

"D:\Telkom University\SE-43-03\Kelas\Semester 2\Struktur Data\TP\TP 3\dll\bin\Debug\dll.exe"

```
id01   buku1   anna
id03   buku3   cikita
```

```
id01   buku1   anna
id02   buku2   bana
id03   buku3   cikita
```

```
id01   buku1   anna
id02   buku2   bana
id03   buku3   cikita
```

```
id01   buku1   anna
id02   buku2   bana
```

Jumlah buku yang terbit sebelum tahun 2015 yaitu 0

Jumlah buku yang terbit sebelum tahun 2018 yaitu 2

Process returned 0 (0x0) execution time : 0.235 s

Press any key to continue.

```
dll.h x dll.cpp x main.cpp x
1  #ifndef DLL_H_INCLUDED
2  #define DLL_H_INCLUDED
3  #include <iostream>
4  #include <string.h>
5  #include <stdbool.h>
6  #define first(L) L.first
7  #define last(L) L.last
8  #define next(P) P->next
9  #define prev(P) P->prev
10 #define info(P) P->info
11
12 /*
13  Name : Muhamad Dwiki Riswanda
14  NIM : 1302194015
15  */
16
17 using namespace std;
18
19 struct buku {
20     string ID;
21     string judul;
22     string pengarang;
23     string penerbit;
24     int tahun;
25 };
26
27 typedef buku infotype;
28 typedef struct elmList *address;
29
```

```
dll.h x dll.cpp x main.cpp x
24     int tahun;
25 }
26
27 typedef buku infotype;
28 typedef struct elmList *address;
29
30 struct elmList{
31     infotype info;
32     address next;
33     address prev;
34 };
35
36 struct list{
37     address first;
38     address last;
39 };
40
41 void buatList(list &L);
42 bool listKosong(list L);
43 address cariElemen(list L, string X);
44 void buatElemen(address &P, string ID, string judul, string pengarang, string penerbit, int tahun);
45 void tambahDataTerakhir(list &L, address P);
46 void hapusDataTerakhir(list &L, address P);
47 void lihatList(list L);
48 void tambahDataSetelah(list &L, address prec, address P);
49 int jumBuku(list L, int thn);
50
51 #endif // DLL_H_INCLUDED
52
```

```
dll.h x dll.cpp x main.cpp x
1     #include "dll.h"
2     #include <iostream>
3
4     /*
5     Name : Muhamad Dwiki Riswanda
6     NIM : 1302194015
7     */
8
9     using namespace std;
10
11 void buatList(list &L) {
12     first(L) = NULL;
13     last(L) = NULL;
14 }
15
16 bool listKosong(list L) {
17     bool status = true;
18     if (first(L) != NULL) {
19         status = false;
20     }
21     return status;
22 }
23
24 address cariElemen(list L, string X){
25     if (first(L) != NULL) {
26         address P = first(L);
27         while (next(P) != NULL && info(P).penerbit != X) {
28             P = next(P);
29         }
30     }
31 }
```

```
dll.h x dll.cpp x main.cpp x
22 }
23
24 address cariElemen(list L, string X){
25     if (first(L) != NULL) {
26         address P = first(L);
27         while (next(P) != NULL && info(P).penerbit != X) {
28             P = next(P);
29         }
30         if (info(P).penerbit == X){
31             return P;
32         } else {
33             P = NULL;
34             return P;
35         }
36     } else {
37         return NULL;
38     }
39 }
40
41 void buatElemen(address &P, string ID, string judul, string pengarang, string penerbit, int tahun){
42     P = new elmList;
43
44     info(P).ID = ID;
45     info(P).judul = judul;
46     info(P).pengarang = pengarang;
47     info(P).penerbit = penerbit;
48     info(P).tahun = tahun;
49     next(P) = NULL;
50     prev(P) = NULL;
51 }
```

```
dll.h x dll.cpp x main.cpp x
49     next(P) = NULL;
50     prev(P) = NULL;
51 }
52
53 void tambahDataTerakhir(list &L, address P){
54     if (first(L) == NULL) {
55         next(P) = first(L);
56         first(L) = P;
57     } else {
58         address prev = first(L);
59         while (next(prev) != NULL) {
60             prev = next(prev);
61         }
62         next(prev) = P;
63     }
64 }
65
66 void tambahDataSetelah(list &L, address prec, address P) {
67     if (first(L) == NULL) {
68         cout << "Tidak ada Element" << endl;
69     } else {
70         if (prec != NULL) {
71             next(P) = next(prec);
72             next(prec) = P;
73             P = NULL;
74             prec = NULL;
75         } else {
76             P = NULL;
77         }
78     }
79 }
```

```
dll.h x dll.cpp x main.cpp x
73         P = NULL;
74         prec = NULL;
75     } else {
76         P = NULL;
77     }
78 }
79 }
80
81 void hapusDataTerakhir(list &L, address P){
82     if (first(L) == NULL) {
83         cout << "Tidak ada Element" << endl;
84     } else {
85         P = first(L);
86         address prev = first(L);
87         while (next(next(prev)) != NULL) {
88             prev = next(prev);
89         }
90         while (next(P) != NULL) {
91             P = next(P);
92         }
93         P = NULL;
94         next(prev) = NULL;
95     }
96 }
97
98 void lihatList(list L){
99     address P = first(L);
100     while (P != NULL) {
101         cout << info(P).ID << " " << info(P).judul << " " << info(P).pengarang << endl;
102     }
103 }
```

```
dll.h x dll.cpp x main.cpp x
91         P = next(P);
92     }
93     P = NULL;
94     next(prev) = NULL;
95 }
96 }
97
98 void lihatList(list L){
99     address P = first(L);
100     while (P != NULL) {
101         cout << info(P).ID << " " << info(P).judul << " " << info(P).pengarang << endl;
102         P = next(P);
103     }
104     cout << endl;
105 }
106
107 int jumBuku(list L, int thn) {
108     address P = first(L);
109     int counter = 0;
110     while (P != NULL){
111         if (info(P).tahun <= thn){
112             counter = counter + 1;
113         }
114         P = next(P);
115     }
116     return counter;
117 }
118 }
```

```
dll.h x dll.cpp x *main.cpp x
5 Name : Muhamad Dwiki Risvanda
6 NIM : 1302194015
7 */
8
9 using namespace std;
10
11 int main()
12 {
13     list L;
14     address ad,adbaru;
15     buatList(L);
16
17     buatElemen(ad,"id01","buku1","anna","informatika",2017);
18     tambahDataTerakhir(L, ad);
19     buatElemen(ad,"id03","buku3","cikita","gramedia",2018);
20     tambahDataTerakhir(L, ad);
21     lihatList(L);
22
23     ad = cariElemen(L, "informatika");
24     buatElemen(adbaru,"id02","buku2","bana","informatika",2018);
25     tambahDataSetelah(L, ad, adbaru);
26     lihatList(L);
27     ad = cariElemen(L, "Penerbit");
28     buatElemen(adbaru,"id05","buku5","wafa","infomatika",2018);
29     tambahDataSetelah(L, ad, adbaru);
30     lihatList(L);
31
32     hapusDataTerakhir(L, adbaru);
33     lihatList(L);
34
35     cout<<"Jumlah buku yang terbit sebelum tahun 2015 yaitu "<<jumBuku(L, 2015)<<endl;
36     cout<<"Jumlah buku yang terbit sebelum tahun 2018 yaitu "<<jumBuku(L, 2018)<<endl;
37     return 0;
38 }
```