ADVANCED TOUR GUIDE APPLICATION

UNDER THE GUIDANCE OF

Mr Aniruddha Das

Project Report submitted to Haldia Institute of Technology, Haldia, in partial fulfilment of the requirements for the degree of

Bachelor of Computer Science & Engineering

by

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HALDIA INSTITUTE OF TECHNOLOGY, HALDIA.

2019-2023

CERTIFICATE

TO WHOM IT MAY CONCERN

I hereby recommend that the dissertation report entitled **Advanced Tour Guide Application** is the bona fide work carried out by **Adrian Sajjan (Uni Roll: 00119010), Aheri Mondal (Uni Roll: 00119011), Aritra Ghorai (Uni Roll: 00119027), Shrayan Bandyopadhyay (Uni Roll: 10300120210)** of B-tech 8th semester in the department of Computer Science & Technology, Haldia Institute of Technology, during the academic year 2019 - 2023 in partial fulfilment for the degree of **Bachelor of Technology in Computer Science & Engineering** at Haldia Institute of Engineering and that this project has not been submitted previously for the award of any other degree, diploma or fellowship.

Prof. (Dr.) Subhankar Joardar
(Head of the Department)

Computer Science & Engineering

Mr Aniruddha Das
(Project Supervisor)

Computer Science & Engineering

Declaration

We certify that,

a) The work contained in this report is original and has been done by me/us under the guidance of our supervisor.

b) The work has not been submitted to any other Institute for any degree or diploma.

c) We have followed the guidelines provided by the Institute in preparing the report.

d) We have conformed to the norms and guidelines given in the Ethical Code of Conduct of the Institute.

e) Whenever we have used materials (data, theoretical analysis, figures, and text) from other sources, we have given due credit to them by citing them in the text of the report and giving their details in the references.

Name and signature of the students.

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Abstract

Advanced Tour Guide Application

Tourism is an industry based on a series of technological advancements, where people from different locations and cultures interact with each other with growing interest. Unlike our predecessors, today people can travel around the world safely and efficiently. As tourism is one of the most popular and emerging industries, governments are carefully observing its benefits and challenges. Tourism affects the economic, sociocultural, ecological and information resources of countries. The tourism industry in India lacks a smart customer support system for travel and tourism. The main objective of our software development project is to provide an android mobile application that will guide tourists by providing relevant information and a system available for inquiry purposes. The system acts as a human counterpart, helping tourists to visit their favourite places under the guidance of our system by communicating with the system. For this, the user is provided with predefined location-based tour packages with details regarding nearby sightseeing destinations. This helps the user to find a suitable location for a trip based on the location and time available.

Acknowledgement

It is my great fortune that I have got the opportunity to carry out the project work under the supervision of Mr Aniruddha Das in the department of Computer Science & Engineering, Haldia Institute of Technology, West Bengal, India. I express my sincere thanks and deepest sense of gratitude for his constant support, unparalleled guidance and limitless encouragement.

I wish to convey my gratitude to Prof. (Dr.) Subhankar Joardar, Head of the Department of Computer Science & Engineering, Haldia Institute of Technology, and to the authority for providing all kinds of the infrastructural facility towards the project work.

I would also like to convey my gratitude to all faculty members and the staff of the Department of Computer Science & Engineering, Haldia Institute of Technology, for their wholehearted cooperation to make this work turn into reality.

Also, thanks to fellow members of our group for working as a team.

Table of Contents

1. Introduction

1.1 Purpose

According to the World Tourism Organization, Yearbook of Tourism Statistics, Compendium of Tourism Statistics and data files, the number of tourists who visit India increases (The World Bank, n.d.) every year. 64,226,545 tourists visited India between 1st of January 2017 to 31st of December 2021 [1].

Table 1: Number of tourists visited India

YEAR	NUMBER OF TOURISTS PER YEAR
2017	15,542,854
2018	17,423,420
2019	17,913,514
2020	6,337,122
2021	7,009,635

Travellers to a foreign country may encounter a number of problems during their journey. When they arrive at the airport, they will be nervous thinking about their upcoming trip. These include the identification of places to visit in the country, travel to places of interest, difficulty in obtaining geolocation information and meeting their accommodation needs. In the modern world, the use of guidance systems has become much more common among people.

Traditionally, people used maps and compasses to navigate to specific places in an unfamiliar environment. But with the advancements in science and technology, people tend to use guidance systems built into their mobile devices. There are millions of tourists visiting a country to see it at their leisure. However, the current advanced tour guide system has only a few and most do not meet the needs of users. condition. Therefore, the demand for such systems has become very high.

1.2 Glossary

TERM	DEFINITION
Database	Collection of all the information monitored by the system.
Tourist Guide	The person who guides the tourist in the areas and accompanies him to the places he wants to go and communicates with him.
Developers	People who developed and built the system.
Software Requirements Specification	A document that entirely describes all of the functions of the proposed system and constraints under which it must operate. For example, this document.
Users	The tourist, Tourist Guide, Developer, Manager, any other person.
Tasked To	The person who has been tasked to accomplish the task.
A	Adrian Sajjan
B	Aheri Mondal
C	Aritra Ghorai
D	Shrayan Bandyopadhyay

1.3 Define the problem

a) It is clear that there is a lack of exploitation of the potential and advantages of the Internet in the large-scale promotion of the various tourist attractions that India has.

b) Weakness of the websites of the Indian tourism organizations on the internet, whether in terms of the design or content of these tourist information applications in India, besides the low distribution of these applications and their presence in global travel guides and internet search advertisements.

c) Weak Interaction with customers(visitors) in many Indian tourism applications on the internet in addition to the weak attention to the attractiveness of the offer and the connection between parts and content of most tourism sites of India online, making it difficult to access the information contained in these applications and navigating these applications tedious and time-consuming.

d) The Government's lack of interest in the official Indian tourist application portal on the internet which provides enough information in various international languages about popular Indian tourist attractions, supported by pictures and video clips, as is the case with many international national tourist application portals on the internet.

e) The absence of electronic applications that contribute to tourism promotion about historical sites and natural elements, and flexibly provide tourist information and services, easily leads to their reluctance to come to visit India.

f) Foreigners lack knowledge about the country's historical sites due to the weakness in tourism promotion and the use of traditional tourism promotion methods, causing the weakness of the tourism industry and negative effects on the national income of the country.

