Figure.5.3.1: Splash screen

Snapshot 2: Activity shows to we are having two modules, Admin and Employee

Figure.5.3.2: Login page for Modules

Snapshot 3: This application run only through internet connection,if we switch off the internet connection then it shows a alert message

Figure 5.3.3 :Alert Dialog to turn on internet

Snapshot 4: Employee activity will login by using username and password.

Figure.5.3.4:Login as Employee

Snapshot 5: Employee activity has some features,the first one is scanning of books continuously,to scan click on Start scan button

Figure.5.3.5: Employee activity for scanning of books

Snapshot 6: This activity is for scanning of QRCodes and its scanning will be done continuously.After completing the scanning of books ,click on finish button.

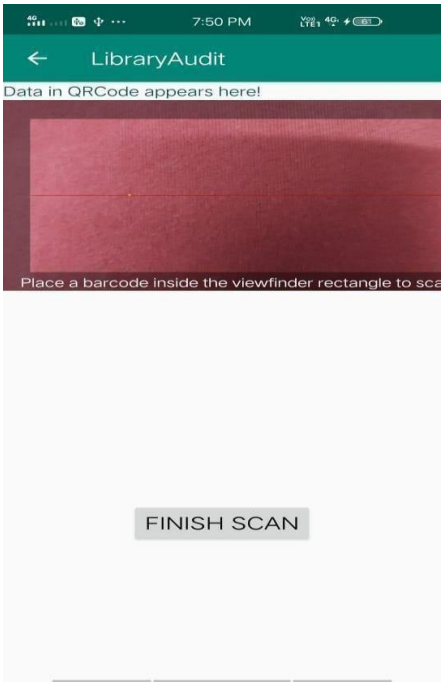

Figure.5.3.6: Scan activity

Snapshot 7: Acivity show to select the module as Admin then click on proceed button

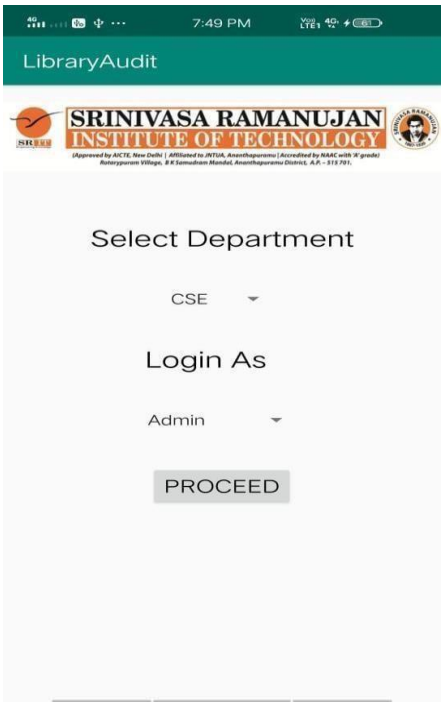

Figure.5.3.7: Login as admin

Snapshot 8 :Employee Activity can check issued books of Employee by using their EmpId

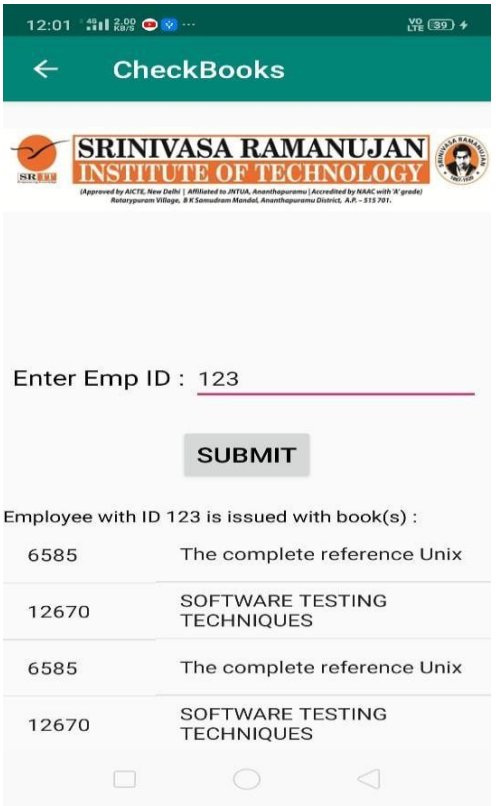

Figure 5.3.8:Employee can check issued Books

Snapshot 9: Admin activity has the properties of issuing books and returning of books and getting reports of missing books as the result of audit. It contains a menu for checking issued books, reset, GenerateQRCode, KeepNotes and Sign Out.

Figure.5.3.9: Admin activity

Snapshot 10: Issue of books activity requires book number and student id to issue a book to the particular employee or student. We can also have a scanner on the menu bar to scan the QR code on the book to issue the book.

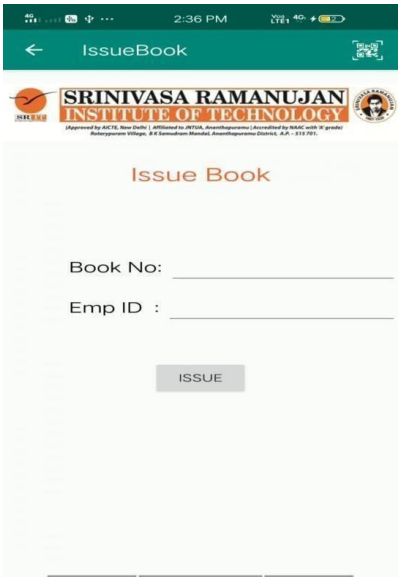

Figure.5.3.10: Book issuing activity by Admin

Snapshot 11: Book return activity asks for book number which is to be returned. It also consists of an scanner to read the book id and directly returned without entering the details.

