STADIUM TICKET BOOKING SYSTEM

CASE STUDY: SIAKA STEVENS STADIUM (BROOKFIELDS, FREEETOWN)

BY

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DECLARATION

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

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CERTIFICATION

This is to certify that this dissertation is the work of Ibrahim Turay, Mohamed Vis Conteh, and Patricia Hawa Tucker, members of Group A under the supervision of our project supervisor.

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(Project Supervisor)   Date:

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ABSTRACT

The research aims to tackle the issues of ticket fraud, overcrowding, and lengthy queues at the Siaka Stevens Stadium during events, which cause inconvenience for both attendees and organizers. This project proposes a web-based ticketing system to address these issues by enabling users to purchase tickets online in advance. The study aims to enhance efficiency for users and organizers, to generate additional revenue for the stadium, and improve security through secure online transactions and ticket validation procedures.

Using an agile development methodology, the project will involve stakeholder consultation, detailed design, rigorous testing, and a comprehensive launching strategy. The design process will prioritize security and privacy compliance, ensuring that the system meets all requirements.

The researches successfully created a contemporary web-based ticketing system for Siaka Stevens Stadium. This system has the potential to transform the event ticketing industry in Sierra Leone by providing a more efficient, convenient, and secure experience for all stakeholders. This project is expected to significantly enhance ticket management and reduce queuing and ticket fraud. Additionally, it has the potential to generate additional revenue for the stadium.

However, the system currently has limited options for fans, including lack of food and drink packages on tickets, seasonal ticket options, and notifications about upcoming events.

Therefore, it is necessary to improve these areas for future study and development.

Keywords: *Ticket fraud, overcrowding, queuing, queuing theory*

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ABBREVIATIONS AND ACRONYMS

CRM: Customer Relationship Management

CSS: Cascading Style sheet

DFD: Data Flow Diagram

ERD: Entity Relationship Diagram

GHZ: Giga Hertz

HTML: Hypertext Markup Language

IoT: Internet of Things

MPESA: Mobile Pesa (Mobile Money)

QR CODE: Quick Response Code

TOR: Terms of Reference

TM: Trademark

UML: Unified Modeling Language

VSCode: Visual Studio Code

CHAPTER ONE

Introduction

1.1 Background of the study

Sports have a significant impact on our culture, promoting unity, well-being, and positive change (World Economic Forum, 2021). Recognizing this influence allows us to know the full potential of sports to build a brighter future. According to Wallace (2023), the tradition of hosting sporting events and entertaining people in stadiums dates back to ancient times. During that period, attending live events often required the purchase of entry tickets, a practice with a long and fascinating history that originated in ancient civilizations. The earliest known use of tickets for events dates back to ancient Greece, where small clay disks stamped with seat numbers served as admission tokens (Shoultes, 2018).

As technology advances and fan expectations change, we expect to see more exciting and innovative stadium designs in the future. Worldwide, there has been a move towards building environmentally friendly sports stadiums (Wergeland & Hognestad, 2021). Technology has revolutionized the way we book tickets, making it more convenient and accessible. The ease of ticket reservations is no longer limited by time or location due to technological advancements (Soegoto & Siddiq, 2018).

Despite these technological developments, the current ticket system at the Siaka Stevens stadium remains predominantly manual, where tickets are printed and sold at the gates. This has resulted in ticket fraud, disorder, and long queues. The Siaka Stevens Stadium is a vast sports venue in Sierra Leone that is a symbol of national pride. With a capacity of 45,000, it hosts football matches, concerts, and rallies, uniting people through shared experiences (Smith, 2020).

1 .2 Statement of the Problem

Buying tickets for events at the Siaka Stevens stadium can be quite a hassle for fans. They have to travel long distances and stand in long lines to purchase tickets manually. The manual ticketing system for large events such as football matches, shows, and other social activities has several drawbacks. These include the printing of illegal tickets, overcrowding, and the mismanagement of money generated from ticket sales.

There is a need to transition to a digital ticketing system to address the challenges faced by event organizers and spectators.

1.3 Aim

To design and implement a ticketing system for the Siaka Stevens Stadium that will mitigate ticket fraud, overcrowding, and lengthy queues at the stadium gate when purchasing tickets.

1.4 Objectives

i. To prevent ticket fraud at the Siaka Stevens stadium.

ii. To reduce the wait time for people standing in a queue at the gate when purchasing a ticket.

iii. To enhance comfort and reduce overcrowding at the stadium facilities.

1.5 Significance of the Study

The online ticket reservation system will benefit stakeholders by reducing ticket fraud, minimizing queuing at stadium gates while purchasing tickets, and making it easier for spectators to attend events.

1.6 Research Scope

The study analyzed how technology can enhance ticket systems for fans at the Sieka Stevens Stadium. The research focused on creating an online-based system for purchasing tickets, evaluating the current manual ticketing process, and suggesting solutions for implementing the system. The adoption of this technology-driven approach can improve convenience, security, and efficiency, thereby attracting more audiences to the stadium.

1.7. Research Questions

i. How does the system mitigate ticket fraud and prevent unauthorized access to the stadium?

ii. How will the system reduce queuing time at the gate? iii. To what extent does the system overcome overcrowding at the stadium?

1.8. Research Limitations

This research project only applies to the Siaka Stevens Stadium and may not provide insights that are directly applicable to other stadiums with different procedures or features. Currently, the Stadium Ticket Booking system does not allow purchasing additional packages like drinks and food alongside tickets. Fans may need to purchase these separately. Due to the specific procedures of the stadium, the system does not offer seasonal tickets to fans. This may limit loyalty programs or ticketing options tailored to frequent attendees. For enhanced security, tickets are scanned twice at the gate as a part of the two-way verification process, which restricts options for fans to share or resell tickets without detection. The inability of the system to send notifications to administrators for any ticket purchase and to users about upcoming events at the stadium is a limitation that needs to be addressed. It is important to consider upgrading the system's functionality to ensure better oversight and communication for both administrators and users.

CHAPTER TWO

Literature Review

2.1 Online Ticket Fraud

The Internet has become an important way for companies to sell things. This has made online shopping grow fast. Many people now buy things online. However, there are also problems with online shopping, like getting too many annoying messages and the risk of getting tricked (Phalitnonkiat, & Chewwasung, 2018). The successful internet usage and technological advancements created an online marketplace suitable for ticket scalping, especially with the invention of ticket bots (Elefant, 2018). These automated programs extract large quantities of tickets within seconds, leaving the average consumer with no choice but to pay excessive prices on the secondary market.

According to a study conducted by (Kassem, 2023), fraud is any dishonest act that hurts someone or puts them at risk for your gain. This includes lying, abusing trust, hiding important information, stealing, accepting bribes, messing with money or company property. Fraud is when you are not honest and try to get something good for yourself by hurting someone else. However, countries are fighting back with lawmaking that outlaws or penalizes the use of ticket bots, while also offering solutions for those harmed by their unfair practices. Research conducted by Lexology (2023) indicates that over the last few years, state lawmakers and enforcement agencies have focused increasingly on protecting consumers who purchase tickets to sports and entertainment events. L'Hoiry's study (2023), also showed that a criminological culture investigating the illegal market for live event tickets in the United Kingdom, marking the first of its kind in criminological studies. It examines the corruption and negligence that contribute to the successful illegal ticket marketplace. He argues that the increase in illegal tickets is a direct outcome of deliberate neglect and tacit acceptance of system loopholes by influential figures in the live events industry.

2.2 Mitigating Online Ticket Fraud

An article published by Read in 2023 delved into the issue of fake ticket scams. The study revealed that scammers take advantage of fans' eagerness to attend sold-out events by using falsified images and fabricated stories to appear real. They then request payment via bank transfer, which offers no protection to the consumer. Once the money is transferred, the scammers disappear, leaving the victim unable to recover their funds or locate the criminals.

In the past, e-commerce platforms used fraud detection techniques to fight online ticket fraud. However, more effective alternatives have been identified in recent times. According to Zhao et al. (2018), these include machine learning, behavioural biometrics, blockchain technology, and customer education. Machine learning algorithms analyze data to identify fraudulent activity, while behavioural biometrics measure subtle variations in user interactions to prevent unauthorized access. Blockchain technology provides secure ticket storage and transfers to ensure authenticity, and customer education empowers consumers to make informed decisions and avoid scams.

To create a more secure and trustworthy online ticketing environment, it is important to implement these advanced technologies and educational initiatives. Additionally, providing law enforcement bodies with the necessary resources and tools to investigate and prosecute online ticket fraud, as well as creating comprehensive consumer education programs, is vital for empowering consumers to avoid online ticket scams.

2.3 Queuing at the stadium gate

According to Afolalu et al. (2021), a queue is a line that customers wait in for service. Waiting in queues is called queuing. Long waiting times in queues can lead to frustration and negative experiences for those waiting.

People have different perceptions of queuing, with varying subjective valuations of their time (Furnham et al., 2020). Queuing has different meanings to different people. High-status individuals view it as a total submission or control of their own time, whereas productive people see it as a break from their busy work schedule. Those who are extremely conscious of their time consider it a significant loss of their time. Queuing from different perspectives can significantly reduce the satisfaction of spectators attending events, as they spend most of their time waiting at the stadium gate. This has become a critical concern for stadiums that aim to improve customer service satisfaction. As a result, people are unable to witness the beginning or the entire process of an event because of the long waiting times in queues, which can lead to reduced satisfaction.

2.4 How Queuing Impact Spectator Satisfaction

When spectators have to spend a significant amount of time and energy waiting in line to enter the stadium, their overall satisfaction can be greatly reduced. This negative experience may discourage many from attending future events as they may be put off by the prospect of having to endure lengthy queues once again. According to Oliver (2006), satisfaction in the context of consumer behaviour and marketing refers to the consumer's overall feeling of happiness with a product or service they have purchased or experienced. The issue of spectator satisfaction at stadium events often arises from long queues at the entrance gates.

According to a study conducted by Khan and Paramasivam in 2023, understanding the impatience of spectators is crucial in the context of a ticket system. Long queues or service delays can lead to impatient spectators, which can have negative consequences for event organizers and the stadium. If spectators perceive the waiting times as too long or the ticketing process as inefficient, they may decide not to attend the event. This impatience can impact not only the revenue generated from ticket sales but also the overall experience and satisfaction of the spectators. It can consume a significant portion of their day waiting in lines.

Stadiums face the complex task of managing large crowds while prioritizing safety, customer satisfaction, and revenue generation. Technological advancements such as IoT sensors, video surveillance, and mobile network data analysis provide valuable insights into crowd behaviour and movement. This empowers proactive management and optimization strategies, enhancing security by enabling real-time monitoring and resource allocation. It allows for an immediate response to potential risks.

In addition to enhancing security, these solutions optimize customer experiences by reducing waiting times and congestion. This leads to increased satisfaction and loyalty among customers. Furthermore, crowd insights derived from these technologies enable targeted marketing and merchandise placement, generating additional revenue streams for stadium operators.

2.5 The Queuing Theory

Queuing Theory is a method that utilizes probability models to understand the dynamics of waiting lines (Ledder, 2019). It then applies optimization techniques to improve system performance. For instance, a queuing model may predict the average waiting time in a supermarket checkout line. However, store managers would use optimization to determine the ideal number of cashiers to minimize customer wait times and maximize efficiency. In this particular case, the focus is on spectators waiting in lines at the stadium gate for ticket purchase. Many studies have concentrated on the average waiting time and the length of the queue, but this approach may not fully capture the idea of customer satisfaction at the Siaka Stevens Stadium. Therefore, to truly optimize the waiting experience, this study will examine the issue of customer satisfaction. For example, a queuing model might predict the average waiting time in a supermarket checkout line.

The study aims to optimize the waiting experience at the Siaka Stevens Stadium by examining customer satisfaction rather than just focusing on average waiting times and queue lengths. The research will utilize both explicit and implicit matrices to understand customer satisfaction from waiting in lines for an extended period. The explicit approach will look at direct experiences, such as waiting times, service quality, and overall queuing. The implicit approach will examine abandonment rates, complaints, and social media sentiment to gain indirect insights into customer frustration and dissatisfaction. To incorporate satisfaction into queuing theory, the study will implement a Linear Penalty function into average waiting time formulas. This function will add a frustration fine or penalty based on how long customers wait in a line, prioritizing both queue efficiency and customer happiness. The penalty will increase linearly with waiting time, meaning that the penalty or fine will increase based on the time a spectator spends in a queue. The penalty coefficient can be determined based on research on how much customers dislike waiting. **Penalty = k * Wq Where:**

k: Penalty coefficient (e.g., 1% dissatisfaction per minute of wait)

Wq: Average waiting time

2.6 Overcrowding

Overcrowding is a situation where too many individuals occupy a space, exceeding its capacity (Nkosi et al., 2019). This can lead to various negative consequences such as competition, disease, stress, and environmental damage. To address this issue, effective strategies such as efficient urban planning, and resource conservation are crucial. It is important to manage overcrowding to ensure the well-being of individuals and the environment. According to Londoño (2022), a recent tragedy has highlighted the urgent need for improved stadium crowd safety. To prevent future incidents, authorities must exercise restraint with tear gas, enhance crowd control measures, and strictly enforce capacity limits. Fans can also contribute by avoiding fake tickets, remaining calm, and adhering to safety protocols. Furthermore, effective communication, accountability, and long-term planning are crucial to prioritize safety and avert heartbreaking events.

