SNS COLLEGE OF TECHNOLOGY

Coimbatore-35
An Autonomous Institution

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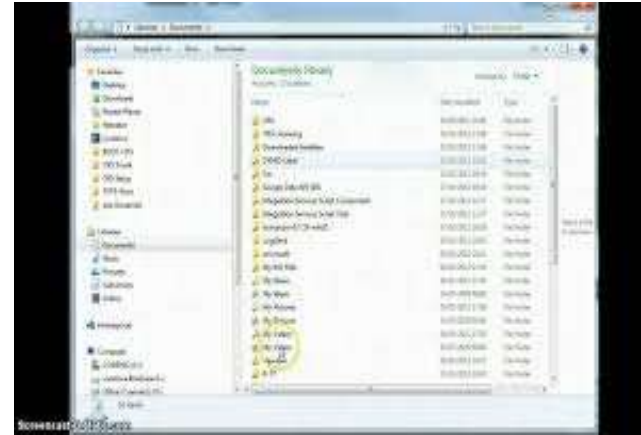**COURSE NAME : 23ITT101&PROGRAMMING IN C AND DATA STRUCTURES**

I YEAR/ II SEMESTER

UNIT – IV LINEAR STRUCTURES
Topic: Introduction &Types

Introduction- Need of Structure

Introduction- Need of Structure

- **Google Search:**
  When you provide a search term in Google and click on search, you get the search results in a fraction of second.

  How many web pages do you think Google goes through before giving you the search result?

- **Google Maps:**
  When you provide a source and destination in Google Maps and click on find route, you get multiple results based on time, current traffic etc. in a fraction of second.

  How do you think Google Maps is able to quickly find locations and routes?
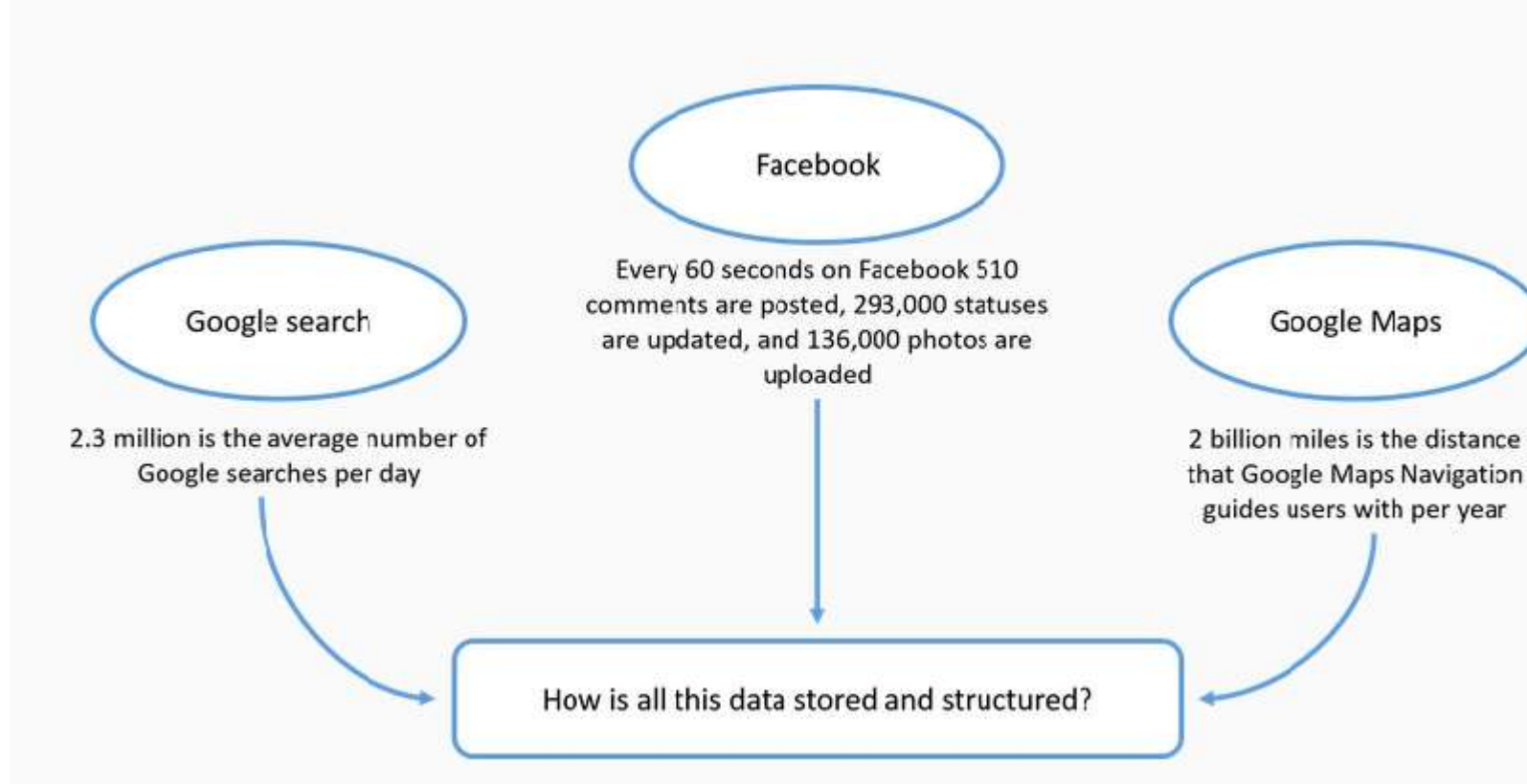
- **Face book:**
  When you put a post in Face book, irrespective of how many friends you are connected to, the post is immediately reflected in all their accounts.

