A WEB-BASED SYSTEM FOR STADIUM TICKETING

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BBIT 4A

An Information System Project proposal submitted to the Faculty of Information Technology in partial fulfilment of the requirements for the award of the Bachelor's Degree in Business Information Technology of

Strathmore University

Faculty of Information Technology

Strathmore University

Nairobi, Kenya

Declaration

I declare that this work has not been previously submitted and approved for the award of a Bachelor's degree by this or any other University. To the best of my knowledge and belief, the proposal contains no material previously published or written by another person except where due reference is made in the proposal itself.

Student's signature:

……..…….. [*Signature*]

……..…….. [*Date*]

Approval

The Information System Project proposal was reviewed and approved *(for examination)* by:

Supervisor's signature:

……..…….. [*Signature*]

……..…….. [*Date*]

Abstract

The problem identified is the absence of a Stadium ticketing system to assist the clients and spectators in the process of ticketing. This comes along with problems such as fake tickets, poor security and overcrowding at the gates. The proposed solution is to develop a web-based system to help in management of the stadiums during games. The proposed system will have features such as a log in page, a sign-up page, a home page and a contact us page where the users can reach out in case of a problem. To avoid fake tickets, the system will have the purchased tickets sent to the spectators' emails as soon as the purchase is complete. Thereafter, during entry into the stadium, the tickets will be verified and the spectators will go in. The system design approach for this proposed system is Object Oriented Analysis and Design, and the methodology is Rapid Application Development (RAD); this methodology allows for feedback from the user. It also allows the system to be developed in modules. The programming language used is PHP as it is a web-based application system. MySQL has been used for the database due to its reliable speed and compatibility with web development.

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List of abbreviations

GUI – Graphical User Interface

IDE – Integrated development environment

OOAD – Object Oriented Analysis and Design

PHP – Hypertext Preprocessor

RAD – Rapid application development

SSAD – Structured system analysis and design

SQL – Structured query language

Chapter 1: Introduction

1.1 Background

A stadium is a venue for outdoor sports, or other events and has a field or stage surrounded by seats or structures made to look like seats to allow spectators to sit and view the event. (Sports venue. n.d.)

The first stadium originated in the VIII century BC in Greece. (Spampinato, 2006). According to Spampinato, it was based on an athletic track shaped as an elongated “U”. It had a 192 m long and 32 m wide track. The starting and finish line were on two ends. This stadium had the capacity of 45000 spectators. This stadium was mainly for athletic activities due to its architecture. As sports became more popular, stadia were built in many Greek towns alongside with hippodromes. These had similar characteristics and dimensions but they were used for horse and chariot racing. These sports facilities soon started to play key roles within the "polis". There are still vestiges in Delphi, Ephesus and most of all in Athens, where in 331 BC Panathenaic stadium was built. It was then rebuilt for the first modern Olympic Games of 1896 and was recently renovated for the Olympic Games of Athens 2004.

In Kenya, the first stadium to be constructed was the City Stadium which was constructed in the 1930s and was first known as African Stadium. (Kiruga, 2013). Other major stadia were built in the 1980s including Nyayo and Moi International Sports Centre Kasarani. Nyayo stadium has a capacity of 30,000 while Kasarani has a capacity of 60,000 people.

There is currently a total of 28 stadia in the country which offer both track and pitch activities such as athletics and football. The stadia are also used for events that are not sports oriented. An example is the matter heart run which is a charity walk that is done to help children with heart problems.

Since the opening of the first stadium in Kenya in the 1930s, there has never been an automated system in place to deal with the issue of ticketing to ensure smooth running of activities during games. (Atingo, n.d.).

The current body in charge of managing stadia in Kenya is Sports Kenya. It is a state corporation established by the Sports Act, 2013 and given the responsibility to carry out functions formally performed by Sports Stadia Management Board and the Department of Sports.

The system in Kenya is manual which has not been efficient. Cases of overcrowding at the gates where the tickets are issued have been reported. This overwhelms the limited number of security officials which in turn leads to chaos.

According to Nyende (2011), Gor Mahia football club lost its Super Sport Limited sponsorship which terminated live broadcast of matches involving Gor Mahia football club over safety concerns, citing the incident of 23rd October 2010, where five Kenyan fans were trampled to death and tens injured in a stampede as the venue (Nyayo National Stadium) and security got overwhelmed by a near-capacity turnout. This also led to banning the venue from hosting future events by Federation of International Football Association (FIFA).

Cases of fraud are also witnessed where some spectators come into the stadium and fail to pay for their tickets due to their relationship with the officials at the ticketing station.

In 2014, Gor Mahia Chairman Ambrose Rachier cancelled Moi Stadium, Kisumu as a home venue for the club, citing low gate collection returns due to fraud. (Okello, 2015)

With the rapid increase of leagues in the country, it is time to introduce an automated system which will be able to generate and deliver electronic tickets to its users who are in this case both Sports Kenya and the spectators.

1.2 Problem Statement

There is a rapid increase of leagues in the country which has made it difficult for stadia to manage the crowds that come to spectate. Nyende (2011)

The problem identified is the absence of a Stadium ticketing system to assist the clients and spectators in the process of ticketing. This comes along with problems such as fake tickets and mix-up of seat numbers hence causing great confusion. This problem makes some of the fans opt to stay in their homes and watch the games from the televisions.

The current system is manual and it lacks transparency. The system is susceptible to fake ticketing and the issue of corruption where the officials at the gate allow their friends to access the games without tickets.

Therefore, there is need for an information web-based system to help curb all this and make it easy for both the Sports Kenya board and the spectators as tickets will be purchased and issued online. This way, acquiring tickets for the spectators will be easy and management of the stadium facilities will be improved.

1.3 Aim

The proposed solution is to develop a system to help in management of the stadia during games. The proposed system will have features such as a log in page, a sign-up page, a home page and a contact us page where the users can reach out in case of a problem. The system will aim to give a unique seat number to each spectator in order to prevent confusion like the manual system.

1.4 Specific Objectives

(i). To evaluate the problems facing the stadium ticketing process

(ii).To analyse the requirements for developing the proposed system.

(iii). To design and develop a web-based–system to facilitate electronic ticketing for spectators entering the stadia.

(iv). To test the developed system in order to ensure all proposed functions were met.

1.5 Justification

The proposed system will be of great help to the involved parties, both Sports Kenya and the spectators themselves. The system aims to give a unique seat number to each spectator in order to prevent confusion like the manual system. To avoid fake tickets, the system ensures the purchased tickets are available on the reserved tickets tab as soon as the purchase is complete. Thereafter, during entry into the stadium, the tickets will then be verified and the spectators will go in.

1.6 Scope and Limitations

The web-based system allows the games organisers to add games and remove. This in turn allows the spectators to select the games they would wish to attend. In order to have access to the tickets, the users are required to sign up. This includes providing their full name, email address, phone number and a password for their account. The system allows the users to purchase the available tickets after signing up. After the purchase has been confirmed, the users will receive an email with their ticket attached to it.

However, the system is only limited to Kenya and is not for use in other countries.

Chapter 2: Literature Review

2.1 Introduction

This chapter aims at analysing the current situation in the ticketing sector and identifying the challenges facing the ticketing process and their attempted solutions

In this literature review the focus is on the different ticket issuing systems that are currently in place and the challenges that affect those systems.

2.2 Current ticketing system in Kenya

In Kenya, the system in place is manual. The tickets are printed and sold to the spectators at the gates before every match. The price of the tickets may vary depending on the game that is being played.

Sports Kenya faces problems such as fake tickets, poor security and mix-up of seat numbers which causes great confusion. Fake tickets come about when malicious people decide to make their own tickets and sell them to the public at a lower price. According to Lawrence, (2016) the concept of cheaper tickets attracts most of the spectators and they end up buying fake tickets.

2.2.1 Challenges experienced with the current ticketing process

Loss making due to fake Tickets. In 2016, during an interview, Football Kenya Federation President outlined that they had established that a loss was made during a game between Kenya and Guinea Bissau. This was attributed to fake tickets. (Mwendwa,2016)

The issue of corruption comes about when the officials at the ticketing booths allow some spectators to attend the matches without paying.

In 2014, Gor Mahia Chairman Ambrose Rachier said they experienced low gate collection returns due to fraud. (Okello, 2015)

The manual process is slow and it tends to cause long queues. This brings about overcrowding at the gates which overwhelms the security personnel stationed there.

