Индуктивни СД. Линейни едносвързани списъци

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Индуктивни СД

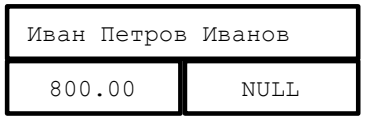
Необходимост от "влагане" на еднотипни обекти

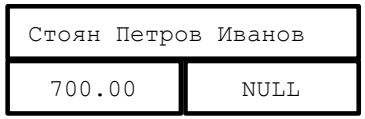
```
struct Employee
{
  char name[100];
  double salary;
  //???
  Employee boss;

};
```

Указател към обект от същия тип

```
struct Employee
{
  char name[100];
  double salary;
  Employee *boss;

};
```

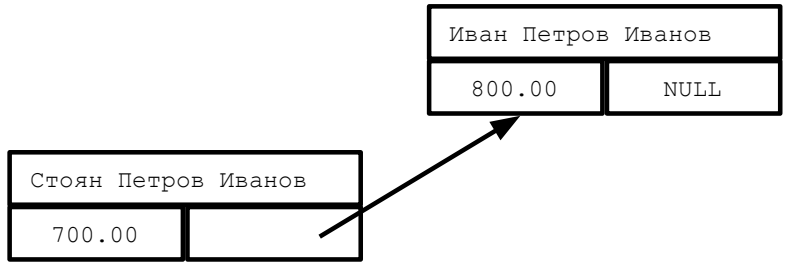
Указател към обект от същия тип





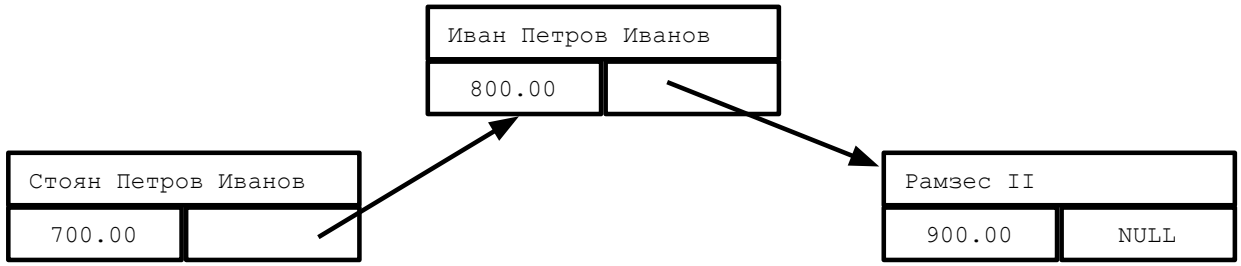

```
struct Employee
{
  Employee (char *n, double s)
  {
    strcpy (name,n);
    salary = s;
    boss = nullptr;
  }
  char name[100];
  double salary;
  Employee *boss;
};
int main ()
{
  Employee
    stoyan ("Stoyan Petrov Ivanov", 700),
    ivan ("Ivan Petrov Ivanov", 800);
  return 0;
}
```

Указател към обект от същия тип



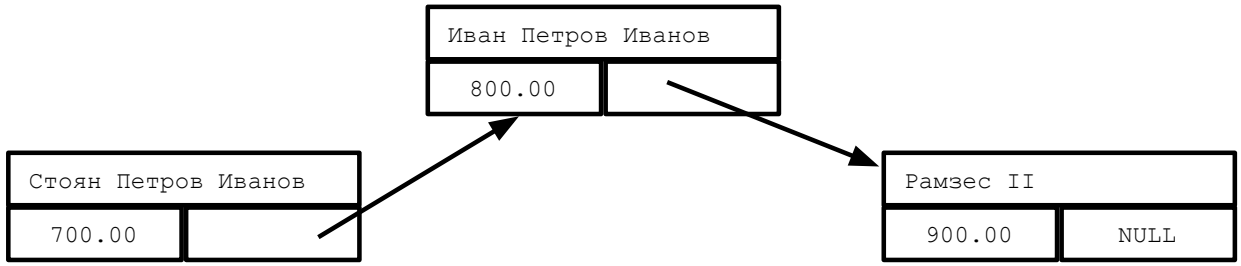

```
int main ()
{
  Employee
    stoyan ("Stoyan Petrov Ivanov", 700),
    ivan ("Ivan Petrov Ivanov", 800);

  stoyan.boss = &ivan;

  return 0;
}
```

Указател към обект от същия тип




```
int main ()
{
  Employee
    stoyan ("Stoyan Petrov Ivanov", 700),
    ivan ("Ivan Petrov Ivanov", 800),
    bigboss ("Big Boss", 900);

  stoyan.boss = &ivan;
  ivan.boss = &bigboss;
  //stoyan.boss->boss = &bigboss;

  cout << stoyan.boss->name;
  cout << stoyan.boss->boss->name;

  return 0;
}
```

"Обхождане"




```
Employee *findSuperBoss (Employee *e)
{
  while (e->boss != nullptr)
    e = e->boss;
  return e;
}
Employee *findSuperBossRec (Employee *e)
{
  if (e->boss == nullptr)
    return e;
  return findSuperBossRec (e->boss);
}
 //...
 cout << findSuperBoss (&stoyan)->name;
 //...
```

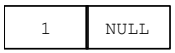
Линейни едносвързани списъци

Т. нар. “двойна кутия”

```
struct box
{
  int data;
  box *next;
  box (int d, box *n):
        data(d), next (n) {}
};
```

