University of Malta

Faculty of ICT

Department of Computer Science

Airline reservations system

by

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Study unit: Programming principles in C

Study unit code: CPS 1003

Summary

In this report, it will be discussed about data objects used for the assignment, how program is implemented by explaining how each function works, providing algorithm for each and in which file it can be found if someone wish to take a look at the source code. The testing will be presented in great details, testing all possible user inputs and showing how program takes care of bad inputs.

The last section is source code, but for better understanding it is preferable to read the code from editor such as visual studio, code block or eclipse, because for each line of code a comment is written describing what that code does. Moreover, functions are also documented; comments will be seen before each function explaining function's purpose.

Note: since the software is developed under 64 bit machine, some unexpected errors might occur under 32 bit machines, but program's functionality will remain the same. The only problem that occurred when I run the program at 32 bit laptop was printing nothing from a file. To prevent this, new data files should be created on each platform in order to be saved in correct format. In other words, if data is saved on 64 bit PC, and then tried to be read on 32 bit PC, there is a chance for data to be represented in bad format but not necessarily.

1. Data Objects

For this assignment, used data objects are: Passenger and Flight.

1.1 Passenger

Passenger is of type **struct** and it is used to store various passengers' information.

Code:

```
static struct Passenger
{
   char name[MAXNAME];
   char surname[MAXNAME];
   char title[MAXTITLE];
   char country[MAXNAME];
   char city[MAXNAME];
   char homeAddress[MAXADDRESS];
   short DOB[DATE];
   short reservations[MAXPASSENGERS];
   unsigned int passportNo;
   unsigned long long int mobNo;

}passenger[MAXPASSENGERS];
```

Character arrays name, surname, title, country, city and home address are used to store passenger's details just as the names say respectively. Integers, in this case short DOB and reservations are used to store passenger's date of birth and reservations being made by him/her. Unsigned integer passportNo stores traveller's passport number while unsigned long long integer mobNo stores mobile number.

1.2 Flight

Flight is of type struct and it contains details about scheduled flights.

```
static struct Flight
{
    short flightID;
    short departureDate[DATE];
    short timeDeparture;
    short timeArrival;
    short availableSeats;
    char  airline[MAXNAME];
    char  departureCity[MAXNAME];
    char  arrivalCity[MAXNAME];
    char  status[STATUS];

}scheduledFlight[MAXPASSENGERS];
```

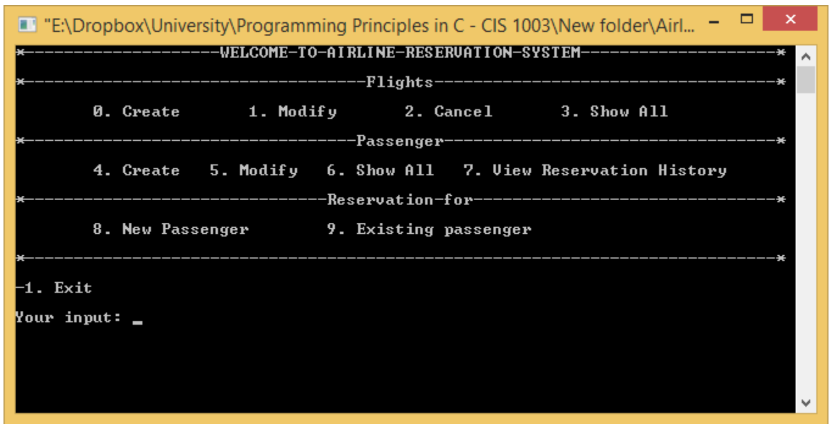
This structure is made of five integer short type and four arrays of character type. FlightID stores identifier for particular scheduled flight and it is unique. DepartureDdate stores information when the flight will take place, timeDeparture and timeArrival at what time and availableSeats represents how many seats for a specific flight has left. Arrays airline, departureCity and arrivalCity stores airline name, in which city the plane will take of and where it will land respectively while status shows whether the scheduled flight is cancelled or not.

2. Implementation

This program has been designed to be user-friendly as much as possible while providing maximum level of security and reliability. The software will only accept correct input, while for bad will show corresponding error and request a new one. Input validation and robustness will be presented in greater detail later in this chapter and with chapter 3, Testing.

2.1 User interface

User interface is designed in a way to be more readable by a user, not taking much space and clearing console window when needed. Below is example of main menu, the first screen that will be seen by a user.

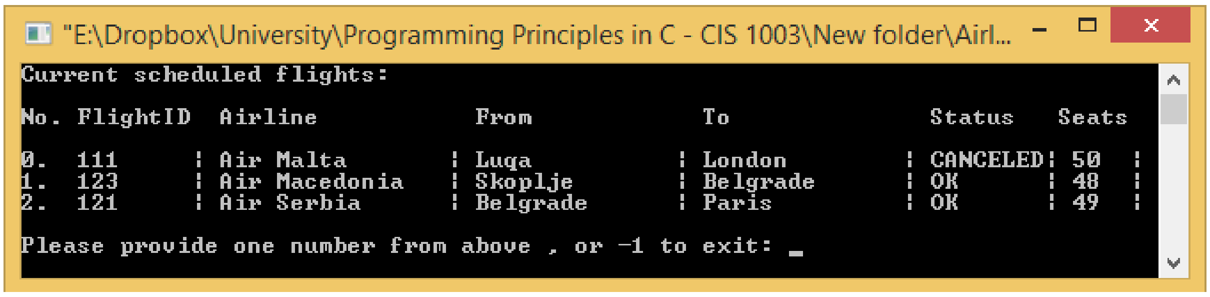

"E:\Dropbox\University\Programming Principles in C - CIS 1003\New folder\Airl...

```
*------------------WELCOME-TO-AIRLINE-RESERVATION-SYSTEM------------------*
*-------------------------------Flights-----------------------------------*
       0. Create        1. Modify        2. Cancel        3. Show All
*------------------------------Passenger----------------------------------*
       4. Create    5. Modify    6. Show All    7. View Reservation History
*---------------------------Reservation-for-------------------------------*
       8. New Passenger          9. Existing passenger
*-------------------------------------------------------------------------*
-1. Exit
Your input: _
```

Frist line is name of the application, second is name referring to the third line. Option 0 means to create a new scheduled flight, “modify” and “cancel” to edit and to call of scheduled flight respectively, while “show all” will display all created scheduled flights.

Forth line “passenger” refers to fifth line. “Create”, “modify” and “show all” represents the same actions as for flight but this time for passenger, while “view reservation history” shows all reservations made by a particular passenger.

Sixth line refers to seventh. “New passenger” will create new passenger and make reservations for him/her and “existing passenger” will make reservations for passengers that have already been created.

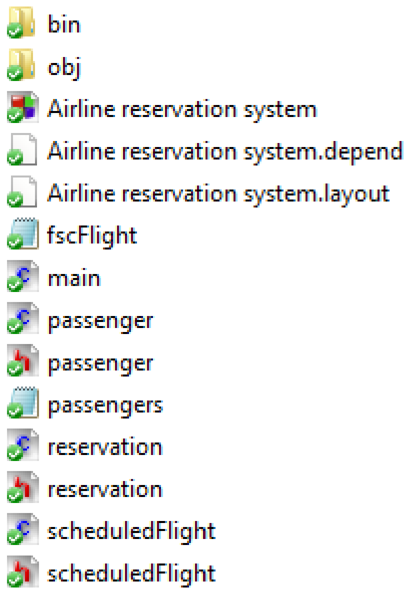

"E:\Dropbox\University\Programming Principles in C - CIS 1003\New folder\Airl...

```
Current scheduled flights:

No. FlightID  Airline            From          To            Status    Seats

0.  111      | Air Malta        | Luqa        | London      | CANCELED| 50  |
1.  123      | Air Macedonia    | Skoplje     | Belgrade    | OK      | 48  |
2.  121      | Air Serbia       | Belgrade    | Paris       | OK      | 49  |

Please provide one number from above , or -1 to exit: _
```

With this example (modify flight), it is presented “screen clear”, and listing of created flights and their details.

2.2 Source file organization

In this project, three header files have been created, passenger, scheduledFlight and reservation as seen below. There are four c source files, passenger, scheduledFlight, reservation and main. First three contain functions declaration which definitions are in corresponding header file, while main contains only one function call which controls all others.



bin
obj
Airline reservation system
Airline reservation system.depend
Airline reservation system.layout
fscFlight
main
passenger
passenger
passengers
reservation
reservation
scheduledFlight
scheduledFlight

2.3 Data type definitions

The mostly used data types are short and char. At first, only int types were used, because at that moment the size of variables were unknown. When the sizes became known, all int types were converted to short where it was possible and array sizes had been reduced. It was interesting that by converting ints to shorts and reducing array sizes by few elements reduced executable size by almost 50%.

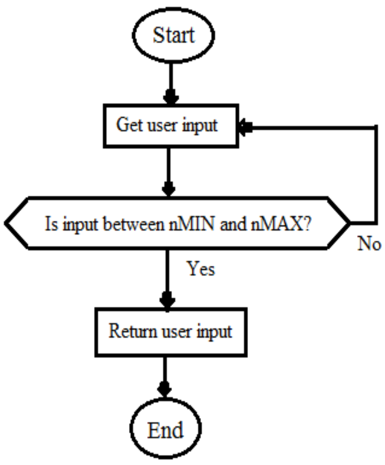
2.4 Functions

The actual implementation will be discussed here. Explaining how functions work and how data is handled with input validation.

2.4.1 User input / input validation

Algorithms will be presented for easier understanding of basic function's procedure.

short get_input(short nMIN, short nMAX)



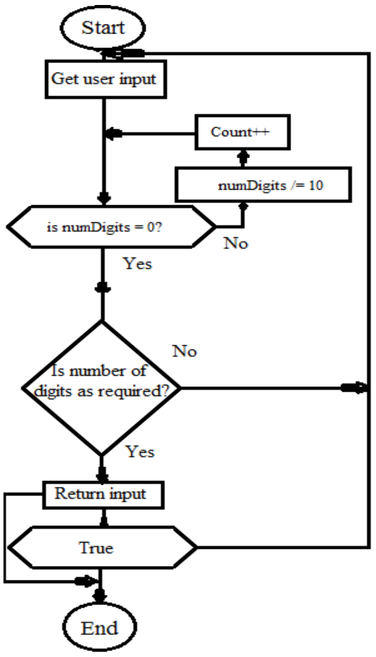
Found in passenger.c

This function takes two short numbers as arguments. First represents the minimum value that user can enter, while the other one maximum value.

```
if(scanf("%hd", &option) != 0)
{
   if(option >= nMIN && option <= nMAX)
      break;
}
```

This is basic input validation. If input is not number it will show error, otherwise it will check if the input is between minimum and maximum values, and if yes break the while loop, returning user input.

unsigned long long int get_int(short n)



Found in passenger.c

This function takes a number which represents the number of digits required. Input validation is the same as the foregoing

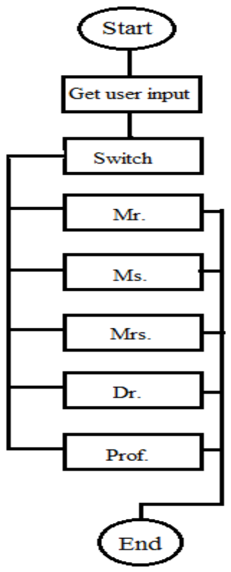
```
while(numDigits) {
          numDigits /= 10;
          count;
       }
```

This piece of code will calculate number of digits

```
if(count == n)  return num;
```

And if it is as required, it will return user input.

void get_Title(char arr[])

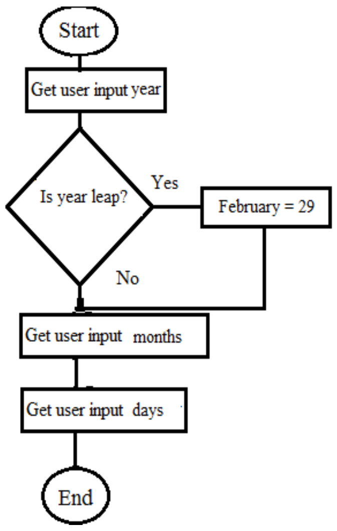


Found in passenger.c

This function is straight forward, it takes user input and depending on number provided, it will store a string into array passed as argument.

For input validation it uses get_input function.

void get_date(short arr[], short minYear, short maxYear, short n)



Found in passenger.c

Function as arguments takes array where data will be stored, minimum and maximum year that can be inputted, and n which determines what to print.

With code below number of days for each month are initialized.

short mm[] = {31,28,31,30,31,30,31,31,30,31,30,31};

if((arr[2]=get_input(minYear, maxYear)) % 4 == 0) mm[1]=29

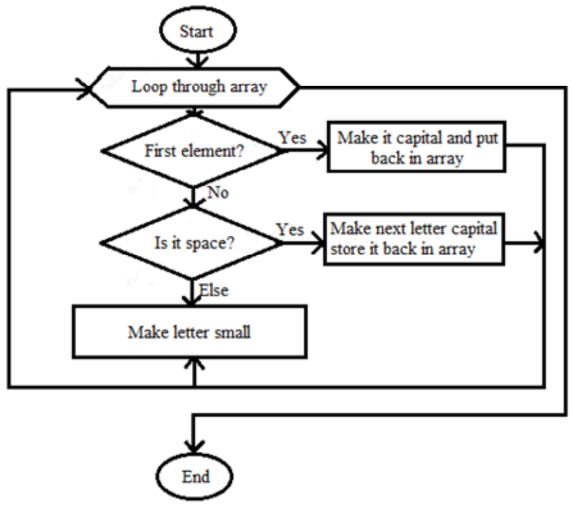
With this code, user is requested to input a year, after that it is calculated whether the year is leap or not, if yes, change number of days of February to 29.

short get_Time(short n)

In: scheduleFlight.c

Very simple function, it uses get_input to get hours and minutes from user and at the end it return hours and minutes as one number. N only determines what will be printed.
return hour*100 + min;

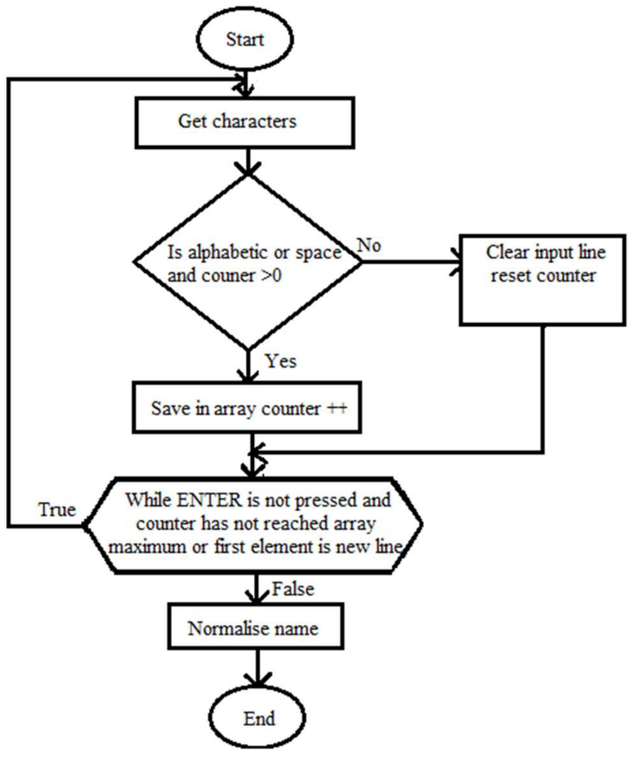
void normalize_name(char arr[])


Start
Loop through array
First element?
Yes
Make it capital and put back in array
No
Is it space?
Yes
Make next letter capital store it back in array
Else
Make letter small
End

Passenger.c

Function as argument takes an array which holds a name. Usually this name is not in correct format e.g. LaAaR. After passing trough this function, name will be normalized to Lazar. If there are spaces, after each space, letter will be capitalized. If it is not first letter nor letter after space, letter will be decapitalized.

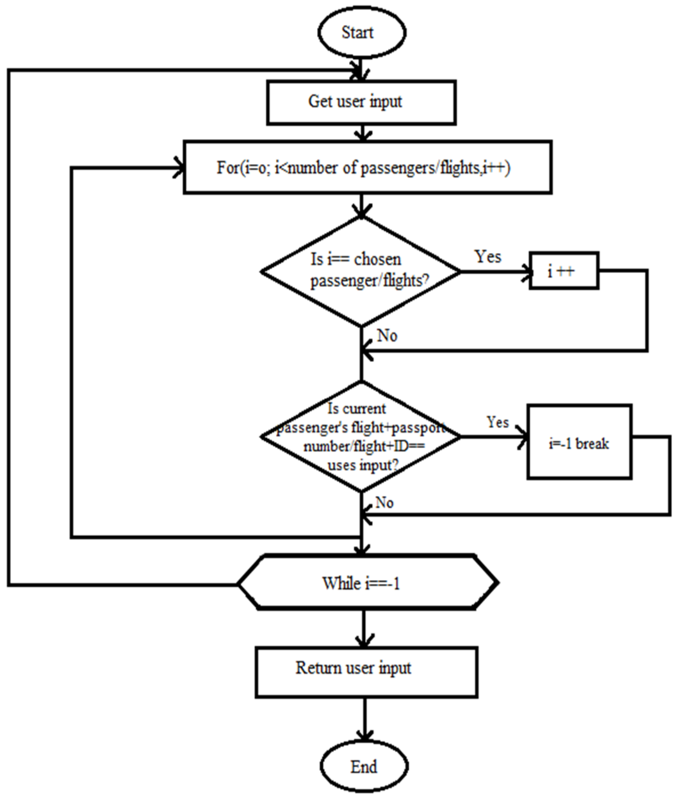
void get_Name(char arr[], short n, short maxN)


Start
Get characters
Is alphabetic or space and couner >0
No
Clear input line reset counter
Yes
Save in array counter ++
True
While ENTER is not pressed and counter has not reached array maximum or first element is new line
False
Normalise name
End

passenger.c

With this function user is asked to enter a name. After enter is being pressed, each letter is checked for validation. If it is number, special character or a space at first array element, error will be shown and request for new name will be given. Otherwise, letter will be stored into array provided as argument. N indicates what will be printer and to make available to press enter for name of passenger and airline company since that is termination character in function for creating passenger and scheduled flight. If everything is in correct format, name will be normalized with function normalize_name.

unsigned int checkPass(short chosenP, short count, const struct Passenger *passenger) / short checkID(short flight, short count, const struct Flight *scheduledFlight)


Start
Get user input
For(i=o; i<number of passengers/flights,i++)
Is i== chosen passenger/flights?
Yes
i++
No
Is current passenger's flight+passport number/flight+ID== uses input?
Yes
i=-1 break
No
While i==-1
Return user input
End

passenger.c and scheduledFlight.c

As arguments it takes chosen passenger/flight, number of records in a file, and structure.

This function checks whether a passport number of flight ID already exist. If yes, user will be prompted to enter a new number.

```
if(chosenP == i)
        i++;
```

If this function is called in modify part, it will skip the passenger or scheduled flight being edited because he/she/it can retain old number.

short openPassengerFile(char *mode) /
short openfscFlightFile(char *mode)

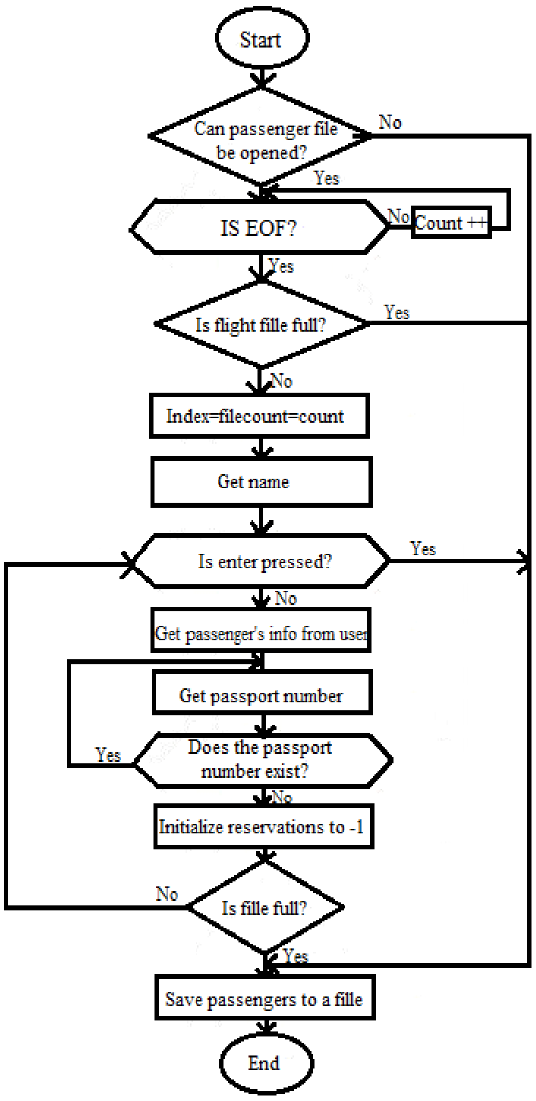
This function is used to open a binary file where data is stored.

```
if ((fscFlight = fopen("fscFlight.dat", mode)) == NULL)
  {
    fputs("Cannot open fscFlight.dat file.\n",stderr);
    return 0;
  }
  else return 1;
```

In case that the file cannot be opened, function will return zero, otherwise one will be returned. This is to prevent program from crashing and other errors.