  How do you think Facebook keeps track of all your friends and update their pages based on your post?

Introduction- Need of Structure

Facebook

Google search

Every 60 seconds on Facebook 510 comments are posted, 293,000 statuses are updated, and 136,000 photos are uploaded

Google Maps

2.3 million is the average number of Google searches per day

2 billion miles is the distance that Google Maps Navigation guides users with per year

How is all this data stored and structured?

In any application, organizing and storing data in a way or in a structure that is best suited to its usage is key to efficient access and processing of data.

There are some standard data structures that can be used to efficiently work with data. We can even customize them or build completely new ones to suit our application.

Data structures represent the way of arranging data in computer so that it can be accessed and used efficiently. It is all about grouping and storing collections of data in memory, operations that can be performed on these collections and algorithms that can be used for these operations.

There are different types of data structures like list, stack, queue etc. Each of them are suitable for specific type of tasks.
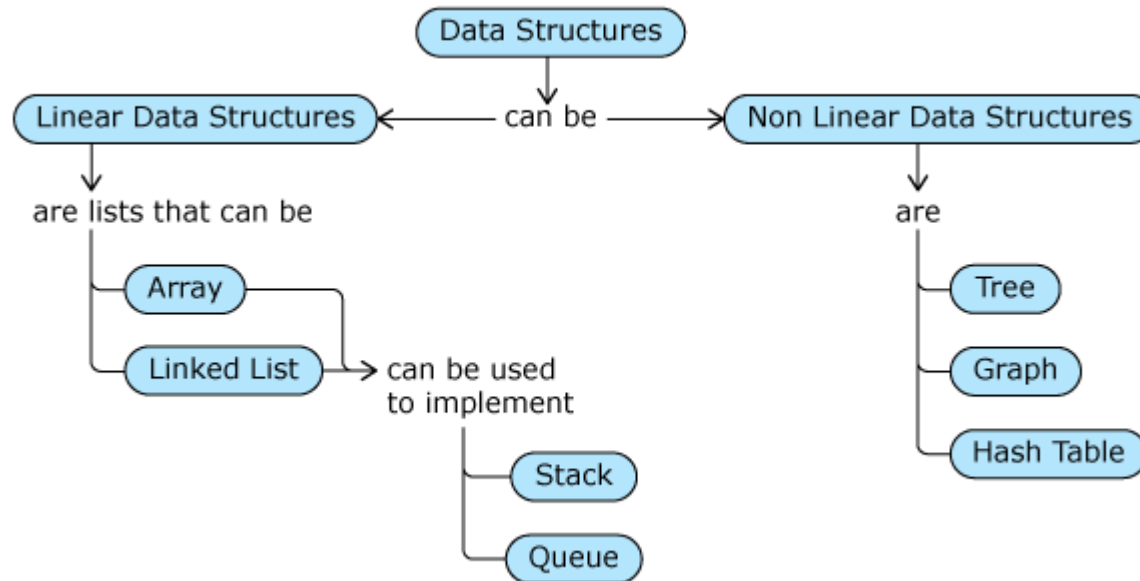
Syllabus

UNIT I LINEAR STRUCTURES & TREES   9

   Introduction Types-Linked Lists -Stack ADT– Queue ADT – circular queue implementation – Applications of stacks and queues- Tree ADT – Tree traversals –Binary Tree ADT – expression trees

UNIT II ADVANCED TREES   9

Binary search tree ADT – AVL trees – binary heaps– B trees-B+ trees –Red Black trees-Applications of trees Huffman Tree

UNIT III GRAPHS 9

Definitions – Topological sort – Breadth-first traversal - shortest-path algorithms –minimum spanning tree – Prim's and Kruskal's algorithms – Depth-first traversal –bi connectivity – Euler circuits – applications of graphs-Travelling Salesman

Problem

UNIT IV HASHING AND SETS 9

Hashing – Separate chaining – open addressing – rehashing – extendible hashing –Disjoint Set ADT – dynamic equivalence problem – smart union algorithms – path compression

UNIT V SORTING AND SEARCHING   9

   Introduction to Algorithm analysis: Asymptotic notation- Sorting: Bubble sort- Selection sort- Insertion sort- Shell sort- Heap sort- Quick sort- Merge sort – Searching: Linear search- Binary search.

