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THE MALDIVES NATIONAL UNIVERSITY

Tour Company Management System

UFA HOLIDAYS PVT LTD

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CPT 311 - Applied IT Project

Faculty of Engineering, Science and Technology

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Table of Contents

Abstract

Travel Company Management System (TCMS) is a web application that allows large travel companies to handle all of their business activities online. It combines different aspects from other software to create a convenient, efficient, secure and flexible system with a modern and interactive UI. The final system might contain some features of Property Management System (PMS), Global Distribution System (GDS), Online Travel Agency (OTA), Customer Relationship Management Software (CRM) Software, Content Management System (CMS), Recommender Systems (RS), Inventory Management System (IMS), Point of Sale (POS) System, and Chatbots and Virtual Assistants. However, there are constraints and limitations to the software development process. Hence, some of the proposed features might be out of the current project scope or included in the future enhancements.

Acknowledgments

List of Figures

Introduction

This Travel Company Management System will include booking features for customers. To check availability and book hotel rooms, tours, transfers and other travel services. As well as a PMS dashboard for staff to check availability of rooms and occupancy information. Moreover, there will be an admin dashboard where admins can add or modify available hotel information in the system and view the CRM dashboard where admins can see information about customers and their booking history. In addition to that, there will be souvenirs available from the website which can be ordered by registered customers. A virtual assistant will be integrated with the system to assist customers with Frequently Asked Questions (FAQs).

Chapter 1 - Context and Preliminary Investigations

1.1 Chapter Introduction

This section will highlight the background of the project which includes the purpose of the project, why it is being undertaken, and its significance. What will be produced at the end of the project, and the project development timeline. As well as any initial investigations or research conducted before starting the project.

1.2 Project Background

- Tourism is the largest economic sector in the Maldives, contributing a significant portion, almost 30% of the country's GDP in 2023 (World Bank) and employing a large percentage of the local workforce. The industry relies heavily on travel agencies to assist tourists in travel and accommodations. But over the past decade, the global travel industry has seen a significant shift towards more convenient digital solutions. Online platforms such as Booking.com and Trip.com have revolutionized how accommodations and travel services are booked offering better availability and more transparent pricing.
- However, Maldivian travel agencies have remained traditional, relying heavily on manual processes and outdated systems like Excel sheets for managing bookings and monthly sales reports. Manual systems are inefficient and more prone to errors leading to lost opportunities and customer dissatisfaction. And with international platforms offering better deals and customer services, traditional travel agencies risk losing market share unless they innovate.
- There is a clear opportunity for innovation within the Maldivian travel industry by developing a new software solution tailored for these agencies. The proposed project was started to bridge the gap between traditional agency operations and modern digital technologies. The goal is to develop a comprehensive software solution that integrates the convenience of online booking platforms with the personalized assistance that traditional travel agencies are known for. This project is strategically important as it directly addresses the urgent need for digital transformation in the Maldivian travel industry. Enhancing its overall competitiveness and sustainability. The project aims to modernize the infrastructure of traditional agencies and revolutionize the Maldivian travel industry.

1.3 Research Methodology

Preliminary research involves conducting initial investigations to gather essential information that will help define the project scope, identify requirements and establish a foundation for more detailed planning and development. For this project, the research will be conducted in the following ways:

- Interviews

    - Simple interviews can be conducted with stakeholders like agency workers, owners and guests. This can help get stakeholder expectations, needs and potential challenges, as well as more potential team members in the future and could help land project sponsors.
- Market Analysis
    - This involves analyzing strengths and weaknesses of competitors and identifying market gaps. This is useful to get insights into market demands, technological trends and validate the need for the product in the marketplace.
- Online Surveys & questionnaires
    - Collecting quantitative and qualitative data from a wider audience relevant to the project can help identify usage patterns, preferences and requirements. This can help with product features and priorities in the future.
- Focus Groups
    - Gather a group of people from the target audience, possibly tech-literate or experts to provide in depth feedback on issues and ideas. This can give qualitative insights into user needs and design or functionality features.
- Prototyping
    - Create basic versions of the solution that incorporate key features to test with potential users. They can provide immediate feedback on usability, design and functionality that can be used to refine the project.
- Technical Research
    - Research current technologies, development frameworks and potential technical challenges that could impact the project. Review existing documents such as project reports, user manuals and system specifications. This can give useful insights into current processes, systems and standards that will influence the project design and requirements.

1.4 Project Scope

i. Goals & Objectives

- To build a more transparent, and standardized system for travel agencies and tour operators. This aims to enhance trustability and reliability in the tourism sector and reduce tourist scams. This is important in this digital day and age where travel and information is becoming increasingly accessible and the tourism industry is rapidly evolving.
- To develop a comprehensive digital platform for travel agencies in the Maldives to manage bookings, customer relations and analytics. Lot of travel agencies in the Maldives use outdated systems to manage travel services including booking and reservations, and to keep track of finances.
- To combine the advantages of modern technology such as the convenience of online booking with the personalized touch and assistance of traditional travel services to provide a seamless customer experience.

ii. Requirements

A. Functional Requirements

- User registration and authentication:
    - Implement a secure system for users to create accounts and login.
    - Each user has different permissions based on their role
    - Safety protocols and secure authentication to protect from unauthorized access
    - Enable users to reset passwords if they forgot their old password
    - Allow users to edit their personal information including contact details
    - Giving some privacy access to users to control what can or cannot be seen by others
    - Account deactivation and deletion
- Resource management:
    - Create a dedicated admin dashboard where authorized personnel can manage resources effectively
    - Access control to ensure only admins can access and modify resource-related information
    - User-friendly interface to add and manage hotel rooms availability and promotional offers.
    - Inventory management for souvenirs.
    - Analytics and reporting, preferably with charts and graphs.
    - Integration with booking system to ensure
    - Customer feedback mechanisms to gather insights
- Booking functionality:
    - Modern and intuitive user interface that displays a list of available hotels, including location, price and room types.
    - Filters and search options to narrow down results based on user preferences.
    - Enable registered users to confirm reservations for desired hotels and dates.
    - Users can provide special requests while booking
    - Ensure that the booking system reflects real-time availability of rooms in each hotel.
    - Ensure that availability status is updated instantly to avoid overbooking.
    - Send immediate booking confirmation through push notification, email or sms once their reservation is confirmed.
    - Include all booking details and cancellation policy in the confirmation communication.
    - Integrate customer support features to assist users with booking queries or issues.
    - Allow registered users to submit reviews and ratings for hotels they visited to help users to make informed decisions.
    - Allow users to wishlist and mark hotels as favorites for future reference.