1.4 Document Conventions

i. Page Settings.
    a. Top Margin - 2.54 cm
    b. Bottom Margin - 2.54 cm
    c. Left Margin - 3 cm
    d. Right Margin - 3 cm
ii. Headers - Bold & Underlined. Font Size - 16.
iii. Sub-Headers - Bold, Font Size - 14.
iv. Table Title - Bold, Font Size - 11.
v. General Text.
    a. Font Type - Courier New
    b. Font Size - 12
    c. Line Spacing - 1.5

1.5 Intended Audience

This document is intended for requirements engineers, domain experts, developer, project supervisors & departmental heads. Before reading this document it is highly recommended to read the user manual to get an overview of the product.

1.6 Project Scope

An android software named **Exploriana** is being developed which will help incoming tourists domestic and foreign to book a guided trip to a particular destination in India for a fixed amount payable upfront. Initially, a backend database will store the location-wise details of most of the metropolitan cities and it will expand as time goes on.

In the implementation phase, the Advanced Tour Guide Application is based on 4 major components.

i. Location-based information.
ii. Optimal route generation based on user's time availability.
iii. Live & Smart notifications
iv. Location-based review system

Objective:

The objective of the project is to develop an application that automates the process and activities of a travel and tourism agency.

2. OVERALL DESCRIPTION

2.1 Product Perspective

Exploriana is a software application similar to other Travel Guide Applications currently available in the Indian software market, for example, MakeMyTrip. This application displays output based on the user requirement of their travel plans to a particular destination within different countries of the world. Currently, the destinations are limited to most of the metropolitan cities of the most popular countries. The contents of this application include a choice for the user for a search of destinations for sightseeing in popular countries, popular spots, and tours based on a budget.

2.2 Feasibility study & Time Plan

2.2.1 Economic Feasibility

The financial costs and benefits associated with the system were identified and the resources with the greatest potential benefits were selected and estimates were made to determine the expected costs and benefits. It is divided into two parts:

- Cost of the hardware:

  The estimated cost is Rs 0.00 as the hardware used in the project is already present in any standard computer.

- Cost of the working group:

  The estimated cost is Null as the software's used in the project are open-source software's and applications.

2.2.2 Technical Feasibility

In which the ability of the team to build the application is evaluated and the technical questions needed for this application can be provided such as software and programmers and whether this application can be used by the average user.

2.2.3 Operational Feasibility

- Ensure that the system guides the user to the destination they want correctly.
- Ensure that the system is suitable for the beneficiaries of the system.
- Make necessary adjustments to the system in the event of any amendment.

2.2.4 Time Feasibility

Phase	Period	Duration
Definition & Selection	09/10/2022-16/10/2022	7 days
Starting & Planning	16/10/2022-24/10/2022	8 days
Analysis	24/10/2022-03/11/2022	10 days
Design	03/11/2022-10/11/2022	7 days
Implementation	10/11/2022-20/11/2022	10 days
Validation		7 days

Table 1 feasibility time table

- Definition and Selection

Phase	Period	Tasked to
Identify projects to be implemented	09/10/2022-11/10/2022	A+B
Classification and assessment of respiratory probabilities	11/10/2022-13/10/2022	C+D
Project Selection	09/10/2022-16/10/2022	A+B+C+D

Table 2 definition & selection table

- Starting and Planning

Phase	Period	Tasked to
Start process	16/10/2022-17/10/2022	A+B+C+D
Preparation of the project	17/10/2022-18/10/2022	A+C+D
Determination of frequency - domain - time	18/10/2022-18/10/2022	B
Risk identification	18/10/2022-20/10/2022	C
Establishing the initial plan of the project	20/10/2022-21/10/2022	A
Confirm approval to move to the next step	21/10/2022-21/10/2022	D
Planning	21/10/2022-22/10/2022	A+C
Building the initial planning	22/10/2022-22/10/2022	B+D

Building feasibility study	23/10/2022-24/10/2022	B+D
Confirm approval for transition for analysis	24/10/2022-24/10/2022	A

Table 3 starting & planning table

- Analysis

Phase	**Period**	**Tasked to**
Requirements Elicitation	24/10/2022-25/11/2022	A+B+C+D
Requirements Analysis	25/10/2022-27/11/2022	A+B+C+D
Requirement Specification	27/10/2022-30/11/2022	C
Requirements Validation	30/10/2022-03/11/2022	A

Table 4 analysis table.

- Design

Phase	**Period**	**Tasked to**
Architecture Design	03/11/2022-06/11/2022	A+B+C+D
UML Design	05/11/2022-10/11/2022	A+C
Database Design	03/11/2022-08/11/2022	C+D
Initial Interfaces Design	05/11/2022-10/11/2022	A+B

Table 5 design table.

- Implementation & validation

Phase	**Period**	**Tasked to**
Interfaces Implementation	10/11/2022-20/11/2022	A+B+C+D
Unit Testing		B+C
Integrated Testing		A+D
System Testing		B+D

Table 6 implementation & validation table.

2.3. Constraints & Impediment

i. Access to tourist destinations is restricted due to security concerns.

ii. It is challenging to find information about tourist destinations due to the official tourism website's lack of interest. This application offers sufficient information on multiple international places about famous tourist attractions, supported by images, as is the case with many different international tourist applications.

iii. It takes time for a person to comprehend and implement a new programming language on an android system.

iv. The team's overburdened workload brought on by the existence of other projects tying the project to the same time period for the project submission, causing delays in the process of on-time delivery.

2.4. Solutions & Proposals

i. Heavy reliance on internet accessibility for information about the world's tourist attractions and archaeological sites.

ii. Acquiring a generator or turning to solar power to stay out of trouble during power outages.

iii. To raise the skill level of the team working on the programming language in the environment used to construct the system. Conduct an online training course or download a training course in the Android environment or other studio settings.

iv. The use of individuals with deep local knowledge and those who are more mobile within the regions, and the gathering of information on these places from them.

3. System Features & Requirements

3.1. Functional Requirements

In software engineering and systems engineering, a **functional requirement** defines a function of a system or its component, where a function is described as a specification of behaviour between inputs and outputs [2].

ID: FR1

Title: Download mobile application

Description: A user should be able to download the mobile application through either an application store or a similar service on the mobile phone. The application should be free to download.

Dependency: None

ID: FR2

Title: Download and notify users of new releases.

Description: When a new or updated version of the software is released the user should check for these manually. The download of the new release should be done through the mobile phone in the same way as downloading the mobile application.

Dependency: FR1

ID: FR3

Title: Registration of new users.

Description: Visitors use their e-mails as the sole identifiers to register. Fill in the email, and password, and re-enter the password when registering.

Dependency: FR1

ID: FR4

Title: Login to the application.

Description: Users will be able to log into their respective applications by using the e-mails and passwords that they have provided while registering themselves on the application.

Dependency: FR3

ID: FR5

Title: User's current location service.

