Dsa 3 by Ankit Kumar

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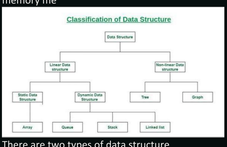
Data Structure

1. Data structure ek storage h
2. Ye data ko store aur organise karta h
3. Ye computer me arrange karne ka tarika h Jisse data ko access or update karte h efficiently main memory me



There are two types of data structure

Linear Data Structure

1. Isme element ko sequence me arrange karte h ek k baad ek
2. Elements ko particular order me arrange karte h jisse asani se implement karte h
3. Ex. Array, stack, queue, linked list

Non linear Data structure

1. Ye kisi bhi sequence me nhi hote h ye hierarchical manner me arrange hote h
2. Jha ek element me ek se jyaada elements connected hote h
3. Ex. Tree, graph

Features :

Organisation - data structure data ko organise karta h jisse hum easily access aur manage kar sakte h

Efficiency - ye data ko efficient tarike se store karta h jisse data retrieval aur manipulate karna asan hota h

Abstraction - data structure ek layer of abstraction provide karta h jisse details ki complexity se mukti milti h ye problem solving par focus karta h

Reusability - ek data structure ko alag alag situation me reuse karte h jo code ko maintain aur scale karne me help karta h

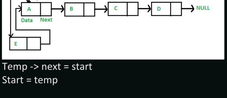
Flexibility - Ds flexibility ko offer karta h in terms of adding, deleting, modifying, data elements

Singly Linked list

1. Singly linked list is a collection of nodes in which each node contain at least two parts, 1st part is information part which has data, 2nd part is next part which is pointer that contains address of the next node of the same type
2. Only ek direction me traverse hota h
3. Slower than doubly linked list

Insertion on singly linked list

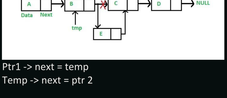
Insert a node at beginning



Temp -> next = start

Start = temp

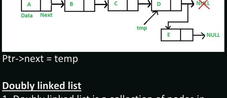
Insertion in between nodes



Ptr1 -> next = temp

Temp -> next = ptr 2

Insertion at last



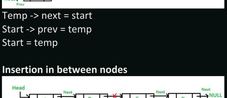
Ptr->next = temp

Doubly linked list

1. Doubly linked list is a collection of nodes in which each node contain at least 3 parts
1st part is information part, which has data
2nd part is next part which is a pointer that contains address of next node of the same type and
3rd part is previous part which is pointer that contains address of the previous node of the same type
2. Both direction me traverse hota h
3. faster than singly linked list

Insertion on doubly linked list

Insertion at the beginning

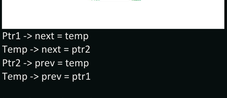


Temp -> next = start

Start -> prev = temp

Start = temp

Insertion in between nodes



Ptr1 -> next = temp

Temp -> next = ptr2

Ptr2 -> prev = temp

Temp -> prev = ptr1

Insertion at the end

Ptr -> next = temp

Temp -> prev = ptr

Dynamic programming

1. Ek problem solving approach h
2. Jisme big problems ko chote chote sub problems me divide karte h phir inke solutions ko store karke baad me reuse karte h
3. Is like a jigsaw puzzle by remember that how many piece you solved

Algorithm

1. First term is 0
2. Second term is 1
3. Third term is sum of step2 and step1
1+0=1
4.Fourth term is sum of step3 and step2
1+1=2
5. Fifth term is sum of step4 and step3
2+1=3

Peusudocode

f(0)=0

f(1)=1

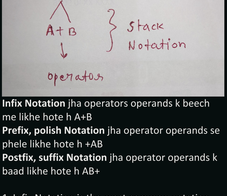
f(2)=f1 + f0

f(3)=f2 + f1

f(4)=f3 + f2

Stack Notation

Stack notation Me operation top se hota h, ye lifo ka principal follow karta h



Infix Notation jha operators operands k beech me likhe hote h A+B

Prefix, polish Notation jha operator operands se phele likhe hote h +AB

Postfix, suffix Notation jha operator operands k baad likhe hote h AB+

1. Infix Notation is the most common notation for writing mathematical expression
2. But prefix and postfix Notation can be useful in certain situation
3. Prefix and postfix are often used computer programming