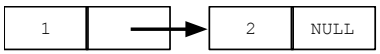
- Един елемент

```
box *first = new box (1,nullptr);
```



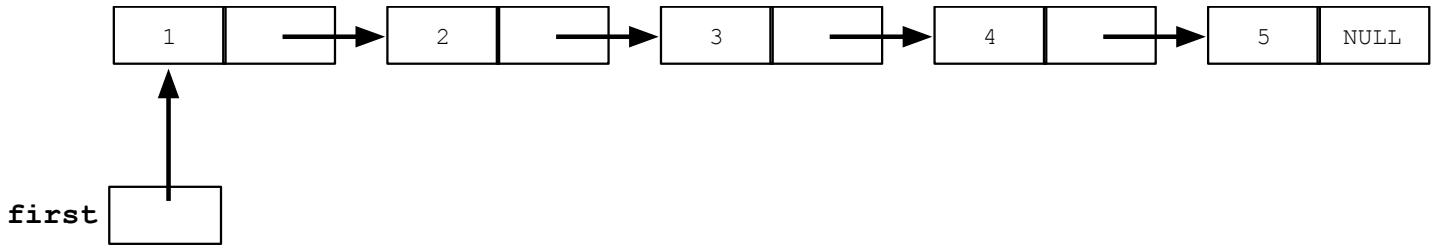
- Два свързани елемента

```
box *first = new box (1,new box (2, nullptr));
```



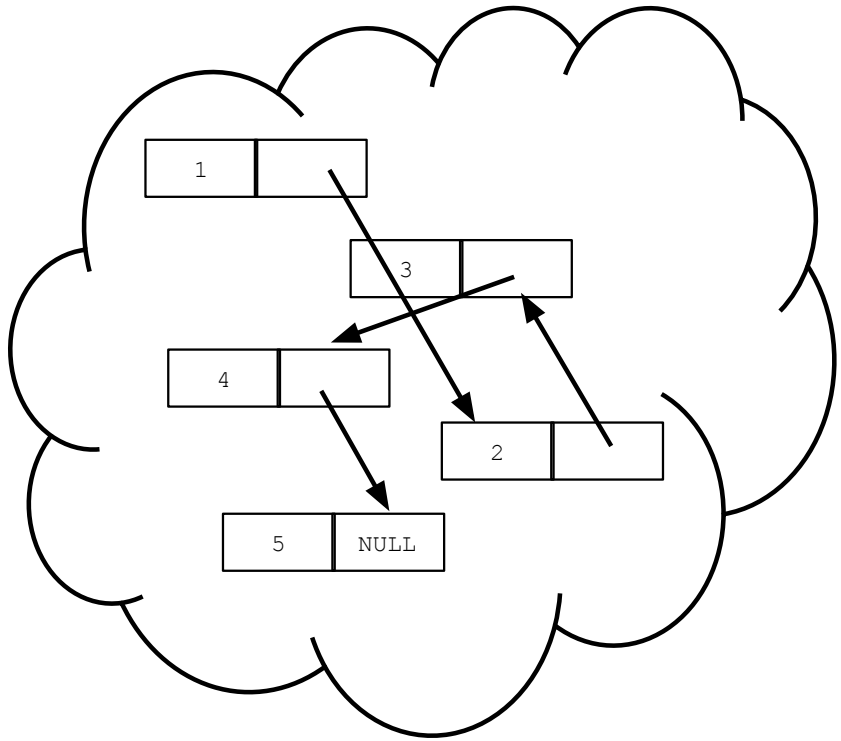
“Плосък” изглед

```
box *first = new box (1,
                 new box (2,
                  new box (3,
                    new box (4,
                      new box (5,nullptr)))));
```



“Реален” изглед

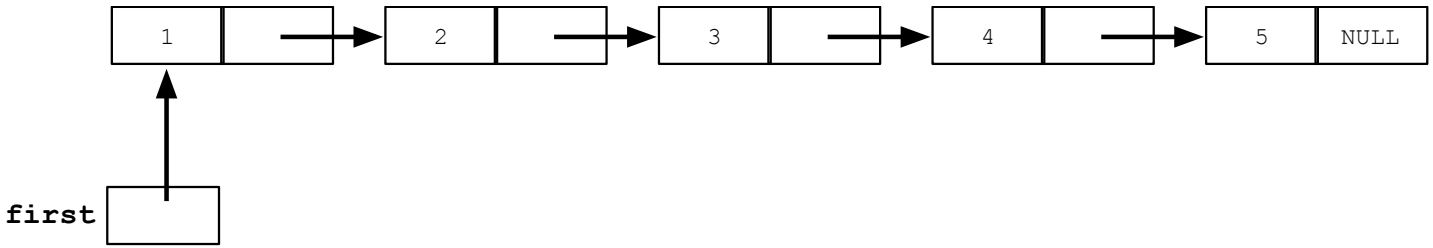
```
box *first = new box (1,
                 new box (2,
                  new box (3,
                    new box (4,
                      new box (5,nullptr)))));
```



“Вмъкване” на елемент в началото (push)

