

**Laporan Tugas Besar IF2211 Strategi Algoritma
Implementasi Algoritma Brute Force untuk Penyelesaian Word-Search Puzzle
dengan Program Word Search Puzzle Solver berbasis Command-Line Interface (CLI)
dalam Bahasa C++**



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1. ALGORITMA BRUTE FORCE

1.1. Penjelasan Singkat

Algoritma brute force adalah algoritma dengan pendekatan paling lempang (straightforward) untuk menyelesaikan suatu permasalahan. Algoritma brute force memecahkan permasalahan dengan sangat sederhana, langsung, dan jelas caranya, dengan mencoba-coba semua kemungkinan dan langkah untuk menyelesaikan persoalan. Salah satu implementasi algoritma brute force yaitu untuk melakukan pencocokan string secara brute force. Pada setiap pencocokan string, dilakukan pencocokan pada tiap huruf di dalam teks dengan string yang ingin dicari.

2.1. Pendekatan Program

Algoritma brute force pada penyelesaian word search puzzle diterapkan pada pencarian tiap kata dalam matriks huruf. Pencarian satu kata dimulai dari pencarian huruf pertama di dalam matriks huruf dengan *sequential search*. Setelah huruf pertama ditemukan, kemudian dicari huruf kedua dengan melakukan pencarian huruf kedua dalam delapan arah, yaitu tepat di atas, kanan atas, kanan, kanan bawah, bawah, kiri bawah, kiri, kiri atas dari huruf pertama. Jika huruf pertama ditemukan di sisi ujung dari matriks huruf, cukup arah yang dapat dicari huruf lainnya saja.

Setelah huruf kedua ditemukan, kemudian dilakukan pencocokan huruf ketiga dan seterusnya dengan arah yang sama seperti arah ditemukannya huruf kedua dari huruf pertama, sampai semua huruf ditemukan. Pencocokan berhenti dilakukan ketika ditemukan huruf yang tidak sesuai dengan urutan huruf dalam kata, atau pencocokan sudah sampai di ujung matriks sehingga pencocokan huruf-huruf selanjutnya tidak dapat dilakukan. Suatu kata berhasil ditemukan dalam matriks apabila pencocokan huruf dapat dilakukan sampai semua huruf cocok dengan kata tersebut, dalam arah yang sama dari huruf pertama hingga huruf terakhir. Jika pencocokan gagal, dilakukan kembali pencarian huruf pertama dalam kata tersebut di huruf-huruf selanjutnya pada matriks huruf.

2. SOURCE PROGRAM

2.1. Program Utama (main.cpp)

```
/* main.cpp */
/* Program utama word-search puzzle solver */

#include <iostream>
#include <string.h>
#include <vector>
#include "lib/readfile.h"
#include "lib/wordsearch.h"

using namespace std;
```

```

int main(){
    string filename;
    vector<vector<char>> m;
    vector<string> wl;

    cout << "Insert filename (from test folder): ";
    cin >> filename;
    readFile(&filename, &m, &wl);

    wordSearch(&m, &wl);

    return 0;
}

```

2.2. Pembacaan file (readfile.h, readfile.cpp)

readfile.h

```

/* readfile.h */
/* Header file untuk readfile.cpp */

#include <iostream>
#include <string.h>
#include <fstream>
#include <vector>
#include "readfile.cpp"
using namespace std;

void    readFile(string    *filename,    vector<vector<char>>    *matrix,
vector<string> *wordlist);

```

readfile.cpp

```

/* readfile.cpp */
/* Mengambil matriks dan daftar kata dari file .txt dalam folder test */

#include <iostream>
#include <string.h>
#include <fstream>
#include <vector>
using namespace std;

vector<char> vectorizeLine(string s){
    vector<char> x;
    for(int i = 0; i < s.length(); i+=2){

```

```

        x.push_back(s[i]);
    }
    return x;
}

void readFile(string *filename, vector<vector<char>> *matrix,
vector<string> *wordlist){
    string line, fullpath;
    bool inwordlist;

    ifstream file("../test/" + *filename);

    if (file.is_open()){
        while(getline(file, line)){
            if(line == ""){
                inwordlist = true;
            } else {
                if (inwordlist){
                    (*wordlist).push_back(line);
                } else {
                    (*matrix).push_back(vectorizeLine(line));
                }
            }
        }
        file.close();
    } else {
        cout << "Unable to open file.";
    }
}

```

2.3. Pencarian kata (wordsearch.h, wordsearch.cpp)

wordsearch.h

```

/* wordsearch.h */
/* Header file untuk wordsearch.cpp */

#include <iostream>
#include <vector>
#include <string>
#include <chrono>
#include "wordsearch.cpp"
using namespace std;

void wordSearch(vector<vector<char>> m, vector<string> l);

```

```

/* wordsearch.cpp */
/* Mencari semua kata dari daftar kata dalam matriks dengan algoritma brute-
force */

#include <iostream>
#include <vector>
#include <string>
#include <chrono>
using namespace std;

// ke atas
void strMatch1(vector<vector<char>> *m,
               vector<vector<int>> *coordlist,
               int it, int j, int *lettercount, string *l,
               bool *found){
    int i = it;
    while((!(*found)) && (m->at(i).at(j) == l->at(*lettercount)) && (i >=
0)){
        (*lettercount)++;
        coordlist->push_back({i, j});
        if(*lettercount == l->length()){
            *found = true;
        }
        i--;
        if (i < 0) break;
    }
}

// ke kanan atas
void strMatch2(vector<vector<char>> *m,
               vector<vector<int>> *coordlist,
               int it, int jt, int *lettercount, string *l,
               bool *found){
    int i = it, j = jt;
    while((!(*found)) && (m->at(i).at(j) == l->at(*lettercount)) && (i >= 0)
&& (j < m->at(i).size())){
        (*lettercount)++;
        coordlist->push_back({i, j});
        if(*lettercount == l->length()){
            *found = true;
        }
        i--;
        j++;
    }
}

```

```

        if (i < 0) break;
        if (j == m->at(i).size()) break;
    }
}

// ke kanan
void strMatch3(vector<vector<char>> *m,
               vector<vector<int>> *coordlist,
               int i, int jt, int *lettercount, string *l,
               bool *found){
    int j = jt;
    while((!(*found)) && (m->at(i).at(j) == l->at(*lettercount)) && (j < m->at(i).size())){
        (*lettercount)++;
        coordlist->push_back({i, j});
        if(*lettercount == l->length()){
            *found = true;
        }
        j++;
        if (j == m->at(i).size()) break;
    }
}

// ke kanan bawah
void strMatch4(vector<vector<char>> *m,
               vector<vector<int>> *coordlist,
               int it, int jt, int *lettercount, string *l,
               bool *found){
    int i = it, j = jt;
    while((!(*found)) && (m->at(i).at(j) == l->at(*lettercount)) && (i < m->size()) && (j < m->at(i).size())){
        (*lettercount)++;
        coordlist->push_back({i, j});
        if(*lettercount == l->length()){
            *found = true;
        }
        i++;
        j++;
        if (i == m->size()) break;
        if (j == m->at(i).size()) break;
    }
}

// ke bawah
void strMatch5(vector<vector<char>> *m,

```

```

        vector<vector<int>> *coordlist,
        int it, int j, int *lettercount, string *l,
        bool *found){
    int i = it;
    while((!(*found)) && (m->at(i).at(j) == l->at(*lettercount)) && (i < m-
>size())){
        (*lettercount)++;
        coordlist->push_back({i, j});
        if(*lettercount == l->length()){
            *found = true;
        }
        i++;
        if (i == m->size()) break;
    }
}

// ke kiri bawah
void strMatch6(vector<vector<char>> *m,
               vector<vector<int>> *coordlist,
               int it, int jt, int *lettercount, string *l,
               bool *found){
    int i = it, j = jt;
    while((!(*found)) && (i >= 0) && (j >= 0)){
        (*lettercount)++;
        coordlist->push_back({i, j});
        if(*lettercount == l->length()){
            *found = true;
        }
        i++;
        j--;
        if (i == m->size()) break;
        if (j < 0) break;
    }
}

// ke kiri
void strMatch7(vector<vector<char>> *m,
               vector<vector<int>> *coordlist,
               int i, int jt, int *lettercount, string *l,
               bool *found){
    int j = jt;
    while((!(*found)) && (j >= 0)){
        (*lettercount)++;
        coordlist->push_back({i, j});
        if(*lettercount == l->length()){

```

```

        *found = true;
    }
    j--;
    if (j < 0) break;
}
}

// ke kiri atas
void strMatch8(vector<vector<char>> *m,
               vector<vector<int>> *coordlist,
               int it, int jt, int *lettercount, string *l,
               bool *found){
    int i = it, j = jt;
    while(!(*found) && (i >= 0) && (j >= 0)){
        (*lettercount)++;
        coordlist->push_back({i, j});
        if(*lettercount == l->length()){
            *found = true;
        }
        i--;
        j--;
        if (i < 0) break;
        if (j < 0) break;
    }
}

/* strMatch : Search kelanjutan sesuai direction, berhenti kalo k == l.length
ato i/j mentok */
void strMatch(vector<vector<char>> *m,
               vector<vector<int>> *coordlist,
               int i, int j, int *lettercount, string *l, short int
direction,
               bool *found){

    // buat ngebungkus, fungsi cuma dijalankan kalo belum ketemu aja
    if(!(*found)){
        switch(direction){
            case 1:
                strMatch1(m, coordlist, i, j, lettercount, l, found);
                break;
            case 2:
                strMatch2(m, coordlist, i, j, lettercount, l, found);
                break;
            case 3:
                strMatch3(m, coordlist, i, j, lettercount, l, found);

