# LAPORAN TUGAS KECIL IF2211/Strategi Algoritma

# **Word Search Puzzle Solver**

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# 1. Algoritma Brute Force

Mula-mula program akan meminta masukan nama file puzzle, kemudian puzzle dan kata yang ingin di cari pada file tersebut akan di transformasikan ke dalam bentuk matrix. Program kemudian akan mencari kata-kata tersebut satu per satu dengan algoritma pencarian.

Pada program *Word Search Puzzle Solver*, terdapat 8 jenis pencarian. Saya menamainya

sesuai dengan arah mata angin, yaitu

- SearchWtoE,pencarian dari kiri ke
- SearchEtoW,pencarian dari kanan ke kiri
- SearchNtoS, pencarian dari atas ke bawah
- SearchStoN, pencarian dari bawah ke atas
- SearchNEtoSW, pencarian dari kanan atas ke kiri bawah secara diagonal
- SearchSWtoNE, pencarian dari kiri bawah ke kanan atas secara diagonal
- SearchSEtoNW, pencarian dari kanan bawah ke kiri atas secara diagonal
- SearchNWtoSE, pencarian dari kiri atas ke kanan bawah secara diagonal

Pertama-tama program akan melakukan pencarian dari kiri ke kanan. Program akan membandingkan huruf pertama pada kata yang ingin dicari dengan huruf paling kiri atas pada matrix. Apabila huruf pertama pada kata dengan huruf pada matrix puzzle sama, maka akan dilanjutkan perbandingan huruf kedua pada kata dan huruf pada kanan matrix puzzle, dan seterusnya. Apabila tidak sama, puzzle akan mengulang membandingkan dari huruf pertama kata yang ingin dicari. Apabila program telah menemukan kata yang ingin berhenti dicari. program akan membandingkan dan mencetak solusi untuk kata pertama. Jika tidak ditemukan kata yang ingin dicari pada teknik pencarian pertama, program akan melanjutkan pencarian kata ke teknik pencarian dari kanan ke kiri, dan begitu seterusnya.