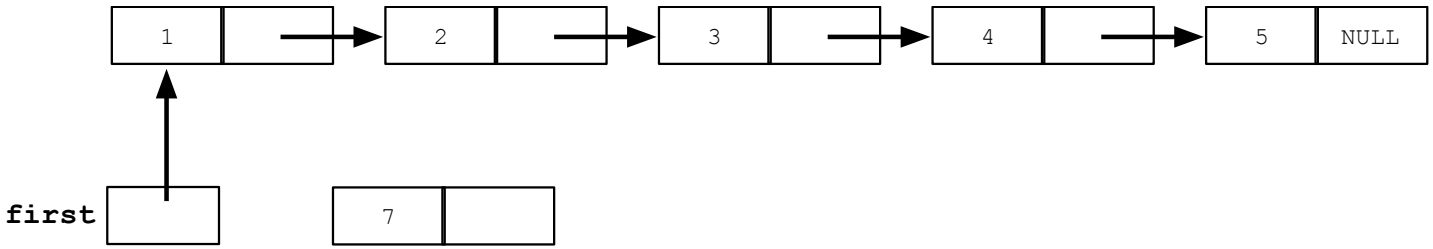
“Вмъкване” на елемент в началото

```
first = ...
```



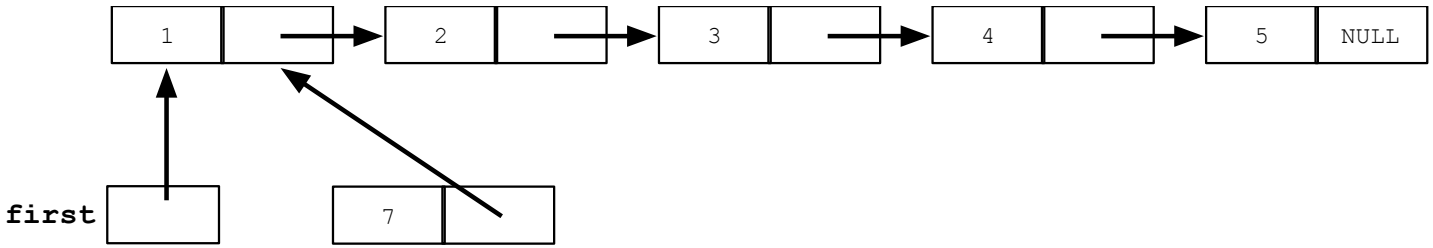
"Вмъкване" на елемент в началото

```
box *newbox = new box (7,nullptr);
```



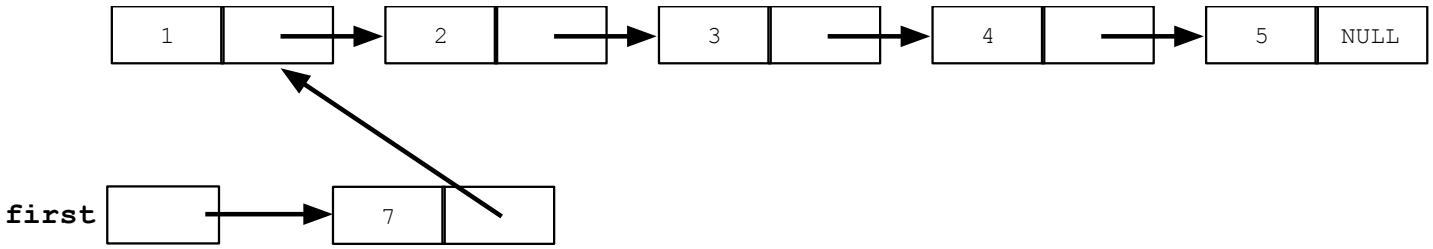
"Вмъкване" на елемент в началото

```
box *newbox = new box (7,nullptr);
newbox->next = first;
```



"Вмъкване" на елемент в началото

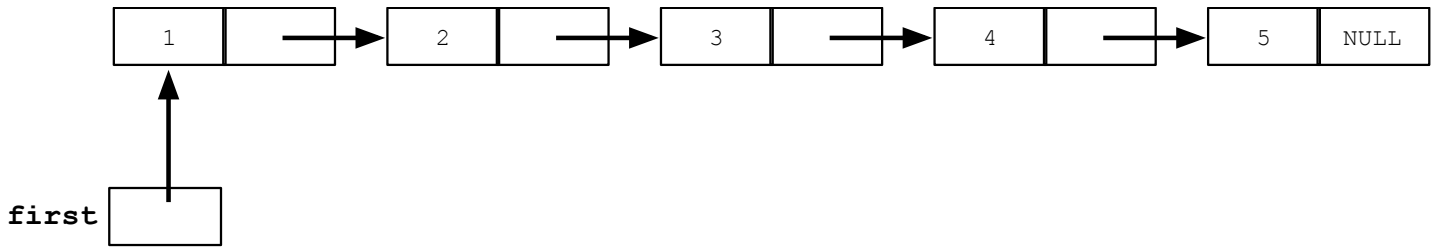
```
box *newbox = new box (7,nullptr);
newbox->next = first;
first = newbox;
```