On 23rd October 2010, five Kenyan fans were trampled to death and tens injured in a stampede at the Nyayo National Stadium. The security got overwhelmed by a near-capacity turnout. Nyende (2011)

2.3 Examples of modern ticketing systems in use worldwide

2.3.1 Gig event management system

Gig provides event organizers with a simple way of engaging attendees and getting insights from any kind of event such as Meet-Ups, Expos, Corporate Events, Concerts, Activations or Fashion Events.

This system requires a user to create an account which has to be verified. After verification, the user can go ahead and see the available events and select them. Event organizers can also pay a fee and publish their events on the site after which customers will be able to buy the tickets.

It offers a wide range of services such as;

RSVP and check-in – This enables users to register and check in for events online. Ticketing where attendees can purchase event tickets via MPESA or VISA. Event analysis and reports where the event organisers are able to get instant reports and analysis of attendees such as: demographics and attendance. Digital event engagement where the organisers can digitally engage their attendees before, during and after the event. Event feedback which ensures event organisers are able to get feedback from the event attendees including suggestions for improvement.

Strengths of Gig event management system

This platform analyses attendee's demographics and attendance and generates reports of the analysis after an event. This enables the event organizers in planning for future events to ensure maximum returns.

This system gives the organizers a platform where they can engage their attendees digitally during and after the event. This involves sending of emails regarding the event and asking for feedback after the event.

Weaknesses of Gig event management system

According to the developers, Gig event management system is meant for expos, meet-ups, concerts and fashion events. It is therefore not suitable for use in the stadium ticketing process which is the point of focus.

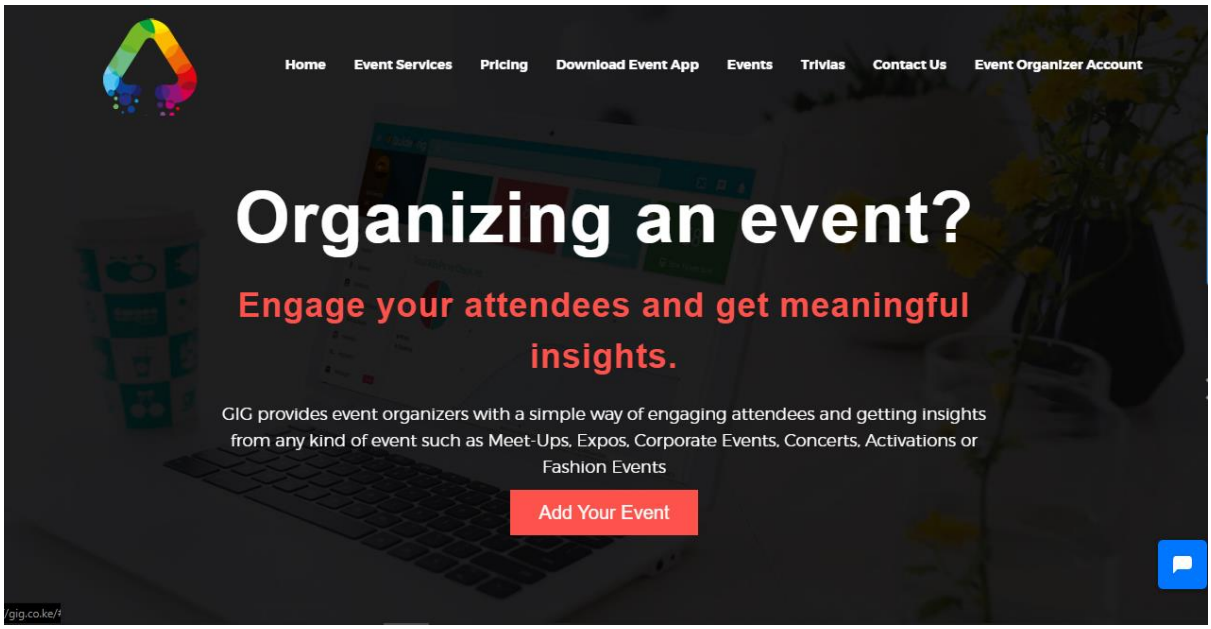

Figure 2.1 home page (Gig, 2018)

In this page, the users are able to view the various functionalities and create accounts in order to use the system.

2.3.2 Ticketsasa event management system

Ticketsasa is a broad system that provides a platform for event organisers to sell their tickets market their events.

It offers services such as;

Ticketing where attendees can purchase event tickets via Mpesa, Visa, Mastercard and Airtel money. It has partnerships with various airlines to get the customers affordable tickets for holidays. Hotel booking where users are able to search for cheap hotels and get good rates to suit their budget. Ticket verification which allows its users to check the status of their tickets and verify that they are legitimate.

Strengths of Ticketsasa System

This system has managed to create partnerships with corporates for example airlines and hotels. This gives the users a wide range of deals which tend to be pocket friendly.

Ticketsasa has a ticket verification module where after the purchase of a ticket, the users can verify if their tickets are legitimate

Weaknesses of Ticketsasa System

The structure of ticketsasa does not suit the stadium ticketing process. Ticketsasa is a broad system which offers many services but it does not solve the issue of stadium ticketing.

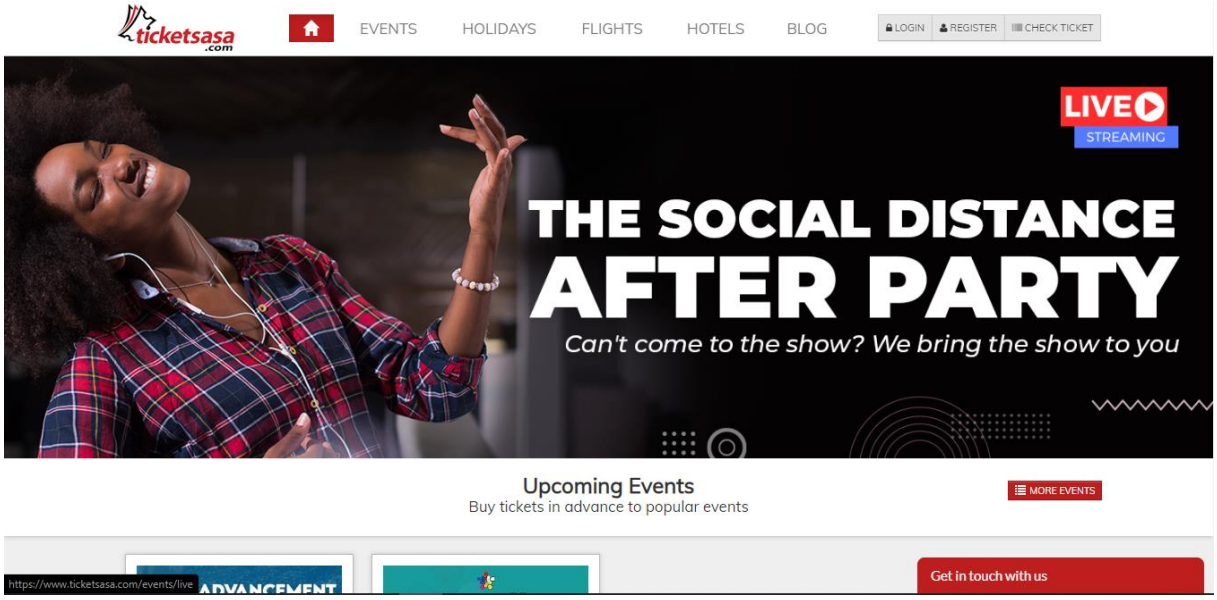

Figure 2.2 Home page (ticketsasa 2018)

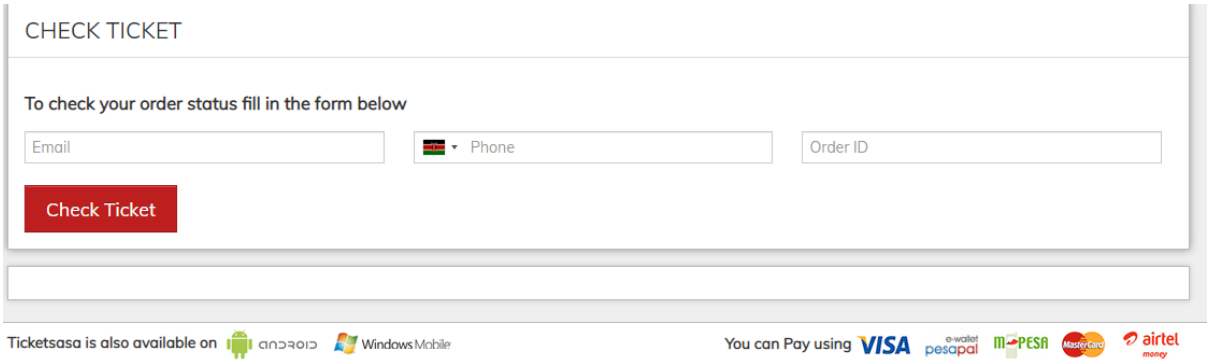

Figure 2.3 Ticket verification page (ticketsasa 2018)

On this page, the users get to verify that their purchased tickets are legitimate.

