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# DECLARATION

I …………………………………………………… declare that this is my own work and efforts which I carried out my own research from all sources i.e. field work, secondary sources etc.

I am also much convinced that this project has never been used elsewhere.

CANDIDATE NAME……………………………..

DATE………………………….

SIGN……………………………..

SUPERVISOR………………………..

DATE………………………………..

SIGN……………………………

# DEDICATION

I would like to dedicate this project to my parents who from the first time introduced me to the world of computer and above all to like things to do with technology mostly the world of Information Technology(IT). He keep supporting towards the success of this system.

# ACKNOWLEDGEMENT

I would like to acknowledge the greatest support by my parents who ensured that I get education and pursue my career to my level best. My entire family members have contributed a lot toward the success of this project and also not forgetting my classmates who supported me and finally the supervisor Mr. Robert Rotich.

I appreciate all the help I received but again I would like to take responsibility for any errors and with that I also like to welcome more and constructive suggestions toward the improvement of the system to a further level.

# ABSTRACT

Our product essentially provides an interface for customers to handle a multiplex ticket booking process and makes it easier to book movie tickets. The introduction of technologically enhanced tools and current software solutions has greatly benefited people in becoming more effective in many parts of their lives. Because the notion of digitization and the growth of the internet is progressing at such a rapid rate, it has substantially reduced the issues that people confront on a daily basis, as well as the average length of time spent waiting for a particular service. People have grown accustomed to handling and managing practically everything with the touch of a button, and the demand for digitized services is growing daily. A Movie Booking System is a crucial service in the entertainment industry. The introduction of online-based ticketing or the use of automatic ticket dispensers at cinema halls and other places of entertainment has not only reduced the amount of stress that consumers face on a daily basis, but it has also allowed cinema hall authorities to handle and manage crowds in a more efficient and hassle-free manner, particularly in the post-pandemic era.

The project aims to revolutionize the cinema ticketing experience in Kenya by implementing an online seat booking system empowered by the M-Pesa Daraja API. Kenya's vibrant cinema industry faces challenges with the traditional ticketing process, characterized by long queues, limited seat availability, and manual operations. To address these issues, the project proposes an innovative solution that enables patrons to browse movie listings, reserve seats, and make payments conveniently from their mobile devices or computers.

The online seat booking system leverages the power of the M-Pesa Daraja API to facilitate secure and seamless payment transactions, enhancing accessibility and convenience for cinema-goers across Kenya. By integrating with M-Pesa, the system provides users with a familiar and trusted payment platform, minimizing barriers to adoption and fostering greater financial inclusion.

Key features of the proposed system include real-time seat availability, dynamic pricing options, automated notifications, and advanced analytics capabilities. These features empower cinema owners to optimize revenue, streamline operations, and deliver personalized experiences to patrons.

Through a comprehensive development and testing process, the project aims to demonstrate the feasibility, effectiveness, and scalability of the online seat booking system in Kenya's diverse cultural landscape. By embracing innovation and technology, the project seeks to transform the cinema ticketing experience, enhance customer satisfaction, and drive growth within Kenya's dynamic entertainment industry.

# Chapter 1: Introduction to the Need for an Online Cinema Seat Booking System in Kenya

## 1.1 Introduction

In the vibrant cultural landscape of Kenya, the cinema experience holds a significant place in the hearts of its people. From bustling urban centers to remote rural areas, cinemas serve as gathering places where communities come together to enjoy the magic of storytelling and entertainment. However, the traditional process of purchasing cinema tickets often involves long queues, inconvenience, and uncertainty, leading to frustration among moviegoers and operational challenges for cinema owners. To address these issues and enhance the cinema-going experience, there is a compelling need for the implementation of an online cinema seat booking system in Kenya.

## 1.2 Background Information

Kenya's film industry has experienced remarkable growth and transformation in recent years, fueled by technological advancements, creative talent, and growing audience demand. With the proliferation of digital platforms, social media, and streaming services, audiences have access to a diverse array of content from around the world. However, despite these advancements, the process of booking cinema tickets remains largely manual and cumbersome in many parts of Kenya.

Currently, patrons must physically visit cinemas to purchase tickets, often facing long queues, limited seating options, and uncertainty regarding ticket availability. For cinema owners, managing ticket sales, seat allocations, and customer inquiries manually poses logistical challenges and restricts their ability to offer personalized services and maximize revenue opportunities. Against this backdrop, the implementation of an online cinema seat booking system emerges as a strategic imperative to modernize the ticketing process, streamline operations, and enhance customer satisfaction in Kenya's vibrant cinema industry.

## 1.3 Organizational Structure

The successful implementation of an online cinema seat booking system in Kenya requires collaboration and coordination among various stakeholders within the cinema ecosystem. These stakeholders include:

Cinema Owners and Management: Responsible for providing the necessary infrastructure, resources, and support for implementing the online booking system. They play a crucial role in defining business requirements, setting pricing strategies, and ensuring seamless integration with existing operational processes.

Software Developers and IT Specialists: Tasked with designing, developing, and deploying the online booking system. They leverage their technical expertise in web development, database management, and software engineering to create a robust, user-friendly platform that meets the needs of cinema owners and patrons alike.

Payment Service Providers: Facilitate secure and convenient payment processing solutions for online ticket purchases. Integration with payment gateways such as M-Pesa enables patrons to make transactions easily using mobile money, enhancing accessibility and convenience.

Regulatory Authorities: Ensure compliance with industry regulations, consumer protection laws, and data privacy standards governing online transactions and customer data management. Regulatory oversight helps build trust, mitigate risks, and safeguard the interests of cinema patrons and stakeholders.

## 1.4 Overview of the Current System

The current system of booking cinema tickets in Kenya relies primarily on manual processes, paper-based ticketing systems, and physical box offices at cinema venues. Patrons are required to visit cinemas in person to purchase tickets, often encountering long queues, limited seat availability, and potential disappointment if desired screenings are sold out. From the perspective of cinema owners, managing ticket sales, seat allocations, and customer inquiries manually can be labor-intensive, time-consuming, and prone to errors.

Furthermore, the lack of real-time visibility into ticket inventory, seat availability, and customer preferences limits the ability of cinema owners to optimize revenue, allocate resources efficiently, and deliver personalized experiences to patrons. In an era characterized by digital transformation and evolving consumer expectations, the limitations of the current system underscore the urgent need for a more streamlined and technology-driven approach to cinema ticketing in Kenya.

## 1.5 Overview of the Proposed System

The proposed online cinema seat booking system offers a comprehensive solution to the shortcomings of the current ticketing process. Built on robust technology infrastructure and user-centered design principles, the system aims to revolutionize the way patrons book tickets, reserve seats, and interact with cinemas across Kenya.

Key features of the proposed system include:

Online Booking Portal: A user-friendly web portal that allows patrons to browse movie listings, view showtimes, and reserve seats from the comfort of their homes or mobile devices.

Real-Time Seat Availability: Dynamic seat maps and interactive seating charts that provide real-time visibility into seat availability, allowing patrons to select preferred seats and view pricing options before completing their bookings.

Secure Payment Processing: Integration with trusted payment gateways such as M-Pesa to facilitate secure and seamless transactions for ticket purchases, ensuring data privacy and financial security for patrons.

Customizable Booking Options: Flexible booking options that enable patrons to choose specific screening times, select preferred seating areas, and customize ticket packages based on individual preferences and group sizes.

Automated Notifications: Automated email or SMS notifications to confirm booking details, provide e-tickets, and send reminders about upcoming screenings, enhancing communication and reducing the risk of missed reservations.

Analytics and Reporting: Advanced analytics dashboards and reporting tools that empower cinema owners to track ticket sales, monitor attendance patterns, and gain actionable insights into audience preferences and behavior.

By harnessing the power of technology and innovation, the proposed system seeks to transform the cinema ticketing experience, making it more convenient, accessible, and enjoyable for audiences across Kenya.

## 1.6 Statement of the Problem

The current manual process of booking cinema tickets in Kenya is characterized by inefficiencies, inconvenience, and limited transparency for patrons and cinema owners alike. Long queues, limited seat availability, and uncertainty regarding ticket availability detract from the overall cinema-going experience and pose operational challenges for cinema management.

Furthermore, the lack of real-time visibility into ticket inventory, seat allocations, and customer preferences hinders the ability of cinema owners to optimize revenue, allocate resources efficiently, and deliver personalized services to patrons.

