

## QR Code Based Event Management System

**Jeyapriya Rajendran, Mohd Hamdi Irwan Hamzah\***

Fakulti Sains Komputer dan Teknologi Maklumat, Universiti Tun Hussein Onn  
Malaysia, Parit Raja, Johor, 86400, MALAYSIA

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**Abstract:** Nowadays many companies are increasing their services on event planning in order to manage event using modern technology. It is difficult to manage event using manual methods by witting manually on spreadsheet and paper documents. Due to that, QR code based event management is developed. This application development can be a platform to manage and promote the events conducted by Chiteeram Solution Sdn.Bhd. This application has admin and user side. The user side consists of nine modules that are registration, login, update profile module, view events, add to cart, book events, generate QR code, view history, settings and logout. The admin side consists of nine modules that are login, create event, update event, delete event, view user profile, scan QR code, generate report and sign out. The physical design of the application constructed using a mobile-based technology, which are Android Studio, Firebase database and Java language. The methodology used in this application system is Object Oriented System Development (OOSD) involves four phases such Object-Oriented Requirement Analysis, Object-Oriented Design, Object-Oriented Implementation and Object-Oriented Testing. Analysis and design of the proposed project done using UML diagrams, data dictionary and interface design. The application will make it easier for the management to implement to their business and manage customer's data.

**Keywords:** Event Management System, Event Management System, QR Code Based System

### 1. Introduction

QR code based event management system is a mobile-based project developed in android platform [1]. This application can be a platform to manage and promote the events conducted by Chiteeram Solution Sdn.Bhd. This application has admin and user side. The user side consists of nine modules that are registration, login, update profile module, view events, add to cart, book events, generate QR code, view history, settings and logout. The admin side consists of nine modules that are login, create event, update event, delete event, view user profile, scan QR code, generate report and sign out. The physical design of the application constructed using a mobile-based technology, which are Android Studio, Firebase database and Java language. This android project provides an easy and fast way to search for an event. This application enables users to find their desired event. Users can easily find the details of the event through their mobiles. Users need to register to the application to login and view event details available on the application. User can update their profile by entering their

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\*Corresponding author: [hamdi@uthm.edu.my](mailto:hamdi@uthm.edu.my)

details. This application helps the user to book event and make payment through online, once payment done the QR code generates. Whereas the administrator of the application will be able to login and create event by inserting event's information. Administrator will be able to update event details anytime and delete event if it is unnecessary. Administrator can also view user profile and generate report of from the user's feedback, total sales and total attendees for each events. Lastly, administrator able to scan QR code from user's mobile phone using the scan QR code module in admin application for registration purpose. This project is developed successfully and achieved all the objectives of this application.

## 2. Literature Review

This part discussed on research has been done regarding application about event management system to ensure that the development of the project runs smoothly by reviewing the advantages and disadvantages of other systems. Identified disadvantages in the other systems can be used as a guide in order to be avoided by the QR code based event management system. The advantages of these systems also provide guidance to improve the quality of the application. In addition, a literature survey also gives knowledge about the various types of facilities that can be added and provided in this application. Furthermore, there is a way to obtain an idea to introduce new elements which makes QR code based event management system different and much more interesting than the existing application.

### 2.1 Study on Event Management and QR Code System

Manual management systems put pressure on people to be correct in all details of their work at all times, the problem being that people are not perfect, they tend to make mistake. With manual management system the level of service depends on individuals and this puts a requirement on management to ensure they are following the correct procedures. However, the online management system also causes problem like need to have a reliable internet connection [2]. If there is no online connection to support online database software, then there is no access to the data. Online management system also requires big space to store the data and it might cost high pricing. Somehow people nowadays prefers online management system to make their life easy. This online management system is quick and easy registration for the participant [3]. Online entry is a fast and easy for the participant to fill up and submit through online. The online data submission is secure and reliable so the participant no need to worry about it.

Based on this study, a project is developed known as QR code based event management system for Chiteeram Solution Sdn.Bhd. It is an event management company where they conduct events all over Peninsular Malaysia. This company requires to develop an application for their daily use. This application has two target users who are the admin and customers. There will be seven modules for the customer's application and five modules for the admin's application.

### 2.2 Technology Approach

#### 2.2.1 Mobile Operating System

Every mobile communication device needs some type of mobile operating system to run its services: voice calls, short message service, camera functionality, and so on. The earlier mobile operating systems were simple, since the capabilities of the phones they supported were limited. However, modern smartphones have added many of the features of a full-fledged computer which includes high speed central processing unit's CPU) and graphics processing unit (GPU), large storage space, multitasking, high resolution screens and cameras and multipurpose communication hardware.

#### 2.2.2 Mobile Operating System

Android software development is the process by which new applications are created for devices running the Android operating system. The Android operating system was developed by Google. It is based on the Linux kernel user interface [4]. The operating system is designed for smartphones and

tablet computers and allows users to engage with it through a touchscreen interface. Software development for mobile devices poses new challenges due to the unique features of this activity. The need to cope with various platforms, standards, protocols and network technologies, limited device capacity although its constant evolution and market time demands are but a few of the issues faced. However, Android support itself by the features such as storage, connectivity, media support, multi-tasking, multi-touch, flash support and web browser [5].

### 2.2.3 Firebase

Firebase is mobile and web application development platform. According to Wikipedia, the initial Firebase product was a “real time database, which provides an API that allows developers to store and sync data across multiple clients.”

### 2.2.4 Android Studio

Android Studio is the official Integrated Development Environment (IDE) for Android app development, based on IntelliJ IDEA, on top of IntelliJ's powerful code editor and developer tools, Android Studio offers even more features that enhance your productivity when building Android apps.