## 2. Source program

```
#include <stdio.h>
#include <stdlib.h>
#include <time.h>
```

```
#include <string.h>
#define boolean unsigned char
#define true 1
#define false 0
#define Maxrow 100
#define Maxcol 100
typedef char ElType;
typedef struct
   ElType contents[Maxrow][Maxcol];
   int rowEff;
   int colEff;
} Matrix;
#define ELMT(M, i, j)
(M).contents[(i)][(j)]
//Mentransformasikan puzzle pada file
ke bentuk matrix
void loadPuzzle(int *rows, int *cols,
int *nword, Matrix *puzzle, Matrix
*words){
    FILE *fptr;
    char now,prev;
    int row = *rows, col = *cols,
count= *nword;
    char* file;
    char path[] = "../test/";
    char fname[50]="";
    printf("Please enter puzzle file
name: ");
    scanf("%s",&fname);
    strcat(path,fname);
    fptr = fopen(path, "r");
    now = fgetc(fptr);
    while (now! = EOF) {
        if(prev != now){
            if (now == '\n'){
                row++;
                col = 0;
                *rows = row;
            else{
```

```
if (now != ' ' ){
                     ELMT(*puzzle,row,co
1) = now;
                     col++;
                     if (*cols< col)</pre>
                         *cols = col;
            prev = now;
            now = fgetc(fptr);
        else{
            int row = 0, col=0;
            now = fgetc(fptr);
            while(now!= EOF){
                if(now != '\n'){
                    ELMT(*words,row,col)
                     col++;
                     now = fgetc(fptr);
                else{
                     ELMT(*words, row, col
                     row++;
                     col = 0;
                     *nword = row;
                     now = fgetc(fptr);
            ELMT(*words,row,col) = '.';
//Menghasilkan matrix berukuran Row x
Col dengan isi ' '
void createSolvePuzzle(int rows, int
cols, Matrix *puzsol){
    for (int i=0; i<rows; i++){</pre>
        for(int j=0; j<cols*2; j+=2){
            ELMT(*puzsol,i,j) = '-';
            ELMT(*puzsol,i,j+1) = ' ';
```

```
//Pencarian dari kiri ke kanan
boolean searchWtoE(Matrix puzzle,
Matrix words, int i, int *row, int
*col, int *len, int *count){
    boolean found = false;
    char now;
    int rows = *row, cols = *col;
    int p = 0, q=0, passp=0, passw=0,
hitung=0;
    while (p < rows && !found &&
ELMT(words,i,passw)!='.'){
        while(q< cols && !found &&
ELMT(words,i,passw)!='.'){
            hitung++;
            if(ELMT(puzzle,p,passp) ==
ELMT(words,i,passw)){
                passp++;
                passw++;
            else{
                passw = 0;
                q++;
                passp = q;
            now = ELMT(words,i,passw);
        if (now == '.'){
            *len = passw;
            found = true;
            *row = p;
            *col = q;
        else{
            passw = 0;
            p++;
            q=0;
            passp=0;
    *count = hitung;
    return found;
```

```
//pencarian dari kanan ke kiri
boolean searchEtoW(Matrix puzzle,
Matrix words, int i, int *row, int
*col, int *len, int *count){
    boolean found = false;
    char now;
    int rows = *row, cols = *col;
    int p = 0, q= cols-1,passp=cols-1,
passw=0, hitung=0;
    while (p < rows && !found &&
ELMT(words,i,passw)!='.'){
        while(q \ge 0 && !found &&
ELMT(words,i,passw)!='.'){
            hitung++;
            if(ELMT(puzzle,p,passp) ==
ELMT(words,i,passw)){
                passp--;
                passw++;
            else{
                passw = 0;
                q--;
                passp = q;
            now = ELMT(words,i,passw);
        if (now == '.'){
            *len = passw;
            found = true;
            *row = p;
            *col = q;
        else{
            passw = 0;
            p++;
            q=cols-1;
            passp=q;
    *count = hitung;
    return found;
//pencarian dari atas ke bawah
```

```
boolean searchNtoS(Matrix puzzle,
Matrix words, int i, int *row, int
*col, int *len, int *count){
    boolean found = false;
    char now;
    int rows = *row, cols = *col;
    int p = 0, q=0, passp=0,
passw=0,hitung=0;
    while (p < cols && !found &&
ELMT(words,i,passw)!='.'){
        while(q< rows && !found &&
ELMT(words,i,passw)!='.'){
            hitung++;
            if(ELMT(puzzle,passp,p) ==
ELMT(words,i,passw)){
                passp++;
