dataStructure

it is way to organize data

after organizing data it becomes easy to process it.

Type

Llinear and non linear

Array linked stack queue tree graph

Algo: an algorithm is a set instruction to perform a task or to solve a given problem

Analysis of algorithms :

There are several different algo to solve a given problem

Analysis of algo deals in finding best algo which runs fast and takes in less memory

Time complexity

Its amount of time taken by algo to run

He input processed by an algorithm helps in determining the time complexity

**package** timecomplexity;

**public** **class** A {

**public** **static** **void** main(String[] args) {

**double** now = System.*currentTimeMillis*();

A a=**new** A();

a.sum(99999);

// System.out.println(a.FindSum(99999));

System.***out***.println("time token "+(System.*currentTimeMillis*()-now));

}

**public** **int** FindSum(**int** n)

{

**return** n\*(n-1)/2;

}

**public** **int** sum(**int** n)

{

**int** s=0;

**for** (**int** i=0;i<=n;i++)

{

s+=i;

}

**return** s;

}

}

Space complexity :

Its amount memory or space by algorithm to run

The memory to process the unput by an algo helps in determining the space complexity

Asymptotic analysis of an algorithm :

Asymptotic analysis helps in evaluating performance of an algo in terms of input size and its increasee.

Using asymptotic analysis we don’t measure actual running time of algo

It helps in determining how time and space taken by algo increases with input size

Best case :

Average case

Worst case

Notation :

Omega :

It is the formal way to express the lower bound of an algo running time

Lower bound means for any given input this this notation determines worst amount of time an algo can take to completed

Big notation :

It is the formal way to express the upper bound of an algo running time

upper bound means for any given input this this notation determines best amount of time an algo can take to completed

theta notation

It is the formal way to express the lower bound and upper bound of an algo running time

By Lower bound and upper bound means for any given input this this notation determines average amount of time an algo can take to completed

Big 0(0) notation :

It is the formal way to express the upper bound of an algo running time

Upper means for any given input this this notation determines longest amount of time an algo can take to completed

Rule :

It a single processor

It performs sequential execution of statement

Assignment operation takes I unit of time

Return statement takes in 1 unit of time

Arithmetical logical operation take 1 unit of time

Drop lower terms (t=n2+ 3n+1=O(n2))

Drop constants multipliers

Public int sum(int x,int y)

{

Int re=x+y;1+1+1+1=4 unit

Return result;//1+1=2 unit 4+2=6 constant (O(1)

}

Singly link list :

Singly linked list is a data structure used for storing collection of node and has following properties

It contains sequence of nodes

A node has data and reference to next node in a list

First node is head node

Last node has data and points to null

|  |
| --- |
|  |

Implementation of list node in singly linked list

Generic type

Public class ListNode<T>

{ private int data;

Private ListNode<T>next;

}

Integer type

Public class ListNode

{ private int data;

Private ListNode next;

}

**package** singlylinklist;

**public** **class** A {

**private** ListNode head;

**private** **static** **class** ListNode

{

**private** **int** data;//generic type

**private** ListNode next;

**public** ListNode(**int** data)

{

**this**.data=data;

**this**.next=**null**;

}

}

}

How create singly linklist;