### 2.2.5 QR code

There are two types of QR code which are static QR code and Dynamic QR code. As it named by static, codes hold static contents. The contents that can never be change and stored in fixed location. If users want to add information inside the static code, they need to generate a new one. This lack leads to the development of dynamic QR code. Dynamic QR code allowing the content that stored inside it to be edited even after generated. Besides, it also allows people to create a single QR code that link to different URLs. Android software development is the process by which new applications are created for devices running the Android operating system. The Android operating system was developed by Google. It is based on the Linux kernel user interface. The operating system is designed for smartphones and tablet computers and allows users to engage with it through a touchscreen interface. Software development for mobile devices poses new challenges due to the unique features of this activity. The need to cope with various platforms, standards, protocols and network technologies, limited device capacity although its constant evolution and market time demands are but a few of the issues faced. However, Android support itself by the features such as storage, connectivity, media support, multi-tasking, multi-touch, flash support and web browser [5].

## 2.3 Comparison with the Existing Systems

After the observation and studies on the three existing application systems, there are several features and elements will helpful for the developers to apply on the development of this project. Table 1 shows the comparison of the advantages and disadvantages found in the existing application of the event management system. The systems that chosen for comparison are Eventbrite application, Boomset application and Bizzabo application. There are a few features that studied include manage event, payment, sales summary, generate QR code and feedback of the application systems. The function and features of this applications will be guidance during the development of this QR code based event management application project.

**Table 1: Comparison with the existing system**

Modules	Eventbrite Organizer	Boomset	Bizzabo	CPREM (Solution Event Management System)
Registration Module	Yes	Yes	Yes	Yes
Attendee Module	Yes	Yes	Yes	Yes
Manage Event Module	Yes	Yes	Yes	Yes
Payment Module	Yes	Yes	Yes	Yes
Sales Summary	Yes	No	Yes	Yes

**Table 1: (cont.)**

Event Organizer	Yes	Yes	Yes	Yes
Feedback	Yes	Yes	Yes	Yes
Generate QR code	Bar code/ QR code	No	No	Yes
Reports	Yes	Yes	Yes	Yes

### 3 Methodology

This chapter discusses the methodology used to develop the QR code based event management system. The development of this system is by using the Software Development Object Orientation methodology approach or better known as its Object-Oriented System Development (OOSD) methodology. There are four phases involved in this development using this OOSD such as analysis object orientation, design object orientation, implementation object orientation and test object orientation.

#### 3.1. Object Oriented System Development Phase

Each phases are explained in the Table 2 below.

**Table 2: Object-oriented system development pases**

Phases	Description
Object Oriented Analysis	<ul style="list-style-type: none"> <li>User requirement identified</li> <li>Model build based on real world objects</li> </ul>
Object Oriented Design	<ol style="list-style-type: none"> <li>System Design           <ul style="list-style-type: none"> <li>System architecture designed</li> </ul> </li> <li>Object Design           <ul style="list-style-type: none"> <li>Design model developed</li> </ul> </li> </ol>
Object Oriented Implementing	<ul style="list-style-type: none"> <li>Object design translated into code using programming language</li> <li>Database created for developed system</li> </ul>
Object Oriented Testing	<ul style="list-style-type: none"> <li>Code is tested and errors are identified</li> </ul>

#### 3.2 Hardware and Software Requirements

The accurate usage of hardware and software is vital in developing the system. Hardware and software requirements need to be given attention in order to adapt to system development and to develop a successful application system. This QR code based event management system requires some specific hardware and software. The specifications of the software and hardware used in developing this system are as described in Tables 3.

**Tables 3: Hardware and software specification**

Tools/Techniques	Content
Software	<ul style="list-style-type: none"> <li>Authorship software</li> <li>Android Studio, Android Software Development Kit (SDK), Android Development Tools (ADT)</li> </ul>

**Tables 3: (cont.)**

	Programming Languages
	<ul style="list-style-type: none"> <li>• JAVA</li> <li>• PHP</li> </ul>
	Database
	<ul style="list-style-type: none"> <li>• Firebase</li> </ul>
	Version android
	<ul style="list-style-type: none"> <li>• Kit Kat sdk19</li> </ul>
	Project scheduling
	<ul style="list-style-type: none"> <li>• Microsoft Project 2016</li> </ul>
	UML Diagrams
	<ul style="list-style-type: none"> <li>• Microsoft Visio 2016</li> </ul>
	Word processing
	<ul style="list-style-type: none"> <li>• Microsoft Word 2016</li> </ul>
	Operating system
	<ul style="list-style-type: none"> <li>• Microsoft Windows 10 64-bit</li> </ul>
	Browser
	<ul style="list-style-type: none"> <li>• Google Chrome</li> </ul>
Hardware	Processing unit
	<ul style="list-style-type: none"> <li>• Intel (R) Core (TM) i5-6200U, 2.30GH</li> <li>• Random access memory (RAM)</li> <li>• 1.8 GB</li> </ul>
	Hard drive
	<ul style="list-style-type: none"> <li>• 1 TB HDD</li> </ul>
	Display monitor
	<ul style="list-style-type: none"> <li>• 15.1"W LCD</li> </ul>

## 4 Analysis and Design

In this part, the process of analysis and design of the QR code based event management application was discussed in details. Analysis emphasizes an investigation of the problem and requirements, rather than a solution. Design emphasizes a conceptual solution that fulfils the requirements, rather than its implementation. Therefore, the analysis is being represents in the form of object-oriented diagrams such as Use Case Diagram, Sequence Diagram, User Activity Diagram, Class Diagram and ERD. This chapter will discuss the system and user requirements, functional requirements and non-functional requirements for the proposed application. Interface design and database design for the proposed application is also mention in this chapter

### 4.1 Requirement Analysis

Requirement analysis is to identify the requirements of the admin and users of the system requirements for the proposed application.