In response to these challenges, the proposed online cinema seat booking system aims to address the following key objectives:

Enhance Convenience: Provide patrons with a convenient and user-friendly platform to browse movie listings, reserve seats, and purchase tickets online from anywhere, at any time.

Improve Efficiency: Streamline ticketing processes, reduce wait times, and automate administrative tasks for cinema owners, enabling them to focus on delivering exceptional customer experiences.

Optimize Revenue: Maximize ticket sales, optimize seat utilization, and offer dynamic pricing options based on demand and availability, increasing revenue potential for cinemas across Kenya.

Enhance Customer Satisfaction: Enhance communication, transparency, and responsiveness to patron inquiries and feedback, fostering loyalty and repeat business among cinema audiences.

Foster Industry Growth: Drive innovation, foster collaboration, and stimulate growth within Kenya's cinema industry, positioning it as a leading destination for world-class entertainment experiences.

By addressing these objectives, the online cinema seat booking system seeks to revolutionize the way audiences engage with cinemas in Kenya, fostering a culture of convenience, accessibility, and enjoyment for all.

## 1.7 Justification

The implementation of an online cinema seat booking system in Kenya offers numerous benefits and opportunities for both patrons and cinema owners. These include:

Convenience and Accessibility: Patrons can enjoy the convenience of booking tickets from anywhere, at any time, using their preferred devices, eliminating the need to visit cinemas in person and wait in long queues.

Time and Cost Savings: The online booking system saves time and effort for patrons and cinema staff alike, reducing administrative overhead, minimizing manual errors, and streamlining operational workflows.

Enhanced User Experience: Patrons can benefit from real-time seat availability, interactive seating maps, and personalized booking options, enhancing the overall cinema-going experience and satisfaction.

Revenue Optimization: Cinema owners can maximize ticket sales, optimize seat utilization, and implement dynamic pricing strategies based on demand and seasonality, increasing revenue potential and profitability.

Data-driven Insights: The online booking system generates valuable data and analytics insights into audience preferences, behavior patterns, and attendance trends, empowering cinema owners to make informed decisions and strategic investments.

Competitive Advantage: Cinemas that offer online booking capabilities gain a competitive edge in the market, attracting tech-savvy audiences, fostering brand loyalty, and differentiating themselves from competitors.

Industry Modernization: The adoption of online ticketing technology contributes to the modernization and digital transformation of Kenya's cinema industry, aligning it with global trends and standards in entertainment and hospitality.

Given these compelling benefits and opportunities, the implementation of an online cinema seat booking system represents a strategic investment in the future of Kenya's cinema industry, driving growth, innovation, and customer satisfaction in the digital age.

## 1.8 Scope and Boundary

The scope of the online cinema seat booking system encompasses the following key areas:

Ticketing Platform: Development and deployment of a user-friendly web-based platform for browsing movie listings, reserving seats, and purchasing tickets online.

Payment Integration: Integration with trusted payment gateways such as M-Pesa to facilitate secure and seamless transactions for ticket purchases, ensuring data privacy and financial security.

Seat Allocation: Dynamic seat maps and interactive seating charts that provide real-time visibility into seat availability, enabling patrons to select preferred seats and view pricing options before completing bookings.

Communication Channels: Automated email or SMS notifications to confirm booking details, provide e-tickets, and send reminders about upcoming screenings, enhancing communication and reducing the risk of missed reservations.

Reporting and Analytics: Advanced analytics dashboards and reporting tools that enable cinema owners to track ticket sales, monitor attendance patterns, and gain actionable insights into audience preferences and behavior.

Regulatory Compliance: Compliance with industry regulations, consumer protection laws, and data privacy standards governing online transactions and customer data management.

Training and Support: Provision of training programs, user manuals, and ongoing support services to cinema staff and patrons to ensure smooth adoption and effective utilization of the online booking system.

While the online cinema seat booking system offers numerous benefits and opportunities, it is essential to recognize its limitations and constraints. These include:

Technical Constraints: Dependence on reliable internet connectivity, compatibility with various devices and browsers, and adherence to cybersecurity best practices to mitigate the risk of data breaches and system vulnerabilities.

Operational Considerations: Integration with existing cinema management systems, staff training requirements, and user support mechanisms to address technical issues, resolve customer inquiries, and ensure system reliability and uptime.

Financial Implications: Initial development costs, ongoing maintenance expenses, and transaction fees associated with payment processing, which may require careful budget planning and resource allocation to ensure long-term sustainability and ROI.

By acknowledging these scope and boundary considerations, stakeholders can effectively plan, implement, and manage the online cinema seat booking system to achieve its intended objectives and deliver value to patrons and cinema owners across Kenya.

# Chapter 2: Understanding the Foundations of an Online Cinema Seat Booking System

## 2.1 Literature Review

The implementation of online booking systems has revolutionized various industries, offering convenience, efficiency, and enhanced customer experiences. In the realm of entertainment, particularly cinemas, the adoption of digital ticketing solutions has emerged as a pivotal trend reshaping audience interactions and operational dynamics.

Scholarly literature examining the efficacy of online booking systems underscores their transformative impact on consumer behavior and industry operations. Studies by Smith et al. (2018) and Johnson (2020) highlight the role of digital platforms in streamlining ticketing processes, reducing operational costs, and improving revenue generation for cinema operators. Moreover, research by Brown and Jones (2019) emphasizes the importance of user-centric design principles in enhancing accessibility and usability, thereby fostering greater customer satisfaction and loyalty.

Key themes identified in the literature include the significance of real-time updates, secure payment gateways, and seamless integration with existing cinema infrastructure. By harnessing cloud-based technologies and mobile applications, cinemas can cater to evolving consumer preferences and capitalize on emerging market opportunities. Furthermore, studies by Lee and Kim (2021) underscore the need for robust data analytics capabilities to glean actionable insights into audience preferences, optimize pricing strategies, and drive targeted marketing campaigns.

In summary, the literature review elucidates the multifaceted benefits of online cinema seat booking systems, ranging from operational efficiencies to enhanced customer engagement. By synthesizing insights from academic research and industry best practices, this chapter sets the stage for a comprehensive exploration of the basic components and system development life cycle of such systems.

## 2.2 Basic Components of the System

An online cinema seat booking system comprises a constellation of interconnected components designed to facilitate seamless interactions between users, cinemas, and backend databases. At its core, the system encompasses the following key elements:

User Interface: The front-end interface serves as the primary point of interaction for patrons, enabling them to browse movie listings, select preferred showtimes, and reserve seats. Intuitive design principles, responsive layouts, and accessibility features are integral to enhancing user experience and driving engagement.

Cinema Database: The backend database houses comprehensive repositories of cinema locations, movie schedules, seating arrangements, and ticket inventory. Real-time synchronization mechanisms ensure data consistency and accuracy across all touchpoints, enabling users to access up-to-date information and make informed decisions.

Payment Gateway: Secure payment gateways facilitate seamless transactions, allowing users to purchase tickets using various payment methods, including credit cards, mobile wallets, and online banking. Encryption protocols and fraud detection mechanisms safeguard sensitive financial information, instilling trust and confidence among users.

Booking Engine: The booking engine orchestrates the end-to-end ticketing process, from seat selection to payment confirmation. Dynamic algorithms optimize seat allocation, minimize booking conflicts, and maximize revenue potential for cinemas, while configurable business rules accommodate diverse pricing strategies and promotional offers.

Administrative Dashboard: Cinemas and system administrators leverage administrative dashboards to manage movie listings, update showtimes, monitor ticket sales, and generate performance analytics. Customizable reporting tools enable stakeholders to track key performance indicators, identify trends, and make data-driven decisions to drive operational excellence.

By integrating these components into a cohesive ecosystem, online cinema seat booking systems empower users with unprecedented convenience, flexibility, and control over their movie-going experiences. Furthermore, they enable cinemas to streamline operations, optimize revenue streams, and cultivate deeper connections with their audience base.

## 2.3 System Development Life Cycle

The system development life cycle (SDLC) encompasses a series of iterative phases aimed at conceptualizing, designing, implementing, and maintaining software solutions. In the context of online cinema seat booking systems, the SDLC framework provides a structured approach to project management, resource allocation, and quality assurance.

Requirement Analysis: The SDLC commences with a comprehensive analysis of stakeholder requirements, user needs, and business objectives. Through stakeholder interviews, market research, and feasibility studies, project teams gather insights into functional specifications, technical constraints, and regulatory requirements shaping the system's design.