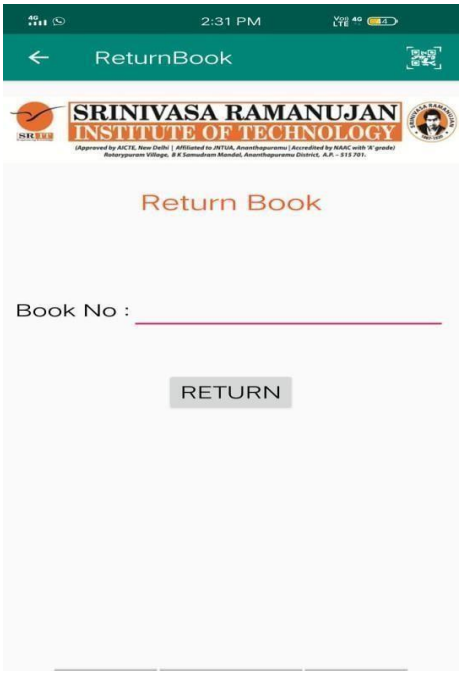

Figure.5.3.11: Return activity by Admin

Snapshot 12: Issue of books activity requires book number and student id to issue a book to the particular employee or student. We can also have a scanner on the menu bar to scan the QR code on the book to issue the book.

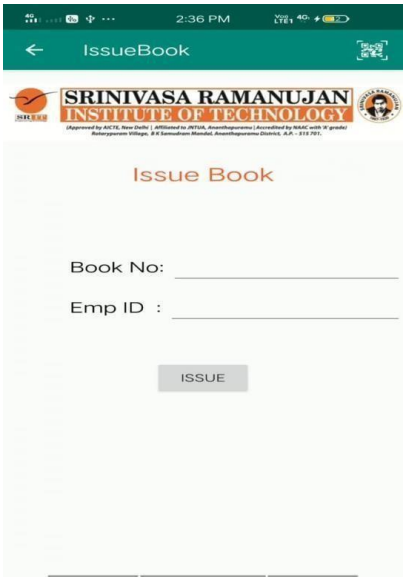

Figure.5.3.12: Book issuing activity

Snapshot 13: Book return activity asks for book number which is to be returned. It also consists of an scanner to read the book id and directly returned without entering the details.

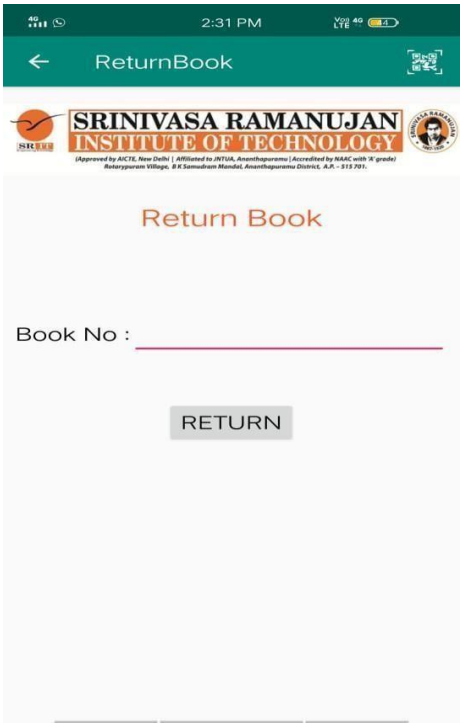

Figure.5.3.13: Returning of Book activity by Admin

Snapshot 14: This activity shows the details of issues by using book number, to which the book is issued.

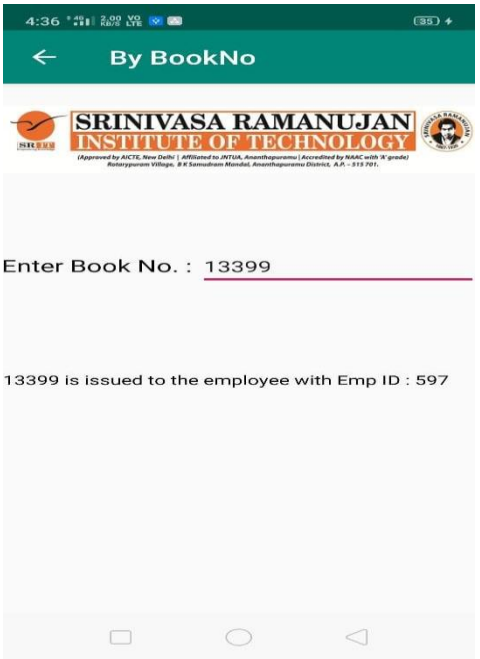

Figure.5.3.14: Check Issued Books by book id

Snapshot 15: This activity shows the details of issues by using employee id, to which the book is issued.

Figure.5.3.15: check details by employee id

Snapshot 16: This activity is to reset the status of audit by clearing scanned details.

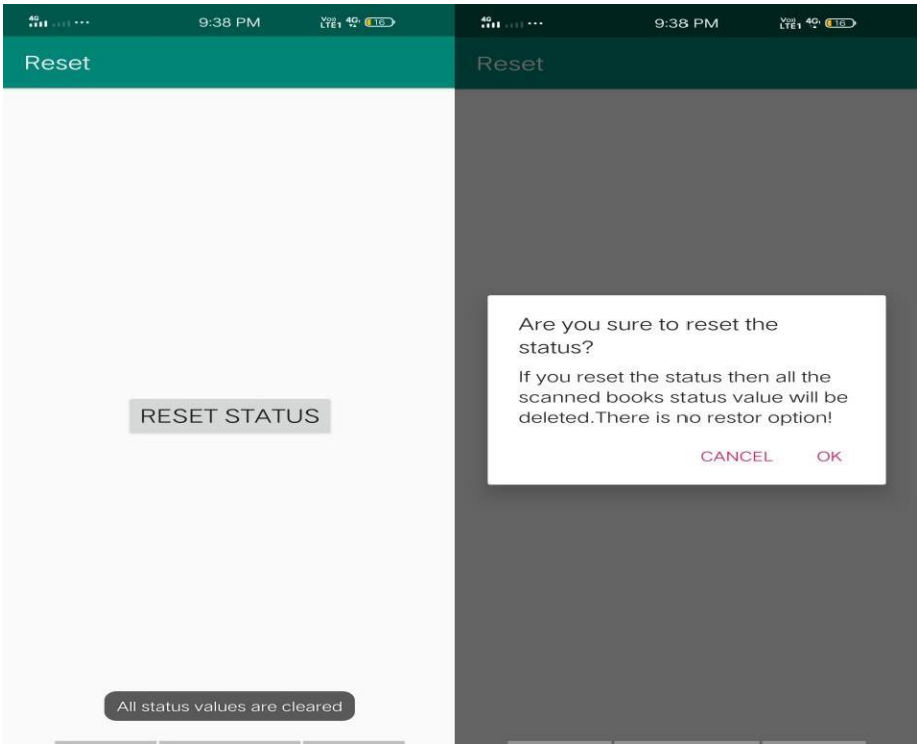

Figure.5.3.16: Reset status for scanning.