Обхождане

Обхождане на всички елементи

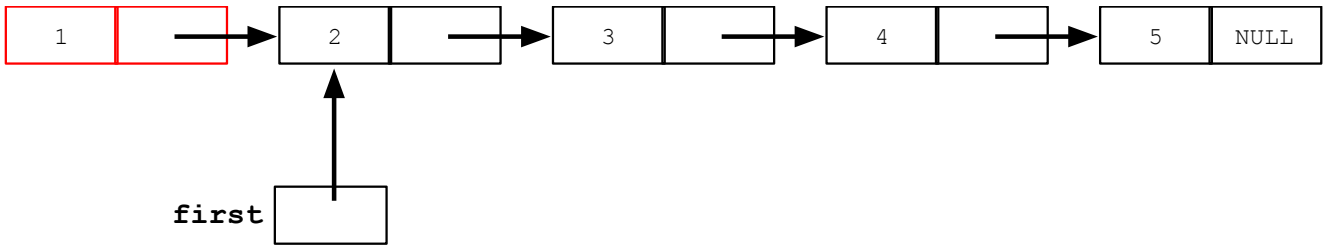
```
cout << first->data;
```



Обхождане на всички елементи

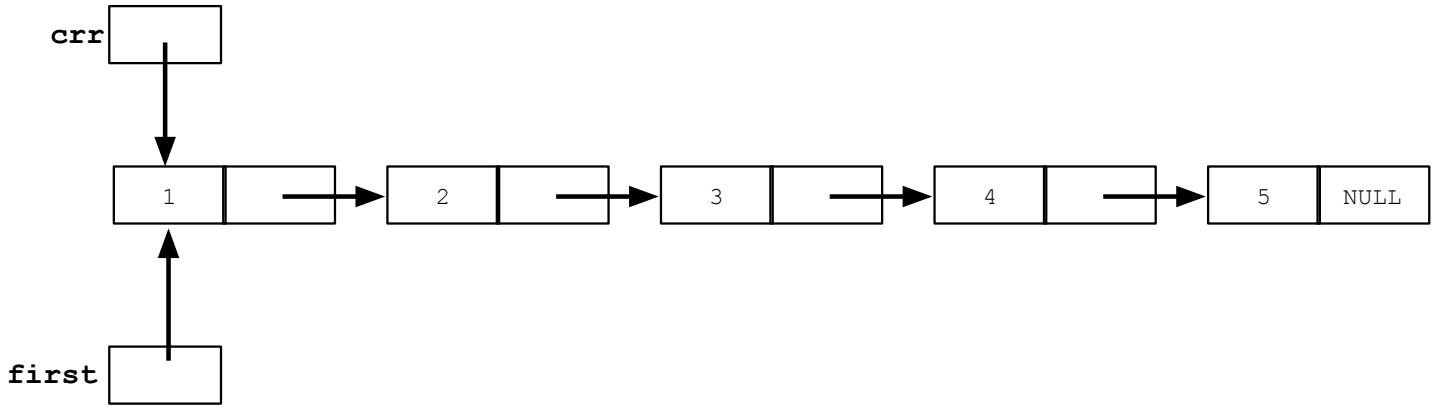
- Трябва ни помощен указател!

```
first = first->next;
cout << first->data;
```



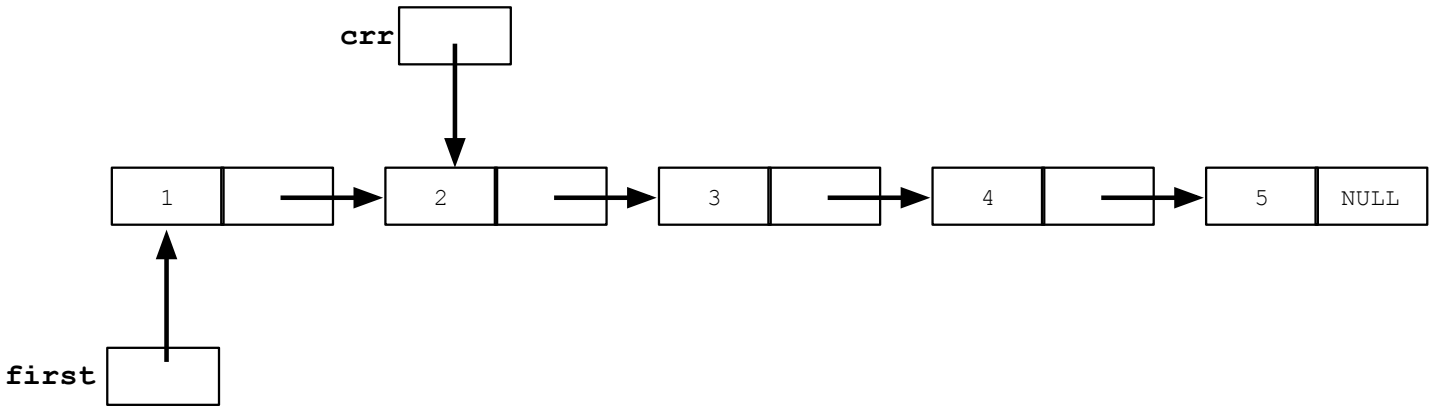
Обхождане на всички елементи

```
box *crr = first;
cout << crr->data;
```



