# Full Stack Application Development for Generating and Purchasing of limited validity tickets

Dissertation submitted to Shri Ramdeobaba College of Engineering and Management, Nagpur in partial fulfilment of requirement for the award of degree of

## Bachelor of Engineering
in
## Computer Science and Engineering
BY
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UNDER THE SUPERVISION OF
**PROF. V. RATHOD**



**DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING**
**SHRI RAMDEOBABA COLLEGE OF ENGINEERING AND MANAGEMENT,**
**NAGPUR-440013**
**(An Autonomous Institution of Rashtrasant Tukadoji Maharaj Nagpur University)**

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Department of Computer Science and Engineering

# CERTIFICATE

This is to certify that the Thesis on "**FULL STACK APPLICATION DEVELOPMENT OF GENERATION AND PURCHASING OF LIMITED VALIDITY TICKETS**" is a bonafide work of

**ABHILASH MANDLEKAR**
**CHINMAY DEGWEKAR**
**PRATIK DEVIKAR**
**SAARTHAK PANDE**

submitted to the  to Rashtrasant Tukdoji Maharaj Nagpur University, Nagpur in fulfilment of  the award of a Degree of Bachelor of Engineering. It has been carried out at the Department of Computer Science and Engineering , Shri Ramdeobaba College of Engineering and Management, Nagpur during the academic year 2016-17.

Date: 25/4/2017

Place: NAGPUR

Prof. V. Rathod                                           Dr. M.B.Chandak
Project Guide                                                    H.O.D
                                          Department of Computer Science and Engineering

Dr. R.S.Pande
Principle

# DECLARATION

I hereby declare that the thesis titled "**FULL STACK APPLICATION DEVELOPMENT OF GENERATION AND PURCHASING OF LIMITED VALIDITY TICKETS**" submitted herein has been carried out in the Department of Computer Science and Engineering of Shri Ramdeobaba College and Management , Nagpur.  The work is original and has not been submitted earlier as a whole or part for the award of any degree/diploma at this or any other institution/ University.

Date: 25/4/2017

Place: Nagpur

| Name of the Student | Roll No | Signature |
|---|---|---|
| Abhilash Mandlekar | 41 | |
| Chinmay Degwekar | 54 | |
| Pratik Devikar | 69 | |
| Saarthak Pande | 77 | |

# APPROVAL SHEET

This report entitled "FULL STACK APPLICATION DEVELOPMENT OF GENERATION AND PURCHASING OF LIMITED VALIDITY TICKETS" by

ABHILASH MANDLEKAR
CHINMAY DEGWEKAR
PRATIK DEVIKAR
SAARTHAK PANDE

is approved for the degree of Bachelor of Engineering.

Name and Signature of the Supervisor          Name and Signature of External
Examiner

Name and Signature of RRC Members          Name and Signature of HOD

Date: 25/4/2017

Place: NAGPUR

# ACKNOWLEDGEMENTS

The success and final outcome of this project required a lot of guidance and assistance from many people and we are extremely fortunate to have got this all along the completion of our project work. Whatever we have done is only due to such guidance and assistance and we will not forget to thank them.

We respect and thank Dr. M.B.Chandak , for giving us an opportunity to do the project work and providing us all support and guidance which made us complete the project on time . We are extremely grateful to him for providing such a nice support and guidance though he had busy schedule managing the college affairs.

We owe our profound gratitude to our project guide Prof. V. Rathod who took keen interest on our project work and guided us all along, till the completion of our project work by providing all the necessary information for developing a good system.

We are thankful to and fortunate enough to get constant encouragement, support and guidance from all Teaching staffs of Department of computer science which helped us in successfully completing our project work. Also, we would like to extend our sincere regards to all the non-teaching staff of department of computer science for their timely support.

**NAME OF THE PROJECTEES-**

**- PRATIK DEVIKAR**
**-ABHILASH MANDLEKAR**
**-CHINMAY DEGWEKAR**
**-SAARTHAK PANDE**

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# 1. ABSTRACT

Now-a-days it is hard to find a person or even becoming difficult to imagine one without a Smartphone. Almost all the mobile users are well connected with internet which leaves a huge opportunity for the organizations to grab the market provided if they bring in a bit of innovation in the way they operate. One such innovation in the recent times is the Virtual Wallet which in near future might replace the physical wallet usage. Our generation at least a few who grew up in remote villages in India have seen the transition from the barter system also, then physical money, very recently to Credit and Debits cards with most of the transactions online using net banking. With the arrival of the Virtual wallets, the shopping experience of the consumers became very easy right in both the modes either online or offline purchases.

The second part is about the time which is wasted standing in long queues in public places. Our aim is to reduce the time of the consumers with the help of smartphones and virtual wallets. We intent that our customers should be able to purchase limited validity tickets just by scanning a qr code and paying through a virtual wallet. This type of transaction completely removes the need of a particular person to issue a ticket.

Our project aims to present the mechanism of online payments through smartphones with the help of qr codes at public places where limited validity tickets are required, scope of virtual wallets, its advantages and disadvantages.
We also intent to show the merchant side of mechanism where a merchant can generate a specific qr code based on his needs and eventually a checker system to validate the tickets of consumers.

Keywords: Digital wallet, online payment,  qr codes, smartphone, validity tickets.

## 2. INTRODUCTION

The growth of mobile commerce follows the increasingly popular ownership and use of mobile personal, programmable communication devices, including mobile phones and PDAs. These devices are effective for authorizing and managing payment and banking transactions, offering security and convenience advantages compared to online payment via PCs. Some of these advantages are available in existing devices; others require modest, inexpensive enhancements likely to be available in new devices in the next few years. The use of secure and convenient mobile personal devices could revolutionize the payment, banking, and investment industries worldwide. Here, I discuss some of the challenges and opportunities involved in their use for making secure payments and authorizing banking transactions. Mobile personal devices, usually with a built-in display and keyboard, are well-positioned to provide a technical solution for reducing fraud and allowing the fair allocation of responsibility for damages from fraud. Some amount of security is already part of the authentication mechanism of existing cell phones as a way to prevent call theft. Moreover, it is relatively easy and inexpensive for device manufacturers to incorporate additional mechanisms to ensure secure transaction authorization. These mechanisms help prevent most fraud and allocate responsibility fairly for any remaining fraud. For users, their value far outweighs their relatively modest cost. Convenience is another reason people use mobile personal devices for transactions. Convenience can result from using their communication capabilities when paying for goods and services, whether on foot or in cars, planes, or trains, and authorizing transactions at remote servers of banks, brokerages, and merchants. A device's user interface can also improve convenience; for example, the user can view balances and logs of transactions and retrieve receipts of payments. It also makes it easy for a single mobile device to support several applications, including banking, investment, and retail payments, using multiple charge, micropayment (cash), and loyalty accounts, all supported by a uniform user interface and consolidated management. To support the many possible scenarios and applications, these devices should incorporate modular authorization architectures.