#### 4.1.1 Admin Requirement Analysis

The target user for this application is the admin and the users. In this section, the admin's features and functionalities for proposed application is identify. Table 4 shows the admin requirements for the application.

**Table 4: Admin requirements for the proposed application.**

No	Admin Requirements
1.	Admin able to login in to the application.
2.	Admin able to manage user's profile
3.	Admin able to create event
4.	Admin able to scan QR code
5.	Admin able to generate report.

#### 4.1.2 User Requirement Analysis

The target user for this application is the user books events. In this section, the user's features and functionalities for proposed application is identify. Table 5 shows the user requirements for the application.

**Table 5: User requirements for the proposed application.**

No	User Requirement
1.	Users able to register to use the application.
2.	User able to login in to the application.
3.	User able register user's details.
4.	User able to view current and upcoming events
5.	User able to book and add to cart the events
6.	User able to make payment for booked event
7.	User able to view history of booked event

#### 4.2 System Requirement Analysis

There are two important elements in the system requirements that are the functional and non-functional requirements. These requirements make sure the functionalities of the proposed application that can meet the objectives of the project. Furthermore, these requirements determine the usefulness and quality of application along to develop an application that meets the needs of the user.

##### 4.2.1 Functional Requirement

A functional requirement can be defined that the function and capabilities existing in a software system or its components. Functional requirements maybe calculations, technical details, data manipulation and processing and other specific functionality that define what a system is supposed to accomplish. Table 6 shows the functional requirements for the system.

**Table 6: Functional requirements for proposed application**

No	Module	Functionalities
1.	Register	1. The application should allow the user to register as a new user of the application.
2.	Login	1. The application should allow the user to input the valid email and password to log in as user.
3.	Update Profile	1. The application should allow user to add, update, delete user's details and view it.
4.	View Events	1. The application should allow user to view events
5.	Book Events	1. The application should allow user to book events 2. The application should allow user to add booked events to cart
6.	Make Payment	1. The application should allow user to make payment and generate QR code
7.	View History	1. The application should allow user to view history

##### 4.2.2 Nonfunctional Requirement

Non-functional requirement is a requirement that specifies criteria that can use to judge the operation of a system, rather than specific behaviors. It is a requirement that specifies the criteria that can be describes as constraints to the application behavior. Table 7 shows the nonfunctional requirements for the system.

**Table 7: Non-functional requirements for proposed application**

No	Data	Functionality
1.	Operational Requirement	This application will operate by using android studio in smart phone. The system only available when there is internet connection.

**Table 7: (cont.)**

2.	Usability Requirement	The application provides interesting, user-friendly and easy to understand applications and provides a variety of modules for the users.
3.	Security Requirement	Users need to enter their email and password to access In this application so that the user information can be protect.
4.	Portability Requirement	The application is portability due to it can run at any android smartphones.

### 4.3 Unified Modelling Language (UML)

UML is a general-purpose, developmental, modelling language in the field of software engineering that intended to provide a standard way to visualize the design of a system. It is a very important part of developing object-oriented software and the software development process. It is also a way of visualizing the design of a system using collection of diagrams. In this section, use case diagram, sequence diagram, user activity diagram and class diagram for the proposed system was construct here.

#### 4.3.1 Use Case Diagram

A use case diagram is a representation of a user's interaction with the system that shows the relationship between the user and system. Figure 3 demonstrates the use case model of proposed application that shows the interactions between the user and proposed application. Figure 3 (Appendix A) shows the use case diagram of proposed system

#### 4.3.2 Sequence Diagram

Sequence diagram is use to display in more detail the interactions involved in this application. This means that the diagrams provide a preliminary picture of the sequence of events performed by the actor as well as the correct order for each event to occur. It also shows how objects interact with each other. Figure 4 (Appendix A) shows the sequence diagram for registration.

#### 4.3.3 Class Diagram

Class diagram is a static model that describe classes and their relationship of the purposed system. In class diagram, each class has its own internal structures and its relationships with other classes. During the analysis phase, class diagram is used to indicate the common roles and responsibilities of the entities that provide the system's behavior. Figure 5 (Appendix B) shows the class diagram for the proposed system.

#### 4.3.4 Activity Diagram

Activity diagram is also graphical representation that is consist of activities workflow and actions to support stepwise selection, iteration and concurrency control.

Activity diagram is one of the UML specification. The activity diagram illustrates the flow of activities that focused on the use case or detailed design methods. In activity diagram, there contain several symbols used in flow chart which are the input, output, processes and data flow. Figure 6 show the Activity Diagram of the proposed system. (Appendix B)

### 4.4 Database Design

The design of the database is to indicate the type of data contained in the attribute. Firebase has been used as a database throughout the development of this system. Explanation of the relationships and attributes of each entity in the system has been provided using Unified Modelling Language (UML). A list of databases and their functions will be shown in this section.

#### 4.4.1 Administrator Database

Table 8 below shows a database that stores the log in information about the administrator. In the administrator table, the id\_admin becomes a unique number and the primary key.

**Table 8: List of attributes for the administrator table**

No	Field	Description	Data Type	Size	Key
1.	id_admin	Unique Id of administrator	varchar	10	Primary Key
2.	Password	Password of administrator	varchar	8	

#### 4.4.2 Customer's Database

Refer to Table 9 shows a database that holds all the information about a successful user registration. In the user table, the username is a unique and the primary key.