   M. A. Weiss, "Data Structures and Algorithm Analysis in C", Pearson Education, 2nd Edition, 2002.

Operations on Data Structures

➢**Traversal** -Processing each element in the list

➢**Search**-Finding the location of the element with a given value with the given key

➢**Insertion** - Adding new element to the list

➢**Deletion** -Removing an elements from the list

➢**Sorting** -Arranging the elements in some type of order
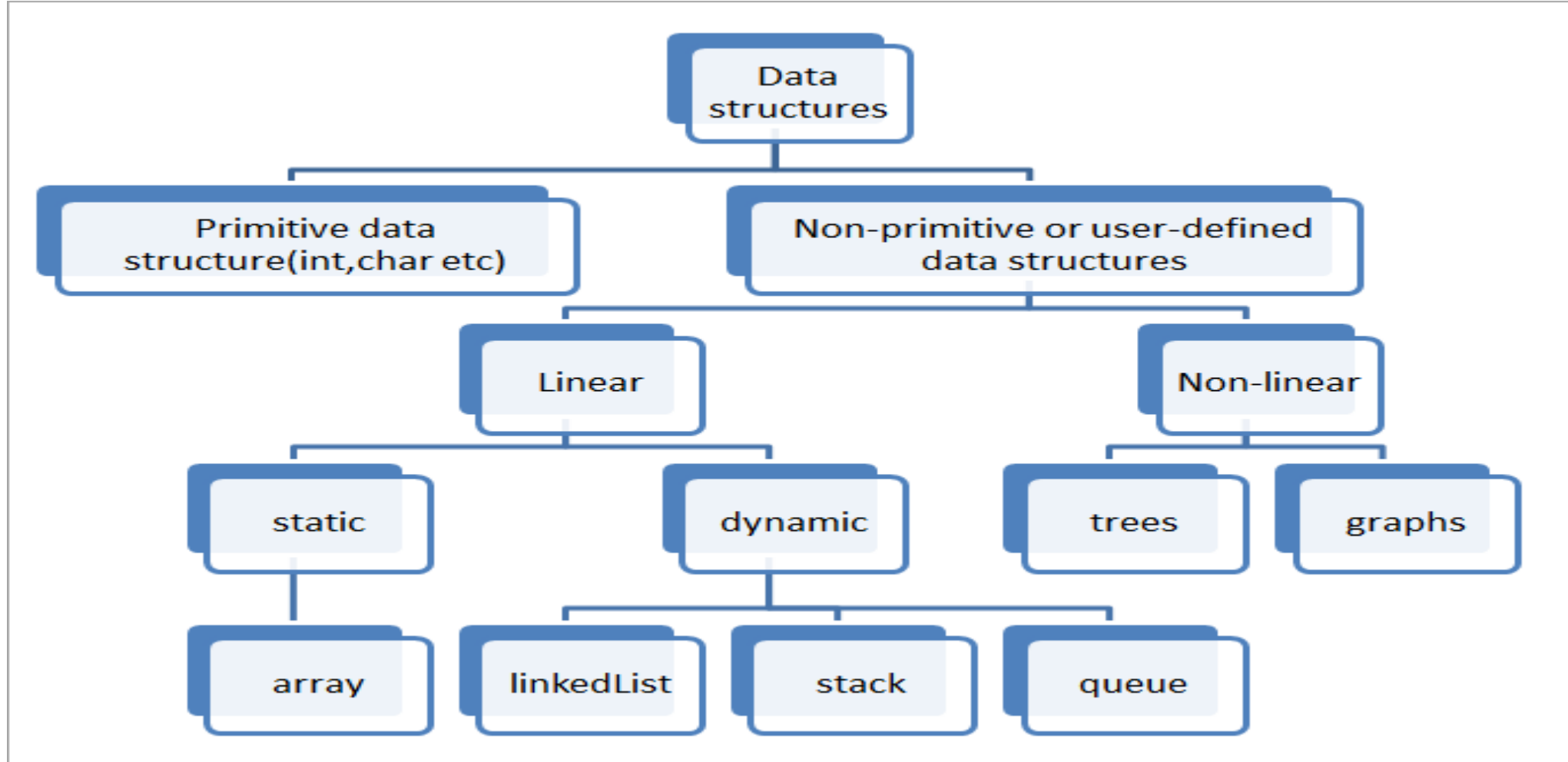
➢**Merging** -Combining two list into a single list

Benefits

➢A data structure requires a certain amount of :