2.4.2 Data objects manipulation

short createNewPassenger(struct Passenger *passenger, short n) /
void createFlight(struct Flight *scheduledFlight)



passenger.c and scheduledFlight.c

This function/s is responsible for creation of new passenger or schedule flight. It will first check whether a file can be opened or not.

if(!openPassengerFile("a+b")) return;

If file cannot be opened, terminate function.

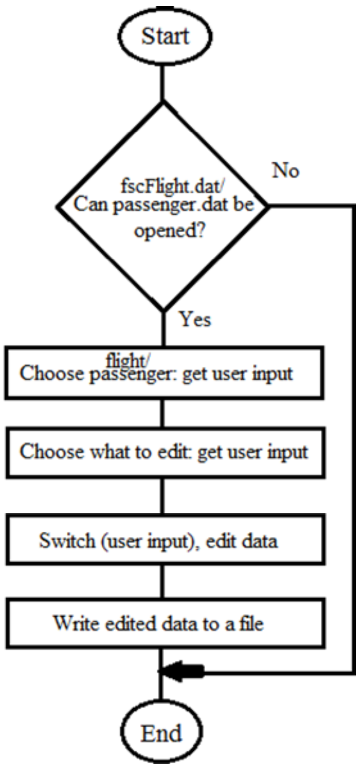
Then it will read all records into structure, and if the file is full, function will end.

User will be then prompted to enter passenger's or scheduled flight's details. If enter is pressed at the name input, function will exit and save all records to a file if any is created.

After one objet is created and if there is still free space in file, user will be prompted again to enter a name.

For createFlight principle is exactly the same as well as alghorithm, therefore no explanation is needed of it.

void modifyPassenger(struct Passenger *passenger) /
void modifyFlight(struct Flight *scheduledFlight)


Start
fscFlight.dat/
Can passenger.dat be opened?
No
Yes
Choose flight/ passenger: get user input
Choose what to edit: get user input
Switch (user input), edit data
Write edited data to a file
End

Found in: passenger.c and scheduledFlight.c respectively

if((count = listPassengers(passenger)) != -1 && (optionP = get_input(-1, count)) != -1)

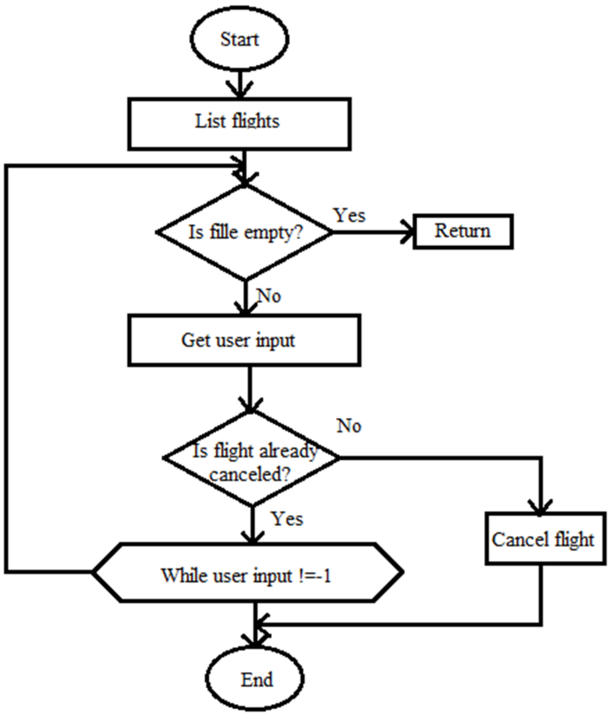
The code above will list all passengers and get user input. If count is not -1, which function listPassengers returns if there is no data, or user input is -1, function will be terminated. Here user input is to choose passenger to be edited.

if((optionE = get_input(-1, 9)) != -1)

With this code, user choose what part to edit. If -1 is inputed, program will terminate.

The same principles applies for modifyFlight, so it would be unnecessary to explain it separately.

void cancelFlight(struct Flight *scheduledFlight)



scheduledFlight.c

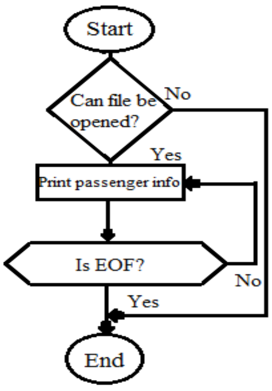
Function to cancel scheduled flight.

if(strcmp(scheduledFlight[optionF].status, "CANCELLED") != 0)

With this code above, it is checked whether a flight has already being cancelled or not. If it is not cancelled, string CANCELLED is copied into a string which holds status information.

User will be prompted to confirm his decision about flight cancellation, and if he agrees, flight is cancelled.

void show_PassengerInfo(short n) /
void show_FlightInfo(short n, const struct Flight *scheduledFlight) /
void show_existingPassengers(const struct Passenger *passenger) /
void show_existingFlights(const struct Flight *scheduledFlight) /

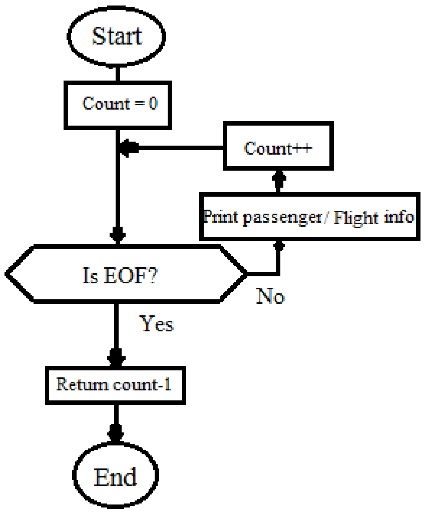


Found in: passenger.c and scheduledFlight.c respectively

The first two functions are very simple, their job is to print all details of corresponding data object (passenger or scheduled flight). Representing details in very nice format and easy readable by user.

The second two functions are used to print all passengers or scheduled flights respectively.

short listPassengers(const struct Passenger *passenger) /
short listFlights(const struct Flight *scheduledFlight)



Found in: passenger.c and scheduledFlight.c respectively

These two functions print details of data objects but in much simpler form used to present to a user which passenger of scheduled flight can be chosen for an action to be taken on them. The another difference of these two and foregoing functions is that these two return a number of records (passengers or scheduled flights). If there is no data in a file, the function will return -1.

2.4.3 Reservations

void iniPassRes(struct Passenger *passenger, const struct Fligh *scheduledFlight)

reservation.c

This function will initialize array's elements to -1,

```
for(index = 0; index < MAXPASSENGERS; index++)
    {
        passenger[count].reservations[index] = -1
        if(passenger[count].reservations[index + 1] == -1) break
    }
```

This code is looping trough array, setting the values to -1, if array has already been initialized but file was deleted, it would be unnecessarily to go to the end.

short findFreeElement(struct Passenger *passenger, short n)

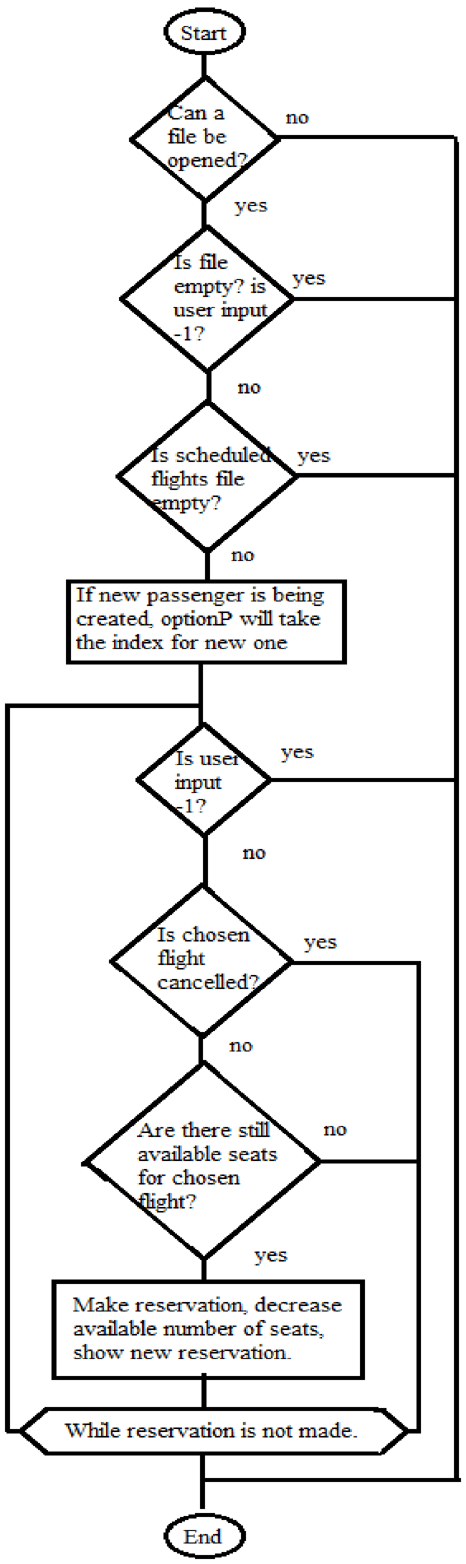
reservation.c

This function will loop trough reservations[] until -1 is found, since all elements are initialized to -1 at the creation of new passenger, therefore -1 represents a free element.

```
if(passenger[n].reservations[i] == -1)
break;
```

With this piece of code, loop will be stopped when free element is found. At the end, function will return index where the first -1 is.

void makeReservationExistingP(struct Passenger *passenger, struct Flight *scheduledFlight, short n, short newPass)


Start
Can a file be opened?
no
yes
Is file empty? is user input -1?
yes
no
Is scheduled flights file empty?
yes
no
If new passenger is being created, optionP will take the index for new one
Is user input -1?
yes
no
Is chosen flight cancelled?
yes
no
Are there still available seats for chosen flight?
no
yes
Make reservation, decrease available number of seats, show new reservation.
While reservation is not made.
End

reservation.c

As arguments, function takes both data objects, n represent that new passenger is going to be created This function will make a reservation for a passenger. At the beginning, it will check whether a files can be opened, and if user input is not -1.
N indicates that a reservation for new passenger is being made and in code:
if(n || ((count = listPassengers(passenger)) != -1 && (optionP = get_input(-1, count)) != -1))

n is 1, counting passenger is not necessarily because a passenger is created at step before, also user input is not needed.

It will ask then to choose a flight which a passenger wants to book, and if it is not cancelled and if there are still available seats, reservation is done. On the other hand, while loop will loop through these steps until a valid reservation is not made or if user's input is not -1.

void makeReservationNewP(struct Passenger *passenger, struct Flight *scheduledFlight)

reservation.c

This function will first create new passenger, and then make a reservation for him.

```
short passengerIndex = listPassengers(passenger) + 1;
```

This code will count the number of passenger in a file, and passenger index will hold an index where to save a new passenger.

```
if(createNewPassenger(passenger, 1))
    makeReservationExistingP(passenger, scheduledFlight, 1, passengerIndex);
```

This code will create new passenger, if file is full or other errors had occurred, no reservations will be made nor new passenger will be created. Otherwise, new passenger is created and a reservation is being made for him/her.

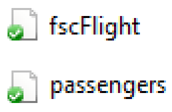
void show_reservations(const struct Passenger *passenger, const struct Flight *scheduledFlight)

reservation.c

This function shows a scheduled flight that is being booked by a chosen passenger.

3. Store/Load Functionality

All data created or modified will be stored on hard disk or load into memory when needed. After creating new passenger or scheduled flight, .dat files will be created as shown below.



For example, when new passenger is created all data will be saved onto hard disk with this code:

```
fwrite(&passenger[filecount], size, count - filecount, fpassengers);
```

fpassenger is name of the pointer to a file where data will be saved.

With code below, data from the hard disk will be loaded into memory, making it available to access data for read or edit purposes.

```
while (fread(&passenger[count], size, 1, fpassengers) == 1)
{
        count++; // increment counter
}
```

Codes like this or similar are used throughout a project, somewhere will be a little bit different depending on the current needs such as saving data to specific location in a file.

4. Testing

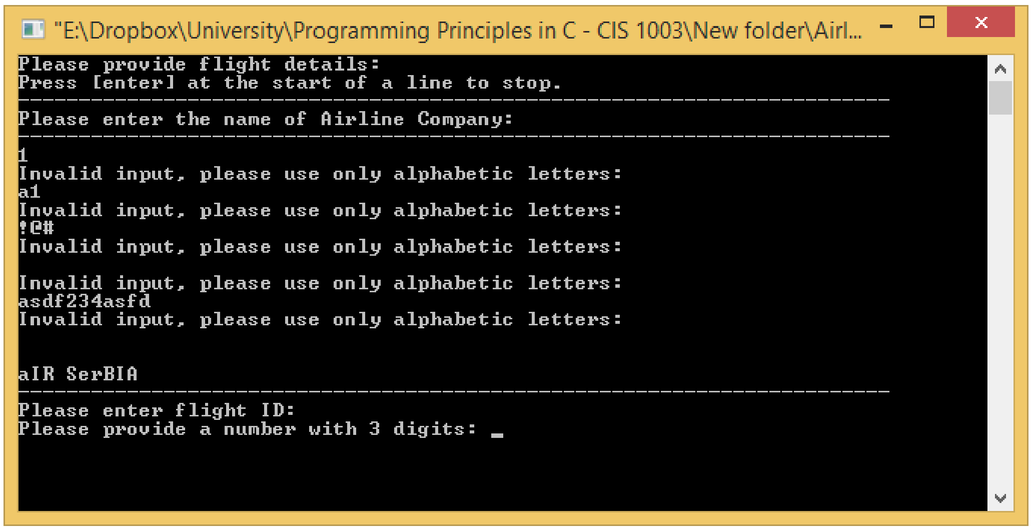
In this section, program functionality will be tested. All possible input will be provided for each part, showing program's input validation, reliability and robustness.

4.1 Testing scheduled flight

Here will be tested scheduled flight creation, modification and cancelation. At the end, all scheduled flights will be presented. For each input, validity will be checked in order to prevent bad inputs which can lead to incorrect data format or program crash.

4.1.1 Scheduled flight creation

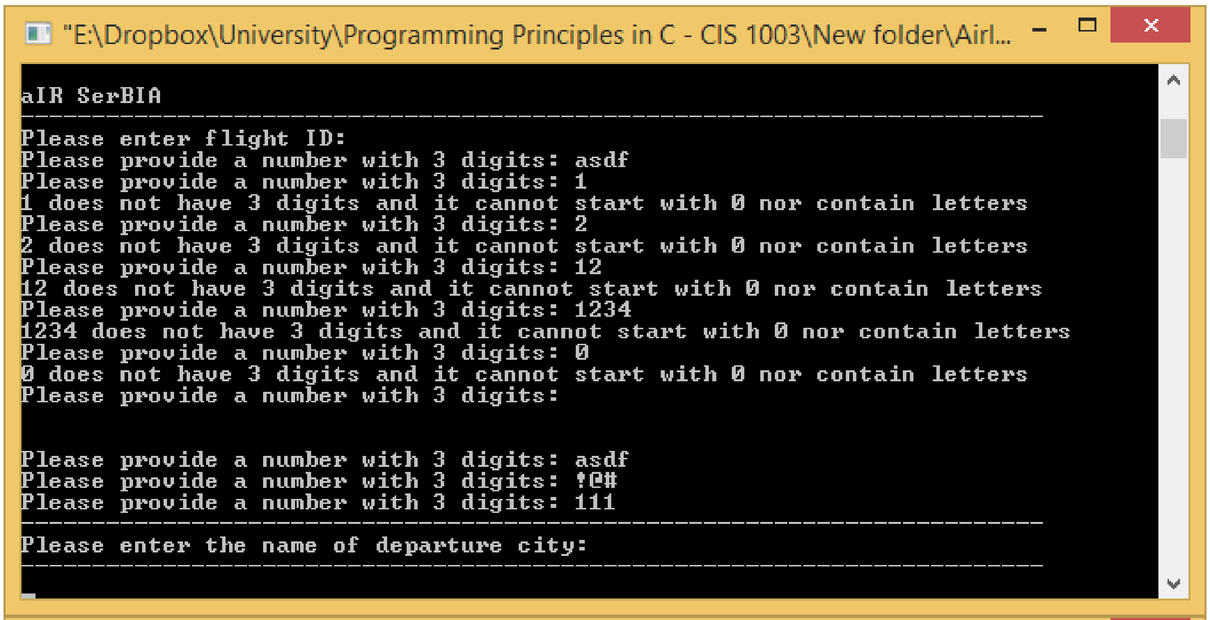
New scheduled flight is created by requesting from user to provide input for airline company name, flight ID, departure city as well as arrival city, date of flight departure and time.



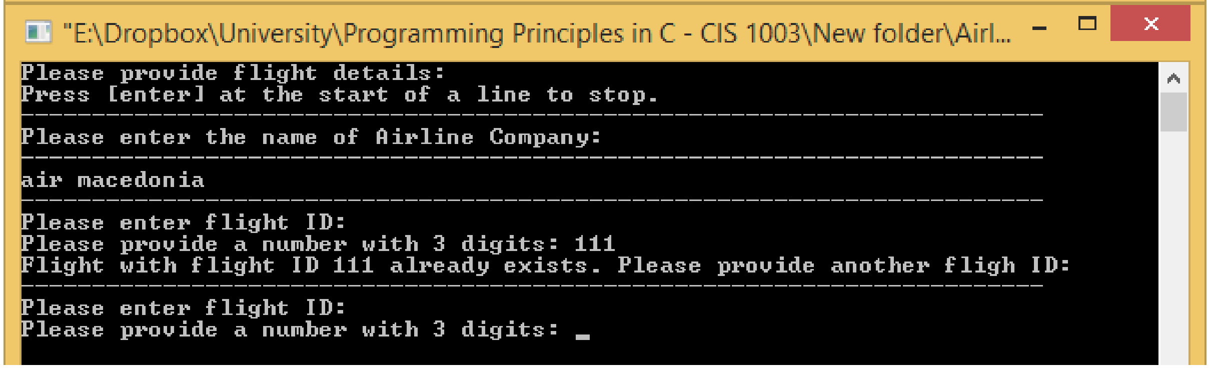
"E:\Dropbox\University\Programming Principles in C - CIS 1003\New folder\Airl...

```
Please provide flight details:
Press [enter] at the start of a line to stop.
------------------------------------------------------------------------
Please enter the name of Airline Company:
------------------------------------------------------------------------
1
Invalid input, please use only alphabetic letters:
a1
Invalid input, please use only alphabetic letters:
!@#
Invalid input, please use only alphabetic letters:

Invalid input, please use only alphabetic letters:
asdf234asfd
Invalid input, please use only alphabetic letters:


aIR SerBIA
------------------------------------------------------------------------
Please enter flight ID:
Please provide a number with 3 digits: _
```

Here is shown that for any name requested, program will accept only alphabetic characters. If user input is correct, but capitalization is not, as above example aIR SerBIA, program will proceed, correcting input by normalizing the name to Air Serbia, as it will be sown at the end.