5.4 QR InfoPoint

QR InfoPoint is mostly used to generate QRCodes in a smarter way.It is mainly used for the purpose of creating QRCode and we can upload documents, images,videos to it. If we scan QRCode then automatically the document which is linked up with it will download.If anyone visit our campus like NBA or NAAC or anyone want to know the information of library ,for this purpose we placing a QRCode outside of a Library . If we scan that QRCode automatically document will be downloaded.We can make changes to the document.Here we are using dynamic QRCode,we can change or edit the information by using the same QRCode.

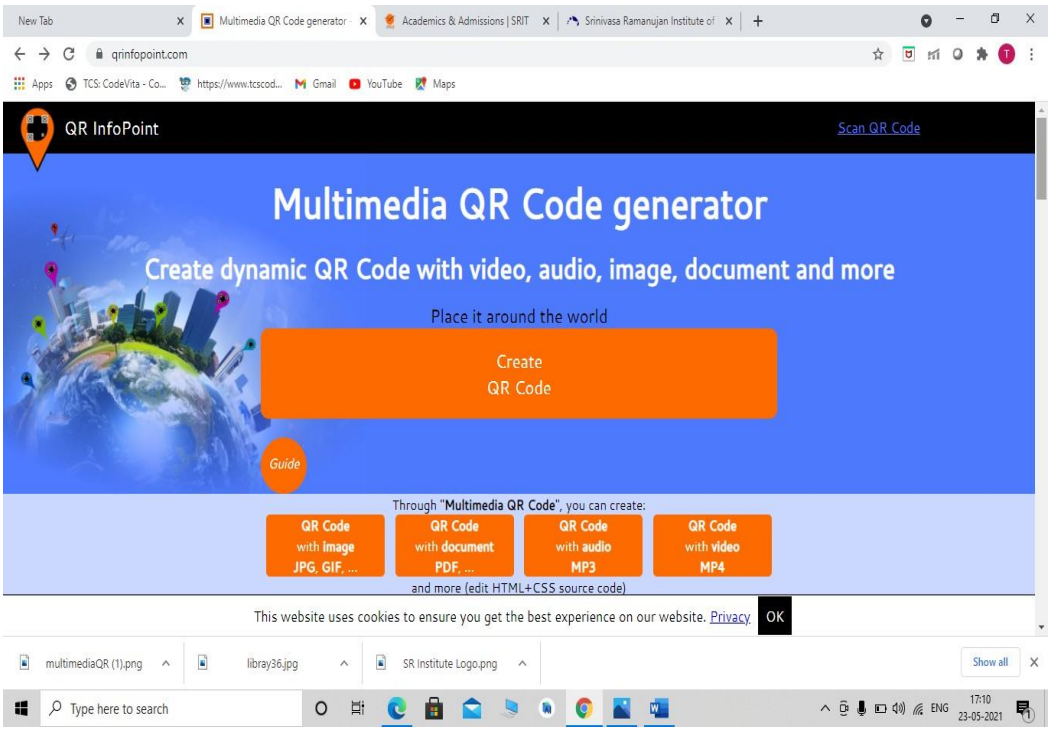

Figure 5.4: QR InfoPoint Website

5.4.1 Login into a QRInfoPoint website:

Firstly we should create an account and then go to login page.Here by using login credentials of Email and password we can login to the website and if you don't have an account you just create an account and then login by using credentials

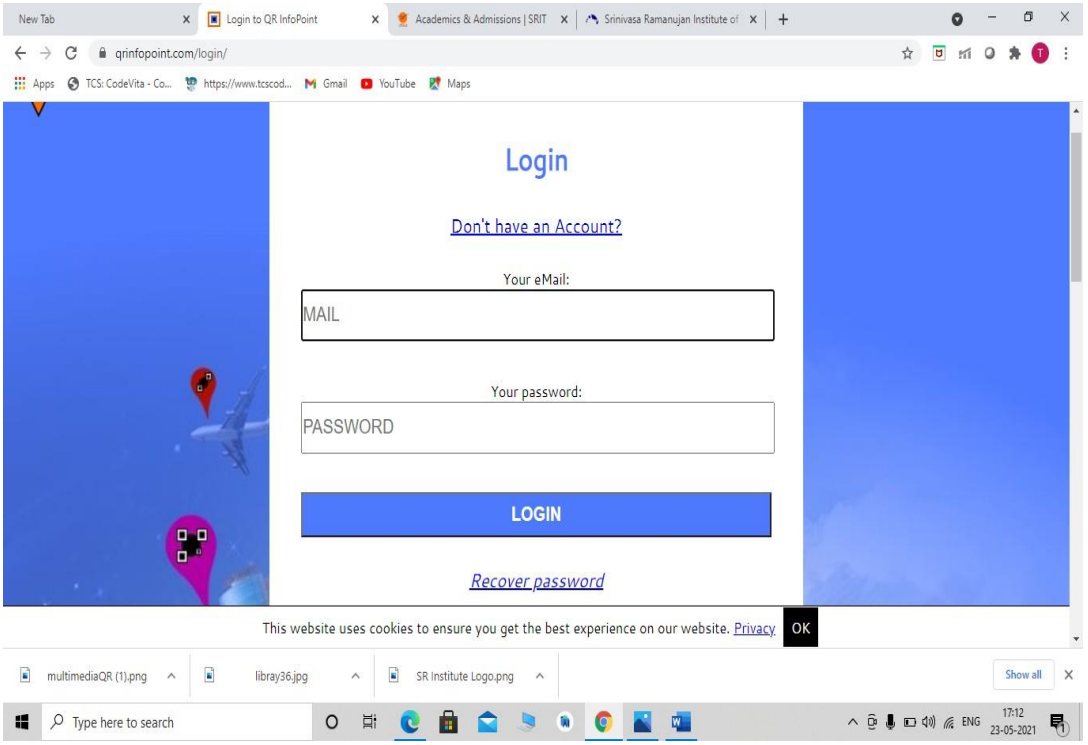

Figure 5.4.1:Login page of QRInfoPoint

5.4.2 To Create a new QRCode:

First we have to give the title name of the document and then click on the upload and after successfully uploaded then automatically a new QRCode will be generated.If we want to make any changes in the document we can edit the document.