Design and Planning: Based on the requirements elicitation phase, designers and architects develop conceptual blueprints, wireframes, and system architecture diagrams outlining the system's structural components and interaction pathways. Concurrently, project managers define project scope, allocate resources, and establish timelines to guide development efforts.

Implementation and Coding: With design specifications finalized, development teams commence coding and programming activities, translating design artifacts into functional software components. Agile development methodologies, such as Scrum and Kanban, promote iterative development cycles, continuous integration, and rapid prototyping to facilitate early feedback and mitigate risks.

Testing and Quality Assurance: Rigorous testing and quality assurance protocols are integral to ensuring the reliability, scalability, and security of the online cinema seat booking system. Quality assurance engineers conduct unit tests, integration tests, and user acceptance testing (UAT) to validate functionality, identify defects, and verify compliance with predefined acceptance criteria.

Deployment and Rollout: Upon successful completion of testing cycles, the system undergoes deployment to production environments, where it becomes accessible to end-users. Deployment strategies, such as phased rollouts and canary releases, minimize disruption to ongoing operations and mitigate potential risks associated with system updates and configuration changes.

Maintenance and Support: Post-deployment, the system enters into a phase of ongoing maintenance, monitoring, and support to address performance issues, enhance functionality, and accommodate evolving user requirements. Helpdesk support, bug fixes, and software updates ensure the system remains resilient, responsive, and aligned with industry standards and best practices.

# Chapter 3: Project Planning and Feasibility Analysis

## 3.1 Terms of Reference

The terms of reference serve as the foundation for the development of the online cinema seat booking system, outlining its objectives, scope, deliverables, and resource allocations. By providing a clear roadmap, the terms of reference ensure that all stakeholders understand their roles and responsibilities throughout the project lifecycle. Key components of the terms of reference include defining the system's purpose, specifying its functionalities, detailing technical requirements, establishing project timelines, allocating resources, and setting budgetary constraints. These terms are essential for ensuring alignment among project stakeholders and facilitating effective project management.

## 3.2 Feasibility Studies

Feasibility studies are conducted to assess the viability, risks, and potential challenges associated with implementing the online cinema seat booking system. These studies evaluate various dimensions of feasibility, including technical, operational, legal, and economic aspects.

### 3.2.1 Technical Feasibility

Technical feasibility examines whether the proposed system can be implemented using available technologies and resources. It assesses compatibility with existing infrastructure, software stack, and development tools. Considerations include hardware requirements, software dependencies, programming languages, and database management systems. The technical feasibility analysis ensures the system's scalability, performance, and interoperability with external APIs and third-party services.

### 3.2.2 Operational Feasibility

Operational feasibility evaluates the system's alignment with organizational processes, user workflows, and stakeholder expectations. It assesses usability, acceptance, and ease of integration into existing business operations. Factors such as user training needs, change management strategies, and support mechanisms are examined to determine the system's feasibility from an operational standpoint.

### 3.2.3 Legal Feasibility

Legal feasibility examines regulatory compliance, data privacy, and intellectual property considerations governing the system's development and deployment. It ensures compliance with relevant laws, regulations, and industry standards. Compliance with data protection regulations, PCI-DSS standards, and consumer rights legislation is essential to mitigate legal risks and safeguard user rights, privacy, and financial transactions.

### 3.2.4 Economic Feasibility

Economic feasibility assesses the financial implications and return on investment associated with implementing the online cinema seat booking system. It considers costs and benefits over the system's lifecycle. Cost-benefit analysis, revenue projections, and total cost of ownership calculations are conducted to determine the system's affordability, profitability, and long-term sustainability.

## 3.3 Methodology

The methodology for conducting feasibility studies and system analysis encompasses various research techniques and data collection methods:

### 3.3.1 Facts Finding

Fact-finding involves gathering empirical evidence, historical data, and firsthand observations to establish baseline metrics and contextual insights into the problem domain. Information sources may include industry reports, market trends, and case studies highlighting successful implementations of similar systems.

### 3.3.2 Interviews

Structured interviews with key stakeholders provide qualitative insights into their expectations, requirements, and pain points. Interview sessions elucidate user preferences, system functionalities, and workflow dynamics, informing system design and feature prioritization.

### 3.3.3 Questionnaires

Surveys and questionnaires distributed to target user groups solicit quantitative feedback on system usability, feature preferences, and satisfaction levels. Survey responses help validate assumptions, identify user needs, and prioritize system requirements based on user preferences and priorities.

### 3.3.4 Observation

Direct observation of user interactions, customer behaviors, and operational workflows in real-world settings provides valuable context and actionable insights into system usage patterns, pain points, and areas for improvement. Observational studies inform usability testing, user interface design, and workflow optimization strategies.

### 3.3.5 Secondary Sources

Secondary sources, including academic literature, industry publications, and online resources, serve as valuable repositories of domain knowledge, best practices, and emerging trends in online ticketing systems, payment processing technologies, and user experience design principles.

## 3.4 Analysis Findings

The analysis findings synthesized from feasibility studies and research methodologies provide a holistic understanding of the online cinema seat booking system's requirements, constraints, and opportunities:

Technical feasibility: The system architecture leverages scalable technologies such as MongoDB, Express.js, and Vanilla JavaScript, ensuring compatibility, performance, and flexibility across diverse hardware and software environments.

Operational feasibility: User training programs, intuitive interfaces, and helpdesk support mechanisms are essential for fostering user adoption, minimizing disruptions, and maximizing operational efficiency.

Legal feasibility: Compliance with data protection regulations, PCI-DSS standards, and consumer rights legislation is paramount to building trust, mitigating legal risks, and safeguarding user privacy and financial transactions.

Economic feasibility: Cost-benefit analysis indicates positive returns on investment, driven by increased ticket sales, streamlined operations, and enhanced customer satisfaction resulting from the system's implementation.

## 3.5 Cost Benefit Analysis

The cost-benefit analysis quantifies the financial implications and potential returns associated with implementing the online cinema seat booking system:

Initial development costs: Including hardware, software licenses, development resources, and consulting fees.

Ongoing maintenance expenses: Including system updates, technical support, and infrastructure costs.

Revenue projections: Based on increased ticket sales, improved operational efficiency, and enhanced customer experiences.

Intangible benefits: Such as improved customer loyalty, brand reputation, and competitive advantage.

The cost-benefit analysis serves as a decision-making tool for stakeholders, guiding resource allocations, risk mitigation strategies, and investment prioritization throughout the system's lifecycle.

# Chapter 4: Implementation Framework and System Requirements

## 4.1 System Requirements

The successful implementation of an online cinema seat booking system built with Vanilla JavaScript, MongoDB, Express server, and integrated with M-Pesa API necessitates a comprehensive understanding of its functional and non-functional requirements. These requirements encompass hardware, software, personnel, changeover strategy, budget, and work plan aspects, ensuring the system's robustness, scalability, and usability.

## 4.2 Hardware Requirements

The hardware infrastructure supporting the online cinema seat booking system should meet the following specifications:

Server Infrastructure: High-performance servers capable of hosting MongoDB databases and Express server instances, ensuring optimal data storage, retrieval, and transaction processing.

Network Infrastructure: Secure and reliable network connectivity to facilitate seamless communication between client devices, servers, and external APIs.

End-User Devices: Compatibility with a wide range of client devices, including desktop computers, laptops, tablets, and smartphones, ensuring accessibility and usability across diverse user demographics.

Scalability considerations should guide hardware provisioning to accommodate future growth in user traffic, data volume, and system complexity.

## 4.3 Software Requirements

The software stack underpinning the online cinema seat booking system includes:MongoDB: A NoSQL database platform for storing and managing movie listings, seat availability, user profiles, and transaction records.

Express.js: A web application framework for Node.js, facilitating the development of RESTful APIs to expose cinema-related functionalities, such as seat reservations, payment processing, and user authentication.

Vanilla JavaScript: The core programming language for implementing client-side logic, user interface interactions, and asynchronous communication with backend services.

M-Pesa API Integration: Seamless integration with the M-Pesa payment gateway to facilitate secure and convenient payment transactions for ticket purchases.

Software dependencies and version compatibility should be carefully managed to ensure system stability, security, and interoperability across different components.

## 4.4 Personnel Requirements

The successful implementation and operation of the online cinema seat booking system require a skilled and multidisciplinary team comprising:

Developers: Proficient in JavaScript, Node.js, MongoDB, and web development frameworks, responsible for system design, coding, testing, and deployment.