2.4 Gaps in the existing systems

The main challenge experienced with the current automated systems mentioned above in relation to the issue of stadium ticketing is that they do not suit the structure of a stadium. The systems are not built in a structure that suits the stadiums hence they do not solve the problems faced by stadiums in Kenya.

The main shortcoming of the manual system is lack of transparency. There is no record keeping and this does not guarantee accountability. As seen before, cases of corruption, fake tickets and overcrowding have been reported.

2.5 The Proposed System

The proposed system has a sign-up module to register users into the system, a sign in module to verify the users' credentials after signing up, a homepage where the users can view the available events and navigate to get tickets. It also includes a Contact us module where the user is able to get in touch with the system managers in case of any clarification or complains.

For payments, the users are able to use Mpesa for secure payment of their tickets. When spectators buy tickets, the administrators are able to generate a copy of how many tickets have been bought per game for analytical purposes.

2.6 Conceptual Framework

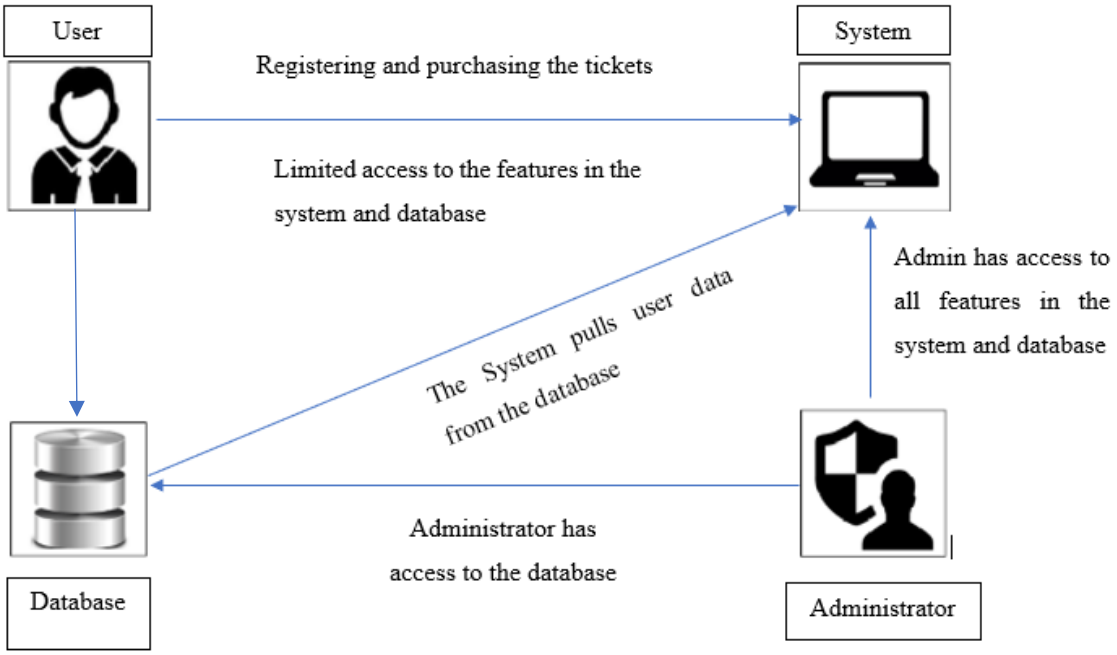

Figure 2.4 Conceptual Framework

The system works in such a way that the user inputs details for registration. The admin has a different platform from the user as both have different features. The data stored in the database is the user details and the event details.

Chapter 3: System Development Methodology

3.1 Introduction

This chapter focuses on the methodology that the system uses. The design methodology that the system follows in relation to how the modules have been developed. It also highlights the functional and non-functional requirements in the system

3.2 System design approach

The proposed approach for this project is the Object-Oriented Analysis and Design. It is a procedure of identifying the requirements and developing specifications in accordance to objects of the system. Its functions and data are modelled after real-world objects that the system interacts with. It allows the reuse of functions which saves on time and makes the code more maintainable. When an error occurs, it is easy to rectify as it does not affect the whole system but rather the module which has the error.

Methods in OOAD allow developers to create a set of objects that work collectively to produce software that brings out the problem in question as a real-world problem that systems developed by Structured Systems Analysis and Design (SSAD). Mukherjee (2016).

3.3 System Development Methodology

The project uses Rapid application development (RAD). Morse (2016) describes it as a method of software development which heavily emphasizes rapid prototyping and iterative delivery. It is a software development methodology technique used in software application development.

When compared to other software development models, rapid application development varies by a considerable amount, the major difference is how rapid application development focuses on speed, when compared to other models which usually focus on bringing a working product to the customer. Morse (2016)

The advantages of using RAD are, this methodology encourages and prioritises user feedback. This is a major step in development because the end goal is for the users to benefit from the system. Requirements of RAD can also be changed at any time hence making it easy for corrections in case there was an error in the first declaration of requirements.

In RAD the development time is drastically reduced hence giving the developers a short time to come up with a working system.

This methodology uses prototyping techniques and tools to come up with software applications. It comprises of a graphical user interface (GUI) development environment. This allows the developers to choose their desired software application components.

One of the disadvantages of RAD is that it needs user requirements at every stage of development. This requires the developers to keep going back to the users and review their requirements. Morse (2016).

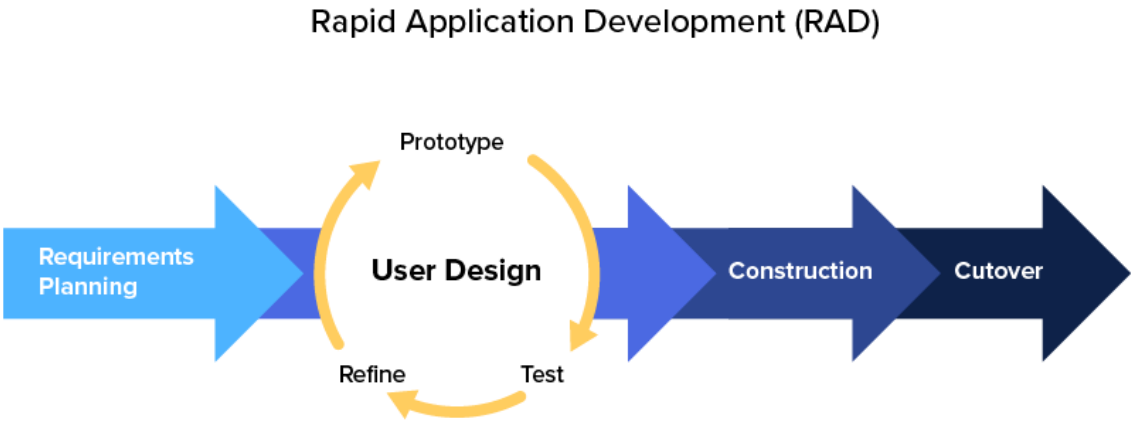

Figure 3.1: Rapid application development (kissflow, 2019)

3.3.1 Requirements planning

During this stage, the developers and the clients define the goals and expectations for the project.

The steps in this stage include, researching the current problem that is causing need for a system, defining the requirements for the project, coming up with each stakeholder's conclusion and approval from the parties involved

3.3.2 User design

User feedback is gathered with great emphasis on determining the system architecture. This allows initial modelling and prototypes to be created. This step is repeated as the project evolves. Prototypes are converted into working models. Developers then gather feedback from users to tweak and improve prototypes and create the best possible product.

3.3.3 Rapid Construction

Once the basic system and user design has begun, the construction phase follows. This is where coding, testing and integration takes place. Just as the user design, the rapid construction phase is repeated when necessary. This is because new components might be required to meet the end goal of the project.

The steps in this stage include, preparation of necessary tools for construction, system construction, generation of test data to be used in the system and transition preparation where stakeholders look into ways of transitioning to the new system.

