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main.cpp | source_1301194086.cpp | **header_1301194086.h**

```cpp
1   /*
2   Name : Mikouizka Satria Kartika
3   NIM : 1301194086
4   */
5   #ifndef HEADER_1301194086_H_INCLUDED
6   #define HEADER_1301194086_H_INCLUDED
7   #include <iostream>
8   #define first(L) L.first
9   #define last(L) L.last
10  #define next(P) P->next
11  #define info(P) P->info
12  using namespace std;
13
14  struct buku{
15      string ID, judul, pengarang, penerbit;
16      int tahun;
17  };
18
19  typedef buku infotype;
20  typedef struct elmlist *address;
21
22  struct elmlist{
23      infotype info;
24      address next;
25  };
26
27  struct List{
28      address first, last;
29  };
30
31  void buatList(List &L);
32  bool listKosong(List L);
33  address cariElemen(List L, string x);
34  void buatElemen(address &P, string ID, string judul, string pengarang, string penerbit, int tahun);
35  void tambahDataTerakhir(List &L, address P);
36  void tambahDataSetelah(List &L, address Prec, address P);
37  void hapusDataTerakhir(List &L, address &P);
38  void lihatList(List L);
39  int jumBuku(List L, int tahun);
40  #endif // HEADER_1301194086_H_INCLUDED
41
```

Logs & others

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<global>

main.cpp | **source_1301194086.cpp** | header_1301194086.h

```cpp
1   /*
2   Name : Mikouizka Satria Kartika
3   NIM : 1301194086
4   */
5   #include "header_1301194086.h"
6   using namespace std;
7
8   void buatList(List &L){
9       first(L) = NULL;
10      last(L) = NULL;
11  }
12
13  bool listKosong(List L){
14      bool found;
15      if(first(L) == NULL && last(L) == NULL){
16          found = true;
17          return found;
18      } else{
19          return found;
20      }
21  }
22
23  address cariElemen(List L, string x){
24      address P;
25      bool found;
26      P = first(L);
27      while(info(P).penerbit != x && !found && P != last(L)){
28          P = next(P);
29          if(info(P).penerbit == x){
30              found = true;
31          }
32      }
33      if(info(P).penerbit == x){
34          found = true;
35          return P;
36      }
```

Logs & others

```cpp
36        }
37    }
38
39    void buatElemen(address &P, string ID, string judul, string pengarang, string penerbit, int tahun){
40        P = new elmlist;
41        info(P).ID = ID;
42        info(P).judul = judul;
43        info(P).pengarang = pengarang;
44        info(P).penerbit = penerbit;
45        info(P).tahun = tahun;
46
47    }
48
49    void tambahDataTerakhir(List &L, address P){
50        address Q;
51        if(first(L) == NULL && last(L) == NULL){
52            first(L) = P;
53            last(L) = P;
54        } else{
55            Q = last(L);
56            next(Q) = P;
57            last(L) = P;
58        }
59    }
60
61    void lihatList(List L){
62        address P = first(L);
63        while(P != NULL){
64            cout<<info(P).ID<<"  "<<info(P).judul<<"  "<<info(P).pengarang<<"\n";
65            P = next(P);
66        }
67        cout<<endl;
68    }
69
70    void tambahDataSetelah(List &L, address Prec, address P){
71        next(P) = next(Prec);
```

```cpp
71        next(P) = next(Prec);
72        next(Prec) = P;
73    }
74
75    void hapusDataTerakhir(List &L, address &P){
76        address Q;
77        if(last(L) != NULL){
78            if(first(L) == last(L)){
79                P = first(L);
80                delete P;
81            } else{
82                Q = first(L);
83                while(next(Q) != last(L)){
84                    Q = next(Q);
85                }
86                P = last(L);
87                last(L) = Q;
88                delete P;
89            }
90        }
91    }
92
93    int jumBuku(List L, int x){
94        address P;
95        int jumlah;
96        P = first(L);
97        jumlah = 0;
98        while(P != last(L)){
99            if(info(P).tahun < x){
100                jumlah++;
101            } else{
102                P = next(P);
103            }
104        }
105        if(info(P).tahun < x){
106            jumlah++;
```

```cpp
106            jumlah++;
107        }
108        return jumlah;
109    }
110
```