- Communication and collaboration:
    - Require users to login to access and participate in the forum.
    - Allow users to comment on posts and reply to comments, to enable interactive conversations and knowledge sharing.
    - Implement moderation tools to manage content and monitor discussions to ensure a positive and respectful environment.
    - Setup a notification system to alert users about new posts and replies.
    - Integrate a chatbot feature for instant answers to frequently asked questions.

B. Non Functional Requirements

- Performance:
    - Ensure that the platform responds quickly to user interactions minimizing loading times and delays.
    - Support multiple users to access the platform simultaneously without degradation in performance.
    - Aim for high uptime and ensure that the platform is available without significant downtime.
    - Implement tools for real-time monitoring of system performance and alters for performance bottlenecks and failures. And design the system to continue operating properly in the event of failure of some of its components.
- Scalability:
    - Design the platform's architecture to handle a growing user base and increased traffic over time
    - Implement scalable resources such as cloud hosting services to accommodate fluctuating demand without compromising performance.
    - Design the system with clear, modular components to simplify updates, maintenance and scalability.
    - Maintain thorough documentation for the system architecture, codebase, APIs and external integrations to facilitate future maintenance and upgrades.
- External Integration:
    - Integrate with reliable and secure payment gateways to facilitate seamless transactions for bookings and payments.
    - Support integration with external APIs for services such as mapping, weather forecasting and social media integration.
- Security
    - Encrypt sensitive user data using strong encryption protocols to protect against unauthorized access.
    - Implement role-based access control to ensure that only admins have access to data and functionality to edit information.
- Compatibility:
    - Ensure that the platform is easily accessible and functions seamlessly across various devices and operating systems with different screen

sizes. And supports common major web browsers to provide a consistent user experience regardless of the browser used.
    - Ensure that the platform can easily integrate with other various systems without issues and facilitate smooth data exchange between systems using standard data formats and APIs.
- Data Management:
    - Implement data validation to ensure that user inputs adhere to specific formats and are complete and accurate.
    - Regularly backup data to prevent data loss in case of system failure and implement recovery procedures to recover the data.
- UI/UX:
    - Design a visually appealing and intuitive user interface with modern design principles, clear navigation and user-friendly interactions.
    - Ensure that UI conveys professionalism and credibility.

Iii. Constraints

- Time:
    - With a short project duration, it's important to use a prioritized backlog to focus on core functionalities first such as user registration and booking features. Additional features can be developed later as part of future enhancements.
- Cost:
    - Platforms like AWS, Google Cloud and Azure provide flexible pay-as-you go models which could be more economically viable for a company. But for a small project like this an alternative way is to use free options like MySQL and self hosting sites like Dokku, just to test and showcase functionality and change to a paid option later.
- Resource:
    - BML payment gateway is difficult to implement in international transactions as Maldivian accounts only support sending money and not receiving money. For this reason websites like paypal cannot work either. Therefore the only way to implement a secure payment option is through the use of TT or cryptocurrency.
    - Since direct SMS notifications cannot be implemented; it's better to opt for push notifications or email.
- Quality:
    - Changing requirements might affect quality. It can be mitigated by adopting a flexible and iterative process for development such as RAD which uses prototyping.

Iv. Assumptions

- Stable internet connectivity for hosted solutions
- Availability of key stakeholders for feedback

V. Exclusions

- Souvenir Shop POS & Inventory Management

    - The system will not include a POS & inventory management system for the souvenir shop which might be created in the future. Only the souvenir items added by admins to the system will be included in the website.

Vi. Deliverables

- UFA travel agency Website
    - **Booking functionality:** booking system that allows users to search for hotels. It will include features like date selection, price comparison and availability checks.
    - Souvenir shopping: integrating an online store into the website where users can browse and purchase souvenirs and travel accessories.
    - **Tours and other travel services:** to facilitate tours, excursions activities, and other travel services offered by the agency. This includes eSim on arrival and Transportation to hotels.
    - **Customer Relationship Management dashboard:** creating a CRM dashboard for managing customer interactions, bookings, inquiries, and feedback. It should provide insights into customer preferences, purchase history, etc.
- Bots
    - **Custom arrival and departure bot:** the bot can send automated alerts to users regarding upcoming departures, arrivals and flight-related information.
    - **Sales reporting:** reporting functionalities to track sales performance, revenue trends and customer demographics. The sales reporting system should generate comprehensive reports and visualizations for informed decision making.
    - **Chatbots to answer FAQs:** Chatbots can be integrated into the website to answer frequently asked questions about booking procedures, travel information, visa requirements and more.