Description: Users will allow the application to collect their current geographic location. The app will then display the user the nearby locations to visit as per their popularity.

Dependency: FR3

ID: FR6

Title: Site search.

Description: The application displays popular tourist places in the city. Visitors can find destinations in the hierarchical structure. Destinations are arranged in a Province - City – Tourist spots structure, in which province, city and Tourist spots pages are separated. The tourist spot is the smallest unit.

Dependency: FR4, FR5

ID: FR7

Title: Tour Booking.

Description: A registered customer can use the application to book a tour of his choice.

Dependency: FR3,FR4

ID: FR8

Title: Tourism services.

Description: A registered customer can use the application to view, edit or cancel any trips of his choice.

Dependency: FR4,FR5

ID: FR9

Title: Wish listing.

Description: The user should be provided with an option to add a displayed trip to someplace where the user can refer to that trip again after browsing other trips. This will help the user to save trips that the user likes and easily get back to those omitting the requirement to search for that trip again.

Dependency: FR4, FR5

ID: FR10

Title: Reviews.

Description: After login, users can rate tourist spots, tours. Rating reflects how much the public liked the trip, tourist spot or attraction. Users can express their own views to provide reference to others. This is a very important feature which users can participate in, rather than just passively receiving information. Thus, users have become the information provider as well. They can also read other user's reviews.

Dependency: FR4

ID: FR11

Title: User Profile.

Description: Users can edit their profile details such as their name, e-mail, phone number, profile picture, etcetera.

Dependency: FR3,FR4

ID: FR12

Title: Logout of the application.

Description: Users can log out of the system by simply clicking on the logout option in the profiles tab.

Dependency: FR3,FR4

3.2. External Interface Requirements

These requirements include user interfaces (interaction logic between software and user), screen layouts, buttons, functions on every screen, hardware interfaces (here a team describes what devices the software is created for), and other relevant particularities.

It also includes software interfaces like frontend and backend stack, database management systems, etc.

3.2.1 USER INTERFACES

Frontend Software: Kotlin / Android Studio

Backend Software: Node.JS / PostgreSQL

i) Registration Window

User: The customer

Properties: This window is used for entry of customer details and registering a new customer for the online booking system. This window has various text fields to take the information like name, address, phone number. There will be a register button upon pressing which the user will be registered.

ii) Log in Window:

User: The customer

Properties: This window has two fields for username and password, and two buttons to log in and register. For the correct username and password, it opens an appropriate window. It has a register button to let new customer register by redirecting to the registration window.

iii) Customer Homepage:

User: Registered customer

Properties: This window opens when a customer logs in. This window is used for booking a tour of the customer's choice and it has provision to display all popular tourist spots in the city and let the customer choose.

3.2.2 HARDWARE INTERFACES

An android smartphone which is running a minimum API Version 21 or Android OS Lollipop.

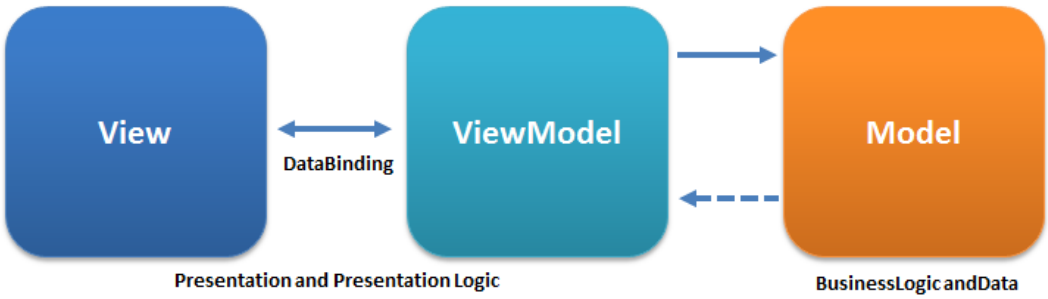
3.2.3 SOFTWARE INTERFACES

Software Used	Description
Operating System	Android OS. Backend hosted on Node.Js and PostgreSQL. Android OS is the most used mobile operating system in the world.
Database	To save the user data, tour data and save user credentials we have chosen PostgreSQL which is a SQL Database.
Frontend Language	We have chosen Kotlin to develop Android Application as Kotlin is now the Google recommended language for developing android based applications. We have coupled it with Jetpack Compose Framework to have a modern declarative UI approach. Additionally we followed the MVVM architecture design approach to maintain a clean and scalable codebase.
Android Studio	Android Studio is the official library for developing android based apps and we have decided to follow the standard procedures.
Java Version	OpenJDK 8

Table 7 software requirements table.

MVVM Architecture:

Model – view – viewmodel (**MVVM**) is an architectural pattern in computer software that facilitates the separation of the development of the graphical user interface (GUI; the *view*)—be it via a markup language or GUI code—from the development of the business logic or back-end logic (the *model*) such that the view is not dependent upon any specific model platform.



3.2.4 COMMUNICATION INTERFACE

All data and requests sent over to the database will securely be encrypted in PostgreSQL. The application shall communicate with various database and software services via API function calls. Additionally, confirmation emails will be sent to the user once they have logged in. The application will also provide users with the option of resetting their forgotten password.

3.3. System Requirements

Heading	Software Used
Platform	Kotlin/Node.JS/ Express.JS
Client System	Android
Server System	Ubuntu
Operating System	Android OS / Linux
Minimum SDK	21
Target SDK	32
Database	PostgreSQL
Type of Database	SQL

Table 8 system requirements table

3.4. Non-Functional Requirements

A. Performance

In every case the response time will be less than 1 second.

B. Security

This app offers password protection so that only registered customers can use its features, only authorized personnel can edit data corresponding to booking, billing and availability information.

C. Accuracy

The application is providing accurate data based on the information available on the internet which is then collected and securely updated on the database server as time goes on.

