DSA ASSIGNMENT (TASK 2)

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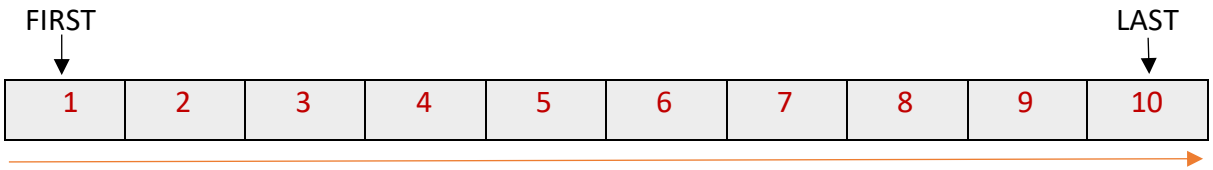
Problem Title: Cargo Shipping System

Data Structure: Priority Queue

EXPLANATION OF THE PROBLEM:

The problem I have chosen is the management of cargo shipping from one station(source) to another station(destination) along a route, which has specific starting and finishing stations. The pre- defined route contains finite number of stations which are numbered sequentially, starting from the initial or the first station. A group of people can register for the transportation of their goods or produce from one station to another. Each person have the option to choose any station in that route as the source station. Considering the restriction, that the cargo shipping is possible only in one-way(unidirectional) the destination can be a station which is ahead of the source station fixed by that particular person. Let us understand the problem in detail with the help of an example.

Consider a route containing finite number of stations. For the sake of simplicity, let us assume that the number of stations on that route are 10. Now, these stations are numbered sequentially, assinging 1 to the first station and 10 to the last station along that route.



Consider that the shipping is possible only from a particular station to a station ahead of it.For example, shipping is possible from station-3 to station-9. However, shipping is not allowed from station-3 to station-1. This is one of the constraints of the taken problem.

Therefore, for the above situation the number of stations that can act as a source or destination becomes limited. Except station-10, all other stations have the possibility to act as a source. Except station-1 all other stations have the possibility to act as a destination.

People can register for the transportation of their goods from one station to another station. Each person could have his/ her own choices of source and destination following the constraints that are discussed earlier. Now, a person is added to the queue whenever he/ she registers for that service. There is a possibility of many registrations at the same time. Apart from the details of the person such as name, age,etc., we need to have information regarding of source and destination. Each person is given a unique dispatch number depending upon the choice of source and destination stations.

Suppose that a group of five persons have registered for the shipping of goods from their respective choice of source station to destination station. Consider the following inputs given one after the other by the user.

S.No.	Person #	From(Source)	To(Destination)
1.	Person A	1	3
2.	Person B	3	6
3.	Person C	7	10
4.	Person D	4	9
5.	Person E	2	3

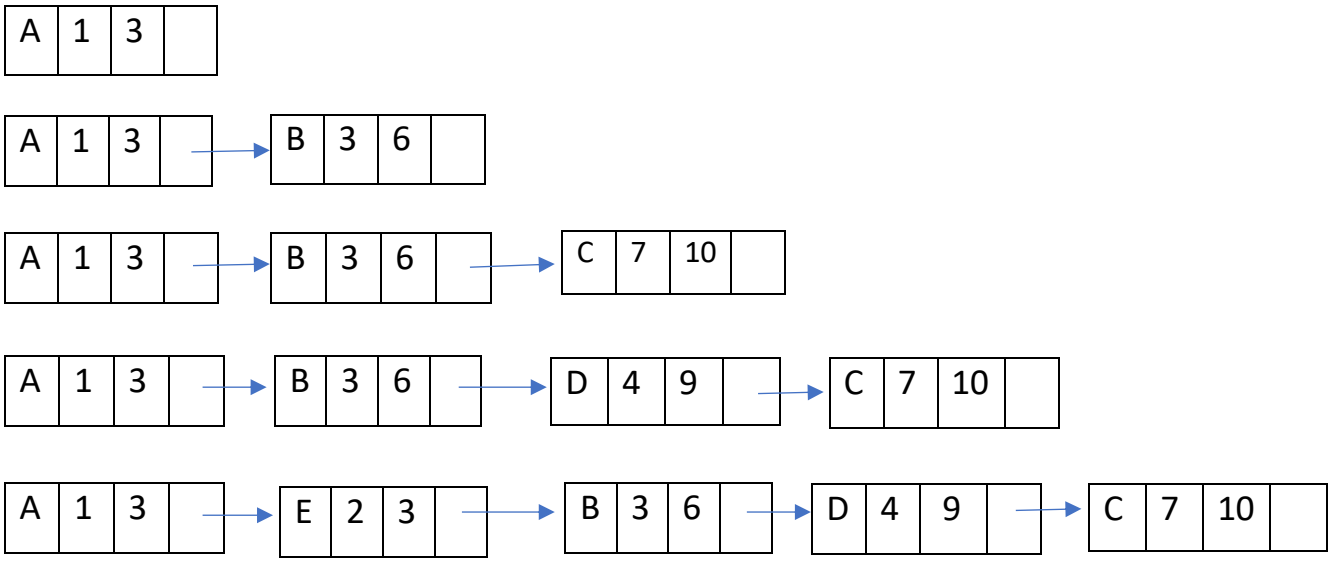
All the inputs are added to the queue maintaining the priority at the beginning of the shipping process itself. Here the priority is given based on location of the destination. The dispatch of the cargo occurs when the destination is reached. Take the case of person A and person B. A is given the first priority as compared to B, as his destination(station 3) is the first in the route. If the destinations are same, then the one for which the source station is first is given the priority. For instance, person A and person E have the same choice of destination(station 3) but A is given first priority as compared to B.

FORMATION OF QUEUE MAINTAINING PRIORITY:

PERSON#	FROM	TO	NEXT

We ensure that the priority is maintained while adding the elements to the queue. The

Priority is dependent on the destination station as discussed earlier.



WHY PRIORITY QUEUE?

We know that priorty queue is a collection of elements such that each element is assigned a priority and that the order in which the elements are processed. In this particular problem the elements needs to be processed based on the priority factor. The elements that are going to be dispatched first are of the highest priority. The data structure best suited for this operation is priority queue and hence I have chosen this data structure for this particular problem.