Vii. Core Functions

- Booking system
    - Reservation and cancellation handling
    - Pricing management
    - Booking confirmation and notifications
- Customer Relationship Management
    - Customer profiles
    - History tracking
    - Loyalty program
    - Preferences and special requests management
- Analytics Dashboard
    - Sales performance tracking
    - Operational metrics
- Administrative Backend
    - Secure login
    - Booking management (add, modify, cancel)
    - Content management (add, update, delete)
- Custom bots
    - Flight schedule alert bot and sales report bot

Viii. Enhance Functions

- Customizable reporting and data visualization
- Recommendation system
- Chatbot assistance
- Mobile application

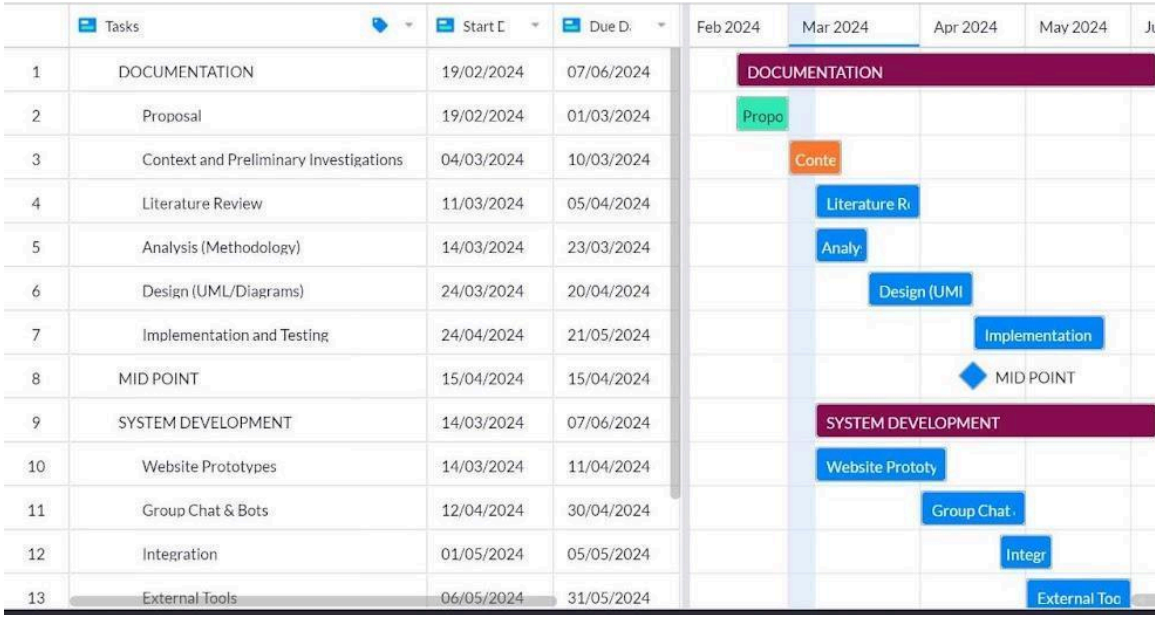
Ix. Future enhancements

- AI-Powered recommendations
- AR/VR integration
- Multi-Currency support
- Blockchain payments
- Social Media Integration
- Predictive analytics
- Geolocation services

1.5 Project Development Plan

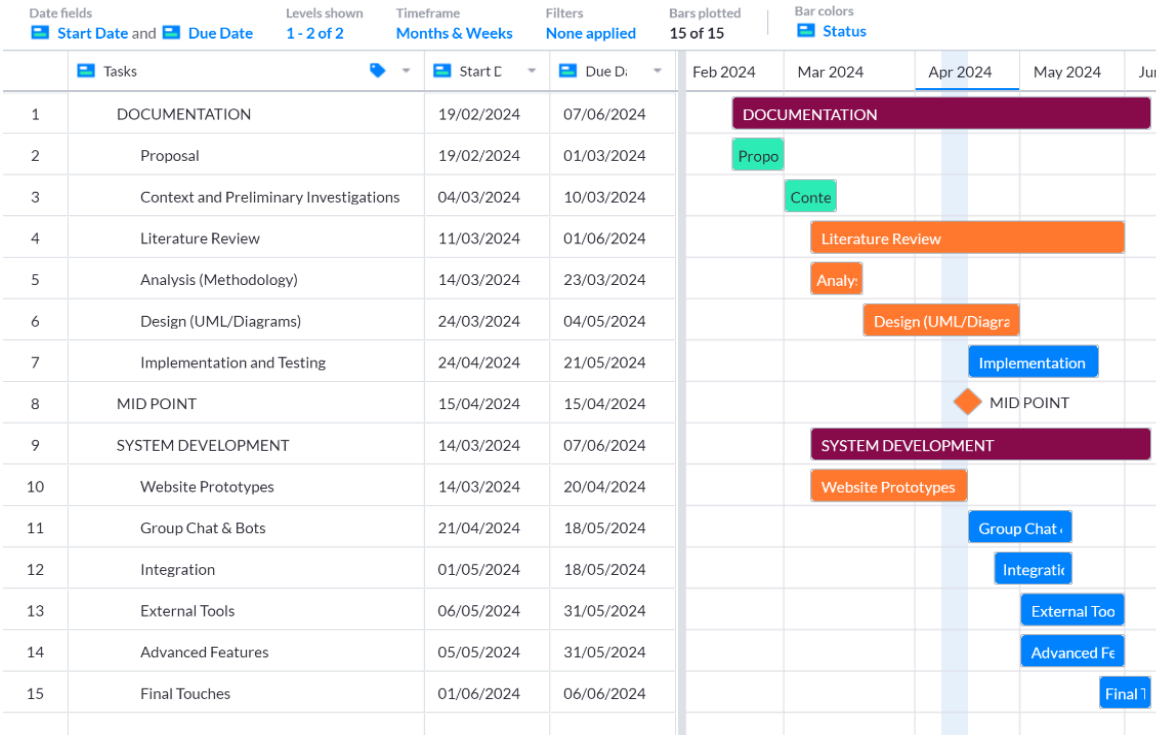
Project timeline with key milestones and deadlines, and risk management

