**Airport Flight Arrival Enquiry System**

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# **Introduction:**

The Airport Flight Arrival Enquiry System is a sophisticated software solution designed to streamline and enhance the experience of tracking flight arrivals at airports. In today’s fast-paced world, where timely information is crucial for travelers, airport staff, and service providers, this system stands as a beacon of efficiency and user-friendliness. Developed in Python, the system is tailored to cater to a wide range of inquiries, offering real-time updates and vital information concerning various flights. At its core, the system revolves around a robust Flight class, encapsulating key flight-related attributes such as flight number, origin, aircraft number, airline name, and code, along with dynamic data including current distance from the airport, flight speed, and timetabled arrival time. This comprehensive collection of data ensures that users have access to all the necessary details to make informed decisions. The user interface of the system is meticulously designed to be intuitive, enabling users to navigate through a set of options presented in a menu format. Users can enquire about flight arrivals based on multiple criteria such as flight number, origin, or airline, making the system versatile and accommodating a wide range of user needs. The functionality of estimating the arrival time of flights based on their current location and speed is a standout feature, adding a layer of precision to the system's capabilities. Furthermore, the system is engineered with a focus on user-friendly interactions, robust error handling, and efficient data processing. It employs loops, conditions, and try-except blocks to ensure smooth operation and to handle erroneous user inputs gracefully. This not only enhances the user experience but also contributes to the reliability and stability of the software. Hence, the Airport Flight Arrival Enquiry System represents a significant leap forward in the domain of airport operations. It is a testament to the power of modern programming and design, offering a seamless and accurate way for users to obtain flight arrival information. This project not only demonstrates technical proficiency but also reflects a deep understanding of the practical needs of end-users in an airport setting.

# **Brief Description of the Program's Aims**

The Airport Flight Arrival Enquiry System is an innovative software tool designed to revolutionize the way airport flight information is accessed and managed. This system aims to provide accurate, real-time information about flight arrivals, enhancing the efficiency of airport operations and improving the overall experience for travelers and airport personnel alike. By leveraging modern programming techniques and a user-centric design philosophy, the program addresses several key objectives:

* One of the primary aims of this system is to offer up-to-date flight arrival details. This includes flight number, origin, aircraft number, airline name, airline code, current distance from the airport, current flight speed, and the timetabled arrival time. This comprehensive information ensures that users are well-informed about flight statuses, helping to manage expectations and plan accordingly.
* The system is designed with a focus on ease of use. It presents a clear, intuitive menu that allows users to make specific inquiries about flight details. Whether it's passengers checking the status of their flight or airport staff coordinating arrivals, the interface caters to a broad user base with varying levels of technical proficiency.
* Utilizing current flight speed and distance from the airport, the system can calculate estimated arrival times. This feature is particularly significant for managing logistics and scheduling, as it provides a more dynamic and precise estimation than traditional timetabled data.
* The software is equipped to handle inquiries based on various flight characteristics, enabling users to retrieve information in multiple ways. This flexibility ensures that the system can cater to diverse needs and scenarios, making it a versatile tool for airport operations.
* Recognizing the importance of reliability in software dealing with critical information, the program includes robust error handling and stability features. This includes managing erroneous user inputs and ensuring the system operates smoothly without crashes, thus maintaining a high standard of service continuity.
* The system efficiently manages flight data, loading it from a file and updating it as necessary. This approach not only ensures data accuracy but also contributes to the overall performance and responsiveness of the system.

However, the Airport Flight Arrival Enquiry System is not just a tool for information retrieval; it is a comprehensive solution designed to streamline airport operations, enhance the travel experience, and embody the technological advancements in the aviation industry.