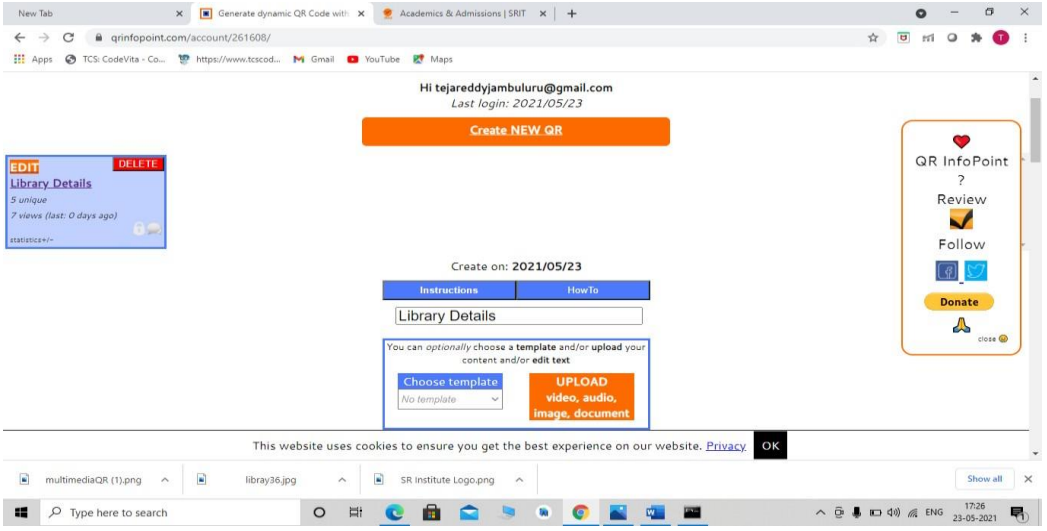

Figure 5.4.2:Give a Title and Upload document

5.4.3 Preview of the QRCode:

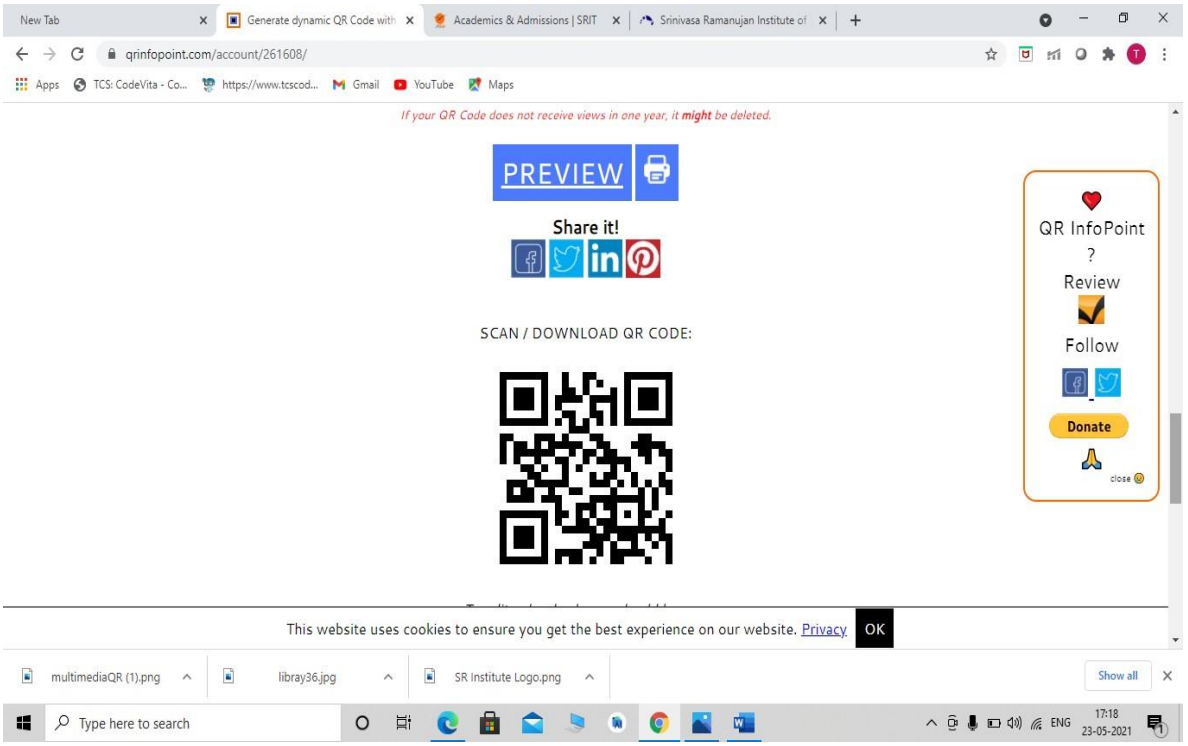

Figure 5.4.3:Preview of the QRCode

CHAPTER-6

TESTING

6.1 Introduction

The purpose of testing is to discover errors. Testing is the process of trying to discover every conceivable fault or weakness in a work product. It provides a way to check the functionality of components, sub-assemblies, assemblies and /or a finished product.

It is the process of exercising software with the intent of ensuring that the software system meets its requirement and user expectations and does not fail in an unacceptable manner. There are various types of tests. Each test type addresses a specific testing requirement.

6.2 Design of Test Cases and Scenarios

6.2.1 Types of Tests:

6.2.1.1 Unit Testing

Unit tests are the fundamental tests in your app testing strategy. By creating and running unit tests against your code, you can easily verify that the logic of individual units is correct. Running unit tests after every build helps you to quickly catch and fix software regressions introduced by code changes to your app.

A unit test generally exercises the functionality of the smallest possible unit of code (which could be a method, class, or component) in a repeatable way. You should build unit tests when you need to verify the logic of specific code in your app.

a. Espresso Testing

Espresso is a tool used for doing unit testing. Espresso is used to write concise, beautiful and reliable Android User Interface test.The core API is small, predictable, and easy to learn and yet remains open for customization. Espresso tests state expectations, interactions, and assertions clearly without the distraction of boilerplate content, custom infrastructure, or messy implementation details getting in

the way. Espresso tests run optimally fast! It lets you leave your waits,syncs, sleeps, and polls behind while it manipulates and asserts on the application UI when it is at rest.