3.3.4 Cutover

This is the final stage and it gives the developer time to move components to a live production environment, where testing or team training can take place. This stage includes the finalization of features, functions and everything else related to the project. Interfaces between various modules are then tested.

User training is done to familiarise the various users with the functionalities of the system. A changeover to the new system is then conducted where the old system will be phased out. The developers will continue to look for bugs while the users report any bugs they come across.

3.4 Application requirements

These include the functional and non- functional requirements for the system. Functional requirements are the functionalities and services that will be provided by the system for it to achieve its purpose. Non-functional requirements describe how well the system supports the functional requirements.

3.4.1 Functional requirements

Authentication

There is a login page to ensure that only those who have signed up can get access to the system.

Fans/Customer module

After authentication, the customer then proceeds to a page where the tickets for the various games are.

In this module, the user should be able to view the list of games which are available. The customer selects the game of choice and buys the ticket.

Administrator panel/module

There is a panel for the administrator where games will be added for the clients to purchase the tickets. Only the administrator can update new games. The customers have view only rights.

Payment module

Before the spectators get their tickets, they will be required to pay via Mpesa for purposes of processing.

Report module

After tickets have been purchased, the administrators will be able to generate a pdf with all the spectators who attended a particular game for analysis purposes.

3.4.2 Non-Functional requirements

Security

The system should ensure data stored in the database is secure from unauthorized parties.

Usability

The system should be easy for the clients to use.

Reliability

The system should be available at any time to avoid unnecessary inconveniences.

Performance

The system should be able to perform all the tasks it was set to do in the minimum time possible.

3.5 Design Diagrams

The following diagrams will be used.

3.5.1 Class diagram

It shows the different objects, their relationship, behaviours, and attributes. (Elgabry, 2017)

3.5.2 Database schema

A database schema is a collection of data that shows the relationship between objects and information in a database. (Elgabry, 2017)

3.5.3 Sequence diagram

It shows the interactions between the different objects in the system, and between actors and the objects in a system. (Elgabry, 2017)

3.5.4 Use case diagram

It shows the interaction between a system and its environment (users or systems) within a particular situation. (Elgabry, 2017)

3.6 Development tools

The IDE used for development was Visual studio as it is a full-fledged environment with numerous tools. The programming language is PHP as the system is a web application with Laravel as the framework. MySQL has been used for the database as it offers superior performance, reliability and greater scalability.

3.7 Domain of execution

The system is web based to make it easy for clients to access the system from any device, provided they have a browser installed on the device.

3.8 Proposed modules and system architecture

The proposed system comprises of the following modules;

Sign-up module, the user can create an account in order to sign in and get access to the full functionalities of the system.

Sign in module, the user is required to input his credentials as registered in the sign-up module. The details will be verified and if they match the ones in the database, the user will be granted access to the system.

Fans/ Customer module, the user is able to view all the events coming up and get access to the tickets.

Contact us Module, in this module, the user is able to get in touch with the system managers in case of any clarification or complains.

Chapter 4: System Analysis and Design

4.1 System Analysis

The functional and non-functional requirements are outlined in this chapter

4.1.1 Requirements

Requirement ID	**Requirement Category**	**Requirement Description**
FRQ1	Functional	The system should allow the user to create an account
FRQ2	Functional	The system should accept the clients' credentials. These include the email, phone number and name.
FRQ3	Functional	The system should also allow the storage of records in a database.
FRQ4	Functional	The system should sort the records such that events that have already happened are separated from those that are yet to take place.
NON-FUNCTIONAL REQUIREMENTS		
URQ1	Usability	The system should be secure, all financial records should be kept private.
RRQ1	Reliability	The system should allow the users to give feedback
RRQ2	Reliability	The system should notify the admin when a user contacts them

URQ2	Usability	The system should notify the user of any payments made.

4.2 System Designs

This section shows the graphical representation of data as it flows in the system in all levels.