D. Portability and Scalability

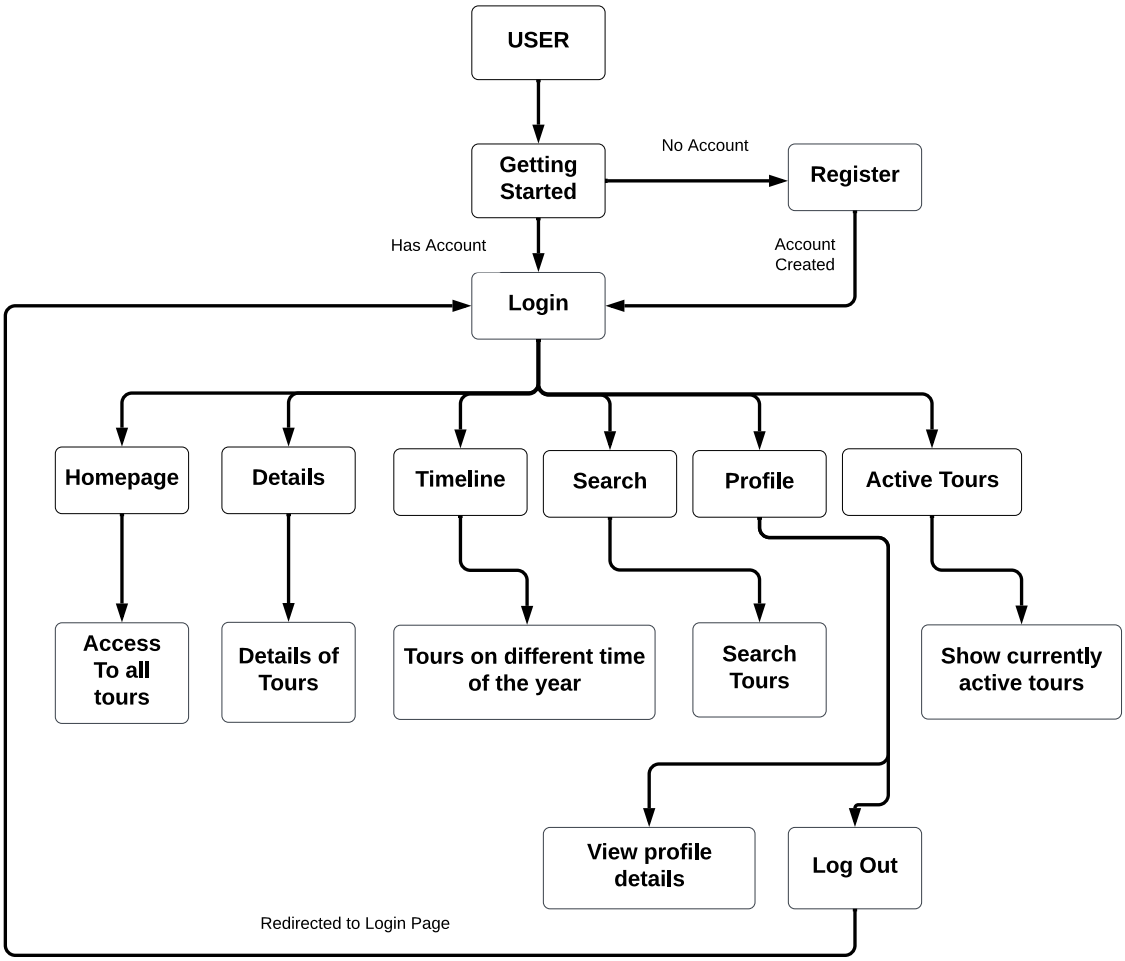
The application could be installed on any android device supporting a minimum version of android apk as mentioned in the system requirements portion above.

When a new customer appears, it can extend the functionality of the system based on the original one and will not affect the existing function.

E. Maintainability of the System

Proper SRS Documentation with Data flow diagrams, Entity Relationship diagrams, User flow diagrams, application code base, Database access, and User guide, ensures proper maintainability of the system by any other developer and quick turnaround time for any faults detected in the system.

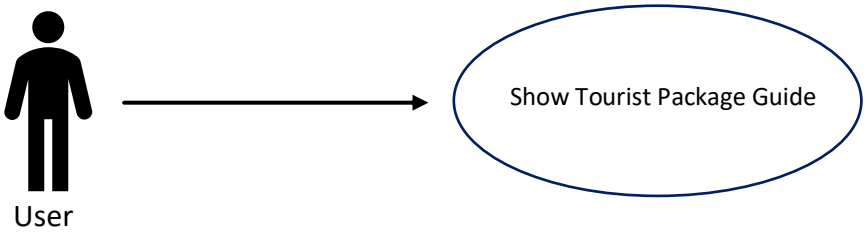
3.5. User - Characteristics



3.6. Visitor Use Case

3.6.1. Use Case: Show tourist package guide

DIAGRAM:

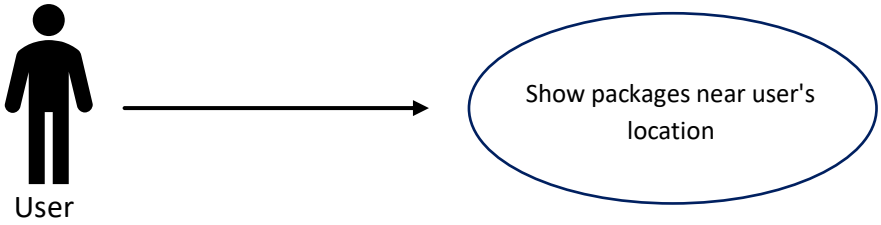


DESCRIPTION:

Where the tourist can see various tourist attraction places and view the details of those landmarks with precise description of it.

3.6.2. Use Case: Show packages near user.

DIAGRAM:

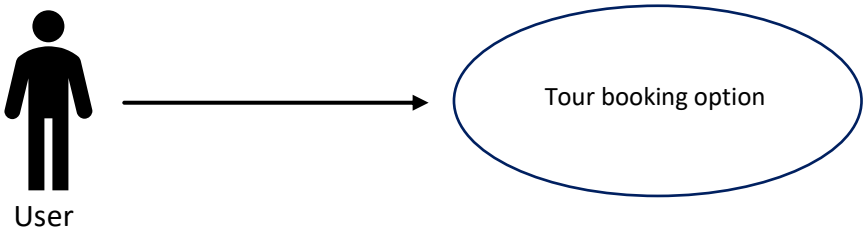


DESCRIPTION:

This function will show the user the tourist packages available near the user's current location if the user has allowed the application the permission to capture their current location.

3.6.3. Use Case: Book Tours

DIAGRAM:



DESCRIPTION:

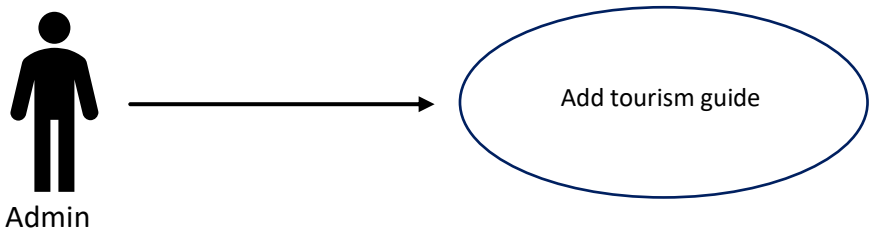
This functionality provides the user with an option to book a tour from the application through the different tours displayed, based on the current location of the user.