Espresso is targeted at developers, who believe that automated testing is an integral part of the development lifecycle. While it can be used for black-box testing, Espresso's full power is unlocked by those who are familiar with the codebase under test.

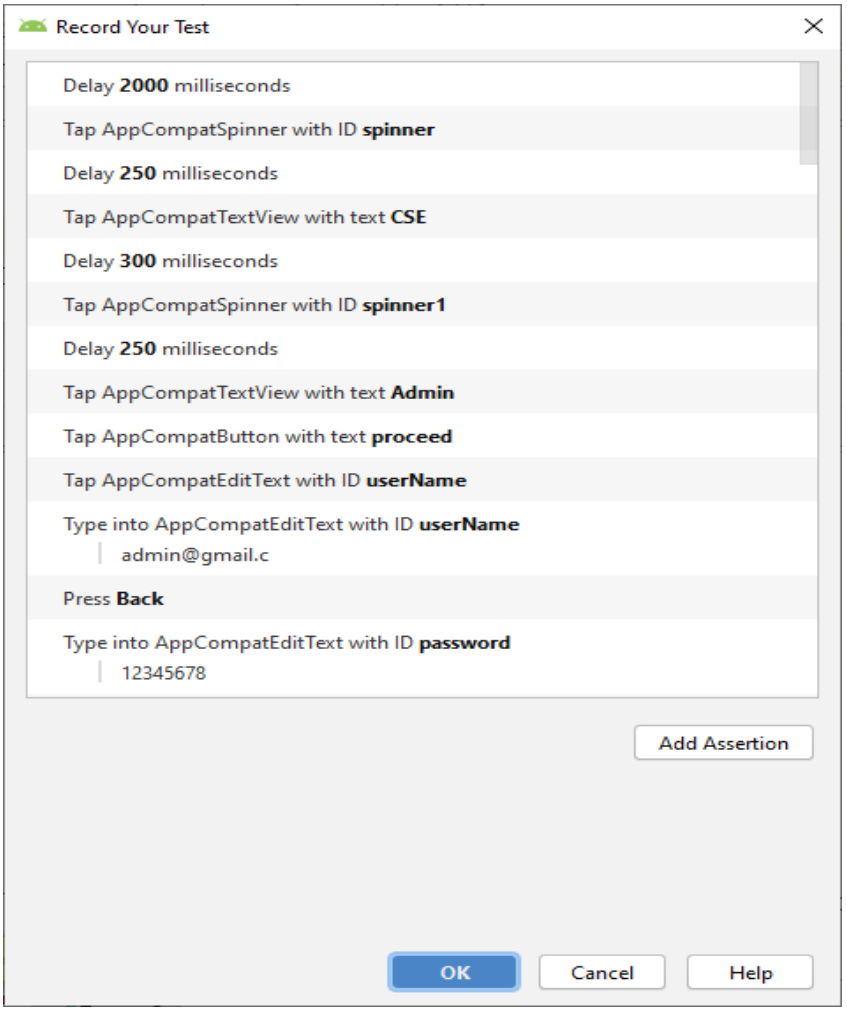

Figure.6.2.1.(a):Espresso testing for User Interface

b. Unit testing for Continuous Scan

Continuous scanning works fine for scanning of multiple QR Codes. It will be the efficient way to scan multiple QR Codes. The below figure shows unit testing for continuous scanning. Scanning is done by Employees.

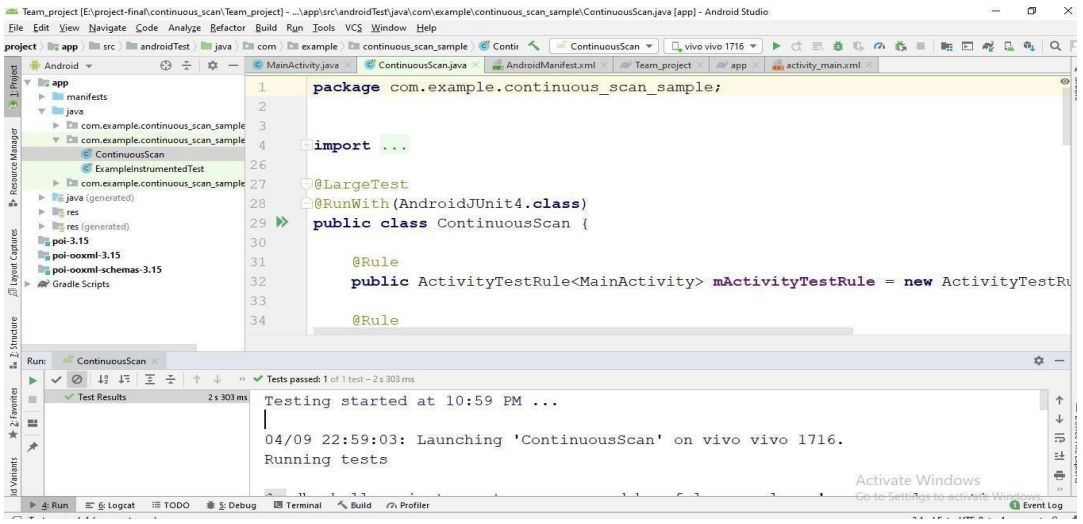

Figure 6.2.1(b):Continuous scanning for Unit Testing

c. Unit testing for Launching Excel sheet

After the completion of scanning, the data will be updated in the firebase. When the admin click on the "Get Report" button, the application launches new excel sheet in a particular path. The excel sheet gives details of missing books.