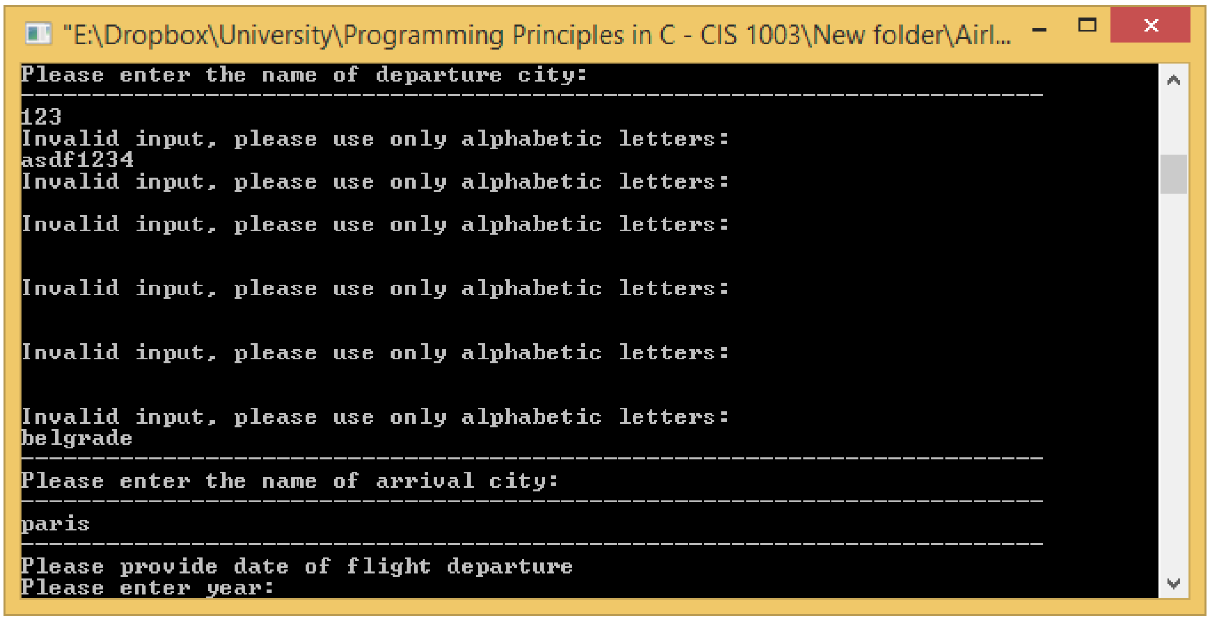


```
"E:\Dropbox\University\Programming Principles in C - CIS 1003\New folder\Airl...

aIR SerBIA
-------------------------------------------------------------------------
Please enter flight ID:
Please provide a number with 3 digits: asdf
Please provide a number with 3 digits: 1
1 does not have 3 digits and it cannot start with 0 nor contain letters
Please provide a number with 3 digits: 2
2 does not have 3 digits and it cannot start with 0 nor contain letters
Please provide a number with 3 digits: 12
12 does not have 3 digits and it cannot start with 0 nor contain letters
Please provide a number with 3 digits: 1234
1234 does not have 3 digits and it cannot start with 0 nor contain letters
Please provide a number with 3 digits: 0
0 does not have 3 digits and it cannot start with 0 nor contain letters
Please provide a number with 3 digits:


Please provide a number with 3 digits: asdf
Please provide a number with 3 digits: !@#
Please provide a number with 3 digits: 111
-------------------------------------------------------------------------
Please enter the name of departure city:
-------------------------------------------------------------------------
```



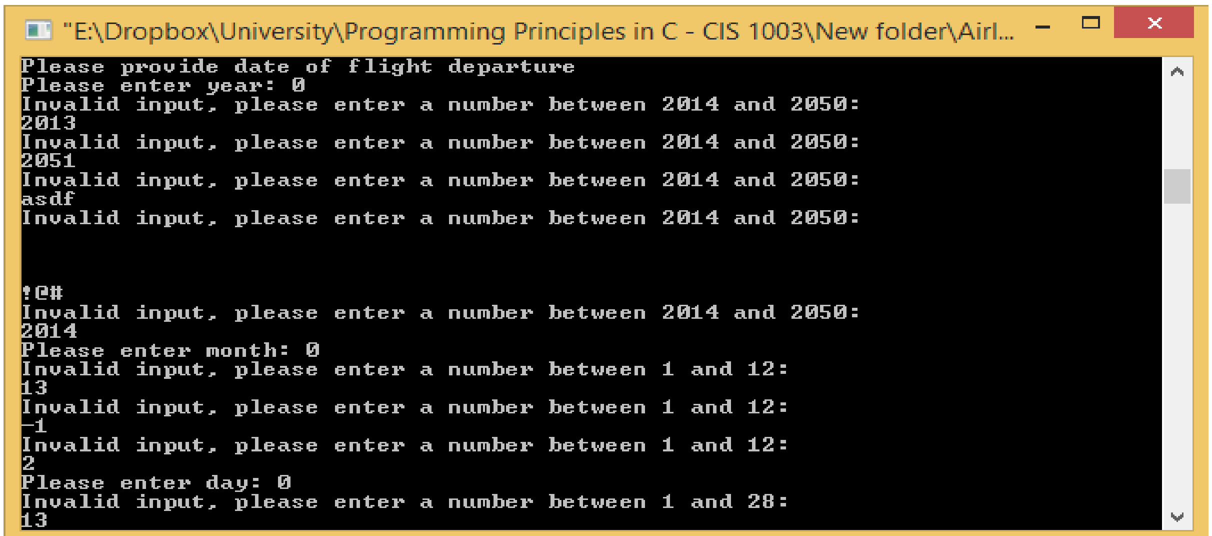
```
"E:\Dropbox\University\Programming Principles in C - CIS 1003\New folder\Airl...
Please provide flight details:
Press [enter] at the start of a line to stop.
-------------------------------------------------------------------------
Please enter the name of Airline Company:
-------------------------------------------------------------------------
air macedonia
-------------------------------------------------------------------------
Please enter flight ID:
Please provide a number with 3 digits: 111
Flight with flight ID 111 already exists. Please provide another fligh ID:
-------------------------------------------------------------------------
Please enter flight ID:
Please provide a number with 3 digits: _
```

For flight ID only three digits are requested, every other input will be thrown away. If flight with enter ID already exist, program will inform user about that and request another one.



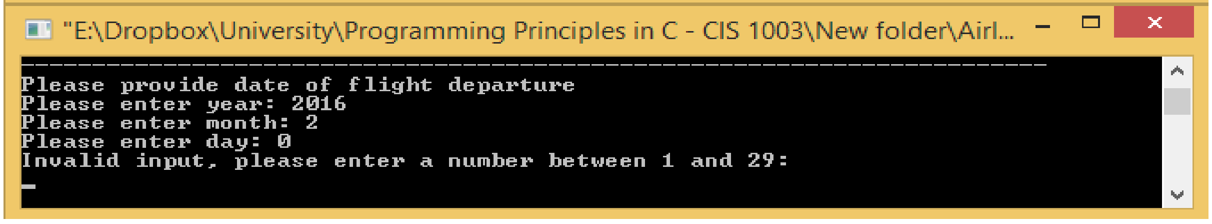
```
"E:\Dropbox\University\Programming Principles in C - CIS 1003\New folder\Airl...
Please enter the name of departure city:
-------------------------------------------------------------------------
123
Invalid input, please use only alphabetic letters:
asdf1234
Invalid input, please use only alphabetic letters:

Invalid input, please use only alphabetic letters:


Invalid input, please use only alphabetic letters:


Invalid input, please use only alphabetic letters:


Invalid input, please use only alphabetic letters:
belgrade
-------------------------------------------------------------------------
Please enter the name of arrival city:
-------------------------------------------------------------------------
paris
-------------------------------------------------------------------------
Please provide date of flight departure
Please enter year:
```

Another example of requesting correct name format from user.



"E:\Dropbox\University\Programming Principles in C - CIS 1003\New folder\Airl...

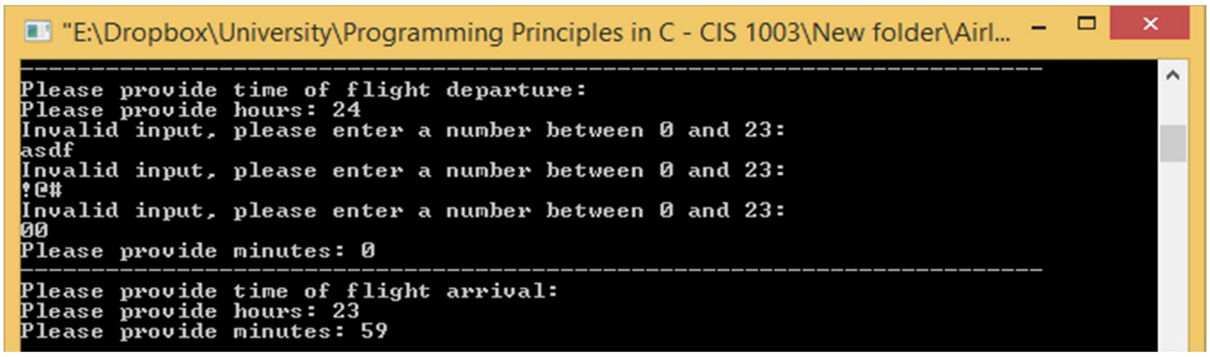
```
Please provide date of flight departure
Please enter year: 0
Invalid input, please enter a number between 2014 and 2050:
2013
Invalid input, please enter a number between 2014 and 2050:
2051
Invalid input, please enter a number between 2014 and 2050:
asdf
Invalid input, please enter a number between 2014 and 2050:



!@#
Invalid input, please enter a number between 2014 and 2050:
2014
Please enter month: 0
Invalid input, please enter a number between 1 and 12:
13
Invalid input, please enter a number between 1 and 12:
-1
Invalid input, please enter a number between 1 and 12:
2
Please enter day: 0
Invalid input, please enter a number between 1 and 28:
13
```



"E:\Dropbox\University\Programming Principles in C - CIS 1003\New folder\Airl...

```
---------------------------------------------------------------------------
Please provide date of flight departure
Please enter year: 2016
Please enter month: 2
Please enter day: 0
Invalid input, please enter a number between 1 and 29:
_
```

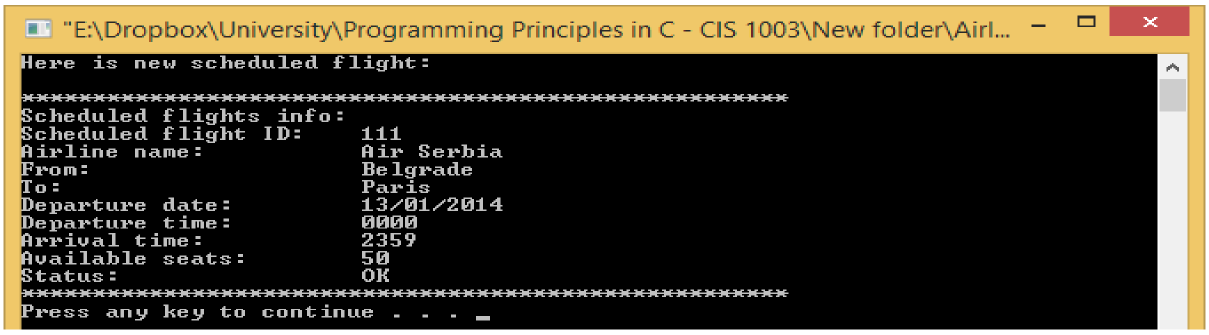
For date of flight departure, first the year must be entered in order to calculate whether the inputted year is leap or not. Flights can be made only after 2013 till 2050. Next requested input is month, in order for next input to ask for correct number of days as shown above. If the year is leap and month is February, program will accept number 29.



"E:\Dropbox\University\Programming Principles in C - CIS 1003\New folder\Airl...

```
---------------------------------------------------------------------------
Please provide time of flight departure:
Please provide hours: 24
Invalid input, please enter a number between 0 and 23:
asdf
Invalid input, please enter a number between 0 and 23:
!@#
Invalid input, please enter a number between 0 and 23:
00
Please provide minutes: 0
---------------------------------------------------------------------------
Please provide time of flight arrival:
Please provide hours: 23
Please provide minutes: 59
```

Next, time of departure and arrival is requested. Input can only be from 0 to 23 for hours, and from 0 to 59 to minutes. Bad inputs will be thrown away and new will be requested. After providing all inputs in correct format, new scheduled flight will be shown with all details. As it can be seen, airline name has been normalized.

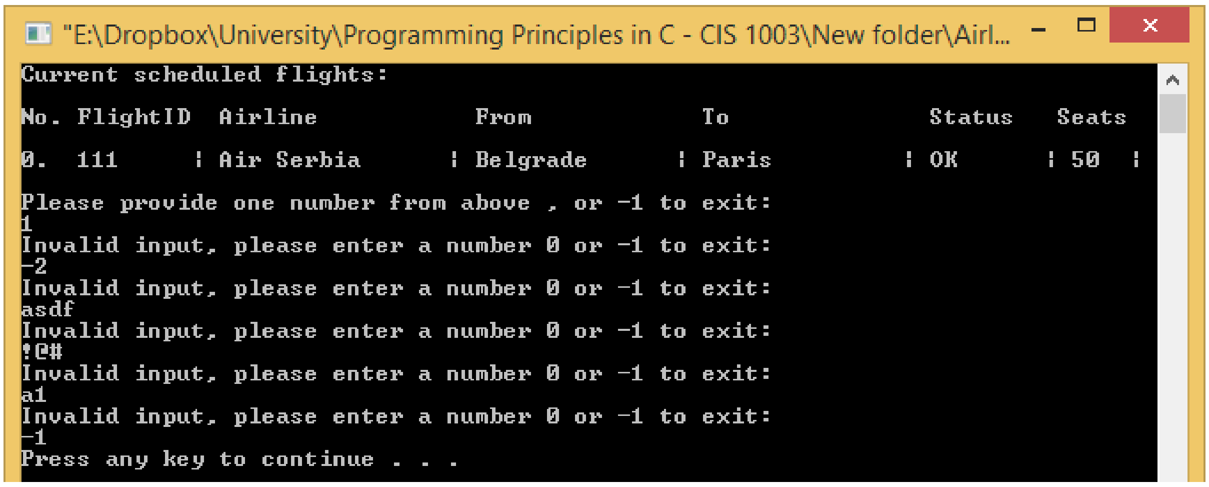


"E:\Dropbox\University\Programming Principles in C - CIS 1003\New folder\Airl...

```
Here is new scheduled flight:

*******************************************************
Scheduled flights info:
Scheduled flight ID:     111
Airline name:            Air Serbia
From:                    Belgrade
To:                      Paris
Departure date:          13/01/2014
Departure time:          0000
Arrival time:            2359
Available seats:         50
Status:                  OK
*******************************************************
Press any key to continue . . . _
```

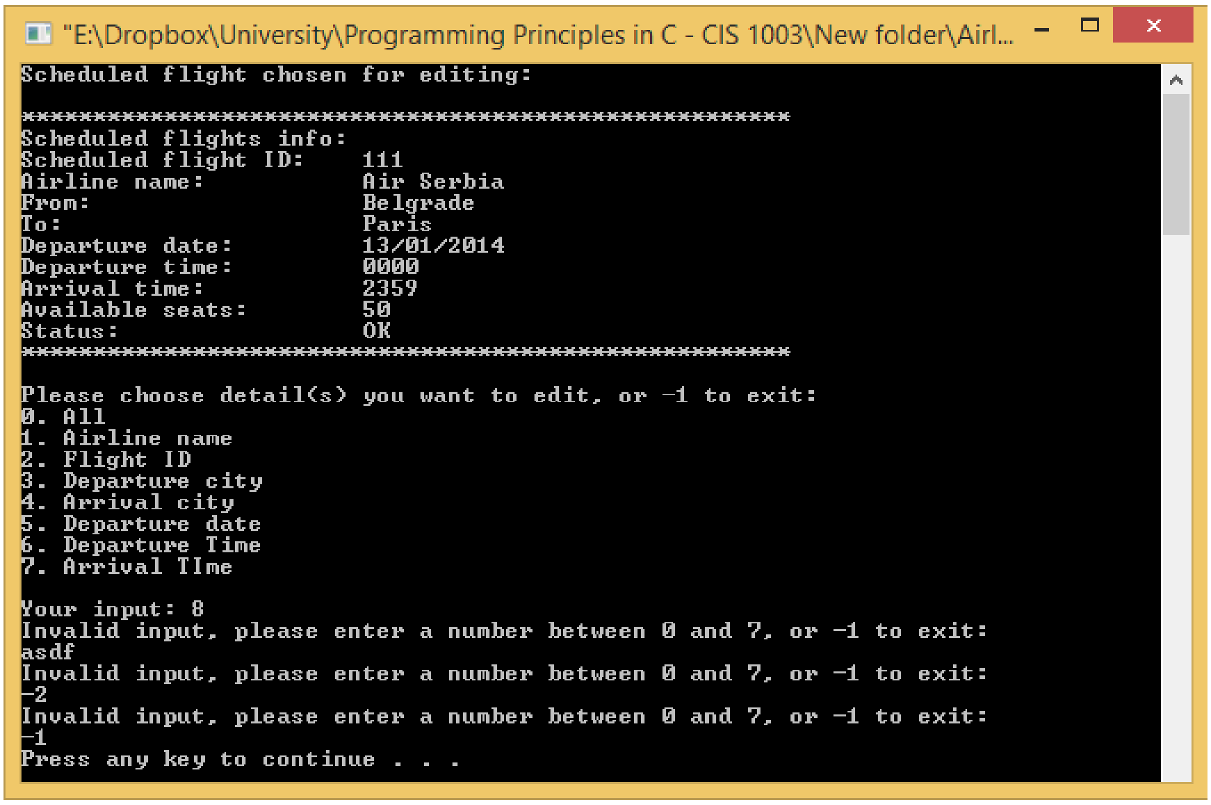
4.1.2 Scheduled flight modification

With flight modification, any data can be changed separately or all at once.


"E:\Dropbox\University\Programming Principles in C - CIS 1003\New folder\Airl...

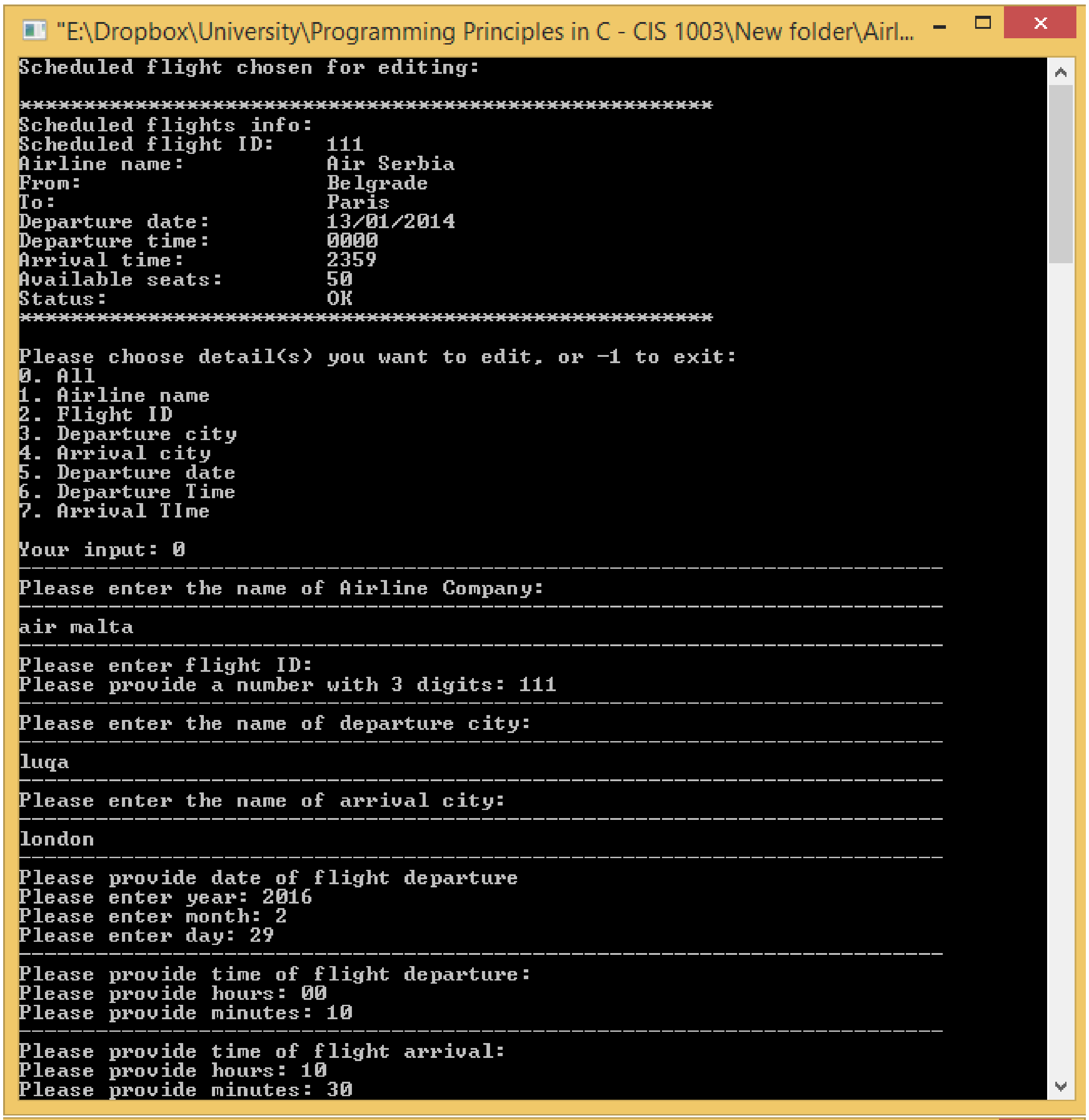
```
Current scheduled flights:
No. FlightID  Airline            From            To              Status   Seats
0.  111      | Air Serbia       | Belgrade       | Paris          | OK      | 50  |
Please provide one number from above , or -1 to exit:
1
Invalid input, please enter a number 0 or -1 to exit:
-2
Invalid input, please enter a number 0 or -1 to exit:
asdf
Invalid input, please enter a number 0 or -1 to exit:
!@#
Invalid input, please enter a number 0 or -1 to exit:
a1
Invalid input, please enter a number 0 or -1 to exit:
-1
Press any key to continue . . .
```

First, all scheduled flights will be listed with number at the beginning which user can choose. Only shown numbers can be chosen or -1 if it is decided to not modify any flight.


"E:\Dropbox\University\Programming Principles in C - CIS 1003\New folder\Airl...