```



```

        break;
    case 4:
        strMatch4(m, coordlist, i, j, lettercount, l, found);
        break;
    case 5:
        strMatch5(m, coordlist, i, j, lettercount, l, found);
        break;
    case 6:
        strMatch6(m, coordlist, i, j, lettercount, l, found);
        break;
    case 7:
        strMatch7(m, coordlist, i, j, lettercount, l, found);
        break;
    case 8:
        strMatch8(m, coordlist, i, j, lettercount, l, found);
        break;
    }

    if(!(*found)){ // kalo dari 8 arah belum ketemu full kata
        coordlist->clear();
        direction = -1;
    }
}

}

/* strSearch : Search per kata, kalo found diwarnain */
void strSearch(vector<vector<char>> *m, vector<vector<short int>> *mcolor,
string *l, int idx){
    int i = 0, j, lettercount = 0, comparison = 0;
    short int direction = -1;
    bool found = false;
    vector<vector<int>> coordlist; // list koordinat masing2 huruf dalam 1
kata yg lagi dicari

    auto start = chrono::high_resolution_clock::now();

    // cari huruf pertama (sequential search)
    while(!found && (i < m->size())){
        j = 0;
        while(!found && (j < m->at(i).size())){
            if (m->at(i).at(j) == l->at(0)){ // kalo ketemu huruf pertama

                lettercount=1;
                coordlist.push_back({i, j});
            }
        }
    }
}

```

```

        if(lettercount == l->length()){
            found = true; // kalo cuma 1 huruf
        } else {
            // cari huruf kedua di 8 arah
            if (i > 0){
                if (m->at(i-1).at(j) == l->at(1)){
                    direction = 1; // atas
                    strMatch(m, &coordlist, i-1, j, &lettercount, l,
direction, &found);
                }
                comparison++;
                if (j < m->at(i).size()-1){
                    if (m->at(i-1).at(j+1) == l->at(1)){
                        direction = 2; // kanan atas
                        strMatch(m, &coordlist, i-1, j+1, &lettercount, l,
direction, &found);
                    }
                    comparison++;
                }
                if (j > 0){
                    if (m->at(i-1).at(j-1) == l->at(1)){
                        direction = 8; // kiri atas
                        strMatch(m, &coordlist, i-1, j-1, &lettercount, l,
direction, &found);
                    } else {
                        comparison++;
                    }
                }
            }
            if (i < m->size()-1){
                if (m->at(i+1).at(j) == l->at(1)){
                    direction = 5; // bawah
                    strMatch(m, &coordlist, i+1, j, &lettercount, l,
direction, &found);
                } else {
                    comparison++;
                }
                if (j < m->at(i).size()-1){
                    if (m->at(i+1).at(j+1) == l->at(1)){
                        direction = 4; // kanan bawah
                        strMatch(m, &coordlist, i+1, j+1, &lettercount, l,
direction, &found);
                    } else {
                        comparison++;
                    }
                }
            }
        }
    }
}

```

```

        }
        if (j > 0){
            if (m->at(i+1).at(j-1) == l->at(1)){
                direction = 6; // kiri bawah
                strMatch(m, &coordlist, i+1, j-1, &lettercount, l,
direction, &found);
            } else {
                comparison++;
            }
        }
    }
    if (j > 0){
        if (m->at(i).at(j-1) == l->at(1)){
            direction = 7; // kiri
            strMatch(m, &coordlist, i, j-1, &lettercount, l,
direction, &found);
        } else {
            comparison++;
        }
    }
    if (j < m->at(i).size()-1){
        if (m->at(i).at(j+1) == l->at(1)){
            direction = 3; // kanan
            strMatch(m, &coordlist, i, j+1, &lettercount, l,
direction, &found);
        } else {
            comparison++;
        }
    }
}

} else {
    comparison++;
}
if (!found){
    coordlist.clear();
}
j++;
}
i++;
}

    auto end = chrono::high_resolution_clock::now();
    long long diff = chrono::duration_cast<chrono::nanoseconds>(end -
start).count();

```

```

// pake coordlist buat isi mcolor
// kode warna ulang2 aja
if (found) {
    int color = 31 + (idx % 6);

    for(i = 0; i < coordlist.size(); i++){
        mcolor->at(coordlist[i][0]).at(coordlist[i][1]) = color;
    }
    cout << *l << " found\n";
    cout << "Total time: " << diff << " nanoseconds\n";
    cout << "Total comparison: " << comparison << endl;
}
}

void print_color(char s, short int x){
    cout << "\033[" << x << "m" << s << "\033[0m";
}

// fungsi utama yang dipanggil dari main
// search masing2 kata dalam l, print ulang pake mcolor, tulis keseluruhan waktu
void wordSearch(vector<vector<char>> *m, vector<string> *l){
    int i, j;
    vector<vector<short int>> mcolor;
    vector<short int> x;

    // inisialisasi mcolor
    for(i = 0; i < m->size(); i++){
        for(j = 0; j < m->at(i).size(); j++){
            x.push_back(0);
        }
        mcolor.push_back(x);
        x.clear();
    }
    x.erase(x.begin(), x.end());

    auto startall = chrono::high_resolution_clock::now();

    // cari semua kata + taroh kode2 warna di mcolor
    for(i = 0; i < l->size(); i++){
        cout << "\nSearching for " << l->at(i) << "..." << endl;
        strSearch(m, &mcolor, &(l->at(i)), i); // search tiap string di matriks
    }
}

```

```

    cout << "\nAll search completed.\n";
    auto endall = chrono::high_resolution_clock::now();
    long long duration = chrono::duration_cast<chrono::nanoseconds>(endall -
startall).count();
    cout << "Total time: " << duration << " nanoseconds\n\n";
    // print semua warna
    for(i = 0; i < m->size(); i++){
        for(j = 0; j < m->at(i).size(); j++){
            print_color(m->at(i).at(j), mcolor.at(i).at(j));
            if(j != m->at(i).size()-1){
                cout << " ";
            }
        }
        cout << "\n";
    }
}

```

3. SCREENSHOT PROGRAM

3.1. Test Case 1 (14 x 14, small)

N	C	W	T	D	E	S	E	B	E	I	S	B	K
S	G	X	O	A	P	E	N	L	K	P	P	K	N
V	X	O	V	D	B	R	N	A	S	R	K	S	O
S	R	X	Z	A	N	L	T	C	O	E	G	L	F
R	V	E	O	B	I	I	E	K	V	N	R	E	H
C	B	V	F	C	H	S	W	B	F	K	X	G	S
G	H	J	N	V	E	M	A	O	K	K	Y	N	L
J	F	E	Q	L	I	D	M	A	X	E	R	Y	V
L	P	S	D	T	V	H	L	R	F	L	G	H	I
A	X	J	R	T	T	G	W	D	G	T	J	P	H
T	G	B	E	A	Y	J	C	P	D	T	K	N	E
K	O	O	B	N	L	Q	S	R	N	O	A	D	H
A	O	O	F	X	C	H	A	I	R	B	V	C	L
A	M	X	B	D	A	K	B	V	J	D	O	H	F

BLACKBOARD
 CHAIR
 PENCIL
 BOOK
 DOOR
 TABLE
 BOTTLE
 PEN
 WINDOW

```

bin> ./main
Insert filename (from test folder): small_1.txt
BLACKBOARD found. (Total time: 0 nanoseconds, Total comparison: 12)
CHAIR found. (Total time: 0 nanoseconds, Total comparison: 207)
PENCIL found. (Total time: 0 nanoseconds, Total comparison: 140)
BOOK found. (Total time: 0 nanoseconds, Total comparison: 82)
DOOR found. (Total time: 0 nanoseconds, Total comparison: 8)
TABLE found. (Total time: 0 nanoseconds, Total comparison: 7)
BOTTLE found. (Total time: 0 nanoseconds, Total comparison: 202)
PEN found. (Total time: 0 nanoseconds, Total comparison: 140)
WINDOW found. (Total time: 0 nanoseconds, Total comparison: 88)

All search completed.
Total time: 6120000 nanoseconds

N C W T D E S E B E I S B K
S G X O A P E N L K P P K N
V X O V D B R N A S R K S O
S R X Z A N L T C O E G L F
R V E O B I I E K V N R E H
C B V F C H S W B F K X G S
G H J N V E M A O K K Y N L
J F E Q L I D M A X E R Y V
L P S D T V H L R F L G H I
A X J R T T G W D G T J P H
T G B E A Y J C P D T K N E
K O O B N L Q S R N O A D H
A O O F X C H A I R B V C L
A M X B D A K B V J D O H F
bin> |

```

3.2. Test Case 2 (15 x 15, small)

Q	F	R	P	N	O	I	L	E	P	J	R	R	P	G
K	R	O	T	A	G	I	L	L	A	H	L	O	Y	I
O	R	Y	X	B	N	N	J	Y	Q	T	L	S	E	R
A	H	O	N	I	I	D	V	Y	H	A	X	G	K	A
T	J	C	T	U	X	T	A	J	R	B	J	U	N	F
S	K	U	G	S	L	K	O	B	S	T	U	A	O	F
S	M	N	G	L	D	O	E	A	H	S	Z	M	M	E
O	E	H	J	N	Z	A	T	S	D	F	I	T	Y	P
P	I	R	Z	P	R	N	N	I	D	W	T	M	P	G
L	F	D	E	W	B	E	A	R	K	A	J	J	I	K
Y	R	A	S	G	Q	D	H	N	K	D	G	U	I	J
Y	O	H	D	H	I	W	P	R	G	O	A	T	T	J
D	G	C	U	D	Y	T	E	E	H	E	I	R	L	K
S	O	X	J	R	Y	E	L	X	W	H	A	E	H	Z
R	F	U	H	Q	M	A	E	Q	M	C	I	I	N	N