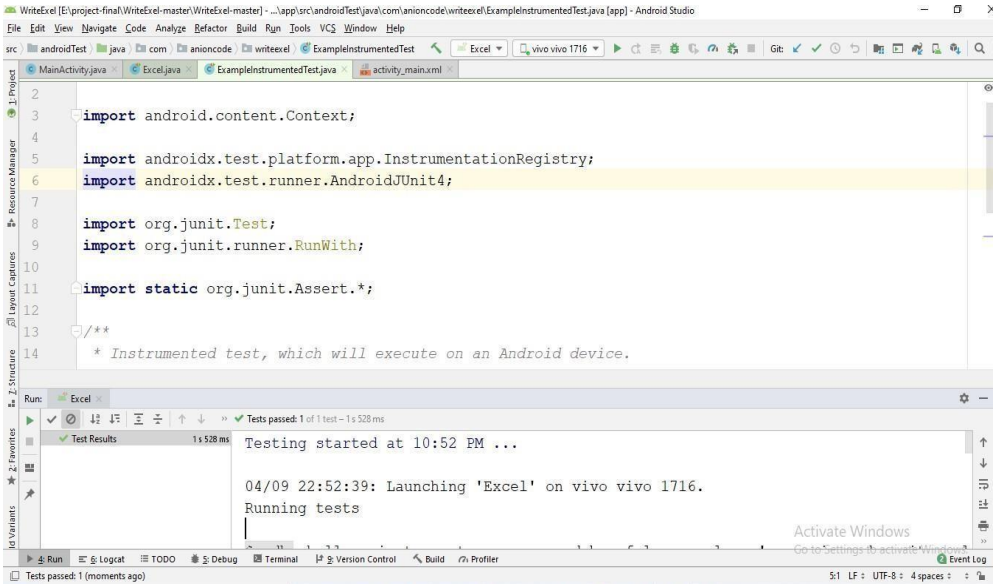

Figure 6.2.1(c):Launching excel sheet for unit testing

6.2.1.2 Integration Testing

Integration tests are designed to test integrated software components to determine if they actually run as one program. Testing is event driven and is more concerned with the basic outcome of screens or fields. Integration tests demonstrate that although the components were individually satisfied, as shown by successfully unit testing, the combination of components is correct and consistent. Integration testing is specifically aimed at exposing the problems that arise from the combination of components.

The combination of unit tests i.e. Continuous scan and Launching excel sheet shows the Integration testing. After all unit tests, the application working fine and it is running successfully without any errors. The below figure shows the screenshot of launching application without any errors.

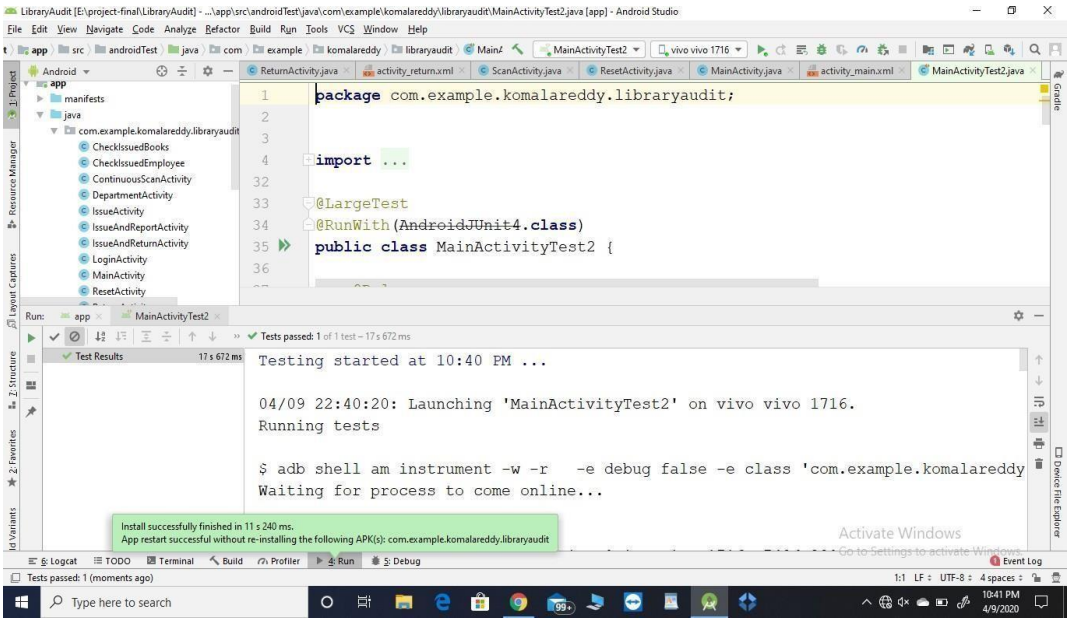

Figure 6.2.1.2:Launching application for Integration testing

6.2.1.3 System Testing

System testing ensures that the entire integrated software system meets requirements. It tests a configuration to ensure known and predictable results. An example of system testing is the configuration oriented system integration test. System testing is based on process descriptions and flows, emphasizing pre-driven process links and integration points.

Procedure of running the application on a system using two virtual machines:

1. First we create and install an android virtual machine.
2. Then we interface it with an application in android studio.
3. The application which we have running will be automatically saved into the virtual machine.
4. Then when we open the application, it will ask for authentication and based on the authentication it directs to the particular activities.
5. If the authentication accepts the employee it directs to scanning activity for auditing and if it is authenticated with admin it directs to admin activity for issuing, return of books, and other implementations which the admin have.

How to run the application on an android phone

1. After running the application on the system once, an .apk file is generated automatically in the workplace.
2. We now copy the .apk file from /bin on the computer to the phone and install it.
3. After installing we run the application in the same way as we run it on a virtual machine.

CHAPTER-7
EXECUTION AND RESULT

7.1 Introduction

Executing consists of the processes used to complete the work defined in the project plan to accomplish the project's requirements. Execution process involves coordinating people and resources, as well as integrating and performing the activities of the project in accordance with the project plan.