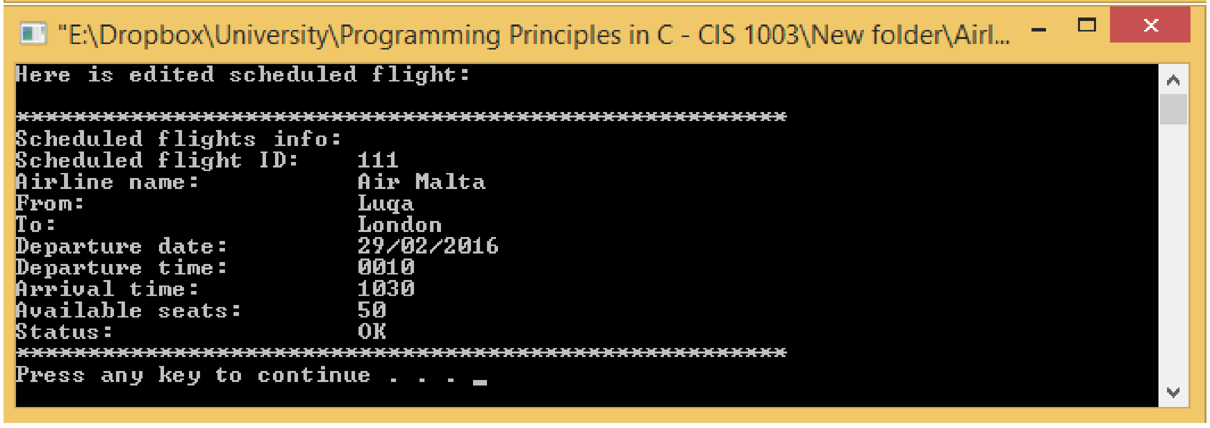
```
Scheduled flight chosen for editing:

******************************************************
Scheduled flights info:
Scheduled flight ID:    111
Airline name:           Air Serbia
From:                   Belgrade
To:                     Paris
Departure date:         13/01/2014
Departure time:         0000
Arrival time:           2359
Available seats:        50
Status:                 OK
******************************************************

Please choose detail(s) you want to edit, or -1 to exit:
0. All
1. Airline name
2. Flight ID
3. Departure city
4. Arrival city
5. Departure date
6. Departure Time
7. Arrival TIme

Your input: 8
Invalid input, please enter a number between 0 and 7, or -1 to exit:
asdf
Invalid input, please enter a number between 0 and 7, or -1 to exit:
-2
Invalid input, please enter a number between 0 and 7, or -1 to exit:
-1
Press any key to continue . . .
```

When flight for modification is chosen, list of options will be provided. Again, only listed numbers can be chosen, all others will be ignored with adequate message, and new will be requested.



"E:\Dropbox\University\Programming Principles in C - CIS 1003\New folder\Airl...

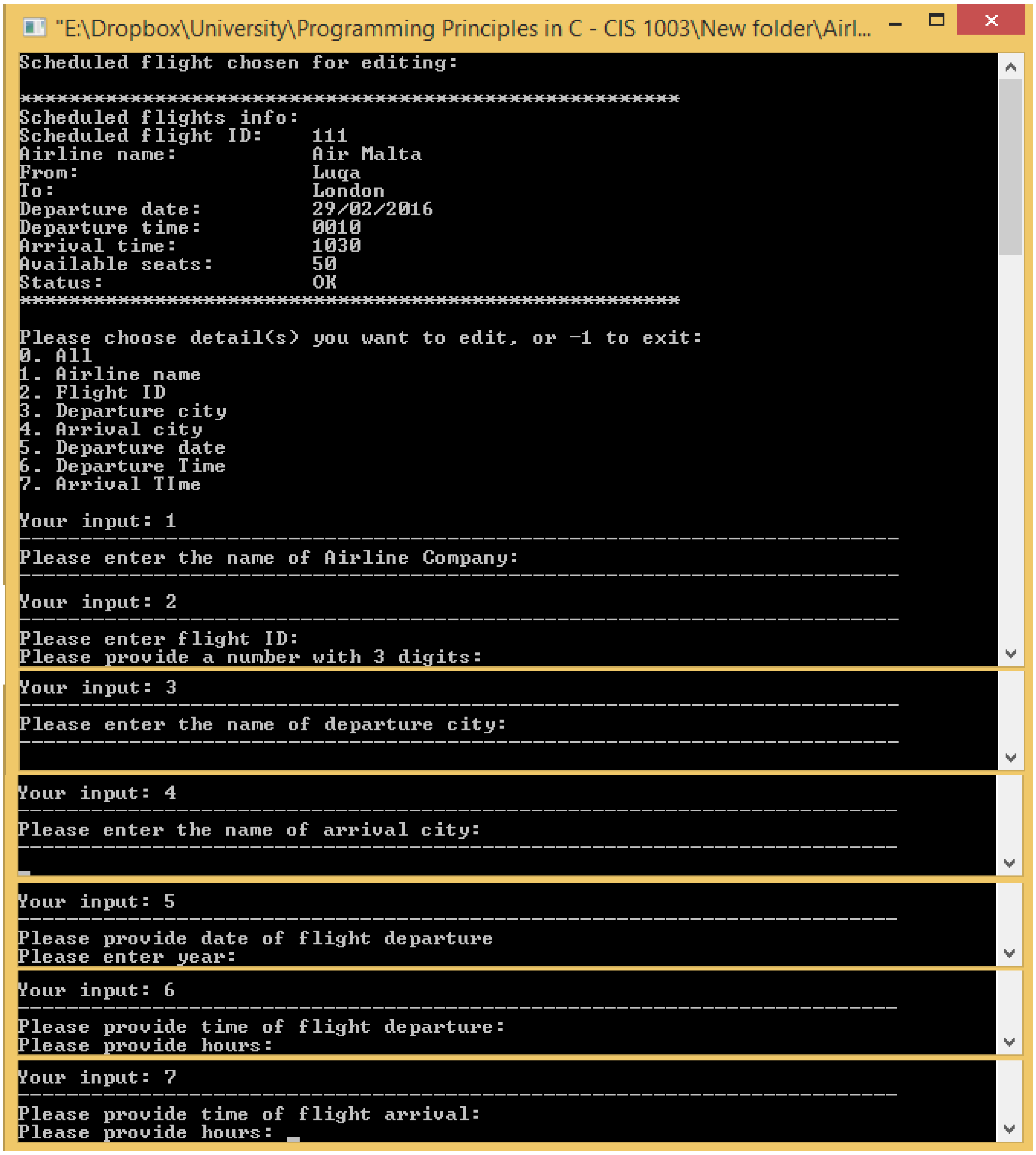
```
Scheduled flight chosen for editing:

******************************************************
Scheduled flights info:
Scheduled flight ID:    111
Airline name:           Air Serbia
From:                   Belgrade
To:                     Paris
Departure date:         13/01/2014
Departure time:         0000
Arrival time:           2359
Available seats:        50
Status:                 OK
******************************************************

Please choose detail(s) you want to edit, or -1 to exit:
0. All
1. Airline name
2. Flight ID
3. Departure city
4. Arrival city
5. Departure date
6. Departure Time
7. Arrival TIme

Your input: 0
------------------------------------------------------------------------
Please enter the name of Airline Company:
------------------------------------------------------------------------
air malta
------------------------------------------------------------------------
Please enter flight ID:
Please provide a number with 3 digits: 111
------------------------------------------------------------------------
Please enter the name of departure city:
------------------------------------------------------------------------
luqa
------------------------------------------------------------------------
Please enter the name of arrival city:
------------------------------------------------------------------------
london
------------------------------------------------------------------------
Please provide date of flight departure
Please enter year: 2016
Please enter month: 2
Please enter day: 29
------------------------------------------------------------------------
Please provide time of flight departure:
Please provide hours: 00
Please provide minutes: 10
------------------------------------------------------------------------
Please provide time of flight arrival:
Please provide hours: 10
Please provide minutes: 30
```



"E:\Dropbox\University\Programming Principles in C - CIS 1003\New folder\Airl...

```
Here is edited scheduled flight:

******************************************************
Scheduled flights info:
Scheduled flight ID:    111
Airline name:           Air Malta
From:                   Luqa
To:                     London
Departure date:         29/02/2016
Departure time:         0010
Arrival time:           1030
Available seats:        50
Status:                 OK
******************************************************
Press any key to continue . . . _
```

If all is chosen, program will prompt all details to be changed. At the end, edited scheduled flight is shown.


"E:\Dropbox\University\Programming Principles in C - CIS 1003\New folder\Airl...

```
Scheduled flight chosen for editing:

*******************************************************
Scheduled flights info:
Scheduled flight ID:     111
Airline name:            Air Malta
From:                    Luqa
To:                      London
Departure date:          29/02/2016
Departure time:          0010
Arrival time:            1030
Available seats:         50
Status:                  OK
*******************************************************

Please choose detail(s) you want to edit, or -1 to exit:
0. All
1. Airline name
2. Flight ID
3. Departure city
4. Arrival city
5. Departure date
6. Departure Time
7. Arrival TIme

Your input: 1
-------------------------------------------------------------------------
Please enter the name of Airline Company:
-------------------------------------------------------------------------

Your input: 2
-------------------------------------------------------------------------
Please enter flight ID:
Please provide a number with 3 digits:
```

```
Your input: 3
-------------------------------------------------------------------------
Please enter the name of departure city:
-------------------------------------------------------------------------
```

```
Your input: 4
-------------------------------------------------------------------------
Please enter the name of arrival city:
-------------------------------------------------------------------------
```

```
Your input: 5
-------------------------------------------------------------------------
Please provide date of flight departure
Please enter year:
```

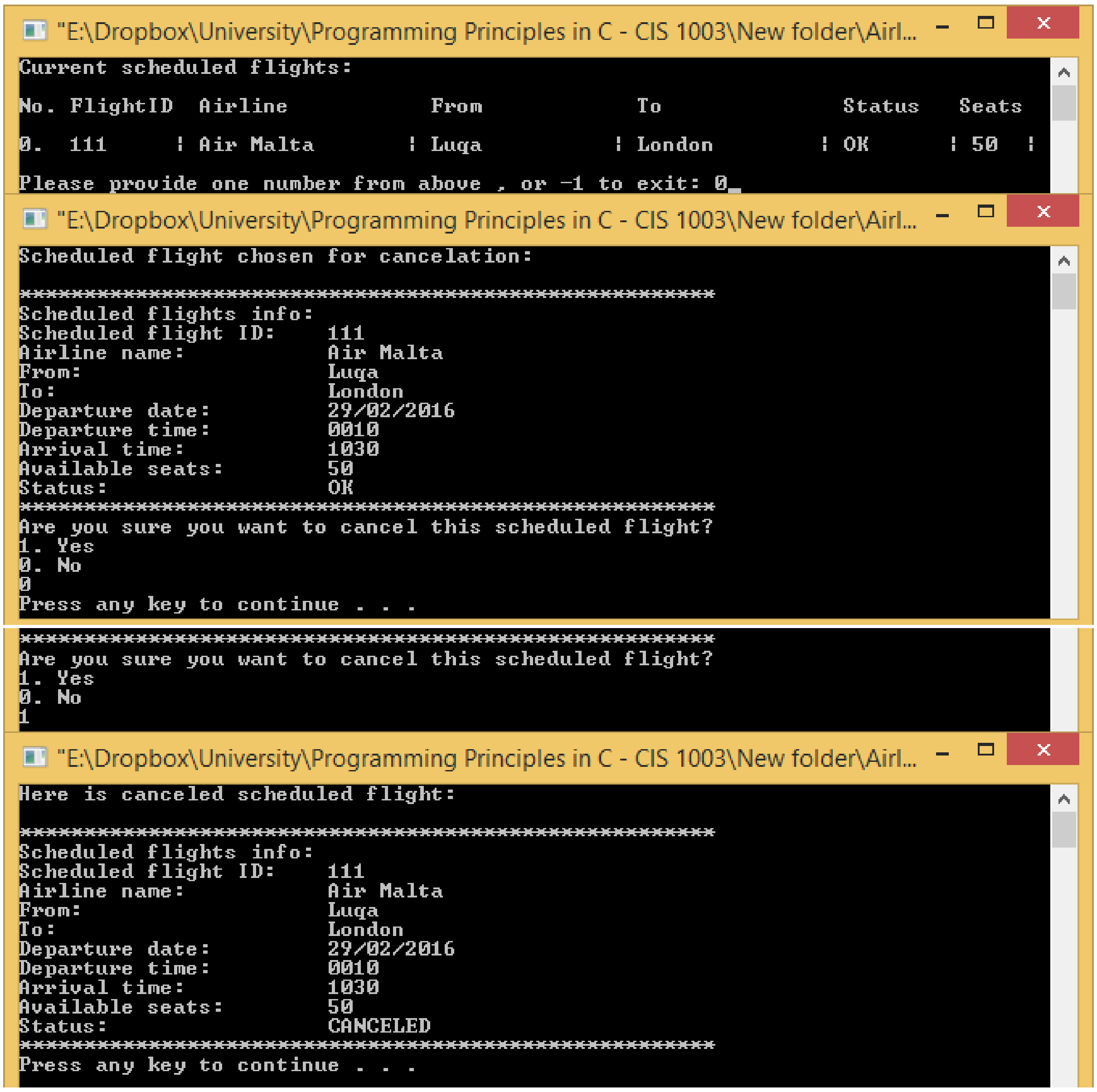
```
Your input: 6
-------------------------------------------------------------------------
Please provide time of flight departure:
Please provide hours:
```

```
Your input: 7
-------------------------------------------------------------------------
Please provide time of flight arrival:
Please provide hours: _
```

Here is presented that each input correspond to correct field to be edited.

4.1.3 Scheduled flight cancelation

If it is decided that a particular flight cannot be done, cancelation is provided.


"E:\Dropbox\University\Programming Principles in C - CIS 1003\New folder\Airl...

```
Current scheduled flights:

No. FlightID  Airline            From             To               Status    Seats

0.  111      | Air Malta        | Luqa            | London          | OK       | 50  |

Please provide one number from above , or -1 to exit: 0_
```

```
Scheduled flight chosen for cancelation:

*******************************************************
Scheduled flights info:
Scheduled flight ID:     111
Airline name:            Air Malta
From:                    Luqa
To:                      London
Departure date:          29/02/2016
Departure time:          0010
Arrival time:            1030
Available seats:         50
Status:                  OK
*******************************************************
Are you sure you want to cancel this scheduled flight?
1. Yes
0. No
0
Press any key to continue . . .
```

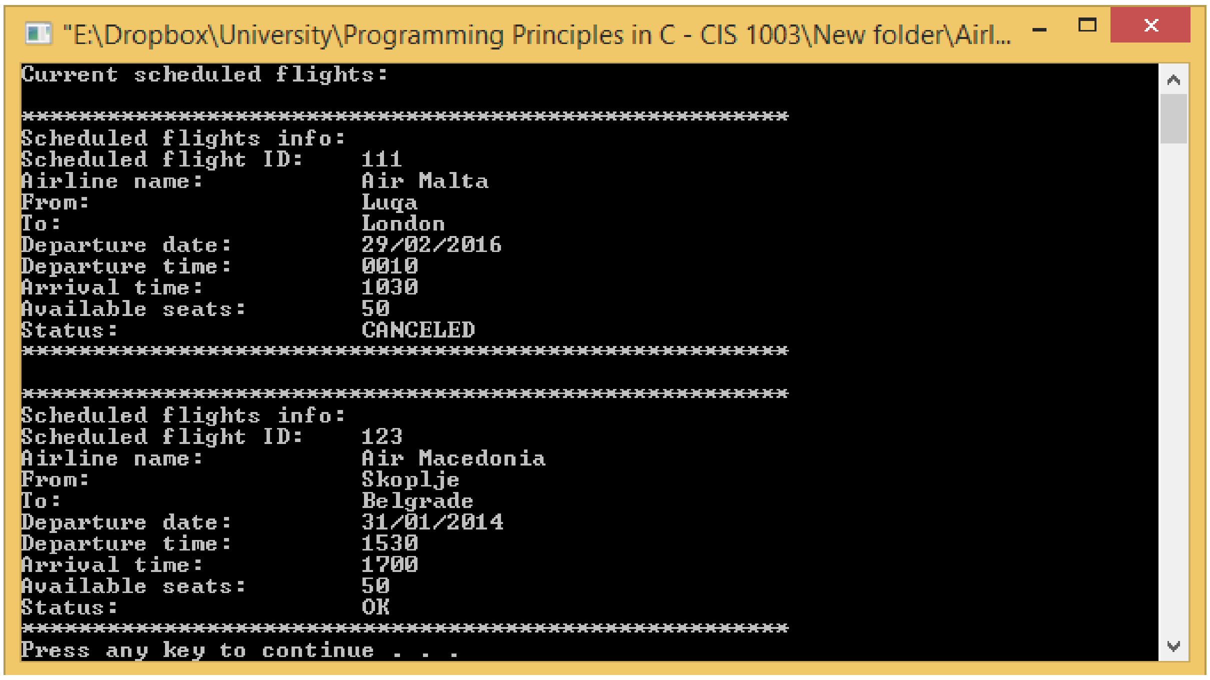
```
*******************************************************
Are you sure you want to cancel this scheduled flight?
1. Yes
0. No
1
```

```
Here is canceled scheduled flight:

*******************************************************
Scheduled flights info:
Scheduled flight ID:     111
Airline name:            Air Malta
From:                    Luqa
To:                      London
Departure date:          29/02/2016
Departure time:          0010
Arrival time:            1030
Available seats:         50
Status:                  CANCELED
*******************************************************
Press any key to continue . . .
```

As always, the program will take care of bad inputs. If number 1 is chosen, flight will be cancelled, showing to user cancelled flight, otherwise nothing will happen, and main menu will be shown.

4.1.4 Presenting all scheduled flights

If someone wishes to see all scheduled flights:


"E:\Dropbox\University\Programming Principles in C - CIS 1003\New folder\Airl...

```
Current scheduled flights:

******************************************************
Scheduled flights info:
Scheduled flight ID:    111
Airline name:           Air Malta
From:                   Luqa
To:                     London
Departure date:         29/02/2016
Departure time:         0010
Arrival time:           1030
Available seats:        50
Status:                 CANCELED
******************************************************

******************************************************
Scheduled flights info:
Scheduled flight ID:    123
Airline name:           Air Macedonia
From:                   Skoplje
To:                     Belgrade
Departure date:         31/01/2014
Departure time:         1530
Arrival time:           1700
Available seats:        50
Status:                 OK
******************************************************
Press any key to continue . . .
```

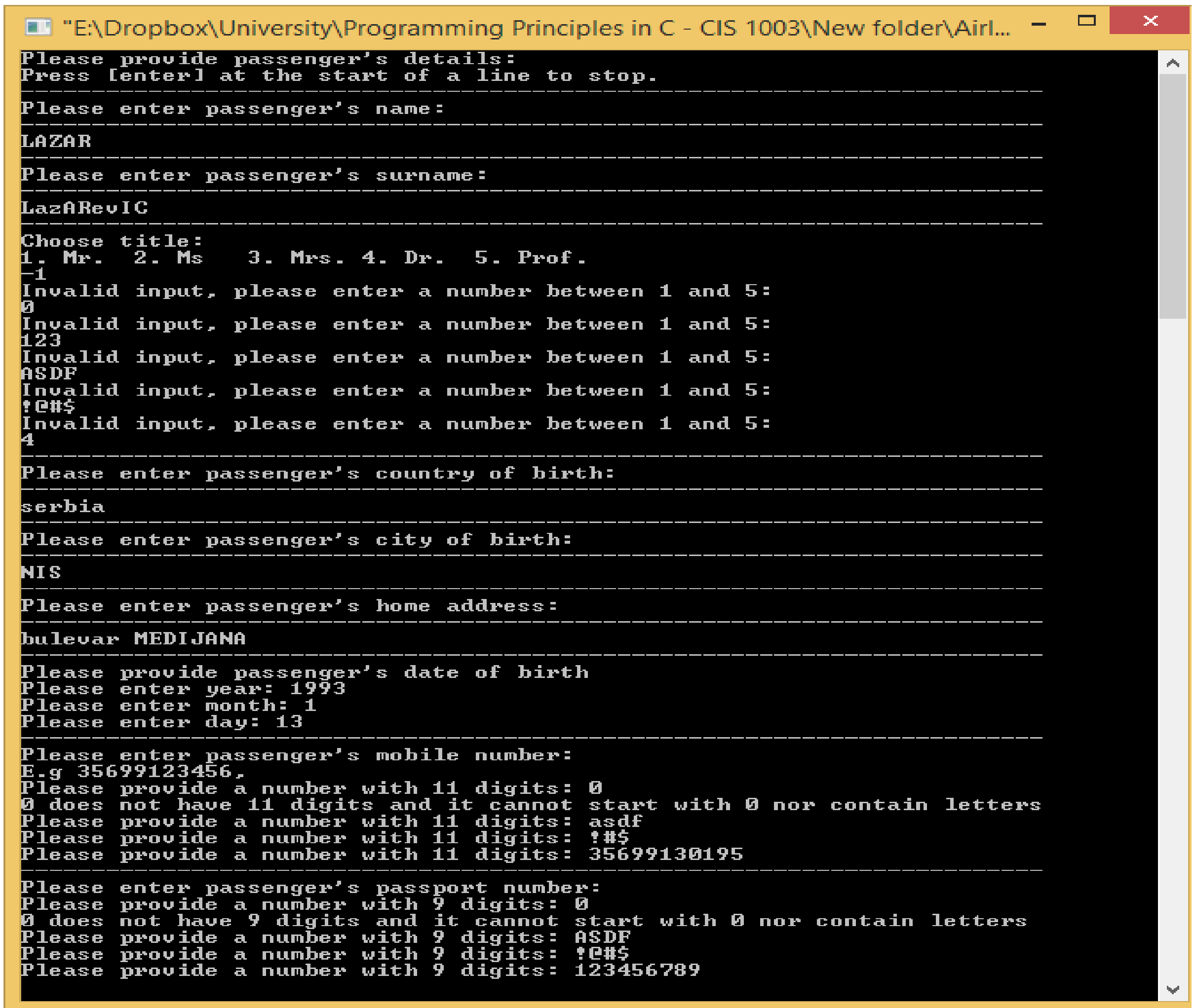
4.2 Testing passenger

Here will be tested passenger creation and modification. At the end, all passengers will be presented. For each input, validity will be checked in order to prevent bad inputs which can lead to incorrect data format or program crash.