3.7. Admin Use Case

In case of multiple admins, this portion refers to the person with whom all communication with the application is made.

3.7.1. Use Case: Add tourism guide & update

DIAGRAM:

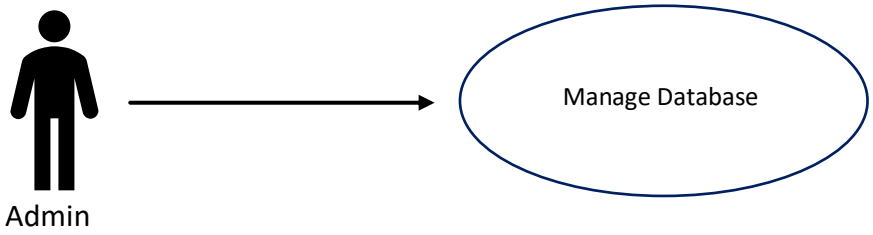


DESCRIPTION:

Tourist features may need to be modified in their data in case they are developed or even add new features.
Through this function the system administrator can add, modify or even delete tourist features.

3.7.2. Use Case: Manage database

DIAGRAM:



DESCRIPTION:

Tourist features may need to be modified in their data in case they are developed or even add new features.
Through this function the system administrator can add, modify or even delete tourist features.

3.8. Logical Structure of the data

The data descriptions of each of these data entities is as follows:

USER DATA ENTITY

Data Item	Type	Description	Comment
id	UUID	Identification number of user	Primary key
name	text	Name of the user	
email	text	Email of the user	
password	text	Password of the user	
role	text	Role of the user	

USER LOCATION DATA ENTITY

Data Item	Type	Description	Comment
id	UUID	Id of user's location	Primary key
address	Text	Address of user's location	
description	Text	Description of user's location	

latitude	Integer	Latitude of user's location	
longitude	Integer	Longitude of user's location	

TOUR DATA ENTITY

Data Item	Type	Description	Comment
id	UUID	Id of the tour	Primary key
cover_image	BLOB	Cover image of the tour	
description	Text	Description of the tour	
difficulty	Text	Difficulty of the tour	
duration	Integer	Duration of the tour	
location_id	UUID	Location id of the tour	
max_group_size	Integer	Maximum group size of the tour	
name	Text	Name of the tour	
price	Integer	cost of the tour	
price_discount	Integer	Discount on the price	
ratings_average	Integer	Average rating of the tour	

ratings_quantity	Integer	Ratings quantity of the tour	
summary	Text	Summary of the tour	

TOUR LOCATIONS DATA ENTITY

Data Item	Type	Description	Comment
location_id	UUID	id of tour location	Composite Key
tour_id	UUID	id of tour	Composite Key
day	Integer	Number of days	

IMAGES DATA ENTITY

Data Item	Type	Description	Comment
image_id	UUID	id of the tourist spot's image	Primary Key
image_url	Text	url of the tourist spot's image	
tour_id	Text	id of the tour	
tour_url	Text	Url of the tour	

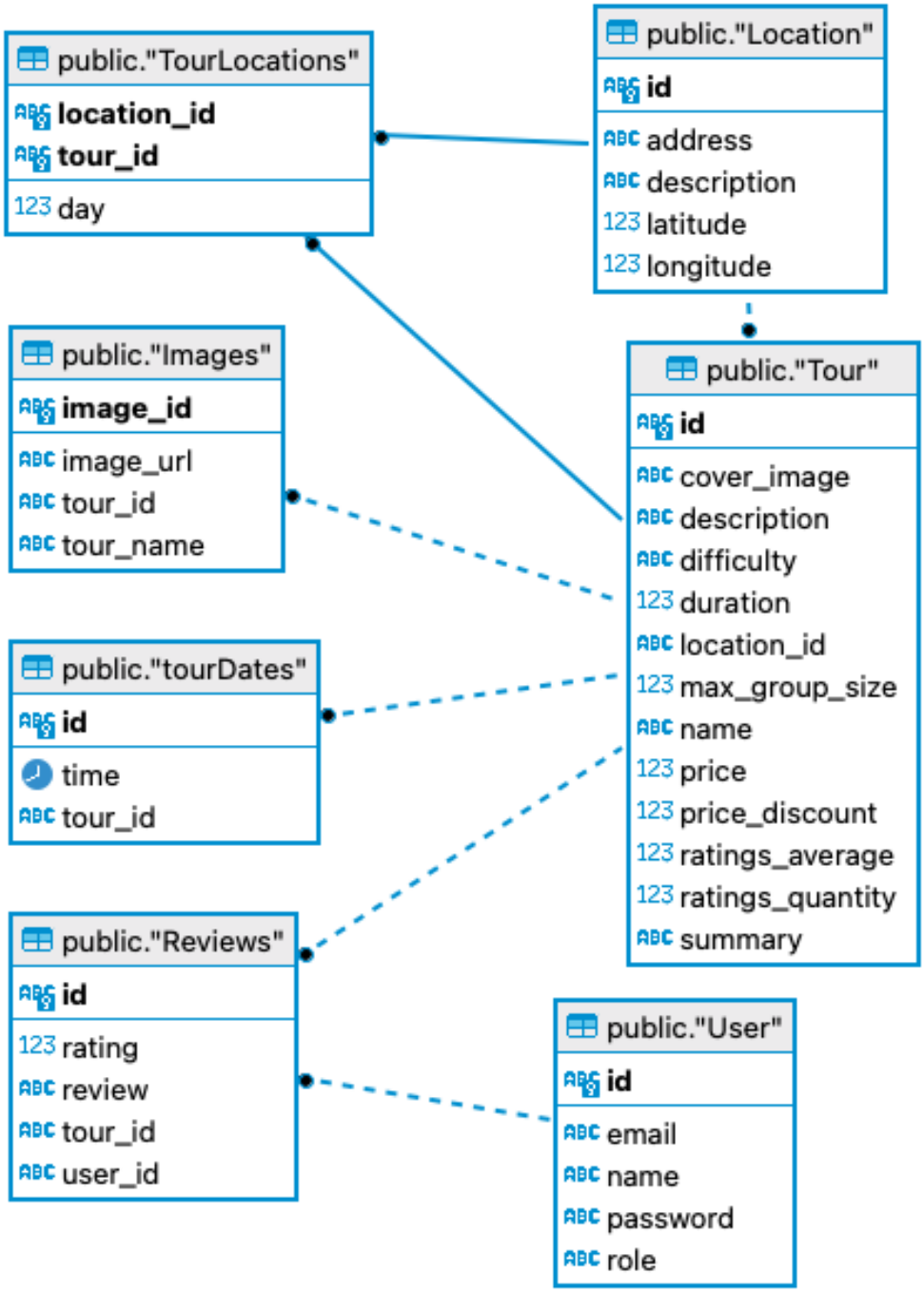
TOUR DATES DATA ENTITY

Data Item	Type	Description	Comment
id	UUID	id of tour dates	Primary Key
time	TIME	Time of tour	
tour_id	Text	id of the tour	