ALLIGATOR

BEAR

ELEPHANT

FROG

GIRAFFE

GOAT

LION

MEERKAT

MONKEY

PANDA

PENGUIN

POLARBEAR

STORK

TIGER

TOAD

```

bin> ./main
Insert filename (from test folder): small_2.txt
ALLIGATOR found. (Total time: 0 nanoseconds, Total comparison: 38)
BEAR found. (Total time: 0 nanoseconds, Total comparison: 104)
ELEPHANT found. (Total time: 0 nanoseconds, Total comparison: 10)
GIRAFFE found. (Total time: 0 nanoseconds, Total comparison: 16)
GOAT found. (Total time: 0 nanoseconds, Total comparison: 209)
LION found. (Total time: 0 nanoseconds, Total comparison: 10)
MEERKAT found. (Total time: 0 nanoseconds, Total comparison: 246)
PANDA found. (Total time: 0 nanoseconds, Total comparison: 7)
PENGUIN found. (Total time: 0 nanoseconds, Total comparison: 17)
POLARBEAR found. (Total time: 0 nanoseconds, Total comparison: 24)
STORK found. (Total time: 0 nanoseconds, Total comparison: 97)
TIGER found. (Total time: 0 nanoseconds, Total comparison: 98)
TOAD found. (Total time: 0 nanoseconds, Total comparison: 155)

All search completed.
Total time: 13263000 nanoseconds

Q F R P N O I L E P J R R P G
K R O T A G I L L A H L O Y I
O R Y X B N N J Y Q T L S E R
A H O N I I D V Y H A X G K A
T J C T U X T A J R B J U N F
S K U G S L K O B S T U A O F
S M N G L D O E A H S Z M M E
O E H J N Z A T S D F I T Y P
P I R Z P R N N I D W T M P G
L F D E W B E A R K A J J I K
Y R A S G Q D H N K D G U I J
Y O H D H I W P R G O A T T J
D G C U D Y T E E H E I R L K
S O X J R Y E L X W H A E H Z
R F U H Q M A E Q M C I I N N
bin> |

```


3.3. Test Case 3 (16 x 14, small)

Q	W	C	L	E	I	H	O	J	F	S	P	E	S
W	V	U	A	J	V	G	U	T	E	G	V	S	S
W	S	X	U	N	V	N	D	K	S	Z	H	E	O
B	P	E	T	P	B	C	A	H	P	E	B	E	D
Z	A	C	V	H	X	H	L	E	G	A	P	H	A
N	W	G	A	I	S	T	M	R	V	F	Z	C	C
X	N	W	U	K	L	I	N	R	G	C	Z	Y	O
F	D	H	L	E	N	O	N	I	Q	P	G	W	V
K	Q	I	F	T	T	V	T	N	Z	S	R	X	A
P	M	J	U	A	S	T	C	G	W	F	Q	O	D
Q	H	Z	H	E	A	J	E	M	B	T	A	T	J
N	V	G	H	K	D	O	X	O	Z	Y	A	D	O
I	B	E	L	O	L	L	I	E	S	K	Z	O	H
X	V	B	T	A	O	B	L	H	B	H	B	F	N

AVOCADOS
BAGUETTE
CHEESE
HERRING
LOLLIES
MILKSHAKES
MINT
OLIVES
PESTO
SODA

```

bin> ./main
Insert filename (from test folder): small_3.txt
AVOCADOS found. (Total time: 0 nanoseconds, Total comparison: 94)
BAGUETTE found. (Total time: 0 nanoseconds, Total comparison: 46)
HERRING found. (Total time: 0 nanoseconds, Total comparison: 48)
LOLLIES found. (Total time: 0 nanoseconds, Total comparison: 202)
MINT found. (Total time: 0 nanoseconds, Total comparison: 84)
OLIVES found. (Total time: 0 nanoseconds, Total comparison: 123)
PESTO found. (Total time: 0 nanoseconds, Total comparison: 73)
SODA found. (Total time: 0 nanoseconds, Total comparison: 43)

All search completed.
Total time: 5996000 nanoseconds

Q W C L E I H O J F S P E S
W V U A J V G U T E G V S S
W S X U N V N D K S Z H E O
B P E T P B C A H P E B E D
Z A C V H X H L E G A P H A
N W G A I S T M R V F Z C C
X N W U K L I N R G C Z Y O
F D H L E N O N I Q P G W V
K Q I F T T V T N Z S R X A
P M J U A S T C G W F Q O D
Q H Z H E A J E M B T A T J
N V G H K D O X O Z Y A D O
I B E L O L L I E S K Z O H
X V B T A O B L H B H B F N
bin> |

```

3.4. Test Case 4 (23 x medium)

N V C Y W P B R S O N P Y J C H E S T E R Z Q
Y Y I A Z J R D P Q K E V W D E D X S P M F V
R W V A O V Y Z W M N F N M A W U Z P W V G P
R L O V K W R W K B W W F U A N C L K S M P J
E O X F O R D S H I R E A H D L E I F H C I L
D D E P M I J O L I E T T E B J Q X D S D Y P
Z F N O H I U I A Z O P H M N V P U N K N I K
K R I I N J E Z D W R M S A D C L A I X O N G
M U V L O M N C K I M U I O X L Y E V R M G R
I Y T Z T H H P S P B Z M E H V Z C W P H L J
J L I V K J F M T X L O A U Z B L Q J A C H P
Q A D I R D R S Q A K N U U B Q K T O S I V X
J S Y B O U J A W U N G Q G W N E W P O R T C
S E V V Y D U N C A N F S D D Z E P A E C G R
K D O O W G N I L L O C Y L K U W T V C X D J
N K O O X L I Y M M E R O H A L P P F H R C K

LAHORE
LICHFIELD
YORKTON
COLLINGWOOD
RICHMOND
CHESTER
JOLIETTE
DERRY
OXFORDSHIRE
DUNCAN
NEWPORT
SQUAMISH

```

bin> ./main
Insert filename (from test folder): medium_1.txt
LAHORE found. (Total time: 0 nanoseconds, Total comparison: 310)
LICHFIELD found. (Total time: 0 nanoseconds, Total comparison: 138)
YORKTON found. (Total time: 0 nanoseconds, Total comparison: 364)
COLLINGWOOD found. (Total time: 0 nanoseconds, Total comparison: 387)
RICHMOND found. (Total time: 0 nanoseconds, Total comparison: 144)
CHESTER found. (Total time: 0 nanoseconds, Total comparison: 22)
JOLIETTE found. (Total time: 0 nanoseconds, Total comparison: 142)
DERRY found. (Total time: 0 nanoseconds, Total comparison: 59)
OXFORDSHIRE found. (Total time: 0 nanoseconds, Total comparison: 117)
DUNCAN found. (Total time: 0 nanoseconds, Total comparison: 184)
NEWPORT found. (Total time: 0 nanoseconds, Total comparison: 190)
SQUAMISH found. (Total time: 0 nanoseconds, Total comparison: 391)

All search completed.
Total time: 5998000 nanoseconds

N V C Y W P B R S O N P Y J C H E S T E R Z Q
Y Y I A Z J R D P Q K E V W D E D X S P M F V
R W V A O V Y Z W M N F N M A W U Z P W V G P
R L O V K W R W K B W W F U A N C L K S M P J
E O X F O R D S H I R E A H D L E I F H C I L
D D E P M I J O L I E T T E B J Q X D S D Y P
Z F N O H I U I A Z O P H M N V P U N K N I K
K R I I N J E Z D W R M S A D C L A I X O N G
M U V L O M N C K I M U I O X L Y E V R M G R
I Y T Z T H H P S P B Z M E H V Z C W P H L J
J L I V K J F M T X L O A U Z B L Q J A C H P
Q A D I R D R S Q A K N U U B Q K T O S I V X
J S Y B O U J A W U N G Q G W N E W P O R T C
S E V V Y D U N C A N F S D D Z E P A E C G R
K D O O W G N I L L O C Y L K U W T V C X D J
N K O O X L I Y M M E R O H A L P P F H R C K
bin> |

```

3.5. Test Case 5 (20 x 20, medium)

Q	A	L	I	P	A	S	E	M	I	H	H	K	F	I	T	L	X	A	Z
A	H	T	U	L	U	E	L	X	E	L	O	Z	A	N	O	C	U	L	F
B	O	U	B	Y	V	B	A	C	L	O	F	E	N	M	X	N	A	Z	F
O	B	W	W	K	M	B	C	F	K	I	X	E	A	C	Q	K	J	Z	P
D	E	T	N	I	S	O	Z	A	R	P	B	B	M	Y	Q	T	T	X	Z
B	N	Z	P	X	Q	J	Y	L	V	I	R	V	E	C	U	E	V	S	N
P	Z	C	E	M	G	T	N	T	V	A	E	A	L	L	A	N	I	S	A
N	T	T	N	H	T	J	A	O	C	E	N	R	O	O	P	I	J	Q	T
B	R	R	I	I	J	J	L	O	L	A	Z	E	X	B	A	G	E	S	R
U	O	I	B	K	V	O	H	Y	L	B	T	N	I	E	N	I	T	N	A
D	P	A	A	C	L	T	L	O	L	D	I	I	C	N	C	R	A	I	S
E	I	M	T	Z	E	T	X	H	A	P	X	C	A	Z	R	T	N	M	I
S	N	C	I	M	J	O	P	K	T	G	F	L	M	A	E	O	O	E	M
O	E	I	C	H	N	R	S	U	I	V	B	I	C	P	L	M	R	T	L
N	S	N	I	E	V	U	L	K	B	I	O	N	P	R	I	A	D	F	E
I	G	O	R	V	U	Y	Z	M	L	A	F	E	R	I	P	L	N	O	T
D	N	L	T	E	Y	A	L	I	A	P	P	M	J	N	A	W	E	R	T
E	G	O	M	R	G	L	T	M	T	N	S	R	Q	E	S	R	L	M	G
R	T	N	E	V	R	Y	M	M	U	W	F	U	N	I	E	V	A	I	Q
U	E	E	A	F	E	U	D	M	B	J	J	J	C	J	R	D	Q	N	Z