## 2.1 *Objectives:*

- To create a generic Customer and Vendor application to generate and validate tickets via QR codes.

- The Vendor application should be able to generate service specific tickets specifying amount, account no, service type and validity.

- The Customer application should be able to make ticket payment and automatically check the validity of the same.

- Both automatic and manual checking of the validity of tickets.

- Hence an additional application would also be created to check a person's ticket.

# 3. REVIEW OF LITERATURE

Modern electronic tickets in public places are more and more put forward to exchange commonly used cash systems of payment and daily or monthly season tickets that needed to be purchased on the ticket counter. Very often, every journey starts with the purchase of a ticket at ticket counter or on a machine. This often involves waiting in a queue, losing some precious time and extends the whole journey. It would be convenient to have an electronic system at our disposal, that could make this task as easier as possible and without additional steps for the passenger. The expanded use of mobile phones, their computational capabilities and their ability to connect to the Internet makes them suitable for solving this problem. Lately, several new technologies have been used for such purposes. The most common solutions for buying a public tickets worldwide are: (i) online ticket purchase and printing a ticket at home (e.g. Austrian railways system), (ii) buying it on a ticket machine, (iii) buying it at ticket counter, (iv) paying a ticket with mobile phone or smart card. The well-known and widespread system for paying with mobile phone in Slovenia is Moneta, which can be also used to pay for services of Ljubljana's public transport company. Very popular choice is the use of virtual mobile wallets such as Paytm which are prepaid. A customer must position his online generated receipt close to the checker's app to allow system to verify his ticket for validity. Another electronic system is using location based ticketing by tracing mobile user during his journey to define check-in and check-out used for the calculation of his fare . Lately, a new approach of using QR code is becoming important in tourism to encode the data by any mobile phone having camera. Mobile tagging, based on QR code is used within a test study in cultural institutions, like museums to increase the usability of mobile services. With that data, it is possible to optimize time tables and other parameters of public data. Electronic tickets gives merchants detailed, continuous and accurate data on behaviour of passengers and enable sophisticated analysis of travel patterns.

# 4. THE BODY OF THESIS

This section discusses in detail all the components involved in the application. It also explains the basic functioning of the application. System architecture talks about the technologies and platform used in the application.

## 4.1 Working

An overview of how the application works described in the following steps:

PART A: Web Portal

A ticketing service provider will generate service specific QR code with following attributes:

- Service name
- Account number( for payment)
- Amount of ticket (in rupees)
- validity of ticket(in mins)

Then it can generate QR code and download to print as multiple POS.


PART B: Client's App

- Scan Ticket QR Code
- Show ticket & payment details (decoded)
- Payment - VISA/PayTM wallet
- List of Live tickets
- Generating QR Code to be shown to ticket checker

- Automatically destroy after validity is elapsed

PART C: AWS Database

On successful payment of a ticket, make entry in database with attributes

- Transaction ID
- Validity of corresponding ticket
- Transaction timestamp

PART D: Ticket Checker's App

- Scan the ticket QR Code generated on clients app
- Take transaction id and payment Time Stamp
- Check against validity

- Update status as checked

## 4.2 Technologies Used

➢ **QR-Codes**

**QR code** (abbreviated from **Quick Response Code**) is the trademark for a type of matrix barcode (or two-dimensional barcode) first designed for the automotive industry in Japan. A barcode is a machine-readable optical label that contains information about the item to which it is attached. A QR code uses four standardized encoding modes (numeric, alphanumeric, byte/binary, and kanji) to efficiently store data; extensions may also be used.

The QR code system became popular outside the automotive industry due to its fast readability and greater storage capacity compared to standard UPC barcodes. Applications include product tracking, item identification, time tracking, document management, and general marketing.

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, and processed using Reed–Solomon error correction 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.

Benefits of QR Code

- Potentially paper-less events which simplifies the process and reduces costs.

- Faster check-in process for you and attendees, saving you both time and money.

- Better tracking because human error is removed the the check-in process and a registration record is kept for all attendees.

Fig 1: Internal working of a Qr code

## ➢ Android Programming

- Android is an open source operating system for mobile device .
- One of the key features of Android is its ability to extend the functionality of devices through new application (or apps).
- Android captured 81.7 percent of global smartphone market share in the three months to the end of December 2016.
- IDE used for development will be **Android Studio**.

- Android Studio is the official IDE for android application development.It works based on IntelliJ IDEA.

## ➢ AWS (Amazon Web Services)

**Amazon Web Services** (**AWS**) is a subsidiary of Amazon.com that offers on-demand cloud computing platforms. These services operate from 16 geographical regions across the world.[4] They include Amazon Elastic Compute Cloud, also known as "EC2", and Amazon Simple Storage Service, also known as "S3". As of

2016 AWS has more than 70 services, spanning a wide range, including compute, storage, networking, database, analytics, application services, deployment, management, mobile, developer tools and tools for the Internet of things. Amazon markets AWS as a service to provide large computing capacity quicker and cheaper than a client company building an actual physical server farm.

## ➢ Paytm Transaction Functionality API

- The Paytm Payments SDK for iOS and Android enables merchants to integrate payments into their mobile app.
- The following diagram describes how a typical payment transaction works. The components involved in completing a payment transaction are as follows:
- User Placing the Order: The end user who wants to initiate a payment transaction.
- Merchant Application: The Application of the merchant where the Paytm Wallet needs to be integrated. This may be an Android or iOS application.