  ➢Space for each item it stores

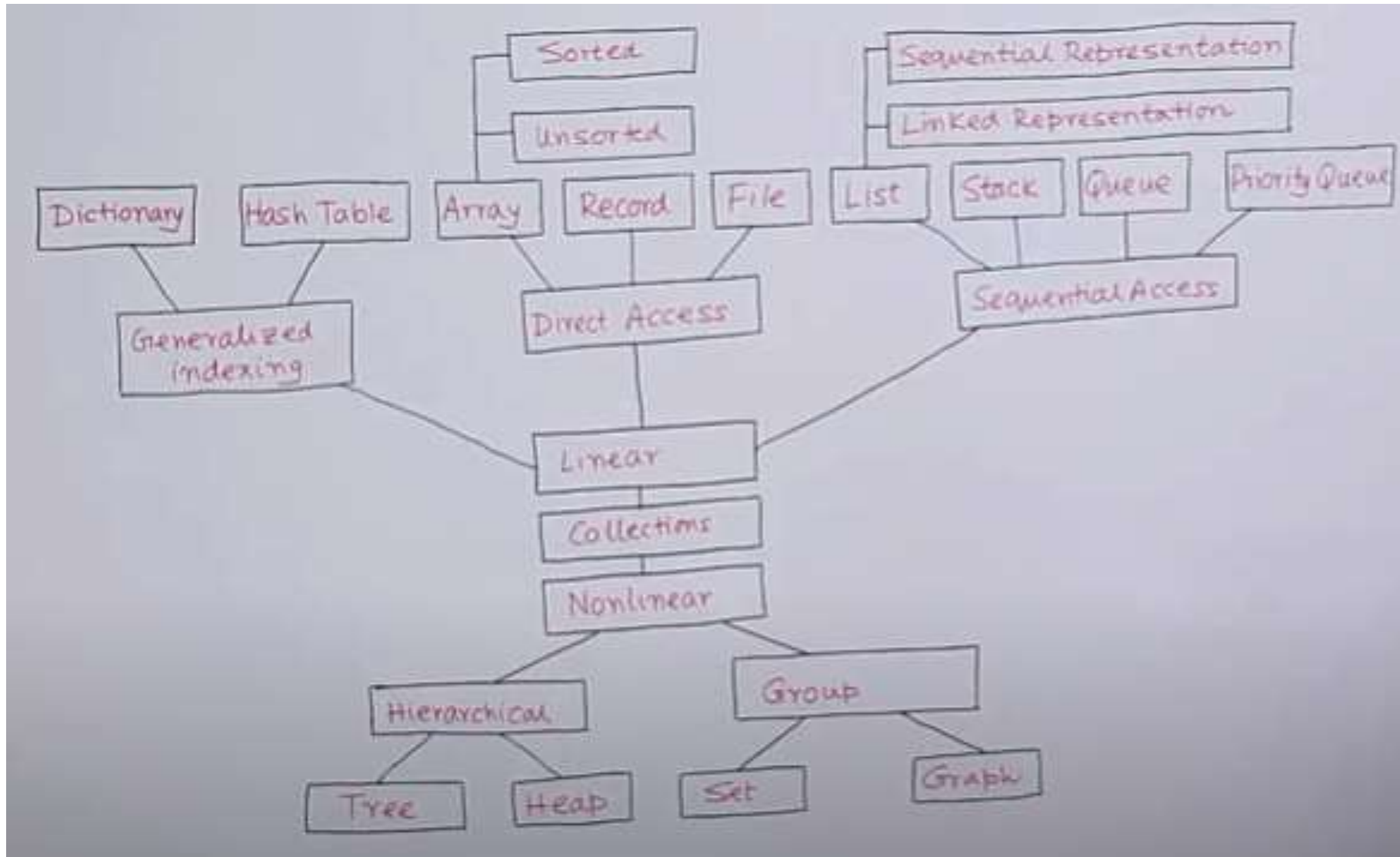 ➢Time to perform a single basic operation

  ➢Programming Effort

Types of Data Structure

Linear and Non Linear Data Structure

Assessment -1

1.Which of the following data structure is non-linear type?

a.Strings

b.Lists

c.Stacks.

D.None of the above

2._____ defines a set of primitive elements which do not involves any other element as its sub-part.

References

1. M. A. Weiss, "Data Structures and Algorithm Analysis in C", Pearson Education, 2nd Edition, 2002.

2. A. V. Aho, J. E. Hopcroft and J. D. Ullman, "Data Structures and Algorithms", Pearson Education, 2nd Edition, 2007

3. Ashok Kamthane, " Data Structures Using C ", Pearson Education, 2nd Edition, 2012.

4. Sahni Horowitz, "Fundamentals of Data Structures in C"Universities Press; Second edition 2008

Thank You