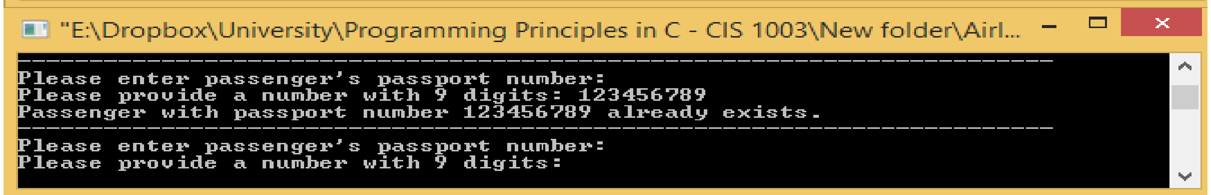
Since input validation is on the same principle as for the scheduled flight, many bad inputs will be skipped.

4.2.1 Passenger creation

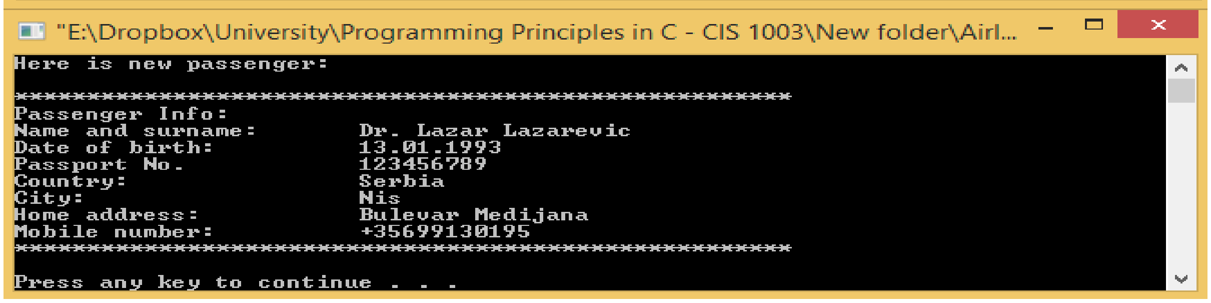
For passenger creation, details that will be requested are: name, surname, title, country of birth, city of birth, home address, date of birth, mobile number and passport.



```
"E:\Dropbox\University\Programming Principles in C - CIS 1003\New folder\Airl...
Please provide passenger's details:
Press [enter] at the start of a line to stop.
-------------------------------------------------------------------------
Please enter passenger's name:
-------------------------------------------------------------------------
LAZAR
-------------------------------------------------------------------------
Please enter passenger's surname:
-------------------------------------------------------------------------
LazARevIC
-------------------------------------------------------------------------
Choose title:
1. Mr.   2. Ms    3. Mrs. 4. Dr.   5. Prof.
-1
Invalid input, please enter a number between 1 and 5:
0
Invalid input, please enter a number between 1 and 5:
123
Invalid input, please enter a number between 1 and 5:
ASDF
Invalid input, please enter a number between 1 and 5:
!@#$
Invalid input, please enter a number between 1 and 5:
4
-------------------------------------------------------------------------
Please enter passenger's country of birth:
-------------------------------------------------------------------------
serbia
-------------------------------------------------------------------------
Please enter passenger's city of birth:
-------------------------------------------------------------------------
NIS
-------------------------------------------------------------------------
Please enter passenger's home address:
-------------------------------------------------------------------------
bulevar MEDIJANA
-------------------------------------------------------------------------
Please provide passenger's date of birth
Please enter year: 1993
Please enter month: 1
Please enter day: 13
-------------------------------------------------------------------------
Please enter passenger's mobile number:
E.g 35699123456,
Please provide a number with 11 digits: 0
0 does not have 11 digits and it cannot start with 0 nor contain letters
Please provide a number with 11 digits: asdf
Please provide a number with 11 digits: !#$
Please provide a number with 11 digits: 35699130195
-------------------------------------------------------------------------
Please enter passenger's passport number:
Please provide a number with 9 digits: 0
0 does not have 9 digits and it cannot start with 0 nor contain letters
Please provide a number with 9 digits: ASDF
Please provide a number with 9 digits: !@#$
Please provide a number with 9 digits: 123456789
```



```
"E:\Dropbox\University\Programming Principles in C - CIS 1003\New folder\Airl...
-------------------------------------------------------------------------
Please enter passenger's passport number:
Please provide a number with 9 digits: 123456789
Passenger with passport number 123456789 already exists.
-------------------------------------------------------------------------
Please enter passenger's passport number:
Please provide a number with 9 digits:
```

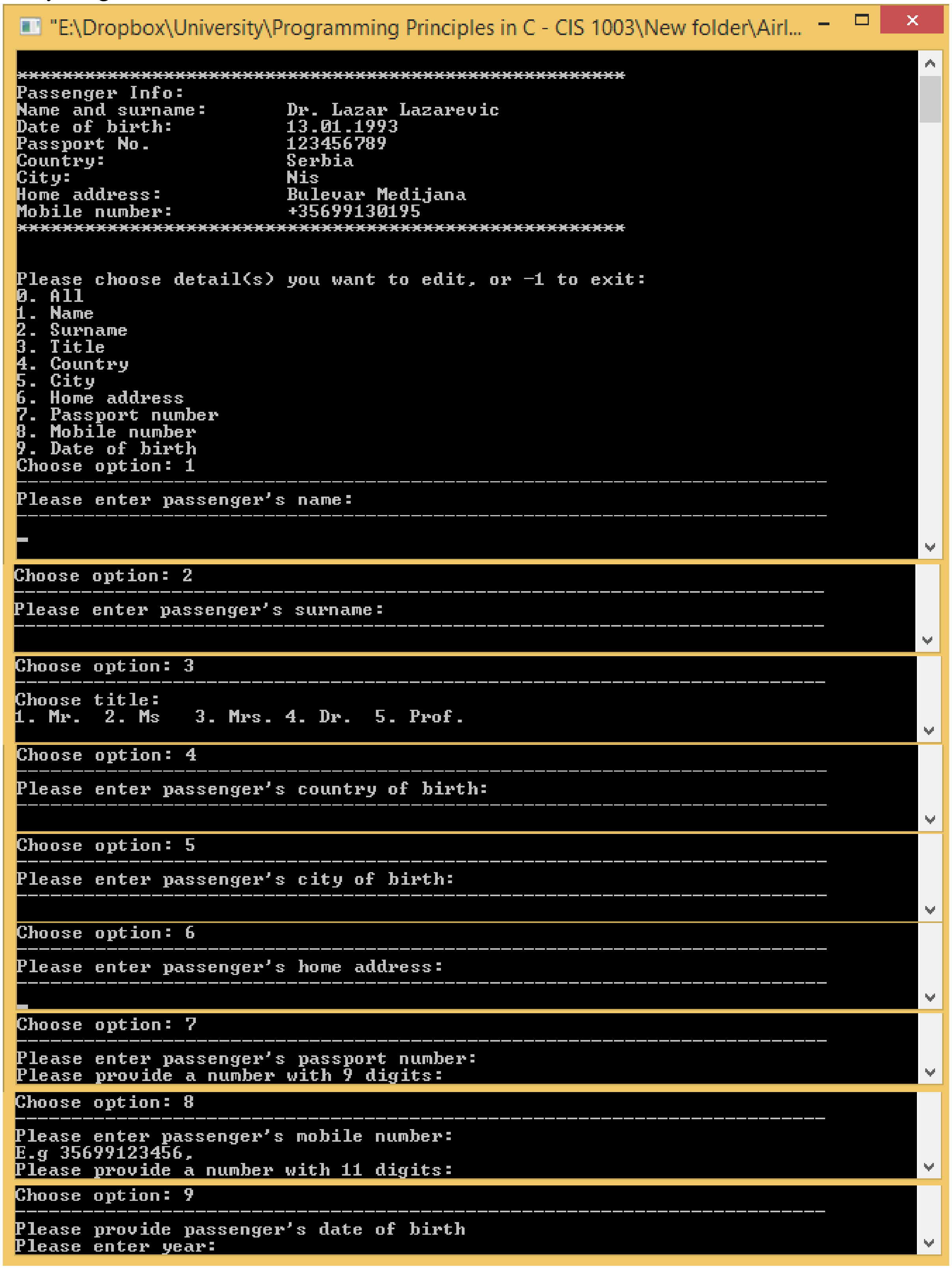


```
"E:\Dropbox\University\Programming Principles in C - CIS 1003\New folder\Airl...
Here is new passenger:

*******************************************************
Passenger Info:
Name and surname:        Dr. Lazar Lazarevic
Date of birth:           13.01.1993
Passport No.             123456789
Country:                 Serbia
City:                    Nis
Home address:            Bulevar Medijana
Mobile number:           +35699130195
*******************************************************

Press any key to continue . . .
```

For passenger's title, only numbers from 1 to 5 are accepted. Mobile number and passport number cannot contain letters nor can start with 0. If passenger with provided passport number already exists, new passport number will be requested.

4.2.2 Passenger modification

As in flight modification, user will be prompted to choose what to edit. In case below, everything will be edited.



"E:\Dropbox\University\Programming Principles in C - CIS 1003\New folder\Airl...

```
******************************************************
Passenger Info:
Name and surname:        Dr. Lazar Lazarevic
Date of birth:           13.01.1993
Passport No.             123456789
Country:                 Serbia
City:                    Nis
Home address:            Bulevar Medijana
Mobile number:           +35699130195
******************************************************


Please choose detail(s) you want to edit, or -1 to exit:
0. All
1. Name
2. Surname
3. Title
4. Country
5. City
6. Home address
7. Passport number
8. Mobile number
9. Date of birth
Choose option: 1
--------------------------------------------------------------------------
Please enter passenger's name:
--------------------------------------------------------------------------

_
```

```
Choose option: 2
--------------------------------------------------------------------------
Please enter passenger's surname:
--------------------------------------------------------------------------
```

```
Choose option: 3
--------------------------------------------------------------------------
Choose title:
1. Mr.   2. Ms    3. Mrs. 4. Dr.   5. Prof.
```

```
Choose option: 4
--------------------------------------------------------------------------
Please enter passenger's country of birth:
--------------------------------------------------------------------------
```

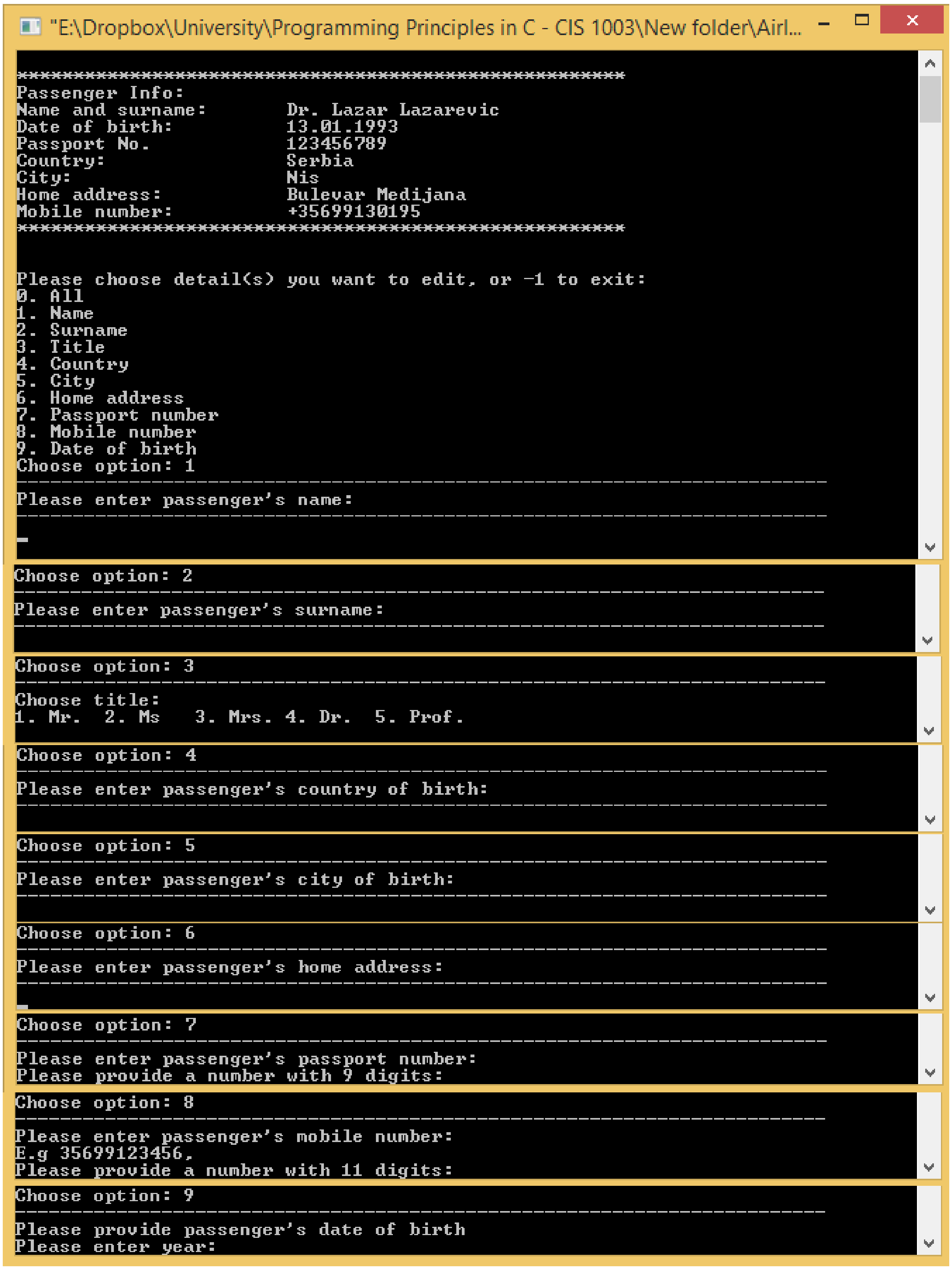
```
Choose option: 5
--------------------------------------------------------------------------
Please enter passenger's city of birth:
--------------------------------------------------------------------------
```

```
Choose option: 6
--------------------------------------------------------------------------
Please enter passenger's home address:
--------------------------------------------------------------------------
_
```

```
Choose option: 7
--------------------------------------------------------------------------
Please enter passenger's passport number:
Please provide a number with 9 digits:
```

```
Choose option: 8
--------------------------------------------------------------------------
Please enter passenger's mobile number:
E.g 35699123456.
Please provide a number with 11 digits:
```

```
Choose option: 9
--------------------------------------------------------------------------
Please provide passenger's date of birth
Please enter year:
```


"E:\Dropbox\University\Programming Principles in C - CIS 1003\New folder\Airl...

```
*******************************************************
Passenger Info:
Name and surname:        Dr. Lazar Lazarevic
Date of birth:           13.01.1993
Passport No.             123456789
Country:                 Serbia
City:                    Nis
Home address:            Bulevar Medijana
Mobile number:           +35699130195
*******************************************************


Please choose detail(s) you want to edit, or -1 to exit:
0. All
1. Name
2. Surname
3. Title
4. Country
5. City
6. Home address
7. Passport number
8. Mobile number
9. Date of birth
Choose option: 1
------------------------------------------------------------------------
Please enter passenger's name:
------------------------------------------------------------------------

_
```

```
Choose option: 2
------------------------------------------------------------------------
Please enter passenger's surname:
------------------------------------------------------------------------
```

```
Choose option: 3
------------------------------------------------------------------------
Choose title:
1. Mr.   2. Ms    3. Mrs. 4. Dr.   5. Prof.
```

```
Choose option: 4
------------------------------------------------------------------------
Please enter passenger's country of birth:
------------------------------------------------------------------------
```

```
Choose option: 5
------------------------------------------------------------------------
Please enter passenger's city of birth:
------------------------------------------------------------------------
```

```
Choose option: 6
------------------------------------------------------------------------
Please enter passenger's home address:
------------------------------------------------------------------------
_
```

```
Choose option: 7
------------------------------------------------------------------------
Please enter passenger's passport number:
Please provide a number with 9 digits:
```

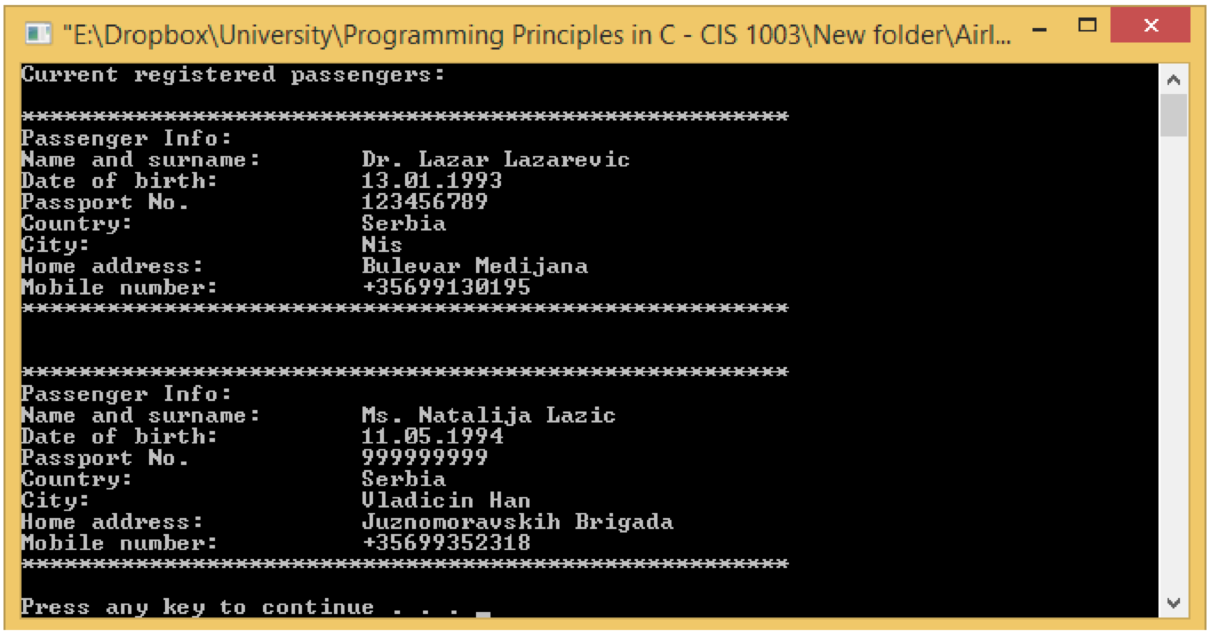
```
Choose option: 8
------------------------------------------------------------------------
Please enter passenger's mobile number:
E.g 35699123456.
Please provide a number with 11 digits:
```

```
Choose option: 9
------------------------------------------------------------------------
Please provide passenger's date of birth
Please enter year:
```

In this case, we are testing that user input correspond to correct part of passenger detail to be edited. If same passport number is entered program will accept it. Otherwise error will be shown and new passport number will be requested.

4.2.3 Presenting all passengers

Here, all passengers are being shown, all with correct details that have been entered by a user.