REVIEWS DATA ENTITY

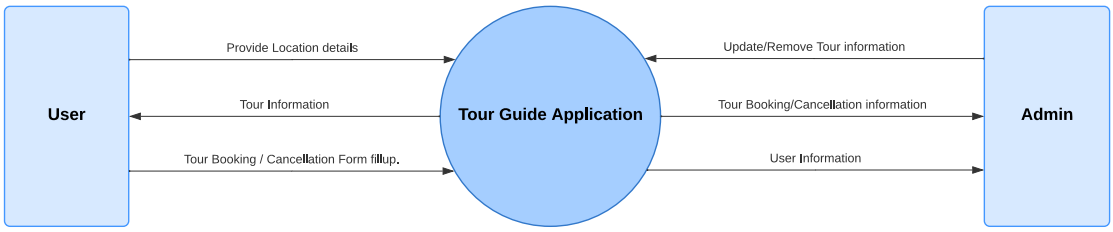
Data Item	Type	Description	Comment
id	UUID	Id of review	Primary Key
rating	Integer	Ratings given	
review	Text	The review written by the user	
tour_id	UUID	Id of the tour	
user_id	UUID	Id of the user	

3.8.1. Entity Relationship Diagram (ERD)

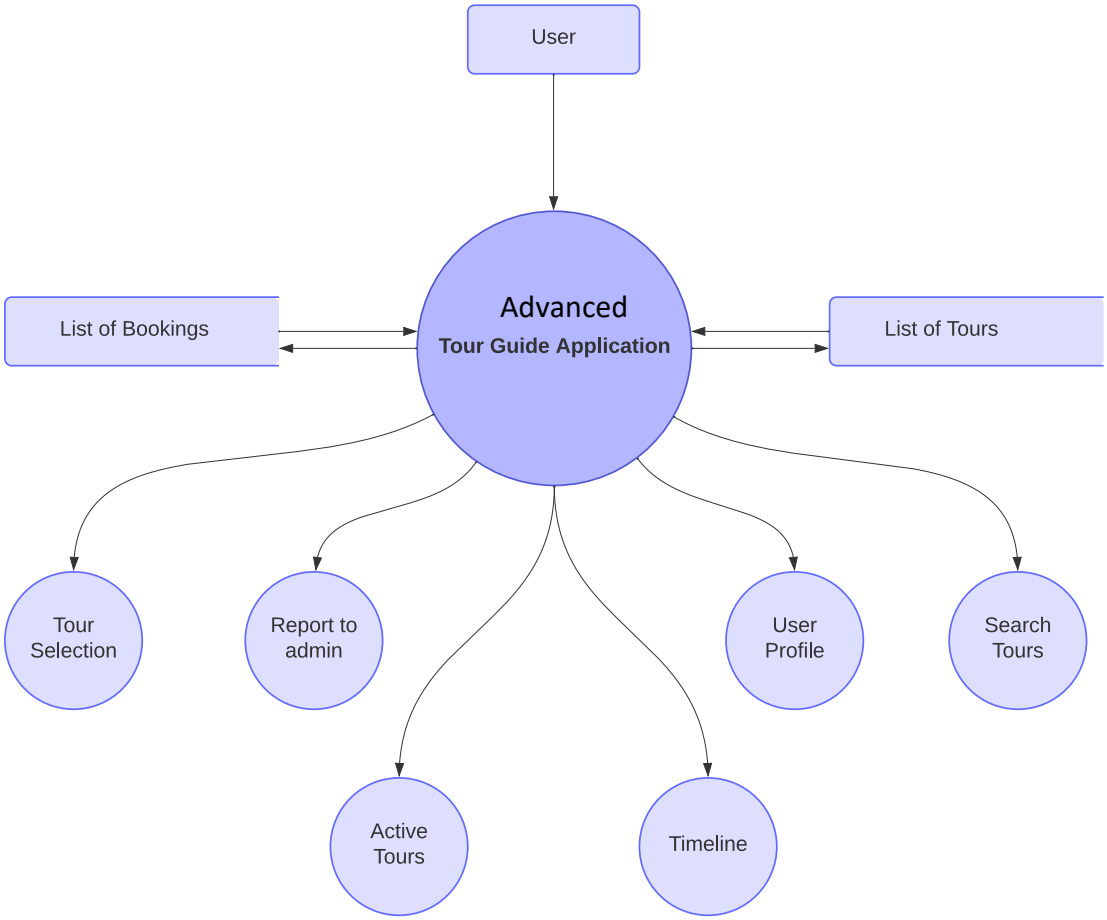


3.8.2. Data Flow Diagrams (L0, L1, L2)

Level 0, Data Flow Diagram (DFD L0)

