

Error Checklist for Flight Booking System:

1. **Date and Time Validation:** Incorrect handling of flight departure and arrival dates and times.
2. **Seat Availability Check:** Failing to check if the desired seat is available.
3. **Overbooking:** Allowing more bookings than the available seats.
4. **Baggage Allowance Check:** Not checking if the baggage weight exceeds the allowance.
5. **Payment Validation:** Failing to validate payment information.
6. **Cancellation Policy:** Not handling cancellations and refunds correctly.
7. **Passenger Details Validation:** Incorrect handling of passenger details (e.g., name, passport number).

Algorithm: Flight Booking System

Version 1: Basic Flight Booking System (with multiple flaws)

```
1 public class Flight {
2     private int totalSeats;
3     private int bookedSeats;
4
5     public Flight(int totalSeats) {
6         this.totalSeats = totalSeats;
7         this.bookedSeats = 0;
8     }
9
10    public String bookSeat(int seats, double baggageWeight) {
11        if (bookedSeats + seats > totalSeats) { // Flaw: Overbooking
12            return "Not enough seats available";
13        }
14        // Flaw: No seat availability, baggage allowance, and passenger details checks
15        bookedSeats += seats;
16        return "Seats booked";
17    }
18
19    public String cancelBooking(int seats) {
20        // Flaw: No cancellation policy
21        bookedSeats -= seats;
22        return "Booking cancelled";
23    }
24 }
25
```

Test Cases for Version 1: Basic Flight Booking System

| Test | Test Case Description | Input Data | Expected | Verdict |
|------|-------------------------|-------------------------------------|------------------------------|---------|
| 1 | Overbooking | 100 seats, 90 booked, book 15 seats | "Not enough seats available" | Failed |
| 2 | Seat Availability Check | 100 seats, 95 booked, book 5 seats | "Seats booked" | Passed |

| | | | | |
|---|------------------------------|-----------------------------------------------------------------------|------------------------------------|--------|
| 3 | Baggage Allowance Check | 100 seats, 50 booked, 25 kg baggage allowance, book 1 seat with 30 kg | "Baggage weight exceeds allowance" | Failed |
| 4 | Passenger Details Validation | 100 seats, 80 booked, book 1 seat with invalid passenger details | "Invalid booking details" | Failed |
| 5 | Cancellation Policy | 100 seats, 80 booked, cancel 10 seats | "Booking cancelled" | Passed |

Version 2: Improved Flight Booking System (corrected)

```

1  import java.time.LocalDateTime;
2
3  public class Flight {
4      private int totalSeats;
5      private int bookedSeats;
6      private double baggageAllowance;
7      private LocalDateTime departureTime;
8
9      public Flight(int totalSeats, double baggageAllowance, LocalDateTime departureTime) {
10         this.totalSeats = totalSeats;
11         this.bookedSeats = 0;
12         this.baggageAllowance = baggageAllowance;
13         this.departureTime = departureTime;
14     }
15
16     public String bookSeat(int seats, double baggageWeight, String passengerName, String passportNumber, LocalDateTime bookingTime) {
17         if (seats ≤ 0 || baggageWeight < 0 || passengerName.isEmpty() || passportNumber.isEmpty()) {
18             return "Invalid booking details";
19         }
20         if (bookingTime.isAfter(departureTime)) {
21             return "Cannot book seats after departure time";
22         }
23         if (bookedSeats + seats > totalSeats) {
24             return "Not enough seats available";
25         }
26         if (baggageWeight > baggageAllowance) {
27             return "Baggage weight exceeds allowance";
28         }
29         bookedSeats += seats;
30         return "Seats booked for " + passengerName;
31     }
32
33     public String cancelBooking(int seats) {
34         if (seats ≤ 0 || seats > bookedSeats) {
35             return "Invalid cancellation";
36         }
37         bookedSeats -= seats;
38         return "Booking cancelled";
39     }
40 }
41

```

Test Cases for Version 2: Improved Flight Booking System

| Test | Test Case Description | Input Data | Expected | Verdict |
|------|-------------------------|-------------------------------------|------------------------------|---------|
| 1 | Overbooking | 100 seats, 90 booked, book 15 seats | "Not enough seats available" | Passed |
| 2 | Seat Availability Check | 100 seats, 95 booked, book 5 seats | "Seats booked" | Passed |

| | | | | |
|---|------------------------------|-----------------------------------------------------------------------|------------------------------------|--------|
| 3 | Baggage Allowance Check | 100 seats, 50 booked, 25 kg baggage allowance, book 1 seat with 30 kg | "Baggage weight exceeds allowance" | Passed |
| 4 | Passenger Details Validation | 100 seats, 80 booked, book 1 seat with invalid passenger details | "Invalid booking details" | Passed |
| 5 | Cancellation Policy | 100 seats, 80 booked, cancel 10 seats | "Booking cancelled" | Passed |