Hussein Madan Migadde 27403645 COS1511 Assignment 2 777488

Input:

```
#include <iostream>
#include <string>
#include <vector>
#include <iomanip>
#include <cctype>
#include <limits>
#include <algorithm>
using namespace std;
// Constants
const int NUM_SEATS = 50;
const int FIRST_CLASS_ROWS = 4;
const double ECONOMY_COST = 1600.00;
const double FIRST_CLASS_MULTIPLIER = 1.20;
// Flight structure to hold flight details
struct Flight {
  string departureTime;
  vector<bool> seats;
  int bookings;
  Flight(string time) : departureTime(time), seats(NUM_SEATS, false),
bookings(0) {}
};
// Booking structure to hold each booking's details
struct Booking {
  string fullName;
  int flightIndex;
  int seatNumber;
};
// Function to display banner
void displayBanner(const string& title, int width) {
  string border(width, '*');
  cout << border << endl;
  cout << "*" << string(width - 2, ' ') << "*" << endl;
  // Calculate centering
  int padding = (width - 2 - title.length()) / 2;
  string paddedTitle = string(padding, ' ') + title + string(padding, ' ');
  // Adjust if odd length
  if ((width - 2 - title.length()) % 2 != 0) {
    paddedTitle += " ";
  }
  cout << "*" << paddedTitle << "*" << endl;
  cout << "*" << string(width - 2, ' ') << "*" << endl;
  cout << border << endl;
}
// Function to print banner
  void printAsterisks(int count) {
    for (int i = 0; i < count; ++i) {
      cout << "*";
    }
    cout << endl;
  }
  void displayTicketBanner() {
    printAsterisks(29);
    cout << "Travel ticket for FLIGHT" << endl;
```

```
    printAsterisks(29);
  }
void displayTicketBanner2(double ticketPrice) {
    printAsterisks(29);
    cout << "Amount: R" << ticketPrice
         << " Thank you for booking with COS1511. "
         << "Your travel agent for this query is Hussein Madan" << endl;
    printAsterisks(29);
}
// Function to print a line of dashes of given length
void printDashLine(int length) {
  for (int i = 0; i < length; ++i) {
    cout << "-";
  }
  cout << "\n";
}
// Function prototypes
void displayMenu(const vector<Flight>& flights);
void displaySeating(const Flight& flight);
int getSeatNumber(const Flight& flight);
void bookSeat(Flight& flight, int seatNumber);
void displayBookingTicket(const string& fullName, const Flight& flight,
int seatNumber);
void displayBookingSummary(const vector<Flight>& flights,
const vector<Booking>& bookings);
// Function to validate name
bool isValidName(const string& name) {