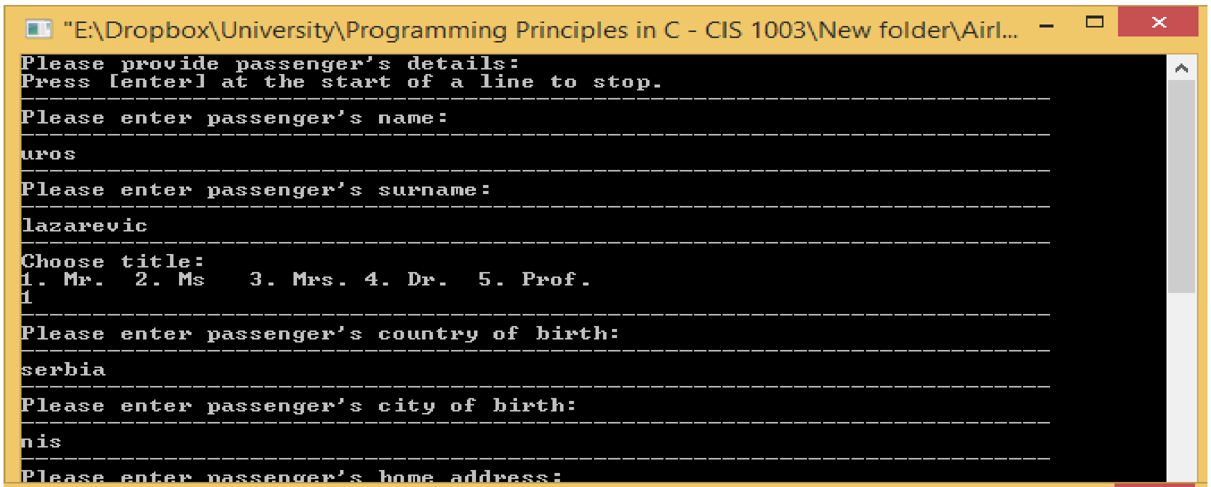
"E:\Dropbox\University\Programming Principles in C - CIS 1003\New folder\Airl...

```
Current registered passengers:

*******************************************************
Passenger Info:
Name and surname:        Dr. Lazar Lazarevic
Date of birth:           13.01.1993
Passport No.             123456789
Country:                 Serbia
City:                    Nis
Home address:            Bulevar Medijana
Mobile number:           +35699130195
*******************************************************


*******************************************************
Passenger Info:
Name and surname:        Ms. Natalija Lazic
Date of birth:           11.05.1994
Passport No.             999999999
Country:                 Serbia
City:                    Vladicin Han
Home address:            Juznomoravskih Brigada
Mobile number:           +35699352318
*******************************************************

Press any key to continue . . . _
```

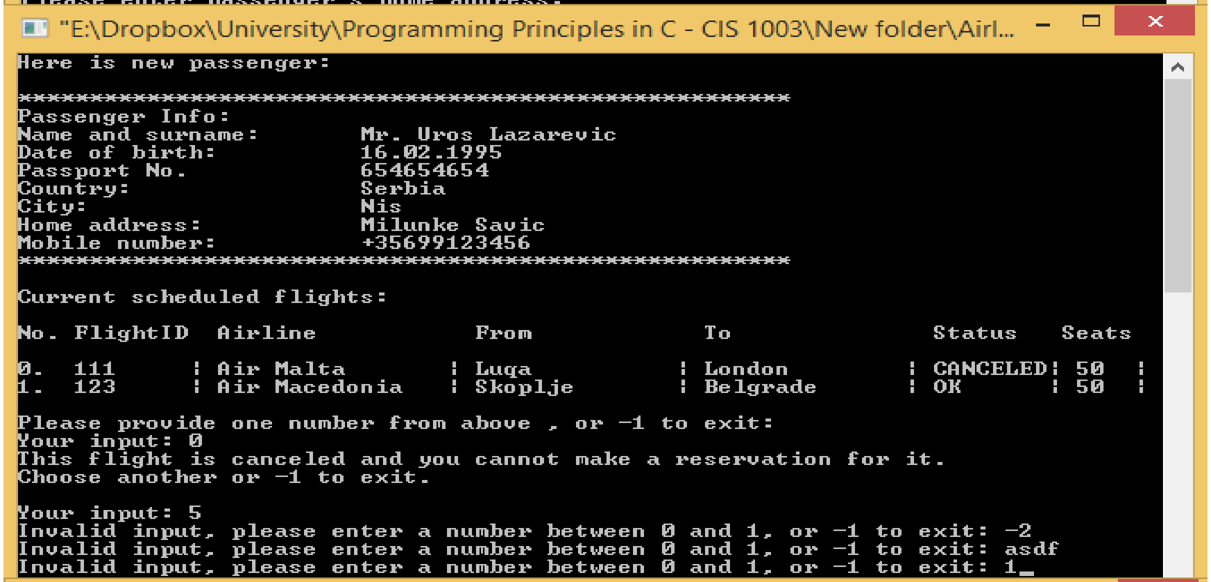
4.3 Testing reservations

In this part of the report, reservations will be tested. This include reservation for new passenger, reservation for existing passengers and show all past passenger’s reservations.

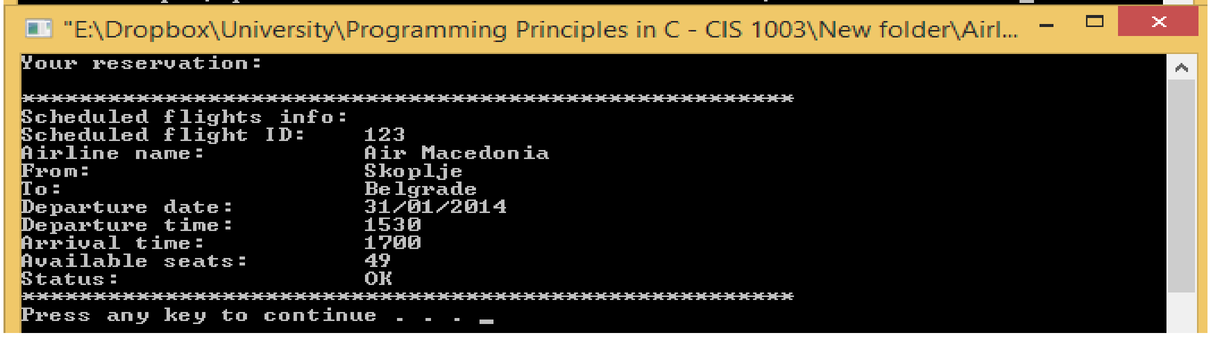
4.3.1 Reservation for new passenger


"E:\Dropbox\University\Programming Principles in C - CIS 1003\New folder\Airl...

```
Please provide passenger's details:
Press [enter] at the start of a line to stop.
------------------------------------------------------------------------
Please enter passenger's name:
------------------------------------------------------------------------
uros
------------------------------------------------------------------------
Please enter passenger's surname:
------------------------------------------------------------------------
lazarevic
------------------------------------------------------------------------
Choose title:
1. Mr.   2. Ms    3. Mrs. 4. Dr.   5. Prof.
1
------------------------------------------------------------------------
Please enter passenger's country of birth:
------------------------------------------------------------------------
serbia
------------------------------------------------------------------------
Please enter passenger's city of birth:
------------------------------------------------------------------------
nis
------------------------------------------------------------------------
Please enter passenger's home address:
```


"E:\Dropbox\University\Programming Principles in C - CIS 1003\New folder\Airl...

```
Here is new passenger:

******************************************************
Passenger Info:
Name and surname:        Mr. Uros Lazarevic
Date of birth:           16.02.1995
Passport No.             654654654
Country:                 Serbia
City:                    Nis
Home address:            Milunke Savic
Mobile number:           +35699123456
******************************************************

Current scheduled flights:

No. FlightID  Airline            From             To               Status    Seats

0.   111      | Air Malta        | Luqa            | London         | CANCELED| 50   |
1.   123      | Air Macedonia    | Skoplje         | Belgrade       | OK      | 50   |

Please provide one number from above , or -1 to exit:
Your input: 0
This flight is canceled and you cannot make a reservation for it.
Choose another or -1 to exit.

Your input: 5
Invalid input, please enter a number between 0 and 1, or -1 to exit: -2
Invalid input, please enter a number between 0 and 1, or -1 to exit: asdf
Invalid input, please enter a number between 0 and 1, or -1 to exit: 1_
```

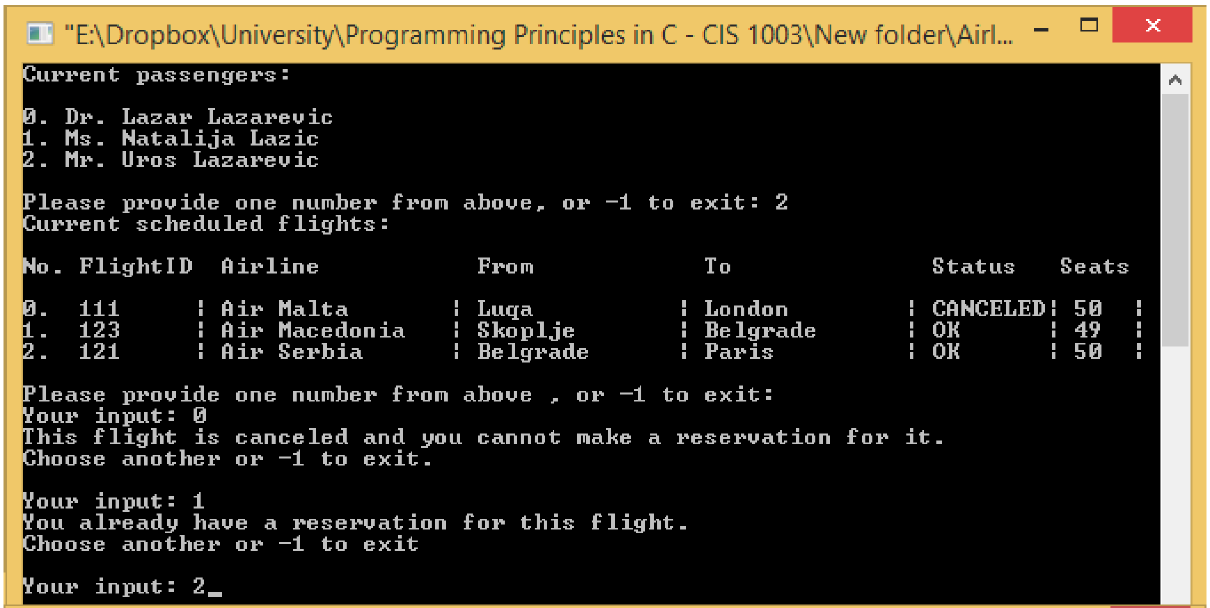

"E:\Dropbox\University\Programming Principles in C - CIS 1003\New folder\Airl...

```
Your reservation:

******************************************************
Scheduled flights info:
Scheduled flight ID:     123
Airline name:            Air Macedonia
From:                    Skoplje
To:                      Belgrade
Departure date:          31/01/2014
Departure time:          1530
Arrival time:            1700
Available seats:         49
Status:                  OK
******************************************************
Press any key to continue . . . _
```

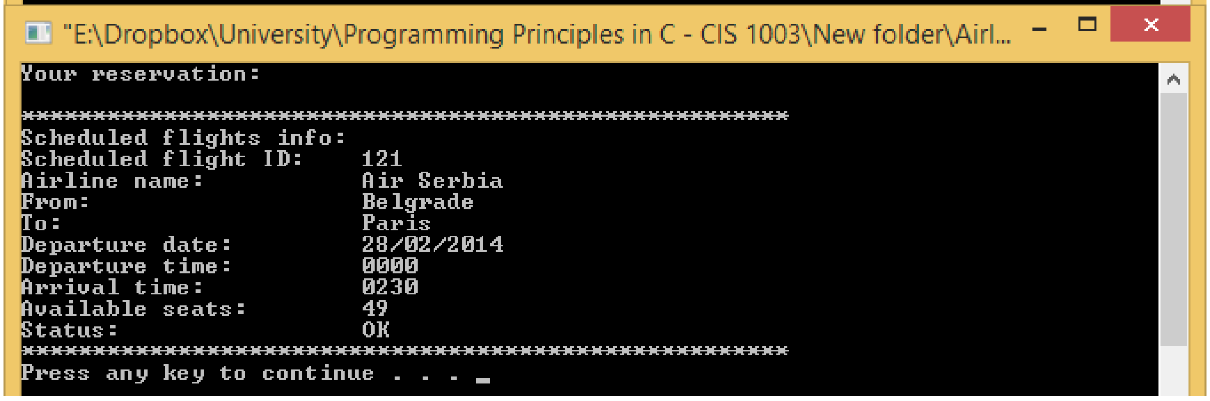
This will create new passenger and make reservation for him/her. If cancelled flight is chosen, error will be shown and new input request will be provided. Bad inputs are handled. The number of seats will be reduced with each reservation being made by passenger.

4.3.2 Reservation for existing passenger

First passengers are listed for user to choose, then scheduled flights are listed. If flight cancelled reservation cannot be made as well as if reservation is already being made for particular flight by particular passenger. As shown below, bad inputs will not be accepted.


"E:\Dropbox\University\Programming Principles in C - CIS 1003\New folder\Airl...

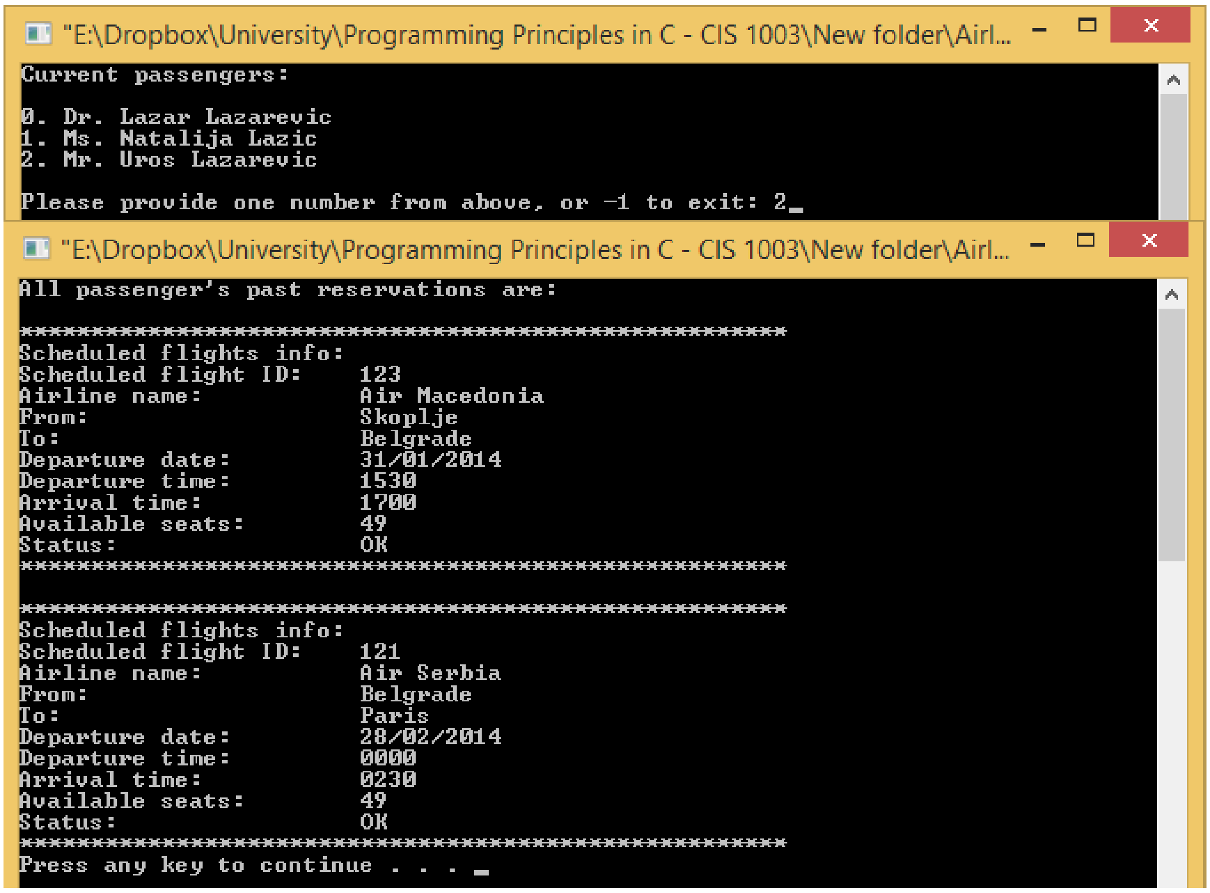
```
Current passengers:

0. Dr. Lazar Lazarevic
1. Ms. Natalija Lazic
2. Mr. Uros Lazarevic

Please provide one number from above, or -1 to exit: 2
Current scheduled flights:

No. FlightID  Airline           From            To              Status    Seats

0.  111      | Air Malta       | Luqa          | London         | CANCELED| 50  |
1.  123      | Air Macedonia   | Skoplje       | Belgrade       | OK      | 49  |
2.  121      | Air Serbia      | Belgrade      | Paris          | OK      | 50  |

Please provide one number from above , or -1 to exit:
Your input: 0
This flight is canceled and you cannot make a reservation for it.
Choose another or -1 to exit.

Your input: 1
You already have a reservation for this flight.
Choose another or -1 to exit

Your input: 2_
```


"E:\Dropbox\University\Programming Principles in C - CIS 1003\New folder\Airl...

```
Your reservation:

******************************************************
Scheduled flights info:
Scheduled flight ID:    121
Airline name:           Air Serbia
From:                   Belgrade
To:                     Paris
Departure date:         28/02/2014
Departure time:         0000
Arrival time:           0230
Available seats:        49
Status:                 OK
******************************************************
Press any key to continue . . . _
```

4.3.3 Presenting all passenger's past reservations

Here for chosen passenger, all reservations are shown. All details are correct and no incorrect data types are being shown as input validations are perfect.


"E:\Dropbox\University\Programming Principles in C - CIS 1003\New folder\Airl...

```
Current passengers:

0. Dr. Lazar Lazarevic
1. Ms. Natalija Lazic
2. Mr. Uros Lazarevic

Please provide one number from above, or -1 to exit: 2_
```

"E:\Dropbox\University\Programming Principles in C - CIS 1003\New folder\Airl...

```
All passenger's past reservations are:

******************************************************
Scheduled flights info:
Scheduled flight ID:     123
Airline name:            Air Macedonia
From:                    Skoplje
To:                      Belgrade
Departure date:          31/01/2014
Departure time:          1530
Arrival time:            1700
Available seats:         49
Status:                  OK
******************************************************

******************************************************
Scheduled flights info:
Scheduled flight ID:     121
Airline name:            Air Serbia
From:                    Belgrade
To:                      Paris
Departure date:          28/02/2014
Departure time:          0000
Arrival time:            0230
Available seats:         49
Status:                  OK
******************************************************
Press any key to continue . . . _
```

5. Appendix

5.2 Passenger

5.2.1 Passenger.h

```
#ifndef PASSENGER_H_INCLUDED
#define PASSENGER_H_INCLUDED

// constants for arrays size
#define MAXNAME 16              /* maximum lenght for any name(name, surname, country, city...)
*/
#define MAXADDRESS 30           /* maximum lenght for addresses  */
#define MAXTITLE 6            /* maximum lenght for titles     */
#define MAXPASSENGERS 50        /* maximum number of passengers  */
#define DATE 3

// constants for printing details in function get_name();
#define NAME 1                  /* number for name */
#define SURNAME 2               /* number for surname */
#define COUNTRY 3               /* number for country */
#define CITY 4                  /* number for city */
#define ADDRESS 5               /* number for address */

// constants for printing details in function get_Int();
#define PASSDIGITS 9            /* how many digits a passport number must have  */
#define MOBDIGITS 11            /* how many digits a mobile number must have  */


/************************************************************
 *   Sturcture for passenger informations
 ************************************************************/
static struct Passenger
{
   char name[MAXNAME];                       // Passenger's name
   char surname[MAXNAME];                    // Passenger's surname
   char title[MAXTITLE];                     // Passenger's title
   char country[MAXNAME];                    // Passenger's country
   char city[MAXNAME];                       // Passenger's city
   char homeAddress[MAXADDRESS];             // Passenger's home address
   short DOB[DATE];                          // Passenger's date of birth
   short reservations[MAXPASSENGERS];        // Link to flights regarding reservations
   unsigned int passportNo;                  // Passenger's passpoert number
   unsigned long long int mobNo;             // Passenger's mobile number

}passenger[MAXPASSENGERS];
/*****************************************************************************
```

```
/************************************************************
 *   Functions prototypes
 ************************************************************/
unsigned long long int get_int(short n);              // function to get integer for any
purpose
short get_input(short nMIN, short nMAX);               // function to get input from user
void  get_Title(char arr[]);                          // function to choose title(Mr.,Dr., ...)
void  get_date(short arr[], short minYear, short maxYear, short n); // function to get date in
format dd/mm/yyyy
void  get_Name(char arr[], short n, short maxN);          // function to get name( of
passenger, country, city, address...)
void  normalize_name(char arr[]);                      // function to normalize a name. e.g.
lAZaR -> Lazar


short createNewPassenger(struct Passenger *passenger, short n);    // function to create a new
passenger
void  modifyPassenger(struct Passenger *passenger);          // function to modify an
existing passenger
short listPassengers(const struct Passenger *passenger);
void  show_existingPassengers(const struct Passenger *passenger);   // function to show all
existing passenger's informations
void  show_PassengerInfo(short n);                     // function to show a particular
passenger's informations
short openPassengerFile(char *mode);                    // function for file opening
unsigned int checkPass(short chosenP, short count, const struct Passenger *passenger);

void menu(void);                                    // function to print main menu

/***********************************************************************
*********************************************/
#endif
```