BENZTROPINE
EMTRICITABINE
METFORMIN
BACLOFEN
PRAZOSIN
LIPASE
LAMOTRIGINE
METHOCARBAMOL
ALENDRONATE
TELMISARTAN
BUDESONIDE
NALOXONE
MELOXICAM
CYCLOBENZAPRINE
VARENICLINE
PANCRELIPASE
BUTALBITAL
TRIAMCINOLONE
NEBIVOLOL
FLUCONAZOLE

```

bin> ./main
Insert filename (from test folder): medium_2.txt
BENZTROPINE found. (Total time: 0 nanoseconds, Total comparison: 86)
EMTRICITABINE found. (Total time: 0 nanoseconds, Total comparison: 531)
METFORMIN found. (Total time: 0 nanoseconds, Total comparison: 11)
BACLOFEN found. (Total time: 1003000 nanoseconds, Total comparison: 64)
PRAZOSIN found. (Total time: 0 nanoseconds, Total comparison: 104)
LIPASE found. (Total time: 0 nanoseconds, Total comparison: 6)
LAMOTRIGINE found. (Total time: 0 nanoseconds, Total comparison: 72)
METHOCARBAMOL found. (Total time: 0 nanoseconds, Total comparison: 292)
ALENDRONATE found. (Total time: 0 nanoseconds, Total comparison: 202)
TELMISARTAN found. (Total time: 0 nanoseconds, Total comparison: 127)
BUDESONIDE found. (Total time: 0 nanoseconds, Total comparison: 212)
NALOXONE found. (Total time: 0 nanoseconds, Total comparison: 41)
MELOXICAM found. (Total time: 0 nanoseconds, Total comparison: 11)
CYCLOBENZAPRINE found. (Total time: 0 nanoseconds, Total comparison: 102)
VARENICLINE found. (Total time: 0 nanoseconds, Total comparison: 131)
PANCRELIPASE found. (Total time: 0 nanoseconds, Total comparison: 407)
BUTALBITAL found. (Total time: 0 nanoseconds, Total comparison: 375)
TRIAMCINOLONE found. (Total time: 0 nanoseconds, Total comparison: 199)
NEBIVOLOL found. (Total time: 0 nanoseconds, Total comparison: 66)
FLUCONAZOLE found. (Total time: 0 nanoseconds, Total comparison: 47)

All search completed.
Total time: 14202000 nanoseconds

Q A L I P A S E M I H H K F I T L X A Z
A H T U L U E L X E L O Z A N O C U L F
B O U B Y V B A C L O F E N M X N A Z F
O B W W K M B C F K I X E A C Q K J Z P
D E T N I S O Z A R P B B M Y Q T T X Z
B N Z P X Q J Y L V I R V E C U E V S N
P Z C E M G T N T V A E A L L A N I S A
N T T N H T J A O C E N R O O P I J Q T
B R R I I J J L O L A Z E X B A G E S R
U O I B K V O H Y L B T N I E N I T N A
D P A A C L T L O L D I I C N C R A I S
E I M T Z E T X H A P X C A Z R T N M I
S N C I M J O P K T G F L M A E O O E M
O E I C H N R S U I V B I C P L M R T L
N S N I E V U L K B I O N P R I A D F E
I G O R V U Y Z M L A F E R I P L N O T
D N L T E Y A L I A P P M J N A W E R T
E G O M R G L T M T N S R Q E S R L M G
R T N E V R Y M M U W F U N I E V A I Q
U E E A F E U D M B J J J C J R D Q N Z
bin> |

```

3.6. Test Case 6 (21 x 21, medium)

E	R	U	I	J	Q	Q	K	P	Y	A	O	S	T	W	X	C	K	R	T	C
H	W	I	B	T	C	O	A	H	O	V	M	B	J	Y	E	S	R	E	J	O
U	L	L	S	S	G	R	S	T	E	T	S	O	N	Z	H	T	O	G	S	D
E	L	E	Y	K	K	L	T	R	B	N	V	K	N	W	O	G	I	X	T	S
R	F	N	G	A	I	A	S	M	S	H	C	Q	R	B	H	Y	B	R	O	W
L	S	K	V	G	P	H	V	M	Y	B	Y	Y	S	P	V	V	I	H	T	I
Q	V	R	Q	C	I	K	A	F	P	Y	A	S	A	O	Q	H	S	F	Z	M
L	M	F	R	R	N	N	W	I	X	R	U	I	R	W	S	T	D	O	W	S
C	U	L	T	S	W	C	G	V	V	O	J	E	H	R	G	A	N	T	J	U
T	Z	A	K	N	O	V	K	S	G	U	P	W	E	B	S	T	M	R	Z	I
O	O	N	O	N	R	N	E	B	N	F	P	D	N	H	H	P	X	E	F	T
H	T	N	F	T	C	F	V	T	H	B	N	P	I	L	N	D	M	G	B	S
J	N	E	L	Z	Y	X	T	O	C	U	P	K	T	S	B	T	D	U	A	I
Z	J	L	H	I	F	P	C	C	N	O	I	U	R	E	K	A	C	P	P	I
I	H	S	U	A	Y	I	Y	P	J	R	N	M	I	O	V	S	E	X	U	K
X	K	E	J	I	Z	W	S	O	T	Z	A	T	H	N	W	A	Y	N	B	V
J	B	D	D	K	F	G	U	N	E	I	F	D	S	E	D	M	I	G	A	W
S	G	D	O	B	C	N	I	C	E	L	O	Q	A	T	L	F	L	R	H	E
X	Q	F	T	W	F	A	T	H	Y	O	R	T	S	E	O	T	M	Y	H	B
V	Y	Z	P	X	I	C	F	O	R	X	E	Z	S	R	B	J	H	A	F	K
O	D	X	H	A	S	E	I	Y	J	R	K	E	M	K	I	M	O	N	O	E
PINAFORE																				
STETSON																				
FLANNELS																				
JERSEY																				
SWIMSUIT																				
PARKA																				
SUIT																				
TOGS																				
KIMONO																				
SHIRT																				
CROWN																				
LEGGINGS																				
GOWN																				
OVERSHIRT																				
SWEATER																				
PONCHO																				
PUMPS																				
UNDERSHIRT																				
UNIFORM																				
DASHIKI																				

```

bin> ./main
Insert filename (from test folder): medium_3.txt
PINAFORE found. (Total time: 0 nanoseconds, Total comparison: 159)
STETSON found. (Total time: 0 nanoseconds, Total comparison: 88)
FLANNELS found. (Total time: 0 nanoseconds, Total comparison: 176)
JERSEY found. (Total time: 0 nanoseconds, Total comparison: 58)
SWIMSUIT found. (Total time: 0 nanoseconds, Total comparison: 133)
PARKA found. (Total time: 0 nanoseconds, Total comparison: 12)
SUIT found. (Total time: 0 nanoseconds, Total comparison: 223)
TOGS found. (Total time: 0 nanoseconds, Total comparison: 91)
KIMONO found. (Total time: 0 nanoseconds, Total comparison: 173)
SHIRT found. (Total time: 0 nanoseconds, Total comparison: 48)
CROWN found. (Total time: 0 nanoseconds, Total comparison: 154)
LEGGINGS found. (Total time: 0 nanoseconds, Total comparison: 49)
GOWN found. (Total time: 0 nanoseconds, Total comparison: 74)
OVERSHIRT found. (Total time: 0 nanoseconds, Total comparison: 15)
SWEATER found. (Total time: 0 nanoseconds, Total comparison: 260)
PONCHO found. (Total time: 0 nanoseconds, Total comparison: 230)
PUMPS found. (Total time: 0 nanoseconds, Total comparison: 232)
UNDERSHIRT found. (Total time: 0 nanoseconds, Total comparison: 232)
UNIFORM found. (Total time: 0 nanoseconds, Total comparison: 232)
DASHIKI found. (Total time: 0 nanoseconds, Total comparison: 175)

```

```

All search completed.
Total time: 14551000 nanoseconds

```

```

E R U I J Q Q K P Y A O S T W X C K R T C
H W I B T C O A H O V M B J Y E S R E J O
U L L S S G R S T E T S O N Z H T O G S D
E L E Y K K L T R B N V K N W O G I X T S
R F N G A I A S M S H C Q R B H Y B R O W
L S K V G P H V M Y B Y Y S P V V I H T I
Q V R Q C I K A F P Y A S A O Q H S F Z M
L M F R R N N W I X R U I R W S T D O W S
C U L T S W C G V V O J E H R G A N T J U
T Z A K N O V K S G U P W E B S T M R Z I
O O N O N R N E B N F P D N H H P X E F T
H T N F T C F V T H B N P I L N D M G B S
J N E L Z Y X T O C U P K T S B T D U A I
Z J L H I F P C C N O I U R E K A C P P I
I H S U A Y I Y P J R N M I O V S E X U K
X K E J I Z W S O T Z A T H N W A Y N B V
J B D D K F G U N E I F D S E D M I G A W
S G D O B C N I C E L O Q A T L F L R H E
X Q F T W F A T H Y O R T S E O T M Y H B
V Y Z P X I C F O R X E Z S R B J H A F K
O D X H A S E I Y J R K E M K I M O N O E
bin> |

