Персистентни СД. Умни указатели

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Персистентни СД

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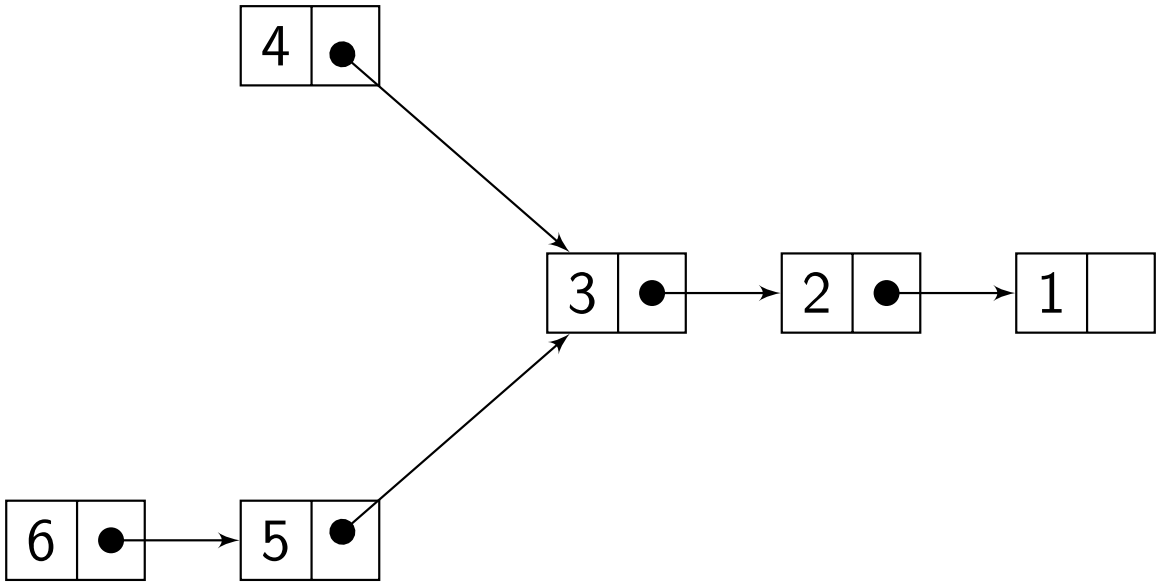
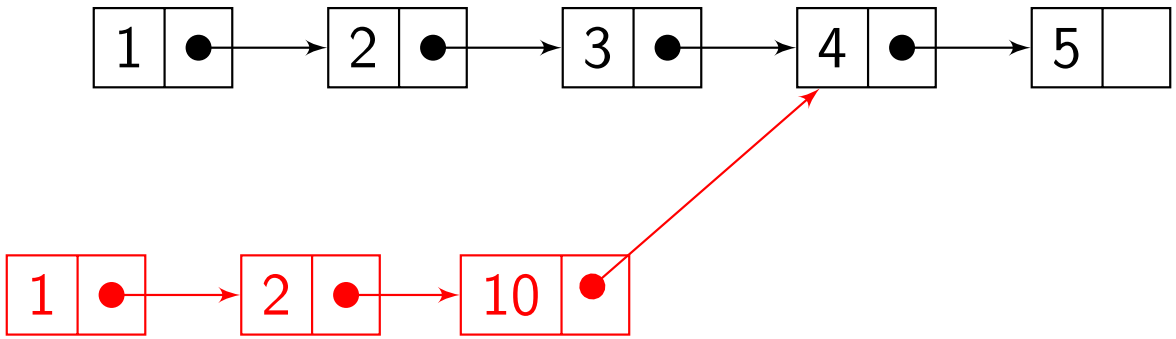
```
let list = [3,2,1]
    list1 = 4:list
    list2 = 6:5:list
```



Модификация на данните

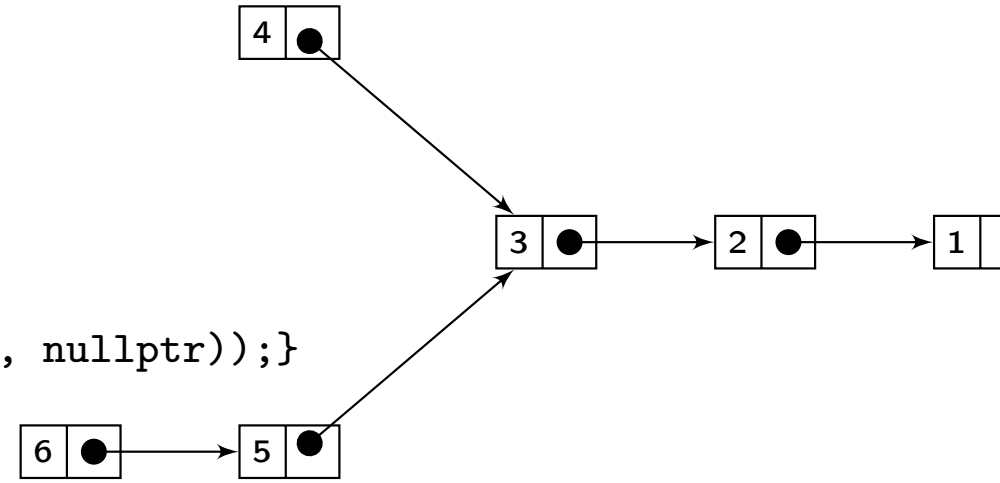
```
list<int> list ({1,2,3,4,5});
//list.set(2,10); -невъзможно
list<int> result = list.set(2,10);
```