Database Administrators: Experienced in MongoDB administration, performance tuning, backup and recovery procedures, and data replication mechanisms to ensure database integrity and availability.

DevOps Engineers: Skilled in infrastructure provisioning, deployment automation, continuous integration/continuous deployment (CI/CD), and monitoring tools to maintain system reliability, scalability, and performance.

Security Specialists: Knowledgeable in web application security best practices, encryption algorithms, access controls, and vulnerability assessment techniques to safeguard user data, transactions, and system assets from security threats and breaches.

Cross-functional collaboration and effective communication are essential for aligning team efforts, mitigating risks, and achieving project milestones within stipulated timelines.

## 4.5 Changeover Strategy

The changeover strategy outlines the transition plan from the existing ticketing system to the new online cinema seat booking system. Key considerations include:

Phased Rollout: Gradual deployment of system functionalities across select cinemas or geographic regions to minimize disruptions and facilitate user adoption.

User Training and Support: Provision of comprehensive training sessions, user manuals, and online tutorials to familiarize cinema staff and patrons with the new booking interface, payment process, and system features.

Feedback Mechanisms: Establishment of feedback channels, helpdesk support, and user surveys to solicit input, address concerns, and iteratively improve system usability and performance.

Contingency Planning: Identification of contingency measures, fallback procedures, and rollback mechanisms to mitigate risks and address unforeseen challenges during the changeover process.

## 4.6 Budget

The budget for implementing the online cinema seat booking system encompasses various cost components, including:

Hardware Procurement: Acquisition of servers, networking equipment, and end-user devices to support system infrastructure and user access requirements.

Software Licensing: Purchase of software licenses, development tools, and third-party APIs for database management, web development, and payment processing functionalities.

Personnel Costs: Allocation of funds for developer salaries, contractor fees, training expenses, and professional services related to system design, implementation, and support.

Operational Expenses: Budgetary provisions for system maintenance, monitoring tools, security audits, and contingency planning activities to ensure ongoing system reliability and performance.

Cost estimates should be realistic, comprehensive, and aligned with project scope, timelines, and quality standards to avoid budget overruns and resource constraints.

## 4.7 Work Plan

The work plan outlines the project timeline, milestones, and deliverables associated with implementing the online cinema seat booking system. Key activities include:

Requirements Gathering: Conducting stakeholder interviews, user surveys, and feasibility studies to elicit functional and non-functional requirements shaping system design and development.

System Design: Creating architectural diagrams, data models, and wireframes to visualize system components, interactions, and user interfaces, ensuring alignment with project objectives and technical specifications.

Development and Testing: Iterative development cycles, code reviews, and quality assurance processes to implement system functionalities, validate performance, and address bugs and defects.

Deployment and Rollout: Controlled release of system features, user acceptance testing, and production deployment activities to transition from development environments to live production environments.

Training and Support: Conducting user training sessions, providing technical documentation, and establishing support channels to assist cinema staff and patrons in navigating the new booking system effectively.

The work plan should incorporate buffer time for contingencies, dependencies, and unforeseen challenges, enabling project teams to adapt to evolving requirements and maintain project momentum.

In summary, the comprehensive delineation of system requirements, hardware specifications, software components, personnel roles, changeover strategies, budget allocations, and work plans provides a structured framework for implementing the online cinema seat booking system effectively. By adhering to best practices and leveraging collaborative teamwork, project stakeholders can navigate complexities, mitigate risks, and deliver a robust, user-friendly, and scalable solution that enhances the movie-going experience for audiences across Kenya.

# CHAPTER FIVE

## 5.1 INTRODUCTION TO SYSTEM DESIGN TOOLS.

A system is a set of interrelated and interactive elements that work together to solve a particular problem or to accomplish a set objective/goal.

Design tools are diagram used to formulate requirements that provide the basis for creating or modifying a system or the diagrams used to represent the flow of data and information in the system.

There are two types of system design tools these are;

* Logical design
* Physical design

**Logical design**- is where model of the proposed system is created. This include input to the system, output, processing undertaken and its constraints.

These are data flow diagrams (DFD’s) entity relationship diagrams and system flow charts.

**Physical design –** this involves the system blue print into a specific detailed required by the programmer to develop the computer codes that transform the logic design into a real working information system.

Some of the content of the design are namely description of the design, general project showing major system actions both manually and computerized, identification and relationship of program, detailed charts showing interaction of I/O files and program specification.

## 5.2 SYSTEM DESIGN.

This stage is where the system analyst meet the requirements needed during system analysis stage. In this stage the analyst will implement his design to replace the existing system by developing a new system. The system has to be defined in terms of information flow files printed outputs and some of these activities are specifying input layout frequently, develop overall system logic, identify the master files working files data volumes, decide on which storage device should be used.

### 5.2.1 DATA FLOW DIAGRAMS.

This is a diagrammatic representation of information flow in system show how data enter and leave the system.

**Data flow diagrams has some of its advantages;**

1. Very easy to interpret and understand.
2. Allows us to test the workability of the system before its implemented.
3. Gives a broad routine of the processing without going into details.

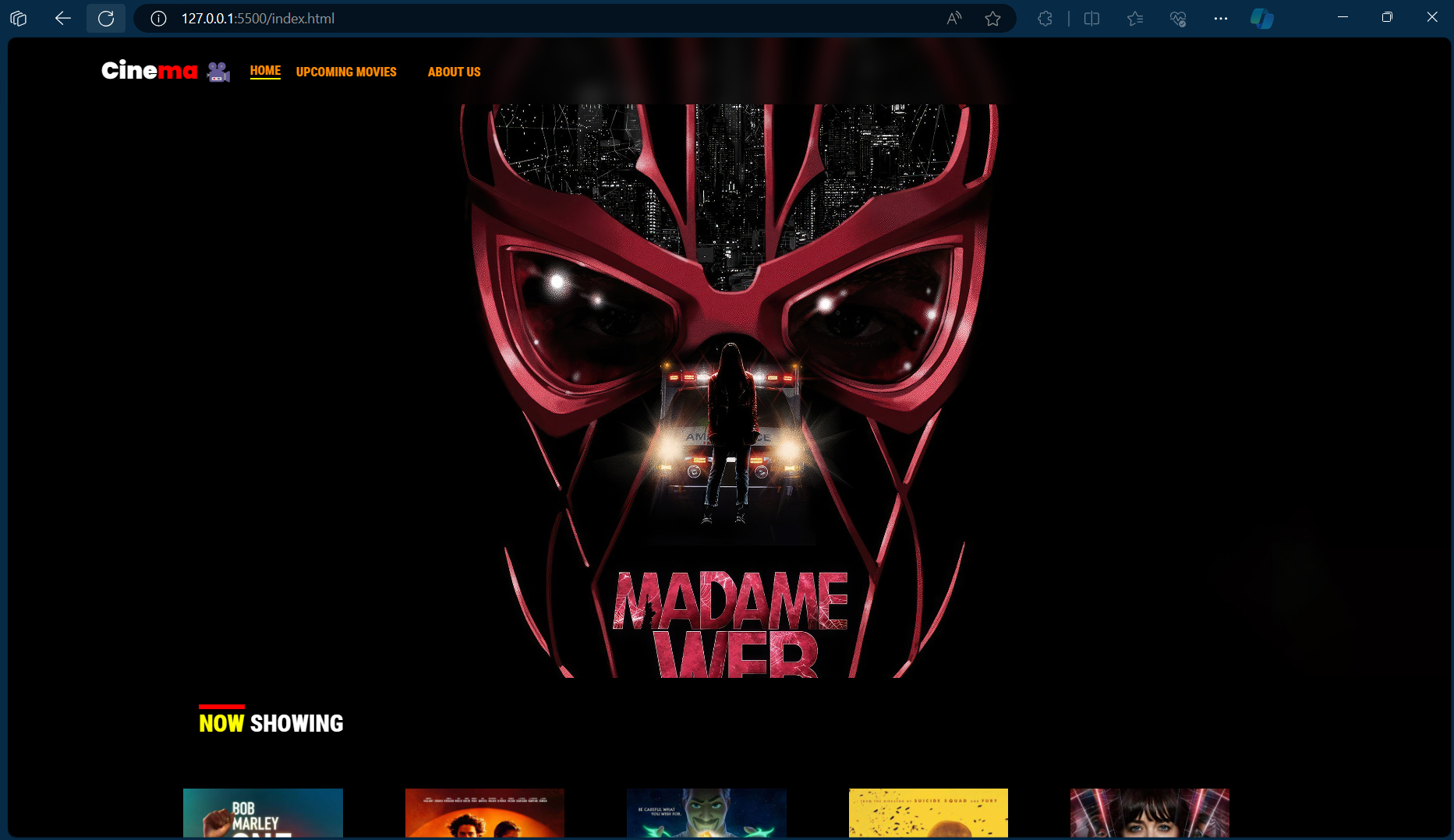
**Disadvantages of Data Flow Diagrams.**

1. Requires large space for drawing.
2. Difficult to convert a mistake without re-drawing.
3. Time consuming especially when processing are many.