                passw++;
            else{
                passw = 0;
                q++;
                passp = q;
            now = ELMT(words,i,passw);
        if (now == '.'){
            *len = passw;
            found = true;
            *row = q;
            *col = p;
        else{
            passw = 0;
            p++;
            q=0;
            passp=0;
    *count=hitung;
    return found;
//pencarian dari bawah ke atas
```

```
boolean searchStoN(Matrix puzzle,
Matrix words, int i, int *row, int
*col, int *len, int *count){
    boolean found = false;
    char now;
    int rows = *row, cols = *col;
    int p = 0, q=rows-1,passp=rows-1,
passw=0, hitung=0;
    while (p < cols && !found &&
ELMT(words,i,passw)!='.'){
        while(q \ge 0 \&\& !found \&\&
ELMT(words,i,passw)!='.'){
            hitung++;
            if(ELMT(puzzle,passp,p) ==
ELMT(words,i,passw)){
                passp--;
                passw++;
            else{
                passw = 0;
                q--;
                passp = q;
            now = ELMT(words,i,passw);
        if (now == '.'){
            *len = passw;
            found = true;
            *row = q;
            *col = p;
        else{
            passw = 0;
            p++;
            q=rows-1;
            passp=q;
    *count=hitung;
    return found;
//pencarian dari kanan bawah ke kiri
atas secara diagonal
```

```
boolean searchSEtoNW(Matrix puzzle,
Matrix words, int i, int *row, int
*col, int *len, int *count){
    boolean found = false;
    char now;
    int rows = *row, cols = *col;
    int p = rows-1, q=cols-
1,passh=q,passv=p,passw=0,hitung=0;
    while (p > 0 \&\& !found \&\&
ELMT(words,i,passw)!='.'){
        while(q \ge 0 \&\& !found \&\&
ELMT(words,i,passw)!='.'){
            hitung++;
            if(ELMT(puzzle,passv,passh)
== ELMT(words,i,passw)){
                passh--;
                passv--;
                passw++;
            else{
                passw = 0;
                q--;
                passh = q;
                passv = p;
            now = ELMT(words,i,passw);
        if (now == '.'){
            *len = passw;
            found = true;
            *row = p;
            *col = q;
        else{
            passw = 0;
            p--;
            q=cols-1;
            passv=p;
            passh=q;
    *count=hitung;
    return found;
```

```
//pencarian dari kiri atas ke kanan
bawah secara diagonal
boolean searchNWtoSE(Matrix puzzle,
Matrix words, int i, int *row, int
*col, int *len, int *count){
    boolean found = false;
    char now;
    int rows = *row, cols = *col;
    int p = 0,
q=0,passh=0,passv=0,passw=0,hitung=0;
    while (p < rows && !found &&
ELMT(words,i,passw)!='.'){
        while(q< cols && !found &&
ELMT(words,i,passw)!='.'){
            hitung++;
            if(ELMT(puzzle,passv,passh)
== ELMT(words,i,passw)){
                passh++;
                passv++;
                passw++;
            else{
                passw = 0;
                q++;
                passh = q;
                passv = p;
            now = ELMT(words, i, passw);
        if (now == '.'){
            *len = passw;
            found = true;
            *row = p;
            *col = q;
        else{
            passw = 0;
            p++;
            q=0;
            passv=p;
            passh=q;
```

```
*count = hitung;
    return found;
//pencarian dari kiri bawah ke kanan
atas secara diagonal
boolean searchSWtoNE(Matrix puzzle,
Matrix words, int i, int *row, int
*col, int *len, int *count){
    boolean found = false;
    char now;
    int rows = *row, cols = *col;
    int p = rows - 1,
q=0, passh=0, passv=p, passw=0, hitung=0;
    while (p \ge 0 \&\& !found \&\&
ELMT(words,i,passw)!='.'){
        while(q< cols && !found &&
ELMT(words,i,passw)!='.'){
            hitung++;
            if(ELMT(puzzle,passv,passh)
== ELMT(words,i,passw)){
                 passh++;
                passv--;
                 passw++;
            else{
                passw = 0;
                q++;
                 passh = q;
                passv = p;
            now = ELMT(words,i,passw);
        if (now == '.'){
            *len = passw;
            found = true;
            *row = p;
        else{
            passw = 0;
            p--;
            q=0;
```