**Table 9: List of attributes for the user's table**

No	Field	Description	Data Type	Size	Key
1.	Username	Unique Id for user	varchar	10	Primary Key
2.	Password	Password for user	varchar	8	
3.	Email	User's email address	varchar	25	
4.	Full_Name	User's full name	varchar	50	

#### 4.5 Application Interface Design

The interface of the application that is developed needs to have some basic criteria such as easy to understand, easy to use by end-user, user friendly and function according to the specification that has been determined. In addition, the design of the interface also aims to create interaction between the application system on the smartphones and the end user, human beings. The use of icons, appropriate background colours for user comfort and buttons in the system should be clearly indicated.

### 5 Implementation and Testing

This section focuses on the description of the implementation of the developed system. In order to implement the interface and database design previously built, the software that needs to be installed is firebase console and Android Studio. The main activity in this phase is programming. Writing code programs is important because it is part of the activity that will be realized and executing all the plans and designs that have been made before. The objective of the implementation phase is to ensure that the system is developed in accordance with the project planning guidelines in the Object Orientation Requirements and Design Object Orientation phase.

#### 5.1 Database Connection

Firestore is chosen for the authentication of the proposed application. Firestore authentication is used in register and login side. SQLite also is used to manage database in the proposed application. Android comes in with built in SQLite database implementation. SQLite is used to create, read, update and delete data in the manage contact module in this proposed application. Figure 1 shows the firestore database connection of the proposed application in Android Studio

```

// GET USER AND STORE IN LOCAL STORAGE
public void getUser(String email, final CoordinatorLayout coordinatorLayout, final Context context) {

    USER_DATABASE_REFERENCE.orderByChild("email").equalTo(email).addValueEventListener(new ValueEventListener() {
        @Override
        public void onDataChange(@NonNull DataSnapshot dataSnapshot) {

            for (DataSnapshot userDataSnapshot : dataSnapshot.getChildren()){
                user = userDataSnapshot.getValue(User.class);
                AppService.writeLocalStorage(context, Constant.LOCAL_USER_TYPE, user.getType());
                AppService.writeLocalStorage(context, Constant.LOCAL_USER_EMAIL, user.getEmail());
                AppService.writeLocalStorage(context, Constant.LOCAL_USER_ID, user.getId());
                AppService.writeLocalStorage(context, Constant.LOCAL_USER_NAME, user.getName());
                Intent intent = new Intent(context, Home.class);
                intent.setFlags(Intent.FLAG_ACTIVITY_SINGLE_TOP);
                context.startActivity(intent);
                AppService.destroyActivity(context);
            }
        }
    });
}

```

**Figure 1: Source code for firebase database connection**

## 5.2 QR code Implementation

Figure 2 shows the partial Java coding of View QR code page. This code segment gets data of the user and event from firebase database and generates the QR code accordingly using Bitmap. The QR code for each events appears once data is successfully retrieve from database.

```

// GET INTENT VALUES
private void getIntentValues(){
    Intent intent = getIntent();
    CART_ID = intent.getStringExtra("name: "CART_ID");
    this.getEventById(EVENT_ID);
}

// LOAD LOCAL STORAGE DATA
private void loadLocalStorageData (){
    Paper.init(context, this);
    LOCAL_USER_ID = Paper.book().read(Constant.LOCAL_USER_ID);
    LOCAL_USER_TYPE = Paper.book().read(Constant.LOCAL_USER_TYPE);
}

private void initComponents() {
    this.toolbar = findViewById(R.id.act_view_code_tlb);
    this.setSupportActionBar(toolbar);
    this.coordinatorLayout = findViewById(R.id.act_view_code_cor_lyt);
    this.imageView = findViewById(R.id.act_view_code_img_view);
}

```

**Figure 2: Partial coding of view QR code page**

## 5.3 Application Interface

This section will show the interfaces of the application system.

### 5.3.1 Registration Module Interface

Figure 7 (Appendix C) shows the first module of the proposed application, which is register interface. User need to register only for the first time in order to use this application. User need to enter name, email address and password to continue to the login page. The user's data is save to Firebase Authentication cloud database. Internet connection is required for the application to function properly and access cloud firebase.

### 5.3.2 Login Module Interface

Figure 8 (Appendix C) shows the login module of the proposed application, which is login interface. The user signs in using registered email address and password. After the verification is successful, user will be redirect to the home page of the proposed application.

### 5.3.3 Homepage Module Interface

Figure 9 (Appendix C) shows the Main Interface of the proposed application. This page contains image of the events that will be held by the management. User can view the events and click on it to view details of the events

### 5.3.4 View Event Module Interface

Figure 10 (Appendix C) shows the View Event Page of the proposed application. This page contains details of the events that will be held by the management. User can view the details of the event and add to cart in order to book the event.

### 5.3.5 Add to Cart Module Interface

Figure 11 (Appendix C) Add to cart shows the Add to Cart Page of the proposed application. This page contains the list of events that user add to cart for future use. User can click on the events to proceed to the payment gateway.

### 5.3.6 Book Event Module Interface

Figure 12 (Appendix C) shows the Book Event Page of the proposed application. This page shows the option box whether to make payment or delete from cart. If the user clicks on make payment it redirects to the payment gateway for the user to make payment.

### 5.3.7 View QR code Module Interface

Figure 13 (Appendix C) shows the View QR code of the proposed application. This page contains the generated QR code of the booked event. The QR code is encrypted with user booking details.

### 5.3.8 Manage Profile Module Interface

Figure 14 (Appendix C) shows the Manage Profile Page of the proposed application. This page contains details of the user. User can change their password and update their basic details in this page.

