**APTO Distribution**



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1. **Doubly Linked List:**

We will use doubly linked list for storing users, products, vehicles data

**1.Use Cases**

U02, U03, U04, U05, U12, U13, U14, U15, U21, U22, U23, U24, U25, U27, U28, U29, U30, U32, U33

**2.Reason**

We do not know the actual number of these data and in linked list we have dynamic memory allocation there is no need to give the initial size of linked list so overflow error will not occur until memory becomes full. Insertion and deletion are also fast in linked list.

**3.Time Complexity**

* Insertion will take O (1) time
* Deletion will take O (1) time
* Searching will take O (n) time

**4.Alternative Data Structure**

**1.Array**

As array is contiguous memory allocation and we must declare the size of the array, so it is not a suitable for large data. Deletion is also costly.

1. **Stack:**

We will use stack for storing completed and canceled orders

**1.Use Cases**

U17, U09, U20

**2.Reason**

We will use stack for storing completed orders as we want specific order as newest completed orders should be on top and goes on and stack is a dynamic memory allocation

**3.Time Complexity**

* Insertion will take O (1) time
* Deletion will take O (1) time
* Searching will take O (n) time

**4.Alternative Data Structure**

**1.Array**

As array is static memory allocation and we want data to be in a specific order and array is costly in pop, push methods.

1. **Queue:**

We will use queue for placing order as order placed first will serve first

**1.Use Cases**

U08, U11

**2.Reason**

We will use queue for placing orders as order placed first will be completed first and order dispatched will be delivered first and so orders will be in a specific order and queue is a dynamic memory allocator.

**3.Time Complexity**

* Insertion will take O (1) time
* Deletion will take O (1) time
* Searching will take O (n) time

**4.Alternative Data Structure**

**1.Array**

As array is static memory allocation and we want data to be in a specific order and array is costly in pop, push methods.

1. **Queue:**

We will use queue for placing order as order placed first will serve first

**1.Use Cases**

U08, U11, U31

**2.Reason**

We will use queue for placing orders as order placed first will be completed first and order dispatched will be delivered first and so orders will be in a specific order and queue is a dynamic memory allocator.

**3.Time Complexity**

* Insertion will take O (1) time
* Deletion will take O (1) time
* Searching will take O (n) time

**4.Alternative Data Structure**

**1.Array**

As array is static memory allocation and we want data to be in a specific order and array is costly in pop, push methods.

1. **Graph:**

We will use graph for assigning routes to delivery team and finding minimum distance.

**1.Use Cases**

U06

**2.Reason**

There is no more suitable data structure other than graphs for routes management and finding minimum distance.