The research will bring transformative change to the overcrowding chaos at the Siaka Stevens Stadium. The practice of printing tickets beyond the available seating capacity has led to discomfort, entry delays, and safety concerns. To restore a safe and enjoyable atmosphere for everyone, we are taking decisive action. Our strategy is based on precise ticketing that aligns with real-time seat availability, high-level security measures to counteract counterfeit tickets, proactive fan education, and empowered staff. We are also exploring innovative seating and pricing models. By working together, we can achieve our goal.

2.7 Existing stadium ticketing systems in use

2.7.1 Gig event management system

Gig is an online platform that event organizers can use to facilitate engagement and gather insights from various types of events (Munywoki, 2021). These include Meet-Ups, Expos, Corporate Events, Concerts, and Fashion Events. The platform is secure and requires users to create and verify their accounts before they can access event features. Once verified, users can browse and select events, while organizers pay a fee to publish their events. Users can register and purchase tickets using MPESA or VISA, and the platform provides real-time reports on attendee demographics. It offers various enhancements that include robust security, user engagement features, customer support, diverse payment methods, marketing tools, accessibility considerations, scalability planning, legal compliance, and a user-friendly interface. One of the major benefits of this platform is that it offers post-event analysis of attendee demographics and participation. This analysis can help event organizers plan future events more effectively. Additionally, the platform provides a digital communication platform for organizers to engage with attendees during and after events. They can send event-related emails and gather feedback to improve future events.

2.7.2 Web-Based System for Stadium Ticketing

A student from Strathmore University in Nairobi, Kenya created a web-based ticket system project. The system has various modules including a sign-up module for users to register, a signin module to verify user identities, and a homepage to view available events and purchase tickets (Munywoki, 2021). To ensure security, the system sends purchased tickets to the user's email address and puts them in a Reserved Tab to prevent fraudulent tickets. The tickets are later verified upon entry into the stadium.

2.8 Gaps in the existing systems

The current system in Sierra Leone lacks transparency and struggles to maintain reliable record-keeping of transactions, often resulting in illegal ticket printing. The Gig event management system was designed primarily for expos, meet-ups, concerts, and fashion events, not for stadium ticketing. The system sends tickets to customers via email, which can cause long queues at the stadium during verification. Additionally, the system is only available to spectators within Kenya, which is disadvantageous for people living outside the country.

The Web-Based System for Stadium Ticketing also faces issues due to differences between countries. For example, the system is limited to Kenya, while the proposed system aims to provide ticket access to anyone with internet access. Neither of these systems has a QR code system to quickly verify tickets, leading to long queues at the stadium gate. The proposed system aims to mitigate this issue by introducing QR code technology.

To combat ticket fraud at the Siaka Stevens Stadium, a digital ticketing system powered by secure QR code technology will be deployed. Each ticket will feature a unique and encrypted code, making it difficult to forge tickets. Double-scan entry will further support security, ensuring fair access for genuine attendees. The system will also personalize QR codes and limit ticket transfers to discourage fraudulent activities. This digital shift will not only enhance convenience and deliver benefits but also unlock valuable data for improved event management and fan experience.

CHAPTER THREE

System Design and Methodology

3.1 Current System

The current system for ticket sales is entirely manual and requires the involvement of the stadium administration in all its processes. Sports officials sell tickets at the gate, and customers may be directed to third-party agencies to acquire tickets. However, these agencies sometimes sell mismatched tickets or close before the due date. Financial tracking is difficult, making it challenging to generate reports on the games' finances accurately. The manual system consists of three components. Firstly, customers must locate where tickets are sold, which can be disadvantageous when tickets are sold in a distant location. Secondly, the sports officials sell tickets at the gate, leading to a lack of transparency and making it hard for the finance department to determine the total gate takings accurately.

3.2 Software Methodology

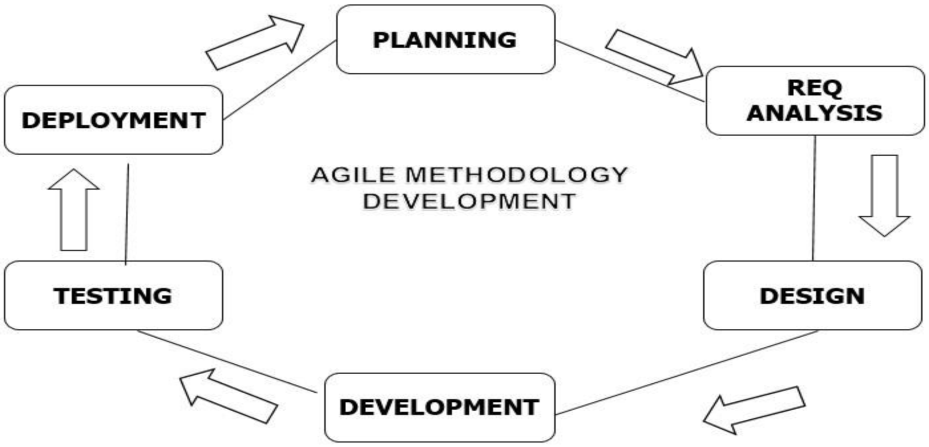
According to the nature of this research, the system will be developed using an agile software methodology that will be better adapted to the needs and wants of customers. This approach is very flexible and can allow us to iterate unaccomplished tasks without affecting the entire development process. This system will undergo the SDLC steps that range from planning, requirements collection, design, development, testing, and deployment. Agile methodology helps manage the project by dividing it into several phases. This requires continuous collaboration with stakeholders and continuous improvement at every stage. Once work begins, teams go through a process of planning, execution, and evaluation. Continuous collaboration is crucial with both team members and project stakeholders. This is the most popular approach because this process also involves the customers so that they can receive updates about their product and also verify that it meets their requirement

3.2.1 Justification

This methodology provides us with the framework to quickly and efficiently respond to changes in customer requirements and feedback. It can also allow us to go back and make corrections when necessary. This involves the customers receiving updates about their system.

The diagram in Figure 1 below, clearly shows the software approach to be used to develop the proposed system. It ranges from planning, requirements analysis, design, development, testing, and deployment. This approach enables us to start from the planning and move on to the final deployment stage. It can allow us to go back to the entire development stage to make corrections when necessary without affecting the entire project.

Figure 1 *Agile software methodology (own work)*



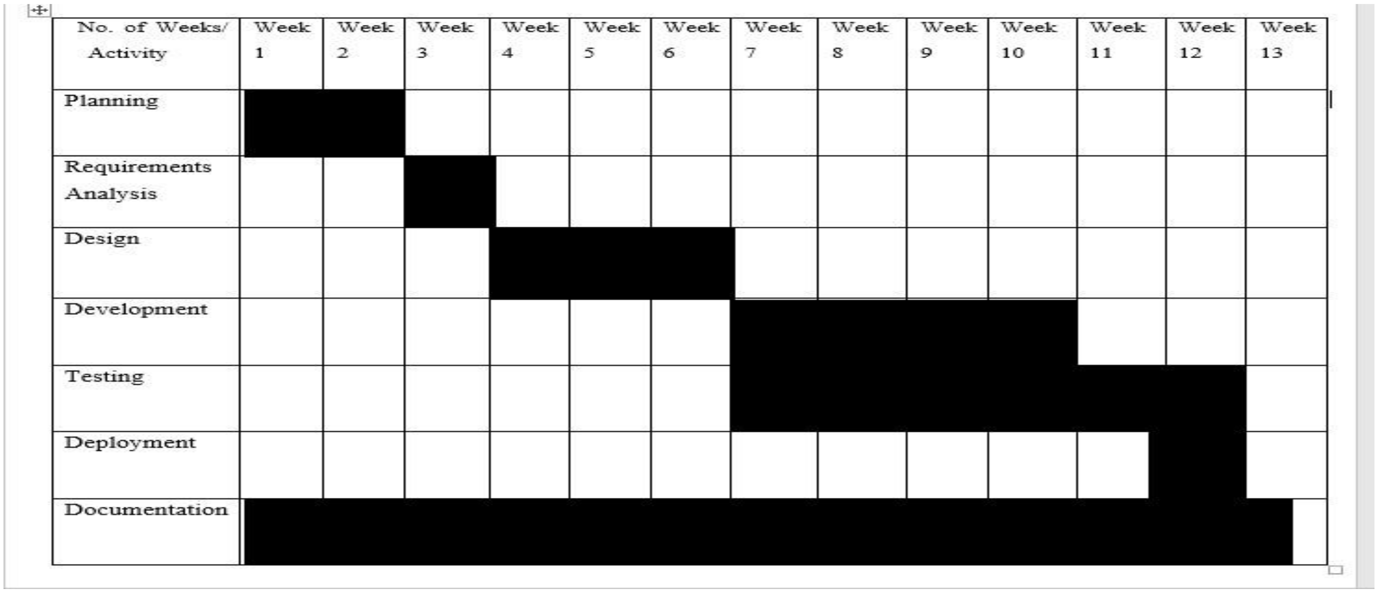
3.2.2 Planning Phase

The initial phase of designing the Siaka Stevens Stadium ticket system involves creating a detailed plan. This plan covers various elements, starting with a clear definition of scope that takes into account factors such as capacity and the types of events hosted at the stadium. It also involves choosing a reliable ticketing approach, ensuring secure payment processing, implementing an organised ticket allocation process, integrating with relevant systems, and paying special attention to ensuring accessibility for all attendees at the stadium

3.2.3 Gant chart

The Gantt chart in Figure 2 below visually represents the timeline for each task, showing when they start and when they finish, helping us to understand the project schedule and reliance between tasks. This is a valuable tool used to ensure that the implementation of the stadium ticket system stays on schedule.

Figure 2 *Gant Chart (own work)*



No. of Weeks/ Activity	Week 1	Week 2	Week 3	Week 4	Week 5	Week 6	Week 7	Week 8	Week 9	Week 10	Week 11	Week 12	Week 13
Planning	■	■											
Requirements Analysis			■										
Design				■	■	■							
Development							■	■	■	■			
Testing							■	■	■	■	■	■	
Deployment												■	
Documentation	■	■	■	■	■	■	■	■	■	■	■	■	■

Figure 2 above shows the Gantt chart that represents the different durations of the activities, which all lasted for 13 weeks. The first stage of planning, which lasted for 2 weeks, had no activity before it. In week 2, the requirements analysis was executed and lasted for 1 week. The design stage started at week 3 after the requirements were analyzed and lasted for 3 weeks. The development or implementation stage comes after the system has been logically designed, and it lasts for 4 weeks. Immediately after the design and implementation stages have started, the testing stage comes into action to ensure that the system works accurately. This stage lasts for 6 weeks and continues until the final deployment stage. At every stage, the system is tested to ensure efficient performance. It is observed that the testing phase overlaps with the development stage, showing that it started on the same day the development stage started and lasted until the deployment stage. The deployment phase started at week 12 and lasted for 1 week. Finally, the project documentation phase is done throughout the project, from the planning stage to the final deployment stage.

3.3 Use Case Diagram

The actors involved in this use case diagram are the Super User, Admin User, and Spectator. Figure 3 illustrates two types of admins - the super admin who oversees the entire system and the admin responsible for updating events, viewing bookings, and adding tickets. Figure 4 shows the Spectators use case, outlining how a customer creates an account, logs in, views events, books tickets, and logs out after purchase. This use case describes how users interact with the system, responding to their requests from their point of view. Each use case is represented as a sequence of simple steps in an ellipse, starting with the user's goal and ending when that goal is fulfilled.