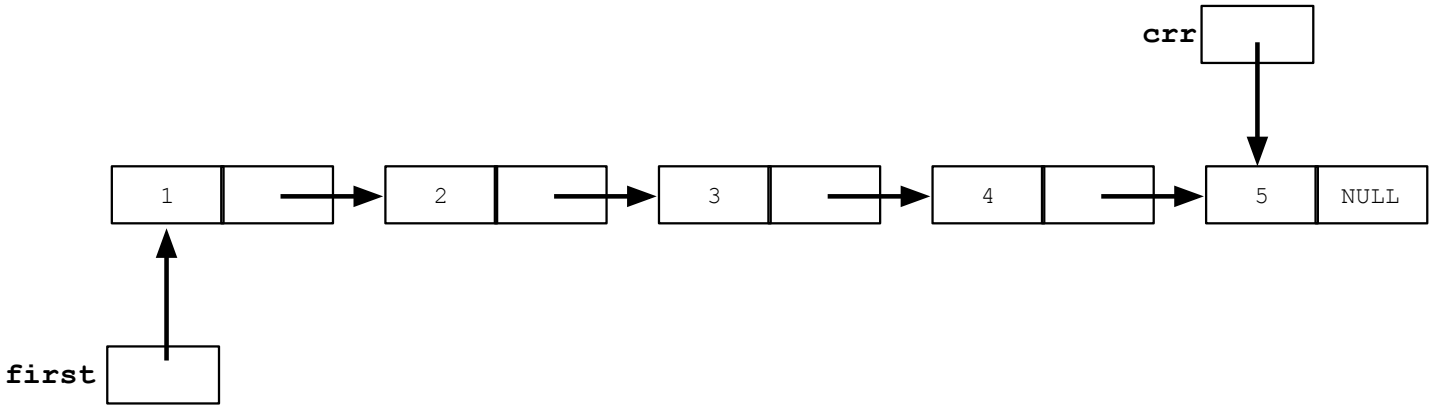
Обхождане на всички елементи

```
box *crr = first;
crr = crr->next;
cout << crr->data;
```



Обхождане на всички елементи

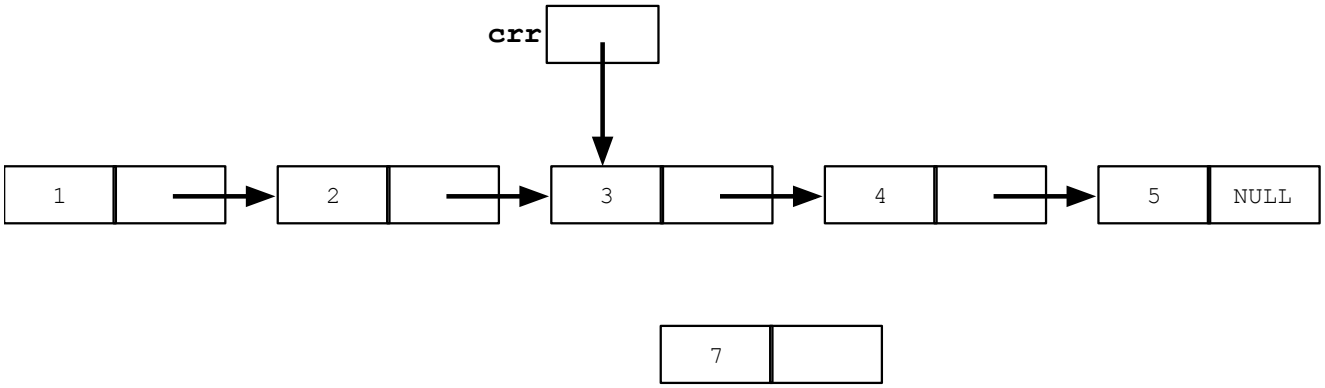
```
box *crr = first;
while (crr != nullptr)
{
   cout << crr->data;
   crr = crr->next;
}
```



Вмъкване във вътрешността

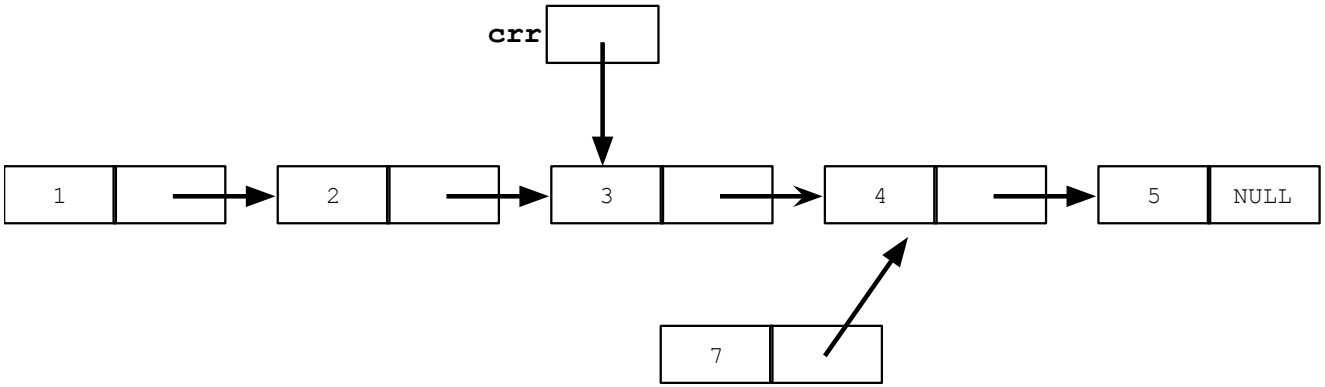
Вмъкване

```
box *newbox = new box (7,nullptr);
```