### 5.3.9 View Setting Module Interface

Figure 16 (Appendix C) shows the View Setting Interface of the proposed application. This page contains About Us, Contact Us and Feedback page. The about page shows the brief description of the management and the Contact us shows the email address of the management for user to contact. The feedback page for user to give star rating based on the management service.

### 5.3.10 Admin Homepage Module Interface

Figure 17 (Appendix C) shows the Admin page of the proposed application. This page contains the images of the upcoming events that are added by the admin. The admin can click on the + button icon to add events and it redirects to add event page.

### 5.3.11 Add Event Module Interface

Figure 18 (Appendix C) shows the Add Event Interface of the proposed application. In this page admin can add their event and details of the events. The details such as image, start date, end date, start time, finish time, price and place of the event will be saved in database and it appears on homepage once it successfully added message shows.

### 5.3.12 Update and Delete Module Interface

Figure 19 (Appendix C) shows the Update, Delete and View Report Page of the proposed application. This page enable admin to update the information of the event, delete the event if it is unnecessary and view report of the event

### 5.3.13 View User Profile Module Interface

Figure 20 (Appendix C) shows the View User Profile Interface of the proposed application. This page contains details of the users that registered in this application. Admin can view the user details that registered to this application.

### 5.3.14 Generate Report Module Interface

Figure 21 (Appendix C) shows the Generate Report page of the proposed application. This page shows the list of charts produced based to the total sale and attendees of each event. The charts appear in bar graph form to ease the admin's work for the business purpose.

### 5.3.15 Scan QR code Module Interface

Figure 22 (Appendix C) shows the Scan QR code Interface of the proposed application. This page shows the back camera of the phone functions after the permission on the camera setting is enabled by the user. Admin can scan the QR code using this scan code page.

## 5.4 Testing

In testing phase, QR Code based Event Management Application is tested and documented using functional system testing. Testing should be carried out in order to check whether there is any error in the application and to ensure that the application is reach the project requirements. Section 5.4.1 below shows the results of functional testing of this application.

### 5.4.1 Functional Testing

Functional testing is to test the functions of all the components and features of this application. This is to ensure that the system performs and functions correctly and as expected. The testing elements are integrated into the test plans based on different test cases of each module. The following subsections will present the test reports for the functional testing run on every module in this system

### 5.4.2 Test Plan

Test plan is carried out after the proposed application is implemented. It can be used to check the application whether it reach the project requirements. The test plan for all the features in QR Code based Event Management Application are shown in Table 10 until Table 18 (Appendix D).

Table 10 shows the test plan for user login page. This module is able to test with input of user's email address and password. Table 11 shows the test plan for user registration page. In this page the email address and password will be verified and user able to login to homepage of the application. Table 12 shows the test plan for reset password. In this activity, user should able to reset the password by entering required characters. Table 13 shows the test plan for manage user profile. In this page, user can update the basic information. Table 14, 15, and 16 are add event, update event and delete event table which perform (CRUD) operation, which enables admin to add event, view event, update event and delete event. Table 17 shows test plan for scan QR code. In this page, admin should be able to scan QR code if it is valid QR code. Table 18 shows the test plan for generate QR code. In this page, user should be able to view QR code after payment is done.

## 6 Conclusion

QR code based event management system will be developed in order to connect the customers and the administrator. Overall, all phases of the system development process have been carried out to meet the target of achieving satisfactorily. This system plays a significant role in facilitating those who are involved in event management and provide benefits to those who are interested to join any kind of

events. In addition, this system is also expected to be enhanced by improving its quality in the near future. The improvement can be done by optimizing performance and usability of the application.

### 6.1 Project Achievements

QR code based event management application was successfully designed and developed to work smoothly. The alpha test is carried out which covers the user requirements as expected and satisfy the users but the beta test could not be carried out due to COVID -19, current world pandemic. Through this application, users are able to use all the features that has been built in the proposed application. Firebase phone authentication has been successfully implemented for the features of register and login for the proposed application. The advantage of firebase phone authentication is that it can prevent fake users because email address is unique data and users cannot register multiple accounts. Besides that, it increases security and user experience because it is very each to register just with an email address only once. QR code generator and scanner system was implemented successfully with use of Google Vision API. The QR code library was added to the library of android studio from GitHub and implemented and generated according to the user requirements. The CRUD features were implemented successfully and worked smoothly for the part of managing events where admin can add, update and delete the details of the events. The QR code helps admin and also user to attend the events without manual attendance.

### 6.2 Limitations

This section will discuss on the limitations existed in this proposed application although the objectives of the project have been achieved. The limitations are:

1. Internet connection for the payment method is required in order for the application to proceed payment and generate QR code.
2. The application shows only the events held by the managements and it requires user to register in order to use the application.
3. The application only applicable for android user but not for IOS users.
4. The application is lack of authentication and security features.

### 6.3 Future Work

This section will discuss on the improvements that can be done in future works. These are some several recommendations that can improve this application.

1. The application security should be improved to avoid forgery.
2. The user interface design of the application should be improvised so it can be use by IOS user too not only limited for the android user.
3. The application should be developed with more functions in order to be user friendly.