    return all_of(name.begin(), name.end(), [](char c) {
        return isalpha(c) || isspace(c);
    });
}
int main() {
  // Initialize flight times
  vector<Flight> flights;
  flights.push_back(Flight("07:00"));
  flights.push_back(Flight("09:00"));
  flights.push_back(Flight("11:00"));
  flights.push_back(Flight("13:00"));
  flights.push_back(Flight("15:00"));
  vector<Booking> bookings; // Store all bookings
  string fullName;
  char continueBooking;
  displayBanner("Welcome to COS1511 Flight Booking System", 50);
    do {
        cout << "Enter full name: ";
        getline(cin, fullName);
        if (fullName.empty()) {
            cout << "Full name cannot be empty. Please try again.\n";
        } else if (!isValidName(fullName)) {
            cout << "Invalid name! Please enter only letters"
                 << " and spaces.\n";
        } else {
            break; // Exit the loop if the name is valid
        }
    } while (true);
do {
  displayMenu(flights);
  int choice;
while (true) {
    cout << "Choose the time by entering the option number"
        << " from the displayed list (1-5): ";
```

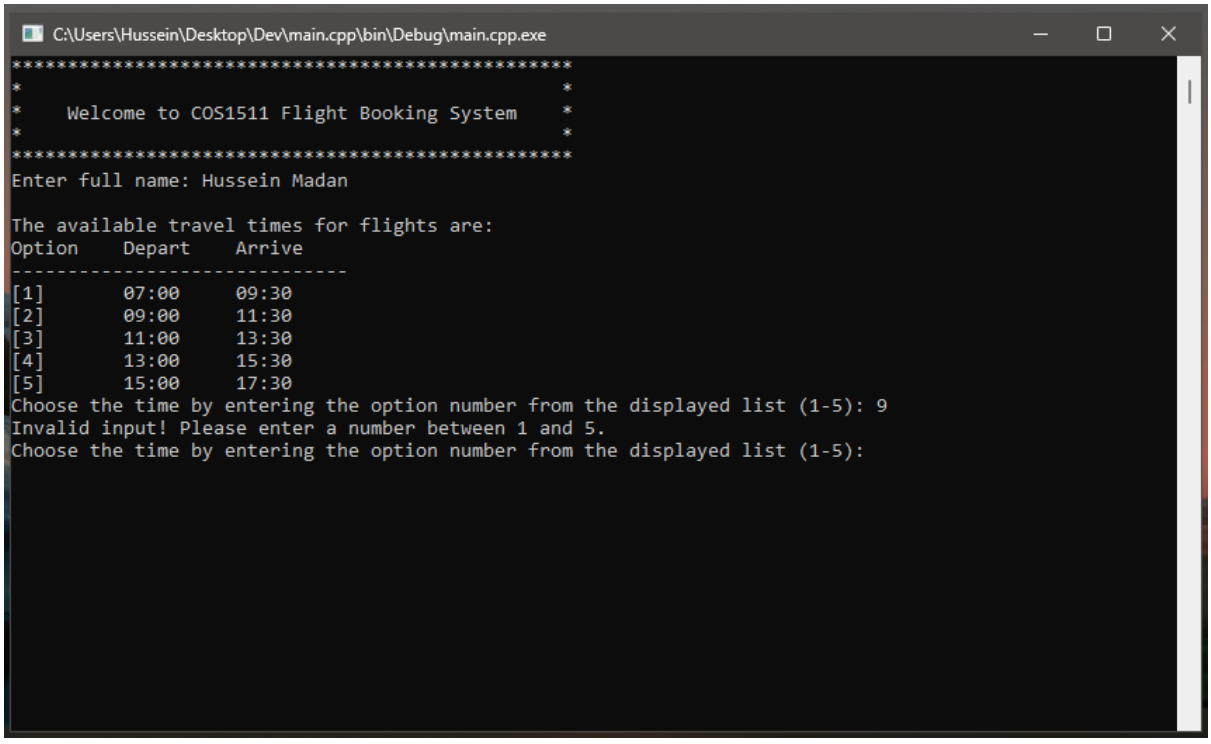
```
    cin >> choice;

    if (cin.fail() || choice < 1 || choice > 5) {
        cin.clear();
        cin.ignore(numeric_limits<streamsize>::max(), '\n');
        cout << "Invalid input! Please enter a number between"
            << " 1 and 5.\n";
    } else {
        cin.ignore(numeric_limits<streamsize>::max(), '\n');
        break;
    }
}
  // Validate input range 1-5
  while (choice < 1 || choice > 5) {
    cout << "Incorrect option! Please choose from 1-5: ";
    cin >> choice;
  }
  Flight& selectedFlight = flights[choice - 1];
  displaySeating(selectedFlight);
  int seatNumber = getSeatNumber(selectedFlight);
  bookSeat(selectedFlight, seatNumber);
  displayBookingTicket(fullName, selectedFlight, seatNumber);
  selectedFlight.bookings++;
  // Store booking details
  Booking newBooking;
  newBooking.fullName = fullName;
  newBooking.flightIndex = choice - 1;
  newBooking.seatNumber = seatNumber;
  bookings.push_back(newBooking);
  cout << "Do you want to make another booking? (Y/N): ";
  cin >> continueBooking;
  cin.ignore(numeric_limits<streamsize>::max(), '\n');
    if (toupper(continueBooking) == 'Y') {
      do {
          cout << "Enter full name: ";
          getline(cin, fullName);
          if (fullName.empty()) {