- Merchant's Web server: The merchant needs to setup this web server at their end. The logic to generate and verify CheckSum needs to be setup on this server. Checksum helps ensure the integrity of transactions i.e. it helps ensure that the transaction requests have not been intercepted and tampered with. Checksum utilities are provided by Paytm for different development platforms.
- Payment Gateway: The Payment Gateway of Paytm. It will communicate with the Paytm SDK and Merchant's Web server. In case, the payment is made via credit cards/debit cards/net banking, the Payment Gateway will interact with the Banks as well.
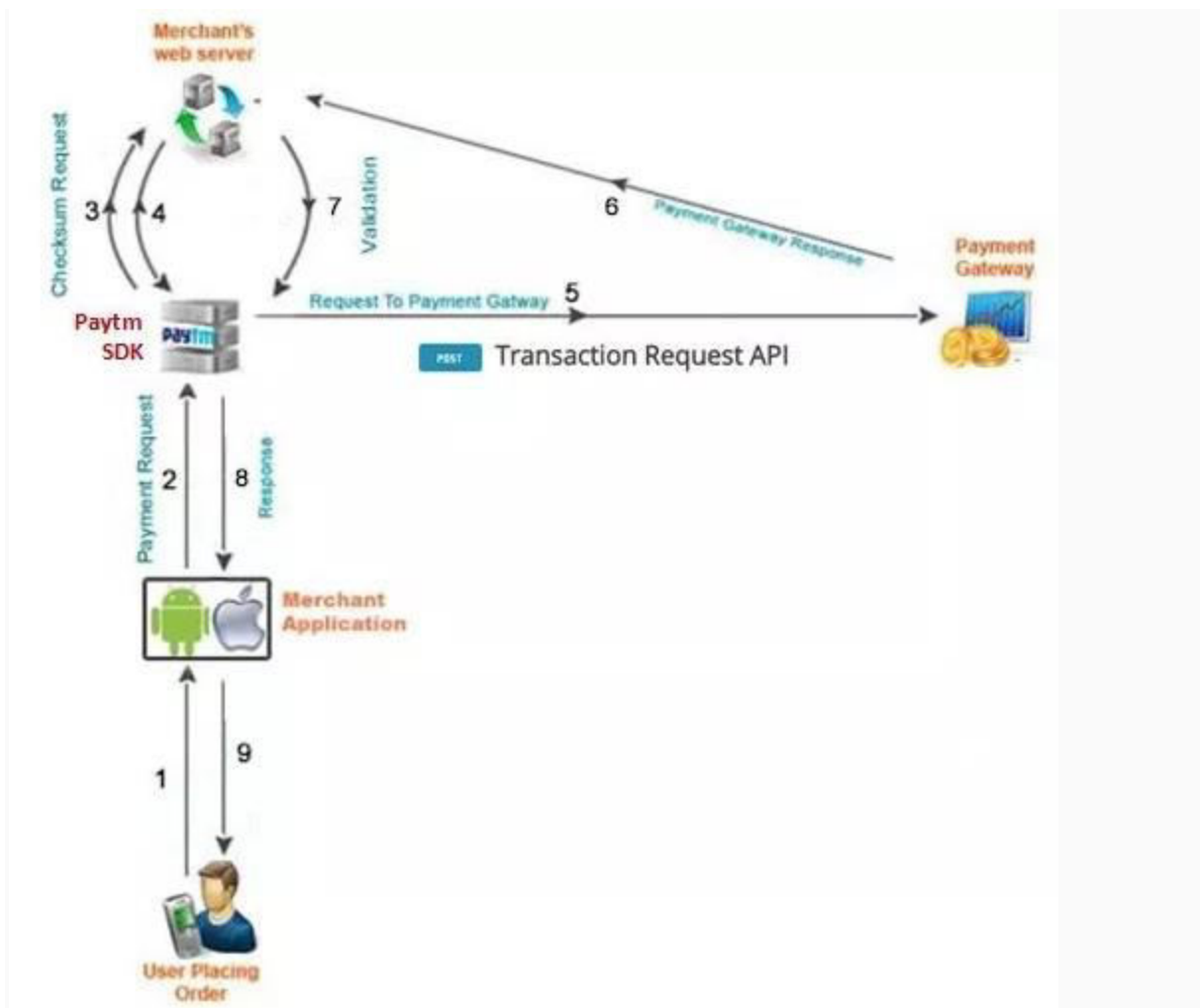
Fig 2: Working of Paytm API

## ➢ HTML, CSS and Java Script

- **HTML** is the standard markup language for creating Web pages. **HTML** stands for Hyper Text Markup Language. **HTML** describes the structure of Web pages using markup.
- Cascading Style Sheets (**CSS**) is a style sheet language used for describing the presentation of a document written in a markup language.

- JavaServer Pages (**JSP**) is a technology that helps software developers create dynamically generated web pages based on HTML, XML, or other document types**.**

**4.3 Methodology**

1) **Vendor's Application**

   This application is for small as well as large vendors. A vendor will need to create an account on the portal in order to avail our services. There, he has to provide specific details like account number, service, amount of ticket and its validity. After that, he will have to download the qr code and make as many copy as he wants. This will allow the customers to scan a specific qr code and thus generating tickets automatically. After the payment is made the transaction Id will be returned to the customer. This app will again generate QR-code again after appending transaction Id to the data.

   We integrated our android application with Paytm wallet API to get transaction Id and timestamp of the current transaction made by the customer in our application.

2) **Client's Application**

   To avail the validity tickets, customers have to scan Ticket QR Code. After he is done paying for it, a receipt of the ticket along with its qr code will be generated in his application for a ticket checker to verify. Customers are expected to pay via Paytm account to the specific merchant. We will automatically destroy the ticket after validity is elapsed.

3) **Ticket Checker's Application**

   The job of ticket checker will be to check the validity tickets of the customers by scanning an auto generated qr code receipt.
   After a customer pays for a ticket, his transaction id and payment time stamp will be stored in our AWS database.
   The checker's app will cross verify a ticket's validity in our database. Attributes of database will contain unique transaction IDs of the customers. Efforts will be made to make transactions fast.