Gantt Chart Week 4



	Tasks	Start D	Due D
1	DOCUMENTATION	19/02/2024	07/06/2024
2	Proposal	19/02/2024	01/03/2024
3	Context and Preliminary Investigations	04/03/2024	10/03/2024
4	Literature Review	11/03/2024	05/04/2024
5	Analysis (Methodology)	14/03/2024	23/03/2024
6	Design (UML/Diagrams)	24/03/2024	20/04/2024
7	Implementation and Testing	24/04/2024	21/05/2024
8	MID POINT	15/04/2024	15/04/2024
9	SYSTEM DEVELOPMENT	14/03/2024	07/06/2024
10	Website Prototypes	14/03/2024	11/04/2024
11	Group Chat & Bots	12/04/2024	30/04/2024
12	Integration	01/05/2024	05/05/2024
13	External Tools	06/05/2024	31/05/2024

W6 gantt



Date fields: Start Date and Due Date | Levels shown: 1 - 2 of 2 | Timeframe: Months & Weeks | Filters: None applied | Bars plotted: 15 of 15 | Bar colors: Status

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1	DOCUMENTATION	19/02/2024	07/06/2024
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10	Website Prototypes	14/03/2024	20/04/2024
11	Group Chat & Bots	21/04/2024	18/05/2024
12	Integration	01/05/2024	18/05/2024
13	External Tools	06/05/2024	31/05/2024
14	Advanced Features	05/05/2024	31/05/2024
15	Final Touches	01/06/2024	06/06/2024

Chapter 2 - Literature Review

2.1 Chapter Introduction

The literature review will help to identify the opportunities to improve existing systems. And identify the challenges faced by them. And to make informed decisions based on data and facts and not just opinions.

2.1.1 Research Methodology

Systematic review of qualitative and quantitative research in existing solutions and other related systems will be conducted from multiple available sources. First, relevant research topics and questions will be selected. Well-cited literature from not older than 5 years ago will be prioritized while searching. Relevance to the project will also be considered for inclusion or exclusion of the literature.

2.1.2 Research Topics (outline)

2.2	**Technology in Tourism**
2.2.1	Digitalization of Tourism
2.2.2	Online Travel Agency (OTA)
2.2.3	Recommendation Systems in Tourism
2.2.4	Predictive Analytics and Forecasting Tourist Arrivals
2.2.5	Blockchain & Crypto in Tourism
2.2.6	Robotics and Automation in Tourism
2.2.7	AI Fraud Prevention and Security
2.2.8	Chatbots and Virtual Assistants in Tourism

2.3	**Related Systems**
2.3.1	Hotel Management System (HMS)
2.3.2	Property Management System (PMS)
2.3.3	Global Distribution System (GDS)
2.3.4	Customer Relationship Management (CRM)
2.3.5	Content Management System (CMS)
2.3.6	Inventory Management System (IMS)
2.3.7	Point of Sale (POS) System

2.4	**Learning Outcomes**
2.4.1	Existing Solutions
2.4.2	Meta Analysis
2.4.3	Conclusion

2.2 Technology in Tourism

2.2.1 Digitalization of Tourism

According to the United Nations World Tourism Organization (UNWTO), we are headed towards the beginning of the 4th industrial revolution. In the Industry 4.0 environment, intelligent machines communicate with each other and complete tasks with minimal human involvement (Ghobakhloo, 2019). Smart Tourism and Tourism 4.0 revolves around new digital technologies. The aim of Tourism 4.0 is to develop a model that minimizes the negative impact of tourism while improving the overall experience. (Penecy, et al. 2020). IoT, AR, VR, Robotics, and Big Data are aspects of Hospitality Industry 4.0. Virtual travel technologies such as VR, drones, and satellites may affect the future of Tourism. (Youssef, Zeqiri 2020) 6 common principles can characterize tourism 4.0. This includes interoperability, virtualization, decentralization, real-time data analysis, service orientation towards internal and external clients, and modularity/flexibility. (Pencarelli, 2020)

ICTs are also being integrated into physical infrastructure. For example, Brisbane installed more than 100 beacons in tourist attractions to notify tourists when they are close. IoT things such as RFID tags, sensors, and mobile devices can interact with each other and bridge the gap between the real world and the digital world. (Gretzel, 2015) Technologies such as 3D Printers can be used to make personalized souvenirs. (Pencarelli, 2020) Although not feasible for small businesses right now, in the future, robots can be used to automate tasks such as inventory management. (Sharma, 2021; Guleria, 2021) Virtual Reality or VR can be used to promote tourism to give users a virtual experience of the destination without physically being there. This can help tourists to make more informed decisions. (Marasco et al., 2018; Rahimizhian et al., 2020 as cited in Junyu et al., 2021)

The viral outbreak of COVID-19 forced governments and organizations to restrict travel to control the spread of the disease. This is one of the best real-world applications of virtual tourism. According to the World Tourism Organization (UNWTO), there was a 74% decline in international tourist arrivals in 2020. (UNWTO, 2021) This has forced people to stay indoors and seek virtual forms of travel. Such as through VR technology (Junyu et al., 2020) During the COVID-19 pandemic, there is less demand for mass activities

and an increased demand for specialized types of tourism (V. Zheleva et al., 2021)

2.2.2 Online Travel Agencies (OTAs)

The Internet and Information technology have changed the way traditional travel agencies work. Online Travel Agencies (OTAs) often provide personalized tourism products (Tütünkov-Hrisztov, 2020; Tao, 2022). The rise of OTAs forced traditional travel agencies to adapt to the digital age to be able to compete in the current market. (Tao, 2022; Tang, 2023).