              cout << "Full name cannot be empty. Please try again.\n";
          } else if (!isValidName(fullName)) {
              cout << "Invalid name! Please enter only letters"
                  << " and spaces.\n";
          } else {
              break; // Exit the loop if the name is valid
          }
      } while (true);
    }
} while (toupper(continueBooking) == 'Y');
  displayBookingSummary(flights, bookings);
  cout << "\nThank you for using the COS1511 Flight Booking System!\n";
  return 0;
}
// Function to display the flight menu
void displayMenu(const vector<Flight>& flights) {
  cout << "\nThe available travel times for flights are:\n";
  cout << left << setw(10) << "Option" << setw(10) << "Depart" << setw(10)
<< "Arrive" << endl;
  printDashLine(30);
  for (size_t i = 0; i < flights.size(); ++i) {
    int departureHour = stoi(flights[i].departureTime.substr(0, 2));
    int arrivalHour = (departureHour + 2) % 24;
```

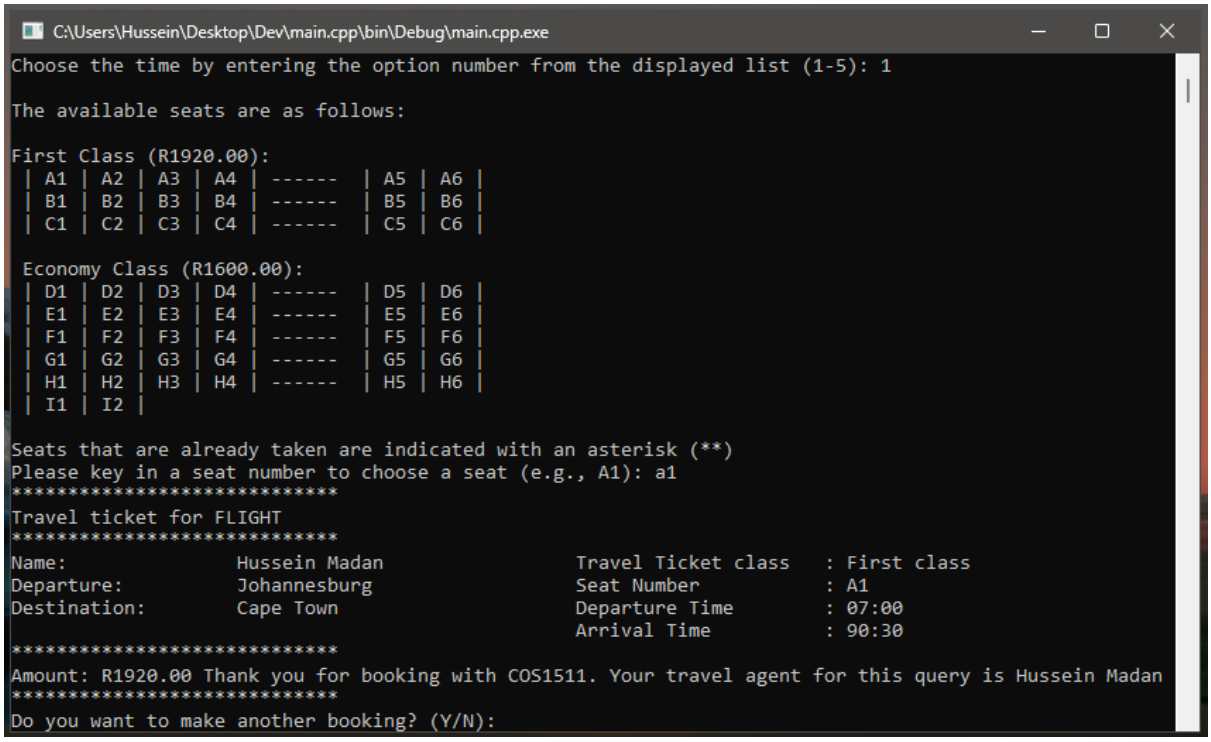
```
    string arrivalTime = (arrivalHour < 10 ? "0" : "") +
to_string(arrivalHour) + ":30";
    cout << left << setw(10) << ("[" + to_string(i + 1) + "]")
     << setw(10) << flights[i].departureTime
     << setw(10) << arrivalTime << endl;
  }
}
// Function to display the seating arrangement
void displaySeating(const Flight& flight) {
  cout << "\nThe available seats are as follows:\n\n";
  char rowLabel = 'A';
  for (int i = 0; i < NUM_SEATS; ++i) {
    // Show section labels
    if (i == 0) {
      cout << "First Class (R1920.00):\n";
    }
    if (i == 18) {
      cout << "\n Economy Class (R1600.00):\n";
    }
    int seatInRow = i % 6;
    string seatLabel = string(1, rowLabel) + to_string(seatInRow + 1);
    cout << " | " << (flight.seats[i] ? "**" : seatLabel);
    // Aisle separator after seat 3
    if (seatInRow == 3) {
      cout << " | ------ ";
    }
    // End of row OR last seat in the array
    if (seatInRow == 5 || i == NUM_SEATS - 1) {
      cout << " |\n";
      rowLabel++;
    }
  }
}
// Function to get the seat number from the user
int getSeatNumber(const Flight& flight) {
  string seatInput;
  bool validSeat = false;
  int seatNumber = 0;
  while (!validSeat) {
    cout << "\nSeats that are already taken are indicated with an"
    << " asterisk (**)";
    cout << "\nPlease key in a seat number to choose a seat (e.g., A1): ";
    cin >> seatInput;
    cin.ignore();
    // Validate input format (e.g., A1, B2 etc.)