5.2.2 Passenger.c

```
#include <stdio.h>
#include <stdlib.h>
#include <string.h>
#include <ctype.h>

#include "passenger.h"
#include "scheduledFlight.h"
#include "reservation.h"

FILE * fpassengers; // create poiner to a file

/******************************************************
 *   Function gets a name for anything,
 *   such as passenger name, surname, country, city, etc.
 ******************************************************/
void get_Name(char arr[], short n, short maxN)
{
   // depending on number provided as argument, choose what to print
   switch (n)
   {
      case 0:
      case 1: puts("----------------------------------------------------------------------\n"
               "Please enter passenger's name:"
               "\n----------------------------------------------------------------------");
            break;

      case 2: puts("----------------------------------------------------------------------\n"
               "Please enter passenger's surname:"
               "\n----------------------------------------------------------------------");
            break;
      case 3: puts("----------------------------------------------------------------------\n"
               "Please enter passenger's country of birth:"
               "\n----------------------------------------------------------------------");
            break;
      case 4: puts("----------------------------------------------------------------------\n"
               "Please enter passenger's city of birth:"
               "\n----------------------------------------------------------------------");
            break;
      case 5: puts("----------------------------------------------------------------------\n"
               "Please enter passenger's home address:"
               "\n----------------------------------------------------------------------");
            break;
      case 6: puts("----------------------------------------------------------------------\n"
               "Please enter the name of Airline Company:"
               "\n----------------------------------------------------------------------");
            break;
```

```
    case 7: puts("----------------------------------------------------------------------\n"
                "Please enter the name of departure city:"
                "\n----------------------------------------------------------------------");
            break;

    case 8: puts("----------------------------------------------------------------------\n"
                "Please enter the name of arrival city:"
                "\n----------------------------------------------------------------------");
            break;
  }

  char ch;        // char for user input
  short i = 0;       // counter for array
  fflush(stdin);   // just to prevent any possible error

  // while user input is not new line and
  // current counter is less than number of elements allowed in array
  do
  {
    ch = getchar();

    if(isalpha(ch) || (ch == ' ' && i > 0))      // check whether input is an alphabetic letter or space
    {
      arr[i] = ch;                  // if yes, put it in array
      i++;                       // increment i for next element in array
    }
    else if(ch != '\n' || (i == 0 && n != 1 && n != 6)) // if input is not a new line or name of passenger
or airline company
    {

      while (getchar() != '\n')      //clear input line
        continue;
      // print error
      puts("Invalid input, please use only alphabetic letters:");

      i = 0;             // reset counter for array to zero
      arr[0]= '\n';      // put new line at first array element to repeat the loop
    }

  // while enter is not pressed and counter + 1 is less than number of characters allowed, or if first
array element is new line
  }while((ch != '\n' && (i + 1) < maxN) || arr[0] == '\n');

  fflush(stdin);      // empty buffer, to prevent any further errors ...
  arr[i] = '\0';      // add \0 at the end of string
  normalize_name(arr);// normalize name

}
/*****************************************************************************/
```

```
/**************************************************************
 *   Function to normalize a name,
 *   example: lAZAR -> Lazar, or nAtAlIjA -> Natalija
 **************************************************************/
void normalize_name(char arr[])        // Function takes array of name as argument
{
   short i = 0;                        // index for array

   for( i = 0; i < strlen(arr); i++)   // loop trough array
   {
      if(i == 0)                       // if first element
      {
         arr[i] = toupper(arr[i]);   // make a letter capital
      }
      else if (arr[i] == ' ')          // if a element is space
      {
         i++;                          // increment index
         arr[i] = toupper(arr[i]);   // make letter next to space capital
      }
      else arr[i] = tolower(arr[i]);  // else, make a letter small
   }
}
/*******************************************************************************

/**************************************************
 *   Function let us choose a title for us
 *   example: Mr. , Dr. etc
 **************************************************/
void get_Title(char arr[])    // Function takes array as argument
{
   // print options
   puts("--------------------------------------------------------------------\n"
        "Choose title:\n1. Mr.\t2. Ms\t3. Mrs.\t4. Dr.\t5. Prof.");

   short option = get_input(1, 5);

   // depending on number entered, choose wich title to assing to a passenger
   // using strncpy to copy a string (title) to array which holds it
      switch(option)
      {
         case 1: strncpy(arr, "Mr.", 4);   break;
         case 2: strncpy(arr, "Ms.", 4);   break;
         case 3: strncpy(arr, "Mrs.", 5);  break;
         case 4: strncpy(arr, "Dr.", 4);   break;
         case 5: strncpy(arr, "Prof.", 6); break;
      }
}

/*******************************************************************************
```

```
/************************************************************************
 *   Function returns integer
 *   depending on how many digits are required example for: mobile number, passport number
 ************************************************************************/
unsigned long long int get_int(short n)              //function takes a number as argument which says
how many numbers function must return
{
   //declarations of variables
   unsigned long long int num, numDigits;      // to hold a integer
   short count;                  // to hold number of digits

   // a number that is passed to n is defined in passenger.h or scheduledFlight.h, PASSDIGITS,
MOBDIGITS or
   switch (n)
   {
      case 3: puts("----------------------------------------------------------------------\n"
               "Please enter flight ID: ");
            break;
      case 9: puts("----------------------------------------------------------------------\n"
               "Please enter passenger's passport number: ");
            break;
      case 11: puts("----------------------------------------------------------------------\n"
                "Please enter passenger's mobile number:\nE.g 35699123456,");
            break;
   }
   // loop trough while requirements is not met
   // in other words,
   // do this while number entered does not have required number of digits
   do
   {
      printf("Please provide a number with %hd digits: ", n);
      count = 0;                  // count initialized to 0
      fflush(stdin);
      if(scanf("%llu", &num) != 0)    // get input from user, if input is number, proceed
      {
         numDigits = num;           // store number to temporary variable

         while(numDigits)           // while numDigits is true ( greater than 0)
         {
            numDigits /= 10;        // truncate last digit
            count++;              // increment counter ( number of digits)
         }
         // if counter is the same as number provided as argument or if it time, minutes and hours
         if(count == n)
            return num;              // return integer from input
         // else print this error
         printf("%llu does not have %hd digits and it cannot start with 0 nor contain letters\n", num, n);
      }
   }while(1); // will loop trough, wile number's digits from input is not same as required
}
```

```
/***********************************************************************
 *   Function to create new passenger
 *   storing them in array, while each passenger has all information
***********************************************************************/
```

short createNewPassenger(struct Passenger *passenger, short n)

```
{
   short count = 0, i, noNew = 1;           // inicializing counter to 0, and declaring counter i
   short index, filecount;       // declaring variables
   long long temp;           // declaring temp variable for user input regarding passport number for
checking purpose
   short size = sizeof (struct Passenger);   // getting size of struct Passenger
   if(!openPassengerFile("a+b")) return;  // open file of passengers
   // while there are elements in file, count them
   while (fread(&passenger[count], size, 1, fpassengers) == 1)
   {
      count++; // increment counter
   }
   // if count is the same as the allowed number of passengers
   if (count == MAXPASSENGERS)
   {
      fputs("The passenger.dat file is full.\n", stderr); // show error
      system("pause");        // pausing screen to be more readable
      fclose(fpassengers);    // close file
      return;   // exit function
   }
      filecount = count;  // inicialize filecount to number of counts
      index = count;      // store count to index for later use

      // if there is space for new elements, proceed
      puts("Please provide passenger's details:");
      puts("Press [enter] at the start of a line to stop.");

      // get first name for while loop
      get_Name(passenger[count].name, NAME, MAXNAME);
      while (count < MAXPASSENGERS && passenger[count].name != NULL &&
passenger[count].name[0] != '\0')
      {
         get_Name(passenger[count].surname, SURNAME, MAXNAME);
         get_Title(passenger[count].title);                              //
         get_Name(passenger[count].country, COUNTRY, MAXNAME);              ////
         get_Name(passenger[count].city, CITY, MAXNAME);                  //////
         get_Name(passenger[count].homeAddress, ADDRESS, MAXADDRESS);
         get_date(passenger[count].DOB, 1900, 2012, 1);                  //////
         passenger[count].mobNo = get_int(MOBDIGITS);                    ////
         passenger[count].passportNo = checkPass(-5, count, passenger);      //
         for( i = 0; i < MAXPASSENGERS; i++)         // using MAXPASSENGERS(100) in order to
avoid redundancy
         {
            passenger[count].reservations[i] = -1;
         }
```

```
            count++;

            if (count < MAXPASSENGERS && !n)
            {
                system("cls");
                puts("Enter the next name or press [ENTER] to exit:");
                get_Name(passenger[count].name, NAME, MAXNAME);
            }
            else
            {
                system("cls");
                puts("\n\n\n------------------------------------------------------------\n"
                     "File is full, you cannot add more passengers!");
            }
        }
        if (count - filecount > 0)
        {
            system("cls");
            if((count - filecount) == 1)
                puts("Here is new passenger:");
            else
                puts("Here are new passengers:");
            for (index; index < count; index++)
                show_PassengerInfo(index);
            fwrite(&passenger[filecount], size, count - filecount, fpassengers);
        }
        else
        {
            puts("No new passengers registered.\n");
            noNew = 0;
        }
        fclose(fpassengers);

        return noNew;
}
/***********************************************************************
```

```
/*************************************************************************
 *   Function to display all passengers in the file
 *************************************************************************/
void show_existingPassengers(const struct Passenger *passenger)
{
   short count = 0;                       // inilialize counter to 0
   short size = sizeof (struct Passenger);  // get seize of structure passenger
   if(!openPassengerFile("rb")) return;           // open a file
   rewind(fpassengers);           // go back to the beggining of a file
   while (fread(&passenger[count], size, 1, fpassengers)){    // while there is data to be read
         if (count == 0)                              // display message only once
            puts("Current registered passengers:");
            show_PassengerInfo(count); // function which shows passenger info with index count
         count++; // increment counter
   }
   if(count == 0)    puts("File is empty.");            // if file is empty, print message
   fclose(fpassengers);    // when done, close file
}
/****************************************************************************

/*************************************************************************
 *   Function to display a particular passenger info
 *   as argument, it takes a number for index of passenger
 *************************************************************************/
void show_PassengerInfo(short n)
{   printf("\n*****************************************************\nPassenger
Info:\nName and surname: \t%s %s %s\nDate of birth: \t\t%-0.2hd.%-0.2hd.%hd\nPassport No.
\t\t%d\n Country: \t\t%s\nCity: \t\t\t%s\nHome address: \t\t%s\nMobile number: \t\t+%llu\n
*****************************************************\n\n"
         , passenger[n].title, passenger[n].name
         , passenger[n].surname, passenger[n].DOB[0]
         , passenger[n].DOB[1], passenger[n].DOB[2]
         , passenger[n].passportNo, passenger[n].country
         , passenger[n].city, passenger[n].homeAddress
         , passenger[n].mobNo);
}
/****************************************************************************

/*************************************************************************/
*   Function to open the file where passangers' informations are stored
 *************************************************************************/
short openPassengerFile(char *mode)
{
   if ((fpassengers = fopen("passengers.dat", mode)) == NULL) {    // if cannot open a file
      fputs("Cannot open passengers.dat file.\n",stderr);         // display errorr
      return 0;
   }
   else return 1;
}
/*************************************************************************/
```

```
/************************************************************************/
*  Function to show user interface main menu
************************************************************************/
void menu(void)
{
   short option;    // variable to store user input
   // printing main menu options
   do
   {
      iniPassRes(passenger, scheduledFlight);
      printf("*--------------------WELCOME-TO-AIRLINE-RESERVATION-SYSTEM------------------
--*\n\n");
      printf("*----------------------------------Flights----------------------------------*\n\n");
      printf("\t0. Create\t1. Modify\t2. Cancel\t3. Show All\n\n");
      printf("*---------------------------------Passenger---------------------------------*\n\n");
      printf("\t4. Create   5. Modify   6. Show All   7. View Reservation History\n\n");
      printf("*------------------------------Reservation-for------------------------------*\n\n");
      printf("\t8. New Passenger\t9. Existing passenger\n\n");
      printf("*---------------------------------------------------------------------------*\n\n");
      printf("-1. Exit\n\n");
      printf("Your input: ");
      option = get_input(-1, 9);
      system("cls");     // clear screen
      switch(option) // depending on input,
      {
         case 0:  createFlight(scheduledFlight);              break; // create new scheduled flight(s)
         case 1:  modifyFlight(scheduledFlight);              break; // show all existing scheduled flights
         case 2:  cancelFlight(scheduledFlight);              break; // cancel scheduled flight
         case 3:  show_existingFlights(scheduledFlight);    break; // show all scheduled flights
         case 4:  createNewPassenger(passenger, 0);          break; // create new passenger(s)
         case 5:  modifyPassenger(passenger);                break; // show all passengers
         case 6:  show_existingPassengers(passenger);       break; // modify passenger
         case 7:  show_reservations(passenger, scheduledFlight);break; // show passenger's past
reservations
         case 8:  makeReservationNewP(passenger, scheduledFlight);  break; // make new passenger/s
and make reservations for them
         case 9:  makeReservationExistingP(passenger, scheduledFlight, 0, 0);  break; // make
reservation for existing passenger
         case -1: puts("Thank you for using our airline ticket reservation system."); break; // exit the
program
         default: puts("Invalid input, please provide a number:");   break; // invalid input
      }
      system("pause");       // pause application
      system("cls");         // clear screen
   }while(option != -1);    // while input is not zero

}
```

```
/************************************************************************
 *   Function to modify chosen passenger, all information or specific one
 *   such as, user can choose only name of passenger to edit or to edit all informations
************************************************************************/
void modifyPassenger(struct Passenger *passenger)
{
   short optionP, optionE, count;               // optionP is to choose passenger which to edit, and
optionE is to choose what to edit
   if(!openPassengerFile("r+b")) return;              // open a file for editing
   fflush(stdin);  // unespected behaviour prevention
   if((count = listPassengers(passenger)) != -1 && (optionP = get_input(-1, count)) != -1)
   {       system("cls");         // clear screen to be more readable
      puts("Passenger chosen for editing:");
      show_PassengerInfo(optionP);    // show passenger chosen to be edited
      printf("\nPlease choose detail(s) you want to edit, or -1 to exit:\n0. All\n1. Name\n2.
Surname\n3. Title\n"
            "4. Country\n5. City\n6. Home address\n7. Passport number\n8. Mobile number\n9. Date of
birth\nChoose option: "); // print options
      if((optionE = get_input(-1, 9)) != -1)
      {          // depenting on number entered
         switch(optionE)
         {
            case 0: get_Name(passenger[optionP].name, 0, MAXNAME);      // edit everything
                  get_Name(passenger[optionP].surname, SURNAME, MAXNAME);
                  get_Title(passenger[optionP].title);
                  get_Name(passenger[optionP].country, COUNTRY, MAXNAME);
                  get_Name(passenger[optionP].city, CITY, MAXNAME);
                  get_Name(passenger[optionP].homeAddress, ADDRESS, MAXADDRESS);
                  get_date(passenger[optionP].DOB, 1900, 2012, 1);
                  passenger[optionP].passportNo = checkPass(optionP, count, passenger);
                  passenger[optionP].mobNo = get_int(MOBDIGITS);
                  break;
            case 1: get_Name(passenger[optionP].name, 0, MAXNAME);  break; // edit only
            case 2: get_Name(passenger[optionP].surname, SURNAME, MAXNAME);break; // edit
only surname
            case 3: get_Title(passenger[optionP].title);       break; // edit only title
            case 4: get_Name(passenger[optionP].country, COUNTRY, MAXNAME);             break;
// edit only country
            case 5: get_Name(passenger[optionP].city, CITY, MAXNAME);                 break; // edit
only city
            case 6: get_Name(passenger[optionP].homeAddress, ADDRESS, MAXADDRESS);
break; // edit only address
            case 7: passenger[optionP].passportNo = checkPass(optionP, count, passenger);   break; //
edit only passport number
            case 8: passenger[optionP].mobNo = get_int(MOBDIGITS);                  break; // edit
only mobile number
            case 9: get_date(passenger[optionP].DOB, 1900, 2012, 1);                 break; // edit only
date of birth
         }
         short size = sizeof (struct Passenger);             // get seize of structure Passenger
```

```
        fseek(fpassengers, size * optionP, SEEK_SET);      // find position of record with chosen
passenger
        fwrite(&passenger[optionP], size, 1, fpassengers);  // write there edited data
        system("cls");                                      // clear screen for to be more readable
        puts("Here is edited passenger: "); // print message
        show_PassengerInfo(optionP);       // print details of edited passenger
      }
   }
   fclose(fpassengers);    // when done, close file
}
/***********************************************************************/

/************************************************************************
 *   Function to check whether a passport number exists or not
 ************************************************************************/
```

unsigned int checkPass(short chosenP, short count, const struct Passenger *passenger)

```
{
   unsigned int temp;
   short i;
   // input valitaion, checking whether passenger with unputed passport number exist or not.
   do
   {
      temp = get_int(PASSDIGITS); // getting user input
      for (i = 0; i < count; i++)
      {
         if(chosenP == i)
            i++;
         if(passenger[i].passportNo == temp)     // comparting passport number with user input
         {
            i = -1;
            printf("Passenger with passport number %lld already exists.\n", temp);
            break;      // if exist, exit loop
         }

      }
   }while(i == -1);       // while entered passport number already exist

   return temp;
}
/***********************************************************************/

/***********************************************************************
 *   Function to go through passengers, list them and count them
************************************************************************/
```

short listPassengers(const struct Passenger *passenger)

```
{
   short count = 0;
   short size = sizeof(struct Passenger);

   while (fread(&passenger[count], size, 1, fpassengers) == 1)     // while there is data to be read
```

```
    {                                                   // read from file and store in struct
        if (count == 0)                                 // display message only once
            puts("Current passengers:\n");
            printf("%d. %s %s %s\n", count, passenger[count].title,
                passenger[count].name, passenger[count].surname); // show passengers

        count++; // increment counter
    }

    if(count == 0)      // if file is empty
    {
        fclose(fpassengers);    // if empty, close it and print message
        puts("passengers.dat file is empty.");
        return -1;              // and exit from function
    }

    printf("\nPlease provide one number from above, or -1 to exit: ");
    return --count;  // return number of passengers in a file
}
/************************************************************************/

/************************************************************************/
/*************************************************************************
 *  Function to get user input, argument indicates the bigest number that user can enter
*************************************************************************/
void get_date(short arr[], short minYear, short maxYear, short n)
{
    short mm[] = {31,28,31,30,31,30,31,31,30,31,30,31};

    if(n)   puts("-------------------------------------------------------------------\n"
                "Please provide passenger's date of birth");

    else    puts("-------------------------------------------------------------------\n"
                "Please provide date of flight departure");

    printf("Please enter year: ");
    if((arr[2] = get_input(minYear, maxYear)) % 4 == 0) mm[1] = 29;

    printf("Please enter month: ");
    arr[1] = get_input(1, 12);

    printf("Please enter day: ");
    arr[0] = get_input(1, (mm[arr[1] - 1]));

}
/**************************************************************************
***************************************/
```

```
/*************************************************************************
 *   Function to get user input, argument indicates the bigest number that user can enter
*******************************************************************************/
```

short get_input(short nMIN, short nMAX)

```
{
   short option;
   do
   {
      if(scanf("%hd", &option) != 0)    // get input from user
      {

         if(option >= nMIN && option <= nMAX)             //if number is from 1 to 5
            break;                                //exit the loop

      }

      // if input is invalid, show these errors depending on numbers provided as argument
      if( nMAX == 0 )   printf("Invalid input, please enter a number 0 or -1 to exit: ");     // if max is 0
      else if ( nMIN == -1 ) printf("Invalid input, please enter a number between 0 and %hd, or -1 to
exit: ", nMAX); // if min is -1
      else printf("Invalid input, please enter a number between %hd and %hd: ", nMIN, nMAX); // if
mn is not -1 and max is not 0

      fflush(stdin);  // empty buffer

   }while (1); // while input is not in the range

   return option;  // return input number

}
/*******************************************************************************
****************************************/
```

5.3 Scheduled flight

5.3.1 Flight.h

```
#ifndef SCHEDULEDFLIGHT_H_INCLUDED
#define SCHEDULEDFLIGHT_H_INCLUDED

// constants for printing details in function get_Int();
#define AIRNAME 6
#define FROM 7
#define TO 8

#define FLIGHTID 3
#define STATUS 10

/*************************************************************
 *   Sturcture for flight schedules informations
 *************************************************************/
static struct Flight
{
   short flightID;
   short departureDate[DATE];
   short timeDeparture;
   short timeArrival;
   short availableSeats;
   char  airline[MAXNAME];
   char  from[MAXNAME];
   char  to[MAXNAME];
   char  status[STATUS];

}scheduledFlight[MAXPASSENGERS];
/******************************************************************************

/*************************************************************
 *   Functions prototypes
 *************************************************************/
void createFlight(struct Flight *scheduledFlight);
void modifyFlight(struct Flight *scheduledFlight);
void cancelFlight(struct Flight *scheduledFlight);

void  show_existingFlights(const struct Flight *scheduledFlight);
void  show_FlightInfo(short n, const struct Flight *scheduledFlight);
short listFlights(const struct Flight *scheduledFlight);
short openfscFlightFile(char *mode);
short checkID(short flight, short count, const struct Flight *scheduledFlight);
short get_Time(short n);
/******************************************************************************
#endif // SCHEDULEDFLIGHT_H_INCLUDED
```