```


3.7. Test Case 7 (32 x 33, large)

V	A	V	R	K	Z	N	K	N	X	I	I	M	N	T	G	Q	D	X	L	H	T	H	B	I
J	J	N	C	C	Q	B	M																	
T	E	A	I	I	L	I	H	Q	Q	C	A	T	P	O	M	E	Q	U	X	P	Q	S	D	E
P	W	X	H	A	H	M	A																	
Z	B	Q	H	O	L	D	D	J	R	C	J	K	O	N	T	K	I	C	G	I	B	O	R	N
C	O	P	J	Y	R	J	B																	
H	M	D	X	C	Y	F	J	P	A	W	A	O	J	B	U	A	Q	F	N	O	J	L	R	Z
Y	G	O	L	J	P	F	C																	
H	X	T	M	D	C	E	A	T	B	Z	Y	B	S	J	D	P	J	S	J	B	U	R	Q	V
J	S	A	A	S	X	M	E																	
O	E	R	A	C	E	Z	C	Z	W	O	V	T	S	R	V	B	Z	B	A	F	L	T	J	J
H	C	D	H	Z	N	B	T																	
O	F	P	Y	M	V	H	X	F	F	F	F	L	M	B	S	T	W	O	R	H	T	E	E	R
F	B	R	A	Y	B	Q	O																	
Q	A	C	O	W	E	A	M	I	W	G	E	A	C	R	L	H	S	G	Q	E	L	P	C	P
C	I	B	F	S	R	F	N																	
T	T	T	H	R	O	W	I	N	G	L	L	D	O	D	F	Y	O	A	S	I	A	S	D	R
R	E	C	C	C	B	X	I																	
I	L	V	J	X	P	P	Y	J	L	H	W	D	Z	R	O	L	A	A	U	B	V	E	M	E
U	E	Q	E	K	C	S	G																	
A	F	P	X	A	W	M	L	L	Y	Q	Z	A	Z	Z	D	A	C	X	U	D	L	C	D	T
H	R	E	D	E	D	C	L																	
G	A	D	S	W	V	Y	U	G	M	G	V	Z	V	M	A	R	C	A	H	N	B	A	S	L
I	O	I	W	I	Y	F	Y																	
R	K	N	V	K	M	U	P	J	Z	T	L	E	E	P	T	U	I	C	Q	G	Z	R	H	U
N	J	H	L	M	K	R	T																	
G	G	D	Z	S	R	G	G	X	Q	E	V	D	B	W	G	C	S	S	N	L	P	W	V	A
L	E	H	L	G	U	A	I																	
K	B	W	E	H	V	U	I	E	S	H	A	A	P	Z	Q	S	N	R	G	P	Y	V	C	V
F	B	T	U	A	O	E	W																	
X	U	V	G	E	P	R	T	M	Z	L	Z	L	H	Y	N	E	W	J	S	D	K	T	E	E
U	M	Y	E	Z	N	J	T																	
K	M	R	F	V	F	P	T	Z	A	C	M	R	S	V	A	U	F	K	P	X	P	K	T	Y
T	S	A	N	M	Y	G	T																	
G	L	O	F	R	F	L	U	C	E	F	W	P	W	E	N	Z	F	I	L	P	C	H	U	O
B	L	U	O	Y	B	C	Q																	
I	X	X	B	W	E	P	V	L	Q	N	T	J	F	U	A	Y	T	S	W	I	M	M	E	R
L	E	E	C	F	B	Q	Y																	
K	L	T	A	H	P	Q	I	Q	B	N	Y	M	T	T	V	C	V	J	G	J	N	K	Y	A
G	D	A	E	B	F	Q	E																	
O	K	O	O	J	S	Y	A	T	H	X	Y	Z	R	J	H	W	F	Y	H	W	S	P	B	P
O	T	S	T	R	O	H	S																	

V	K	U	H	O	U	E	C	O	I	V	T	V	Q	E	Y	J	T	K	Q	M	G	E	U	C
	R	X	B	K	Q	Z	H	M																
Q	I	O	N	B	S	W	T	F	Y	A	B	S	R	G	M	Z	D	N	N	Y	L	N	T	D
	F	I	N	G	U	Z	Y	I																
K	P	S	I	L	G	C	Z	A	C	E	I	O	Q	Z	S	G	W	J	Z	D	I	J	F	N
	Z	O	R	K	Q	H	T	G																
C	N	F	L	T	G	Q	I	H	K	N	L	G	Z	B	M	I	E	T	D	C	F	H	R	W
	E	A	K	A	Z	F	V	M																
I	L	I	E	B	X	V	S	T	N	S	I	T	W	L	Y	Y	S	A	Y	T	T	Z	N	M
	R	X	M	A	X	X	F	O																
D	R	E	V	D	S	C	V	E	S	W	E	E	F	G	Z	E	P	C	B	W	D	G	Y	P
	L	A	L	M	A	E	U	W																
W	N	N	A	E	C	T	T	V	J	A	R	C	R	O	T	A	L	J	J	D	K	G	T	Q
	Y	E	O	H	W	Q	Y	Z																
Q	F	I	J	T	Q	I	A	U	E	I	N	S	I	L	L	E	J	S	A	G	D	Q	C	H
	W	H	O	T	L	N	F	D																
K	I	O	C	G	S	T	P	B	P	L	V	M	T	L	P	R	C	J	P	V	G	E	R	X
	U	X	P	M	X	B	N	R																
I	U	W	X	R	K	K	M	M	D	F	V	R	Y	T	W	T	L	Y	V	S	F	O	R	Q
	S	L	A	L	O	M	K	T																
D	F	E	K	S	T	M	U	I	S	A	N	M	Y	G	U	A	A	W	D	D	S	V	A	C
	V	Q	S	M	S	Q	P	O																

GYMNASIUM
 SWIMMER
 GYMNAST
 CATCHER
 UNICYCLE
 CANOE
 SLALOM
 GOLDMEDAL
 GYMNASTICS
 TENNIS
 UMPIRE
 THROWING
 POOL
 PADDLEBALL
 DUGOUT
 SHORTSTOP
 JAVELIN
 JUMPROPE
 PITCHER
 VAULTER
 ICESKATES
 FREETHROW

CLEATS RACE JOG

```

bin> ./main
Insert filename (from test folder): large_1.txt
GYMNASIUM found. (Total time: 0 nanoseconds, Total comparison: 143)
SWIMMER found. (Total time: 0 nanoseconds, Total comparison: 770)
GYMNAST found. (Total time: 0 nanoseconds, Total comparison: 143)
CATCHER found. (Total time: 0 nanoseconds, Total comparison: 94)
UNICYCLE found. (Total time: 0 nanoseconds, Total comparison: 652)
CANOE found. (Total time: 0 nanoseconds, Total comparison: 94)
SLALOM found. (Total time: 0 nanoseconds, Total comparison: 219)
GOLDMEDAL found. (Total time: 0 nanoseconds, Total comparison: 19)
GYMNASTICS found. (Total time: 0 nanoseconds, Total comparison: 143)
TENNIS found. (Total time: 0 nanoseconds, Total comparison: 286)
UMPIRE found. (Total time: 0 nanoseconds, Total comparison: 419)
THROWING found. (Total time: 0 nanoseconds, Total comparison: 28)
POOL found. (Total time: 0 nanoseconds, Total comparison: 117)
PADDLEBALL found. (Total time: 0 nanoseconds, Total comparison: 313)
DUGOUT found. (Total time: 0 nanoseconds, Total comparison: 21)
SHORTSTOP found. (Total time: 0 nanoseconds, Total comparison: 186)
JAVELIN found. (Total time: 0 nanoseconds, Total comparison: 189)
JUMPROPE found. (Total time: 0 nanoseconds, Total comparison: 530)
PITCHER found. (Total time: 0 nanoseconds, Total comparison: 692)
VAULTER found. (Total time: 0 nanoseconds, Total comparison: 440)
ICESKATES found. (Total time: 0 nanoseconds, Total comparison: 18)
FREETHROW found. (Total time: 0 nanoseconds, Total comparison: 212)
CLEATS found. (Total time: 0 nanoseconds, Total comparison: 333)
RACE found. (Total time: 0 nanoseconds, Total comparison: 7)
JOG found. (Total time: 0 nanoseconds, Total comparison: 122)

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All search completed.
Total time: 16212000 nanoseconds

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V A V R K Z N K N X I I M N T G Q D X L H T H B I J J N C C Q B M
T E A I I L I H Q Q C A T P O M E Q U X P Q S D E P W X H A H M A
Z B Q H O L D D J R C J K O N T K I C G I B O R N C O P J Y R J B
H M D X C Y F J P A W A O J B U A Q F N O J L R Z Y G O L J P F C
H X T M D C E A T B Z Y B S J D P J S J B U R Q V J S A A S X M E
O E R A C E Z C Z W O V T S R V B Z B A F L T J J H C D H Z N B T
O F P Y M V H X F F F F L M B S T W O R H T E E R F B R A Y B Q O
Q A C O W E A M I W G E A C R L H S G Q E L P C P C I B F S R F N
T T T H R O W I N G L L D O D F Y O A S I A S D R R E C C C B X I
I L V J X P P Y J L H W D Z R O L A A U B V E M E U E Q E K C S G
A F P X A W M L L Y Q Z A Z Z D A C X U D L C D T H R E D E D C L
G A D S W V Y U G M G V Z V M A R C A H N B A S L I O I W I Y F Y
R K N V K M U P J Z T L E E P T U I C Q G Z R H U N J H L M K R T
G G D Z S R G G X Q E V D B W G C S S N L P W V A L E H L G U A I
K B W E H V U I E S H A A P Z Q S N R G P Y V C V F B T U A O E W
X U V G E P R T M Z L Z L H Y N E W J S D K T E E U M Y E Z N J T
K M R F V F P T Z A C M R S V A U F K P X P K T Y T S A N M Y G T
G L O F R F L U C E F W P W E N Z F I L P C H U O B L U O Y B C Q

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I X X B W E P V L Q N T J F U A Y T S W I M M E R L E E C F B Q Y
K L T A H P Q I Q B N Y M T T V C V J G J N K Y A G D A E B F Q E
O K O O J S Y A T H X Y Z R J H W F Y H W S P B P O T S T R O H S
V K U H O U E C O I V T V Q E Y J T K Q M G E U C R X B K Q Z H M
Q I O N B S W T F Y A B S R G M Z D N N Y L N T D F I N G U Z Y I
K P S I L G C Z A C E I O Q Z S G W J Z D I J F N Z O R K Q H T G
C N F L T G Q I H K N L G Z B M I E T D C F H R W E A K A Z F V M
I L I E B X V S T N S I T W L Y Y S A Y T T Z N M R X M A X X F O
D R E V D S C V E S W E E F G Z E P C B W D G Y P L A L M A E U W
W N N A E C T T V J A R C R O T A L J J D K G T Q Y E O H W Q Y Z
Q F I J T Q I A U E I N S I L L E J S A G D Q C H W H O T L N F D
K I O C G S T P B P L V M T L P R C J P V G E R X U X P M X B N R
I U W X R K K M M D F V R Y T W T L Y V S F O R Q S L A L O M K T
D F E K S T M U I S A N M Y G U A A W D D S V A C V Q S M S Q P O
bin> |
```