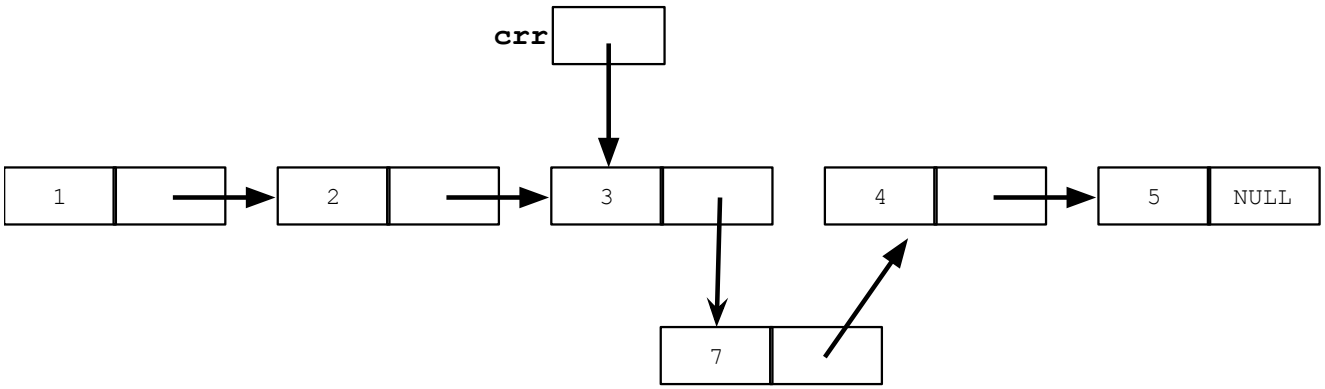
Вмъкване

```
box *newbox = new box (7,nullptr);
newbox->next = crr->next;
```



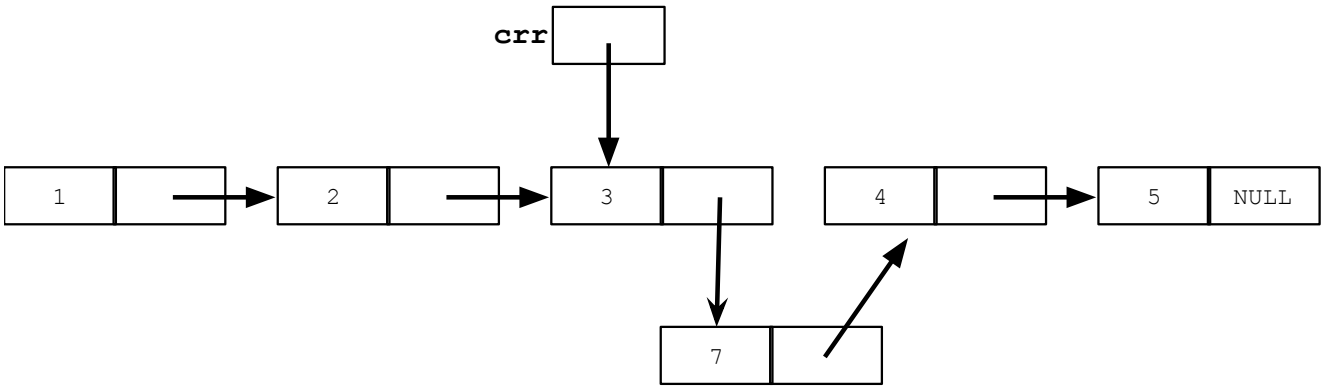
Вмъкване

```
box *newbox = new box (7,nullptr);
newbox->next = crr->next;
crr->next = newbox;
```



Вмъкване

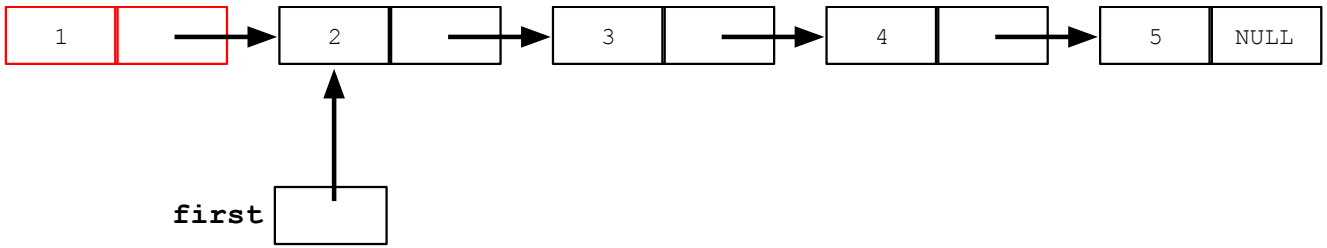
```
box *crr = first;
while (3 != crr->data)
  crr = crr->next;

box *newbox = new box (7,nullptr);
newbox->next = crr->next;
crr->next = newbox;
```



Изтриване на елемент от началото (pop)