2.2.3 Recommendation Systems in Tourism

Tourists are sometimes unable to make informed decisions because they have too many options or don't have enough knowledge about something. This is the main reason why Recommender Systems or (RSs) were being used in Tourism. Sometimes external factors like the weather and time, often referred to as contextual conditions, make the choice harder. This is why Context-Aware Recommender Systems (CARSs) were introduced. Modern Recommendation Systems learn about specific patterns and order from previous history and try to find points of interests (POIs). Pesonen, et al. (2019) Machine learning algorithms such as collaborative filtering and Bayesian algorithms are crucial for interactive recommender systems tailored to user preferences (Jannach, 2020; Menk, 2019; Bentaleb, 2021) The large-scale Machine Learning ranking system significantly improves profits for Booking.com (Mavridis, 2020) and Probabilistic Latent Semantic Analysis (PLSA) is very useful for sentiment detection (Khotimah, 2018).

2.2.4 Predictive Analytics and Forecasting Tourist Arrivals

(Liu et al., 2018) noticed that tourist arrivals and web search queries share a direct relationship. And presented a method combining feature selection, support vector regression, and particle swarm optimization algorithm to predict tourist arrivals in Taiwan. (Huang, 2020) introduced a two-step method combining a double-boosting algorithm and an ensemble Support Vector Regression-based Deep Belief Network approach which surpassed other models in forecasting monthly tourist arrivals in Hong Kong. (Wen et al., 2021) proposed a hybrid forecasting framework combining fuzzy time series and an atom search optimization algorithm.

(Yang, 2021) proposes a decision-making algorithm for online hotel reservations combining aspect-based sentiment analysis and intuitionistic fuzzy-VIKOR, enhancing prediction accuracy and aiding customer decision-making. (Forouzandeh, 2020) introduces a hotel recommender system using the Artificial Bee Colony algorithm and fuzzy-TOPSIS model showcasing high accuracy.

2.2.5 Blockchain & Crypto in Tourism

Many tourism service providers have started accepting cryptocurrencies which can reduce fees, and increase privacy for tourists. (Treiblmaier, 2020). In The Marshall Islands, The state issued their own cryptocurrency - the Sovereign (SOV) to diversify from US dollar dependency, and boost the economy. (Kwok, 2019)

2.2.6 Robotics and Automation in Tourism

2.2.7 AI Fraud Prevention and Security in Tourism

2.2.8 Chatbots & Virtual Assistants in Tourism

Pattern matching chatbots require predefined answers. But chatbots that use Neural Networks and Deep Learning synthesize human-like responses based on trained datasets. They are typically more context-aware and can generate accurate results. (Adampoulou, & Moussiades, 2020) Chatbots and virtual assistants can improve customer service in Tourism (Camilleri, 2023; Nica, 2018). However, these chatbots are only trained to respond to a set of queries and data sets. And (Gupta, 2022) noted the limitations of current technologies in handling complex queries. (Sahani, 2022; Panduro-Ramirez, 2023) highlight that natural language processing and machine learning could improve these technologies in the future.