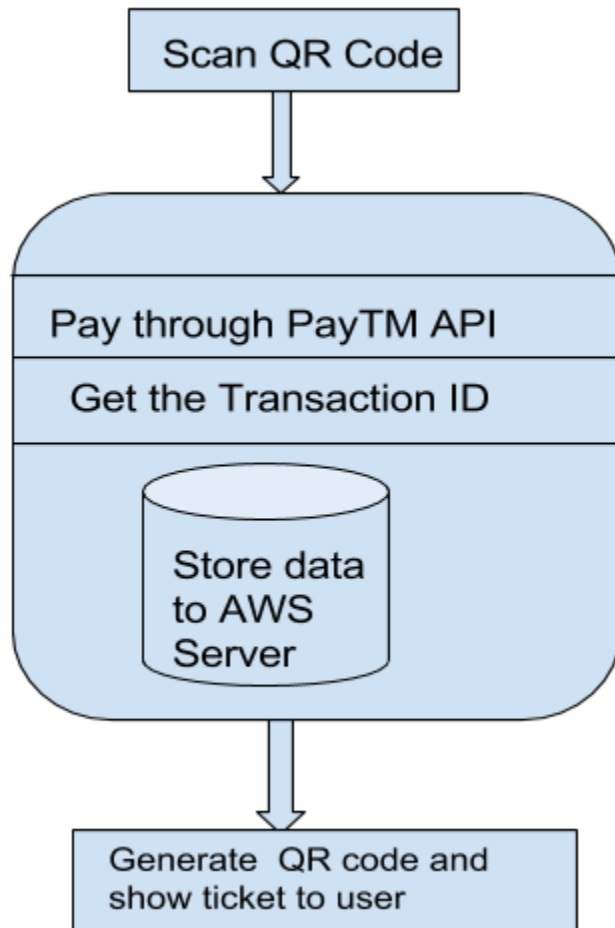## 5. PROCESS MODELS

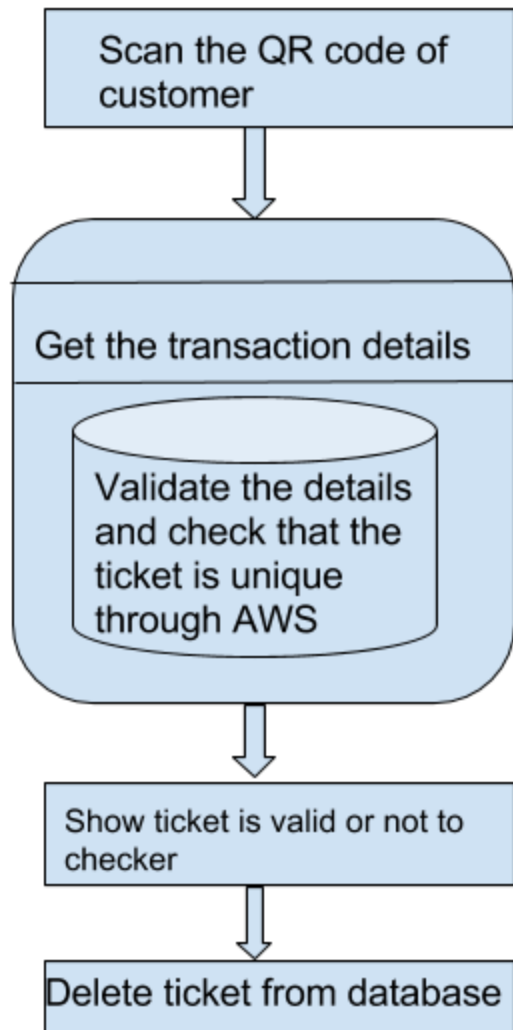**i)Control flow diagram**



**Fig 3: Customer Side CFD**

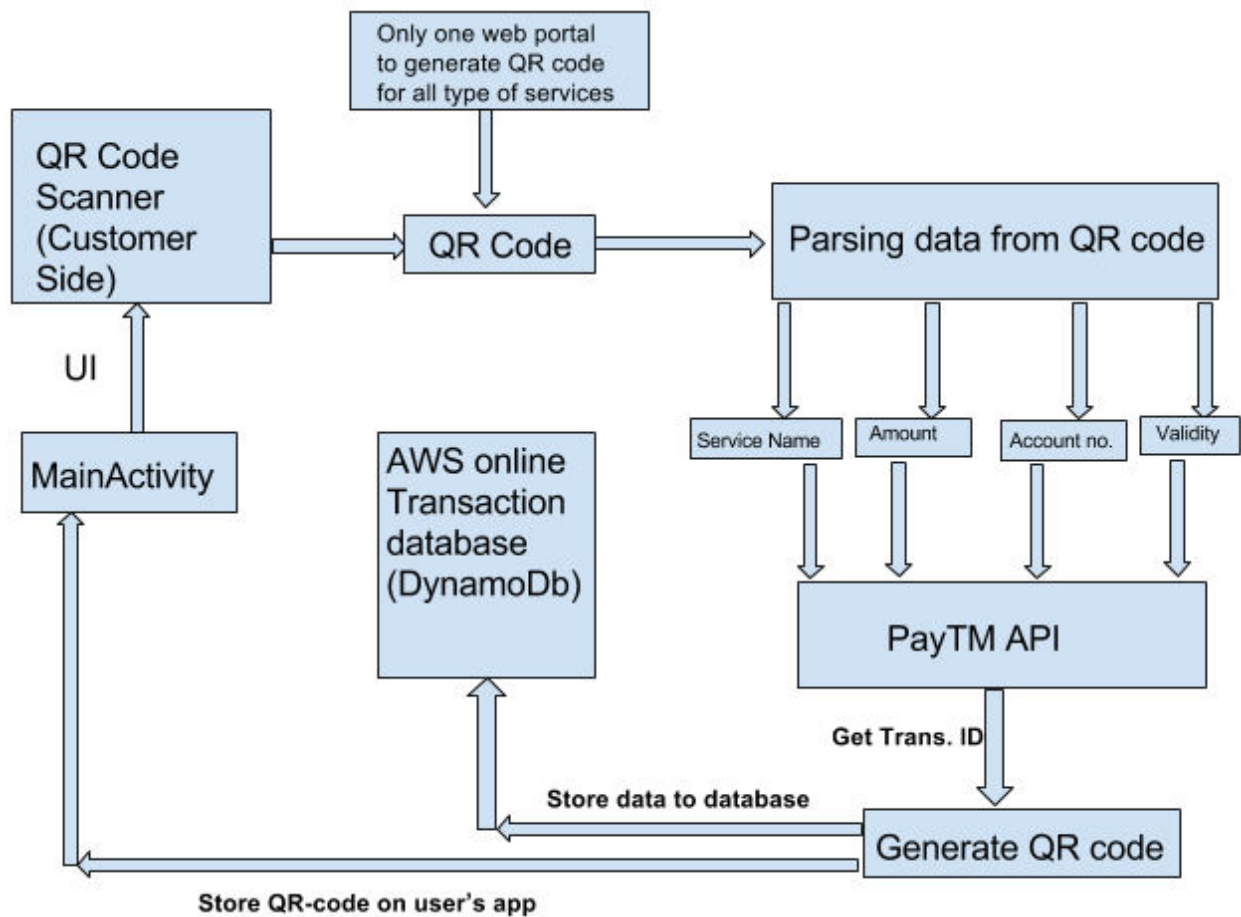**Fig 4: Vendor side CFD**