Figure 3 *Admin Use case (own work)*

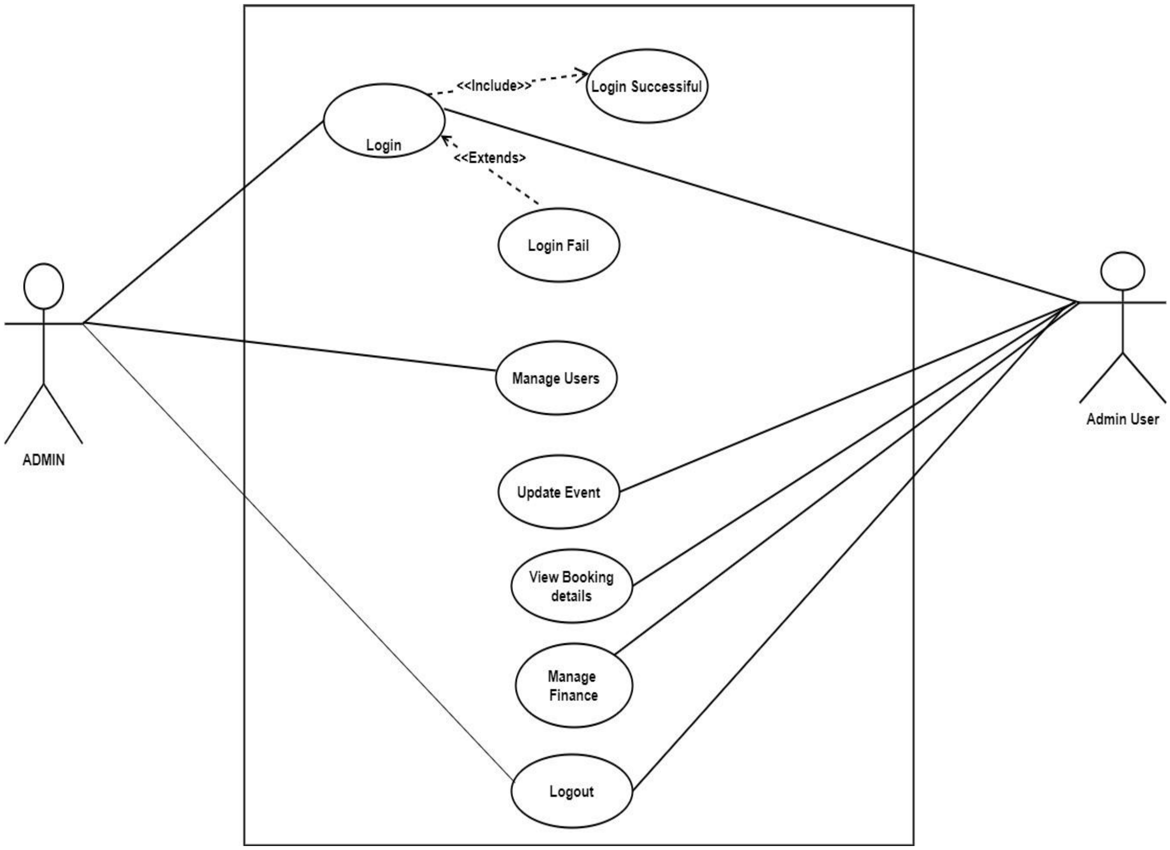
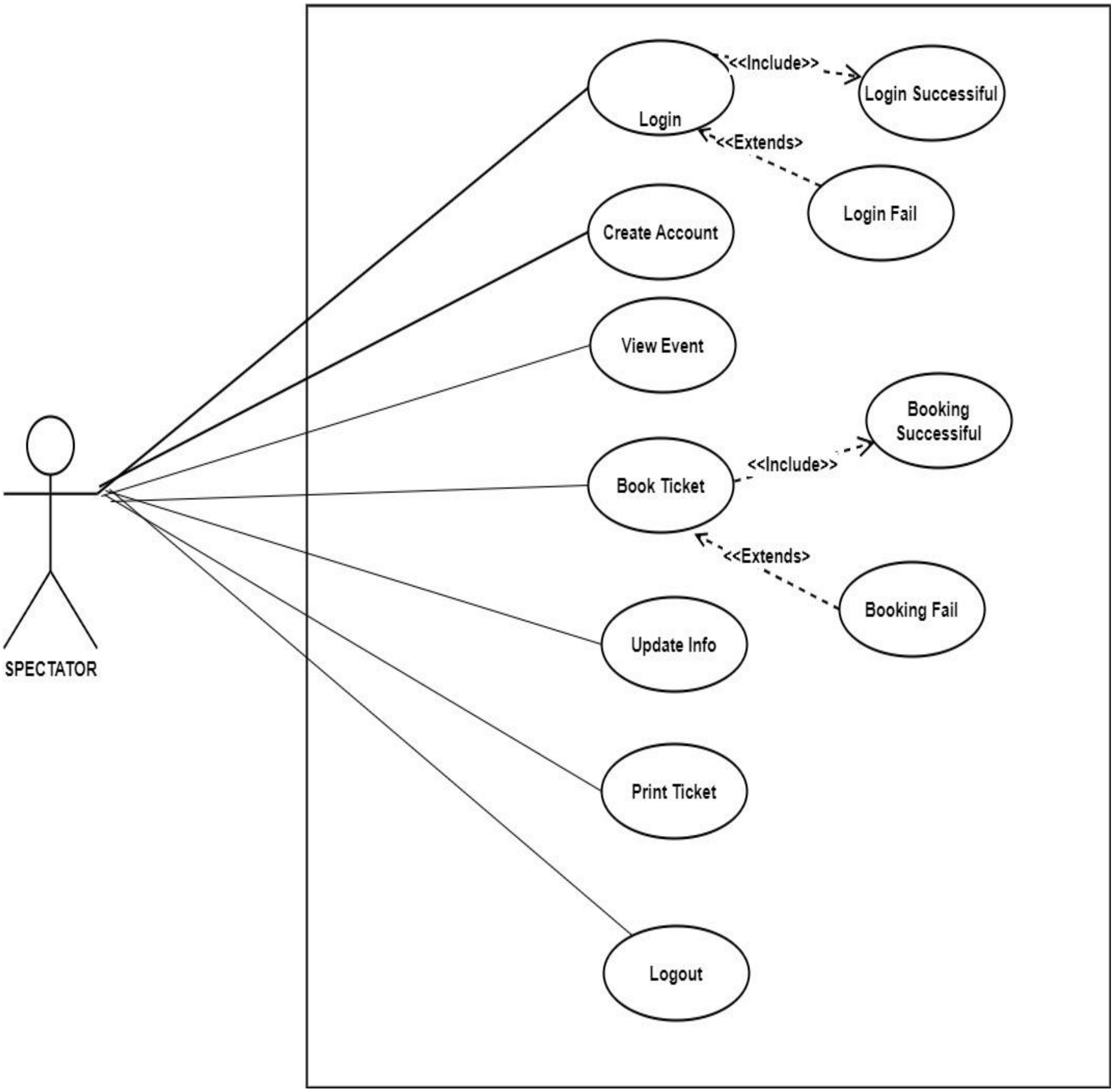

Login
<<Include>>
Login Successiful
<<Extends>
Login Fail
Manage Users
Update Event
View Booking details
Manage Finance
Logout
ADMIN
Admin User

Figure 4 *Spectator Use case (own work)*



3.4 Sequence Diagram

The sequence diagram illustrates the system's requirements and displays the interaction logic between the actors, as well as the activities in the system sequentially. In Figure 5, it is shown that the admin must log in first to access the system. However, if the credentials provided are incorrect, the admin will be redirected to re-enter their credentials. If this continues to happen, the lifeline (vertical dotted lines) indicates that access to the system will be denied. After successful login, the admin can proceed to add or update events before finally logging out. In Figure 6, the diagram displays how a spectator can authenticate themselves to gain access to the system, and then proceed to book a ticket for an event.

Figure 5 *Admin Sequence diagram (own work)*

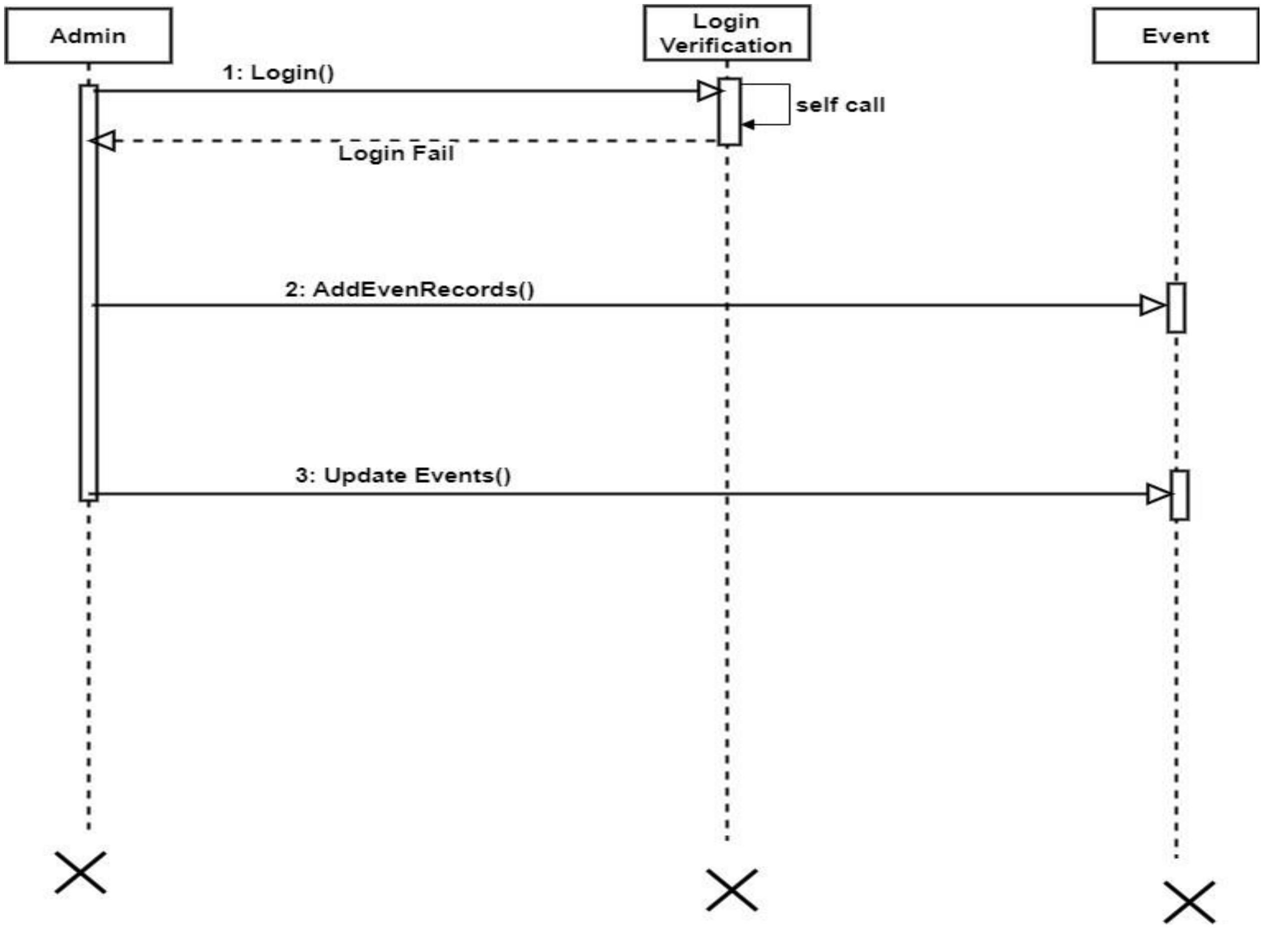
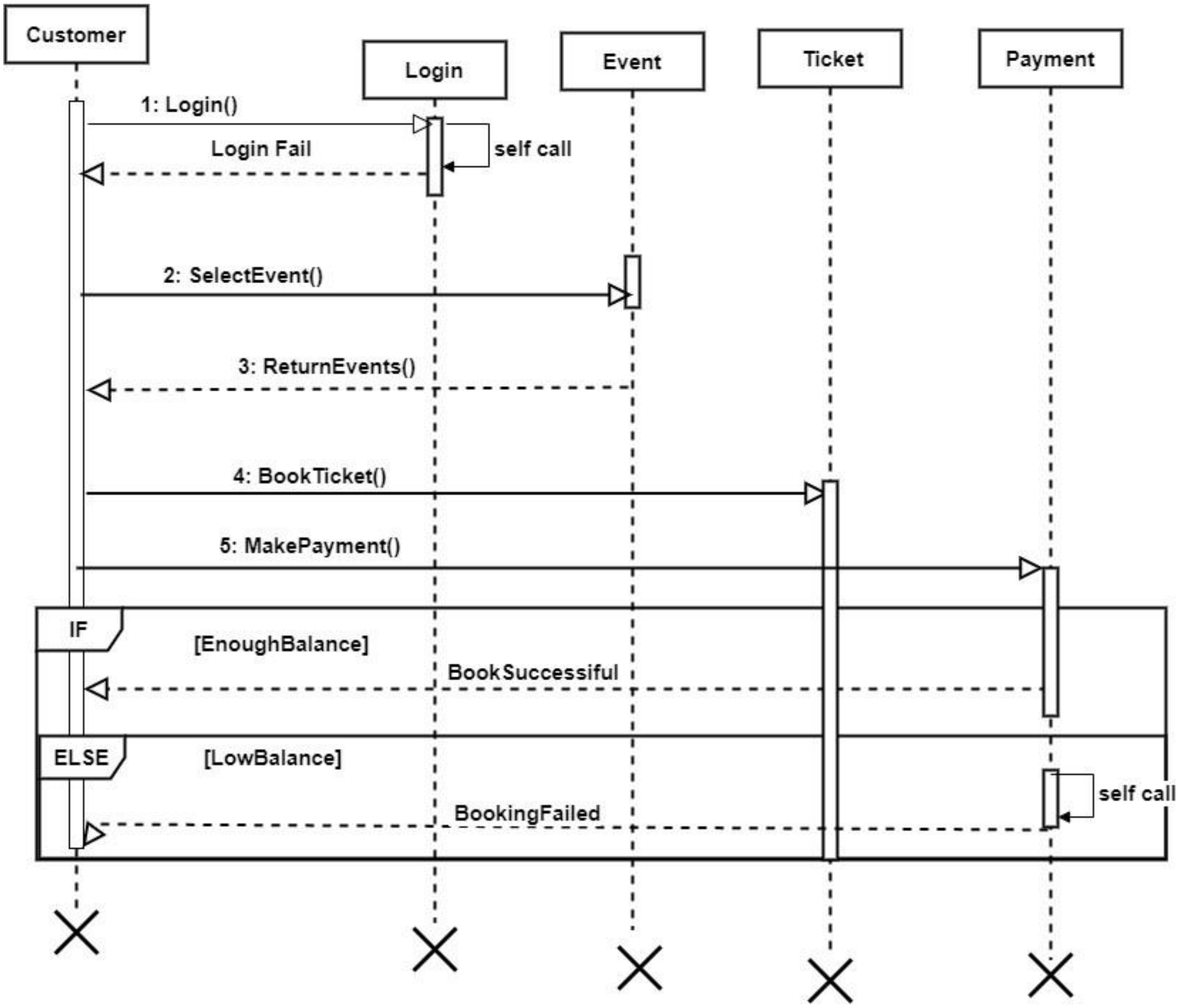