Потребител / собственик на памет

Създател, потребител, собственик

```
struct node
{int data; node* next};

node* cons (int head, node* tail)
{return new node{head,tail};}

node* makelist ()
{return cons (3, cons (2, cons (1, nullptr));}

void uselists ()
{
  node* list = makelist();
  node* list1 = cons (4, list);
  node* list2 = cons (6, cons (5, list));

  anotheruser1(list1);
  anotheruser2(list2);

  //delete list, list1, list2?
}
```

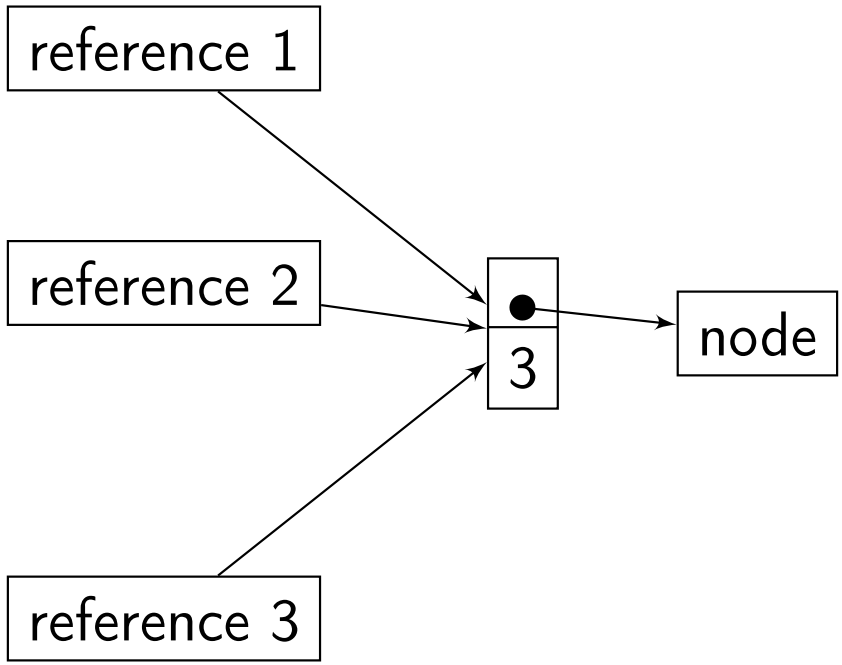


Умни указатели

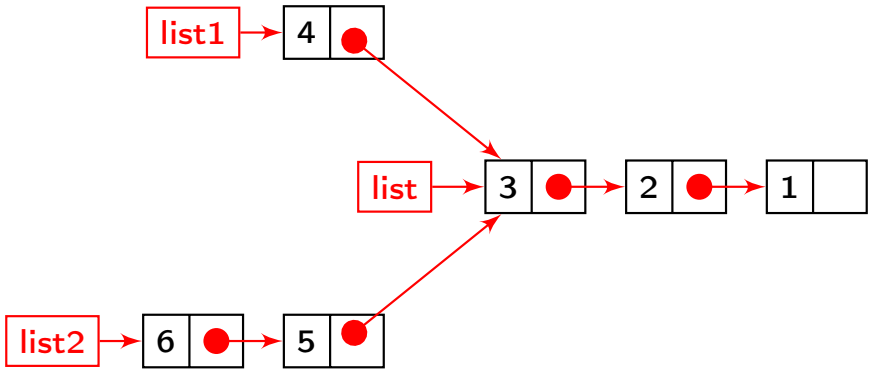
Reference counting. std::shared_ptr<T>

`node*` $\rightarrow$ `std::shared_ptr<node>`

`new` $\rightarrow$ `std::make_shared`

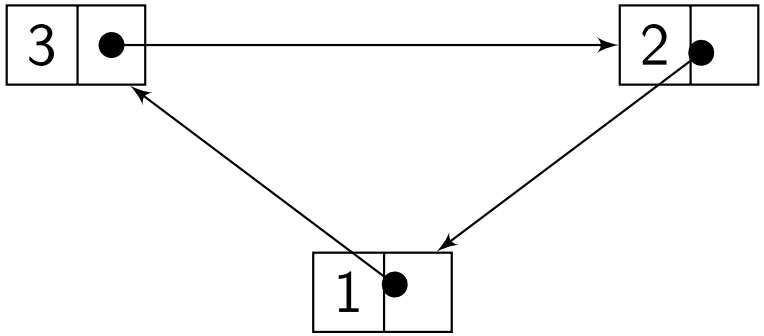


Reference counting




```
struct node
{int data; shared_ptr<node> next};

shared_prt<node> cons (int head, shared_ptr<node> tail)
{return make_shared(head,tail);}

shared_prt<node> makelist ()
{return cons (3, cons (2, cons (1, nullptr));}

void uselists ()
{
  shared_prt<node> list = makelist();
  shared_prt<node> list1 = cons (4, list);
  shared_prt<node> list2 = cons (6, cons (5, list));

  anotheruser1(list1);
  anotheruser2(list2);
}//~list, ~list1, ~list2
```

Някои проблеми



Благодаря за вниманието!