Header.h
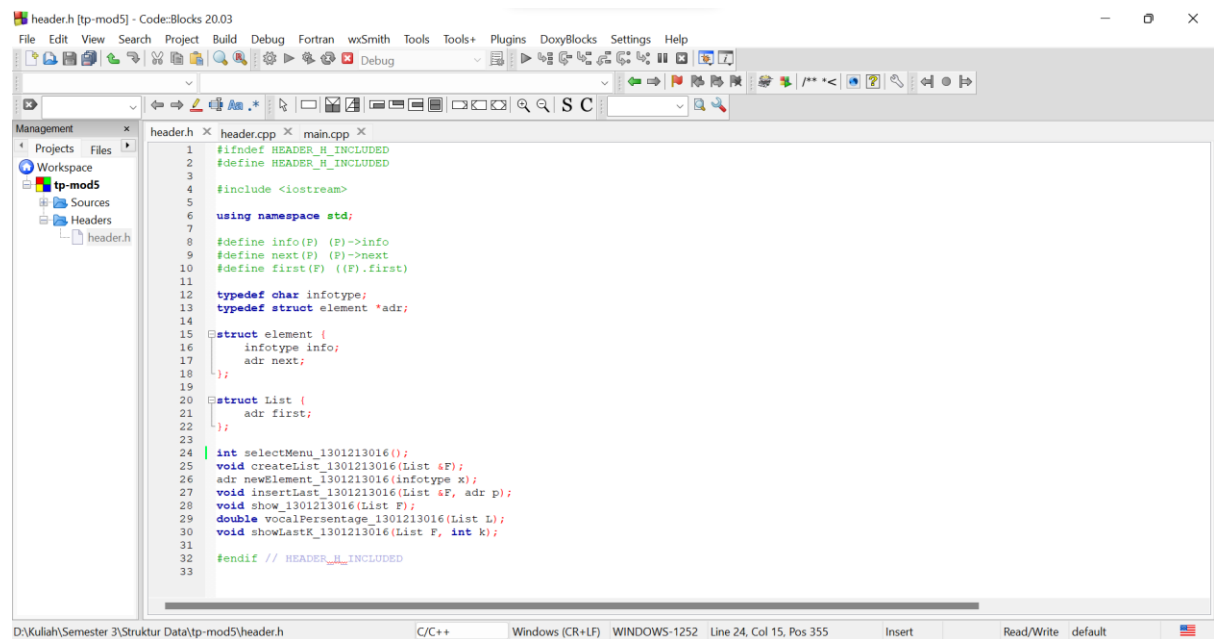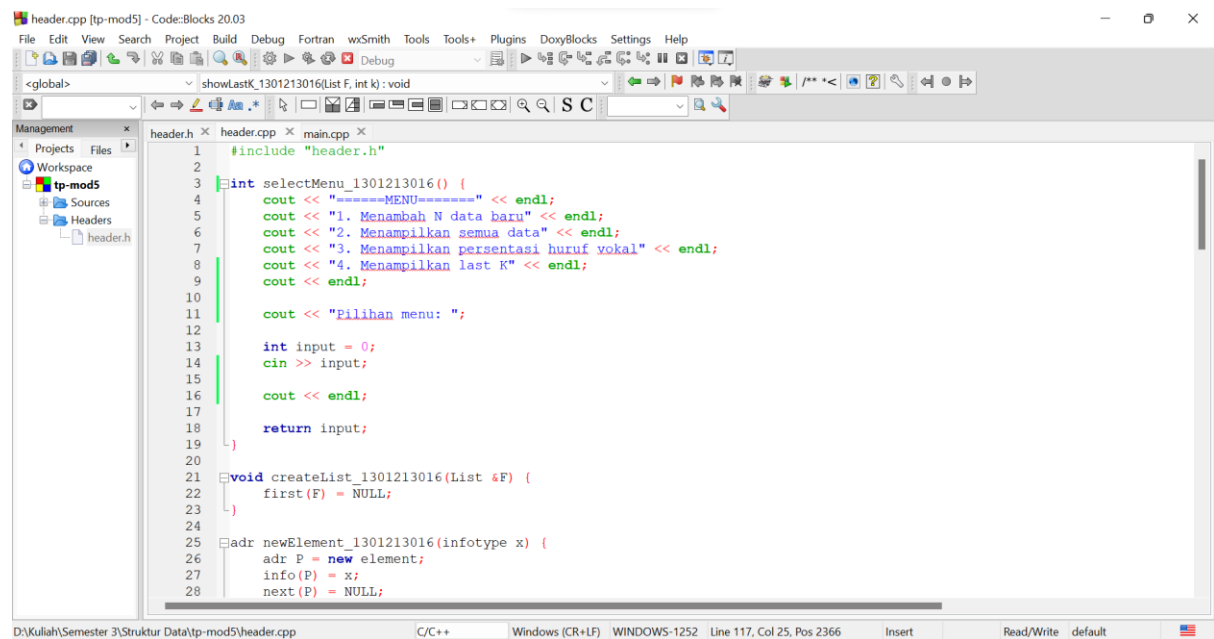
```
#ifndef HEADER_H_INCLUDED
#define HEADER_H_INCLUDED

#include <iostream>

using namespace std;

#define info(P) (P)->info
#define next(P) (P)->next
#define first(F) ((F).first)

typedef char infotype;
typedef struct element *adr;

struct element {
    infotype info;
    adr next;
};

struct List {
    adr first;
};

int selectMenu_1301213016();
void createList_1301213016(List &F);
adr newElement_1301213016(infotype x);
void insertLast_1301213016(List &F, adr p);
void show_1301213016(List F);
double vocalPersentage_1301213016(List L);
void showLastK_1301213016(List F, int k);

#endif // HEADER_H_INCLUDED
```

Header.cpp

```
#include "header.h"

int selectMenu_1301213016() {
    cout << "======MENU======" << endl;
    cout << "1. Menambah N data baru" << endl;
    cout << "2. Menampilkan semua data" << endl;
    cout << "3. Menampilkan persentasi huruf vokal" << endl;
    cout << "4. Menampilkan last K" << endl;
    cout << endl;

    cout << "Pilihan menu: ";

    int input = 0;
    cin >> input;

    cout << endl;

    return input;
}

void createList_1301213016(List &F) {
    first(F) = NULL;
}

adr newElement_1301213016(infotype x) {
    adr P = new element;
    info(P) = x;
    next(P) = NULL;
```

```cpp
adr newElement_1301213016(infotype x) {
    adr P = new element;
    info(P) = x;
    next(P) = NULL;

    return P;
}


void insertLast_1301213016(List &F, adr p) {
    adr q;

    if (first(F) == NULL) {
        first(F) = p;
    } else {
        q = first(F);
        while (next(q) != NULL) {
            q = next(q);
        }
        next(q) = p;
    }
}


void show_1301213016(List F) {
    if (first(F) == NULL) {
        cout << "List Kosong" << endl;
    } else {
        adr p = first(F);
        while (p != NULL) {
```

```cpp
void show_1301213016(List F) {
    if (first(F) == NULL) {
        cout << "List Kosong" << endl;
    } else {
        adr p = first(F);
        while (p != NULL) {
            cout << info(p) << " ";
            p = next(p);
        }
        cout << endl;
    }
}


adr deleteLast_1301213016(List &F) {
    adr p, q;

    if (first(F) == NULL) {
        p = NULL;
        cout << "List Kosong" << endl;
    } else if (next(first(F)) == NULL) {
        p = first(F);
        first(F) = NULL;
    } else {
        q = first(F);
        p = first(F);
        while (next(p) != NULL) {
            q = p;
            p = next(p);
```

```cpp
