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ALGORITHM & DATA STRUCTURE

Prepared By: Pn. Zati Hanani Binti Zainal

CHAPTER 1 LESSON

■ 1.0 OVERVIEW OF ALGORITHM AND DATA STRUCTURES

■ Understand Algorithm

- a) Identify the characteristic of algorithm.
- b) Describe the role of algorithm in problem solving.
- c) Understand Data Structure.
- d) Define data structure.
- e) Identify the types of data structures.
 - Primitive and Non-Primitive
 - Linear and Non-Linear
 - Static and Dynamic

ALGORITHM CREATION TECHNIQUE

Get idea to solve
problem generally

Withdraw at ATM machine

Step 1 :

Step 2 :

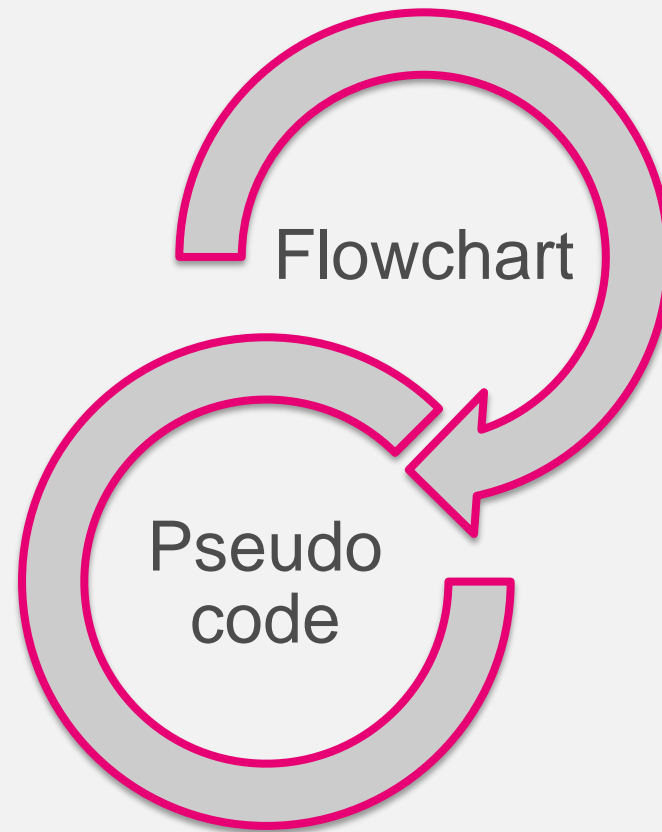
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Step n :