**ii) Data Flow Diagram**



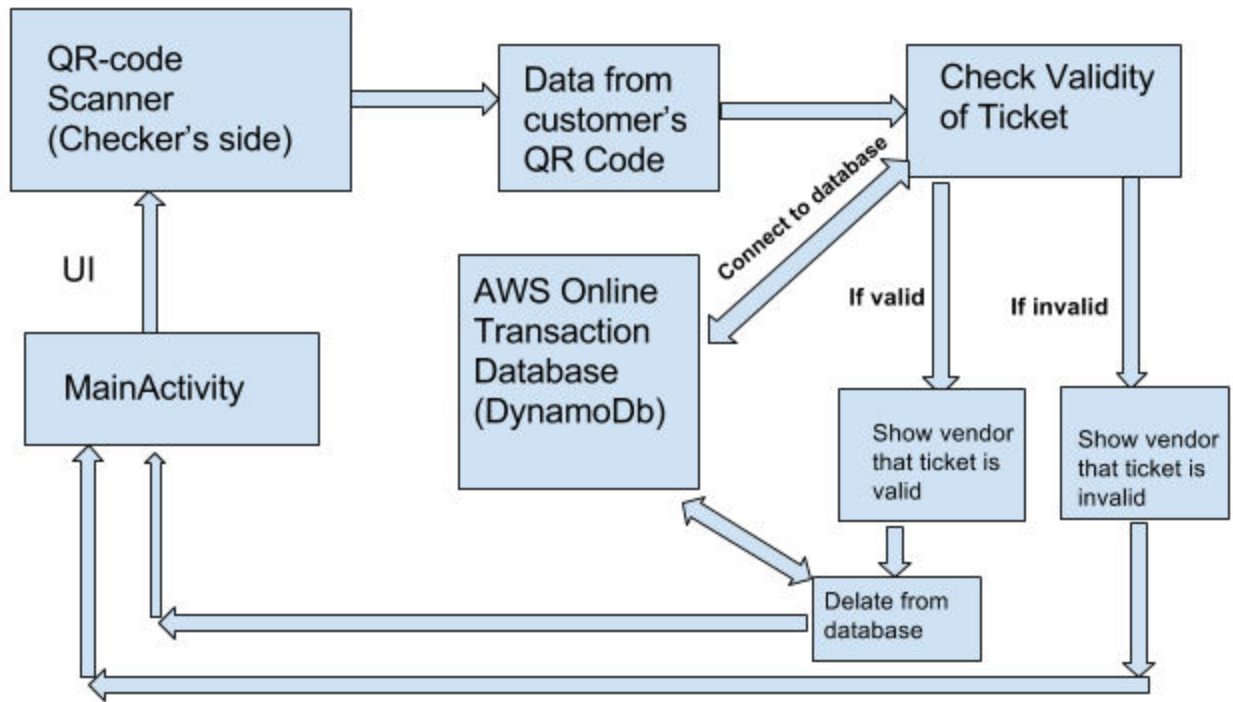**Fig 5: Customer side Android application**

**Fig 6: Vendor side Android application**

# 6. IMPLEMENTATION
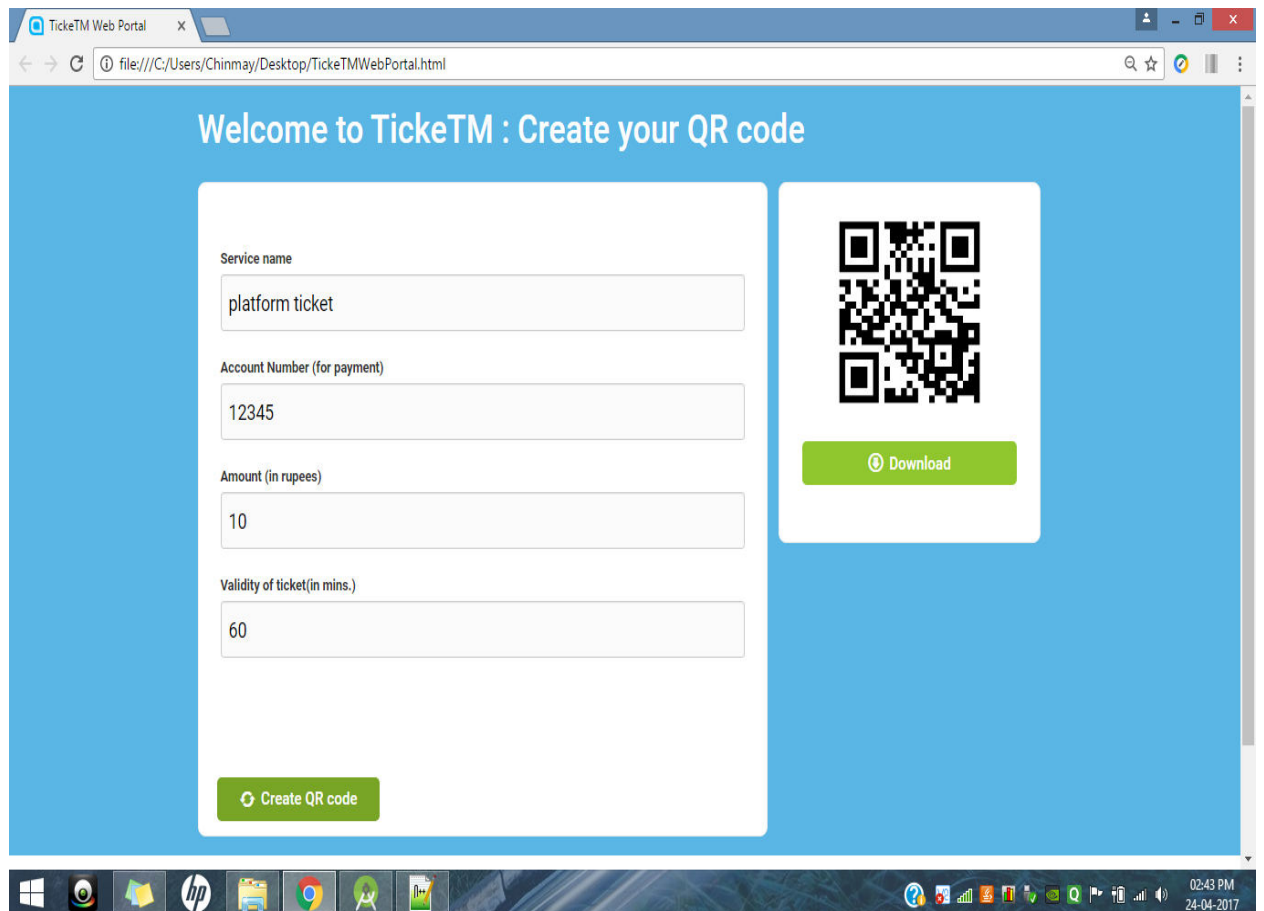
**PROJECT SCREENSHOTS:**
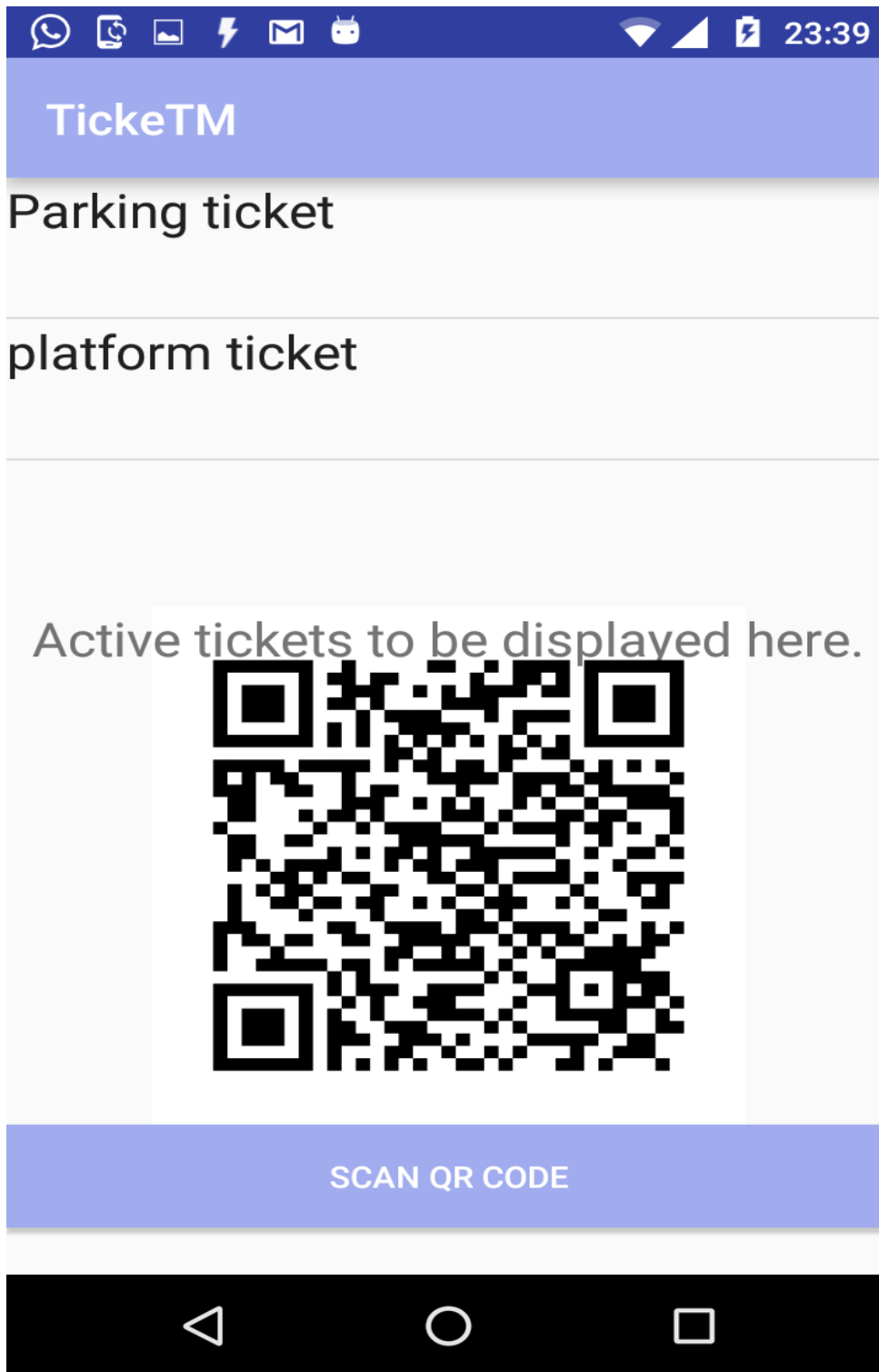