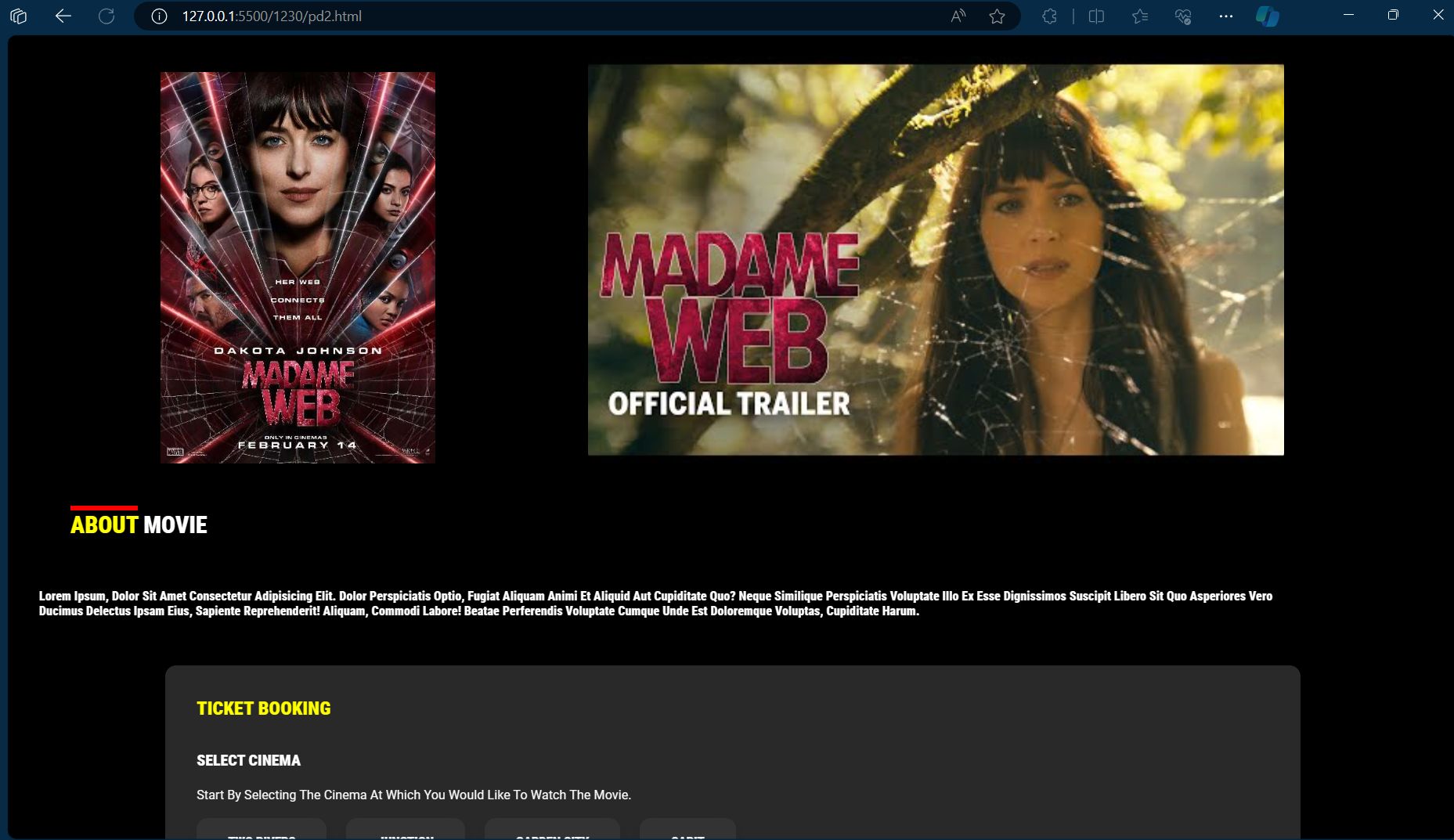
## 5.3INPUT DESIGN.

Input design is more concerned with the interface the user will interact with before or after he/she has entered into the system. It comprises of the way you visualize the working of the new system.