3.8. Test Case 8 (33 x 33, large)

F	A	Z	M	D	T	T	S	V	B	E	F	E	P	S	O	E	U	F	O	Z	T	D	H	Q
	G	P	R	W	L	U	T	A																
B	U	W	N	Z	S	Y	F	F	V	J	N	R	U	E	N	L	Q	E	H	Z	H	G	B	D
	S	C	U	D	C	N	H	E																
U	J	T	R	T	H	W	F	D	M	A	G	O	T	Y	T	K	J	X	S	L	I	H	A	F
	R	J	T	A	D	O	W	G																
D	I	N	W	W	X	B	E	K	D	E	I	R	M	E	X	N	S	Z	I	I	B	H	O	K
	T	K	H	I	B	X	Q	B																
N	V	S	M	O	J	K	X	P	V	T	F	M	T	H	X	Y	Y	J	F	B	K	O	E	E
	R	G	V	B	O	H	D	G																
O	S	L	D	A	C	Q	Y	W	I	P	M	L	C	R	Z	X	T	S	L	E	W	N	Z	Y
	B	U	J	X	M	G	O	E																
J	A	B	B	O	C	N	W	B	M	S	G	I	B	N	H	Y	S	T	E	R	I	C	A	L
	D	N	P	E	H	F	E	C																
C	W	I	H	J	G	G	M	Z	Z	O	T	S	A	I	S	N	S	B	S	A	F	P	A	G
	V	B	T	B	T	R	L	B																
V	M	S	E	S	N	A	V	C	Z	S	T	N	A	N	G	I	D	N	I	T	X	L	Y	X
	H	A	V	V	D	N	B	R																
I	F	L	D	T	S	P	J	O	I	I	H	V	L	F	O	P	D	E	T	E	I	U	Q	X
	Z	W	X	C	N	N	A	J																
V	X	A	G	D	H	X	G	M	W	K	A	N	T	U	V	M	Q	S	I	D	U	G	K	X
	J	N	X	X	V	H	R	H																
Y	H	W	G	G	D	T	I	J	R	O	L	B	J	R	S	N	U	U	E	T	J	O	A	S
	T	O	N	I	S	H	E	D																
B	Y	W	N	A	A	T	Y	D	R	E	A	R	Y	I	D	W	S	O	X	U	U	V	A	Z
	S	B	D	I	J	F	S	N																
K	N	M	S	Q	P	U	T	W	H	L	D	I	Q	A	T	Y	J	A	Y	C	Z	G	N	S
	J	S	E	L	A	A	I	L																
P	S	G	M	O	O	C	K	D	G	Y	I	K	H	T	P	T	W	L	T	M	D	C	A	Y
	T	I	B	D	X	S	M	S																
V	E	N	P	H	R	E	L	E	A	E	V	R	O	E	D	R	W	N	R	T	Z	D	P	D
	W	K	E	N	V	M	Z	M																
T	V	G	Z	H	D	Z	M	T	L	J	X	Q	Z	D	E	B	V	Z	H	H	U	E	Q	E
	I	T	B	H	R	K	F	O																
Y	B	O	G	Z	T	J	D	E	K	A	R	D	G	N	V	F	V	N	S	F	W	F	N	N
	C	K	Y	O	U	F	U	E																
V	Y	E	L	K	U	I	Y	R	G	P	Z	F	F	D	Y	J	Q	H	T	N	A	U	I	E
	D	V	M	R	E	Z	L	F																
S	I	V	M	Z	Y	E	Z	M	X	S	G	V	P	W	G	H	A	F	L	E	F	Q	F	T
	M	C	Z	R	F	B	F	M																
Z	R	I	A	U	Z	M	M	I	G	O	U	R	E	I	J	X	L	U	G	E	M	F	J	A
	W	O	G	I	B	D	I	C																

D	E	T	A	U	T	A	F	N	I	O	A	C	Y	C	T	H	O	K	K	D	A	K	D	E
I	P	T	F	P	E	L	D																	
H	D	I	Z	Z	P	Y	H	E	V	R	F	U	K	A	S	B	D	Q	O	F	Q	I	I	R
G	S	P	I	Z	Y	L	Z																	
Q	A	S	S	N	B	D	J	D	Q	C	B	F	V	G	U	T	P	T	Y	U	Q	O	J	H
C	S	M	E	O	O	E	L																	
J	E	N	Z	L	F	S	V	C	Z	X	O	F	H	A	K	B	N	D	E	L	P	I	N	T
L	P	M	D	Z	N	D	L																	
N	Z	E	Z	J	Z	J	E	T	C	F	E	Z	Z	V	H	E	C	A	R	J	G	V	L	G
A	U	S	Y	F	N	A	J																	
X	R	S	M	V	H	O	E	D	F	J	U	Z	D	O	T	P	L	V	D	O	I	O	B	I
N	B	K	P	C	A	U	L																	
S	L	C	A	X	E	S	L	V	P	K	B	V	G	N	I	R	O	D	A	Z	L	M	B	F
U	I	Z	Q	Z	F	H	Q																	
L	U	F	T	E	R	G	E	R	W	W	G	M	O	F	T	U	L	L	P	M	V	U	X	Y
H	Y	T	Y	E	R	T	X																	
F	V	V	C	A	N	O	G	Q	U	T	T	C	I	N	P	Y	A	R	O	U	S	E	D	F
R	Z	I	S	G	W	A	R																	
W	U	B	F	X	Q	W	U	H	I	R	V	S	J	N	K	D	F	C	O	N	F	I	D	E
N	T	U	K	U	P	F	Y																	
L	T	J	C	W	S	L	K	Q	G	C	A	L	A	M	I	T	O	U	S	V	K	I	X	U
Y	E	I	N	E	R	I	N																	
V	X	H	S	L	R	B	Q	C	I	H	T	A	P	M	E	T	J	A	P	W	M	U	B	B
R	F	V	I	O	C	T	Q																	

SHOCKED
 TRUSTING
 OPTIMISTIC
 SENSITIVE
 ADORING
 FULFILLED
 EMPATHIC
 DETERMINED
 HORRIFIED
 ASTONISHED
 NEEDFUL
 CALAMITOUS
 INFATUATED
 MISERABLE
 INDIGNANT
 CALM
 AROUSED
 AFFECTED
 REGRETFUL
 EMOTIONAL