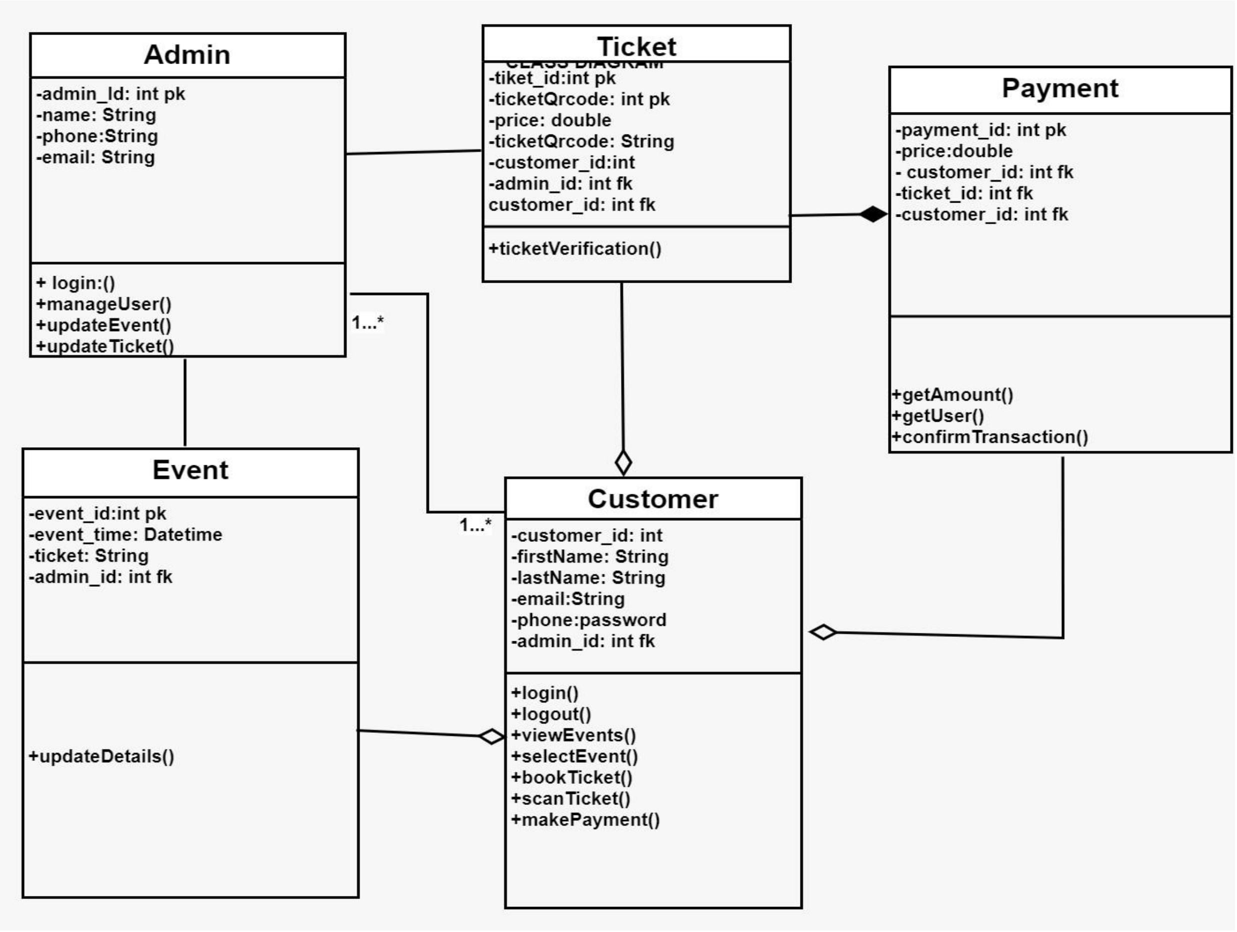
Figure 6 *Spectator Sequence diagram (own work)*



3.5 Class Diagrams

The system's class diagram shows only the functionalities that are necessary to users at a highly abstract level using object-oriented programming concept. There are five classes in the diagram which are event, customer, payment, admin, and the ticket. The research uses classes to represent real world objects and their properties and methods. The properties describe the attributes of the objects. The class diagram of a system represents the functionalities that are essential to users at a highly abstracted level by using the concept of object-oriented programming. The diagram uses classes to represent real-world objects and their properties and methods. The properties describe the attributes of the objects, and the methods denote the functions that the objects can perform on the system. The class diagram also displays the relationships between classes. It is mainly designed for developers to comprehend software requirements and describe detailed designs.

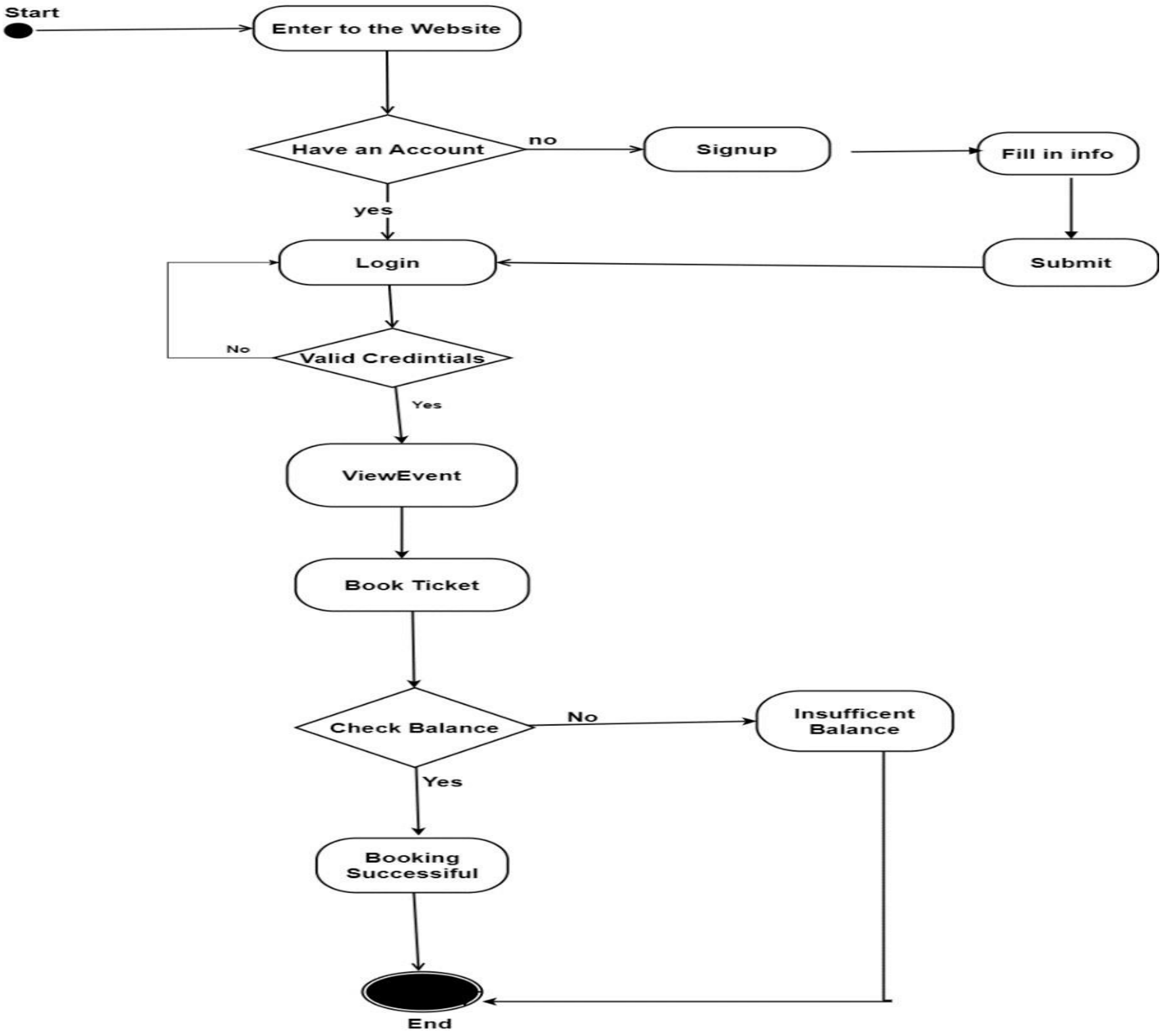
Figure 7 *Class Diagram (own work)*



3.6 Activity diagram

Activity diagrams are used to describe business processes and use cases and to document the implementation of system processes. Activity charts can visualise even the most complex progress. Control and target flows describe sequential and external workflows. Activity diagrams represent activities that are made up of a flow of activities.

Figure 8 *Activity Diagram (own work)*



3.7 Data Flow Diagram

The data flow diagram (DFD) maps the information flow in the stadium ticket system. It starts with a high-level view of external entities like fans and payment gateways, then drills down into processes like ticket purchases and event management, revealing data movements and storage points. This clear visualization helps identify bottlenecks, streamline operations, and design future features, ultimately ensuring a smooth and exciting experience for every game day. ***Figure 9*** *Level Zero Data Flow diagram (own work)*