5.3.2 Flight.c

```
#include <stdio.h>
#include <stdlib.h>
#include <string.h>

#include "passenger.h"
#include "scheduledFlight.h"
FILE * fscFlight;


/*****************************************************
 *   Function creates new scheduled flight
 *****************************************************/
```

void createFlight(struct Flight *scheduledFlight)

```
{
    short count = 0, i;              // inicializing counter to 0
    short index, filecount;           // declaring variables
    short temp;

    short size = sizeof (struct Flight);   // getting size of struct scheduledFlight
    if(!openfscFlightFile("a+b")) return;// open a file for editing purpose
    // while there are elements in file, count them
    while (fread(&scheduledFlight[count], size, 1, fscFlight) == 1)
    {
        count++; // increment counter
    }
    // if count is the same as the allowed number of passengers
    if (count == MAXPASSENGERS)
    {
        fputs("The fscFlight.dat file is full.\n", stderr); // show error
        system("pause");
        fclose(fscFlight);    // close file
        return;   // exit function
    }
        filecount = count;  // inicialize filecount to number of counts
        index = count;      // store count to index for later use
        // if there is space for new elements, pro
        puts("Please provide flight details:");
        puts("Press [enter] at the start of a line to stop.");
        // get first name for while loop
        get_Name(scheduledFlight[count].airline, AIRNAME, MAXNAME);
        while (count < MAXPASSENGERS && scheduledFlight[count].airline != NULL &&
scheduledFlight[count].airline[0] != '\0')
        {
            scheduledFlight[count].flightID = checkID(-5, count, scheduledFlight);  // when input is valid,
store it in struct member flightID
            get_Name(scheduledFlight[count].from, FROM, MAXNAME);                // get name from
where a flight is taking place
```

```
        get_Name(scheduledFlight[count].to, TO, MAXNAME);                    // get name to where a
flight is taking place
        get_date(scheduledFlight[count].departureDate, 2014, 2050, 0);         // get date of flight
departure
        scheduledFlight[count].timeDeparture = get_Time(1);                  // get time whene a plane
will take off ( 1 is indicator what print, departure)
        scheduledFlight[count].timeArrival = get_Time(0);                   // get time when a plane will
land ( 0 is indicator what print, arrival)
        strncpy(scheduledFlight[count].status, "OK", 4);  // set status of flight to OK(still not
cancelled).
        scheduledFlight[count].availableSeats = 50;                         // initialize avaliable seats to 50
        count++;                // increment counter
        if (count < MAXPASSENGERS)  // if maximum number of allowed flights is not reached
        {
           system("cls");
           puts("Please provide next flight details, or press [ENTER] to finish:");
           get_Name(scheduledFlight[count].airline, AIRNAME, MAXNAME);             // get neext
name of airline company
        }
        else
        {
           system("cls");
           puts("\n\n\n------------------------------------------------------------\n"
               "File is full, you cannot add more scheduled flights!");
        }
    }
    if (count - filecount > 0)      // if at least 1 new flight is registered
    {
        system("cls");

        if((count - filecount) == 1)              // if only one is made
           puts("Here is new scheduled flight:");
        else                                  // if more than one
           puts("Here are new scheduled flights:");

        // show new scheduled flight(s)
        for (index; index < count; index++)         // index is starting positions of (last flight + 1) in
record
           show_FlightInfo(index, scheduledFlight);

        // write them in a file
        fwrite(&scheduledFlight[filecount], size, count - filecount, fscFlight);
    }
    else
        puts("No scheduled flights.\n"); // if no new flights

    fclose(fscFlight);

}
```

```
/******************************************************************************/
 *   Function to to modify chosen passenger, all information or specific one
 *   such as, user can choose only name of passenger to edit or to edit all informations
********************************************************************************
void modifyFlight(struct Flight *scheduledFlight)
{
   short count;                    // inilialize counter to 0
   short optionP, optionE;              // optionP is to choose passenger which to edit, and optionE is to
choose what to edit
   short size = sizeof (struct Flight); // get seize of structure Passenger

   if(!openfscFlightFile("r+b")) return;          // open a file for editing

   if((count = listFlights(scheduledFlight)) != -1)// list all flights and store their number in count
   {
      fflush(stdin);  // unespected behaviour prevention

      if((optionP = get_input(-1, count)) != -1)
      {
           system("cls");          // clear screen to be more readable
           puts("Scheduled flight chosen for editing:");
           show_FlightInfo(optionP, scheduledFlight);    // show passenger chosen to be edited

           printf("\nPlease choose detail(s) you want to edit, or -1 to exit:\n0. All\n1. Airline name\n2.
Flight ID\n3. Departure city\n"
                 "4. Arrival city\n5. Departure date\n6. Departure Time\n7. Arrival TIme\nChoose
option: "); // print options

           if((optionE = get_input(-1, 7)) != -1)
           {
              // depenting on number entered
              switch(optionE)
              {

                 case 0: get_Name(scheduledFlight[optionP].airline, AIRNAME, MAXNAME);          //
edit everything
                       scheduledFlight[optionP].flightID = checkID(optionP, count, scheduledFlight);
                       get_Name(scheduledFlight[optionP].from, FROM, MAXNAME);
                       get_Name(scheduledFlight[optionP].to, TO, MAXNAME);
                       get_date(scheduledFlight[optionP].departureDate, 2014, 2050, 0);
                       scheduledFlight[optionP].timeDeparture = get_Time(1);
                       scheduledFlight[optionP].timeArrival = get_Time(0);
                       break;

                 case 1: get_Name(scheduledFlight[optionP].airline, AIRNAME, MAXNAME);
break; // edit only airline name
                 case 2: scheduledFlight[optionP].flightID = checkID(optionP, count, scheduledFlight);
break; // edit only flighID
                 case 3: get_Name(scheduledFlight[optionP].from, FROM, MAXNAME);
break; // edit only departure city
```

```
                case 4: get_Name(scheduledFlight[optionP].to, TO, MAXNAME);
break; // edit only arrival city
                case 5: get_date(scheduledFlight[optionP].departureDate, 2014, 2050, 0);
break; // edit only date of flight departure
                case 6: scheduledFlight[optionP].timeDeparture = get_Time(1);                break;
// edit only time of departure
                case 7: scheduledFlight[optionP].timeArrival = get_Time(0);                break; //
edit only time of arrival

              }

              fseek(fscFlight, size * optionP, SEEK_SET);           // find position of record with
chosen passenger
              fwrite(&scheduledFlight[optionP], size, 1, fscFlight);  // write there edited data
              system("cls");                              // clear screen for to be more readable
              puts("Here is edited scheduled flight: ");            // print message
              show_FlightInfo(optionP, scheduledFlight);            // print details of edited passenger

            } // end of inner if
        }   // end of outer if
    }

    fclose(fscFlight);    // when done, close file

}
/*******************************************************************************

/*******************************************************************************
 *   Function to cancel chosen flight
********************************************************************************
```

void cancelFlight(struct Flight *scheduledFlight)

```
{
    short count = 0;                    // inilialize counter to 0
    short optionF, optionE;               // optionF is to choose which flight to cancel, opetionE is for
yes/no confirmation
    if(!openfscFlightFile("r+b")) return;;             // open a file for editing

    if((count = listFlights(scheduledFlight)) != -1)   // list scheduled flights and store their number in
count
    {
        fflush(stdin);  // unespected behaviour prevention
        printf("\nPlease provide one number from above , or -1 to exit: ");

        do
        {
            if((optionF = get_input(-1, count)) != -1)                    // if input is not -1
            if(strcmp(scheduledFlight[optionF].status, " CANCELLED ") != 0)    // and if chosen flight is
not already cancelled
            {
                system("cls");                              // clear screen to be more readable
                puts("Scheduled flight chosen for cancelation:");
                show_FlightInfo(optionF, scheduledFlight);               // show flight chosen to be cancelled

                puts("Are you sure you want to cancel this scheduled flight?\n1. Yes\n0. No");

                if((optionE = get_input(0, 1)) == 1)                     // if input is 0
                {
                   strncpy(scheduledFlight[optionF].status, "CANCELLED", STATUS);       // cancel flight

                   short size = sizeof (struct Flight);                  // get seize of structure Passenger

                   fseek(fscFlight, size * optionF, SEEK_SET);           // find position of record with chosen
passenger

                   fwrite(&scheduledFlight[optionF], size, 1, fscFlight); // write there edited data
                   system("cls");                                    // clear screen for to be more readable

                   puts("Here is cancelled scheduled flight: ");         // print message
                   show_FlightInfo(optionF, scheduledFlight);            // print details of edited passenger

                   break;
                }
                else break;

            }
            else puts("Flight is already cancelled. Choose another or -1 to exit.");

        }while(optionF != -1); // while input is not -1
    }

    fclose(fscFlight);    // when done, close file
}
/*******************************************************************************

/*******************************************************************************
 *  Function to display all scheduled flights in the file
********************************************************************************
void show_existingFlights(const struct Flight *scheduledFlight)
{
    short count = 0;                      // inilialize counter to 0

    short size = sizeof (struct Flight);      // get seize of structure passenger

    if(!openfscFlightFile("rb")) return;    // open a file for reading

    rewind(fscFlight);                    // go back to the beggining of a file
    while (fread(&scheduledFlight[count], size, 1, fscFlight))  // while there is data to be read
    {
            if (count == 0)                                 // display message only once
                puts("Current scheduled flights:");
```

```
        show_FlightInfo(count, scheduledFlight);      // function which shows passenger info with
index count

      count++; // increment counter
   }

   if(count == 0)          // if file is empty, print message
      puts("File is empty.");

   fclose(fscFlight);   // when done, close file
}
/*********************************************************************************

/*********************************************************************************
 *   Function to display a particular scheduled flight info
 *   as argument, it takes an number for index of scheduled flight
**********************************************************************************
```

void show_FlightInfo(short n, const struct Flight *scheduledFlight)

```
{
   // print info
   printf("\n*****************************************************\nScheduled flights
info:"
         "\nScheduled flight ID: \t%d\nAirline name: \t\t%s\nFrom: \t\t\t%s\nTo: \t\t\t%s\n"
         "Departure date: \t%-0.2hd/%-0.2hd/%hd\nDeparture time: \t%-0.4hd\nArrival time: \t\t%-
0.4hd\n"
         "Available seats:
\t%d\nStatus:\t\t\t%s\n*****************************************************\n"
         , scheduledFlight[n].flightID, scheduledFlight[n].airline
         , scheduledFlight[n].from, scheduledFlight[n].to
         , scheduledFlight[n].departureDate[0], scheduledFlight[n].departureDate[1]
         , scheduledFlight[n].departureDate[2], scheduledFlight[n].timeDeparture
         , scheduledFlight[n].timeArrival, scheduledFlight[n].availableSeats, scheduledFlight[n].status);

}
/*********************************************************************************

/*********************************************************************************
 *   Function to display all scheduled flights and to return how many are in the file
**********************************************************************************
```

short listFlights(const struct Flight *scheduledFlight)

```
{
   short count = 0;
   short size = sizeof(struct Flight);

   while (fread(&scheduledFlight[count], size, 1, fscFlight) == 1)    // while there is data to be read
   {
      if (count == 0)                       // display message only once
         puts("Current scheduled flights:\n\nNo. FlightID  Airline \t\tFrom\t\tTo \t\tStatus\t Seats\n");
         printf("%hd.  %-8hd| %-16s|\t%-14s|\t%-14s|\t%-8s| %-4hd|\n", count,
scheduledFlight[count].flightID, scheduledFlight[count].airline,
                scheduledFlight[count].from, scheduledFlight[count].to
                , scheduledFlight[count].status, scheduledFlight[count].availableSeats);// function which
shows passenger info with index count

      count++; // increment counter
   }

   if(count == 0)      // if file is empty
   {
      fclose(fscFlight);    // if empty, close it and print message
      puts("fscFlight.dat file is empty.");
      return -1;                // and exit from function
   }

   printf("\nPlease provide one number from above , or -1 to exit: ");
   return --count;

}
/*******************************************************************************

/*******************************************************************************
 *   Function to get time in 24h format
*******************************************************************************
short get_Time(short n)
{
   short hour, min;

   if (n)
      puts("-----------------------------------------------------------------------\n"
          "Please provide time of flight departure:");
   else
      puts("-----------------------------------------------------------------------\n"
          "Please provide time of flight arrival:");

   printf("Please provide hours: ");

   hour = get_input(0, 23);

   printf("Please provide minutes: ");

   min = get_input(0,59);

   return hour*100 + min;

}
/*******************************************************************************
```

```
/*******************************************************************************
 *   Function to check if flightID already exist
********************************************************************************
short checkID(short flight, short count, const struct Flight *scheduledFlight)
{
   short temp, i;
   // checking whether flight with entered ID already exist or not
   do
   {
      temp = get_int(FLIGHTID);      // getting user input
      for (i = 0; i <= count; i++)
      {
         if(i == flight)
            i++;

         if(scheduledFlight[i].flightID == temp)     // checking
         {
            i = -1; // for purpose to repeat the loop
            printf("Flight with flight ID %d already exists. Please provide another fligh ID:\n", temp);
            break;      // exit for loop
         }

      }

   }while(i == -1);       // if flight ID exist, repeat process

   return temp;
}
/*******************************************************************************

/*******************************************************************************
 *   Function to open the file where scheduled flights' informations are stored
********************************************************************************
short openfscFlightFile(char *mode)
{
   if ((fscFlight = fopen("fscFlight.dat", mode)) == NULL)     // if cannot open a file
   {
      fputs("Cannot open fscFlight.dat file.\n",stderr);        // display errorr
      return 0;
   }
   else return 1;
}
/*******************************************************************************
```

5.4 Reservation

5.4.1 Reservation.h

```
#ifndef RESERVATION_H_INCLUDED
#define RESERVATION_H_INCLUDED

void makeReservationExistingP(struct Passenger *passenger, struct Flight *scheduledFlight, short n,
short newPass);
void makeReservationNewP(struct Passenger *passenger, struct Flight *scheduledFlight);
void show_reservations(const struct Passenger *passenger, const struct Flight *flight);
short findFreeElement(struct Passenger *passenger, short n);


#endif // RESERVATION_H_INCLUDED
```

5.4.1 Reservatoin.c

```
#include <stdio.h>
#include <stdlib.h>
#include <string.h>

#include "passenger.h"
#include "scheduledFlight.h"
#include "reservation.h"

FILE * fpassengers;
FILE * fscFlight;


/*******************************************************************************
 *   Function to make a reservation
 *   by choosing a passenger and scheduled flight
********************************************************************************
void makeReservationExistingP(struct Passenger *passenger, struct Flight
*scheduledFlight, short n, short newPass)
{
   short count;    // declare variable
   short optionP, countF, optionR;  // opetionP stores user's choise of passenger, countF to store
number of records in scheduled flight file, opetionR store user's choise of flight

   fflush(stdin);       // unespected behaviour prevention
   // if passenger and flight file file can be opened, and there is at least one passenger in file and user
input is not -1
   // there is at least one schedule flight in a file, proceed
   if(openPassengerFile("r+b") && openfscFlightFile("r+b"))
   if( n || ((count = listPassengers(passenger)) != -1 && (optionP = get_input(-1, count)) != -1))
   if((countF = listFlights(scheduledFlight)) != -1)
```

```
  {
    short ok = 0; // when it is 1, loop will stop
    if(n)   optionP = newPass; // if n is 1(which indicates that reservation for new passenger is being
made) optionP takes value of passengerIndex

    do
    {
      printf("\nYour input: ");

      // get user input and proceed if not -1
      if((optionR  = get_input(-1, countF)) == -1) break;
      else
      {
        // if choosen flight is cancelled, reservation cannot be made
        if(strcmp(scheduledFlight[optionR].status, "CANCELLED" ) == 0)
          puts("This flight is cancelled and you cannot make a reservation for it.\n"
             "Choose another or -1 to exit.");
        else if(scheduledFlight[optionR].availableSeats < 1)
          puts("There are no more available seats in this flight.\nChoose another or -1 to exit.");
        else
        {
          // if not, check whether a reservation on that flight is already being made
          for(count = 0; count < MAXPASSENGERS; count++)
          {
            if(passenger[optionP].reservations[count] == optionR)
            {
              puts("You already have a reservation for this flight.\n"
                 "Choose another or -1 to exit");
              break;
            }
            else if(passenger[optionP].reservations[count] == -1)   // if free element is reached,
make reservation
            {
              ok = 1;
              // store chosen flight to a location where is first free element found
              passenger[optionP].reservations[findFreeElement(passenger, optionP)] = optionR;
              scheduledFlight[optionR].availableSeats--;
              system("cls");
              //show reservation
              puts("Your reservation:");
              show_FlightInfo(optionR, scheduledFlight);

              short sizeP = sizeof (struct Passenger);  // get seize of structure Passenger
              short sizeF = sizeof (struct Flight);  // get seize of structure Passenger

              fseek(fpassengers, sizeP * optionP, SEEK_SET);       // find position of record with
chosen passenger
              fwrite(&passenger[optionP], sizeP, 1, fpassengers);   // write there edited data
```

```
                    fseek(fscFlight, sizeF * optionR, SEEK_SET);        // find position of record with
chosen passenger
                    fwrite(&scheduledFlight[optionR], sizeF, 1, fscFlight);   // write there edited data
                    break;  // break the loop
                  }

               }
            }
         }
      }while(ok != 1);   // while free element is not reached
   }   // inner if
   fclose(fscFlight);      // close file
   fclose(fpassengers);    // when done, close file
}
/*********************************************************************************

/*********************************************************************************
 *   Function to make a reservation for new passenger
**********************************************************************************
```

void makeReservationNewP(struct Passenger *passenger, struct Flight *scheduledFlight)

```
{
   openPassengerFile("r+b");

   short passengerIndex = listPassengers(passenger) + 1;

   system("cls");

   if(createNewPassenger(passenger, 1))
      makeReservationExistingP(passenger, scheduledFlight, 1, passengerIndex);

   fclose(fpassengers);
}
/*********************************************************************************

/*********************************************************************************
 *   Function to display all passenger's past reservations
**********************************************************************************
```

void show_reservations(const struct Passenger *passenger, const struct Flight *scheduledFlight)

```
{

   short count;    // declare counter
   fflush(stdin);// unespected behaviour prevention
   short optionP;  // get user input, optionP is to choose passenger which history we want

   // if files can be opened and there is at least one passenger, and one scheduled flight, proceed
   if(openPassengerFile("rb") && openfscFlightFile("rb") && (count = listPassengers(passenger)) !=
-1 && ((optionP = get_input(-1, count)) != -1))
   {
        count = 0;                                          // reset counter
        short sizeF = sizeof (struct Flight);                          // get size of Flight structure

        while (fread(&scheduledFlight[count], sizeF, 1, fscFlight) == 1)     // while there is data to be
read,
           count++;                                       // read from file and store in structure
                                                        // increment counter
        system("cls");

        // loop trough passenger's reservations
        for( count = 0; count < MAXPASSENGERS; count++)
        {

           if(passenger[optionP].reservations[count] == -1)    // when free element(-1) is read
              break;                                // exit loop

           if(count == 0)                            // show message only once if there are any reservations
              puts("All passenger's past reservations are: ");

           show_FlightInfo(passenger[optionP].reservations[count], scheduledFlight); // show
reservation
        }

        if(count == 0) puts("No reservations by this passenger.");  // if there are no reservations
    }
    fclose(fscFlight);
    fclose(fpassengers);
}
/******************************************************************************

/******************************************************************************
 *   Function loop trough array to find element -1
 *   -1 indicates that there is no data written (data is reference to a schedule flight)
*******************************************************************************
short findFreeElement(struct Passenger *passenger, short n)
{
    short i;                        // declare counter;

    for ( i = 0; i < MAXPASSENGERS; i++)    // loop trough loop
    {
        if(passenger[n].reservations[i] == -1) // if free element is found
           break;                        // exit loop
    }

    return i;   // return index of free element
}
/******************************************************************************
```

```
/********************************************************************************
 *   Function reinisialize reservations to -1
 *   if file or content of the flight file is deleted accidentally or on purpose
*********************************************************************************
 void iniPassRes(struct Passenger *passenger, const struct Fligh *scheduledFlight)
{
   short count, index;
   int size = sizeof(struct Passenger);

   if(!openfscFlightFile("rb") || (count = listFlights(scheduledFlight) == -1))    // if file or its content is
deleted
   {

      count = 0;
      if(openPassengerFile("r+b"))
      while (fread(&passenger[count], size, 1, fpassengers) == 1)
      {
         for(index = 0; index < MAXPASSENGERS; index++)
         {
            passenger[count].reservations[index] = -1;                 // reset reservation to -1(which
indicates no reservations
            if(passenger[count].reservations[index + 1] == -1) break;   // if -1 is next element, break the
loop
         }
         count++; // increment counter
      }

      rewind(fpassengers);
      fwrite(&passenger[0], size, count, fpassengers);   // write edited data
   }

   fclose(fscFlight);
   fclose(fpassengers);
   system("cls");
}
/********************************************************************************
*****************************************/
```