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## Appendix A

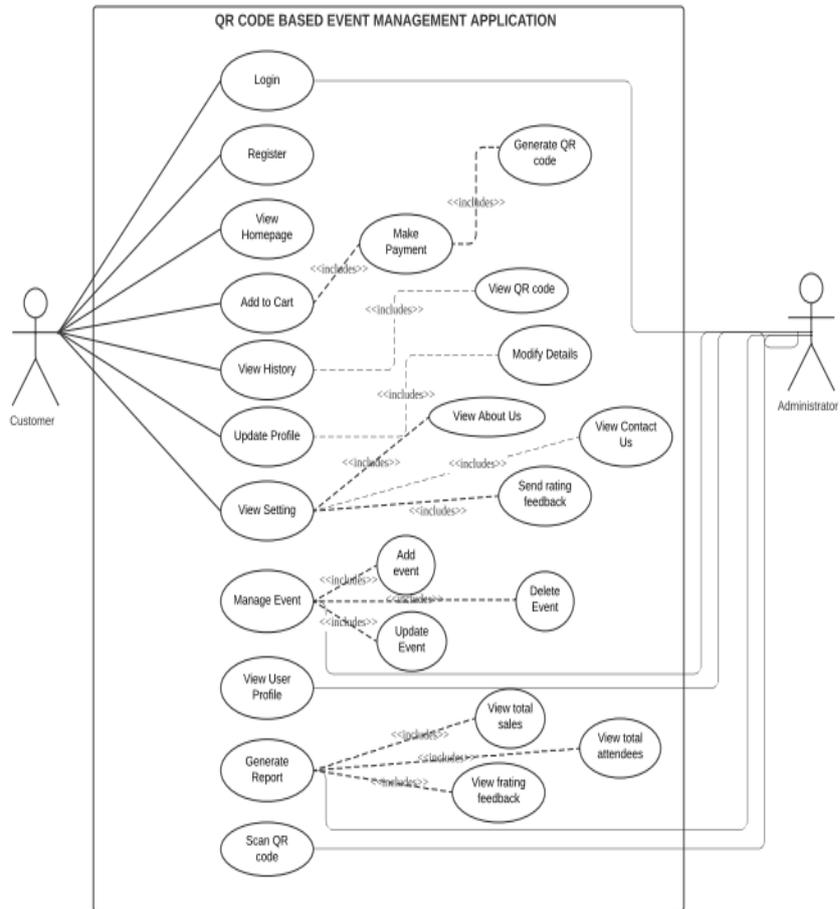


Figure 3: Use case diagram

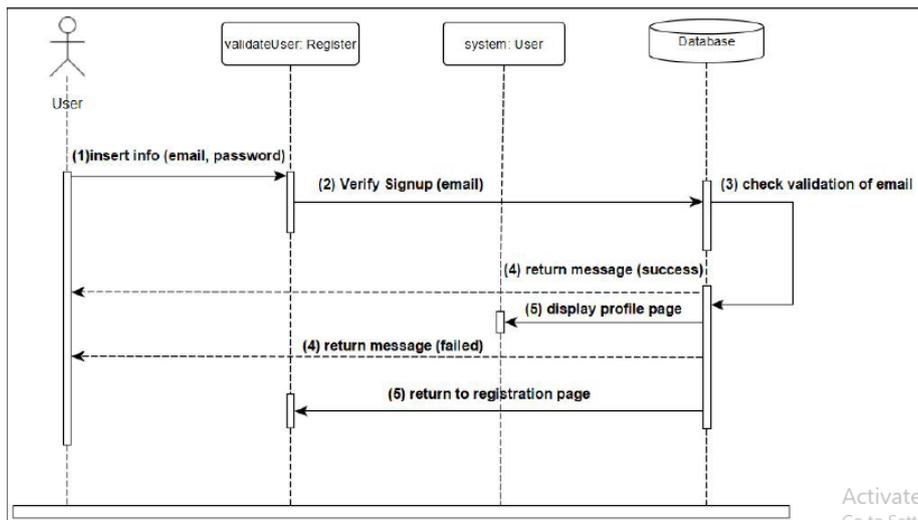


Figure 4: Sequence diagram fro registration

## Appendix B

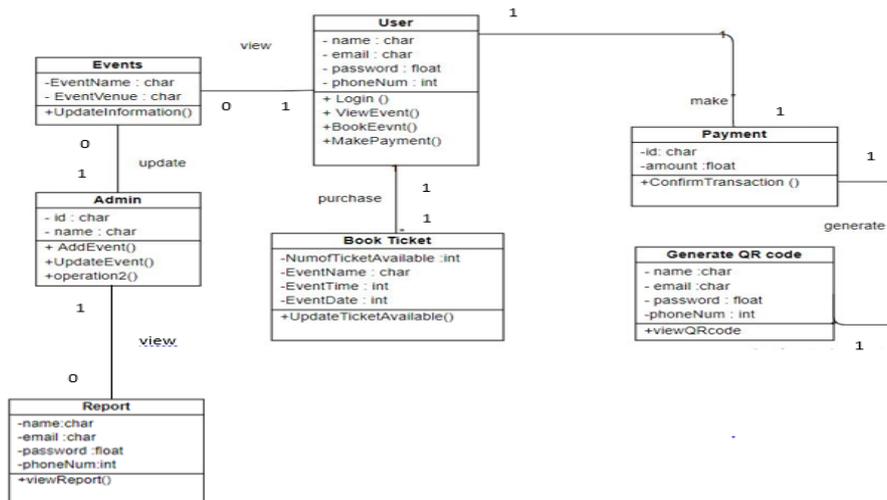


Figure 5: Class diagram of proposed system

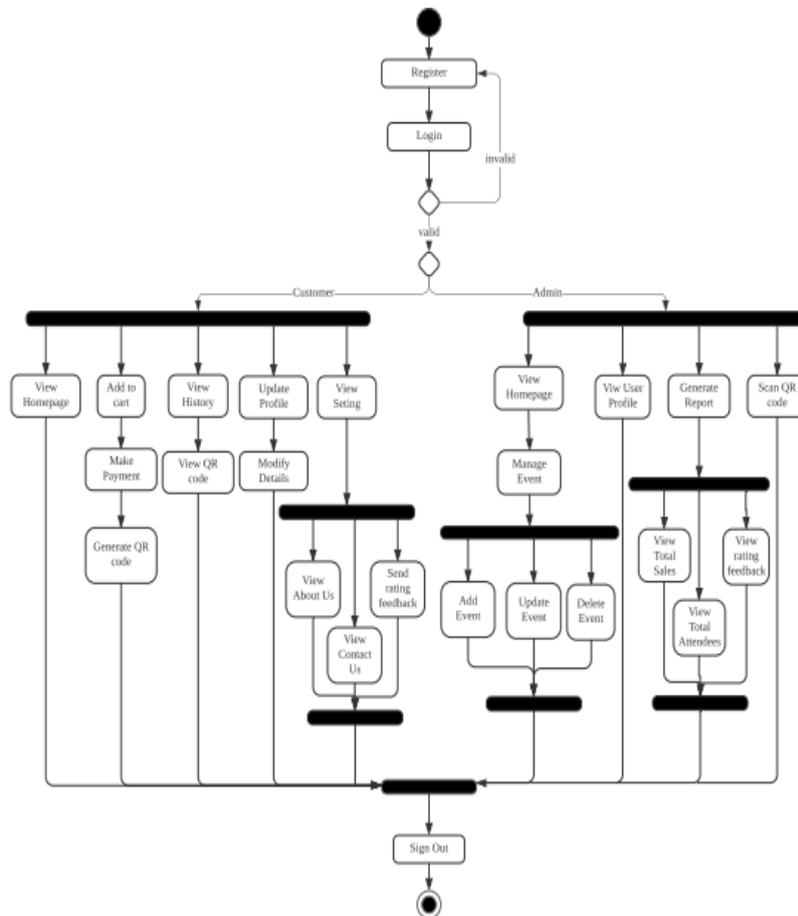


Figure 6: Activity diagram of proposed system

## Appendix C

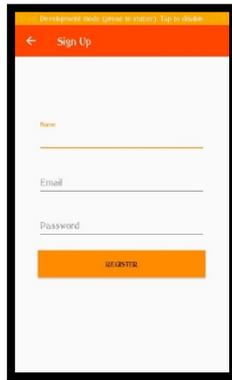


Figure 7: Registration Module Interface

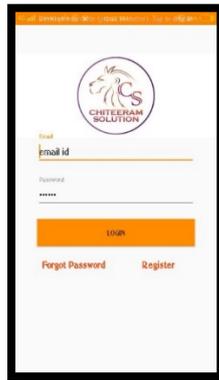


Figure 8: Login Module Interface



Figure 9: Homepage Module Interface

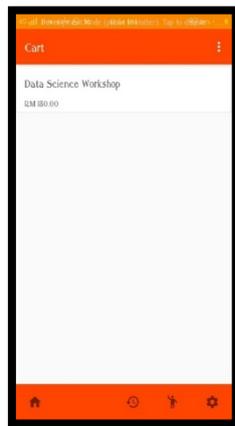


Figure 10: View Event Module Interface

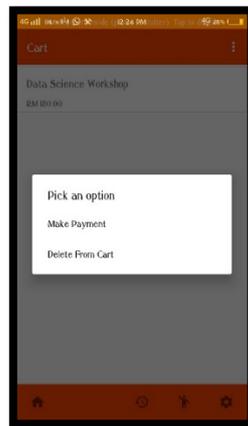


Figure 11: Add to Cart Module Interface

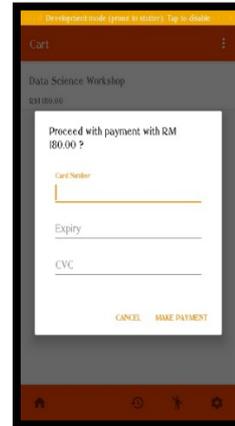


Figure 12: Book EventModule Interface



Figure 13: View QR code Module Interface

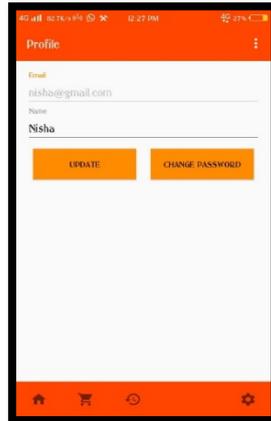


Figure 14: Manage Profile Module Interface

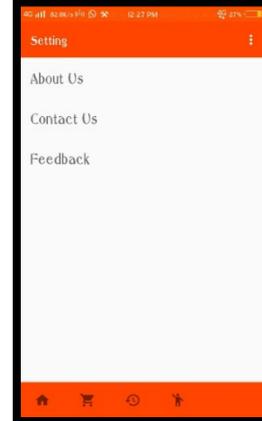


Figure 15: View Setting Module Interface

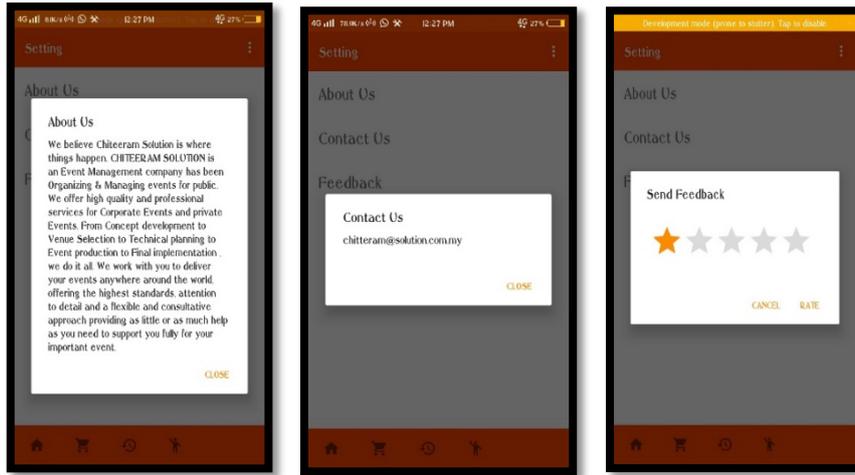


Figure 16: View Setting Module Interface



Figure 17: Admin Homepage Module Interface

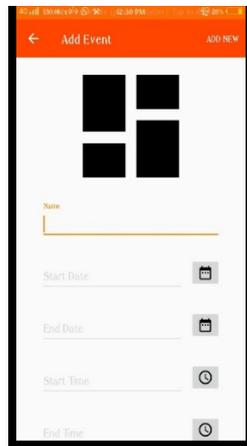


Figure 18: Add eventModule Interface



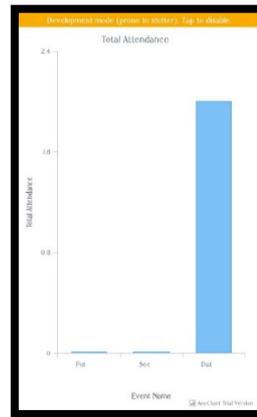
Figure 19: Update and Delete Module Interface



Figure 20: View User Profile Module Interface



Figure 21: Generate Report Module Interface



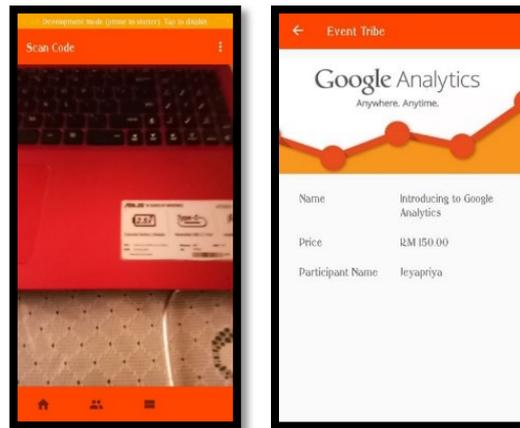


Figure 22: Scan QR code Module Interface

## Appendix D

**Table 10: Test plan for Login**

No	Test Cases	Expected Output	Actual Output
1.	Enter valid email address and password	Login is successful and a message box with the message "Login Successful" will be displayed.	As expected