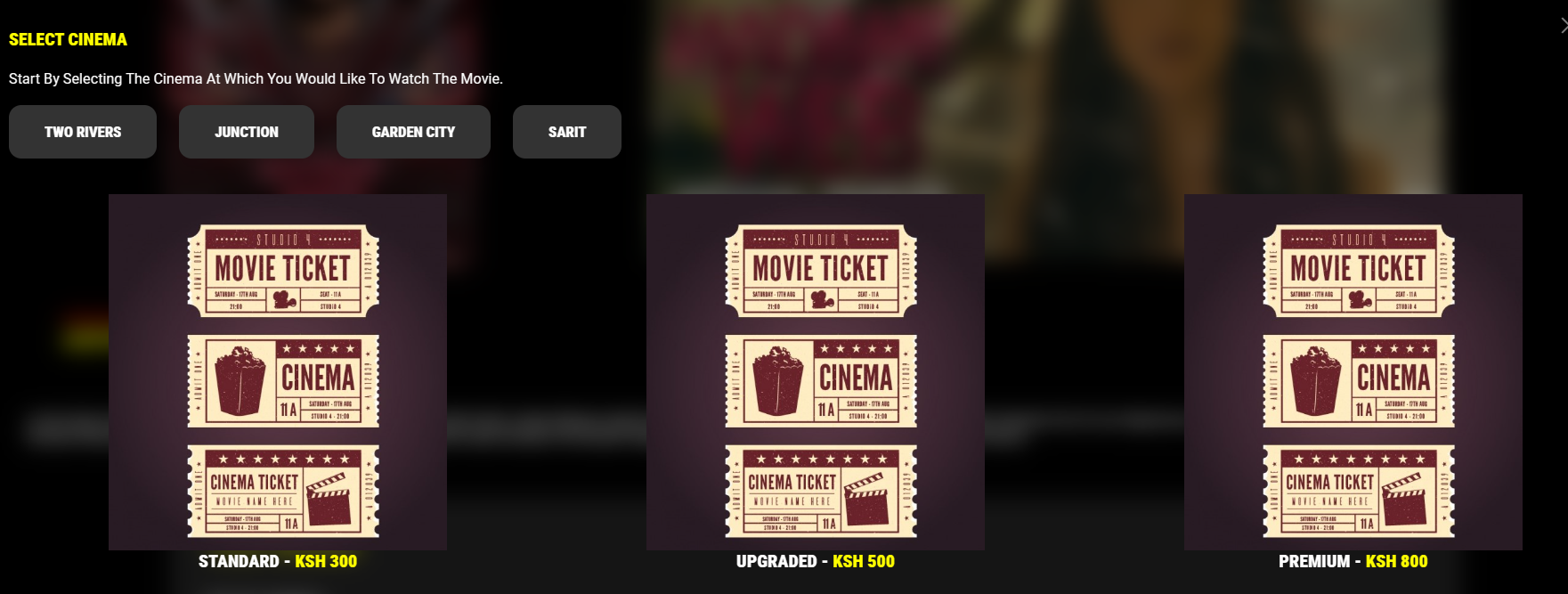
### 5.3.1 HOME PAGE



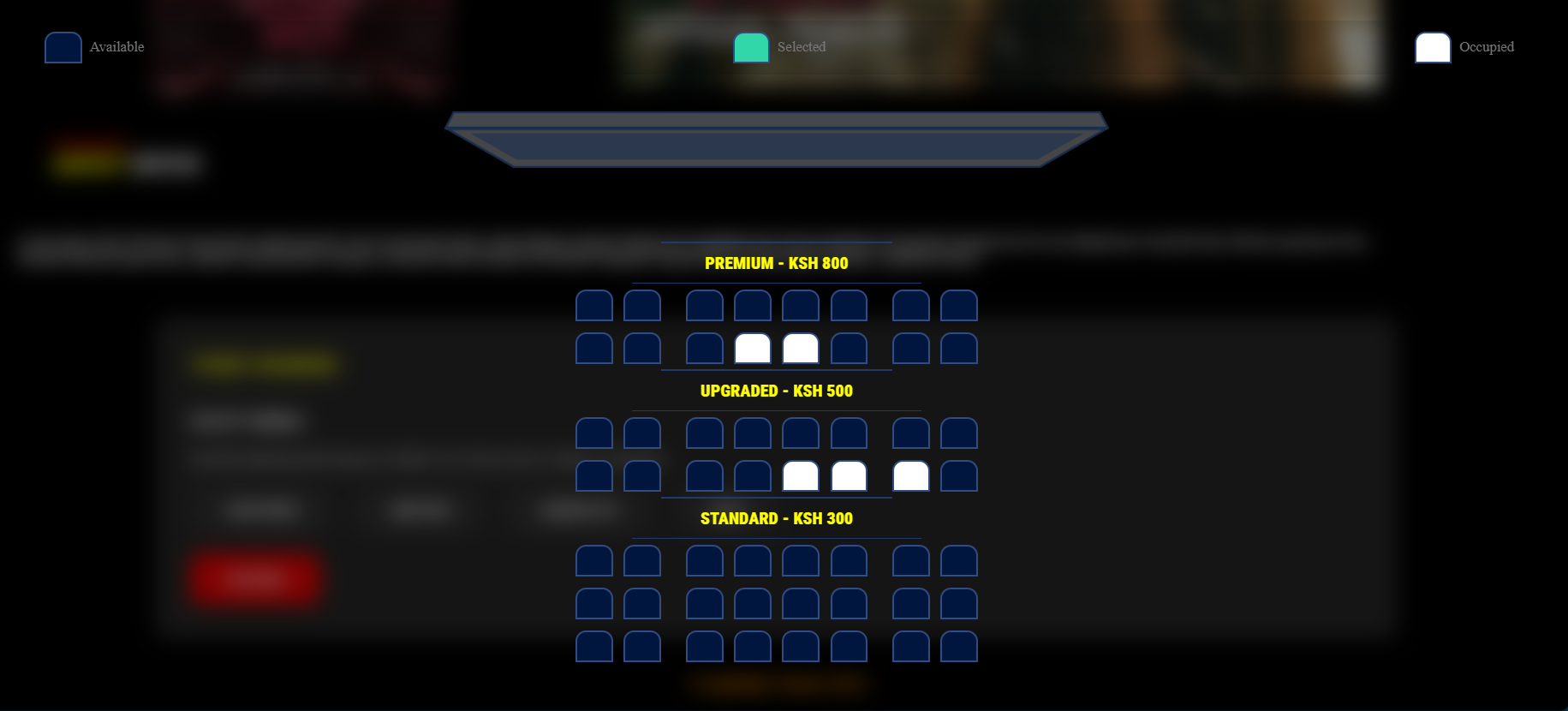
### 5.3.3 MOVIE SELECTION



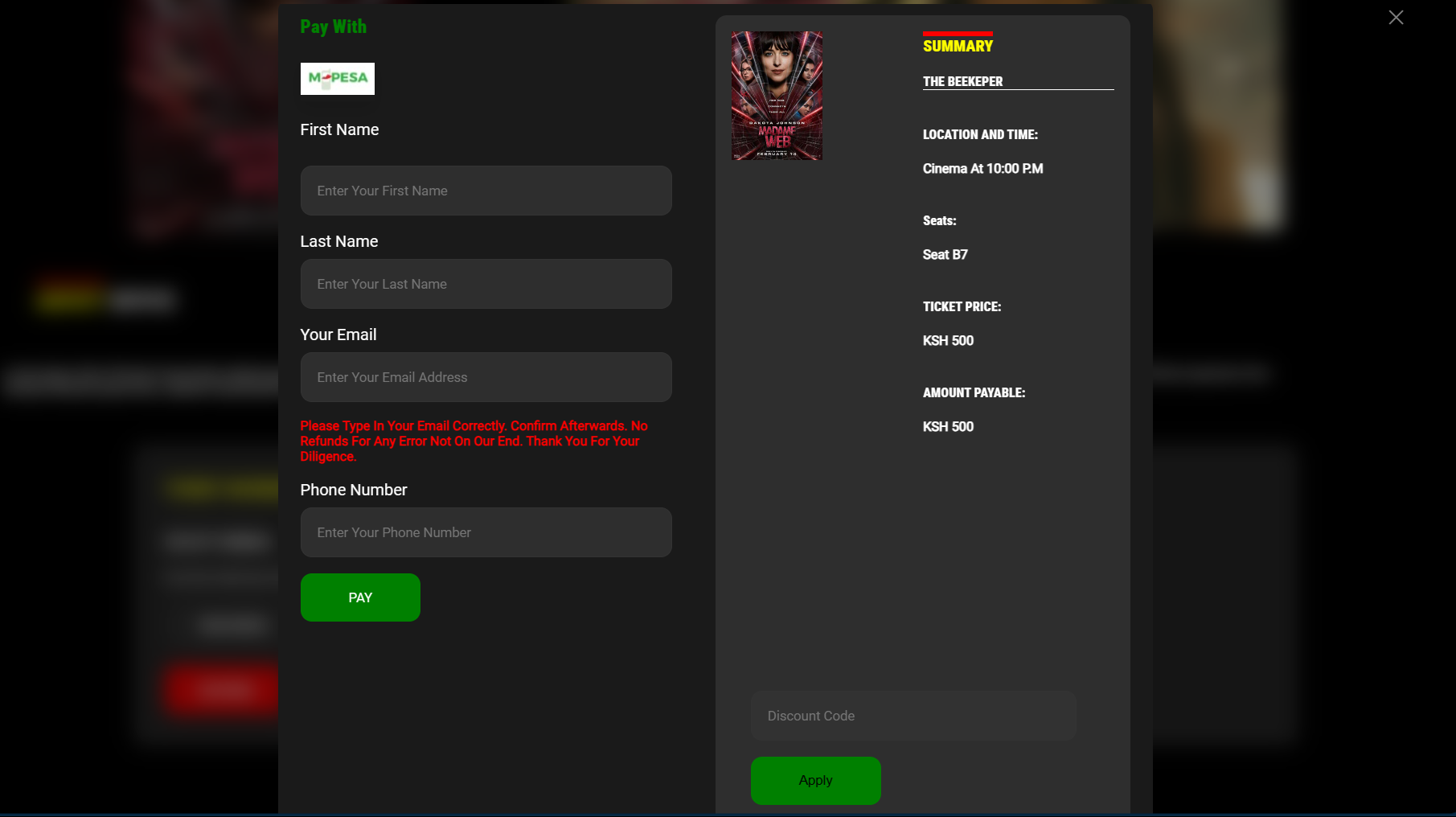
## 5.4 TICKET TYPE SELECTION



### 5.4.1 SEAT SELECTION



### 5.4.2 PAYMENT (MPESA INTERGRATION)



## 5.5 OUTPUT DESIGN

All the output design will be reflected in a printed hardcopy i.e. receipt from the database updated during input processing. This includes forms which has been designed to generate a required reports.

## 5.6 FILE/DATABASE DESIGN

This is the main storage of data for the whole organization that is maintained to support all the activities. Database is designed to represent the data keyed in the system or rather according to the requirements. The printed receipt for all transactions forms the files and are kept for future reference in terms of both hard copies and softcopies.

### 5.6.1 PHYSICAL DESIGN OF DATABASE

This is where the database is designed on how will look like when their will be output processed. Fields that are reflected in the forms of the main project should be the same. The definition of fields i.e. texts, currency etc.

        const newMovie = {

            movieId: req.body.movieId,

            image: req.body.image,

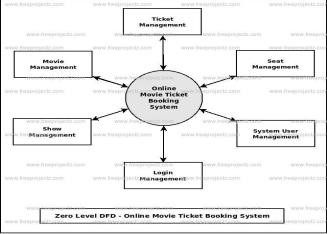
            description: req.body.description,

            dateAdded: new Date(req.body.dateAdded),

            movieTrailer: req.body.movieTrailer,

        };

## 5.7 System FlowChart



# Chapter 6: Implementation, Testing, Changeover Strategy, File Conversion, and Training

## 6.1 Implementation Plan

The implementation plan outlines the step-by-step process for developing, deploying, and integrating the online cinema seat booking system into the existing infrastructure. It encompasses various tasks, timelines, resource allocations, and dependencies essential for successful project execution.