`main.cpp` `source_1301194086.cpp` `header_1301194086.h`

```cpp
1    /*
2    Name : Mikogirka Satria Kartika
3    NIM : 1301194086
4    */
5    #include "header_1301194086.h"
6    using namespace std;
7
8    int main()
9    {
10       List L;
11       infotype a;
12       int i, data, z, sama, tahun, cari;;
13       address ad, adbaru;
14       buatList(L);
15
16       i = 0;
17       z = 1;
18       cout<<"Masukan banyak buku: ";
19       cin>>data;
20       buatList(L);
21       while(i<data){
22           cout<<"Buku ke-"<<z++<<": \n";
23           cout<<"ID: ";
24           cin>>a.ID;
25           cout<<"Judul: ";
26           cin>>a.judul;
27           cout<<"Pengarang: ";
28           cin>>a.pengarang;
29           cout<<"Penerbit: ";
30           cin>>a.penerbit;
31           cout<<"Tahun: ";
32           cin>>a.tahun;
33           buatElemen(ad, a.ID, a.judul, a.pengarang, a.penerbit, a.tahun);
34           tambahDataTerakhir(L, ad);
35           i++;
36           cout<<endl;
37       }
38       lihatList(L);
39       cout<<endl;
40
41       string tanya;
42       cout<<"Ingin buat elemen insert?(yes/no): ";
43       cin>>tanya;
44       if(tanya == "yes" || tanya == "Yes"){
45           cout<<"Masukkan penerbit buku untuk insert after: ";
46           cin>>a.penerbit;
47           ad = cariElemen(L, a.penerbit);
48           if(a.penerbit != ""){
49               cout<<"Detail buku: "<<endl;
50               cout<<"ID: ";
51               cin>>a.ID;
52               cout<<"Judul: ";
53               cin>>a.judul;
54               cout<<"Pengarang: ";
55               cin>>a.pengarang;
56               cout<<"Penerbit: ";
57               cin>>a.penerbit;
58               cout<<"Tahun: ";
59               cin>>a.tahun;
60               buatElemen(adbaru, a.ID, a.judul, a.pengarang, a.penerbit, a.tahun);
61               tambahDataSetelah(L,ad,adbaru);
62               cout<<endl;
63           }
64       }
65       lihatList(L);
66
67       cout<<"Setelah data terakhir dihapus:\n";
68       hapusDataTerakhir(L,ad);
69       lihatList(L);
70       cout<<endl;
71
72       cout<<"Banyak data tahun yang dicari: ";
73       cin>>tahun;
74       i = 0;
75       sama = 0;
76       cari = 0;
77       while(i<tahun){
78           cout<<"Tahun yang dicari: ";
79           cin>>cari;
80           sama = jumBuku(L, cari);
81           cout<<sama;
82           i++;
83       }
84       return 0;
85   }
86
87
```

```
D:\tp03\bin\Debug\tp03.exe                                                      —   □   ×

Masukan banyak buku: 3
Buku ke-1:
ID: id01
Judul: buku1
Pengarang: anna
Penerbit: sidu
Tahun: 2015

Buku ke-2:
ID: id02
Judul: buku2
Pengarang: cikita
Penerbit: gelatik
Tahun: 2018

Buku ke-3:
ID: id03
Judul: buku3
Pengarang: bana
Penerbit: sidu
Tahun: 2018

id01  buku1  anna
id02  buku2  cikita
id03  buku3  bana


Ingin buat elemen insert?(yes/no): yes
Masukkan penerbit buku untuk insert after: sidu
Detail buku:
ID: id00
Judul: buku0
Pengarang: miko
Penerbit: sidu
Tahun: 2018

id01  buku1  anna
id00  buku0  miko
id02  buku2  cikita
id03  buku3  bana

Setelah data terakhir dihapus:
id01  buku1  anna
id00  buku0  miko
id02  buku2  cikita
└ ▯ è▯▯
```