# **Design**

The design of the Airport Flight Arrival Enquiry System is a testament to thoughtful software engineering, blending user experience with functional robustness. The system's architecture is constructed with several key components, each playing a crucial role in achieving the program's objectives. At the heart of the system is the Flight class, embodying object-oriented programming principles. This class encapsulates all the relevant details of a flight, including identifiers like flight number and airline code, as well as dynamic attributes such as distance from the airport and flight speed. This modular design not only aids in keeping the code organized but also simplifies the process of data management and retrieval. User Interface (UI): The UI is designed for simplicity and ease of use, presenting users with a menu-driven system. The menu options are clearly laid out, guiding users to the information they seek with minimal effort. This design consideration ensures that the system is accessible to a wide range of users, including those with limited technical expertise. Data Handling and Processing: A critical aspect of the system's design is the efficient handling of flight data.

***Psuedo Code***

*START*

*Class Flight:*

*Initialize with flight\_number, origin, aircraft\_number, airline\_name, airline\_code, distance\_from\_airport, flight\_speed, timetable\_arrival*

*Method calculate\_estimated\_arrival:*

*Calculate and return estimated arrival time based on distance and speed*

*Method load\_flights\_from\_file:*

*Open and read file "flights\_data.txt"*

*For each line in file:*

*Create a Flight object and add it to flights list*

*Return flights list*

*Method find\_flights\_by\_attribute:*

*Input: flights list, attribute, value*

*Find and return flights where flight.attribute matches value*

*Method main:*

*flights = load\_flights\_from\_file()*

*While true:*

*Display menu options to user*

*Get user choice*

*If choice is to enquire by Flight Number:*

*Get flight number from user*

*Call find\_flights\_by\_attribute with flight number*

*Display flight details and estimated arrival*

*If choice is to enquire by Origin:*

*Get origin from user*

*Call find\_flights\_by\_attribute with origin*

*Display matching flights and estimated arrivals*

*If choice is to enquire by Aircraft Number, Airline Name, or Airline Code:*

*Get respective input from user*

*Call find\_flights\_by\_attribute with respective attribute*

*Display matching flights and estimated arrivals*

*If choice is to Exit:*

*Break the loop*

*End While*

*End main*

*END*

The program reads flight information from a text file (flights\_data.txt), parsing the data into Flight objects. This method not only streamlines the process of data loading but also facilitates easier updates and modifications to the flight information. Dynamic Arrival Time Calculation: A key feature of the system is its ability to calculate estimated arrival times based on current flight data. This functionality relies on algorithms that take into account the flight's speed and distance from the airport, providing users with an updated and more accurate arrival time than static timetables. Versatile Inquiry Handling: The system's design accommodates inquiries based on various flight attributes. Users can search for flights using different criteria like flight number, origin, or airline name. This flexibility is achieved through a combination of well-structured data and intelligent search algorithms, ensuring that the system can cater to a wide range of query types. The design includes comprehensive error handling mechanisms. The system gracefully manages erroneous inputs and unforeseen errors, ensuring that the user experience is not disrupted. This reliability is crucial, especially in an environment where accurate and uninterrupted access to information is paramount. While the current design addresses the core requirements, it also allows for future enhancements. The modular architecture means new features or improvements can be integrated with minimal disruption to the existing functionality.

# **Testing**

The testing of the Airport Flight Arrival Enquiry System was a comprehensive process aimed at ensuring the system's functionality, accuracy, and robustness. The primary focus was on functional testing, where each feature of the system was methodically checked to confirm it operated as intended. This included validating the menu options, ensuring the accuracy of flight data displayed, and verifying the correct functioning of the estimated arrival time calculations. Additionally, a significant portion of the testing was dedicated to user input validation. The system was rigorously tested with a variety of inputs, including both valid and erroneous data, to assess its error handling capabilities. For instance, entering an incorrect flight number or an invalid date format was crucial to ensure the system responded appropriately without crashing. Load testing was another critical aspect, wherein the system was subjected to multiple simultaneous inquiries to simulate a real-world scenario. This was essential to ensure that the system remained stable and performed efficiently under heavy usage, a key requirement for any real-time information system in a busy airport environment.