2.3 Related Systems

2.3.1 Hotel Management System (HMS)

2.3.2 Property Management System (PMS)

2.3.3 Global Distribution System (GDS)

2.3.4 Customer Relationship Management (CRM) Software

2.3.5 Content Management System (CMS)

2.3.6 Inventory Management System (IMS)

2.3.7 Point of Sale (POS) System

2.4 Learning Outcomes

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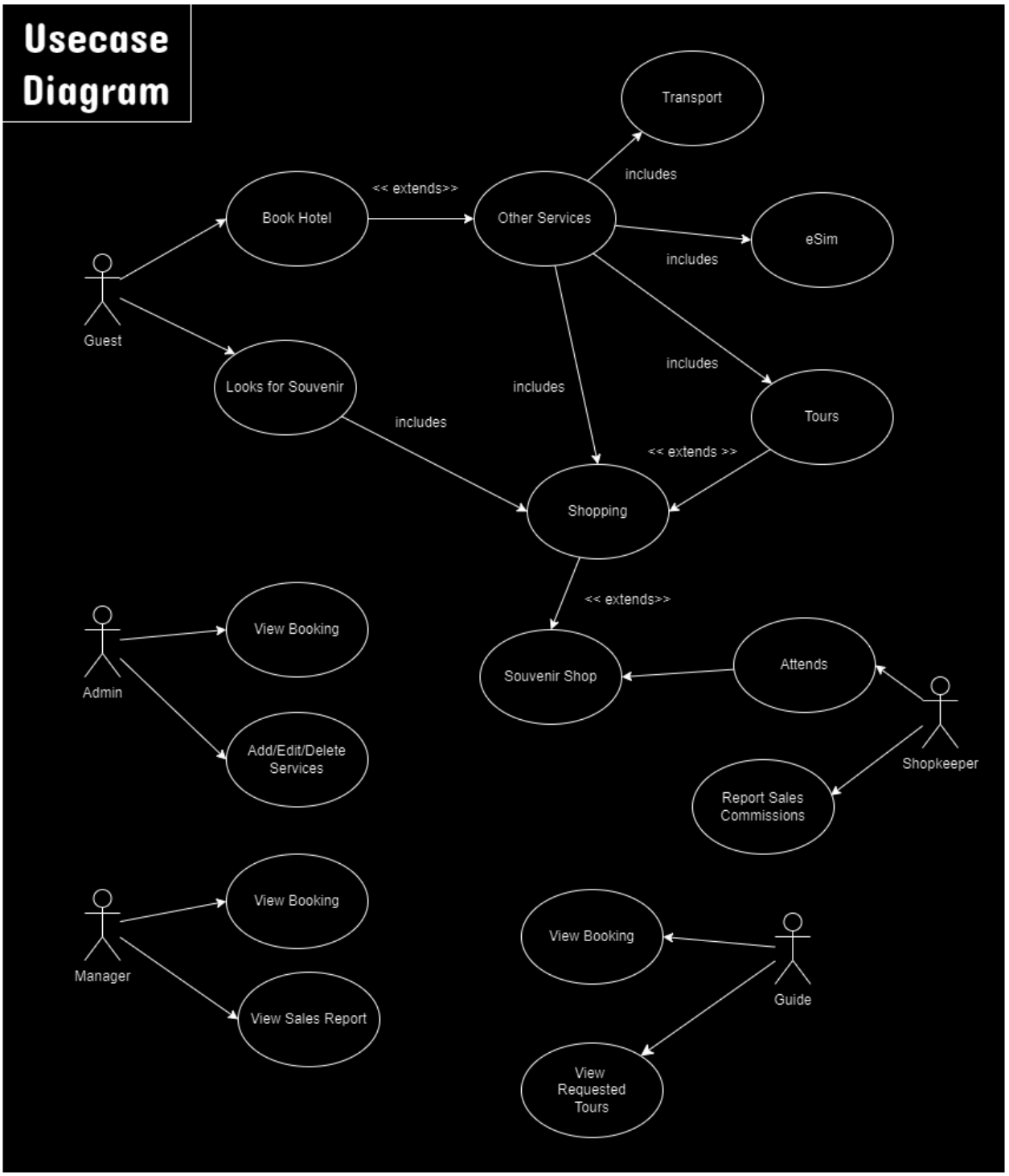
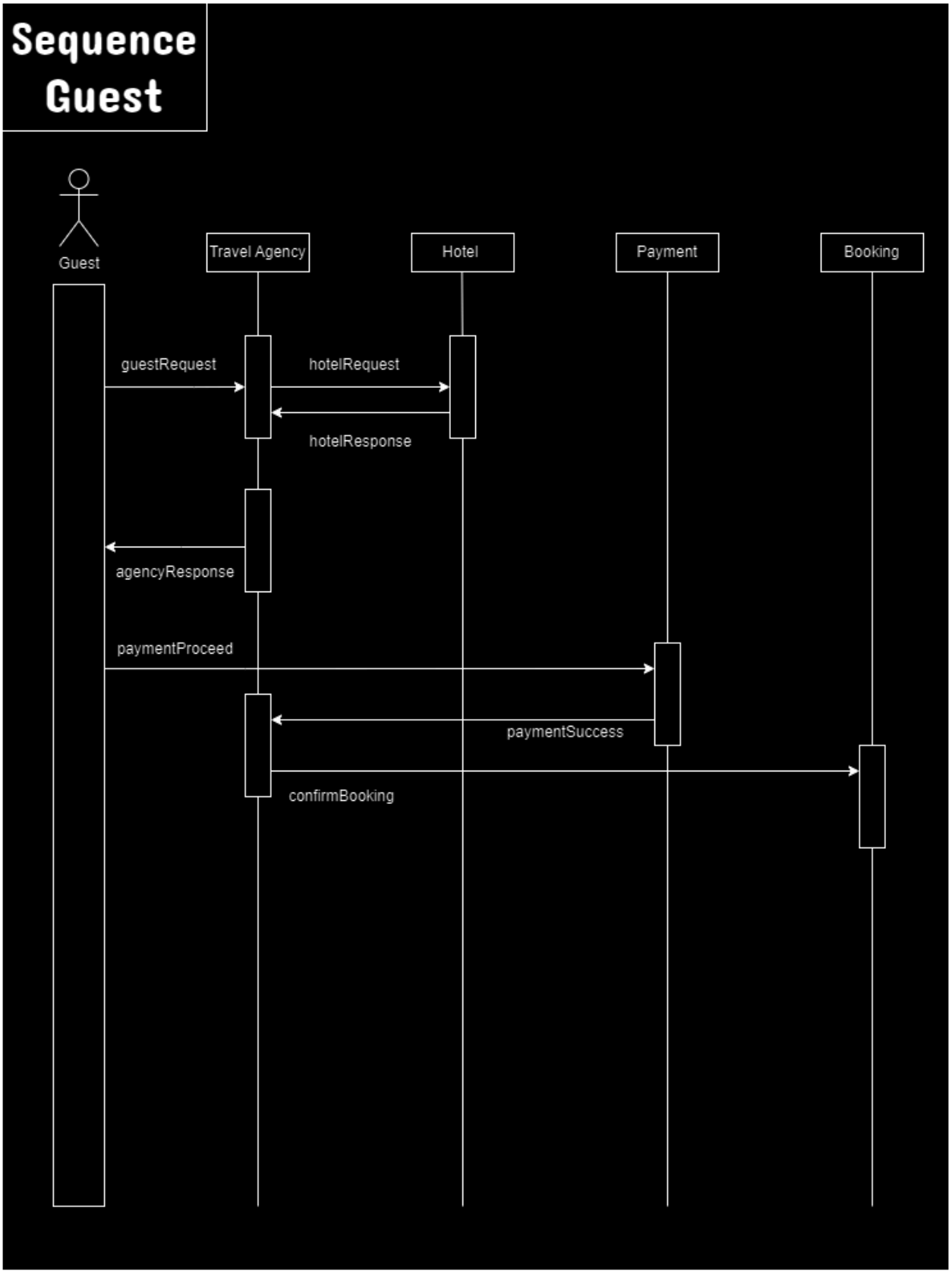
Chapter 3 - System Analysis and Design

3.1 Chapter Introduction

This chapter will include the high-level system architecture which shows the overview of the system. Component-level design including data flow diagram, class diagram and other UML diagrams. And data of the system including the database schemas, and API documentation. As well as, the analysis or problem solving method used.