Fig 7: Web Portal to generate QR Code
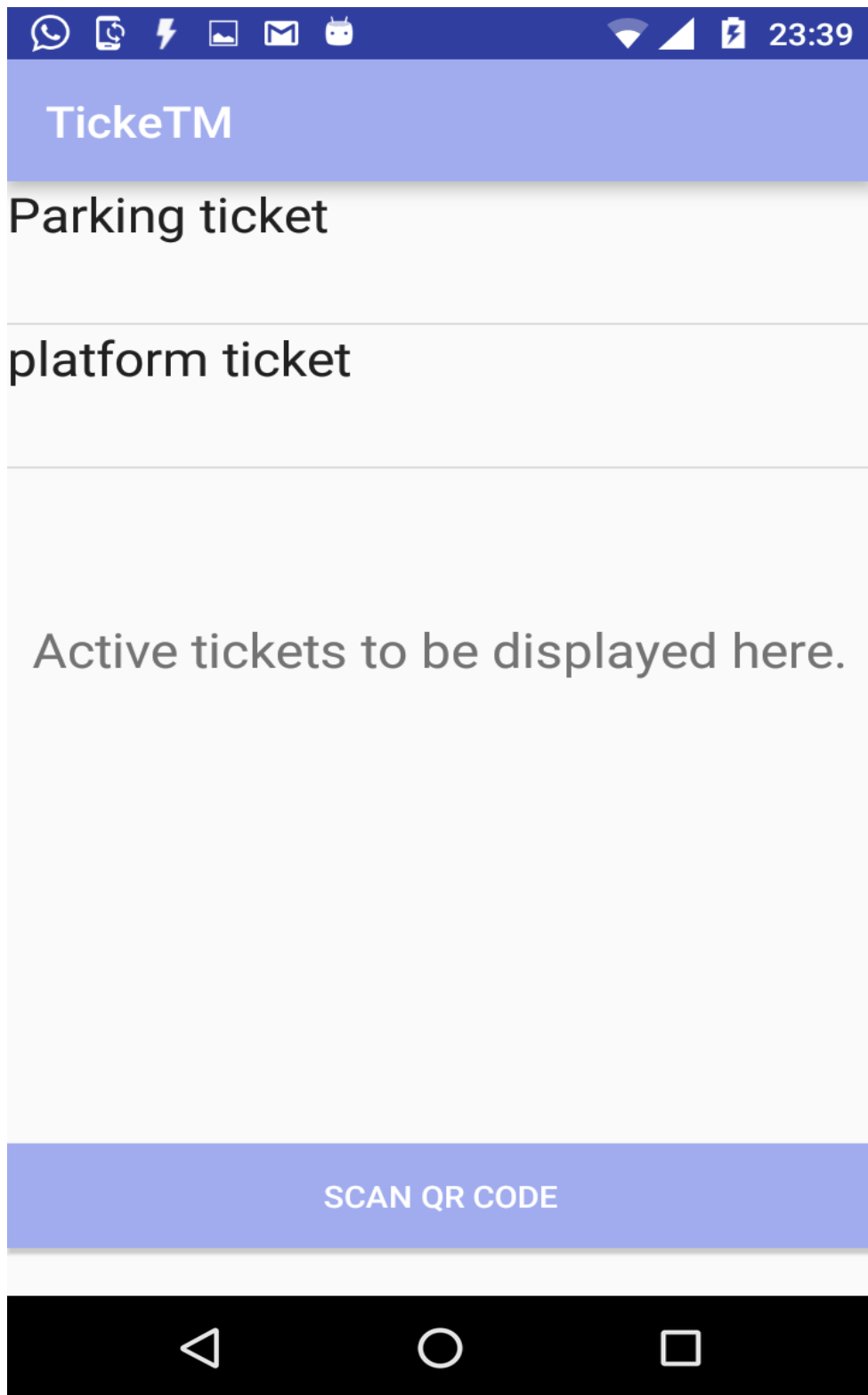
Fig 8: User App home page with Active tickets