    if (seatInput.length() != 2) {
      cout << "Invalid format! Please enter a seat number like A1,"
      << " B2, etc.\n";
      continue;
    }
    char row = toupper(seatInput[0]);
    int column = seatInput[1] - '0';
    // Validate row (A-I) and column (1-6)
    if (row < 'A' || row > 'I') {
      cout << "Invalid row! Please choose from A to I.\n";
      continue;
    }
    if (column < 1 || column > 6) {
      cout << "Invalid column! Please choose from 1 to 6.\n";
      continue;
    }
```

```
    // Calculate the seat index in the vector
    int rowIndex = row - 'A';
    seatNumber = rowIndex * 6 + (column - 1);
    // Check if seat number exceeds total seats (0-49)
    if (seatNumber >= NUM_SEATS) {
      cout << "Invalid seat! This seat does not exist.\n";
      continue;
    }
    // Check if the seat is already booked
    if (flight.seats[seatNumber]) {
      cout << "That seat is already booked. Please choose another seat.\n";
    } else {
        validSeat = true;
      }
  }
  return seatNumber + 1; // Return 1 - based seat number
}
// Function to book the seat
void bookSeat(Flight& flight, int seatNumber) {
  flight.seats[seatNumber - 1] = true;
}
// Function to display the booking ticket
void displayBookingTicket(const string& fullName, const Flight& flight,
int seatNumber) {
  double ticketPrice;
  string seatClass;
  // Convert seat number to letter + number format
  char row = 'A' + (seatNumber - 1) / 6;
  int column = ((seatNumber - 1) % 6) + 1;
  string seatLabel = string(1, row) + to_string(column);
  if (seatNumber <= FIRST_CLASS_ROWS * 6) {
    ticketPrice = ECONOMY_COST * FIRST_CLASS_MULTIPLIER;
    seatClass = "First class";
  } else {
      ticketPrice = ECONOMY_COST;
      seatClass = "Economy";
  }
  int departureHour = stoi(flight.departureTime.substr(0, 2));
  int arrivalHour = (departureHour + 2) % 24;
  displayTicketBanner();