3.2 Design diagrams

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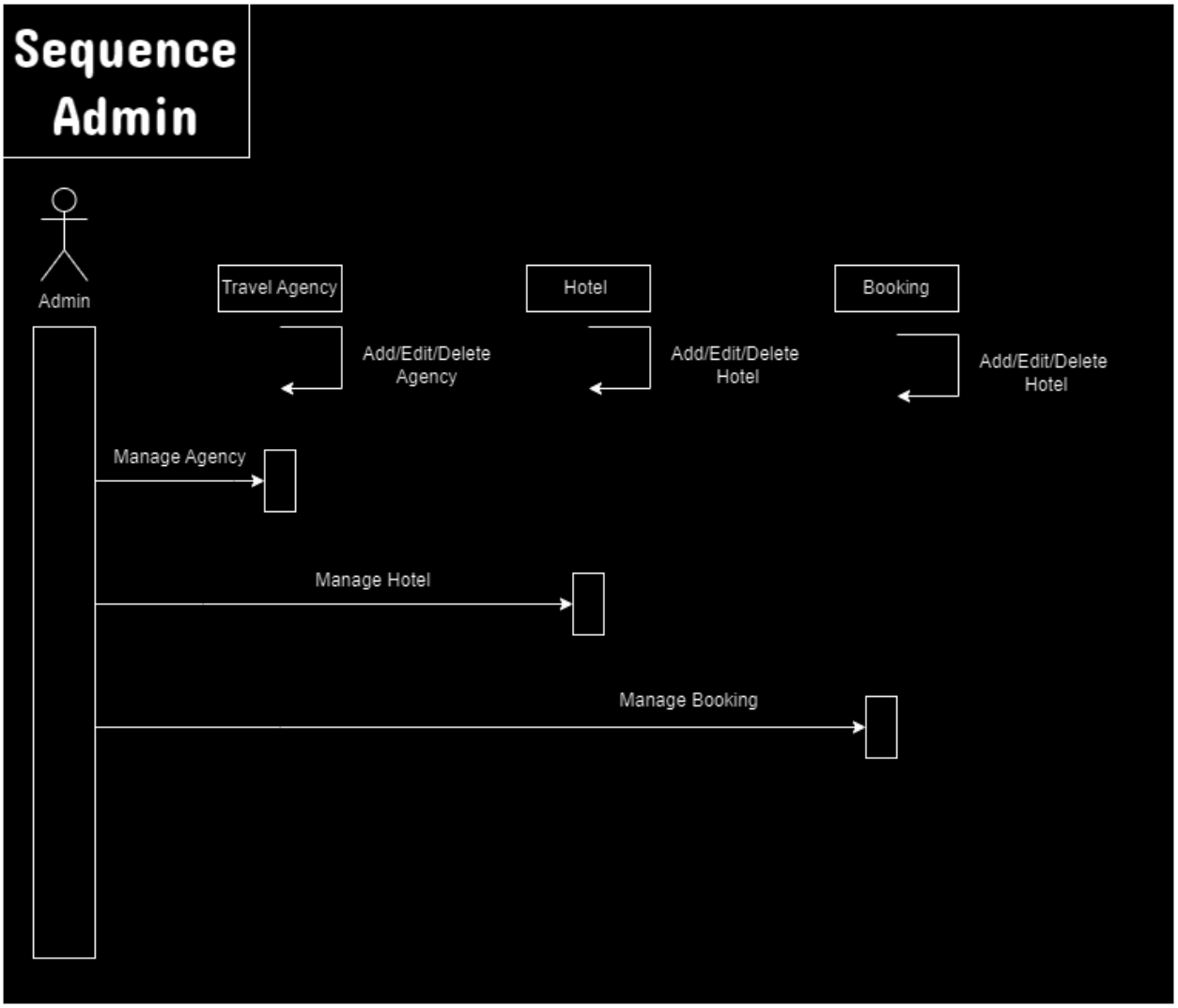
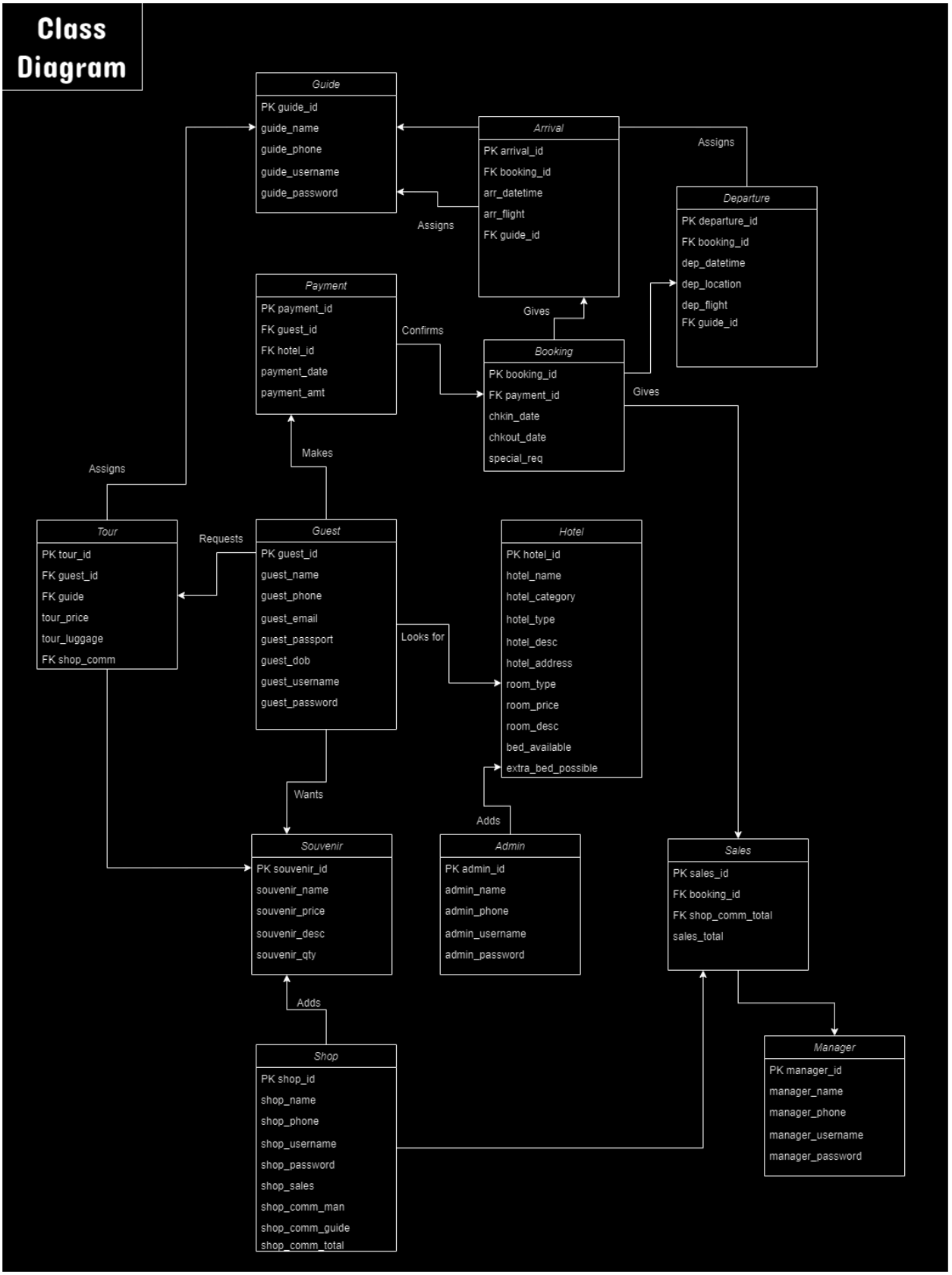
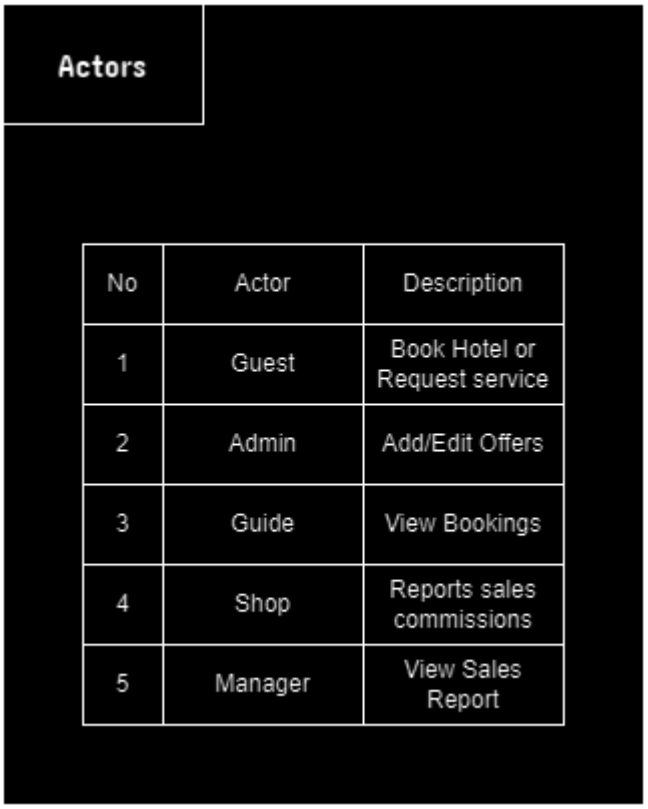
Guest
Travel Agency
Hotel
Payment
Booking
guestRequest
hotelRequest
hotelResponse
agencyResponse
paymentProceed
paymentSuccess
confirmBooking