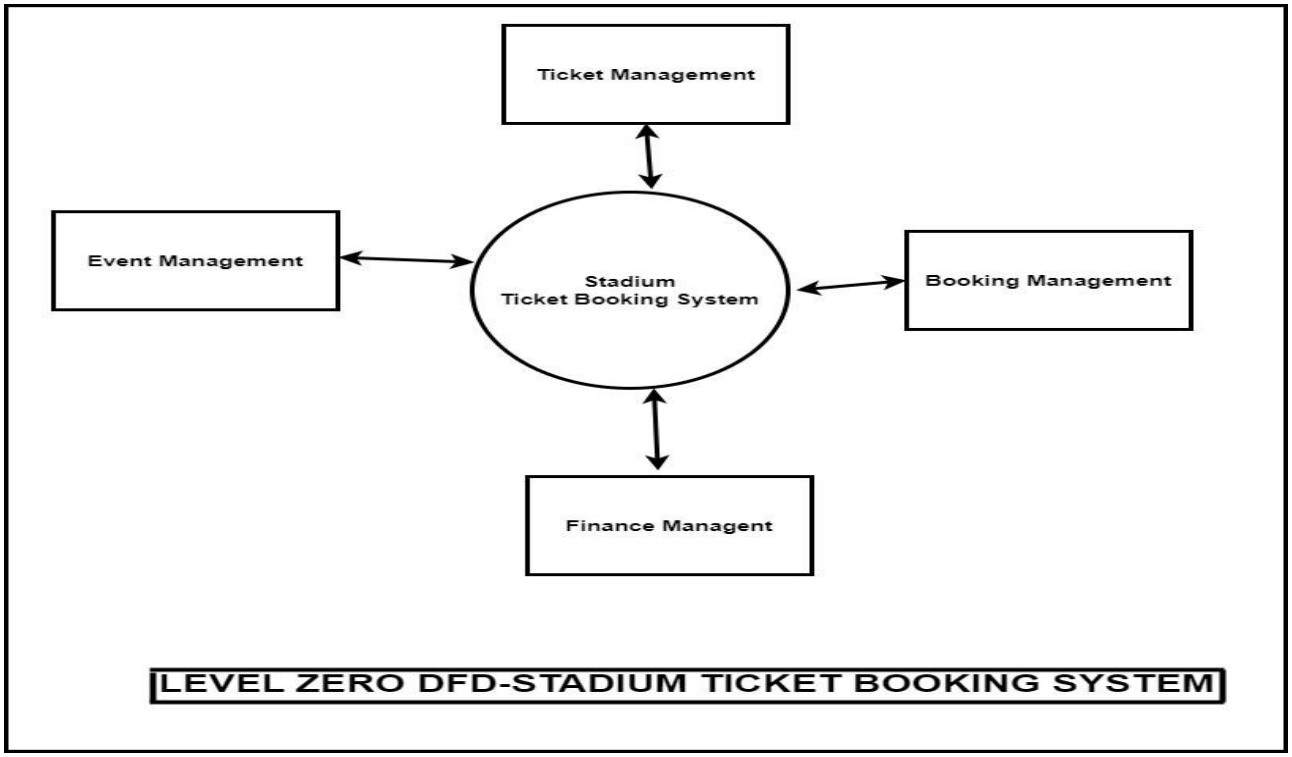


Figure 10: *Level one Data Flow (own work)*

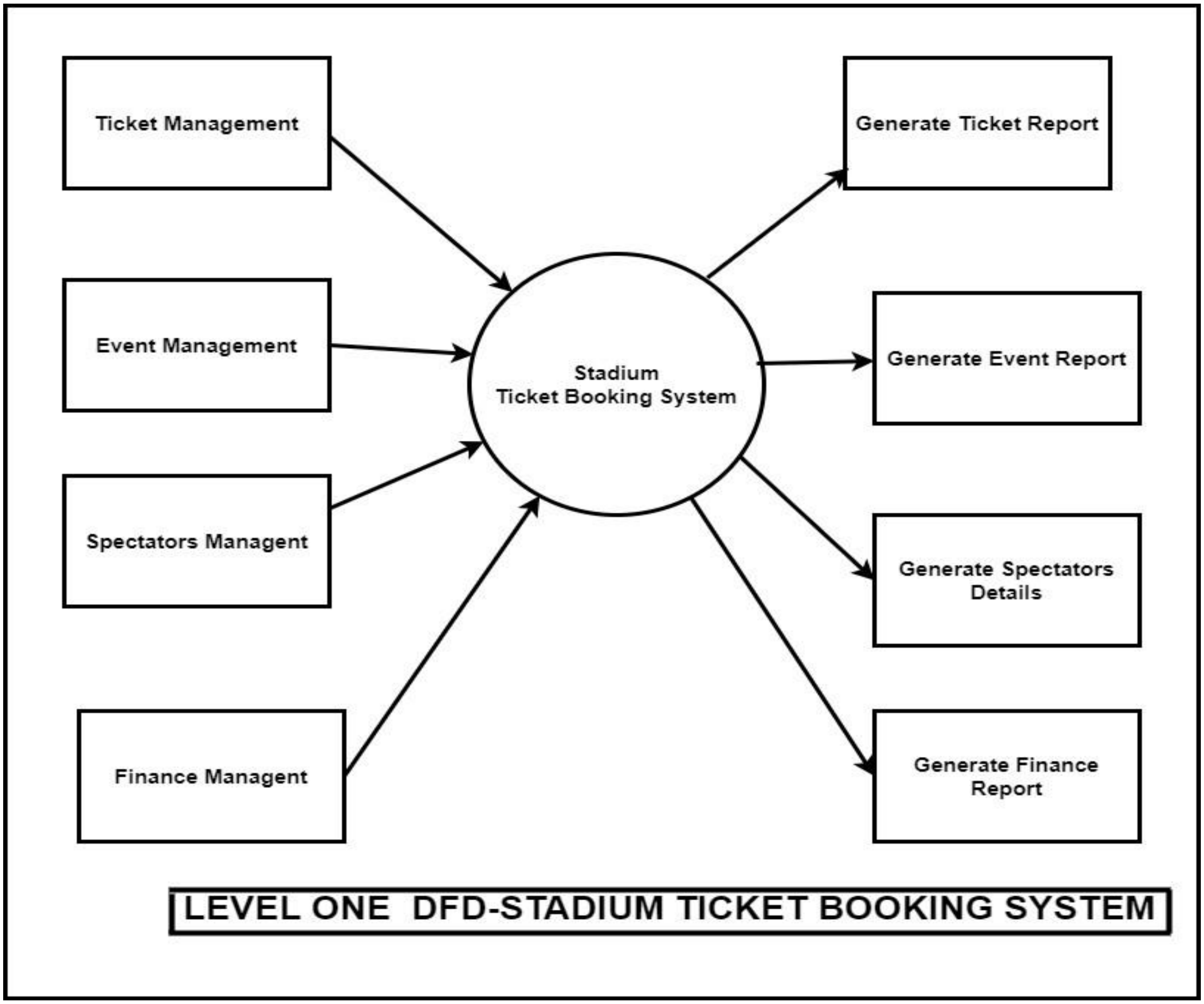
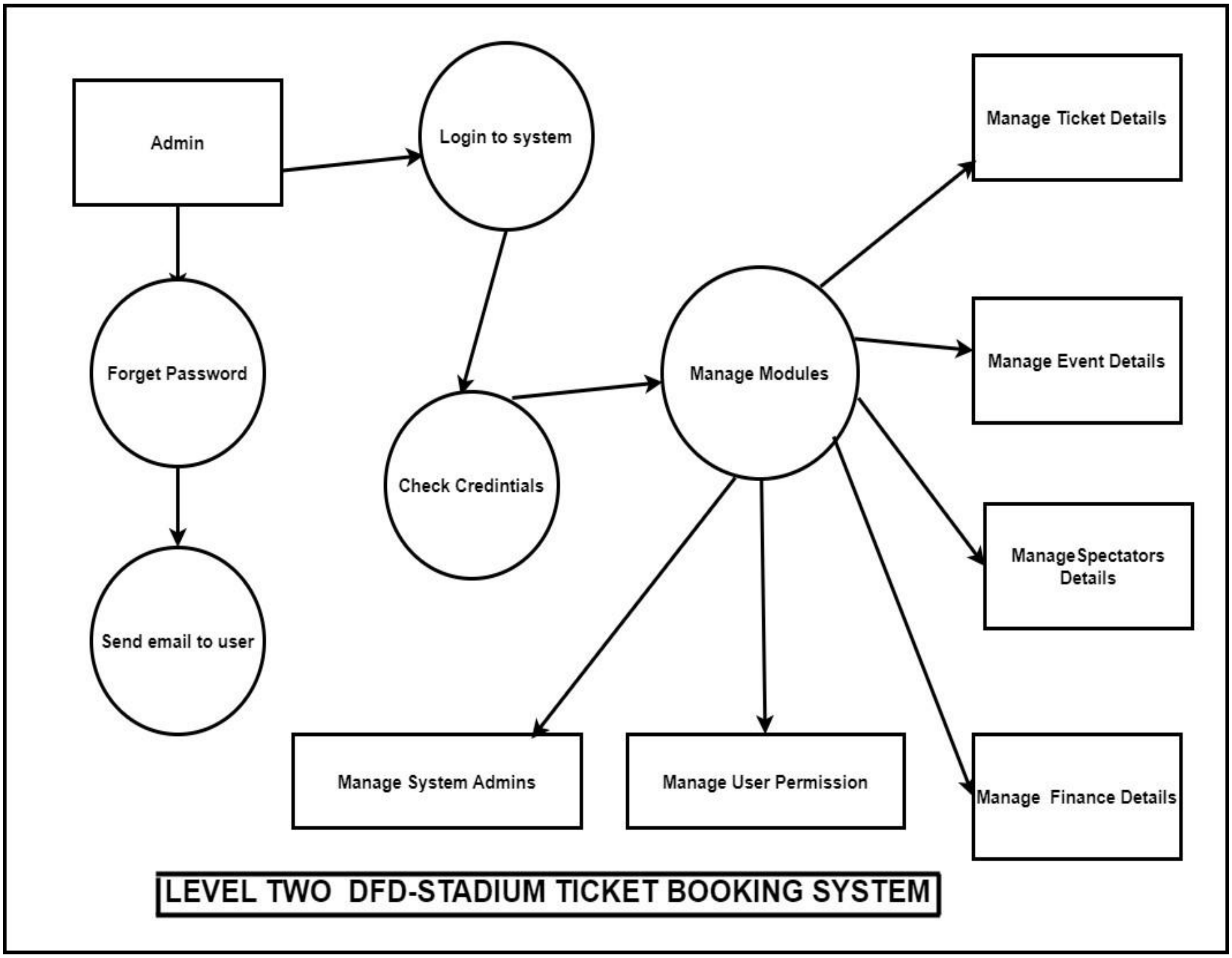


***Figure 11** Level Two Data Flow Diagram (own work)*



3.8 Entity Relationship Diagram

The Entity-Relational Model contains five entities: event, ticket, customer, admin, and payment. Figure 12 shows that an event has many tickets, a customer can select multiple events, and an admin can update many events and tickets. This data is stored in a Django SQLite database.

Figure 12 *Entity relationship diagram (own work)*

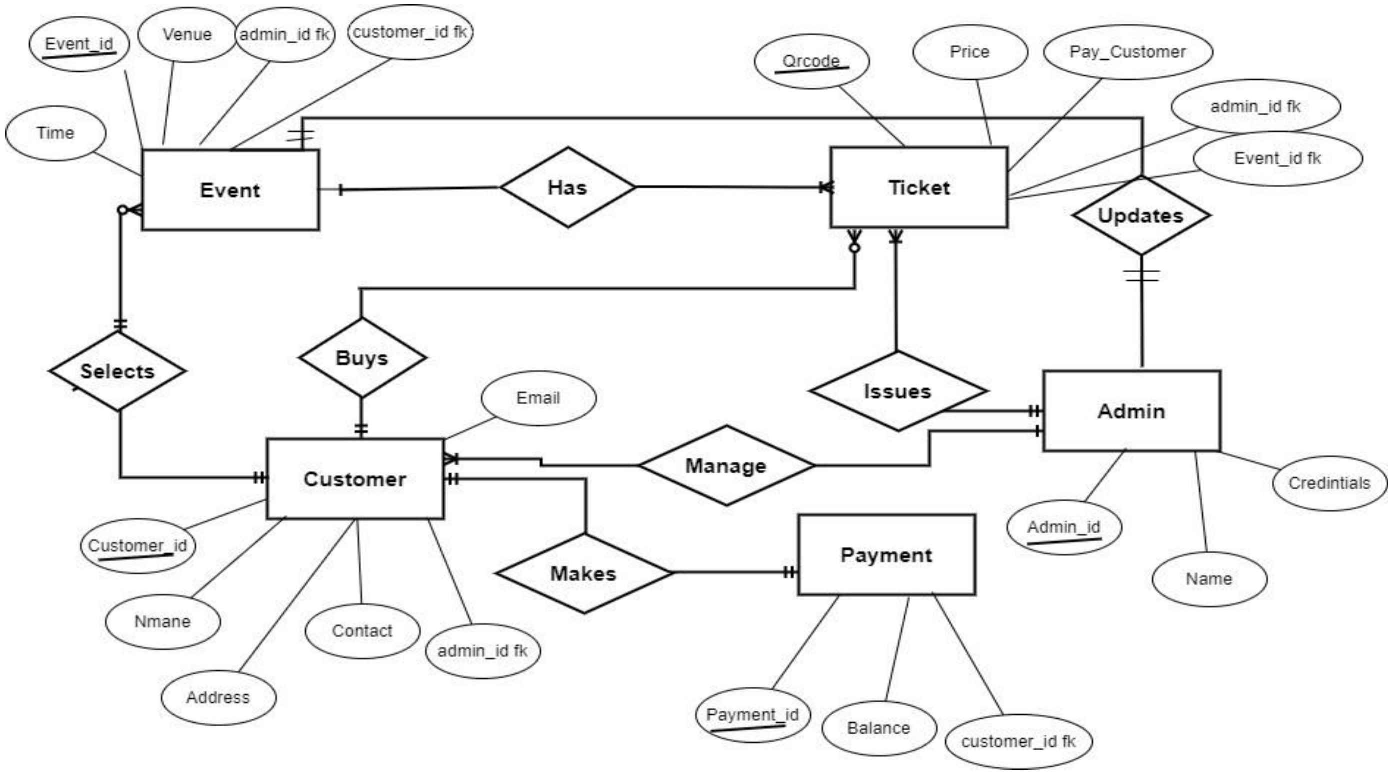


Table 1: *Admin Database*

SNO.	FIELD NAME	DATA TYPE	DESCRIPTION	CONSTRAINTS
1	Admin_id	Integer	Admin identity	Primary key
2	Username	charField(15)	Admin user name	
3	Password	VarChar(16)	Security key	

Table 2*: Customer Database*

SNO.	FIELD NAME	DATA TYPE	DESCRIPTION	CONSTRAINTS
1	customer_id	Integer ()	Customer identity	Primary key
2	Username	charField(15)	Customer user name	
3	Password	VarChar(16)	Security key	
4	Contact	varChar(20)	Phone number	
5	Address	VarChar(50)	Customer location	
6	admin_id	Integer ()	Reference key to admin	Foreign key

Table 3: *Event Database*

SNO.	FIELD NAME	DATA TYPE	DESCRIPTION	CONSTRAINTS
1	event_id	Integer ()	Event identity	Primary key
2	Venue	charField(15)	Event user name	
3	Event_time	Time Field()	Time for the event	
4	Event_date	Date Field()	The date of the event	
5	event-id	Integer ()	Reference admin key	Foreign key

***Table 4** Ticket Database*

SNO.	FIELD NAME	DATA TYPE	DESCRIPTION	CONSTRAINS
1	ticket_id	Integer ()	Ticket identity	Primary key
2	Ticket_qrcode	BooleanField(default=False)	Unique qr- code	
3	Price	Double ()	Cost of ticket	
4	Quantity	Integer ()	Amount of ticket	
5	Customer_id	Integer ()	Ticket buyer	Foreign key

***Table 5:** Payment Database*

SNO.	FIELD NAME	DATA TYPE	DESCRIPTION	CONSTRAINS
1	payment_id	Integer ()	Payment identity	Primary key
2	Price	Double ()	Amount	
3	Customer_id	Integer()	The one that pay	Foreign Key
4	Event_id	Integer()	The event paying for	Foreign key

CHAPTER FOUR

Implementation and Testing

4.1 System Requirements

These requirements are the necessary features that end users demand as crucial functionalities that the system must provide. These features must be integrated into the system and are typically defined in terms of the required inputs, operations to be executed, and expected outputs. In this section of the research, all the prerequisites required for the system to be functional and ready for use will be discussed. This will include functional and non-functional requirements that must be met during the development stage, implementation, testing, deployment, and user system training until the final stage.