  cout << left << setw(20) << "Name:" << setw(30) << fullName
       << "Travel Ticket class\t: " << seatClass << endl;
  cout << left << setw(20) << "Departure:" << setw(30) << "Johannesburg"
       << "Seat Number\t\t: " << seatLabel << endl;
  cout << left << setw(20) << "Destination:" << setw(30) << "Cape Town"
       << "Departure Time\t: " << flight.departureTime << endl;
  cout << left << setw(20) << "" << setw(30) << ""
       << "Arrival Time\t\t: " << setw(2) << setfill('0') << arrivalHour
       << ":30" << setfill(' ') << endl;
  cout.setf(ios::fixed);
  cout.precision(2);
  displayTicketBanner2(ticketPrice);
}
// Function to display booking summary (with detailed bookings)
void displayBookingSummary(const vector<Flight>& flights,
const vector<Booking>& bookings) {
  cout << "\nBooking Summary:\n";
  printDashLine(39);
  // Display total bookings per flight
  for (size_t i = 0; i < flights.size(); ++i) {
    cout << "Number of bookings made for " << flights[i].departureTime
```

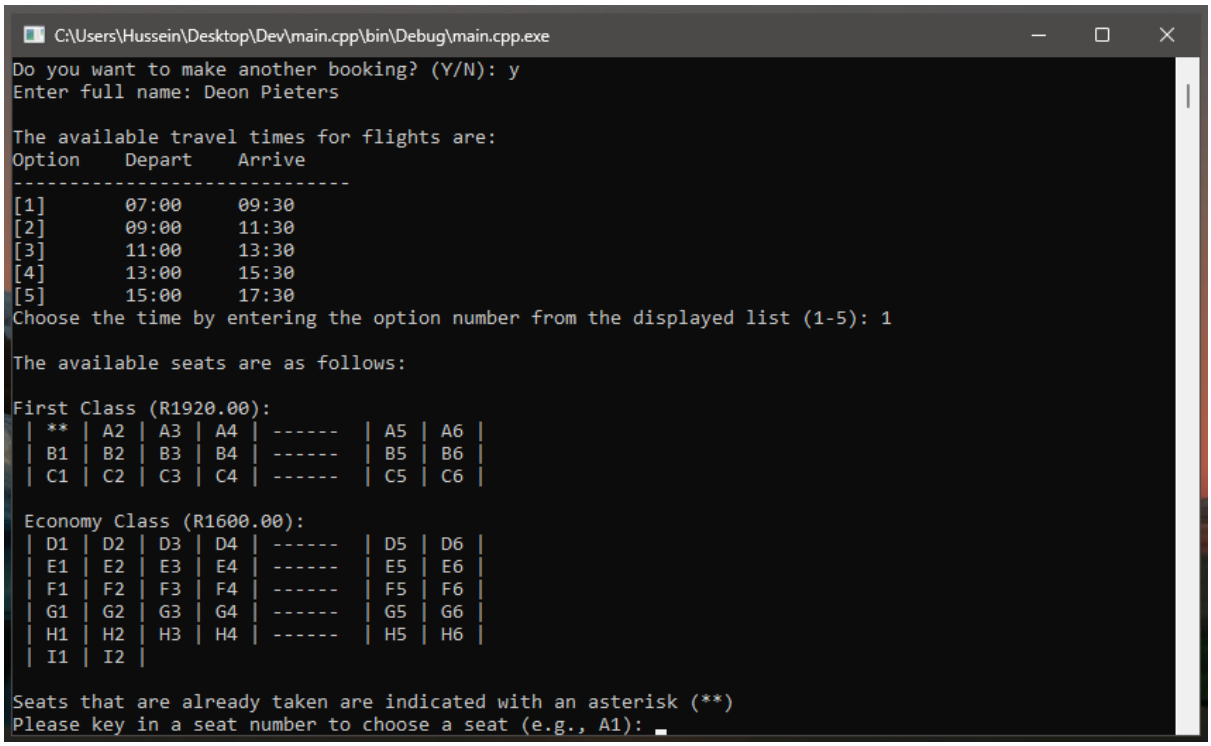
```
        << ": " << flights[i].bookings << "\n";
  }
  cout << "\nDetailed Bookings:\n";
  printDashLine(39);
  if (bookings.empty()) {
    cout << "No bookings have been made.\n";
    return;
  }
  for (const Booking& b : bookings) {
    const Flight& flight = flights[b.flightIndex];
    // Convert seat number to letter + number format
    char row = 'A' + (b.seatNumber - 1) / 6;
    int column = ((b.seatNumber - 1) % 6) + 1;
    string seatLabel = string(1, row) + to_string(column);
    cout << left << setw(25) << b.fullName
         << "Flight: " << setw(6) << flight.departureTime
         << " Seat: " << seatLabel << endl;
  }
}
```

Output:

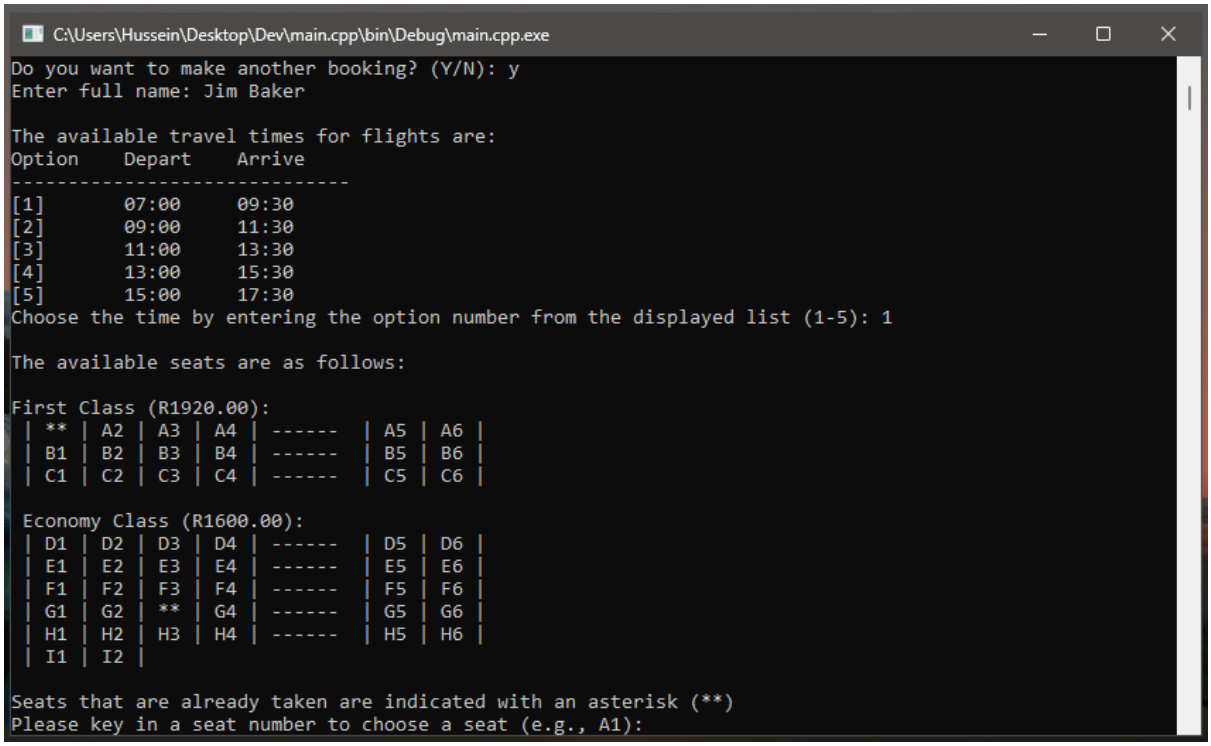


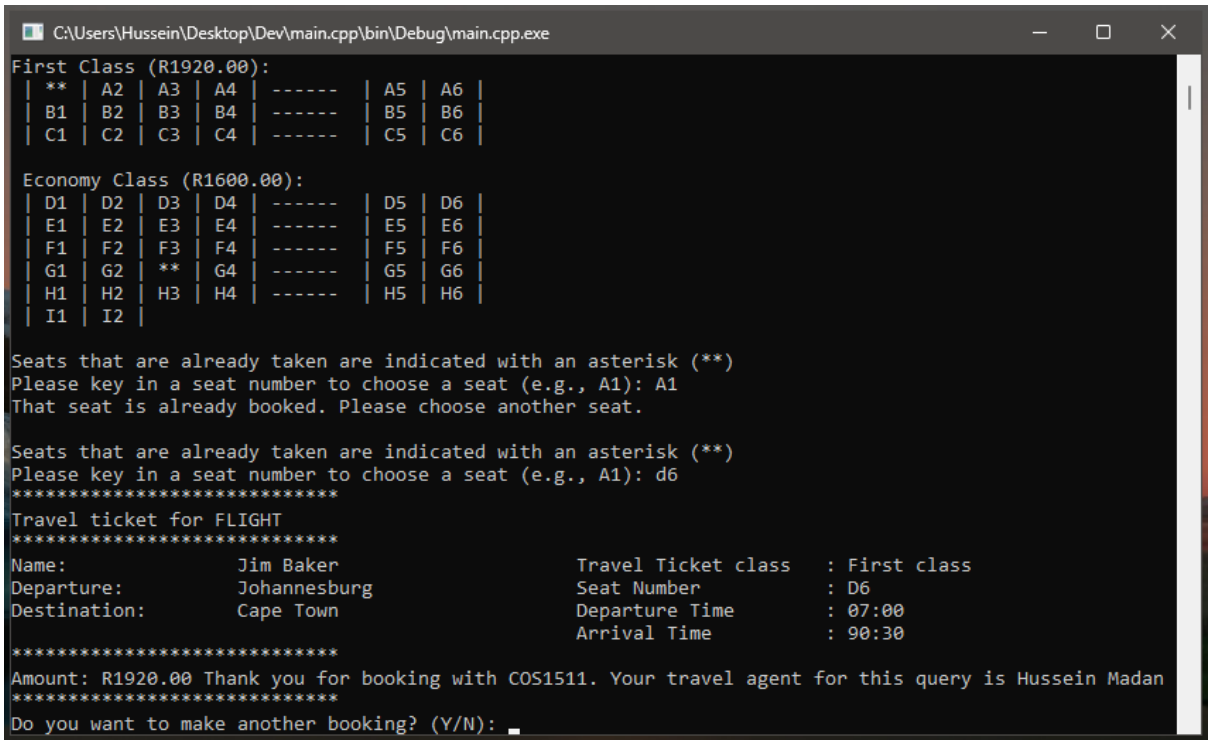


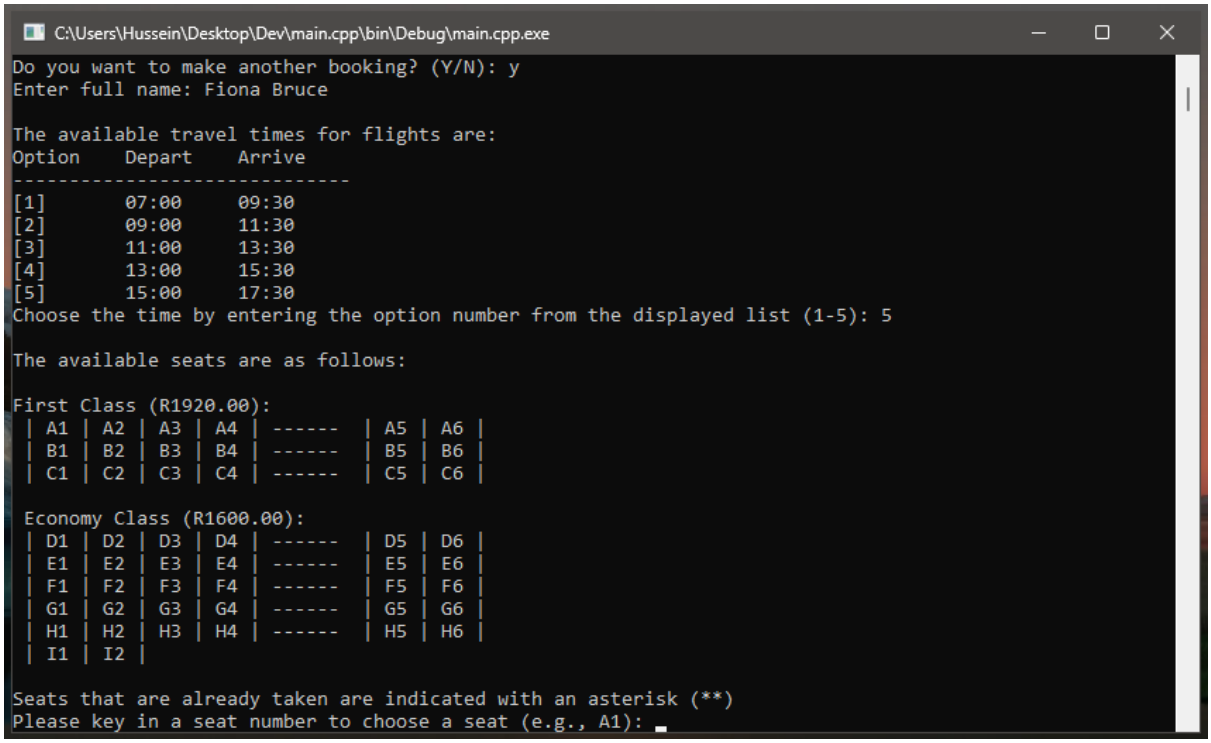
```
C:\Users\Hussein\Desktop\Dev\main.cpp\bin\Debug\main.cpp.exe