passv=p;

```
passh=q;
    *count=hitung;
    return found;
//pencarian dari kiri atas ke kanan
bawah secara diagonal
boolean searchNEtoSW(Matrix puzzle,
Matrix words, int i, int *row, int
*col, int *len, int *count){
    boolean found = false;
    char now;
    int rows = *row, cols = *col;
    int p = 0, q = cols-
1,passh=q,passv=p,passw=0,hitung=0;
    while (p < rows && !found &&
ELMT(words,i,passw)!='.'){
        while(q \ge 0 && !found &&
ELMT(words,i,passw)!='.'){
            hitung++;
            if(ELMT(puzzle,passv,passh)
== ELMT(words,i,passw)){
                passh--;
                passv++;
                passw++;
            else{
                passw = 0;
                q--;
                passh = q;
                passv = p;
            now = ELMT(words,i,passw);
        if (now == '.'){
            *len = passw;
            found = true;
            *row = p;
            *col = q;
        else{
            passw = 0;
```

```
p++;
            q=cols-1;
            passv=p;
            passh=q;
    *count=hitung;
    return found;
//mengisi matrix solusi
void result(Matrix *puzsol, Matrix
puzzle, int rows, int cols, int len, int
option){
    if(option>=1 && option <=4){</pre>
        for (int i=0; i<len; i++){
            ELMT(*puzsol,rows,cols*2) =
ELMT(puzzle,rows,cols);
            if (option == 1){
                cols++;
            }else if(option == 2){
                cols--;
            }else if(option == 3){
                rows++;
            }else{
                rows--;
    else{
        for (int i=0; i<len; i++){
            ELMT(*puzsol,rows,cols*2) =
ELMT(puzzle,rows,cols);
            if (option == 6){
                cols++;
                rows++;
            }else if(option == 5){
                cols--;
                rows--;
            }else if(option == 7){
                cols++;
                rows--;
            }else{
                cols--;
                rows++;
```

```
//mencetak solusi
void displayResult(Matrix puzsol,
Matrix puzzle,int ori_row,int ori_col){
    for (int i=0; i<ori row; i++){</pre>
        for(int j=0; j<ori_col*2;j++){</pre>
            printf("%c",ELMT(puzsol,i,j
));
        printf("\n");
boolean searchWord(Matrix puzzle,
Matrix words, int i, int *row, int
*col, int *len, int search_option, int
*count){
    boolean found = false;
    if (search option == 1){found =
searchWtoE(puzzle,words,i,row,col,len,
count);}
    else if (search_option == 2){found
searchEtoW(puzzle,words,i,row,col,len,
count);}
    else if (search_option == 3){found
searchNtoS(puzzle,words,i,row,col,len,c
ount);}
    else if (search option == 4){found
searchStoN(puzzle,words,i,row,col,len,c
ount);}
    else if (search_option == 5){found
searchSEtoNW(puzzle,words,i,row,col,len
,count);}
    else if (search_option == 6){found
searchNWtoSE(puzzle,words,i,row,col,len
,count);}
```

```
else if (search_option == 7){found
searchSWtoNE(puzzle,words,i,row,col,len
,count);}
    else if (search_option == 8){found
searchNEtoSW(puzzle,words,i,row,col,len
,count);}
    return found;
void execute(Matrix puzzle, Matrix
puzsol, Matrix words, int Row, int Col,
int nword, int len, int *count){
    boolean found;
    int rows, cols, sum=0,counts;
    for (int i=0; i<=nword;i++){</pre>
        rows = Row; cols = Col;
        createSolvePuzzle(Row, Col,
&puzsol);
        int j=1;
        found = false;
        while(j<=9 && !found){</pre>
            found =
searchWord(puzzle,words,i,&rows,&cols,&
len,j,count);
            sum = sum + *count;
            if (found) {
                result(&puzsol,puzzle,r
ows,cols,len,j);
                displayResult(puzsol,pu
zzle,Row,Col);
                printf("\n");
            j++;
    *count = sum;
int main(){
    Matrix puzzle, puzsol, words;
    int rows=0, cols=0, nword=0, len,
Row, Col,count;
```

```
loadPuzzle(&rows, &cols, &nword,
&puzzle, &words);
   Row = rows;
   Col = cols;

   clock_t t;
   t = clock();
   execute(puzzle,
puzsol,words,Row,Col,nword,len,&count);
   t = clock() - t;
   double time_taken =
   ((double)t)/CLOCKS_PER_SEC;
     printf("%d times comparison \n",
   count);
     printf("Execution time: %f
seconds", time_taken);
   return 0;
}
```