HYSTERICAL
CONTENT
SELFISH
DREARY
CONFIDENT
INFURIATED
THREATENED
AMBITIOUS
ANNOYED
LIBERATED


```
bin> ./main
Insert filename (from test folder): large_2.txt
SHOCKED found. (Total time: 0 nanoseconds, Total comparison: 372)
TRUSTING found. (Total time: 0 nanoseconds, Total comparison: 113)
OPTIMISTIC found. (Total time: 0 nanoseconds, Total comparison: 589)
SENSITIVE found. (Total time: 0 nanoseconds, Total comparison: 1140)
ADORING found. (Total time: 0 nanoseconds, Total comparison: 89)
FULFILLED found. (Total time: 0 nanoseconds, Total comparison: 27)
EMPATHIC found. (Total time: 0 nanoseconds, Total comparison: 163)
DETERMINED found. (Total time: 0 nanoseconds, Total comparison: 455)
HORRIFIED found. (Total time: 0 nanoseconds, Total comparison: 89)
ASTONISHED found. (Total time: 0 nanoseconds, Total comparison: 299)
NEEDFUL found. (Total time: 0 nanoseconds, Total comparison: 68)
CALAMITOUS found. (Total time: 939000 nanoseconds, Total comparison: 76)
INFATUATED found. (Total time: 0 nanoseconds, Total comparison: 371)
MISERABLE found. (Total time: 0 nanoseconds, Total comparison: 409)
INDIGNANT found. (Total time: 0 nanoseconds, Total comparison: 371)
CALM found. (Total time: 0 nanoseconds, Total comparison: 76)
AROUSED found. (Total time: 962000 nanoseconds, Total comparison: 945)
AFFECTED found. (Total time: 0 nanoseconds, Total comparison: 811)
REGRETFUL found. (Total time: 0 nanoseconds, Total comparison: 196)
EMOTIONAL found. (Total time: 0 nanoseconds, Total comparison: 163)
HYSTERICAL found. (Total time: 0 nanoseconds, Total comparison: 287)
CONTENT found. (Total time: 0 nanoseconds, Total comparison: 189)
SELFISH found. (Total time: 0 nanoseconds, Total comparison: 347)
DREARY found. (Total time: 0 nanoseconds, Total comparison: 514)
CONFIDENT found. (Total time: 0 nanoseconds, Total comparison: 189)
INFURIATED found. (Total time: 0 nanoseconds, Total comparison: 371)
THREATENED found. (Total time: 0 nanoseconds, Total comparison: 659)
AMBITIOUS found. (Total time: 0 nanoseconds, Total comparison: 89)
ANNOYED found. (Total time: 0 nanoseconds, Total comparison: 269)
LIBERATED found. (Total time: 0 nanoseconds, Total comparison: 102)

All search completed.
Total time: 20390000 nanoseconds
```

```

F A Z M D T T S V B E F E P S O E U F O Z T D H Q G P R W L U T A
B U W N Z S Y F F V J N R U E N L Q E H Z H G B D S C U D C N H E
U J T R T H W F D M A G O T Y T K J X S L I H A F R J T A D O W G
D I N W W X B E K D E I R M E X N S Z I I B H O K T K H I B X Q B
N V S M O J K X P V T F M T H X Y Y J F B K O E E R G V B O H D G
O S L D A C Q Y W I P M L C R Z X T S L E W N Z Y B U J X M G O E
J A B B O C N W B M S G I B N H Y S T E R I C A L D N P E H F E C
C W I H J G G M Z Z O T S A I S N S B S A F P A G V B T B T R L B
V M S E S N A V C Z S T N A N G I D N I T X L Y X H A V V D N B R
I F L D T S P J O I I H V L F O P D E T E I U Q X Z W X C N N A J
V X A G D H X G M W K A N T U V M Q S I D U G K X J N X X V H R H
Y H W G G D T I J R O L B J R S N U U E T J O A S T O N I S H E D
B Y W N A A T Y D R E A R Y I D W S O X U U V A Z S B D I J F S N
K N M S Q P U T W H L D I Q A T Y J A Y C Z G N S J S E L A A I L
P S G M O O C K D G Y I K H T P T W L T M D C A Y T I B D X S M S
V E N P H R E L E A E V R O E D R W N R T Z D P D W K E N V M Z M
T V G Z H D Z M T L J X Q Z D E B V Z H H U E Q E I T B H R K F O
Y B O G Z T J D E K A R D G N V F V N S F W F N N C K Y O U F U E
V Y E L K U I Y R G P Z F F D Y J Q H T N A U I E D V M R E Z L F
S I V M Z Y E Z M X S G V P W G H A F L E F Q F T M C Z R F B F M
Z R I A U Z M M I G O U R E I J X L U G E M F J A W O G I B D I C
D E T A U T A F N I O A C Y C T H O K K D A K D E I P T F P E L D
H D I Z Z P Y H E V R F U K A S B D Q O F Q I I R G S P I Z Y L Z
Q A S S N B D J D Q C B F V G U T P T Y U Q O J H C S M E O O E L
J E N Z L F S V C Z X O F H A K B N D E L P I N T L P M D Z N D L
N Z E Z J Z J E T C F E Z Z V H E C A R J G V L G A U S Y F N A J
X R S M V H O E D F J U Z D O T P L V D O I O B I N B K P C A U L
S L C A X E S L V P K B V G N I R O D A Z L M B F U I Z Q Z F H Q
L U F T E R G E R W W G M O F T U L L P M V U X Y H Y T Y E R T X
F V V C A N O G Q U T T C I N P Y A R O U S E D F R Z I S G W A R
W U B F X Q W U H I R V S J N K D F C O N F I D E N T U K U P F Y
L T J C W S L K Q G C A L A M I T O U S V K I X U Y E I N E R I N
V X H S L R B Q C I H T A P M E T J A P W M U B B R F V I O C T Q
bin> |

```

3.9. Test Case 9 (34 x 34, large)

D	K	T	L	G	X	E	B	F	L	P	H	T	F	J	N	E	S	R	S	R	I	U	T	Z
	S	G	V	Q	A	V	T	Z	Y															
X	X	U	Q	S	F	C	N	L	W	X	D	S	T	O	R	T	O	I	S	E	V	X	F	O
	X	R	C	V	M	O	Y	R	M															
R	G	G	Z	M	W	Z	O	S	Y	L	F	G	I	U	P	E	T	J	C	Y	J	G	P	T
	X	A	S	X	D	C	A	E	D															
K	H	Q	J	E	E	L	Z	T	U	A	P	W	Z	F	S	Q	X	I	G	J	Z	L	R	X
	Y	T	R	O	U	C	K	Z	C															
L	C	U	L	S	I	A	K	N	N	N	S	D	E	K	G	X	F	F	U	H	R	F	O	K
	K	D	J	B	R	A	V	E	N															
D	D	J	X	V	N	I	D	Z	J	U	H	S	A	P	Y	O	L	N	P	U	G	Q	E	H
	E	L	K	S	O	E	U	B	T															
M	F	U	K	V	O	R	A	O	J	T	Z	P	K	G	R	F	D	E	L	C	J	Q	C	Z
	V	U	Z	D	L	C	L	A	E															
X	L	O	I	O	P	X	K	Q	W	A	I	W	V	J	M	C	O	E	Q	Z	I	I	I	Z
	O	C	E	N	Q	B	M	M	R															
J	E	F	H	S	M	M	K	H	R	L	K	I	P	L	R	M	R	N	E	H	R	O	O	M
	E	M	O	I	W	J	U	Y	E															
B	L	M	R	B	P	K	Z	L	L	S	A	F	H	G	S	F	A	W	A	C	D	D	D	W
	C	U	O	H	O	M	S	H	V															
K	I	W	L	S	N	A	P	E	R	E	G	R	I	N	E	G	A	W	J	B	Q	Z	Y	R
	U	C	R	O	Z	K	S	U	E															
L	I	Z	A	R	D	E	R	F	J	G	M	R	K	R	I	T	L	A	P	B	E	L	D	T
	Y	A	F	P	M	G	O	S	L															
V	H	R	E	O	B	A	J	R	D	D	X	L	W	M	E	M	J	V	K	B	A	T	D	I
	I	Z	V	S	R	X	P	L	Q															
F	I	K	W	M	Y	M	M	C	O	Z	X	C	R	R	K	V	G	L	R	K	R	F	U	I
	O	D	Y	V	H	S	O	H	M															
T	L	Z	I	Z	M	K	R	E	G	W	Q	A	F	M	J	I	P	A	F	I	M	G	M	P
	I	G	L	H	S	H	V	R	U															
T	Y	B	T	T	J	R	X	D	N	L	T	O	L	G	I	A	X	T	Z	C	E	A	S	N
	B	I	T	Q	I	F	M	E	Y															
Q	P	Z	I	L	T	M	G	B	K	P	W	Q	P	D	P	P	W	S	F	B	G	H	G	D
	Q	E	I	O	F	F	E	B	B															
M	M	M	N	T	H	E	F	I	S	L	E	D	A	T	R	L	Q	W	O	P	C	O	N	P
	M	Y	K	E	G	J	Q	U	G															
C	G	T	M	S	L	R	N	Q	R	I	L	J	K	O	G	A	I	T	L	R	Q	F	J	M
	D	U	F	Z	N	E	X	L	S															
D	G	X	H	N	D	S	N	T	P	K	C	U	B	U	V	E	H	A	O	I	X	O	A	T
	G	O	S	K	I	S	E	L	A															
Y	Y	W	B	J	L	R	U	R	M	F	Y	V	G	C	U	Y	G	C	U	L	W	L	O	I
	H	K	K	Q	Y	I	I	O	D															