Choose the time by entering the option number from the displayed list (1-5): 1

The available seats are as follows:

First Class (R1920.00):
 | A1 | A2 | A3 | A4 | ------  | A5 | A6 |
 | B1 | B2 | B3 | B4 | ------  | B5 | B6 |
 | C1 | C2 | C3 | C4 | ------  | C5 | C6 |

 Economy Class (R1600.00):
 | D1 | D2 | D3 | D4 | ------  | D5 | D6 |
 | E1 | E2 | E3 | E4 | ------  | E5 | E6 |
 | F1 | F2 | F3 | F4 | ------  | F5 | F6 |
 | G1 | G2 | G3 | G4 | ------  | G5 | G6 |
 | H1 | H2 | H3 | H4 | ------  | H5 | H6 |
 | I1 | I2 |

Seats that are already taken are indicated with an asterisk (**)
Please key in a seat number to choose a seat (e.g., A1): a1
******************************
Travel ticket for FLIGHT
******************************
Name:               Hussein Madan               Travel Ticket class   : First class
Departure:          Johannesburg                Seat Number           : A1
Destination:        Cape Town                   Departure Time        : 07:00
                                                Arrival Time          : 90:30
******************************
Amount: R1920.00 Thank you for booking with COS1511. Your travel agent for this query is Hussein Madan
******************************
Do you want to make another booking? (Y/N):
```

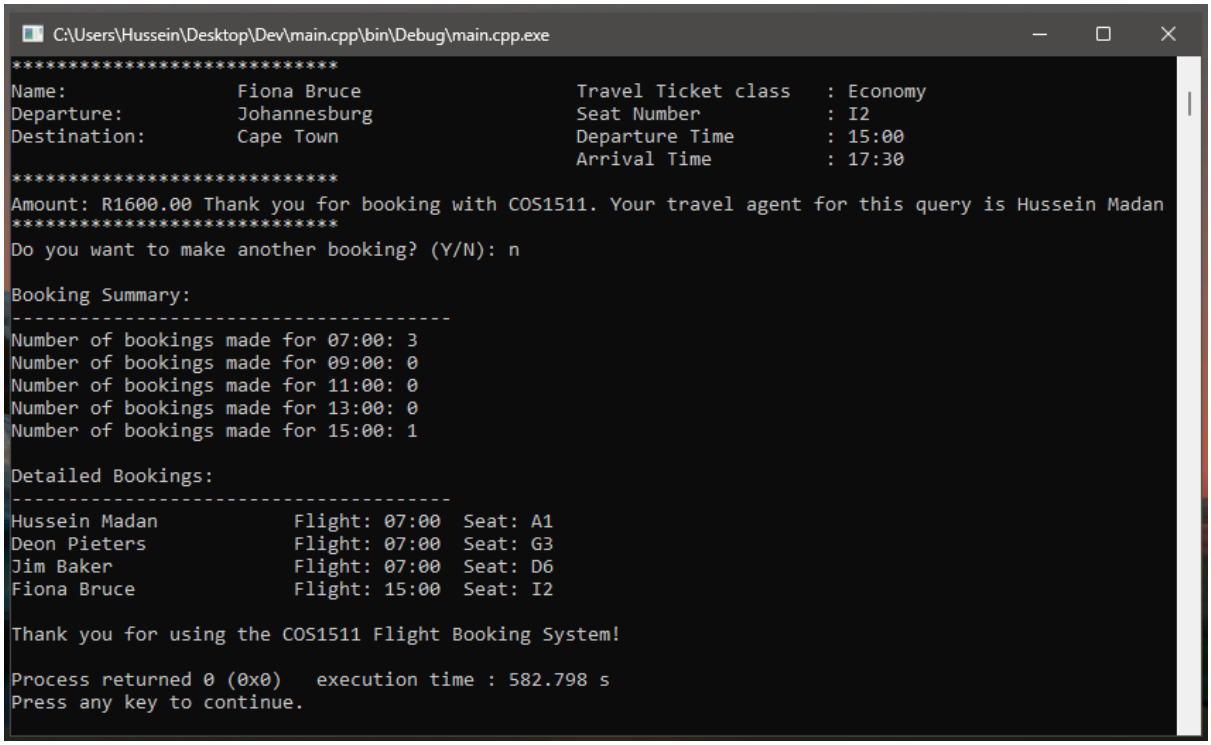


```
C:\Users\Hussein\Desktop\Dev\main.cpp\bin\Debug\main.cpp.exe
Do you want to make another booking? (Y/N): y
Enter full name: Deon Pieters

The available travel times for flights are:
Option    Depart    Arrive
------------------------------
[1]       07:00     09:30
[2]       09:00     11:30
[3]       11:00     13:30
[4]       13:00     15:30
[5]       15:00     17:30
Choose the time by entering the option number from the displayed list (1-5): 1

The available seats are as follows:

First Class (R1920.00):
 | ** | A2 | A3 | A4 | ------  | A5 | A6 |
 | B1 | B2 | B3 | B4 | ------  | B5 | B6 |