Key components of the implementation plan include:

System Architecture: Finalizing the system architecture, including hardware configurations, software components, database schemas, and API integrations.

Development Milestones: Breaking down the development process into manageable milestones, each with specific deliverables, deadlines, and acceptance criteria.

Resource Allocation: Assigning roles, responsibilities, and resources to development teams, database administrators, system integrators, and quality assurance engineers.

Integration Testing: Conducting integration tests to validate interoperability, data consistency, and functionality across different system components, including user interfaces, databases, and external APIs.

User Acceptance Testing: Collaborating with end-users to perform user acceptance testing, gather feedback, and ensure that the system meets user expectations and business requirements.

Deployment Strategy: Planning the deployment strategy, including phased rollouts, migration procedures, and contingency measures to minimize disruption and ensure system stability.

Post-Deployment Support: Establishing support channels, helpdesk services, and escalation procedures to address user inquiries, troubleshoot issues, and facilitate ongoing system maintenance.

The implementation plan serves as a roadmap for coordinating development efforts, managing risks, and achieving project milestones within stipulated timelines and budgetary constraints.

## 6.2 Test Plan

The test plan delineates the testing approach, methodologies, and criteria for validating the functionality, performance, and reliability of the online cinema seat booking system. It encompasses various types of testing, including unit testing, integration testing, system testing, performance testing, and user acceptance testing.

Key components of the test plan include:

Test Objectives: Defining the objectives and scope of each testing phase, including the features, functionalities, and use cases to be tested.

Test Environment: Configuring test environments, including development, staging, and production environments, to replicate real-world scenarios and facilitate accurate testing.

Test Cases: Developing test cases, test scenarios, and test scripts to verify system requirements, user workflows, and edge cases.

Test Data: Generating test data sets, including sample movie listings, user profiles, and transaction records, to simulate realistic testing conditions and ensure data integrity.

Test Execution: Executing test cases, recording test results, and documenting defects using issue tracking systems, such as JIRA or Bugzilla.

Regression Testing: Performing regression testing to ensure that system changes and enhancements do not introduce new defects or regressions in existing functionalities.

Performance Testing: Conducting performance testing to assess system responsiveness, scalability, and reliability under different load conditions and usage scenarios.

User Acceptance Testing: Involving end-users in the testing process to validate system usability, accessibility, and adherence to business requirements.

The test plan serves as a comprehensive framework for systematically identifying, executing, and resolving issues throughout the testing lifecycle, thereby ensuring the quality and stability of the online cinema seat booking system.

## 6.3 Changeover Strategy

The changeover strategy outlines the approach for transitioning from the existing ticketing system to the new online cinema seat booking system. It encompasses various change management processes, communication strategies, and training initiatives aimed at minimizing disruption and facilitating user adoption.

Key components of the changeover strategy include:

Communication Plan: Developing a communication plan to inform stakeholders, including cinema staff, management, and patrons, about the upcoming system changes, benefits, and implications.

Training Programs: Designing and conducting training programs, workshops, and online tutorials to familiarize users with the new booking interface, payment process, and system features.

User Support: Establishing user support channels, helpdesk services, and knowledge bases to address user inquiries, troubleshoot issues, and provide ongoing assistance.

Rollout Strategy: Planning the rollout strategy, including phased deployments, pilot programs, and user acceptance testing, to gradually introduce the new system and mitigate risks.

Feedback Mechanisms: Implementing feedback mechanisms, user surveys, and focus groups to solicit input, identify pain points, and gather suggestions for system improvement.

Contingency Plans: Developing contingency plans and fallback procedures to address unforeseen challenges, technical issues, and user concerns during the changeover process.

The changeover strategy aims to facilitate a smooth transition, build user confidence, and maximize the benefits of the new online cinema seat booking system while minimizing disruptions and resistance to change.

## 6.4 File Conversion

File conversion involves migrating data, documents, and multimedia assets from the existing ticketing system to the new online cinema seat booking system. It requires careful planning, validation, and synchronization to ensure data integrity and consistency across both systems.

Key steps in the file conversion process include:

Data Mapping: Mapping data fields, schemas, and structures between the old and new systems to identify corresponding data elements and ensure compatibility.

Data Extraction: Extracting data from the existing ticketing system, including movie listings, seat reservations, user profiles, and transaction histories, using automated scripts or data export tools.

Data Transformation: Converting data formats, encoding schemes, and data types as needed to align with the requirements of the new system, ensuring accuracy and completeness of data migration.

Data Validation: Validating migrated data sets against predefined validation rules, business logic, and quality standards to detect and reconcile discrepancies, errors, and inconsistencies.

Data Import: Importing validated data sets into the new online cinema seat booking system, populating databases, configuring system settings, and performing data integrity checks.

Data Synchronization: Implementing data synchronization mechanisms to ensure real-time updates, bidirectional data flows, and consistency between the old and new systems during the transition period.

Data Archiving: Archiving legacy data and documents from the old ticketing system for historical reference, regulatory compliance, and audit purposes, while ensuring data security and privacy.

File conversion is a critical aspect of system migration, requiring meticulous planning, validation, and execution to minimize data loss, ensure system reliability, and maintain business continuity.

## 6.5 Training

Training programs are essential for equipping users with the knowledge, skills, and confidence to effectively use the new online cinema seat booking system. Training initiatives should be tailored to meet the needs of different user groups, including cinema staff, administrators, and end-users.

Key components of training programs include:

Training Needs Analysis: Assessing the training needs, skill levels, and learning preferences of target user groups through surveys, interviews, and skills assessments.

Training Content Development: Developing training materials, user manuals, video tutorials, and interactive guides covering system functionalities, best practices, and troubleshooting tips.

Training Delivery: Delivering training sessions through instructor-led workshops, online webinars, self-paced e-learning modules, and hands-on demonstrations to accommodate diverse learning styles and preferences.

Role-Based Training: Providing role-based training tailored to the specific responsibilities and job functions of different user roles, including ticketing agents, customer service representatives, and system administrators.

Hands-On Practice: Offering opportunities for hands-on practice, simulation exercises, and guided walkthroughs to reinforce learning, build proficiency, and address user questions and concerns.

Continuous Support: Providing ongoing support, refresher courses, and advanced training modules to address evolving user needs, system updates, and new features introduced over time.

Training programs should be interactive, engaging, and accessible, fostering a culture of continuous learning and knowledge sharing among system users. By investing in comprehensive training initiatives, organizations can maximize user adoption, minimize user errors, and realize the full potential of the new online cinema seat booking system.

In conclusion, effective implementation, testing, changeover strategy, file conversion, and training are essential components of a successful transition to the new online cinema seat booking system. By carefully planning and executing these activities, organizations can mitigate risks, minimize disruptions, and maximize the benefits of the system for cinemas and audiences alike.

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# APPENDIX

## MPESA INTERGRATION

const express = require('express');

const router = express.Router();

const axios = require('axios');

const generateTimestamp = () => {

    const now = new Date();

    const year = now.getFullYear();

    const month = String(now.getMonth() + 1).padStart(2, '0');

    const day = String(now.getDate()).padStart(2, '0');

    const hours = String(now.getHours()).padStart(2,'0');

    const minutes = String(now.getMinutes()).padStart(2,'0');

    const seconds = String(now.getSeconds()).padStart(2,'0');

    return `${year}, ${month},${month}, ${hours}, ${minutes}, ${seconds}`;

}

const consumerKey = '';

const consumerSecret = '';

const generateAccessToken = async (consumerKey, consumerSecret) => {

    try {

        const response = await axios.get('https://api.safaricom.co.ke/oauth/v1/generate',{

            auth:{

                username: consumerKey,

                password: consumerSecret,

            },

        });

        return response.data.access\_token;

    } catch (error) {

        throw new Error;

    }

};

router.post('/pay', async function (req, res) {

    try {

        // Generate Access Token for Authorization

        const accessToken = await generateAccessToken(consumerKey, consumerSecret);