4.1.1 Non-functional Requirement

The system must always be available and vigilant, except for planned maintenance or unforeseen interruptions when it can take a shutdown. It should have solid layers of security, with multi-factor authentication like a watchful guard and data encryption. Think of it as a friendly helper, providing clear directions and familiar faces. Colours and fonts should work in perfect harmony, making it a joy to explore.

4.1.2 Functional Requirement

The stadium ticket system is a complex platform that comprises multiple features. It involves user registration and authentication, event management for administrators, ticket sales and reservations, payment processing, ticket delivery and printing, access control, customer account management, reporting and analytics, compliance and security measures, scalability, and performance. All these requirements are crucial for the system to effectively manage ticketing operations, ensure a seamless customer experience, and provide event organizers and administrators with the necessary tools to manage ticketing operations successfully.

4.1.3 Hard Ware System Requirement

- A minimum hard disk space of 20 Gigabytes (GB)
- Processor: Intel(R) Core(TM) i3-3120M CPU @ 2.50GHz 2.50 GHz
- Installed RAM size: 4.00 GB (3.88 GB usable)
- System Type: 64-bit operating system, x64-based processor

4.1.4 Software System Requirement

- Windows Edition: Windows 10 Pro.
- Python Version: 3. X
- Code editor: Visual Studio Code
- Web Browser: Google Chrome or Mozilla Firefox

4.2 Tools and Libraries Used

During the development of the system, we used various tools to create it. Visual Studio Code was our source code editor of choice, used to write, test, and debug source code. For frontend development, we used HTML, CSS, and JavaScript. For server-side logic, we utilised Django, a popular web framework of Python. To store user data and their actions within the system, we used SQLite as our back-end database software. Additionally, we made use of Django's QR code library to generate QR codes for every ticket booked by customers.

4.3 Programming Language Selection

Choosing a programming language depends on the developer's experience and the scope of the application. Common programming languages such as Java, C#, C++, Python, and C can be used to develop various kinds of applications. Each language has its strengths and weaknesses. For our proposed web-based application that will be hosted on the internet, we have decided to use Python as it is the most suitable language for developing web applications. Python has libraries like Flask and Django that make web application development easy. In this system, we will use Django because it requires little or no effort to connect to the database and can develop web applications that meet all the system requirements at a faster rate.

4.4 Code Snippet

4.4.1. The Setting. Py File

This file holds the settings for the entire project and its apps in Django. Django needs to identify what is going to be implemented and how it should be executed. This file contains all the configurations of the system. Additionally, the built-in applications are registered here, and so are all the applications that we created.

```
from pathlib import Path import
os
# Build paths inside the project like this: BASE_DIR / 'subdir'.
BASE_DIR = Path(__file__).resolve().parent.parent

ALLOWED_HOSTS = []
# Application definition

INSTALLED_APPS = [
    'jazzmin',
    'django.contrib.admin',
    'django.contrib.auth',
    'django.contrib.contenttypes',
    'django.contrib.sessions',
    'django.contrib.messages',
    'django.contrib.staticfiles',
    'ticket',
    'user',
    'crispy_forms',
]
```

```
MIDDLEWARE = [
    'Django.middleware.security.SecurityMiddleware',
    'django.contrib.sessions.middleware.SessionMiddleware',
    'django.middleware.common.CommonMiddleware',
    'django.middleware.csrf.CsrfViewMiddleware',
    'django.contrib.auth.middleware.AuthenticationMiddleware',
    'django.contrib.messages.middleware.MessageMiddleware',
    'django.middleware.clickjacking.XFrameOptionsMiddleware',
]

ROOT_URLCONF = 'stadium.urls'

TEMPLATES = [
    {
        'BACKEND': 'django.template.backends.django.DjangoTemplates',
        'DIRS': [os.path.join(BASE_DIR, 'templates')],
        'APP_DIRS': True,
        'OPTIONS': {
            'context_processors': [
                'django.template.context_processors.debug',
                'django.template.context_processors.request',
                'django.contrib.auth.context_processors.auth',
                'django.contrib.messages.context_processors.messages',
            ],
        },
    },
]
WSGI_APPLICATION = 'stadium.wsgi.application'
CRISPY_TEMPLATE_PACK = 'bootstrap4'

# Database
# https://docs.djangoproject.com/en/4.2/ref/settings/#databases

DATABASES = {
    'default': {
        'ENGINE': 'django.db.backends.sqlite3',
        'NAME': BASE_DIR / 'db.sqlite3',
    }
}


# Password validation
# https://docs.djangoproject.com/en/4.2/ref/settings/#auth-password-validators
```

```
AUTH_PASSWORD_VALIDATORS = [
    {
        'NAME': 'django.contrib.auth.password_validation.UserAttributeSimilarityValidator', },
    {
        'NAME': 'django.contrib.auth.password_validation.MinimumLengthValidator',
    },
  {
        'NAME': 'django.contrib.auth.password_validation.CommonPasswordValidator',
    },
{
        'NAME': 'django.contrib.auth.password_validation.NumericPasswordValidator',
    },
]

# Internationalization
# https://docs.djangoproject.com/en/4.2/topics/i18n/

LANGUAGE_CODE = 'en-us'

TIME_ZONE = 'UTC'

USE_I18N = True

USE_TZ = True

# Static files (CSS, JavaScript, Images)
# https://docs.djangoproject.com/en/4.2/howto/static-files/

STATIC_URL = 'static/'
MEDIA_URL = '/media/'
MEDIA_ROOT = os.path.join(BASE_DIR,'media')
STATICFILES_DIRS = [
    os.path.join(BASE_DIR,'static')
]
# Default primary key field type
# https://docs.djangoproject.com/en/4.2/ref/settings/#default-auto-field

DEFAULT_AUTO_FIELD = 'django.db.models.BigAutoField'
LOGIN_REDIRECT_URL='admin1'
```

4.4.2 Views. Py File

This file shows the entire logic that is happening at the back end. This determines what page to display to a user when a particular action is made and how it is going to be made.

```
from django.shortcuts import render, redirect
from django.contrib.auth.decorators import login_required
from   django.contrib.auth.models   import   User   from
django.contrib  import  messages  import  qrcode  from  io
import BytesIO
from django.http import HttpResponse from
django.template.loader import get_template from
xhtml2pdf import Pisa
from .models import Stadium, Events,SeatType, Booking,Fixtures,Athletics from
.forms import
StadiumForm,EventsForm,SeatTypeForm,BookingForm,FixturesForm,AthleticsForm from
django.http import JsonResponse
from django.views.decorators.http import require_POST


# Create your views here.

def  index(request):        return  render(request,
'ticket/index.html',{})

@login_required(login_url='login') def
stadium(request):     return render(request,
'ticket/stadium.html',{})

@login_required(login_url='login')    def
soccer(request):           front_booking  =
Booking.objects.all()          front_seat  =
SeatType.objects.all()              form   =
BookingForm(request.POST)              if
request.method  ==  'POST':               if
form.is_valid():
        booking = form.save(commit=False)  # Create a booking instance but don't save it to the database
yet

        # Check if there are enough remaining seats for the selected seat type
remaining_quantity = booking.seat_type.remaining_quantity            if
booking.number_of_tickets <= remaining_quantity:
booking.save()  # Save the booking to the database
          # messages.success(request, "Your are now a valid customer")
return redirect('viewbooking')             else:
```

```
            messages.error(request, "Not enough seats available for this seat type.")
else:
      form = BookingForm()

   fixture      =      Fixtures.objects.all()
context ={
      'fixture':fixture,
       'front_seat':front_seat,
       'front_booking':front_booking,
       'form':form,
   }                         return        render(request,
 'ticket/soccer.html',context)

def view booking(request):
   user = request.user
   user_bookings = Booking.objects.filter(username=user)

   context = {
      'user_bookings': user_bookings,
   }
   return render(request, 'ticket/viewbooking.html', context)

def         see_viewbooking(request,         pk):
viewbook = Booking.objects.get(id=pk)
   return render(request, 'ticket/viewbooking.html', {'viewbook': viewbook})

@login_required(login_url='login') def
athletics(request):    return render(request,
'ticket/athletics.html',{})

@login_required(login_url='login') def
admin1(request):    count_stadium =
Stadium.objects.all().count()    count_event =
Events.objects.all().count()    count_users =
User.objects.all().count()    count_bookings =
Booking.objects.all().count()    context={
      'count_stadium':count_stadium,
      'count_event':count_event,
      'count_users':count_users,
      'count_bookings':count_bookings,
   }

   return render(request,'ticket/admin1.html',context)
```

4.4.3 Data Base Models. Py File

This is the database of the application that stores all the data of the system. It captures ticket purchases, events, personal details of users, and the time a ticket purchase is made.

```
from Django. db import models
from django.contrib.auth.models import User #
Create your models here.
TICKET_CATEGORY = (
        ('VIP', 'VIP'),
        ('Local', 'Local'),
        ('Open Stand',' Open Stand'),
)

class     Stadium(models.Model):                        stadium     =
models.CharField(max_length=100, null=True)     location =
models.CharField(max_length=100)
    stadium_image   =   models.ImageField(null=True,   blank=True,   upload_to='Profile_Images')
def __str__(self):
        return self. stadium

class     Events(models.Model):                        name     =
models.CharField(max_length=100,null=True)           def
__str__(self):         return self. name

class     Fixtures(models.Model):                        team1     =
models.CharField(max_length=100, null=True)     team2 =
models.CharField(max_length=100,                  null=True)
game_date    =    models.DateField()              game_time    =
models.TimeField()
    description = models.TextField(max_length=200)
    venue = models.ForeignKey(Stadium,on_delete=models.CASCADE)     team1_image =
models.ImageField(null=True, blank=True, upload_to='Profile_Images/')     team2_image
= models.ImageField(null=True, blank=True, upload_to='Profile_Images/')     def
__str__(self):         return f" {self.team1} vs {self.team2}"

class     Athletics(models.Model):                      title     =
models.CharField(max_length=100,               null=True)
event_date   =   models.DateField()            event_time    =
models.TimeField()
    description = models.TextField(max_length=200)
    venue = models.ForeignKey(Stadium,on_delete=models.CASCADE)
    event_image = models.ImageField(null=True, blank=True, upload_to='Profile_Images/')
def __str__(self):         return f" {self.title} event at {self.venue}"
```

```
class SeatType(models.Model):
   CHOICES = [
      ('VIP', 'VIP'),
      ('Local Seat', 'Local Seat'),
     ('Open Stand', 'Open Stand'),
   ]

   seat_type  =  models.CharField(max_length=20,  choices=CHOICES)
 available_quantity = models.IntegerField()   # Initial quantity of items
 seat_price = models.DecimalField(max_digits=10, decimal_places=2)
   total_price = models.DecimalField(max_digits=10, decimal_places=2, null=True, blank=True)

   @property     def remaining_quantity(self):         used_quantity =
self.booking_set.aggregate(total_used=models.Sum('number_of_tickets'))['total_used'
]         if used_quantity is None:
          used_quantity = 0
      return self.available_quantity - used_quantity

   def __str__(self):
      return self.seat_type

class Booking(models.Model):      username = models.ForeignKey(User,
on_delete=models.CASCADE)
   address     =     models.CharField(max_length=100,     null=True)
contact = models.IntegerField()
   event = models.ForeignKey(Events, on_delete=models.CASCADE)
teamfixture = models.ForeignKey(Fixtures, on_delete=models.CASCADE)
seat_type = models.ForeignKey(SeatType, on_delete=models.CASCADE)
number_of_tickets = models.IntegerField()     scan_count =
models.PositiveIntegerField(default=0)
   total_cost = models.DecimalField(max_digits=10, decimal_places=2, null=True, blank=True)

   def           __str__(self):
return self. name

   def save(self, *args, **kwargs):         if self.seat_type and
self.number_of_tickets:             if self.number_of_tickets > 0 and
self.number_of_tickets <= self.seat_type.remaining_quantity:
# Calculate the total cost
            self.total_cost = self.seat_type.seat_price * self.number_of_tickets
super(Booking, self).save(*args, **kwargs)             else:
            # Handle cases where not enough tickets are available                 #
You can raise an exception or return an error message here.
```

```
self.total_cost = 0  # Set total_cost to 0 if there are not enough tickets.
super(Booking, self).save(*args, **kwargs)
```

4.5 System Testing and Debugging

System testing is a crucial phase that evaluates the software's real-world performance. In this project we looked at source code testing, which inspects the program's logic by developers, and specification testing, which assesses the system's behaviour under specific conditions, involving both developers and select users. This evaluation ensures the software's readiness for deployment and its potential to improve or replace existing systems.

For the establishment of an efficient stadium ticket system, the initial step is understanding the system's unique requirements, which encompass event types, customer expectations, authentication and verification processes, and payment procedures. A comprehensive set of tests is accurately planned, covering ticket sales, access control, and user interface scenarios.

To ensure a rigorous and smooth verification process, a combination of automated and manual testing tools is employed. Notable tools for system testing and debugging include Mozilla Firefox, Visual Studio Code, and user involvement.

The system also undergoes unit, integration testing, user acceptance testing, performance testing, and security testing.

