**1. Data Structure**

Data structure is the organization of the data in a way so that it can be used efficiently in terms of storing data. Efficiently in data structure all ways measured in terms of TIME and SPACE

In a given scenario me as a system analyst the data structure that could be better to use over other data structure like linear data structure and many other is Linked List.

Firstly let understand what does Linked List mean it’s refer to a collection of objects called nodes that are randomly stored in the memory. each node contains a connection to another node. Each node contains two field data stored at a particular address and pointer point to next node. In linked list the insertion and deletion operations are efficient and easily implemented.

Example of linked list with help of diagram



From a given problem bases on forum concept since user doesn't know or is not aware with the size, this linked list data structure could be better over other data structure since it offer dynamic insertion of data, re sizable at run-time and also, allow user to add data to a memory until the memory is full this mean that Sizing is no longer a problem since we do not need to specify its size at the time of declaration. List grows as per the program's demand and limited to the available memory space, Therefore due to that a user could be comfortable with Linked List data structure.

Then in message charting also the linked list data structure could be better because this data structure its implementation in data insertion and deletion is very straight forward. Since users will need to send message to any one and user can replay any message among of received message.

# Algorithm

# Linear Search Algorithm this is the one algorithm that could be better to use in searching user that a user want to chart with because this algorithm allow user to search unordered list. we just traverse the list entirely and match each element of the list with the item whose location is to be found. If the match is found, then the location of the item is returned otherwise, the algorithm returns NULL.

# Merge Sort Algorithm This algorithm will be used for sorting data especially user. This is most efficiency algorithm that used in world wide since it used divide and conquer approach to sort the elements. The list split the given list into two equal halves, calls itself for the two halves and then merges the two sorted halves.

# **2. Asymptotic analysis**

Asymptotic analysis of an algorithm refers to defining the mathematical framing of its run-time performance. Using asymptotic analysis, we can very well conclude the best case, average case, and worst case scenario of an algorithm.

Asymptotic analysis refers to computing the running time of any operation in mathematical units of computation. For example, the running time of one operation is computed as *f*(n) and may be for another operation it is computed as *g*(n2)

This means the first operation running time will increase linearly with the increase in n and the running time of the second operation will increase exponentially when n increases. Similarly, the running time of both operations will be nearly the same if n is significantly small.

Our focus is on finding the time complexity rather than space complexity, and by finding the time complexity, we can decide which data structure is the best for an algorithm.

From the given problem consider the linked list as a data structure to add the element at the beginning. remember linked list contains two parts data and address of the next node. We just add the address of the first node in the new node, and head pointer will now point to the newly added node. Therefore, we conclude that adding the data at the beginning of the linked list is faster than the arrays. In this way, I have compared the data structures and select the best possible data structure for performing the operations and that data structure is Linked list.