7.2 Output Screens

Following are the screenshots that will display after execution of our project Source Code

7.2.1 Scanning of Individual Books by Employee

Figure.7.2.1: Scanning of Individual books by Employee

7.2.2 Admin can Issue and Restrict the issue to five books.

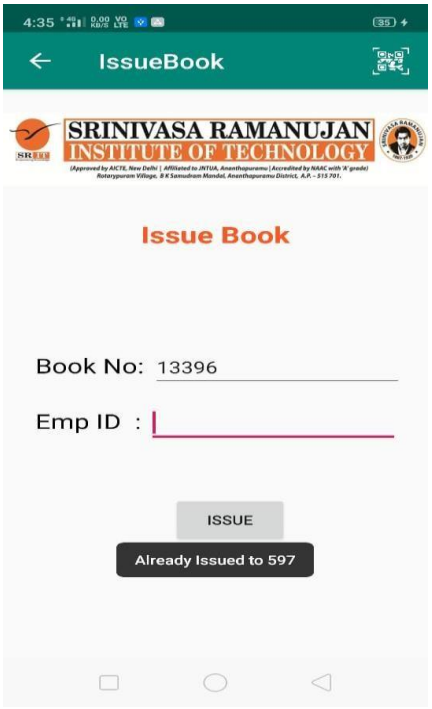

Figure.7.2.2 Issuing book

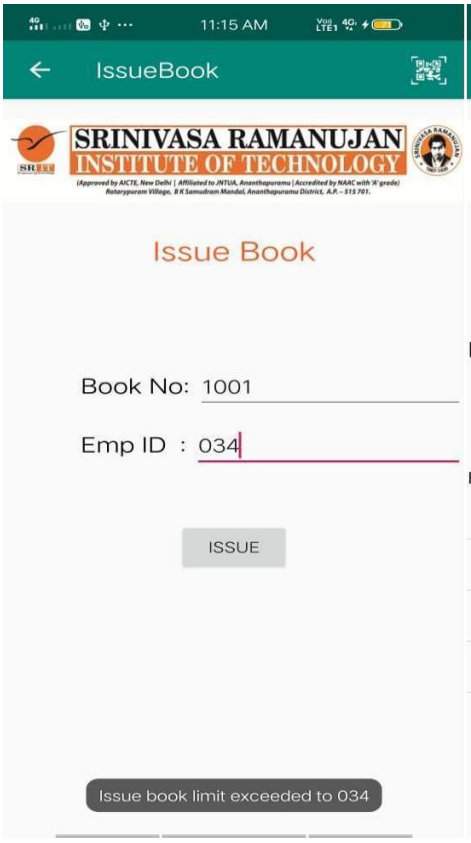

Figure 7.2.2(a) Issue restriction limit

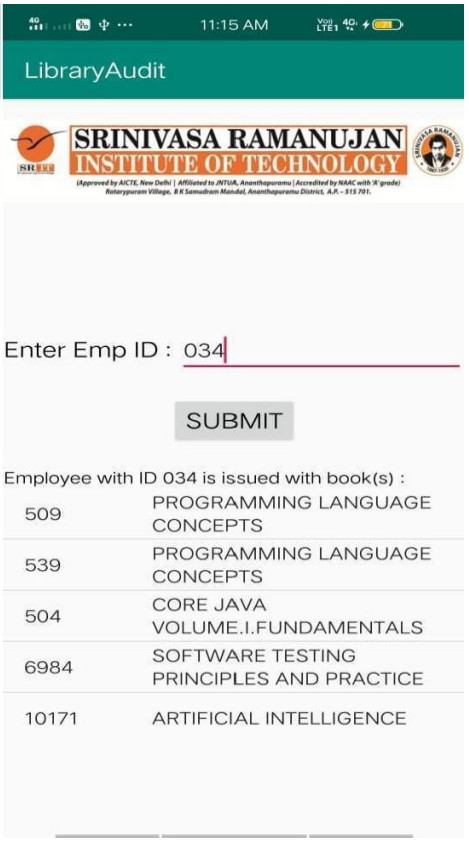

Figure 7.2.2(b) Exceeding limit

7.2.3. Admin has access to return the Books

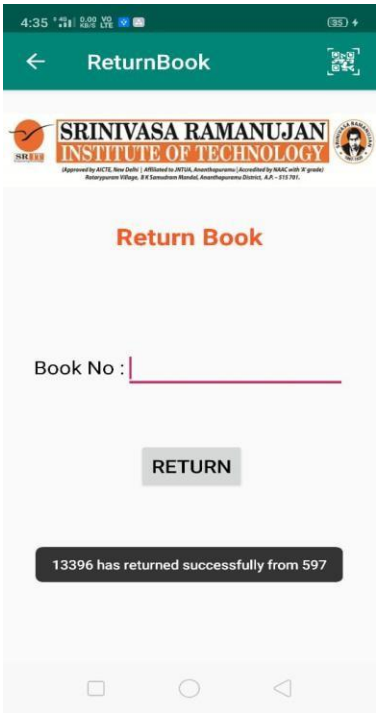

Figure 7.2.3 Return of Books

7.2.4 Admin can check the issued books by bookNo or EmpId

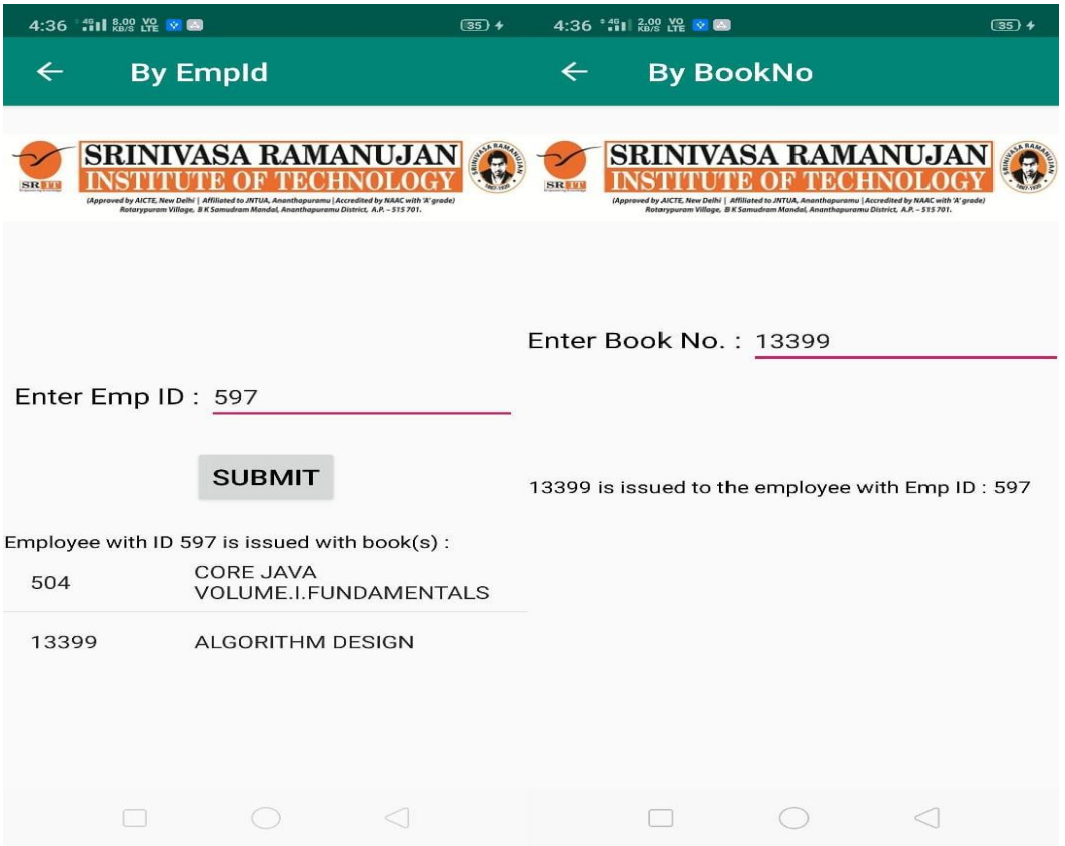

Figure.7.2.4: Admin can check the issued books by BookId or EmpId

7.3 The main Functionality of these application isto retrieve the missing books in Excel sheet by Admin

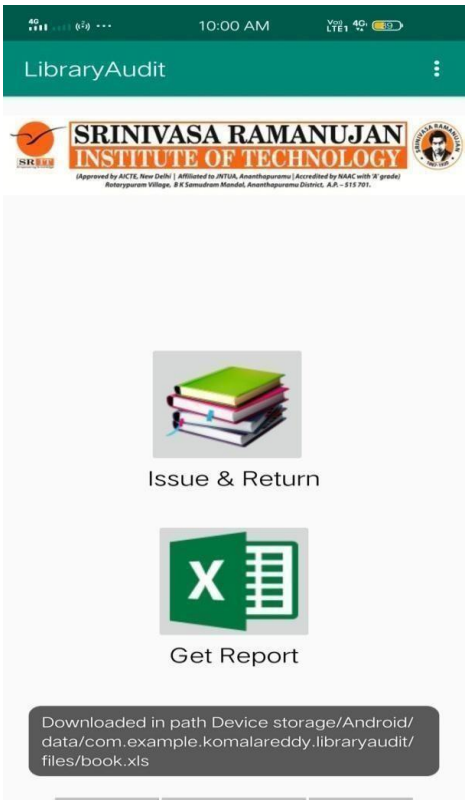

Figure.7.3.1: Report of missing books Downloaded in a path

Figure.7.3.2: Missing books in Excel.

7.4 Access the information about library through QRCode

If we scan a QRCode then we will download a document contain information about the library by using QR InfoPoint Website.

Figure 7.4:QRCode has generated

7.4.1 Scan QRCode using QRCode Scanner

Figure 7.4.1:Scan the QRCode then click on the link

7.4.2 Document is downloaded

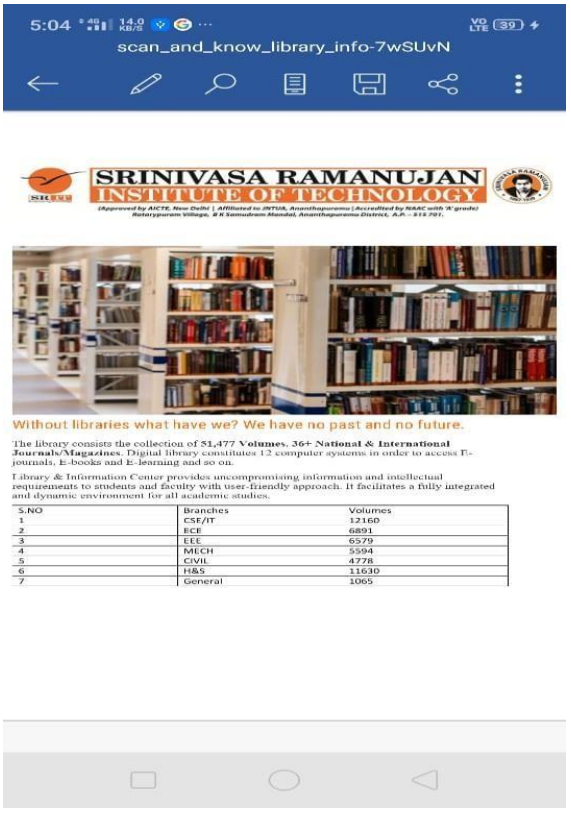

Figure 7.4.2:Snapshot of downloaded document

CONCLUSION

"Enhanced QRCode based Library Management System" is an android application which helps these for auditing of books in library. By using this application auditing can be done effectively and it reduces the manpower and time in large amounts. It provides authentication for the employees in the library. This application allows the specified persons who are employees in the library. The authentication contains two types