

Data Structures



UNIT I

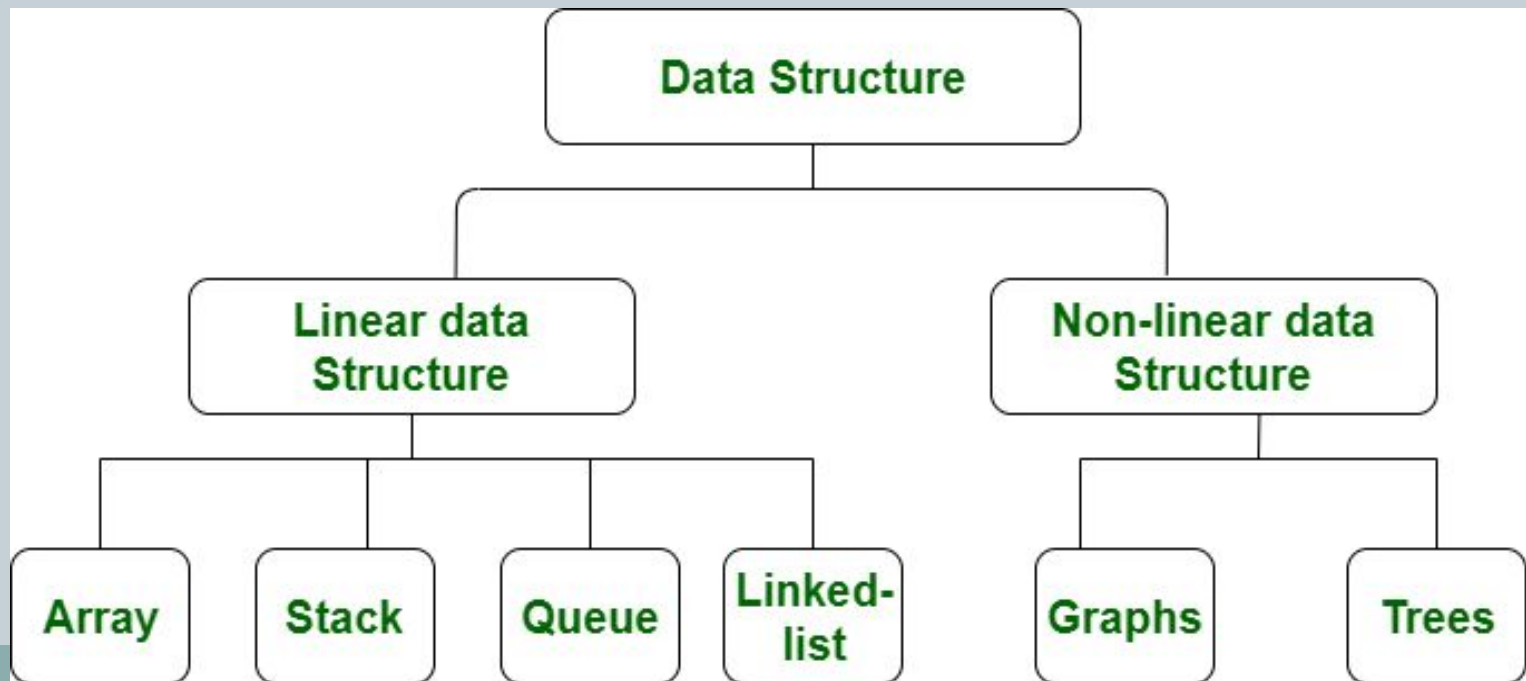
DATATYPES INTRODUCTION

INTRODUCTION



- **DATA STRUCTURE**

A data structure is a particular way of organizing, processing, retrieving and storing data in a computer.



PSEUDOCODES



- A tool – used to define algorithms , is pseudocode.

- **Definition:**

- One of the most common tools for defining algorithms is pseudocode , which is part english , part structured code.

- **Format for data types:**

cout<integer>

- **Structure of the data:**

node

 data <datatype>

 link <pointer to node>

end node

ALGORITHM HEADER



- Each algorithm begins with a header that names it, describes its parameters, and lists any pre and post conditions.

PURPOSE, CONDITIONS and RETURN



● Purpose

- What the algorithm does.
- To describe only the general algorithm processing.

● Conditions

- Pre condition – lists any precursor requirements for the parameters. Sometimes, there are no precondition.
 - Pre Nothing
- Post condition – identifies any action taken and the status of any output parameters.

● Return

- if a value is returned, it will be identified by a return condition.
- Often there is none, and no return condition is needed.

STATEMENT NUMBERS , VARIABLES



● Statement Numbers

- Statements are numbered using an abbreviated decimal notation.
- To identify an individual statement

● Variables

- Use intelligent data names that describe the meaning of data.
- Example: pageNumber
 - RULES:
 - Do not use single character names.
 - Do not use generic names.
 - Abbreviations are not excluded as intelligent data names.
 - Example: stuCnt - studentCount

ALGORITHM ANALYSIS



- Not every line of code is explained
pseudocode:

algorithm average

pre nothing

post calculate average

1 $i=0$

2 loop(not eof)

1 read number into array[i]

2 $sum=sum+number$

3 $i=i+1$

3 end loop

4 $average=sum/i$

5 print (average)

6 return

end average

STATEMENT CONSTRUCTS



- Any algorithm can be written with only three programming constructs:
 - Sequence
 - Selection
 - Loop

SEQUENCE



- A sequence is a series of statements that do not alter the execution path within an algorithm.
- Each algorithm has only one entry and one exit.
- When an algorithm completes, it returns to the statement immediately after the call that invoked it.

SELECTION



- Selection statements evaluate one or more alternatives.
- If the alternatives are true, one path is taken otherwise a different path is taken.

```
1  if (condition)
    1  action1
2  else
    1  action2
3  end if
```

LOOP



- Loop iterates a block of code.
- It is a pre test loop.
- The condition is evaluated before the body of the loop is executed.
- If the condition is true, the body is executed.
- If the condition is false, the loop terminates.