هياكل البيانات

المرحلة الثانية

محاضرة(9)

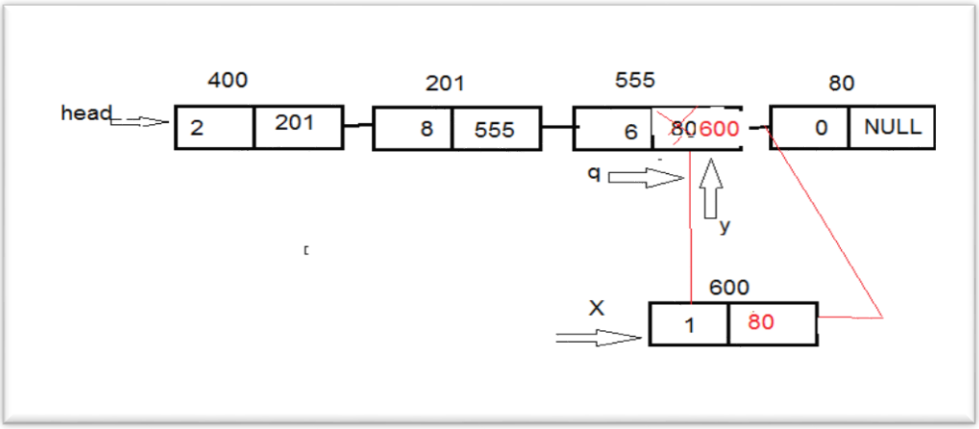
م.م فرح معاذ جاسم

Farahmaath86@uoanbar.edu.iq

INSERT NODE IN THE MIDDLE OF THE LINKED LIST

To insert a new node in the middle apply the following steps:
1. Create new node.
2. Create q node to find the node location number.
3. While step to search the location, when the condition false ,then linked the node.

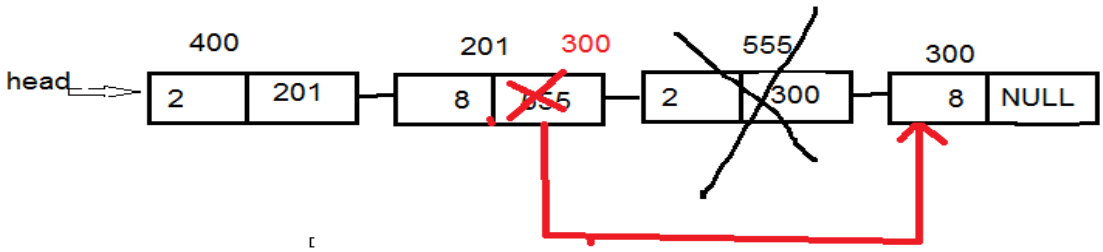
```
void insert_mid(int n,int y)
{
node *x=new node;
x->data=n;
node *q=head;
while (q->data ! =y)
q=q->link;
x->link=q->link;
q->link=x;
}
```



DELETE NODE FROM THE MIDDLE OF THE LINKED LIST

```
void DeleteMid(int y)
{
node *q=head;
while(q->data!=y)
q=q->link;
q->link=q->link->link;

}
```



Write program to calculate the number of even and odd numbers in linked list .

```
#include<iostream>
using namespace std؛
struct node
{
int data؛
node *link ;
};
node *head=NULL؛
main()
{
int odd=0,even=0؛
node *f=new node; // create new node
cout<<"numbers  ؛" :
cin>>f->data؛
f->link=NULL؛
head=f؛
for(int i=0;i<4;i++) ( هذا الجزء مهم هو لخلق مثلا 4 عقد)
{
node *q=new node؛
cin>>q->data؛
q->link=NULL؛
head->link=q؛
head=q؛
}
head=f؛
while(head!=NULL)
{
if(head-> data %2==0)
even++;
else
 odd++;
head=head->link؛
}
 cout<<"odd= "<<odd<<" even="<<even؛
}
```

Ex: write a complete c++ program split one list into two linked list

```
#include<iostream>
using namespace std؛
struct node
{ int data؛
node *link;} ؛
void split(node *f1,node*&f2) ( & لكي ترجعلي قيمة نضع علامة)
{node *p,*q؛
int c؛
 p=f1؛
cout<<"enter the number to split\n"; (ادخل الرقم الذي تريد قطع السلسلة منه)
 cin>>c؛
while(p->data!=c)
p=p->link؛
f2=p->link؛
p->link=NULL ؛
}
void print(node *f)
{node *p=new node؛
  p=f؛
while(p!=NULL)
   { cout<<p->data؛
      p=p->link؛
     }
}
 main()
{ node *p,*q,*f2؛
node *f1=new node؛
cout<<"enter the first node"<<endl؛
cin>>f1->data ؛
f1->link=NULL؛
p=f1؛
cout<<"enter the linked list data"<<endl؛
for(int i=1; i<5;i++)
{node *q= new node؛
cin>>q->data؛
 q->link=NULL؛
p->link =q؛
 p=q؛
 }
```

```
p=f1;
split(f1,f2);
print (f1);
cout<<endl;
print(f2);
}
```

Advantages of linked lists:

Linked lists have many advantages. Some of the very import ant advantages are:

1. Linked lists are dynamic data structures. i.e., they can grow or shrink during the execution of a program.

2. Linked lists have efficient memory utilization. Here, memory is not pre allocated. Memory is allocated whenever it is required and it is deallocated (removed) when it is no longer needed.

3. Insertion and Deletions are easier and efficient. Linked lists provide flexibility in inserting a data item at a specified position and deletion of the data item from the given position.

4. Many complex applications can be easily carried out with linked lists.

Disadvantages of linked lists:

1. It consume s more space because every node requires additional pointer to store address of the next node.

2. Searching a particular element in list is difficult and also time consuming