 | C1 | C2 | C3 | C4 | ------  | C5 | C6 |

 Economy Class (R1600.00):
 | D1 | D2 | D3 | D4 | ------  | D5 | D6 |
 | E1 | E2 | E3 | E4 | ------  | E5 | E6 |
 | F1 | F2 | F3 | F4 | ------  | F5 | F6 |
 | G1 | G2 | G3 | G4 | ------  | G5 | G6 |
 | H1 | H2 | H3 | H4 | ------  | H5 | H6 |
 | I1 | I2 |

Seats that are already taken are indicated with an asterisk (**)
Please key in a seat number to choose a seat (e.g., A1):
```


C:\Users\Hussein\Desktop\Dev\main.cpp\bin\Debug\main.cpp.exe
Do you want to make another booking? (Y/N): y
Enter full name: Jim Baker
The available travel times for flights are:
Option Depart Arrive
[1] 07:00 09:30
[2] 09:00 11:30
[3] 11:00 13:30
[4] 13:00 15:30
[5] 15:00 17:30
Choose the time by entering the option number from the displayed list (1-5): 1
The available seats are as follows:
First Class (R1920.00):
**	A2	A3	A4	------	A5	A6
B1	B2	B3	B4	------	B5	B6
C1	C2	C3	C4	------	C5	C6
Economy Class (R1600.00):
D1	D2	D3	D4	------	D5	D6
E1	E2	E3	E4	------	E5	E6
F1	F2	F3	F4	------	F5	F6
G1	G2	**	G4	------	G5	G6
H1	H2	H3	H4	------	H5	H6
I1	I2
Seats that are already taken are indicated with an asterisk (**)
Please key in a seat number to choose a seat (e.g., A1):


C:\Users\Hussein\Desktop\Dev\main.cpp\bin\Debug\main.cpp.exe
First Class (R1920.00):
**	A2	A3	A4	------	A5	A6
B1	B2	B3	B4	------	B5	B6
C1	C2	C3	C4	------	C5	C6
Economy Class (R1600.00):
D1	D2	D3	D4	------	D5	D6
E1	E2	E3	E4	------	E5	E6
F1	F2	F3	F4	------	F5	F6
G1	G2	**	G4	------	G5	G6
H1	H2	H3	H4	------	H5	H6
I1	I2
Seats that are already taken are indicated with an asterisk (**)
Please key in a seat number to choose a seat (e.g., A1): A1
That seat is already booked. Please choose another seat.
Seats that are already taken are indicated with an asterisk (**)
Please key in a seat number to choose a seat (e.g., A1): d6
Travel ticket for FLIGHT
Name: Jim Baker
Travel Ticket class : First class