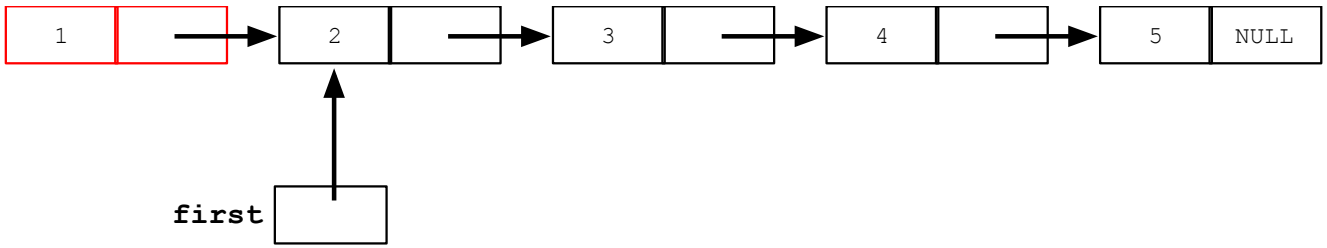
Pop

```
first=first->next;
```



Pop

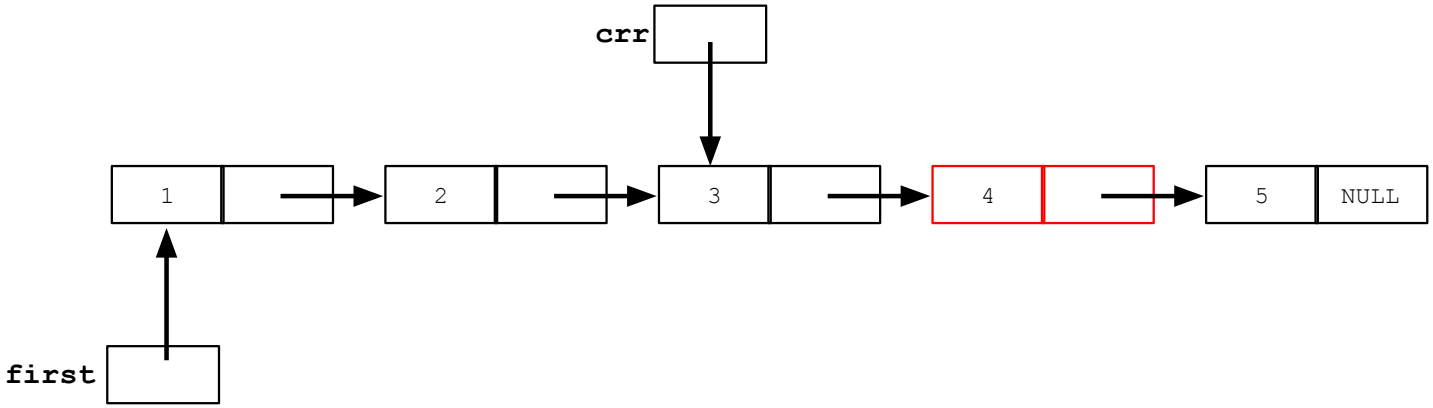
```
box *save = first;
first=first->next;
delete save;
```