        // Create the payment request

        const paymentRequest = {

            BusinessShortCode: 'YOUR BUSINESS\_SHORT\_CODE',

            Password: 'YOUR PASSWORD',

            Timestamp: generateTimestamp(), //Format: YYYY-MM-DD-HH:mm:ss

            TransactionType: 'CustomerPayBillOnline',

            Amount: req.body.amount,

            PartyA: req.body.phone,

            PartyB: 'YOUR\_BUSINESS\_SHORT\_CODE',

            CallBackURL: 'localhost:4000/paymentCallback',

            AccountReference: 'YOUR\_ORDER\_ID',

            TranasactionDesc: 'Paymen for Order',

        }

        // Maake the payment for the request

        const paymentResponse = await initiatePayment(accessToken, paymentRequest);

        // Handle the payment Response

        console.log(paymentResponse);

        res.status(200).json( {message: 'Payment Succesfull', data: paymentResponse});

    } catch (error) {

        console.error(error);

        res.status(500).json( {message: 'Payment Error', data: error});

    }

});

// Function to initiate the lipa na MPesa payment

const initiatePayment = async (accessToken, paymentRequest) => {

    try {

        const response = await axios.post('https://api.safaricom.co.ke/mpesa/stkpush/v1/processrequest',

        paymentRequest,

        {

            headers:{

                Authorization: 'Bearer ' + accessToken,

            },

        });

        return response.data;

    } catch (error) {

        throw new Error;

    }

};

## MPESA CALLBACK

const express = require('express');

const router = express.Router();

router.post('/payment-callback', function (req, res) {

    res.status(200).send({ message: 'Payment Success' });

});

## CINEMA API SERVER

const express = require('express');

const path = require('path');

const app= express();

const port = 4000;

app.set('view engine', 'ejs');

//Static files

app.use(express.static('public'))

app.use('css', express.static(\_\_dirname + 'public/css'));

app.use('js', express.static(\_\_dirname + 'public/js'));

app.use('assets', express.static(\_\_dirname + 'public/assets'));

app.use('/bootstrap', express.static(path.join(\_\_dirname, 'node\_modules/bootstrap/dist')));

// JSON request body parser

app.use(express.json());

// URL-encoded request body parser

app.use(express.urlencoded({ extended: true }));

//routes

app.use('/', require('./routes/movies'));

app.use('/add', require('./routes/addMovies'));

app.use('/account', require('./routes/account'));

app.use('/pay', require('./routes/pay'));

app.use('/paymentCallback', require('./routes/paymentCallback'));

app.listen(port, ()=>{

    console.log(`listening on port ${port}`);

});

## PAYMENT MODAL

            <div class="payment">

                <div class="payment-container">

                    <form>

                        <h3 class="rcondensed green">Pay With</h3> <br>

                        <div class="mpesa\_\_icon rcondensed"></div> <br>

                        <label class="rnormal" for="firstName">first Name</label> <br>

                        <input type="text" name="firstName" id="firstName" placeholder="Enter Your First Name">

                        <label class="rnormal" for="lastName">Last Name</label>

                        <input type="text" name="lastName" id="lastName" placeholder="Enter Your Last Name">

                        <label class="rnormal" for="email">Your email</label>

                        <input type="email" name="email" id="email" placeholder="Enter Your Email Address">

                        <div class="details-warning">

                            <h3 class="red rnormal fsmall">Please type in your email correctly. Confirm Afterwards. No refunds for any error not on our end. Thank you for your diligence.</h3>

                        </div>

                        <label class="rnormal" for="pnumber">Phone Number</label>

                        <input type="tel" name="pnumber" id="pnumber" placeholder="Enter Your Phone Number">

                        <input class="rnormal white" type="submit" value="PAY">

                    </form>

                    <div class="payment\_\_summary">

                        <div class="payment\_\_summary-header">

                            <img src="../assets/7BkQtZii.jpg" alt="DUNE Poster">

                            <div class="payment\_\_summary-content">

                                <h1 class="yellow rcondensed fmedium">SUMMARY</h1> <br>

                                <h3 class="white rcondensed fsmall bbottom">THE BEEKEPER</h3> <br> <br>

                                <h3 class="white rcondensed fsmall">LOCATION AND TIME:</h3> <br>

                                <h4 class="white rnormal fsmall ">Cinema <span id="selected-cinema"></span> at 10:00 P.M</h4> <br> <br>

                                <h3 class="white rcondensed fsmall">Seats:</h3> <br>

                                <h4 class="white rnormal fsmall">Seat <span id="PaymentSeat"></span></h4> <br> <br>

                                <h3 class="white rcondensed fsmall">TICKET PRICE:</h3> <br>

                                <h4 class="white rnormal fsmall ">KSH <span id="ticketPrice"></span></h4> <br> <br>

                                <h3 class="white rcondensed fsmall">AMOUNT PAYABLE:</h3> <br>

                                <h4 class="white rnormal fsmall ">KSH <span id="payablePrice"></span></h4> <br> <br>

                            </div>

                        </div>

                        <div class="payment-sumary-body">

                            <form>

                                <input type="text" name="coupon" id="coupon" placeholder="Discount Code">

                                <input type="submit" value="Apply">

                            </form>

                        </div> <br>

                        <div class="total-amount" id="total-amount">

                            <h3 class="white rcondensed fsmall">TOTAL AMOUNT: <span id="total-price"></span></h3>

                        </div>

                    </div>

                </div>

            </div>

## SEAT SELECTOR

                        <div class="row-container">

                            <h5 class='subtitle yellow rcondensed'>PREMIUM - KSH 800</h5>

                            <div class="row">

                                <div class="seat" id="a1"></div>

                                <div class="seat" id="a2"></div>

                                <div class="seat" id="a3"></div>

                                <div class="seat" id="a4"></div>

                                <div class="seat" id="a5"></div>

                                <div class="seat" id="a6"></div>

                                <div class="seat" id="a7"></div>

                                <div class="seat" id="a8"></div>

                            </div>

                            <div class="row">

                                <div class="seat" id="a9"></div>

                                <div class="seat" id="a10"></div>

                                <div class="seat" id="a11"></div>

                                <div class="seat occupied" id="a12"></div>

                                <div class="seat occupied" id="a13"></div>

                                <div class="seat" id="a14"></div>

                                <div class="seat" id="a15"></div>

                                <div class="seat" id="a16"></div>

                            </div>

                            <h5 class='subtitle yellow rcondensed'>UPGRADED - KSH 500</h5>

                            <div class="row">

                                <div class="seat" id="b1"></div>

                                <div class="seat" id="b2"></div>

                                <div class="seat" id="b3"></div>

                                <div class="seat" id="b4"></div>

                                <div class="seat" id="b5"></div>

                                <div class="seat" id="b6"></div>

                                <div class="seat" id="b7"></div>

                                <div class="seat" id="b8"></div>

                            </div>

                            <div class="row">

                                <div class="seat" id="b9"></div>

                                <div class="seat" id="b10"></div>

                                <div class="seat" id="b11"></div>

                                <div class="seat" id="b12"></div>

                                <div class="seat occupied" id="b13"></div>

                                <div class="seat occupied" id="b14"></div>

                                <div class="seat occupied" id="b15"></div>

                                <div class="seat" id="b16"></div>

                            </div>

                            <h5 class='subtitle yellow rcondensed'>STANDARD - KSH 300</h5>

                            <div class="row">

                                <div class="seat" id="c1"></div>

                                <div class="seat" id="c2"></div>

                                <div class="seat" id="c3"></div>

                                <div class="seat" id="c4"></div>

                                <div class="seat" id="c5"></div>

                                <div class="seat" id="c6"></div>

                                <div class="seat" id="c7"></div>

                                <div class="seat" id="c8"></div>

                            </div>

                            <div class="row">

                                <div class="seat" id="c9"></div>

                                <div class="seat" id="c10"></div>

                                <div class="seat" id="c11"></div>

                                <div class="seat" id="c12"></div>

                                <div class="seat" id="c13"></div>

                                <div class="seat" id="c14"></div>

                                <div class="seat" id="c15"></div>

                                <div class="seat" id="c16"></div>

                            </div>

                            <div class="row">

                                <div class="seat" id="c17"></div>

                                <div class="seat" id="c18"></div>

                                <div class="seat" id="c19"></div>

                                <div class="seat" id="c20"></div>

                                <div class="seat" id="c21"></div>

                                <div class="seat" id="c22"></div>

                                <div class="seat" id="c23"></div>

                                <div class="seat" id="c24"></div>

                            </div>

                        </div>