Departure: Johannesburg
Seat Number : D6
Destination: Cape Town
Departure Time : 07:00
Arrival Time : 90:30
Amount: R1920.00 Thank you for booking with COS1511. Your travel agent for this query is Hussein Madan
Do you want to make another booking? (Y/N):


C:\Users\Hussein\Desktop\Dev\main.cpp\bin\Debug\main.cpp.exe
Do you want to make another booking? (Y/N): y
Enter full name: Fiona Bruce
The available travel times for flights are:
Option Depart Arrive
[1] 07:00 09:30
[2] 09:00 11:30
[3] 11:00 13:30
[4] 13:00 15:30
[5] 15:00 17:30
Choose the time by entering the option number from the displayed list (1-5): 5
The available seats are as follows:
First Class (R1920.00):
A1	A2	A3	A4	------	A5	A6
B1	B2	B3	B4	------	B5	B6
C1	C2	C3	C4	------	C5	C6
Economy Class (R1600.00):
D1	D2	D3	D4	------	D5	D6
E1	E2	E3	E4	------	E5	E6
F1	F2	F3	F4	------	F5	F6
G1	G2	G3	G4	------	G5	G6
H1	H2	H3	H4	------	H5	H6
I1	I2
Seats that are already taken are indicated with an asterisk (**)
Please key in a seat number to choose a seat (e.g., A1):


C:\Users\Hussein\Desktop\Dev\main.cpp\bin\Debug\main.cpp.exe
Name: Fiona Bruce
Departure: Johannesburg
Destination: Cape Town
Travel Ticket class : Economy
Seat Number : I2
Departure Time : 15:00
Arrival Time : 17:30
Amount: R1600.00 Thank you for booking with COS1511. Your travel agent for this query is Hussein Madan
Do you want to make another booking? (Y/N): n
Booking Summary:
Number of bookings made for 07:00: 3
Number of bookings made for 09:00: 0
Number of bookings made for 11:00: 0
Number of bookings made for 13:00: 0
Number of bookings made for 15:00: 1
Detailed Bookings:
Hussein Madan Flight: 07:00 Seat: A1
Deon Pieters Flight: 07:00 Seat: G3
Jim Baker Flight: 07:00 Seat: D6
Fiona Bruce Flight: 15:00 Seat: I2
Thank you for using the COS1511 Flight Booking System!
Process returned 0 (0x0) execution time : 582.798 s
Press any key to continue.