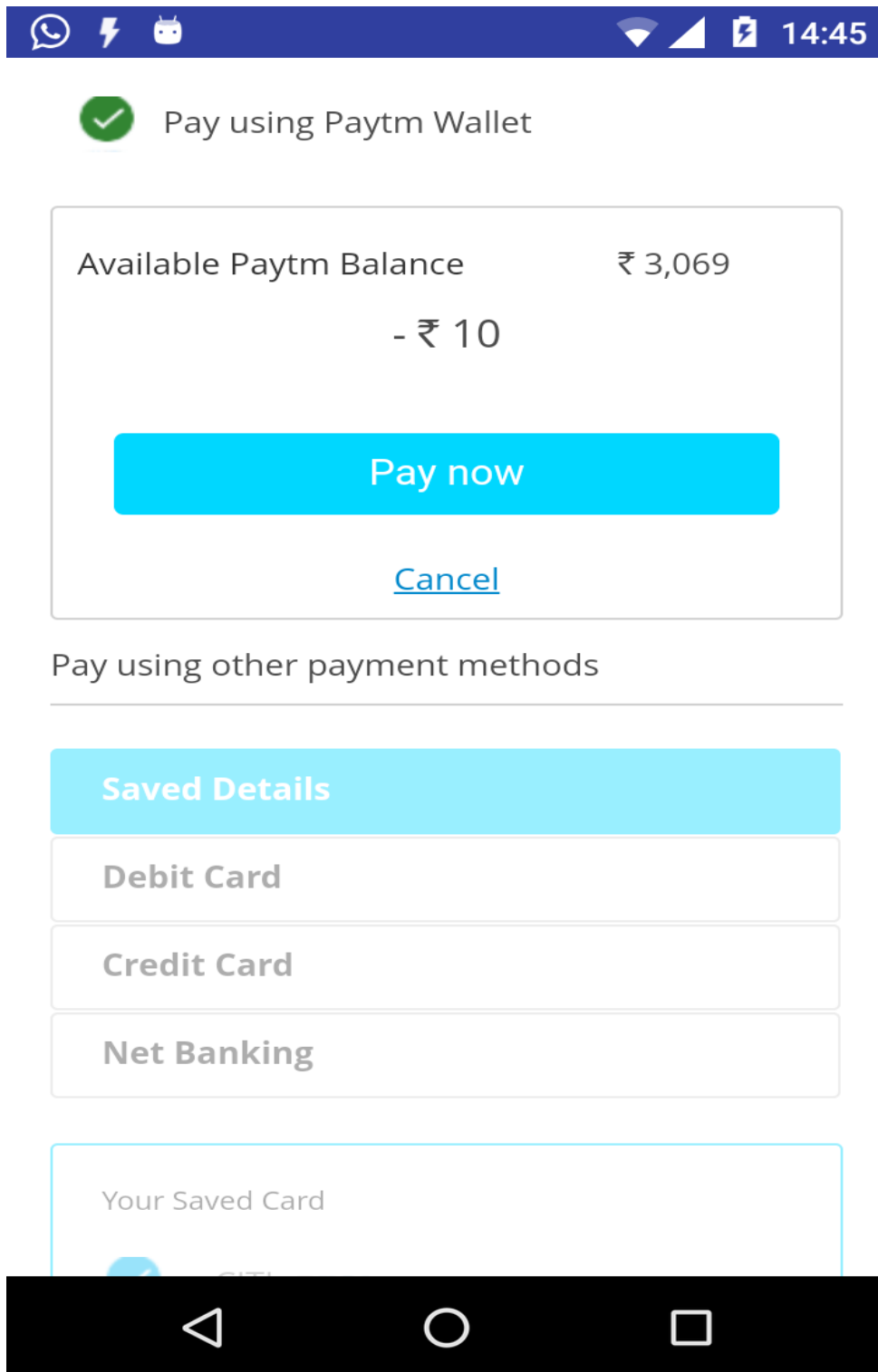Fig 9: User Application Home page.