2.	Enter invalid email address and valid password	If login is unsuccessful, a message box with the message "Email invalid" will appear.	As expected
3.	Enter valid email address and invalid password	If login is unsuccessful, a message box with the message "Password invalid" will appear.	As expected
4.	Enter invalid email address and password	If login is unsuccessful, a message box with the message "No user recorded" will appear.	As expected

**Table 11: Test plan for Registration**

No.	Test Cases	Expected Output	Actual Output
1.	Register using correct email and password	Registration successful and display login page.	As expected
2.	Enter incorrect email address	Error message is displayed to enter valid email address	As expected
3.	Enter incorrect password	Error message is displayed to enter 8 characters of password	As expected
4.	Attempt to continue (Login) without register.	Error message is displayed to fill in empty fields	As expected

**Table 12: Test plan for Reset Password**

No.	Test Cases	Expected Output	Actual Output
1.	Enter valid password characters	Reset is successful and a message box with the message "Reset Password Successful" will be displayed.	As expected
2.	Enter invalid password characters	Error message is displayed to enter valid password characters	As expected

**Table 13: Test plan for Manage User Profile**

No.	Test Cases	Expected Output	Actual Output
1.	Edit and click update button	When edit the selected data must be updated and pop up "Updated" message.	As expected
2.	Edit and unclick update button	Failed no data selected to update	As expected

**Table 14: Test plan for Add Event**

No.	Test Cases	Expected Output	Actual Output