Изтриване на елемент от позиция

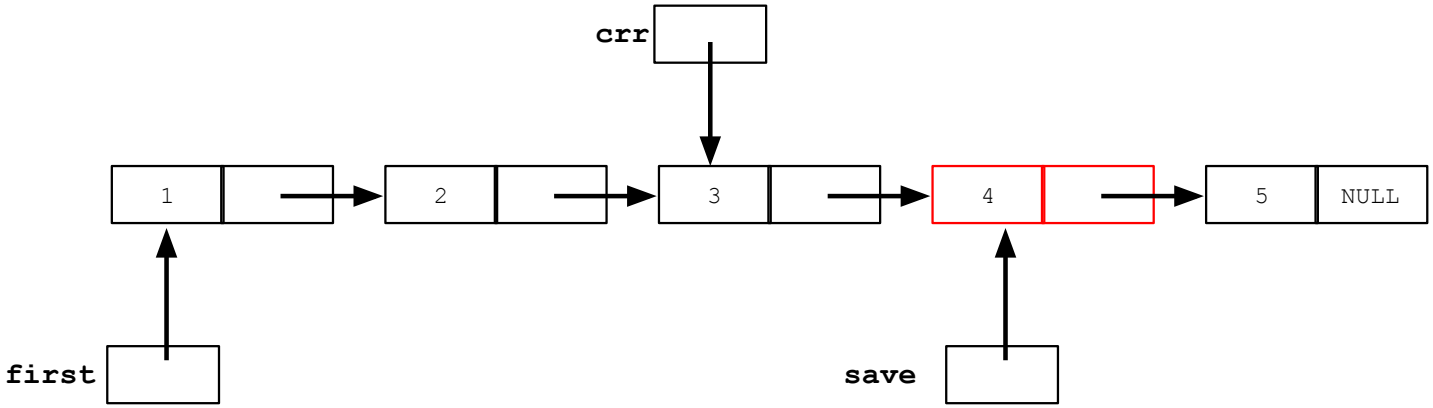
Изтриване

```
crr=...
```



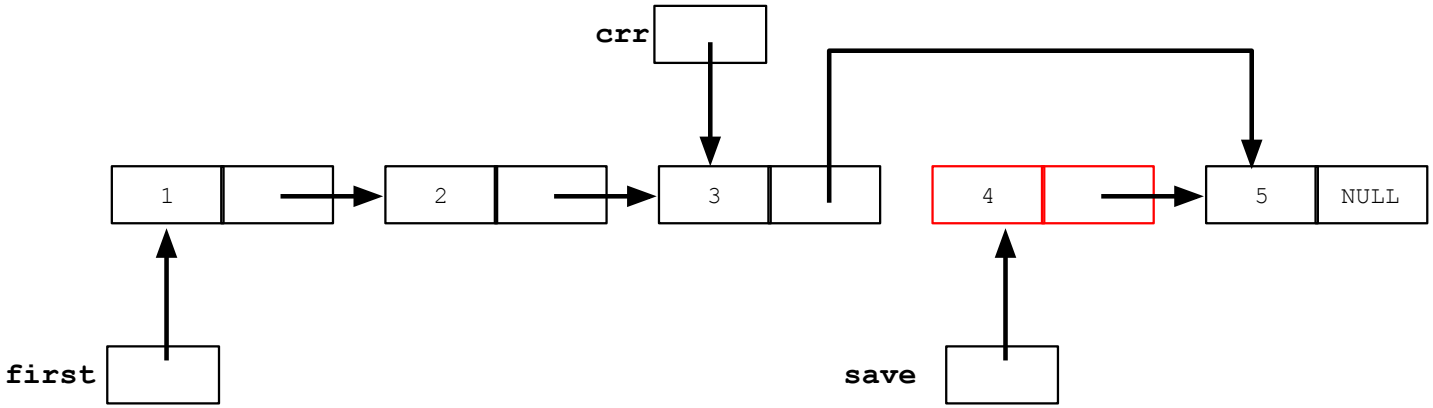
Изтриване

```
box *save = crr->next;
```



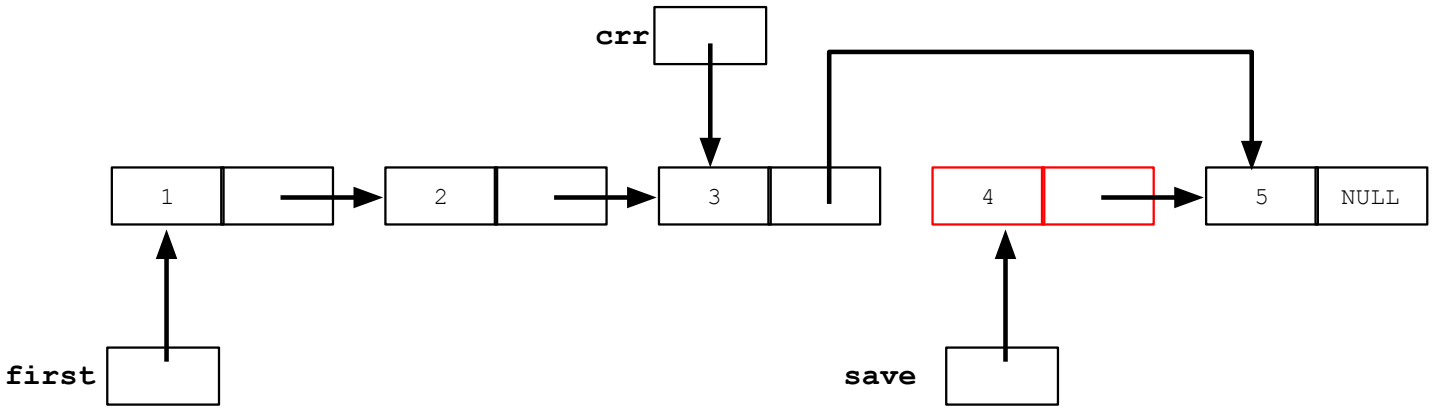
Изтриване

```
box *save = crr->next;
crr->next = crr->next->next;
```



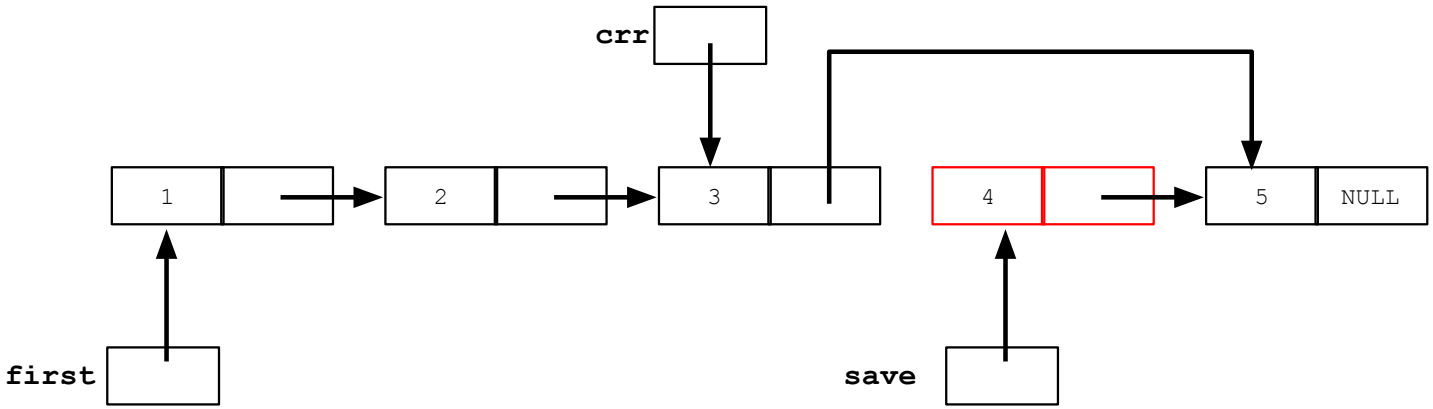
Изтриване

```
box *save = crr->next;
crr->next = crr->next->next;
delete save;
```



Изтриване на ел. 4

```
box *crr = first;
while (crr->next->data != 4)
  crr = crr->next;

box *save = crr->next;
crr->next = crr->next->next;
delete save;
```



Благодаря ви за вниманието!