Sequence Admin
Admin
Travel Agency
Hotel
Booking
Add/Edit/Delete Agency
Add/Edit/Delete Hotel
Add/Edit/Delete Hotel
Manage Agency
Manage Hotel
Manage Booking


Home Layout
logo
Menu Navbar (Header)
login
Hero Area + Book Now
Info Section
<< Deals (carousel) >>
About Us (Footer)


Class Diagram
Guide
PK guide_id
guide_name
guide_phone
guide_username
guide_password
Arrival
PK arrival_id
FK booking_id
arr_datetime
arr_flight
FK guide_id
Assigns
Assigns
Departure
PK departure_id
FK booking_id
dep_datetime
dep_location
dep_flight
FK guide_id
Payment
PK payment_id
FK guest_id
FK hotel_id
payment_date
payment_amt
Confirms
Gives
Booking
PK booking_id
FK payment_id
chkin_date
chkout_date
special_req
Gives
Makes
Assigns
Tour
PK tour_id
FK guest_id
FK guide
tour_price
tour_luggage
FK shop_comm
Requests
Guest
PK guest_id
guest_name
guest_phone
guest_email
guest_passport
guest_dob
guest_username
guest_password
Looks for
Hotel
PK hotel_id
hotel_name
hotel_category
hotel_type
hotel_desc
hotel_address
room_type
room_price
room_desc
bed_available
extra_bed_possible
Wants
Adds
Souvenir
PK souvenir_id
souvenir_name
souvenir_price
souvenir_desc
souvenir_qty
Admin
PK admin_id
admin_name
admin_phone
admin_username
admin_password
Sales
PK sales_id
FK booking_id
FK shop_comm_total
sales_total
Adds
Shop
PK shop_id
shop_name
shop_phone
shop_username
shop_password
shop_sales
shop_comm_man
shop_comm_guide
shop_comm_total
Manager
PK manager_id
manager_name
manager_phone
manager_username
manager_password



No	Actor	Description
1	Guest	Book Hotel or Request service
2	Admin	Add/Edit Offers
3	Guide	View Bookings
4	Shop	Reports sales commissions
5	Manager	View Sales Report

Chapter 4 - Implementation

4.1 Chapter Introduction

This chapter shows clearly how the solution to the problem is realized.

Chapter 5 - Testing

5.1 Chapter Introduction

Address the evaluation of the solution against its objectives and success criteria. It should include the resting strategy used, and the planning and application of the tests. And any modification to the design and implementation to be recommended.

Chapter 6 - Critical Evaluation

6.1 Chapter Introduction

Success of the project in academic terms and learning outcomes.

References