

Hackathon Problem Statement

Train Reservation System

You are designing and implementing a system to enable users to book train tickets through an online portal. In other words, you are working for IRCTC to implement the train reservation system.

In this round, you will have to build the system incrementally as explained below. For simplicity and considering the time constraints, some of these requirements are simplified.

Milestone 1: Book Tickets

Book tickets for a given route, date, class/coach type and number of passengers.

Example:

You will be given a list of trains and coach configurations in below format.

2

```
17726 Rajkot-0 Mumbai-750
17226 S1-72 S2-72 B1-72 A1-48 H1-24
37392 Ahmedabad-0 Surat-300
37392 S1-15 S2-20 S3-50 B1-36 B2-48
```

1. 2 in first line indicates that there are total 2 trains
2. First word in each line represents train number
3. For each train the first and last station is mentioned. Along with the station, the distance is mentioned in km.
For example, train 17726 travels from Rajkot to Mumbai. Mumbai is 750 km away from Rajkot. However, Rajkot is 0 km away from itself. This distance will be used while calculating the fare, explained below.
4. Second line indicates the list of coaches and seats within each coach.
For example, 17226 S1-72 S2-72 B1-72 A1-48 H1-24

This train has 5 coaches, S1, S2, B1, A1 and H1. In S1, S2 and B1, there are 72 seats/berths in each coach. In A1, there are 48 seats and in H1, there are 24 seats.

First letter of a coach represents coach type, i.e.

S - Sleeper (SL)

B - 3 Tier AC (3A)
A - 2 Tier AC (2A)
H - 1st class AC (1A)

As a next, the user will enter **booking requests**, in the following format,

Input: Rajkot Mumbai 2023-03-15 SL 6

User wants to book tickets **from Rajkot to Mumbai** for the **date 15th March, 2023**. SL indicates **Sleeper class**. **Total passengers: 6**

Following symbols represent different class/coach types (in booking request), i.e. instead of SL, the user can specify any one from below.

SL - Sleeper
3A - 3 Tier AC
2A - 2 Tier AC
1A - First Class AC

Your program should book the tickets, if there is a train for a given route and if the required number of seats are available in the selected class.

Output: 100000001 4500

100000001 represents PNR, which is a unique ticket number. It must be a 9 digit integer number. First ticket issued by the system will have PNR as 100000001, second ticket will have PNR as 100000002 and so on.

4500 represents the total fair for this ticket. The fair is calculated as follows,

SL - 1 INR per KM per passenger
3A - 2 INR per KM per passenger
2A - 3 INR per KM per passenger
1A - 4 INR per KM per passenger

So, for above example, the total fair will be,
 $750 \text{ km} \times 1 \text{ INR} \times 6 \text{ passengers} = 4500$

Next Input: Rajkot Mumbai 2023-03-15 1A 24

Output: 100000002 72000

Note: Group booking is allowed and so the user is able to book the entire coach (24 tickets) in a single request.

Next Input: Rajkot Mumbai 2023-03-15 1A 1

Output: No Seats Available

Next Input: Rajkot Mumbai 2023-03-16 1A 10

Output: 100000003 30000

Tickets are available on next day, i.e. on 16th March

Next Input: Rajkot Chennai 2023-03-16 1A 10

Output: No Trains Available

Assumptions:

1. Number of trains will be between 1 and 50
2. Number of coaches in sleeper category/class will be between 1 and 18
3. Number of coaches in 3A (3 tier AC) category/class will be between 0 and 3
4. Number of coaches in 2A (2 tier AC) category/class will be between 0 and 3
5. Number of coaches in 1A (First Class AC) category/class will be between 0 and 1
6. Number of seats in each coach will be between 1 and 72
7. Each train runs 7 days a week
8. Each train completes entire journey on the same day, from first station to last station
9. Book ticket only if the ticket/seat is confirmed for all passengers, e.g.. if there are only 2 seats available in sleeper class (across all coaches), and if user submits a new request with total passengers as 4, then display message "No Seats Available"
10. It is okay, if all tickets/seats are not available in the same coach, e.g. if there are 2 seats available in S1 and 3 seats are available in S2, and if user submits a new request with total passengers as 4, the ticket will be booked successfully, i.e. 2 seats in coach S1 and another 2 tickets in coach S2.
11. Based on availability, always book tickets from lowest coach number to highest. Similarly, within each coach, book tickets from lowest seat number to highest seat number

Milestone 2: Book Tickets, Retrieve Booking Details using PNR and Generate Report

In this stage, you will enhance the above solution to fulfill the below requirements.

1. User should be able to book the ticket
2. User should be able to retrieve booking details using PNR
3. Generate report

Example:

List of trains in below format,

```
3
17726 Rajkot-0 Ahmedabad-200 Vadodara-300 Surat-500 Mumbai-750
17226 S1-72 S2-72 B1-72 A1-48 H1-24
37392 Ahmedabad-0 Anand-50 Vadodara-100 Bharuch-200 Surat-300
37392 S1-15 S2-20 S3-50 B1-36 B2-48
29772 Vadodara-0 Dahod-150 Indore-350
29772 S1-72 S2-72 B1-72 A1-48
```

Note that, for each train, first, last and all intermediate stations will be provided.

For example, train 17726 travels from Rajkot to Mumbai and stops in between at Ahmedabad, Vadodara and Surat.

Ahmedabad-200 represents that the Ahmedabad is 200 KM away from Rajkot

Vadodara-300 represents that the Vadodara is 300 KM away from Rajkot

Surat-500 represents that the Surat is 500 KM away from Rajkot

Mumbai-750 represents that the Mumbai is 750 KM away from Rajkot

Booking Requests:

Input: Ahmedabad Surat 2023-03-15 SL 3

Output: 17726 37392

There are two eligible trains and so display train numbers of both.

Next Input: 17726

Output: 100000001 900

User has selected 17726 (out of both options) and so the ticket is booked in this train. Total distance is 300 KM and number of passengers are 3, and so the total fair is 900

Input: Ahmedabad Surat 2023-03-15 1A 2

Output: 17726

Note:

1A (First Class AC) is only available in 17726 and so only one train number is displayed.
If there are no seats available in any of the eligible trains, then display message "No Seats Available"

Next Input: 17726

Output: 100000002 2400

Retrieve booking details using PNR

Input: 100000001

Output: 17726 Ahmedabad Surat 2023-03-15 900 S1-1 S1-2 S1-3

For a given PNR 100000001, print complete booking details in above format, i.e.

1. Train Number: 17726
2. From: Ahmedabad
3. To: Surat
4. Date: 2023-03-15
5. Total Fare: 900
6. Seat Details (Coach Number-Seat Number): S1-1 S1-2 S1-3

Input: Vadodara Indore 2023-03-15 SL 2

Output: 29772 (Since there is only train for this route)

Next Input: 29772

Output: 100000003 700

Input: 100000025

Output: Invalid PNR

Input: 100000003

Output: 29772 Vadodara Indore 2023-03-15 700 S1-1 S1-2

Generate Report

Input: REPORT

Output:

PNR	DATE	TRAIN	FROM	TO	FARE	SEATS
100000001	2023-03-15	17726	Ahmedabad	Surat	900	S1-1 S1-2 S1-3
100000002	2023-03-15	17726	Ahmedabad	Surat	2400	H1-1 H1-2
100000003	2023-03-15	29772	Vadodara	Indore	700	S1-1 S1-2

Rows in report should be sorted by PNR