60  adr deleteLast_1301213016(List &F) {
61      adr p, q;
62
63      if (first(F) == NULL) {
64          p = NULL;
65          cout << "List Kosong" << endl;
66      } else if (next(first(F)) == NULL) {
67          p = first(F);
68          first(F) = NULL;
69      } else {
70          q = first(F);
71          p = first(F);
72          while (next(p) != NULL) {
73              q = p;
74              p = next(p);
75          }
76          next(q) = NULL;
77      }
78
79      return p;
80  }
81
82  double vocalPersentage_1301213016(List F) {
83      double x = 0, y = 0, persentase = 0;
84      adr p = first(F);
85
86      while (p != NULL) {
87
```

```cpp
81
82  double vocalPersentage_1301213016(List F) {
83      double x = 0, y = 0, persentase = 0;
84      adr p = first(F);
85
86      while (p != NULL) {
87
88          if (info(p) == 'a' || info(p) == 'A' || info(p) == 'e' || info(p) == 'E' || info(p) == 'i' || info(p) == 'I' |
89              y++;
90          }
91
92          x++;
93
94          p = next(p);
95
96      }
97
98      persentase = ((y/x) * 100.0);
99
100
101     return persentase;
102 }
103
104 void showLastK_1301213016(List F, int k) {
105     int i = 0, l = 0;
106     adr p = first(F);
107     adr q = first(F);
108
```

```cpp
100
101        return persentase;
102    }
103
104    void showLastK_1301213016(List F, int k) {
105        int i = 0, l = 0;
106        adr p = first(F);
107        adr q = first(F);
108
109        while (p != NULL) {
110            l++;
111            p = next(p);
112        }
113
114        if (l >= k) {
115            while (i < (l-k)) {
116                i++;
117                q = next(q);
118            }
119            cout << info(q) << " " << endl;
120        } else if (k > l){
121            cout << "Nilai K lebih besar dari panjang list" << endl;
122        } else {
123            cout << "List Kosong" << endl;
124        }
125    }
126
```

Main.cpp

```cpp
1    #include "header.h"
2    #include <iostream>
3
4    using namespace std;
5
6    int main() {
7        int pilihan = 0;
8        List F;
9        adr p;
10
11        // createList
12        createList_1301213016(F);
13
14        pilihan = selectMenu_1301213016();
15
16        while (pilihan != 0) {
17            switch(pilihan) {
18                case 1:
19                    int i, jumlah;
20                    char data;
21
22                    i = 0;
23
24                    cout << "Jumlah data yang akan ditambahkan: ";
25                    cin >> jumlah;