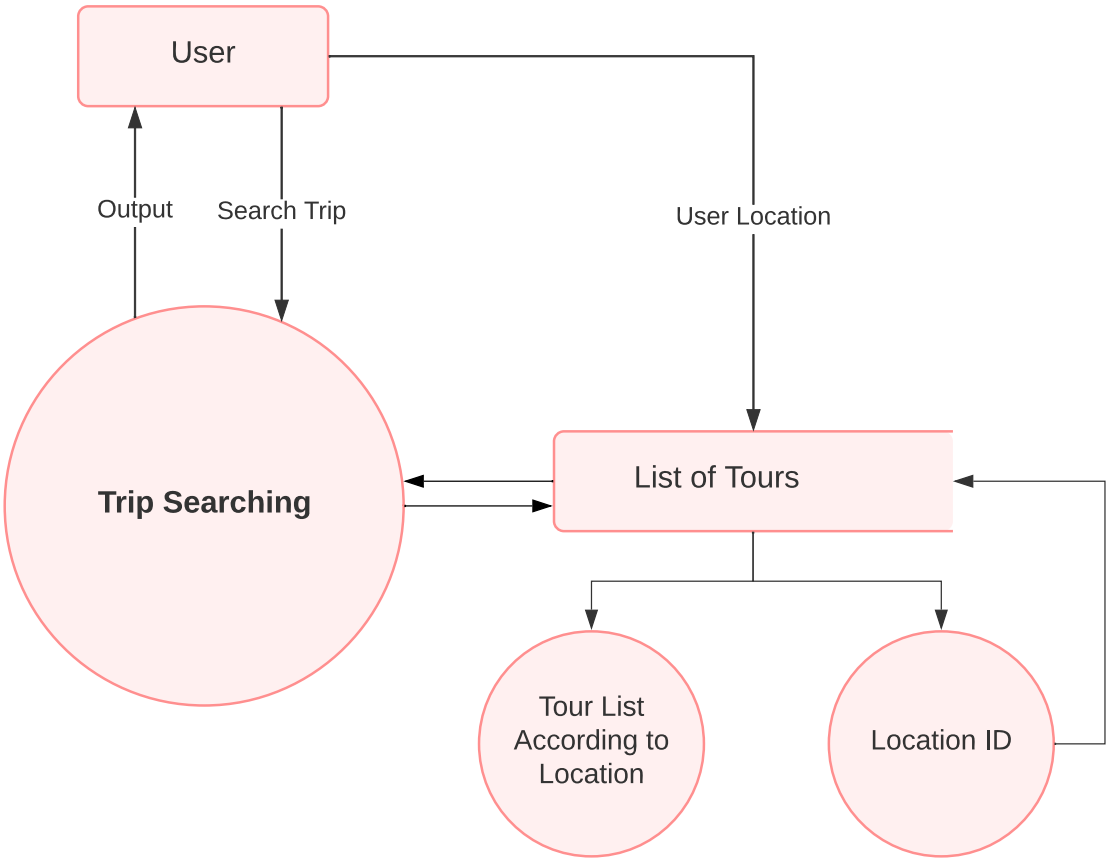


Level 1, Data Flow Diagram (DFD L1)

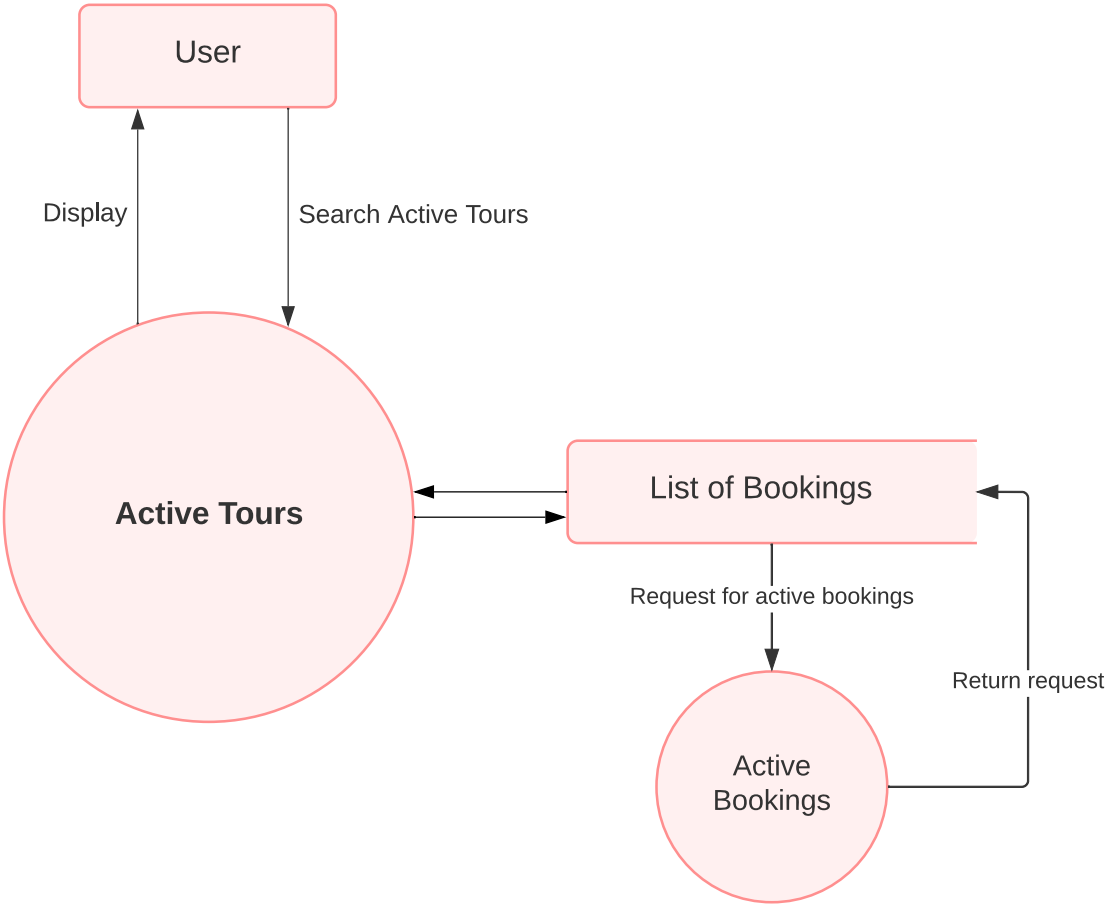


Level 2, Data Flow Diagram (DFD L2)