4.2.1 Use case diagram

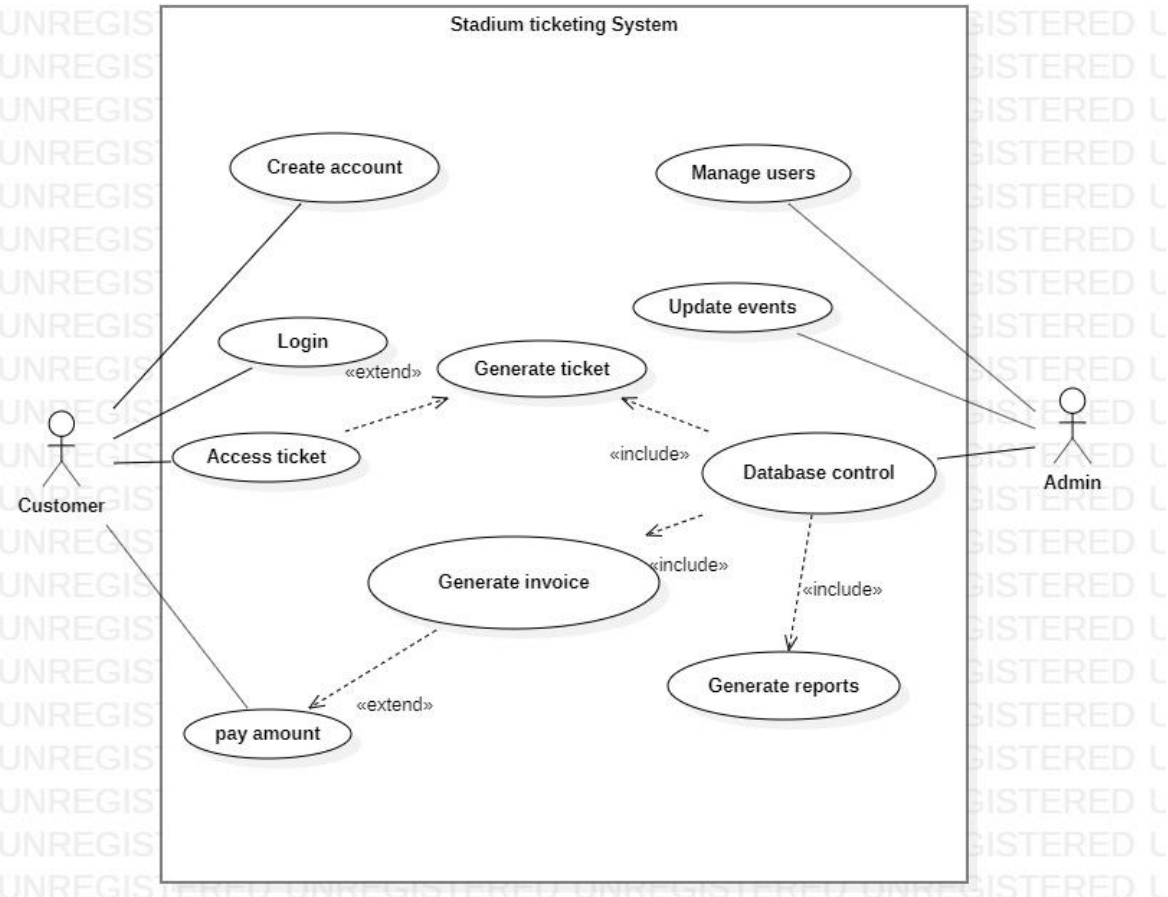

Figure 4.1 Use case diagram

4.2.2 Class diagram

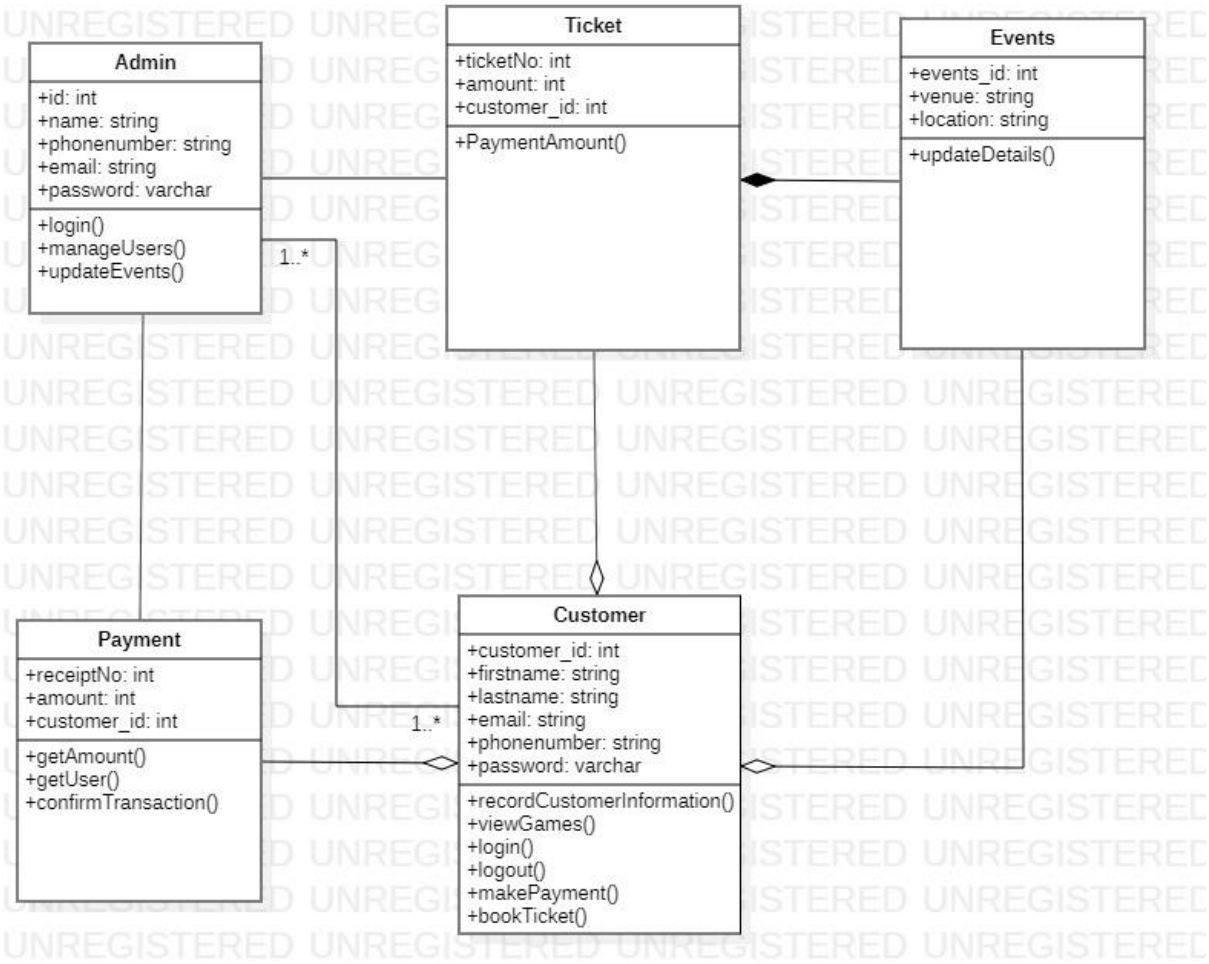

Figure 4.2 Class diagram

4.2.3 Sequence diagram

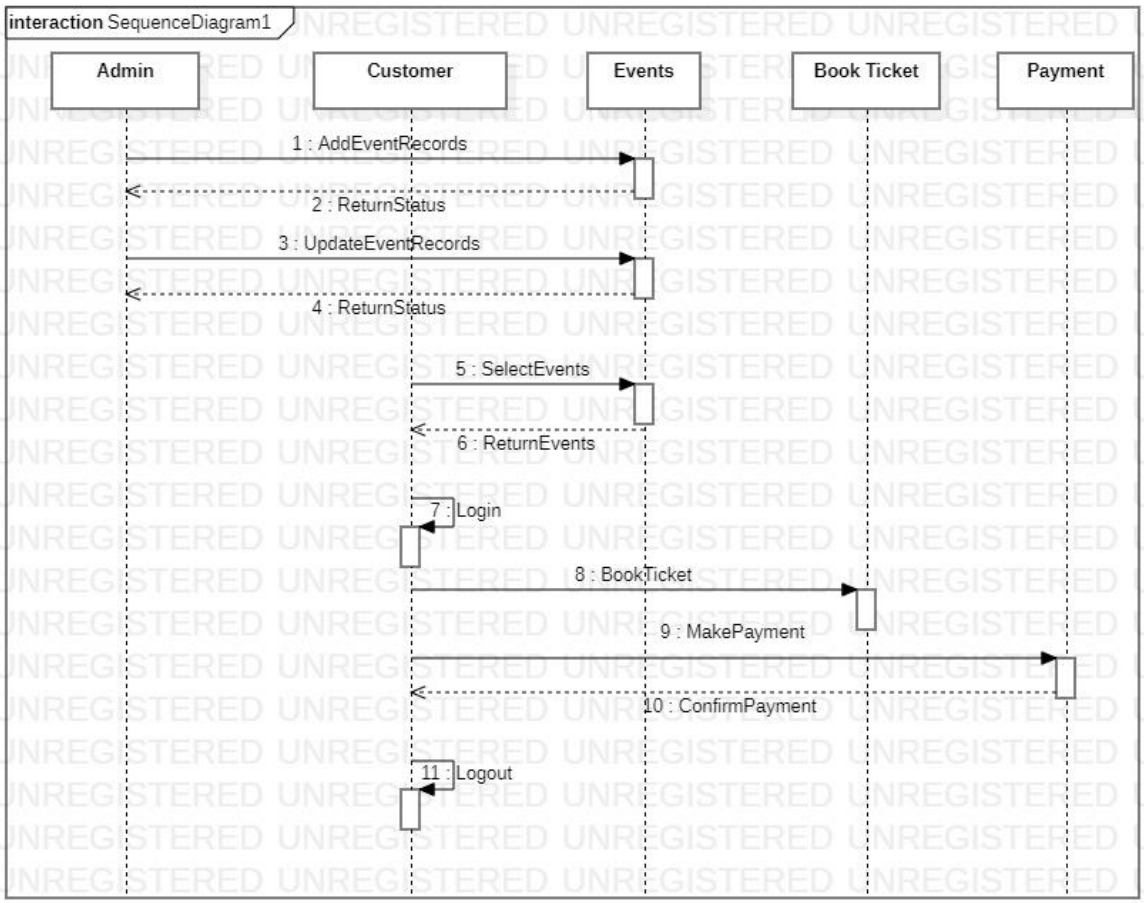

Figure 4.3 Sequence diagram

4.2.4: Database Schema

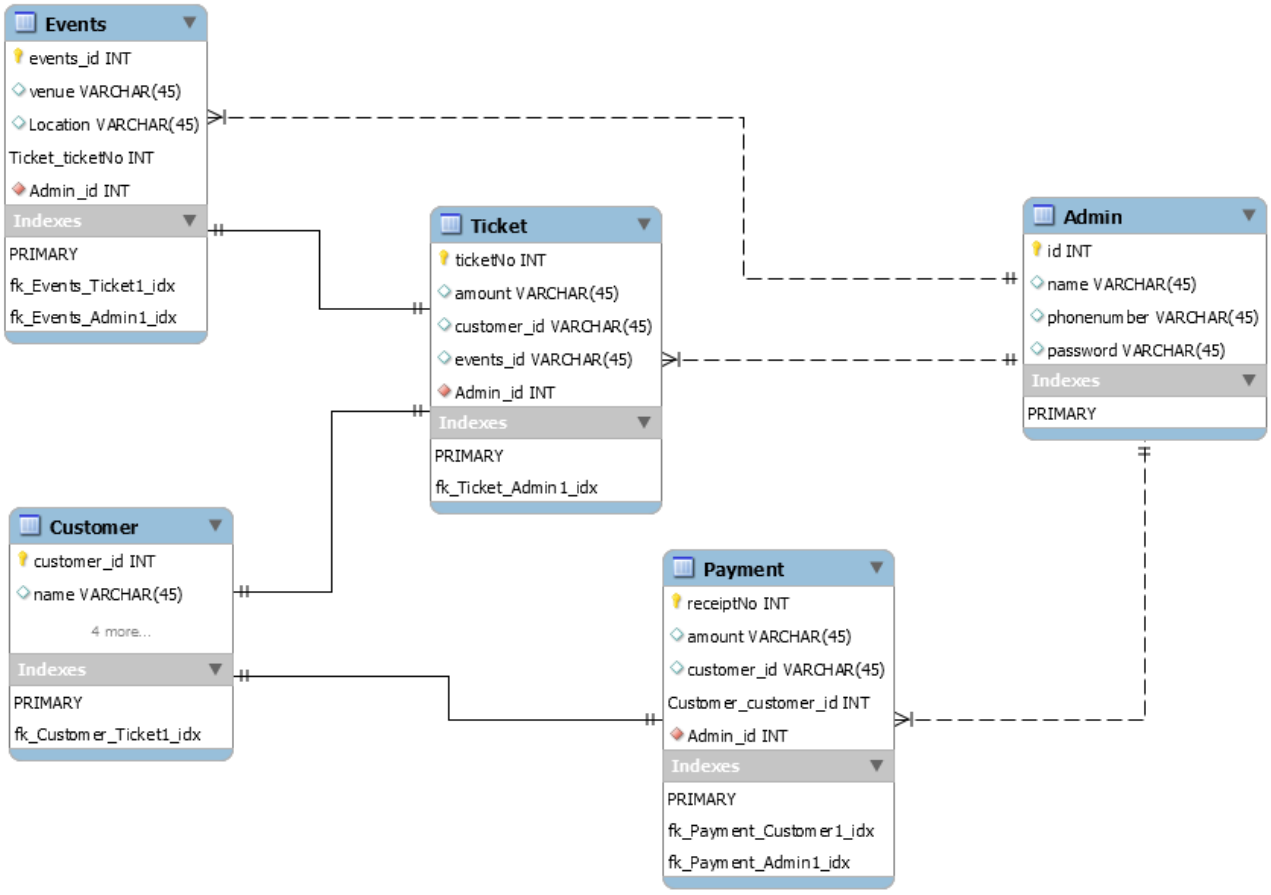

Figure 4.4 Database schema