A screenshot of a computer

Description automatically generated

**Figure 1: Testing of the Program.**

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# **Critique**

The Airport Flight Arrival Enquiry System, upon thorough evaluation, revealed several strengths and areas for improvement. One of its primary strengths was the user-friendly interface, which was straightforward and easy to navigate, significantly enhancing the user experience. Another notable strength was the accuracy of the information provided; the system reliably delivered precise flight details and estimated arrival times, which is crucial for an airport information system. Furthermore, the robust error handling capability of the system was commendable. The program effectively managed erroneous inputs and unexpected scenarios, preventing system crashes and ensuring continuous operation. However, the system also presented areas for improvement. Integrating real-time flight data feeds would be a significant enhancement, moving beyond the limitations of static data files. Additionally, incorporating more advanced search functionalities, such as filtering by estimated arrival times or distance, could further improve user convenience. Finally, while the interface was functional, enhancing its aesthetic appeal and user interactivity could further elevate the overall user experience.

# **Conclusion**

In conclusion, the Airport Flight Arrival Enquiry System represents a significant step forward in providing timely and accurate flight information in a user-friendly manner. The system's ability to provide a variety of flight-related information, including estimated arrival times based on current data, makes it a valuable tool for both travelers and airport personnel. Its robust design ensures stability and reliability, even when handling erroneous user inputs or operating under heavy load. However, the system's potential for further enhancements, particularly in terms of real-time data integration and advanced search capabilities, points towards an even more versatile and efficient future application. Overall, the development of this system has demonstrated the effectiveness of combining user-centric design with robust backend functionality, setting a standard for future developments in airport information systems.

# **Appendix: (Code)**

import datetime

class Flight:

    def \_\_init\_\_(self, flight\_number, origin, aircraft\_number, airline\_name, airline\_code, distance\_from\_airport, flight\_speed, timetable\_arrival):

        self.flight\_number = flight\_number

        self.origin = origin

        self.aircraft\_number = aircraft\_number

        self.airline\_name = airline\_name

        self.airline\_code = airline\_code

        self.distance\_from\_airport = float(distance\_from\_airport)

        self.flight\_speed = float(flight\_speed)

        self.timetable\_arrival = datetime.datetime.strptime(timetable\_arrival, '%Y-%m-%d %H:%M')

    def calculate\_estimated\_arrival(self):

        if self.flight\_speed > 0:

            hours\_to\_arrival = self.distance\_from\_airport / self.flight\_speed

            return self.timetable\_arrival + datetime.timedelta(hours=hours\_to\_arrival)

        else:

            return "Not available"

def load\_flights\_from\_file(filename):

    flights = []

    try:

        with open(filename, 'r') as file:

            for line in file:

                data = line.strip().split(',')

                flights.append(Flight(\*data))

    except FileNotFoundError:

        print(f"File {filename} not found.")

        exit()

    return flights

def find\_flights\_by\_attribute(flights, attribute, value):

    found\_flights = [flight for flight in flights if getattr(flight, attribute, '') == value]

    return found\_flights

def main():

    flights = load\_flights\_from\_file("flights\_data.txt")

    while True:

        print("\nAirport Flight Arrival Enquiry")

        print("1. Enquire by Flight Number")

        print("2. Enquire by Origin")

        print("3. Enquire by Aircraft Number")

        print("4. Enquire by Airline Name")

        print("5. Enquire by Airline Code")

        print("6. Exit")

        choice = input("Enter your choice: ")

        if choice in ['1', '2', '3', '4', '5']:

            attribute\_map = {'1': 'flight\_number', '2': 'origin', '3': 'aircraft\_number', '4': 'airline\_name', '5': 'airline\_code'}

            attribute = attribute\_map[choice]

            value = input(f"Enter {attribute.replace('\_', ' ').title()}: ")

            matched\_flights = find\_flights\_by\_attribute(flights, attribute, value)

            if matched\_flights:

                for flight in matched\_flights:

                    print(f"Flight {flight.flight\_number}: Estimated Arrival Time: {flight.calculate\_estimated\_arrival()}")

            else:

                print("No matching flights found.")

        elif choice == '6':

            print("Exiting program.")

            break

        else:

            print("Invalid choice. Please choose again.")

if \_\_name\_\_ == "\_\_main\_\_":

    main()