

CSCE 1040 Homework 5

For this assignment we are going to re-design and modify the code for a system to schedule flight crews and aircraft for Mean Green Airlines that we started in Homework 3 and Homework 4.

For this we will need the following entities, plus collections for each of the entities: Plane/Aircraft, Crew Member and Flight.

The data for a Plane will contain at least the following: (no change from HW4)

Make (e.g. Boeing)
Model (eg 737)
Tail Number (eg B171A)
Number of Seats (eg 137)
Range (e.g. 800 miles)
Status (out, in, repair)

You may add other data needed for your implementation as well as you will need accessor and mutator functions for the data.

The data for a crew member will contain at least: (this has changed since HW4)

Name
ID number
Status (available, on leave, sick)

The Crew Member class will be **a base class for three child classes** of

Pilot, CoPilot and Cabin

Pilot will need to add data for
5 character rating code
cumulative flight hours as pilot

CoPilot will need data for
4 character rating code
cumulative flight hours as a CoPilot

Cabin crew will need data for
Position : First Class, Business Class EconomyFront, EconomyRear, Lead

There should be a **virtual** PrintInfo function that will print all the info for a given crew member starting with the base information and then the details for the particular type. Note this function will be useful in the collection class reporting methods. It should first be declared in the base class.

You may add other data needed for your implementation as well as you will need accessor and mutator functions for the data.

The data for a Flight (The transaction entity) will contain at least the following: (changed also)

- Plane ID (Tail number)
- Pilot ID
- CoPilot ID
- Crew IDs for 3 Cabin Crew Members
- Start Date/Time with TZ
- End Date/Time with TZ
- Starting Airport code (3 letters)
- Ending Airport Code (3 letters)
- Number of Passengers
- Status (active, cancelled, completed)

You may add other data needed for your implementation as well as you will need accessor and mutator functions for the data.

You will need to use the Time class from C++ libraries to work with the time information. We will discuss this in class and there will be some video and other resources posted about this for your reference.

For the collections of each of the 3 Entity Classes identified above you will need to include the ability to:

- Add
- Edit
- Delete
- Search/Find based on appropriate criteria
- Print a list of all entries in the collection
- Print the details for a single entity (do a find first)

Note that the crew collection class will now be a mixed collection and will have to use run-time polymorphism for certain capabilities.

for the Flights collection when you add a flight you will need to verify that

- a. the plane selected is available during the defined time period
- b. the plane selected has number of seats sufficient for the passengers
- c. the crew selected are of the appropriate types and assigned to the proper roles, and that they are not already assigned to another flight at the same time. Also that they are available to assign

Note that a particular plane or crew member could have multiple assignments as long as they do not conflict with dates or times. For this assignment you do not need to worry about verifying availability based on starting and ending points.

You will also need to provide in the Flights collection the ability to print an assignment schedule for a particular aircraft or for a particular crew member of all the active assignments. Also to print a list of flights based on their status. You should also provide a means to delete all cancelled flights or all completed flights from the menu. You should also provide a means to periodically update all flights from active to completed based on time and date.

You will need to provide an appropriate menu system that can be multi-level if you like.

You will need to load and store the data. This can be done automatically when the program starts and ends. You should also want to store after an add, delete or edit to make sure changes to the data are preserved.

For this design portion you will need to turn in an updated design including the same elements you turned in for Homework 4 modified to include the inheritance relationships and additional functionality and attributes. As a review this will consist of the items described below.

A document set consisting of:

1. A title page with your name, assignment, course and title
2. a single class relationship diagram showing only the relationships, data attributes, and methods needed.
3. Step-by-Step algorithms for every method defined in every class in pseudo code. Again you can reuse homework 4 and only add the new or revised methods affected by this design change

4. A 2-3 paragraph minimum report about your experience with the redesign as well as with implementing the inheritance component of this assignment

All of these items should be gathered together, in order, in a single PDF File that you will turn in on Canvas.

Then you will need to modify the code from Homework 4 to implement the new features you have designed. This will be worth 70% of the total grade for this assignment. You should collect all the cpp files and h files, as well as your makefile into a single zip file. You should also include 1-2 paragraphs in your report about the development experience in addition to the section about the design (as described above).

There will be point deductions assessed for not zipping your code files together and for not providing a working makefile.