1.	Add image and enter data in all fields	A message of successfully "Event Added" is shown and the uploaded event will display on main activity and user's event list.	As expected
2.	Leaves empty fields without filling up	Failure message is shown and prompt users to fill in the blank	As expected
3.	Internet Problems/ No connection	Failure message is shown and add event action is rejected	As expected

**Table 15: Test plan for Update Event**

No.	Test Cases	Expected Output	Actual Output
1.	Click save- Update image and details	A message of successfully "Event Updated" is shown and the uploaded event will display on main activity and user's event list.	As expected
2.	No connection/Internet problems	Failure message is shown and update event action is rejected	As expected

**Table 16: Test plan for Delete Event**

No.	Test Cases	Expected Output	Actual Output
1.	Click delete event	The deleted image and details not shown	As expected
2.	Internet problems/No connection	Failure message is shown and delete event action is rejected	As expected

**Table 17: Test plan for Scan QR code**

No.	Test Cases	Expected Output	Actual Output
1.	Allow permission on phone camera setting	The scan QR code page able to access phone camera and scan QR code	As expected
2.	Disallow permission on phone camera setting	The scan QR code page not able to access phone camera and scan QR code	As expected
3.	Scan QR code	The details of user and events appears	As expected
4.	Scan invalid QR code	No data recorded message appears	As expected

**Table 18: Test plan for Generate QR code**

No.	Test Cases	Expected Output	Actual Output
1.	Complete / Make payment	The QR code generated and stored in user history page	As expected
2.	Incomplete / No payment	No QR code generated	As expected