4.2.5: Entity Relationship Diagram

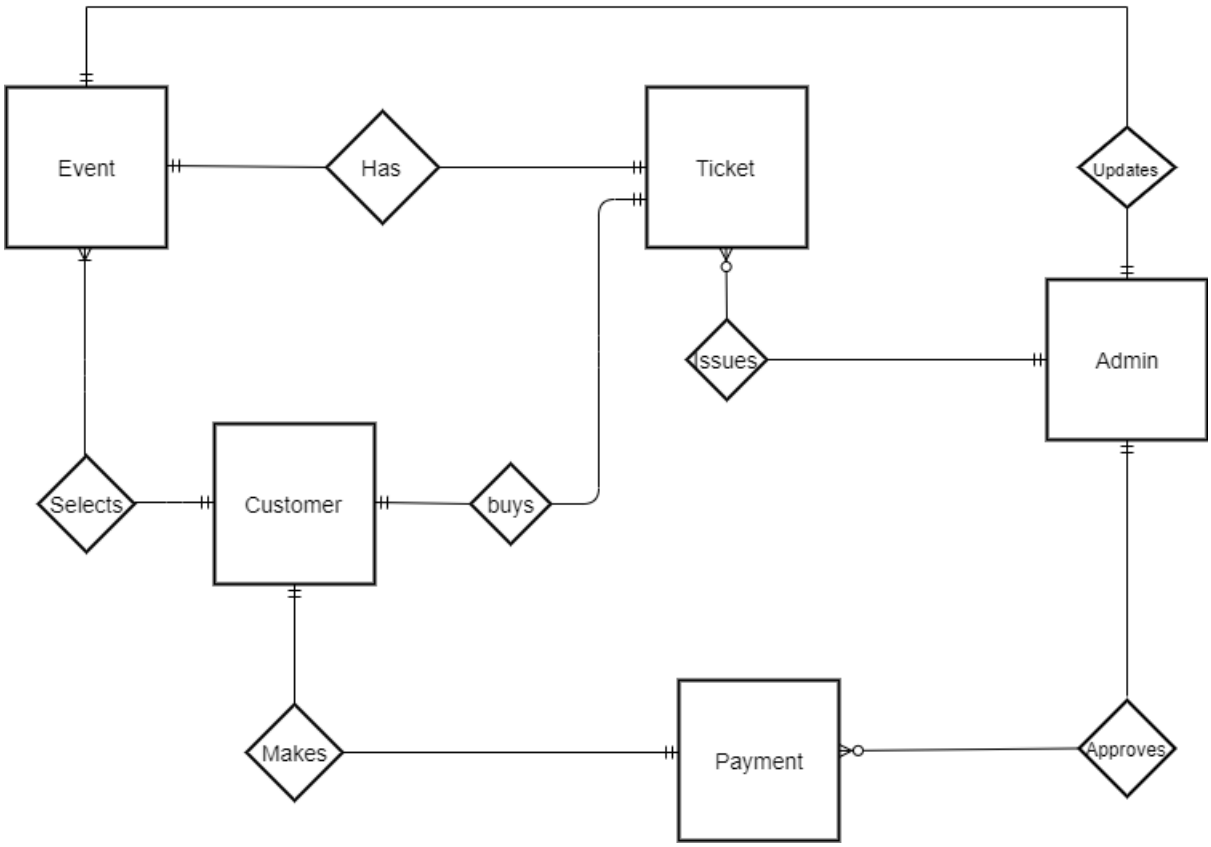

Figure 4.5 Entity relationship diagram

Chapter 5: System Implementation and Testing.

5.1 Graphical user interface design

This is the design of the interfaces for the web-based system. For simplicity the interface involves icons and tabs that make it easier for one to navigate through the system.

