New-PAK Airline Flight System (NPAFS)

Project Instructions: (100 marks)

- This is an individual project.
- Plagiarism will result in F-grade in this course. It may also lead your degree to be completed after 4.5 years.
- It has two phases:
    - In Phase-1, you need to submit a **class diagram** in a .pptx file with other necessary details to understand what you are about to implement.
    - In Phase-2, a **complete code** with a driver function needs to be submitted. Make a short **2-minute video** to demonstrate the working using driver function. Narrate every action done using the main menu in console screen.
- No late submission will be accepted so now this is the right time to start working on it.
- Phase-1 is due on 11-June-2021 till 12 Mid-Night.
- Phase-2 is due on 21-June-2021 till 12 Mid-Night.
- Phase-1 is of 10 marks and Phase-2 has 90 marks. Remember Phase-2 extremely depends on Phase-1.
- **Submission Format:** Make a zip folder with all your data. Name of the folder is your registration number and section. For Example: i190101_G.

Project Statement:

Develop an application namely **New-PAK Airline Flight System (NPAFS)** for a newly established airline. PAFS is functional in five major cities of Pakistan. These cities are Islamabad, Lahore, Quetta, Peshawar, and Karachi. Each city has two airports located at the North and South. NPAFS team wants to have a flight reservation system. NPAFS has 20 airplanes in each city whereas maximum 5 can land at a time in an airport. NPAFS has established a network of flights in 25 countries around the globe. Due to COVID situation some countries have travel bans. NPAFS greatly value its passengers and abide by the international travelling laws. 50,000 passengers use NPAFS annually. Ten Local flights and Five International flights take off from each airport on daily basis depending on their schedule. Each plane of NPAFS has seating capacity of 50 passengers in economy class and 10 in business class during the COVID days. The days passengers are seated with a gap of one seat. The main features identified by the NPAFS administration are as follows:

Menu: **(10 marks)**

A menu is provided to navigate the full system. After completion of each step users are provided with a menu to the subsequent process and a link to main menu. Basic details about NPAFS are available for every person without a login. System specific details like Flight Reservation, and Cancellation etc. are only accessible to the registered users.

Login: **(10 marks)**

- **Admin Panel:** NPAFS has a team to manage the interaction with the system. The team members can login to change the schedule of flights. Add new routes for local and international flights. Restrict the number of passengers in a plane. Update airline inquiry details.
- **Passenger Panel:** Users are the passengers that use to travel using NPAFS. A new user can register in the system with a valid CNIC. An adult passenger can also register for the dependents under 18.

Registration details are stored in two separate files namely Admin.txt and Passengers.txt. These files have Usernames and Passwords. User can also reset the password and username.

The registration process hides the password and only shows ******** instead of actual entered characters. New user must re-enter the password and system verify any typing mistake. Password must be 8 characters long and use of minimum one special character, uppercase, lowercase, and numeric digit is must. The passenger account is only created if a valid 13-digit CNIC is provided and CNIC must not be repeated in existing record. Otherwise, appropriate messages should be generated to notify the users. Users provide their basic identification details to register.

A registered user is also asked to provide account details for payments and transactions. Account details are verified through a non-member function "VerifyFinancialDetail" by a Finance Department of NPAFS.

Flight Schedule: **(10+10 marks)**

Maintain a complete schedule of flights for each airplane, covering the following details:

- A plane can either travel locally or internationally in a single day.
- Number of hours required to complete a flight journey must be recorded.
- Arrival and Departure Time should be displayed for each flight.
- Current available seats regularly updated should be displayed in the information panel.
- A local flight is of short duration and a plane can have multiple journeys per day with a gap of 2 hours.
- Indirect flights are also detailed with exact locations in the schedule. For example: A flight from Pakistan to USA can be via UAE.

There must not be any clash between timings and maximum airplanes that can be at an airport as described earlier. Both registered and un-registered users can search for schedule details with customized keywords.

Find the shortest path between Pakistan and USA based on hours. A Special Flight (SF) is dedicated to follow the shortest path once in a month. SF does not drop passengers to countries coming in the shortest route. Provide the details about this SF, only to the users who have maximum availed the NPAFS services. More specifically to those who frequently travel between Pakistan and USA.

Passengers: **(10 marks)**

Passengers have a valid Passport. Passport can be Local or Foreign. Passport must have a stamp of VISA for travelling. For a local journey VISA is not required but for international trips VISA is a must. A passenger can register and login to the system. Details of the passenger can also be updated. Passenger can view the detail of most visited country with an estimate of travelling cost on NPAFS.

Maintain a travel history for passengers and offer 10% discount on booking a flight to those passengers who travel frequently based on their previous month history.

Booking: **(20 marks)**

Passengers book a flight by providing and considering the following information:

- Selecting the country and destination airport details.
- Reserving a seat by considering the current available seats and schedule of flights.
- Route details for direct and indirect flights.
- Costs are provided for each available flight by **overloaded stream operator**.

Any user can search the available flights and timing details. Only a registered passenger can reserve a seat. Passengers can update their details. Change their scheduled flight or even cancel it with a penalty of 25% actual payment.

Due to COVID some flights may not be available but can be resumed. The system must allow admin to resume or block flight schedule to a specific affected country.

Payment: **(10 marks)**

The payment details for each booked flight are recorded. Ticket price for all journeys is displayed to the users.

- One hour travel costs Rs.10,000 for a local flight and Rs.20,000 for international flights.
- Government deducts 5% and 10% tax on local and international flights, respectively.
- A route from a country A to B can have C etc. in between, therefore the cost for a flight depends on the route.

Requirements:

Phase-1

1. Design an UML class diagram and follow it throughout the implementation.
   (5 marks)

2. Identify Aggregation (if any), Association (if any), Composition (if any), Virtual Inheritance (if any), Polymorphism, member, non-member, virtual functions, static and constant data members. **(5 marks)**

Phase-2

1. Follow all above mentioned details of the project and must use all OOP concepts. **(80 marks)**
2. Provide a common interface for displaying the results using Polymorphism in each class hierarchy. **(2 marks)**
3. Use of dynamic array is compulsory wherever an array is required. **(2 marks)**
4. Provide parameterized constructors in each class. **(1 mark)**
5. Use destructor to destroy dynamically allocated memory. **(1 mark)**
6. Provide a copy constructor to deep copy where necessary. **(1 mark)**
7. Program must not stop execution for logical errors instead display an appropriate message for 10 seconds and navigate to the main menu. **(1 mark)**
8. Use filing to store all data that needs to be stored for a longer duration. **(1 mark)**
9. **Populate NPAFS application with sufficient data before submission, to demonstrate each feature. (1 mark)**

Use the below mentioned link or any other website to find details related to distances and flight durations. You may also assume yourself and provide a graph or table for it.

https://distancecalculator.globefeed.com/Distance_Between_Countries.asp

Best Wishes!