In details



CHARACTERISTIC OF AN ALGORITHM

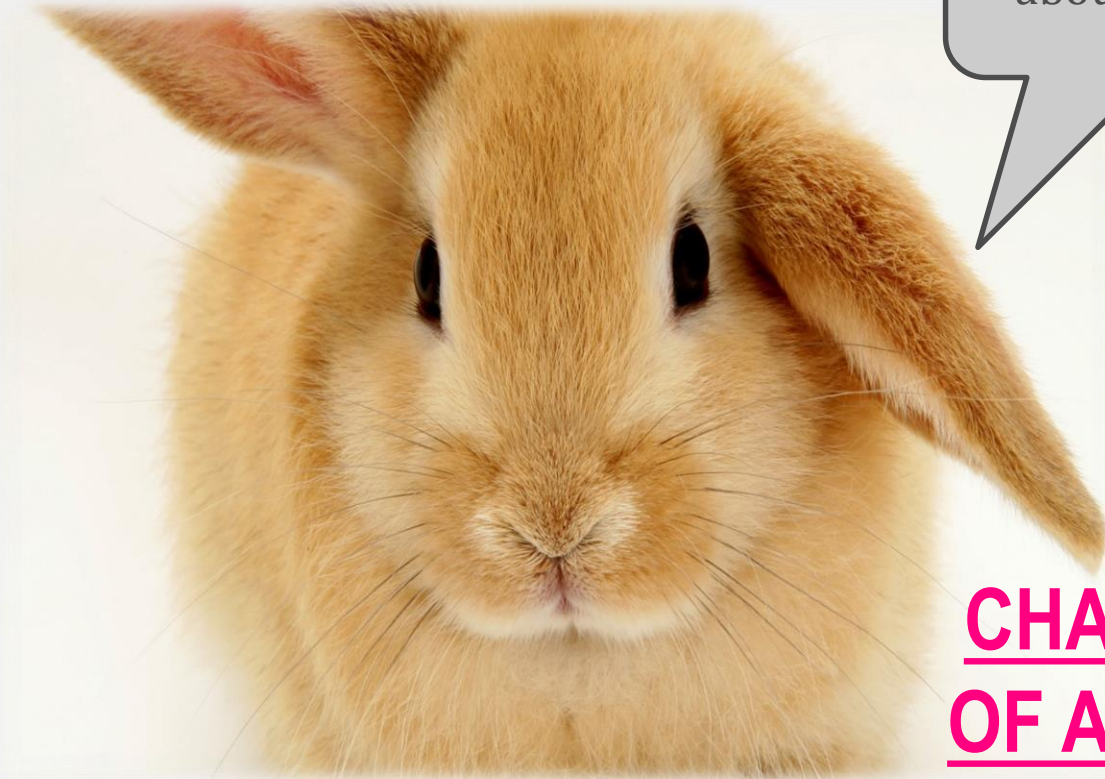
SIX(6) Essential Properties of an algorithm.

- Each step of an algorithm must be **exact**.
- An algorithm must have **input** to start the execution.
- An algorithm must **terminate/output** to get the result of the execution.
- An algorithm must be **general**.
- An algorithm must operate **effectively**.
- An algorithm must **solve the problem**.

ROLES OF AN ALGORITHM IN PROBLEM SOLVING

Algorithm must meet requirement below:

- Have **input**.
- Produce at **least one output**.
- **Clear**
- **Solve** the problem.



Describe precisely
about me. I am....

CHARACTERISTIC
OF AN ALGORITHM

ALGORITHM

- An **ALGORITHM** is the sequence of steps required to provide a solution to a problem.

Procedure to solve problem step by step

- Each algorithm in solving problem will involve a certain data structure.
- Example :
Withdraw money from ATM machine.

DATA STRUCTURE

- A **DATA STRUCTURE** is a particular way of storing and organizing data in a computer so that it can be used efficiently.
- Data structure **BEST** describe as *a single name represents a group of data type.*
- Structure in C + + is represented by the **struct** keyword.
- Which shows the data structure to *allow different types of data stored in a name.*

- Primitive data type is one that fits the base architecture of underlying computer.
- Primitive data are only **single values**, do not have special capabilities.
- There are 8 primitive data types: **byte, short, int, long, float, double, char, boolean**

Common Primitive Types

Type	Description	Example of Literals
int	integers (whole numbers)	42, 60634, -8, 0
double	real numbers	0.039, -10.2, 4.2E+72
char	single characters	'a', 'B', '&', '6'
boolean	logical values	true, false

