

DLL.H

```
#ifndef DLL_INCLUDED

#define DLL_INCLUDED
#include <iostream>

using namespace std;

#define first(L) (L).first
#define last(L) (L).last
#define next(p) (p)->next
#define prev(p) (p)->prev
#define info(p) (p)->info

struct Sepeda {
    int id;
    string merk, warna;
};

typedef Sepeda infotype;
typedef struct Element *address;

struct Element {
    infotype info;
    address prev, next;
};

struct List {
    address first, last;
};

void createList_1301213232(List &L);
address createNewElement_1301213232(infotype info);
void insertFirst_1301213232(List &L, address p);
void showAllData_1301213232(List L);
void showEven_1301213232(List L);

#endif
```

DLL.cpp

```
#include "DLL.h"

void createList_1301213232(List &L) {
    first(L) = NULL;
```

```

    last(L) = NULL;
}

address createNewElement_1301213232(infotype info) {
    address p = new Element;
    info(p) = info;
    prev(p) = NULL;
    next(p) = NULL;
    return p;
}

void insertFirst_1301213232(List &L, address p) {
    if (L.first != NULL) {
        next(p) = first(L);
        prev(first(L)) = p;
        first(L) = p;
    } else {
        first(L) = p;
        last(L) = p;
    }
}

void showAllData_1301213232(List L) {
    if (first(L)) {
        address cur = first(L);
        while (cur) {
            cout << "INFO: " << info(cur).merk << " | " << info(cur).warna << " (id: " << info(cur).id <<
            ")" << endl;
            cur = next(cur);
        }
    } else {
        cout << "INFO: List kosong." << endl;
    }
}

void showEven_1301213232(List L) {
    if (first(L)) {
        address cur = first(L);
        while (cur) {
            if (info(cur).id % 2)
                cout << "INFO: " << info(cur).merk << " | " << info(cur).warna << " (id: " <<
                info(cur).id << ")" << endl;
            cur = next(cur);
        }
    } else {
        cout << "INFO: List kosong." << endl;
    }
}

```

main.cpp

```
#include "DLL.h"

// helper
Sepeda createNewSepeda_1301213232(int id, string merk, string warna) {
    Sepeda s;
    s.id = id;
    s.merk = merk;
    s.warna = warna;
    return s;
}

int main() {
    List L;

    createList_1301213232(L);

    int choice = -1;
    int n, id = -1;
    string merk, warna;

    for (;;) {
        cout << "== Menu ==" << endl;
        cout << "1 - Menambahkan N data baru" << endl;
        cout << "2 - Menampilkan semua data" << endl;
        cout << "3 - Menampilkan data yang memiliki id ganjil" << endl;
        cout << "0 - Exit" << endl;
        cout << "Masukkan menu: ";
        cin >> choice;

        switch(choice) {
            case 1:
                cout << "Masukkan jumlah data yang akan ditambahkan: ";
                cin >> n;

                while (n--) {
                    cout << "Masukkan nomor sepeda: ";
                    cin >> id;

                    cout << "Masukkan merk sepeda: ";
                    cin >> merk;

                    cout << "Masukkan warna sepeda: ";
                    cin >> warna;
```

```
        insertFirst_1301213232(L,
createNewElement_1301213232(createNewSepeda_1301213232(id, merk, warna)));
    }
    break;

    case 2:
        showAllData_1301213232(L); break;
    case 3:
        showEven_1301213232(L); break;
    case 0:
        goto EXIT;
    default:
        cout << "ERROR: Invalid choice" << endl; break;

}

}
EXIT:
    return 0;
}
```

```
== Menu ==
1 - Menambahkan N data baru
2 - Menampilkan semua data
3 - Menampilkan data yang memiliki id ganjil
0 - Exit
Masukkan menu: 1
Masukkan jumlah data yang akan ditambahkan: 3
Masukkan nomor sepeda: 1
Masukkan merk sepeda: aaaa
Masukkan warna sepeda: aaaa
Masukkan nomor sepeda: 2
Masukkan merk sepeda: bbbb
Masukkan warna sepeda: bbbb
Masukkan nomor sepeda: 3
Masukkan merk sepeda: ccc
Masukkan warna sepeda: cccc
== Menu ==
1 - Menambahkan N data baru
2 - Menampilkan semua data
3 - Menampilkan data yang memiliki id ganjil
0 - Exit
Masukkan menu: 2
INFO: ccc | cccc (id: 3)
INFO: bbbb | bbbb (id: 2)
INFO: aaaa | aaaa (id: 1)
== Menu ==
1 - Menambahkan N data baru
2 - Menampilkan semua data
3 - Menampilkan data yang memiliki id ganjil
0 - Exit
Masukkan menu: 3
INFO: ccc | cccc (id: 3)
INFO: aaaa | aaaa (id: 1)
== Menu ==
1 - Menambahkan N data baru
2 - Menampilkan semua data
3 - Menampilkan data yang memiliki id ganjil
0 - Exit
Masukkan menu: 0
```