5.1.1 Registration page

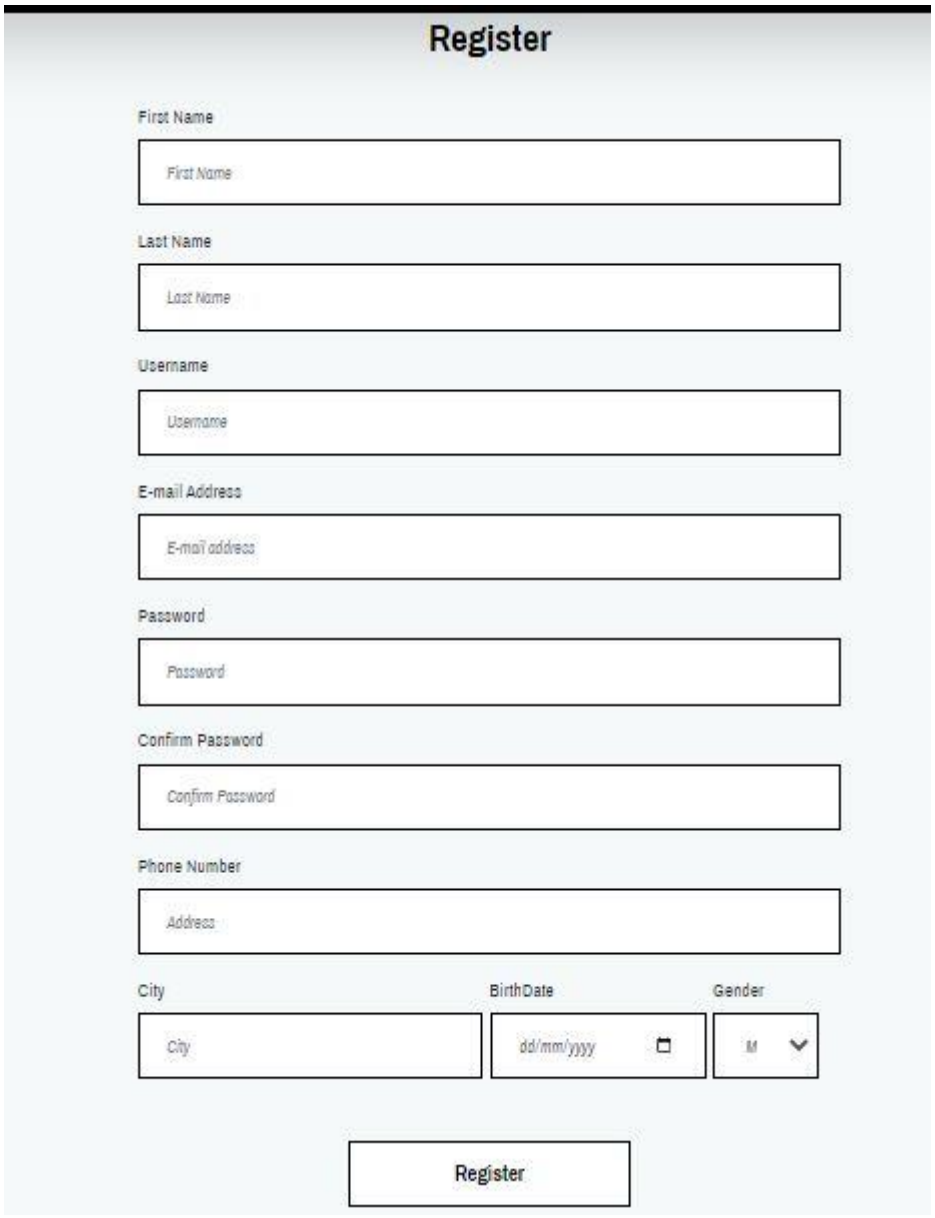

Figure 5.1 Registration page

5.1.2 Home Page

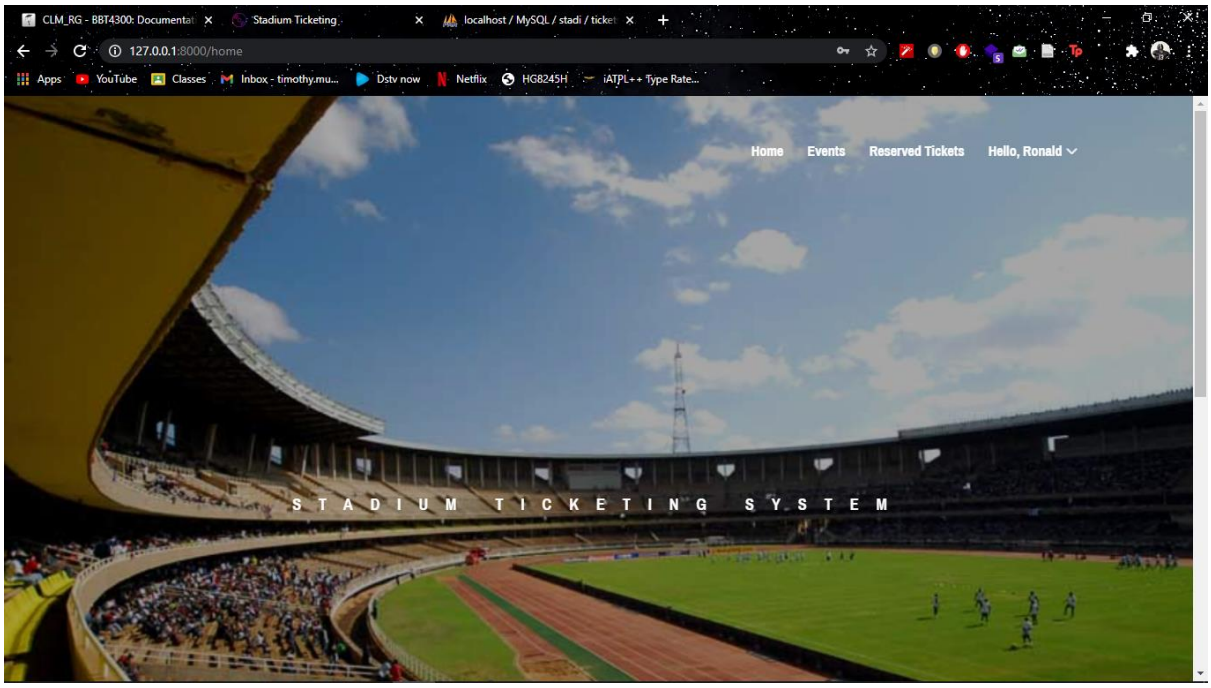

Figure 5.2 Home page

5.1.3 Report generation

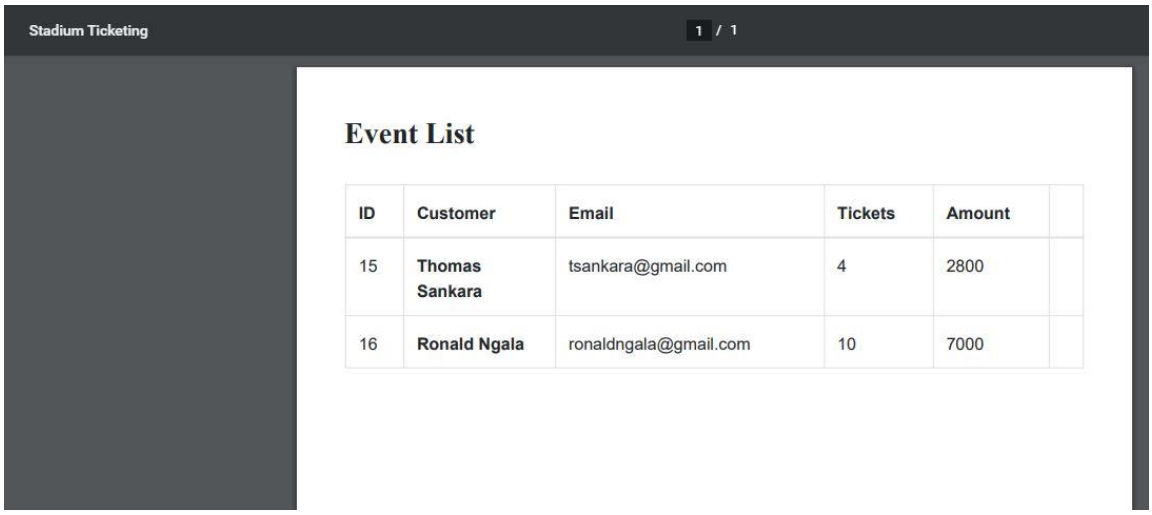

Figure 5.3 Report generation page

This is a simple pdf generation on the admin panel that shows all the customers who bought tickets of a particular game and how many they bought.