3. Screenshoot hasil eksekusi program

a. Puzzle small 1

```
Word Search Puzzle:

WR FII KEITOENCY
PRIUIR CN FN EALR
TERSTHAAGARTOE
IES VBENALENYCD
THIAYAPCSESIKT
TCSTHMBOIKNELB
ESSTADLYRSKDAY
FYYHIUNOYTUAAN
NRCETYWFEARMER
OAQINEPNPANTYY
CUONRAEDARAPRT
QNNTHCHATECNAD
CAFNTHIDNIGHTR
BJMPFMLLABTOGF
BABY
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PARADE
PARTY
RESOLUTION
VEAR
```

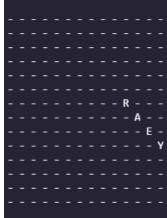
Hasil eksekusi program: Please enter puzzle file name: puzzle\_small1.txt

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# b. Puzzle small 2 Word Search Puzzle: SHCRAMWINDYME ALRCHREWOHSMM YIESSYAFIDTRI ODCELZGTOOMAT EIDLTENNEGLWG IKIUEEIALWGGN IHWOMRWNAGNYI CNODGBAOUISRR OUBSFTHSTUELP IKNNRETLNTALS AMIOEYENABXMW DMAWSMYWRAINY CXRYHCLOUDYDL **BREEZY** CHILLY CLOUDY FOGGY FRESH **GUSTY** MARCH MELTING MUDDY RAINBOW RAINY SHOWER SLEET SNOWY **SPRINGTIME** SUNNY THAWING WARM WATER WET WINDY