N	W	M	P	Y	G	R	J	Y	I	G	R	H	N	A	S	P	O	D	L	Q	L	P	C	Q
	D	C	Z	V	L	B	O	C	M															
T	Z	S	T	K	K	L	J	O	R	I	U	C	X	N	E	D	G	D	D	I	P	U	X	L
	O	S	T	V	F	I	T	K	P															
Z	I	Z	K	E	G	X	Q	N	H	Q	F	M	X	T	I	S	E	X	N	W	P	C	E	I
	X	L	R	Z	V	R	N	S	T															
J	K	J	Y	T	D	L	C	W	S	K	O	P	C	L	G	A	C	Y	I	I	D	D	X	K
	X	U	H	F	R	J	M	J	K															
M	V	C	I	E	C	Q	T	F	Y	O	P	C	E	J	S	R	K	Z	H	O	X	O	P	V
	C	R	Q	Y	N	E	B	B	G															
R	Y	A	L	C	G	U	S	R	Y	M	L	N	H	B	Q	M	O	J	L	P	J	H	U	J
	X	U	N	M	A	H	O	K	K															
V	M	T	P	S	L	F	U	Y	Y	V	W	R	S	O	Q	S	D	Z	O	W	L	A	Z	L
	A	S	H	L	M	A	P	V	U															
B	E	P	C	V	F	A	A	K	M	Y	D	D	U	B	R	E	Z	Q	L	D	W	K	C	G
	F	S	K	C	C	E	W	H	U															
O	R	S	M	H	S	B	R	K	T	U	G	H	R	I	W	G	H	R	N	P	F	Y	M	U
	R	Y	X	L	D	Z	O	R	Y															
A	P	P	T	O	O	O	E	K	J	G	G	A	H	Y	V	J	V	J	S	U	X	O	U	Z
	G	P	E	A	C	O	C	K	D															
N	H	P	N	U	Z	I	Q	L	R	F	W	T	T	G	U	B	Z	O	A	P	H	W	M	B
	K	N	X	P	J	W	O	P	L															
J	P	I	A	J	B	U	L	Z	O	V	X	V	E	I	Y	T	R	F	Z	X	E	E	U	Y
	O	U	P	V	T	U	T	W	C															
R	D	C	E	O	I	W	I	D	L	G	R	L	Z	Z	D	S	S	O	V	T	W	M	K	L
	J	P	J	V	T	Z	H	Z	G															

HINDS
 BULLOCKS
 PTARMIGAN
 QUAIL
 WATERFOWL
 MOORHEN
 OPOSSUM
 LIZARD
 KAPI
 PEACOCK
 CUB
 DINOSAUR
 CROCODILE
 SEAGULL
 SHRIMP
 DINGO
 TOUCAN
 GECKO

TUNA
PILCHARD
COBRA
DOGFISH
PONIE
FLYINGFISH
MEADOWLARK
TORTOISE
BUCK
LEVERET
KITTEN
CUR
IBIS
ZEBRA
RAVEN
SPARROW
LARK
THRUSHE
PEREGRINE
PIG
WOODCHUCK
TURKEY

```

bin> ./main
Insert filename (from test folder): large_3.txt
HINDS found. (Total time: 0 nanoseconds, Total comparison: 378)
BULLOCKS found. (Total time: 0 nanoseconds, Total comparison: 220)
PTARMIGAN found. (Total time: 0 nanoseconds, Total comparison: 675)
QUAIL found. (Total time: 0 nanoseconds, Total comparison: 876)
WATERFOWL found. (Total time: 0 nanoseconds, Total comparison: 370)
MOORHEN found. (Total time: 0 nanoseconds, Total comparison: 365)
OPOSSUM found. (Total time: 0 nanoseconds, Total comparison: 78)
LIZARD found. (Total time: 0 nanoseconds, Total comparison: 137)
KAPI found. (Total time: 0 nanoseconds, Total comparison: 148)
PEACOCK found. (Total time: 0 nanoseconds, Total comparison: 226)
CUB found. (Total time: 0 nanoseconds, Total comparison: 126)
DINOSAUR found. (Total time: 0 nanoseconds, Total comparison: 229)
CROCODILE found. (Total time: 0 nanoseconds, Total comparison: 75)
SEAGULL found. (Total time: 0 nanoseconds, Total comparison: 21)
SHRIMP found. (Total time: 0 nanoseconds, Total comparison: 255)
DINGO found. (Total time: 0 nanoseconds, Total comparison: 229)
TOUCAN found. (Total time: 0 nanoseconds, Total comparison: 46)
GECKO found. (Total time: 0 nanoseconds, Total comparison: 428)
TUNA found. (Total time: 0 nanoseconds, Total comparison: 34)
PILCHARD found. (Total time: 0 nanoseconds, Total comparison: 262)
COBRA found. (Total time: 0 nanoseconds, Total comparison: 300)
DOGFISH found. (Total time: 0 nanoseconds, Total comparison: 113)
PONIE found. (Total time: 0 nanoseconds, Total comparison: 295)
FLYINGFISH found. (Total time: 0 nanoseconds, Total comparison: 106)
MEADOWLARK found. (Total time: 0 nanoseconds, Total comparison: 78)
TORTOISE found. (Total time: 0 nanoseconds, Total comparison: 46)
BUCK found. (Total time: 0 nanoseconds, Total comparison: 220)
LEVERET found. (Total time: 0 nanoseconds, Total comparison: 137)
KITTEN found. (Total time: 0 nanoseconds, Total comparison: 165)
CUR found. (Total time: 0 nanoseconds, Total comparison: 126)
IBIS found. (Total time: 0 nanoseconds, Total comparison: 629)
ZEBRA found. (Total time: 0 nanoseconds, Total comparison: 95)
RAVEN found. (Total time: 0 nanoseconds, Total comparison: 94)
SPARROW found. (Total time: 0 nanoseconds, Total comparison: 535)
LARK found. (Total time: 0 nanoseconds, Total comparison: 539)
THRUSHE found. (Total time: 0 nanoseconds, Total comparison: 20)
PEREGRINE found. (Total time: 0 nanoseconds, Total comparison: 226)
PIG found. (Total time: 0 nanoseconds, Total comparison: 262)
WOODCHUCK found. (Total time: 0 nanoseconds, Total comparison: 384)
TURKEY found. (Total time: 0 nanoseconds, Total comparison: 34)

All search completed.
Total time: 27553000 nanoseconds

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D K T L G X E B F L P H T F J N E S R S R I U T Z S G V Q A V T Z Y
X X U Q S F C N L W X D S T O R T O I S E V X F O X R C V M O Y R M
R G G Z M W Z O S Y L F G I U P E T J C Y J G P T X A S X D C A E D
K H Q J E E L Z T U A P W Z F S Q X I G J Z L R X Y T R O U C K Z C
L C U L S I A K N N N S D E K G X F F U H R F O K K D J B R A V E N
D D J X V N I D Z J U H S A P Y O L N P U G Q E H E L K S O E U B T
M F U K V O R A O J T Z P K G R F D E L C J Q C Z V U Z D L C L A E
X L O I O P X K Q W A I W V J M C O E Q Z I I I Z O C E N Q B M M R
J E F H S M M K H R L K I P L R M R N E H R O O M E M O I W J U Y E
B L M R B P K Z L L S A F H G S F A W A C D D D W C U O H O M S H V
K I W L S N A P E R E G R I N E G A W J B Q Z Y R U C R O Z K S U E
L I Z A R D E R F J G M R K R I T L A P B E L D T Y A F P M G O S L
V H R E O B A J R D D X L W M E M J V K B A T D I I Z V S R X P L Q
F I K W M Y M M C O Z X C R R K V G L R K R F U I O D Y V H S O H M
T L Z I Z M K R E G W Q A F M J I P A F I M G M P I G L H S H V R U
T Y B T T J R X D N L T O L G I A X T Z C E A S N B I T Q I F M E Y
Q P Z I L T M G B K P W Q P D P P W S F B G H G D Q E I O F F E B B
M M M N T H E F I S L E D A T R L Q W O P C O N P M Y K E G J Q U G
C G T M S L R N Q R I L J K O G A I T L R Q F J M D U F Z N E X L S
D G X H N D S N T P K C U B U V E H A O I X O A T G O S K I S E L A
Y Y W B J L R U R M F Y V G C U Y G C U L W L O I H K K Q Y I I O D
N W M P Y G R J Y I G R H N A S P O D L Q L P C Q D C Z V L B O C M
T Z S T K K L J O R I U C X N E D G D D I P U X L O S T V F I T K P
Z I Z K E G X Q N H Q F M X T I S E X N W P C E I X L R Z V R N S T
J K J Y T D L C W S K O P C L G A C Y I I D D X K X U H F R J M J K
M V C I E C Q T F Y O P C E J S R K Z H O X O P V C R Q Y N E B B G
R Y A L C G U S R Y M L N H B Q M O J L P J H U J X U N M A H O K K
V M T P S L F U Y Y V W R S O Q S D Z O W L A Z L A S H L M A P V U
B E P C V F A A K M Y D D U B R E Z Q L D W K C G F S K C C E W H U
O R S M H S B R K T U G H R I W G H R N P F Y M U R Y X L D Z O R Y
A P P T O O O E K J G G A H Y V J V J S U X O U Z G P E A C O C K D
N H P N U Z I Q L R F W T T G U B Z O A P H W M B K N X P J W O P L
J P I A J B U L Z O V X V E I Y T R F Z X E E U Y O U P V T U T W C
R D C E O I W I D L G R L Z Z D S S O V T W M K L J P J V T Z H Z G
bin> |

```

4. ALAMAT DRIVE PROGRAM

GitHub Repository: <https://github.com/alifiarahmah/WordSearchPuzzle-Solver.git>

Google Drive:

<https://drive.google.com/drive/folders/19Iu0SVOSvZmppIvvOtcuDtNp37vNR5eM?usp=sharing>

5. LAIN-LAIN

Poin	Ya	Tidak
Program berhasil dikompilasi tanpa kesalahan (<i>no syntax error</i>)	✓	
Program berhasil <i>running</i>	✓	
Program dapat membaca file masukan dan menuliskan keluaran	✓	
Program berhasil menemukan semua kata di dalam puzzle	✓	