5.1.4 Payment

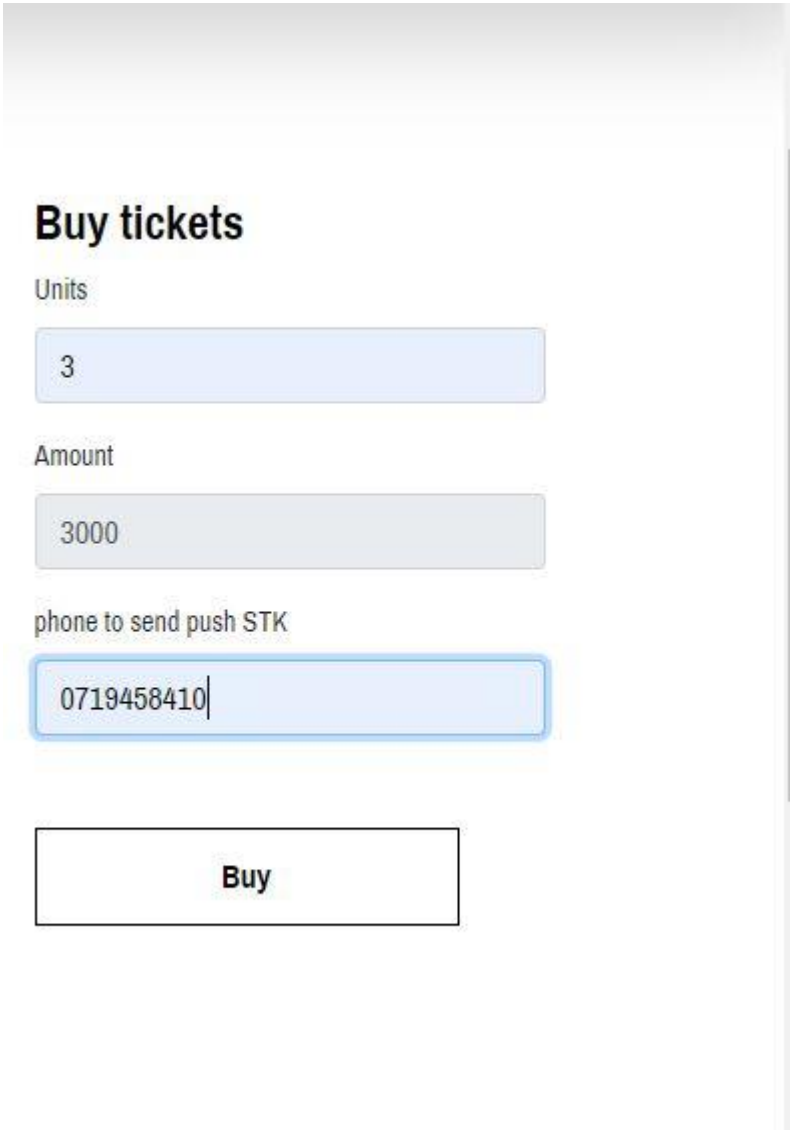

Figure 5.4 Payment page

5.1.5 Events page

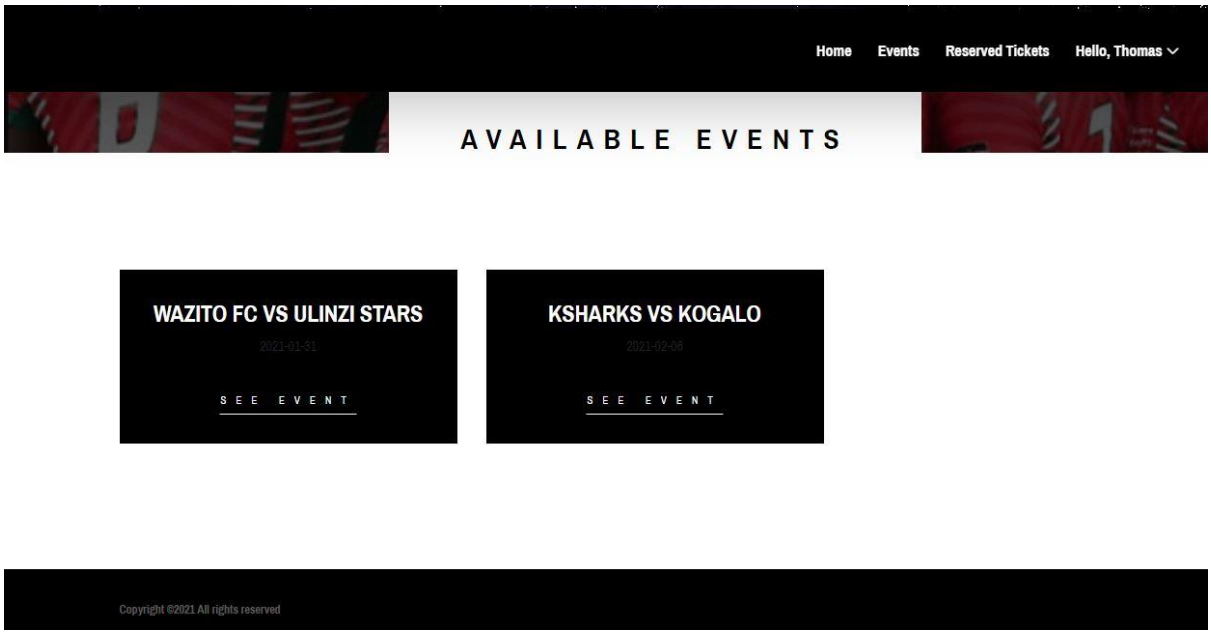

Figure 5.5 Events page

5.2 Testing

The tests carried out on the system were;

Module testing: The registration module and payment module were tested independently to ascertain whether they fulfil their requirements.

System testing: The system was tested to see if it meets the functional and non-functional requirements.

5.2.1 Test Environment

The following requirements have to be met for the system to work at its best:

a) Server-side specifications.

Operating System	**Windows 10 64-bit OS**
Primary memory	4.00 GB (3.86 usable)
Processor	Intel Core i3-6006U CPU @2.00 GHz
Database management system	MySQL Workbench 6.3 CE

Table 5.1 Server-side specifications

b) Client-side requirements

Browser environment: Google Chrome

5.2.2 Test Cases

Test ID	Requirements	Inspection Check	Pre-Condition	Test data	Priority level
R1	The system should validate login input	Does the system validate login input?	The user must be registered with the system	Data from the database	High
R2	The system should register users	Does the system allow users to register?	The users' personal details are required	Users' personal credentials	High
R3	Displaying games available to the users	Does the system display games for the users to select?	The system administrator must have added all the games available	The administrator's	High
R4	System should allow users make payments	Does the system allow users to make payments?	The user must be logged into the system	Users' personal details	High

Table 5.2 Test Cases

5.2.3 Test Results

Test ID	Expected Results	Actual Results	Status	Remarks
R1	The system should allow a user to log in	The system allows the user to log in	Pass	Fast system login
R2	The system should register users	The system allows users to register	Pass	Fast user registration
R3	The system should display games available to users	The system displays games available to the users	Pass	All games are displayed
R4	The system should allow users to make payments	The system allows users make payments	fail	Payment methods are available but require integration

Table 5.3 Test Results

Chapter 6: Conclusion and Recommendations for Future Work

6.1: Conclusion

The online stadium ticketing System has contributed greatly in solving problems associated with access to game tickets and mismanagement of funds from the sale of the tickets the system was also able to get rid of the manual system of cash that was in place before.

The major problem eliminated was the mishandling of tickets at the gate. This has been eliminated through providing the tickets to the spectators via email after a payment has been made.

Seat confusion has also been eliminated. The system allocates seat number to a specific ticket which is given to the users of the system.

6.2: Recommendations for Future Work

Adoption of web application systems is highly recommended as it would reach many users. However, this system did not fully solve the issues identified hence some things can be improved in future such as;

i. Notifying both clients and server via email when a payment is successful.
ii. Integrating the system with a universal method of payment such as PayPal.
iii. Expanding the system to be used by other event organizers and not only stadiums.

6.3: Deliverables

The following are the modules that were developed at the end of the project;

1. **Registration module**: The module will be used to register users into the system.
2. **Login module**: This will be used to authenticate users that have already registered with the system.
3. **Events module**: This is where the available events are viewed by the users of the system for them to choose.
4. **Payment module**: The system has a provision to integrate with Mpesa as a method of payment for the tickets.
5. **A database of MySQL**: this was developed to enable the storage of data that is keyed into the system.
6. **User manual document**: This is a document that shows how to use the stadium ticketing system. This document is to be used mainly by the end users of the system to assist them in knowing how the system works.

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Appendix A: Timeline of activities

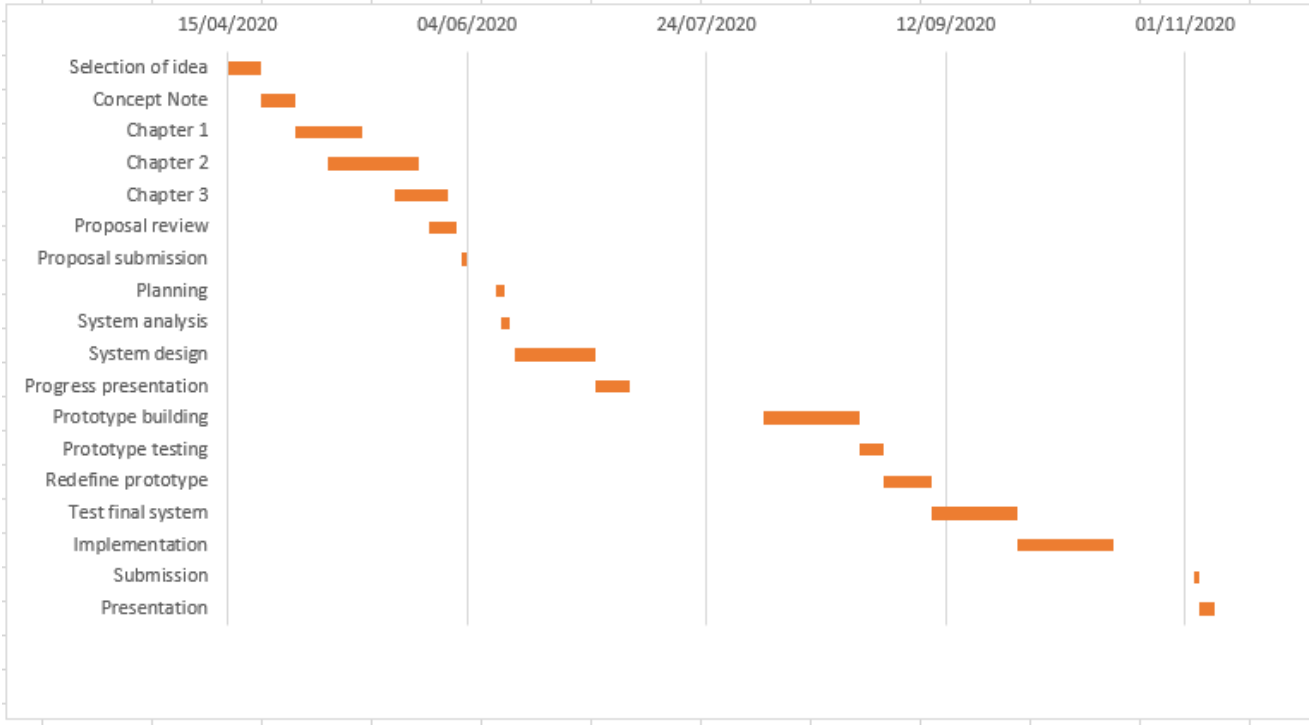

Figure 3.2 Gantt Chart