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Small Puzzle 3

Word Search Puzzle:

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**AIRPORT AUTO CAMERA** CRUISE **DIRECTIONS FERRY GUIDE** HIKE HOTEL MAP MOTEL MOTORCYCLE **PASSENGER PASSPORT ROUTE** SHIP TICKET TOUR TRAIN VACATION WORLD

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# d. Puzzle medium 1

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BABY

**CALENDAR** 

CHAMPAGNE

CHEER

CLOCK

CONFETTI

DANCE

FAMILY FIREWORKS

FIRST

FOOTBALL

HAPPY

HAT

**JANUARY** 

KTSS

MIDNIGHT MUSIC

PARADE

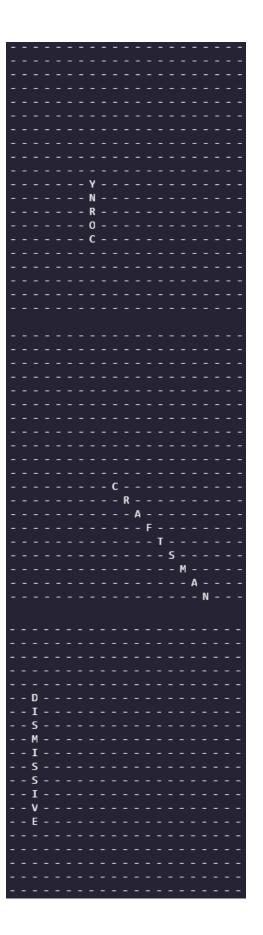
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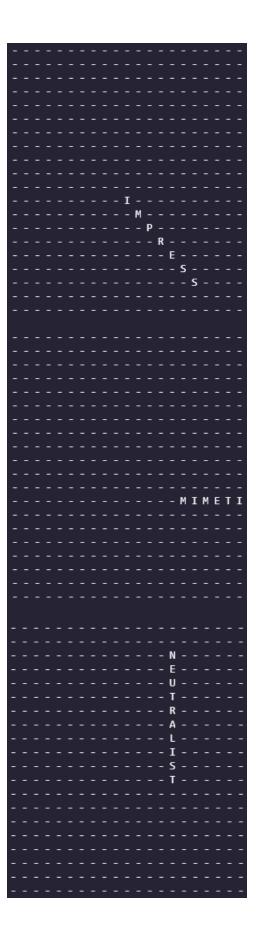
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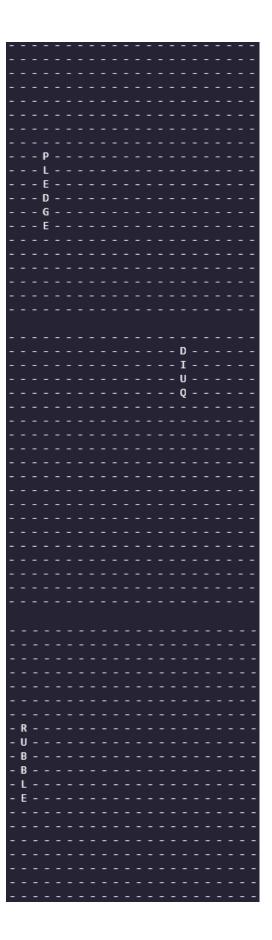
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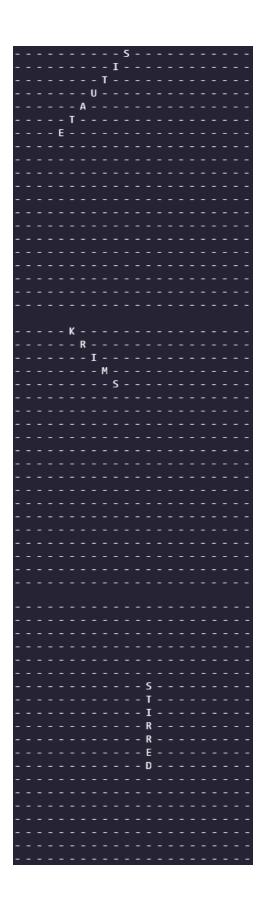
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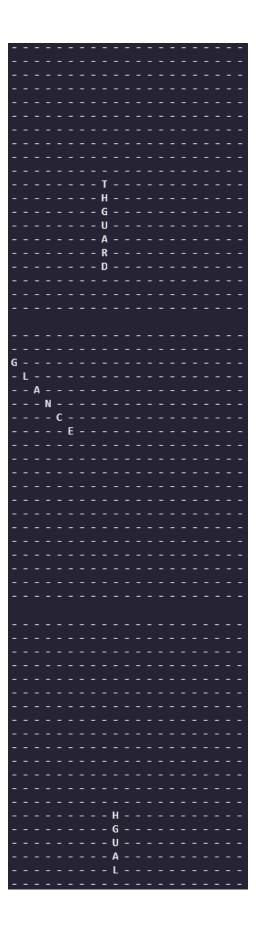
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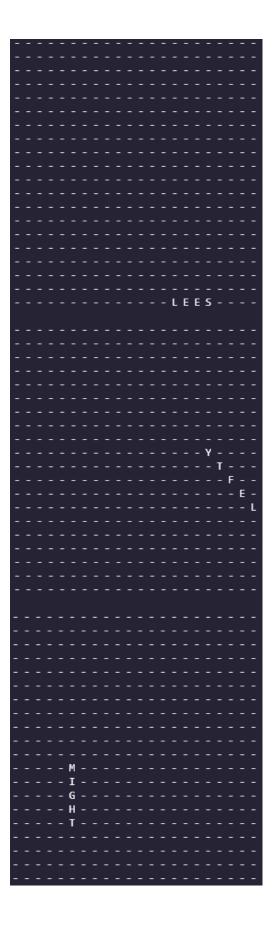
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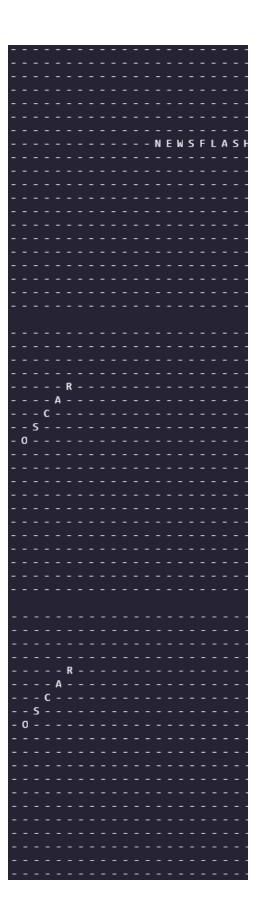
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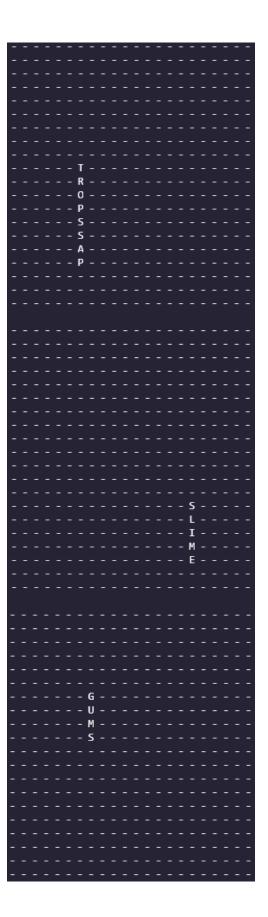
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# f. Puzzle medium 3