4.5.1 Unit Testing

In this phase, the system undergoes individual component testing. This includes verifying calculations for accuracy, ensuring secure transaction processing for payments, and testing ticket generation for proper information. Data validation and error messages are handled to ensure accurate input acceptance and clear user guidance. Early identification and resolution of bugs in individual units is encouraged through this process, simplifying debugging and enhancing code quality and maintainability. Unit testing forms the bedrock for future testing phases, laying a solid foundation for a reliable and trustworthy system.

4.5.2 Integration Testing

After testing system components and modules independently from the initial stage, we integrate all of them into one and test to know how they work together, like the ticket QR codes, database, payment, and ticket purchase.

4.5.3 User Acceptance Testing (UAT)

This phase involves testing with real people like fans, club members, and season ticket holders. They test typical things they do online, like buying tickets and managing their accounts. We watch how easy it is to use the system, how accessible it is for everyone, and how clear the information is. Their feedback is crucial for making the system better: we fix problems they find, learn from their suggestions, and ultimately, create a ticket-buying experience that works for everyone.

4.5.4 Specification Testing

In this phase of system testing, we verify that the system adheres to the specific features and functionalities outlined in the system requirements document. This includes rigorous testing of the speed and reliability of crucial functions, such as result generation and reporting, to ensure the system operates efficiently even during peak usage times.

4.5.5 Security Testing

This system went through security testing to protect customer data and financial transactions, safeguarding users from data breaches or unauthorized access. Users create accounts with secured passwords that have a mixture of characters to test for user authentication and authorization. Furthermore, rigorous testing verifies the QR code's security, guaranteeing its resistance to duplication and unauthorized use. This ensures each ticket remains unique and valid, preventing fraud and protecting ticket holders.

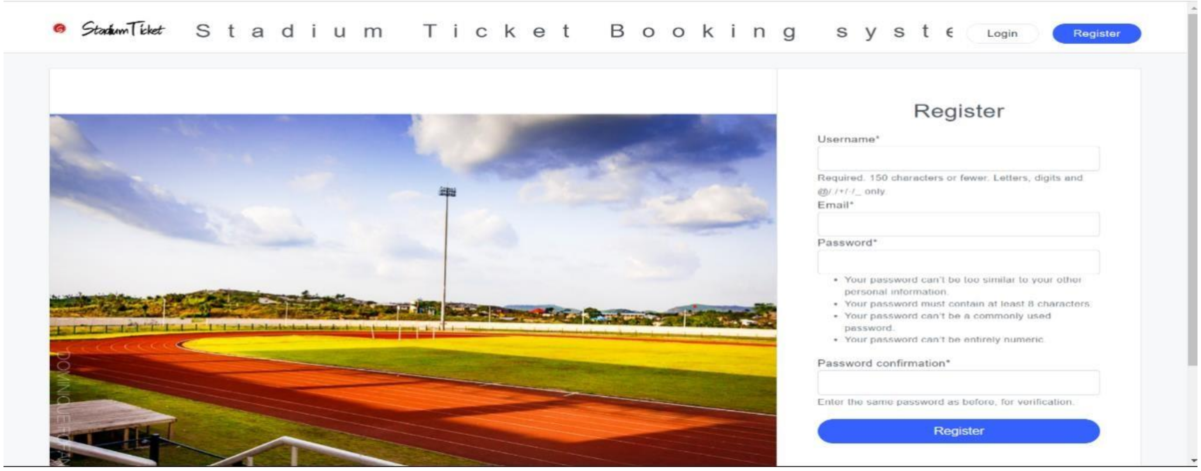
4.6 Process Design

This GUI design phase for a stadium ticket system involves designing an intuitive, visually appealing, and user-friendly interface. This phase includes creating wireframes, refining them into high-fidelity mockups, and testing the system with potential users for feedback. We work closely to ensure that the design is technically feasible and consistent with the brand of the stadium

4.6.1 Authentication:

The system contain a secure registration and login system ensuring user verification by employing encryption to protect stored passwords and enhance security with features providing an additional layer of protection for user accounts. User have to provide valid credentials before buying a ticket.

Figure 13: *Authentication Page (own work)*



Register

Username*

Required. 150 characters or fewer. Letters, digits and @/./+/-/_ only.

Email*

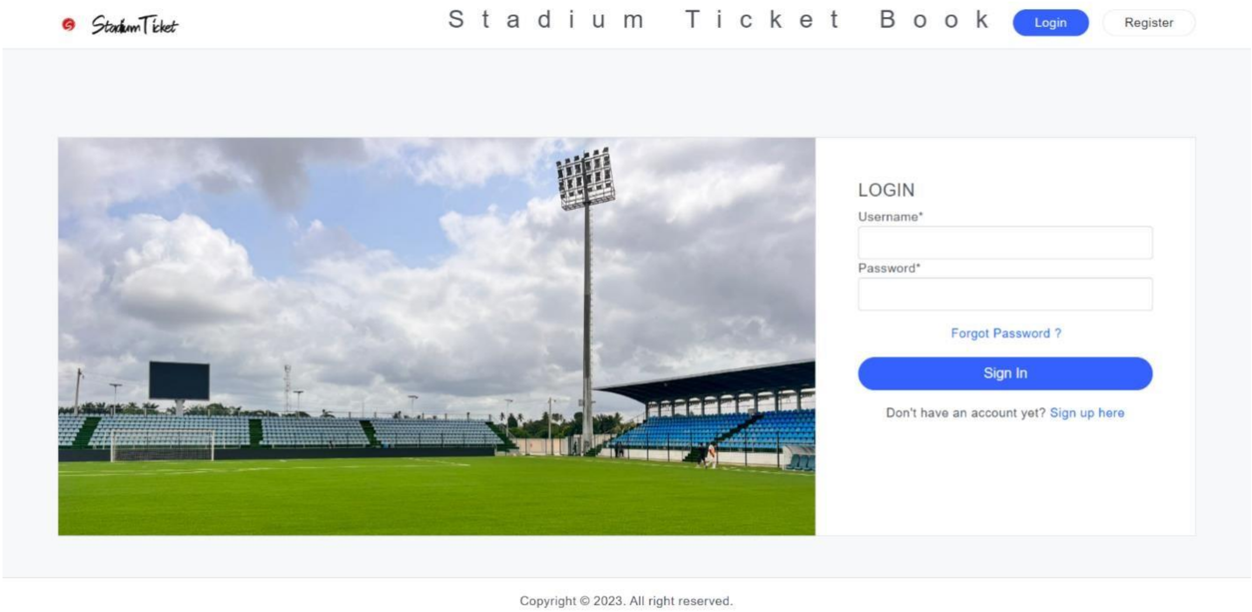
Password*

- Your password can't be too similar to your other personal information.
- Your password must contain at least 8 characters.
- Your password can't be a commonly used password.
- Your password can't be entirely numeric.

Password confirmation*

Enter the same password as before, for verification.

***Figure 14**: Login Page (own work)*



Don't have an account yet? Sign up here

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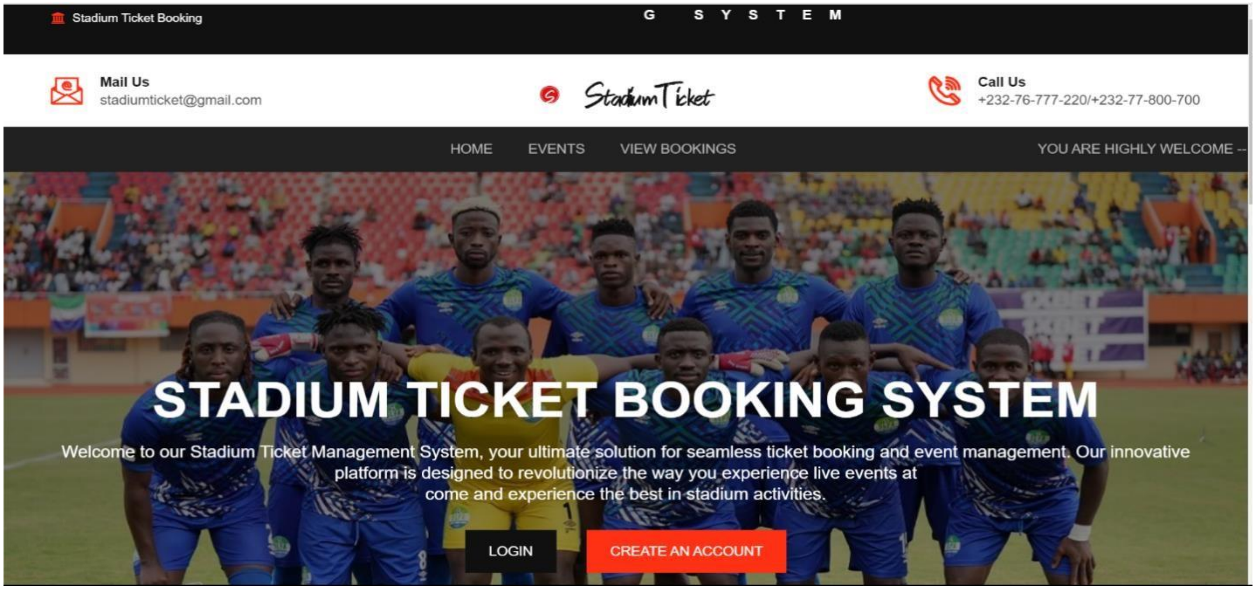
4.6.2. Customer Module:

After successful authentication, users will be directed to the user page displaying the available events, games, and booking details. A user can decide to book a particular ticket for his or her desired events.

***Figure 15:** Home Page (own work)*



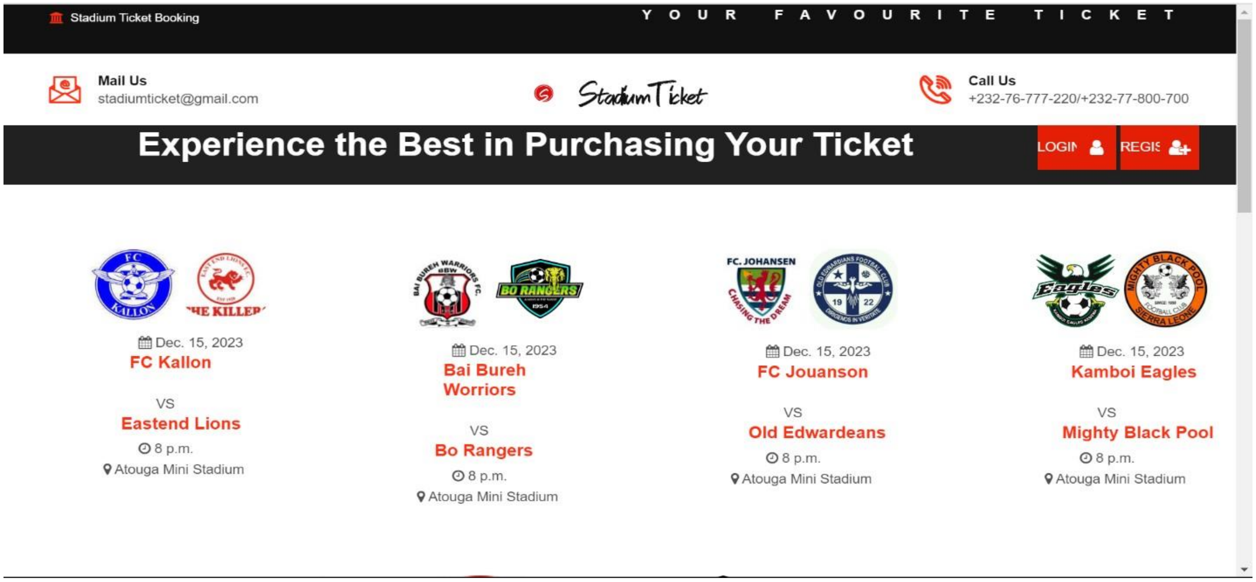
Mail Us
stadiumticket@gmail.com

Call Us
+232-76-777-220/+232-77-800-700

STADIUM TICKET BOOKING SYSTEM

Welcome to our Stadium Ticket Management System, your ultimate solution for seamless ticket booking and event management. Our innovative platform is designed to revolutionize the way you experience live events at come and experience the best in stadium activities.