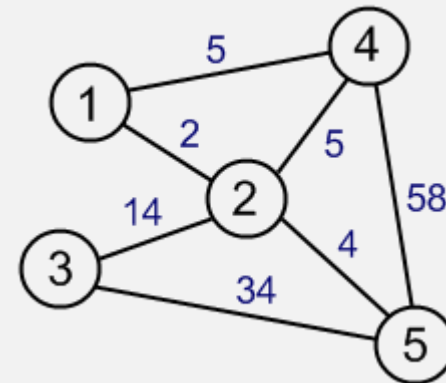
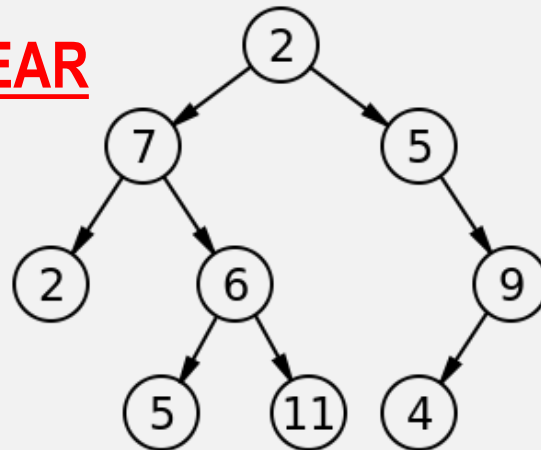
- The non-primitive data types are used to store the group of values.
- Non-primitive data types are not defined by the programming language, but are instead created by the programmer
- Examples of non-primitive data types :
 - a) Array
 - b) Structure
 - c) Union
 - d) Link list
 - e) Stacks
 - f) Queue

LINEAR	NON-LINEAR
A linear data structure traverses the data elements sequentially, in which only one data element can directly be reached.	Every data item is attached to several other data items in a way that is specific for reflecting relationships. The data items are not arranged in a sequential structure.
The elements are in sequence and form a linear list	A data item is connected to several other data items. The data item has the possibility to reach one-or-more data items.
Arrays, Linked Lists, Queue, Stack	Tree and Graph

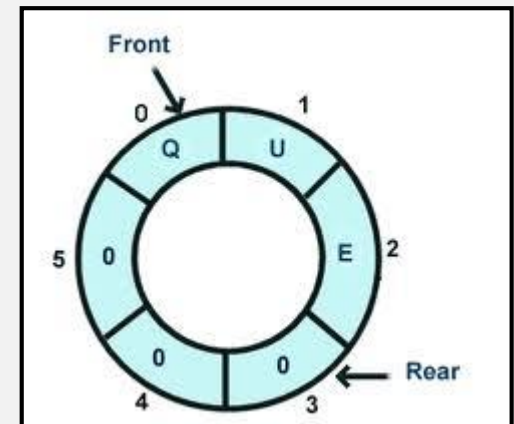
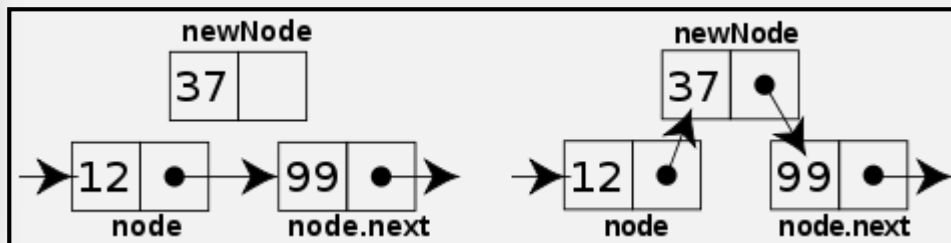
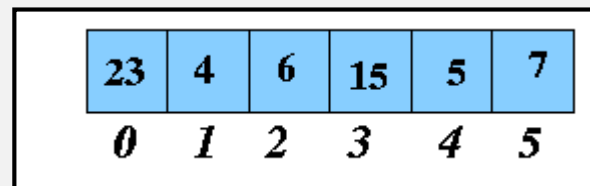
LINEAR & NON-LINEAR

04

NON-LINEAR



LINEAR



STATIC (array based) & DYNAMIC (pointer based) 04

STATIC	DYNAMIC
The size of the item/element are fixed	The size of the item/element can grow or shrink in size during execution of the program. Size are not fixed.
Waste extra memory.	Does not require any extra space therefore it does not waste extra memory.
Not flexible in rearranging the items efficiently.	Provide flexibility in rearranging the items efficiently.



End of Chapter 1

NEXT

We're Going to Learn
List & Linked List