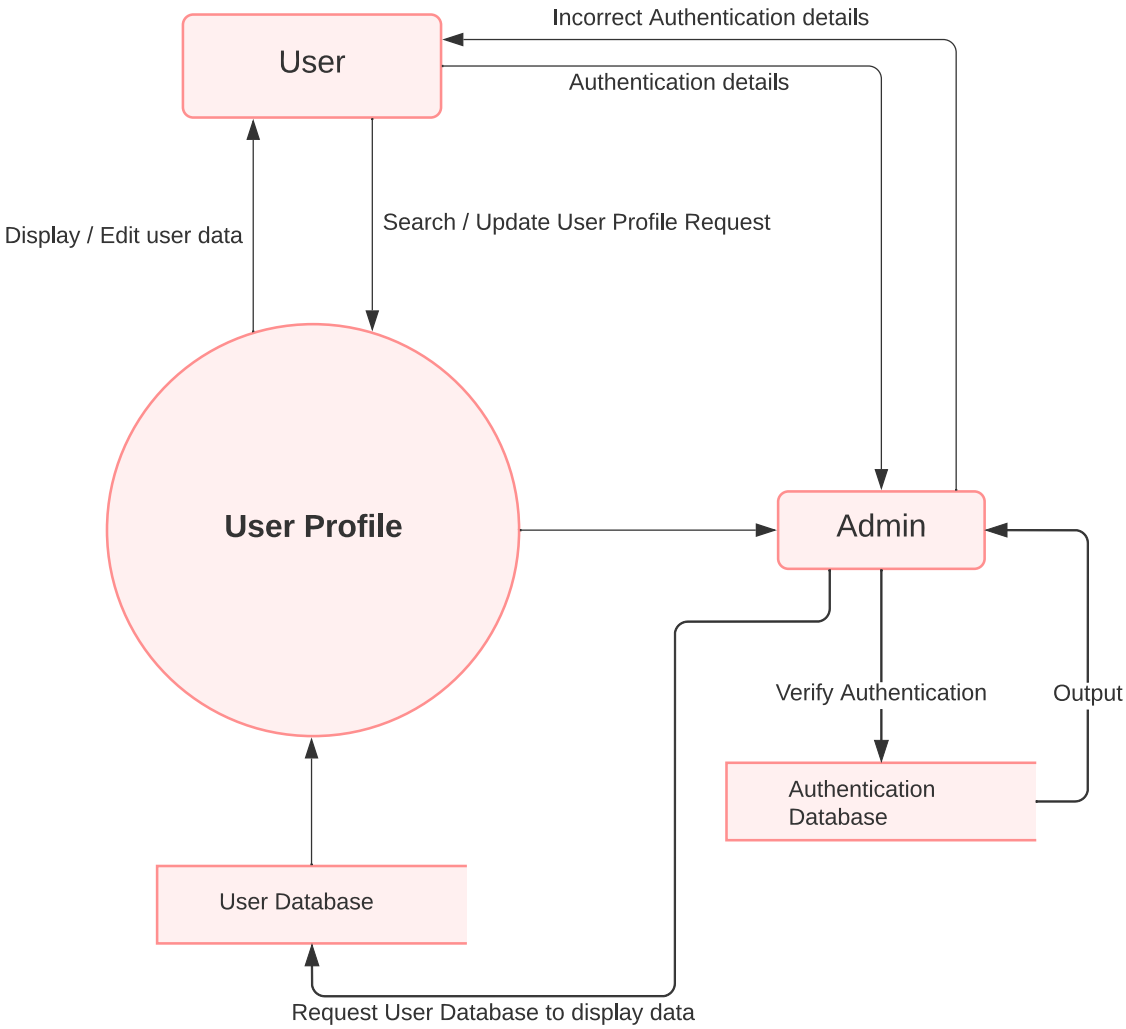
- L2 DFD for Trip Searching



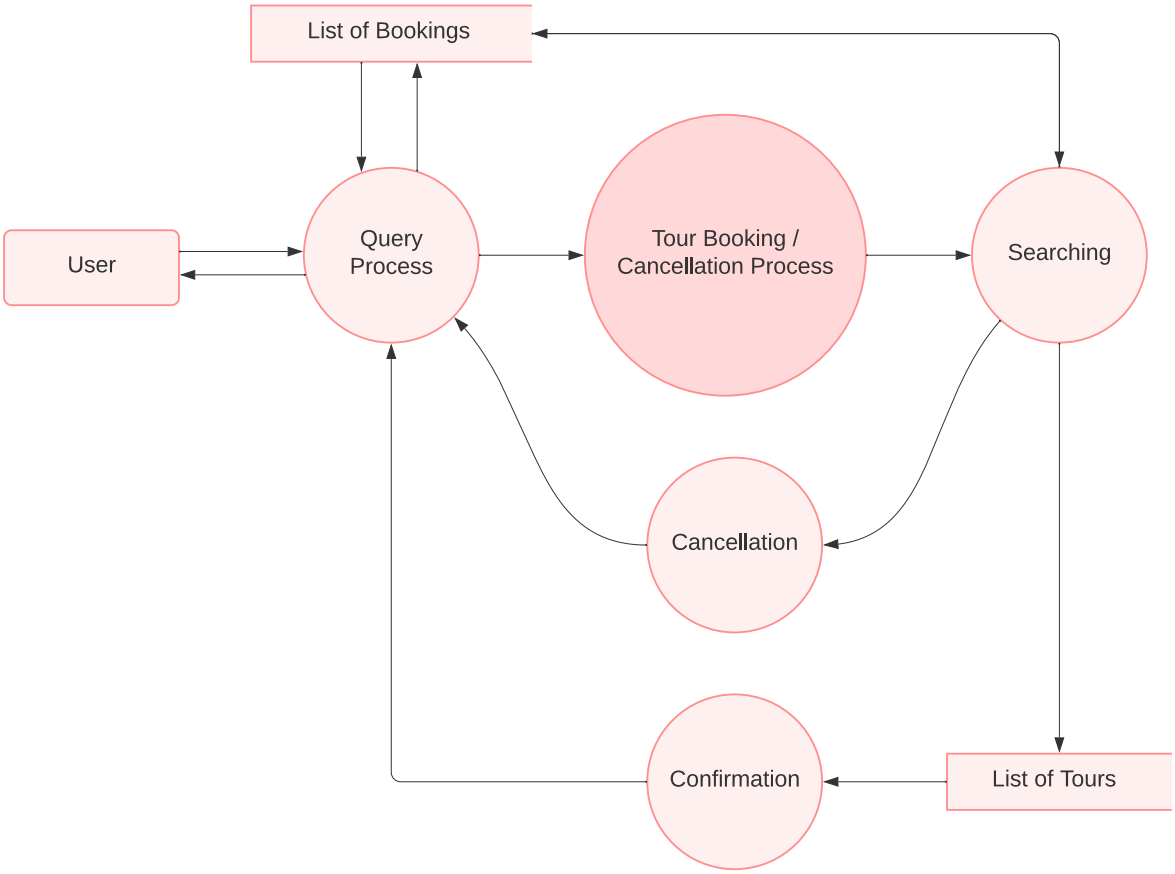
- L2 DFD for Active Tours



- L2 DFD for Search / Update User Profile request



- L2 DFD for Tour Booking / Cancellation



4. References

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5. CONCLUSION

This article discusses using our system as a virtual guide system that will help travellers customize their tours accordingly. We tried to provide a system that would eliminate the need for a third party for tourists visiting an unknown location. With our system, the user will be able to have a clear understanding of the places he is going and through the use of a mobile application, he will be constantly updated on the status of his visit. This dissertation paper has provided a complete overview of the system as to how it had been developed, using which software and the proper E-R Diagram, Use-Case Diagram, and Data Flow Diagrams have also been provided for future reference of the development process and for further maintenance of the application software. Existing analogue systems do not provide much customization to the travel locations and timeframe. Through our product, we have made sure that it is necessary to provide the best possible recommendation to travelers and other users to ensure that they have the best possible experience.