Input

```cpp
#include <iostream>
#include <string>
#include <vector>
#include <iomanip>
#include <cctype>
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; // 1-based seat number
};
// 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);
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;
    cout << "************************************************" << endl;
```

```cpp
    cout << "*                                           *" << endl;
    cout << "*   Welcome to COS1511 Flight Booking System     *" << endl;
    cout << "*                                           *" << endl;
    cout << "*************************************************" << endl;
    cout << "Enter full name: ";
    getline(cin, fullName);
    do {
        displayMenu(flights);
        int choice;
        cout << "Choose the time by entering the option number from the
displayed list (1-5): ";
        cin >> choice;
        // 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(); // Clear newline from input buffer
        if (toupper(continueBooking) == 'Y') {
            cout << "Enter full name: ";
            getline(cin, fullName);
        }
    } 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 << setw(6) << "Option" << setw(12) << "Depart" << setw(12) <<
"Arrive\n";
    cout << setw(30) << setfill('-') << "" << endl;
    cout << setfill(' ');
    for (size_t i = 0; i < flights.size(); ++i) {
        int departureHour = stoi(flights[i].departureTime.substr(0, 2));
        int arrivalHour = (departureHour + 2) % 24;
```

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        string arrivalTime = (arrivalHour < 10 ? "0" : "") +
to_string(arrivalHour) + ":30";
        cout << setw(6) << to_string(i + 1) + "." << setw(12) <<
flights[i].departureTime << setw(12) << arrivalTime << endl;
    }
}
// Function to display the seating arrangement
void displaySeating(const Flight& flight) {
    cout << "\nThe available seats are as follows:\n";
    cout << " First class (R1920.00)\n";
    char rowLabel = 'A';
    for (int i = 0; i < NUM_SEATS; ++i) {
        int seatNum = (i % 6) + 1;
        string seatLabel = string(1, rowLabel) + to_string(seatNum);
        cout << " | " << (flight.seats[i] ? "**" : seatLabel) << " ";
        if (seatNum == 3) {
            cout << " | ------ ";
        }
        if (seatNum == 6) {
            cout << " |\n";
            rowLabel++;
            if (rowLabel == 'E') {
                cout << " | Economy class (R1600.00)\n";
            }
        }
    }
}
// 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;
```

```cpp
        }
        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.\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;
    cout << "\n****************************\n";
    cout << "Travel ticket for FLIGHT\n";
    cout << "****************************\n";
    cout << left << setw(20) << "Name:" << setw(30) << fullName
         << "Travel Ticket class\t: " << seatClass << endl;
    cout << left << setw(20) << "Departure:" << setw(30) << "Johannesburg"
```

```cpp
                    << "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);
    cout << "*****************************\n";
    cout << "Amount: R" << ticketPrice << " Thank you for booking with
COS1511."
            << " Your travel agent for this query is Hussein Madan" << endl;
    cout << "*****************************\n";
}
// Function to display the booking summary (with detailed bookings)
void displayBookingSummary(const vector<Flight>& flights, const
vector<Booking>& bookings) {
    cout << "\nBooking Summary:\n";
    cout << "--------------------------------" << endl;
    // 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";
    cout << "--------------------------------\n";
    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

```
● ● ● h — '/Volumes/Data/Dev/COS1511/assignment_2/main' — '/Volumes/Data/Dev/COS1511/assignment_2...

Last login: Wed Apr 16 16:28:38 on console
'/Volumes/Data/Dev/COS1511/assignment_2/main'
                                                        ✓  19:25:48
    '/Volumes/Data/Dev/COS1511/assignment_2/main'
**************************************************
*                                                *
*    Welcome to COS1511 Flight Booking System    *
*                                                *
**************************************************
Enter full name: Hussein Madan Migadde

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): 9
Incorrect option! Please choose from 1 — 5: ▊
```

```
● ● ● h — '/Volumes/Data/Dev/COS1511/assignment_2/main' — '/Volumes/Data/Dev/COS1511/assignment_2...

Last login: Wed Apr 16 16:28:38 on console
'/Volumes/Data/Dev/COS1511/assignment_2/main'
                                                        ✓  19:25:48
    '/Volumes/Data/Dev/COS1511/assignment_2/main'
**************************************************
*                                                *
*    Welcome to COS1511 Flight Booking System    *
*                                                *
**************************************************
Enter full name: Hussein Madan Migadde

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): 9
Incorrect option! Please choose from 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  |
 | D1  | D2  | D3  | ------ | D4  | D5  | D6  |
 | Economy class (R1600.00)
 | 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): ▊
```

```
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): 9
Incorrect option! Please choose from 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  |
 | D1  | D2  | D3  | ------ | D4  | D5  | D6  |
 | Economy class (R1600.00)
 | 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 Migadde        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):
```

```
*****************************
Travel ticket for FLIGHT
*****************************
Name:            Hussein Madan Migadde        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): y
Enter full name: Hussein Madan Migadde

The available travel times for flights are:
OptionDepart      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  |
 | D1  | D2  | D3  | ------ | D4  | D5  | D6  |
 | Economy class (R1600.00)
 | 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):
```

```
****************************
Travel ticket for FLIGHT
****************************
Name:           Hussein Madan Migadde      Travel Ticket class   : Economy
Departure:      Johannesburg               Seat Number           : G3
Destination:    Cape Town                  Departure Time        : 07:00
                                           Arrival Time          : 90:30

****************************
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): y
Enter full name: Hussein Migadde

The available travel times for flights are:
OptionDepart       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 |
  | D1 | D2 | D3 | ------ | D4 | D5 | D6 |
  | Economy class (R1600.00)
  | 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): █
```

```
****************************
Travel ticket for FLIGHT
****************************
Name:          Hussein Migadde          Travel Ticket class  : First class
Departure:     Johannesburg             Seat Number          : C6
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): y
Enter full name: Fiona Bruce

The available travel times for flights are:
OptionDepart      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  |
 | D1  | D2  | D3  | ------ | D4  | D5  | D6  |
 | Economy class (R1600.00)
 | 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):
```

```
 | 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): I2

****************************
Travel ticket for FLIGHT
****************************
Name:          Fiona Bruce              Travel Ticket class  : Economy
Departure:     Johannesburg             Seat Number          : I2
Destination:   Cape Town                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 Migadde    Flight: 07:00  Seat: A1
Hussein Madan Migadde    Flight: 07:00  Seat: G3
Hussein Migadde          Flight: 07:00  Seat: C6
Fiona Bruce              Flight: 15:00  Seat: I2

Thank you for using the COS1511 Flight Booking System!
```