Figure 16: *Events Pages (own work)*



Stadium Ticket Booking

YOUR FAVOURITE TICKET

Mail Us
stadiumticket@gmail.com

StadiumTicket

Call Us
+232-76-777-220/+232-77-800-700

Experience the Best in Purchasing Your Ticket

Dec. 15, 2023
FC Kallon
VS
Eastend Lions
8 p.m.
Atouga Mini Stadium

Dec. 15, 2023
Bai Bureh Worriors
VS
Bo Rangers
8 p.m.
Atouga Mini Stadium

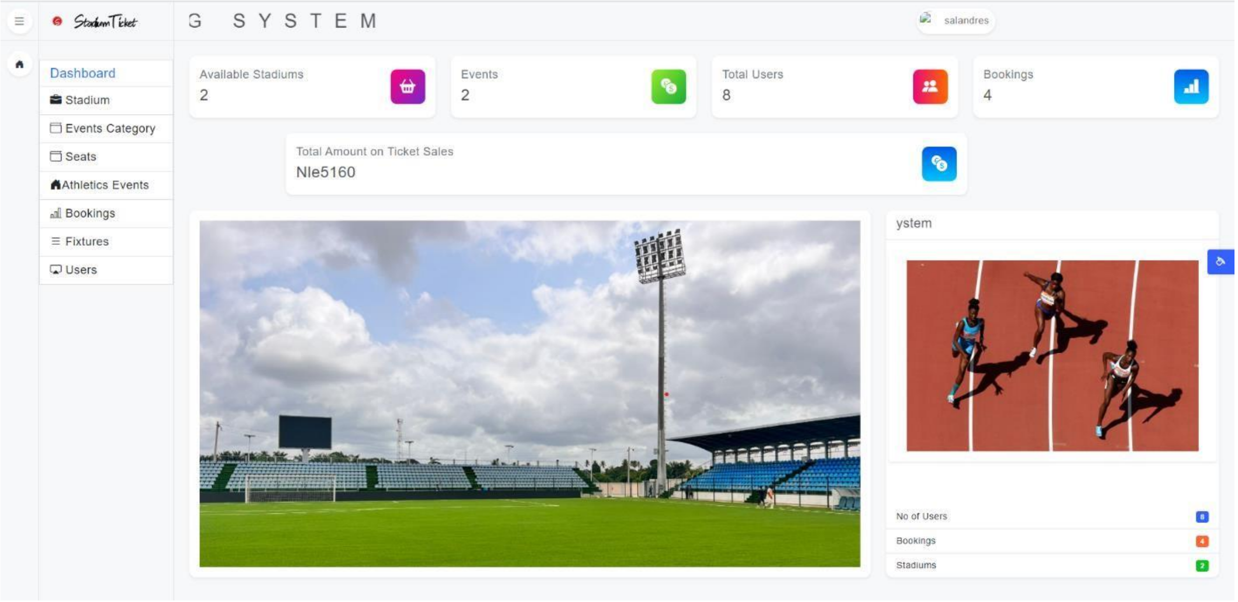
Dec. 15, 2023
FC Jouanson
VS
Old Edwardeans
8 p.m.
Atouga Mini Stadium

Dec. 15, 2023
Kamboi Eagles
VS
Mighty Black Pool
8 p.m.
Atouga Mini Stadium

4.6. 3 Administrator Panel/Module

There should be an admin module that will allow the admin of the system to add, delete, and update events, stadiums, and tickets of the system. However, the admin must be restricted from certain privileges by the super administration.

Figure 17: *Admin Dash Board (own work)*



StadiumTicket

G SYSTEM

salandres

Available Stadiums 2

Events 2

Total Users 8

Bookings 4

Total Amount on Ticket Sales
Nle5160

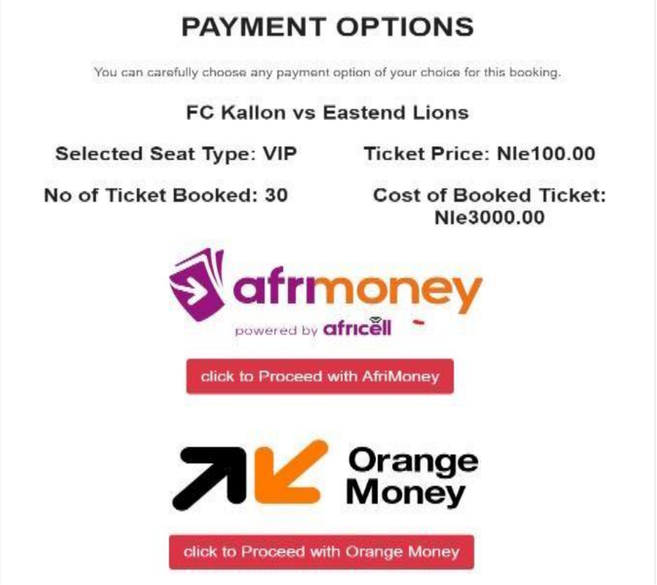
ystem

No of Users 8
Bookings 4
Stadiums 2

4.6.4. Payment Module:

Implement a secure payment method to support Orange Money and AfriMoney, ensuring a wellsecure payment processing, and providing users with detailed payment details.

Figure 18: *Payment Page (own work)*



PAYMENT OPTIONS

You can carefully choose any payment option of your choice for this booking.

FC Kallon vs Eastend Lions

Selected Seat Type: VIP

Ticket Price: Nle100.00

No of Ticket Booked: 30

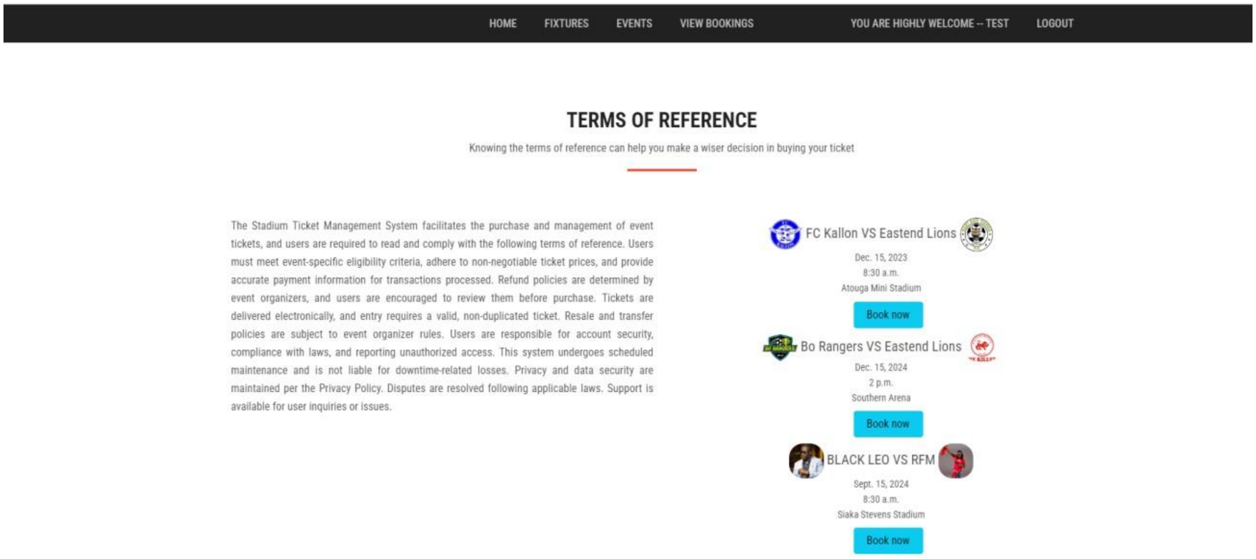
Cost of Booked Ticket: Nle3000.00

afrmoney
powered by africell
click to Proceed with AfriMoney
Orange Money
click to Proceed with Orange Money

4.6.5. The Terms of Reference (TOR)

This document serves as a guide for all users involved in this system. It offers a clear overview of the system's goals, scope, and objectives, promoting understanding among fans or spectators, the management, and other users of the system.

Figure 19: Terms of Reference (own work)



TERMS OF REFERENCE

Knowing the terms of reference can help you make a wiser decision in buying your ticket

The Stadium Ticket Management System facilitates the purchase and management of event tickets, and users are required to read and comply with the following terms of reference. Users must meet event-specific eligibility criteria, adhere to non-negotiable ticket prices, and provide accurate payment information for transactions processed. Refund policies are determined by event organizers, and users are encouraged to review them before purchase. Tickets are delivered electronically, and entry requires a valid, non-duplicated ticket. Resale and transfer policies are subject to event organizer rules. Users are responsible for account security, compliance with laws, and reporting unauthorized access. This system undergoes scheduled maintenance and is not liable for downtime-related losses. Privacy and data security are maintained per the Privacy Policy. Disputes are resolved following applicable laws. Support is available for user inquiries or issues.

FC Kallon VS Eastend Lions
Dec. 15, 2023
8:30 a.m.
Atouga Mini Stadium
Book now

Bo Rangers VS Eastend Lions
Dec. 15, 2024
2 p.m.
Southern Arena
Book now

BLACK LEO VS RFM
Sept. 15, 2024
8:30 a.m.
Siaka Stevens Stadium
Book now

4.7 System Deployment

This section outlines the essential steps for deploying the system on the internet for production purposes. The deployment process is crucial to ensure efficient ticket sales to fans. To make the system accessible online. It has to transition from local hosting or developer's mode to a web server or production mode. For the system to be moved from development mode to production mode, it requires some amount of resource that depends on the type and duration of hosting and the hosting service provider. However, we chose the Heroku free hosting site for students' purposes by setting up an account, configuring the database, handling static files, using environment variables for sensitive data, setting up a custom domain and SSL, deploying the project, testing and monitoring it, consider scaling for traffic, and regularly perform backups and maintenance.

4.8 System Maintenance:

In this phase, we are to implement a comprehensive stadium ticket system maintenance plan that involves regular security audits, backup procedures, user feedback tracking, performance monitoring, database optimization, code reviews, compliance updates, documentation maintenance, staff training, version control, stakeholder communication, scalability assessments, integration testing, user training for new features, security awareness training, and budgeting for upgrades. This whole approach ensures the continuous security, functionality, and adaptability of the system.

CHAPTER FIVE

Discussion, Recommendation, and Conclusion

5.1 System Deliverable

The proposed system will provide an online platform for event ticket management. Fans can purchase tickets, access details, and manage their accounts directly through the website. Electronically generated tickets will be delivered securely, eliminating the need for physical printing and reducing costs. This will also facilitate efficient entry at the stadium gate, minimizing queuing and enhancing the overall event experience. Online sales will increase accessibility, reach a wider audience, and lead to potential revenue growth. Additionally, the system will offer valuable data insights for improved decision-making and enhanced fan engagement. By incorporating advanced security features, the system will help to reduce ticket counterfeiting and improve overall security. These functionalities and benefits combine to create a powerful tool for event organizers, enhancing efficiency, reducing costs, and fostering a more secure and enjoyable experience for both fans and organizers.

5.3 Future Enhancement

In the future, we would like the system to provide dynamic ticket packages that include food, beverages, transportation, and seasonal tickets and to incorporate CRM and another system. This makes planning events easier and more convenient for fans. Also, the system should make reselling tickets easier and safer for fans who may want to resell tickets to ensure fans get a fair price for their tickets.

5.4 Recommendations

The stadium ticket system is essential to reduce waiting times at stadium gates. However, it is crucial to integrate the system with the website and CRM system, allowing clients to customize it to meet their specific needs. Future systems should be matched with other stadium systems such as stadium access control and point-of-sale. To achieve optimal results, additional solutions or partnerships may be necessary for staff management, sales analysis, and scanner hardware. Additionally, the system should include packages that offer food and drinks. Further study should consider sending notifications to administrators for any ticket purchase. This ensures that they can oversee purchases made on the system and prevent misplacement of money generated from ticket sales. Users of the system should receive notifications about upcoming events at the stadium.

5.5 Conclusion

The web-based ticketing application for Siaka Stevens Stadium is a solution to the persistent issue of lengthy queues, overcrowding, and inconvenience associated with manual ticket sales during events. The project adopts an agile software development methodology which aims to deliver a flexible and responsive system that meets the specific needs of stakeholders and evolves with changing requirements. This eliminates the challenges posed by the manual ticketing system. The system incorporates a secure QR code technology to ensure tickets are not duplicated or reused, and prevent overcrowding at the stadium.

The deployment of the system marks a vital moment in enhancing the overall event experience at Siaka Stevens Stadium. The efficient, web-based approach to ticketing promises operational efficiency and contributes to a smoother and more enjoyable experience for event attendees and organizers. The benefits of the system go beyond the convenience of ticket reservations, including improved data management, enhanced security, and a more responsive ticketing infrastructure. Collaboration between development teams and stakeholders is crucial to ensure the successful implementation and sustained effectiveness of the ticketing solution. User acceptance testing, training sessions, and a robust support system are integral components to achieve this goal.

The proposed web-based ticketing application aims to transform the overall event management sector at Siaka Stevens Stadium. By embracing modern software development practices and putting the user experience at the forefront, the project intends to contribute positively to the entertainment landscape of the stadium in Sierra Leone. Through the iterative nature of agile development, the system's modification is poised to align with the changing needs of the stadium and its diverse audience, supporting a more efficient and accessible environment for effective planning, comprehensive requirements analysis, logical design, and systematic development to create an efficient system that allows spectators to reserve event tickets in advance, thus eliminating the challenges posed by manual ticket sales. We incorporate a secure QR code technology to ensure tickets are not reused and duplicated. This will also prevent overcrowding at the stadium as a result of the printing of tickets more than the available seats.

Deployment of the system marks a vital moment in enhancing the overall event experience at Siaka Stevens Stadium. The shift from manual ticketing to a streamlined, web-based approach promises operational efficiency and contributes to a smoother and more enjoyable experience for event attendees and organizers. The benefits of the system go beyond the convenience of ticket reservations, including improved data management, enhanced security, and a more responsive ticketing infrastructure. As the project progresses through testing, deployment, and ongoing support, collaboration between development teams and stakeholders becomes paramount. User acceptance testing, training sessions, and a robust support system are integral components to ensure the successful implementation and sustained effectiveness of the ticketing solution.

The proposed web-based ticketing application aims to modify the overall event management sector at Siaka Stevens Stadium. By embracing modern software development practices and putting user experience at the forefront, the project intends to contribute positively to the entertainment landscape of the stadium in Sierra Leone. Through the iterative nature of agile development, the system's modification is poised to align with the changing needs of the stadium and its diverse audience, supporting a more efficient and accessible environment for all.

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