

ICT167 ANS10

Data structures:

- Different ways of organising the data in structures so program can run effectively
- Common to use a standard abstract data type (ADT) to manage a structured collection of data

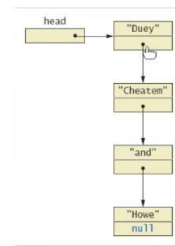
Characteristics of data structures:

- Way data is arranged either- **Linear way** (an array) or **non-linear way** (tree shape)
- How access to data items is allowed- **sequential access** or **direct access**
- Whether the data items have to be same type- **homogenous** or can be mixed **heterogenous**
- Whether the data structure is- **static** (of a fixed size, known at compile time eg array) or **dynamic** (can grow and shrink when program is running eg ArrayList)

Type of data structures-

List (ADT)

- Is a linear structure with varying length
- Generally, a list is homogenous and some only allow sequential access or in some cases direct access
- Collection of data stored sequentially for example array list of students. It is linked one by one
- Link consist of nodes and each nodes has a place for an element of data and has a link (pointer) to another node. (Unlike array which has no link as it goes by item number)
- [Add more description of link]



Queue (ADT)

- Is a homogenous and linear structure with restricted access
- In a queue, insertions take place at the back of the queue and deletions take place from the front of a queue

Stack (ADT)

- Is also homogenous, linear structure but with a different restricted access
- Think of it like stacking books the last book on top will be the first book coming out
- There are methods for stacks- **empty()**, **pop()**...
- In a stack insertions and deletions take place only at the end, referred to as the top of stack
 - ***Stack mystack <String> = new Stack<String>();***

Set (ADT)

- Is a non-linear data structure
- Only one copy of any element is allowed in the set

Class ARRAY

- Arrays are a special build in data structure and they are static (fixed size)
- Can have arrays of a specific type including primitive type size cannot be changed
- array has no links as it goes by item number

Class ARRAYLIST

- Arrays that can grow and shrink while program is running
- This is data structure: list
- Link consist of nodes and each nodes has a place for an element of data and has a link (pointer) to another node

Pass by reference is used for objects where changes affects original object (memory address) (think pointer to) except when you are dealing with primitive

Pointer: is a variable, whose memory cell contains the address in memory where a data item resides