of categories. They are the admin and the employees. The employees have the only access for scanning of books and check issued books of employee using EmpId .Admin has access to scanning of books, issuing of books and return of books. The admin can check the issued books to whom it was issued by using the book id or the student Id. Admin can only have the access of resetting the status of scanned books. There will be a sign out option to login as the admin or employee.

We can note an important information and stored it permanently within an application. We can get library information by just scanning of QRCode which is present outside of library.This application is using continuous scanning of QR Codes to read the data on the books. The report of the audit is downloaded in a specified path when admin clicks on the "Get Report" button provided in the application after scanning all the books. And it can reset the report for the next audit whenever needed.

BIBLIOGRAPHY

Journal Article

[1] U.Narmadhaa,P. Pavithra, M.Tharuneswari, S. Sowmiya, Nagarajan. "Enhanced QR-code based application for library management system using android". International Journal on Applications in Information and Communication Engineering Volume 3: Issue 1: February 2017

[2] Lambodara Parabhoi, Nivedita Bhattacharjya, Rupashree Dhar "Use of QR Code in Library" researchgate.net/publication/318259063 January 2017

[3] Mr. Nagesh L. Londhe, Dr. Suresh K. Patil,"Open source library management systems: a survey and present developmental status", International Journal of Library and Information Science (IJLIS), Volume 4, Issue 1, January - April (2015)

[4] Sangeeta Singh, "QR Code Analysis", International Journal of Advanced Research in Computer Science and Software Engineering, Volume 6, Issue 5, May 2016

World Wide Web:

[5] QRCode Generator**:** https://www.the-qrcode-generator.com/