### Word Search Puzzle:

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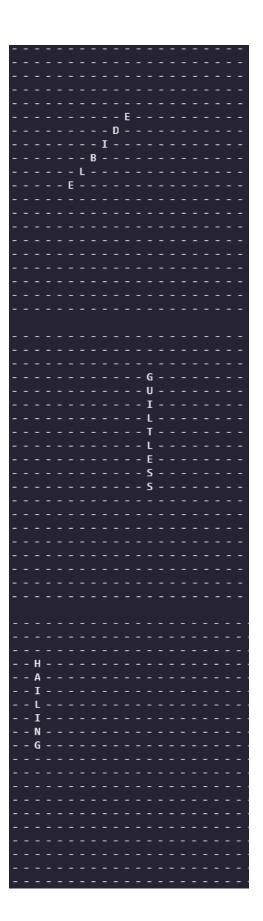
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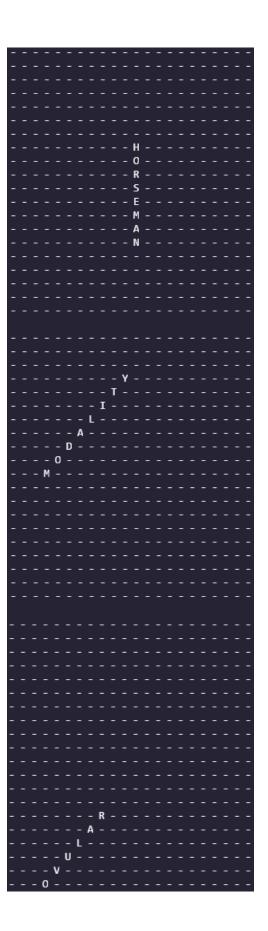
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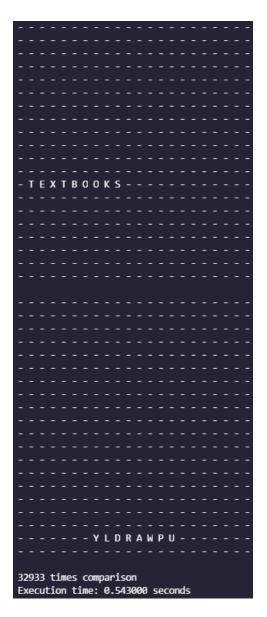
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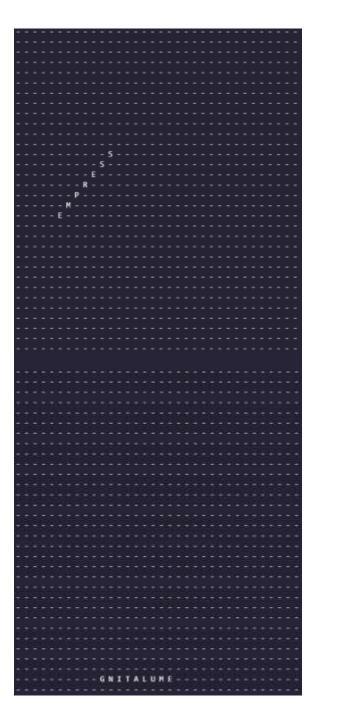
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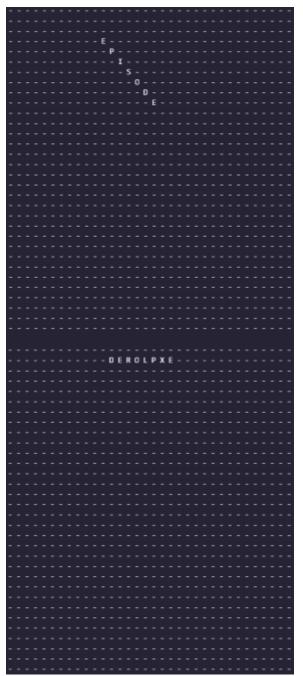