Fig 10: Pay the ticket money using Paytm.
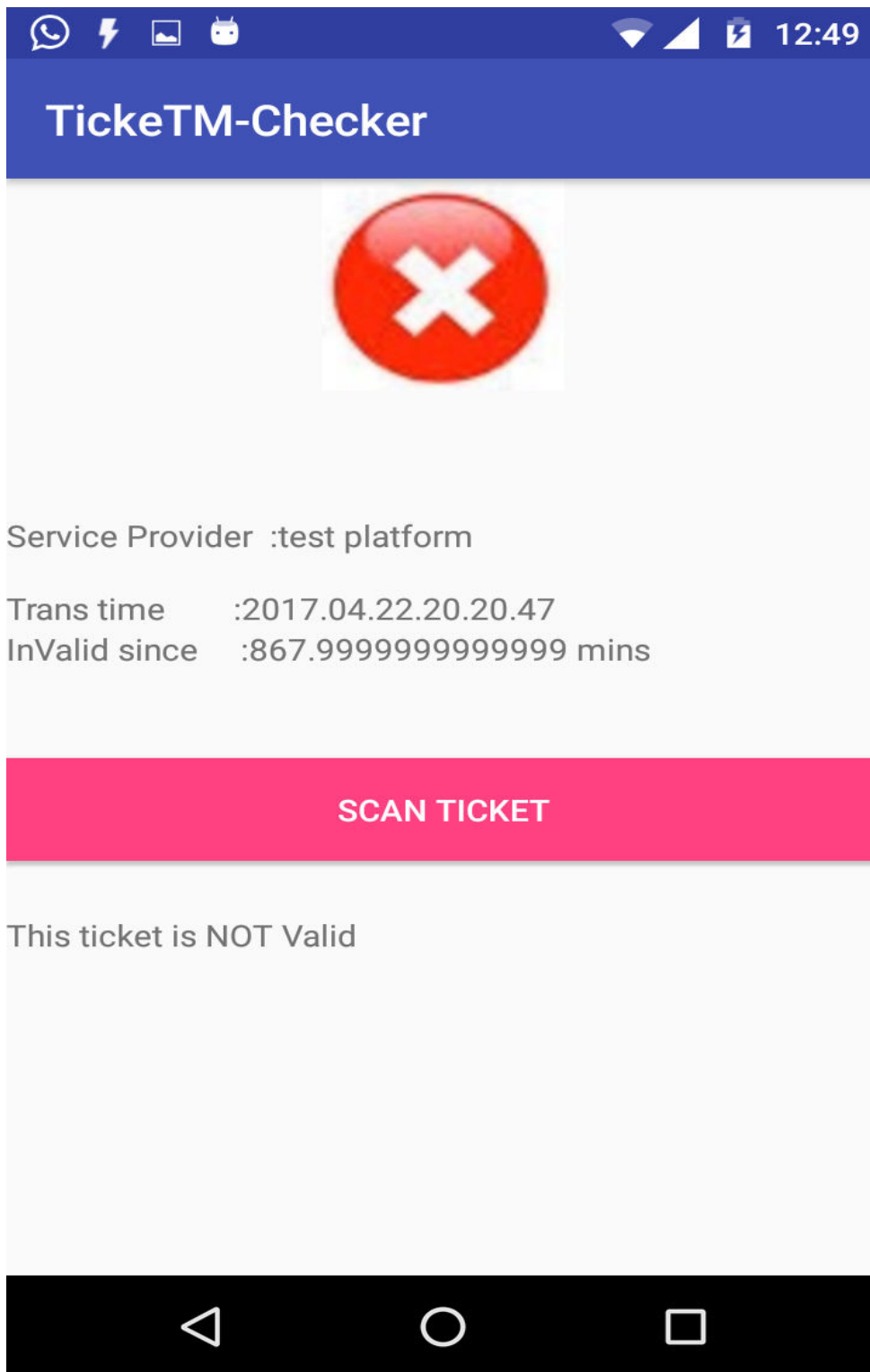
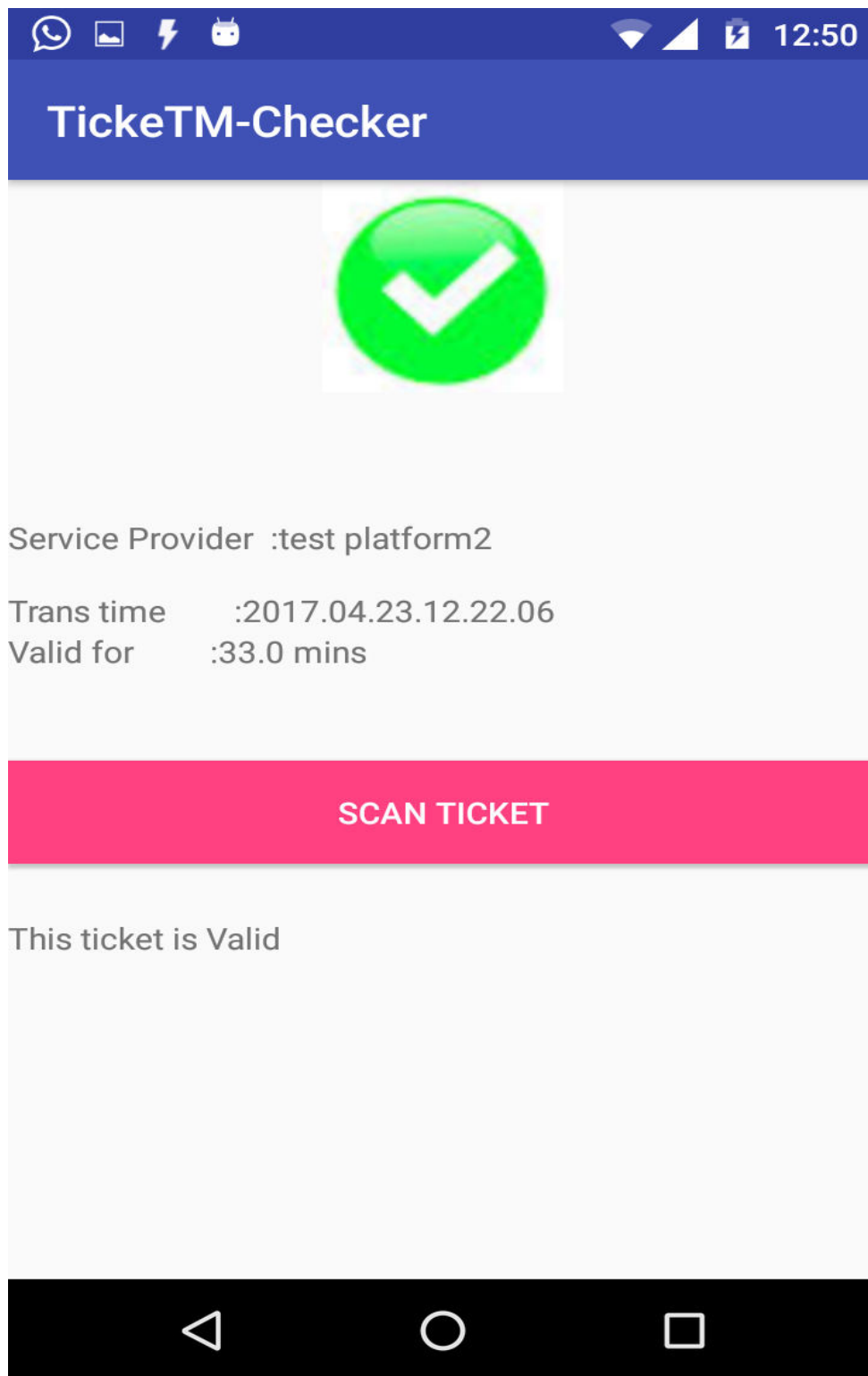Fig 11: Ticket Checker's Application identifying invalid ticket

Fig 12: Ticket Checker's Application identifying valid ticket

Fig 13: Amazon Web Services



Fig 14:  User's tickets information in AWS Database

# 7. Conclusion

A complete generic ticketing system has been developed with all functionalities right from generating service specific tickets by vendors , scanning tickets by clients and making payments "On The Go", Maintaining validity of ticket and there by automatic destruction of expired tickets. This will reduce time wasted in long queues and paper wastage. Furthermore, Ticket Checkers app will be useful in reducing overall ticket checking time, labour work and human error, as he/she need not mentally check the validity of ticket. With the use of AWS database, the scalability of application can be increased based on its acceptance in practice and variation in ticket generation traffic. Thus a deployable full stack application was developed successfully.

# 8. Future Work

The application features great future implementation with social acceptance of baffle gates. Such kinds of gates are programmable and can be connected to internet. This will help in automated ticket checking. A QR Code scanner will be installed on these gates which will scan passengers' ticket, parse out the ticket details, check in the database and accordingly open the gate.

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