26
27                    while (i < jumlah) {
28                        cout << "Masukkan data baru: ";
```

```
26
27          while (i < jumlah) {
28              cout << "Masukkan data baru: ";
29              cin >> data;
30
31              p = newElement_1301213016(data);
32              insertLast_1301213016(F, p);
33
34              i++;
35          }
36
37          cout << endl;
38
39          break;
40      case 2:
41          show_1301213016(F);
42
43          cout << endl;
44          break;
45      case 3:
46          double d;
47          d = vocalPersentage_1301213016(F);
48          cout << "Persentase huruf vokal di dalam list: " << d << "%" << endl;
49
50          cout << endl;
51          break;
52      case 4:
53          int k;
```



```
50          cout << endl;
51          break;
52      case 4:
53          int k;
54
55          cout << "Masukka nilai K: ";
56          cin >> k;
57
58          showLastK_1301213016(F, k);
59
60          cout << endl;
61
62          break;
63      }
64
65      char kembali;
66      cout << "Kembali ke menu utama? (Y/N): ";
67      cin >> kembali;
68      cout << endl;
69
70      if (kembali == 'Y') {
71          pilihan = selectMenu_1301213016();
72      } else {
73          pilihan = 0;
74      }
75
76  }
77
```

Output

```
"D:\Kuliah\Semester 3\Struktur Data\tp-mod5\bin\Debug\tp-mod5.exe"
======MENU=======
1. Menambah N data baru
2. Menampilkan semua data
3. Menampilkan persentasi huruf vokal
4. Menampilkan last K

Pilihan menu: 1

Jumlah data yang akan ditambahkan: 10
Masukkan data baru: A
Masukkan data baru: B
Masukkan data baru: C
Masukkan data baru: D
Masukkan data baru: E
Masukkan data baru: F
Masukkan data baru: G
Masukkan data baru: H
Masukkan data baru: I
Masukkan data baru: J

Kembali ke menu utama? (Y/N): Y

======MENU=======
1. Menambah N data baru
2. Menampilkan semua data
3. Menampilkan persentasi huruf vokal
4. Menampilkan last K

Pilihan menu: 2

A B C D E F G H I J

Kembali ke menu utama? (Y/N): Y

======MENU=======
1. Menambah N data baru
2. Menampilkan semua data
3. Menampilkan persentasi huruf vokal
4. Menampilkan last K
```

```
"D:\Kuliah\Semester 3\Struktur Data\tp-mod5\bin\Debug\tp-mod5.exe"
Pilihan menu: 3

Persentase huruf vokal di dalam list: 30%

Kembali ke menu utama? (Y/N): Y

======MENU=======
1. Menambah N data baru
2. Menampilkan semua data
3. Menampilkan persentasi huruf vokal
4. Menampilkan last K

Pilihan menu: 4

Masukka nilai K: 5
F
Kembali ke menu utama? (Y/N):
```