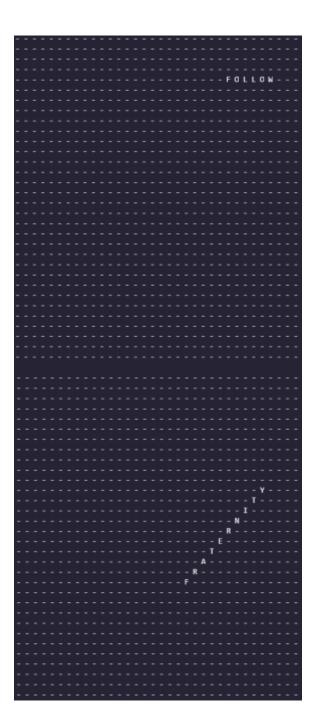
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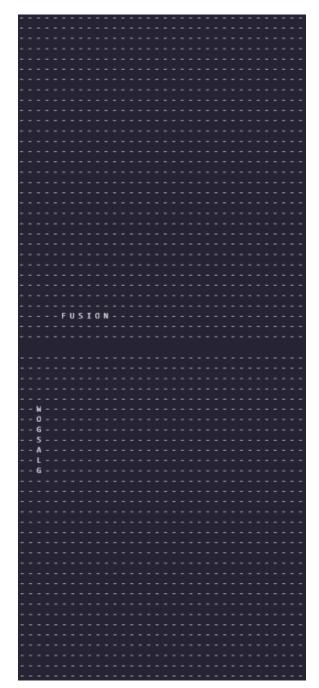
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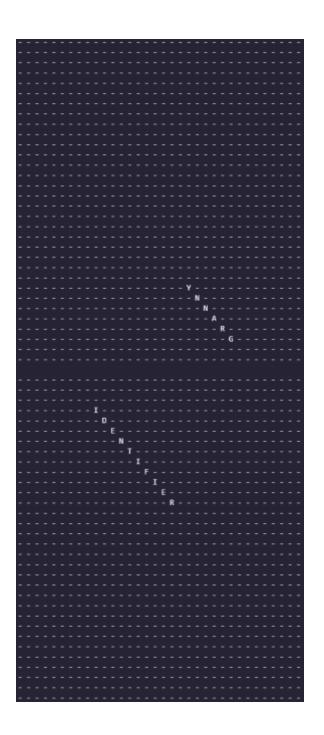
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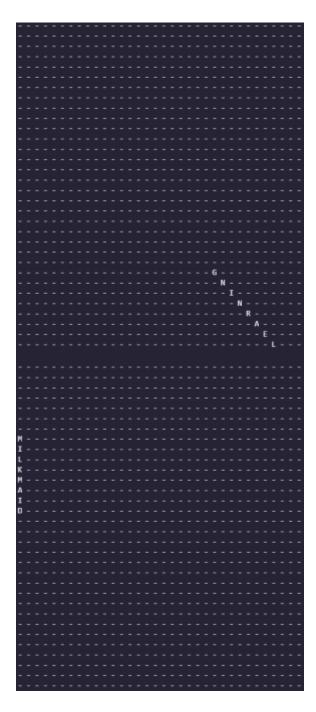


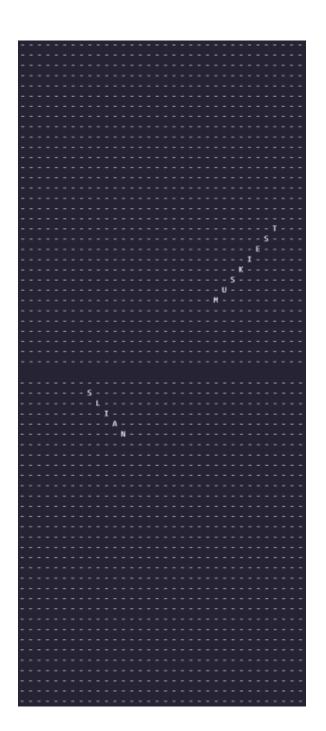


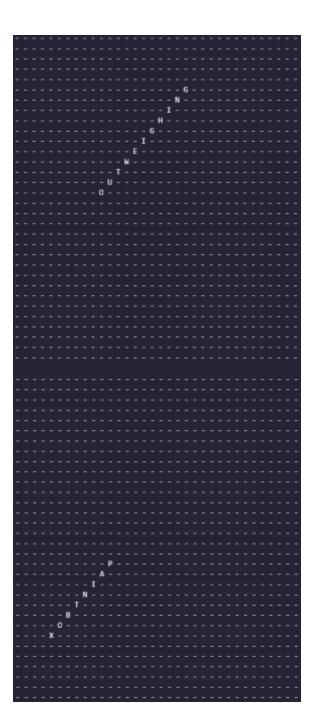


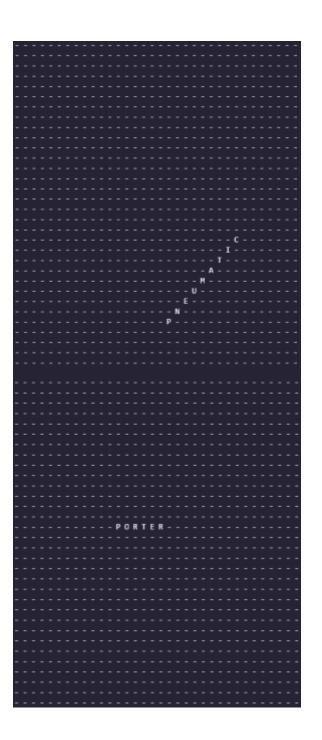


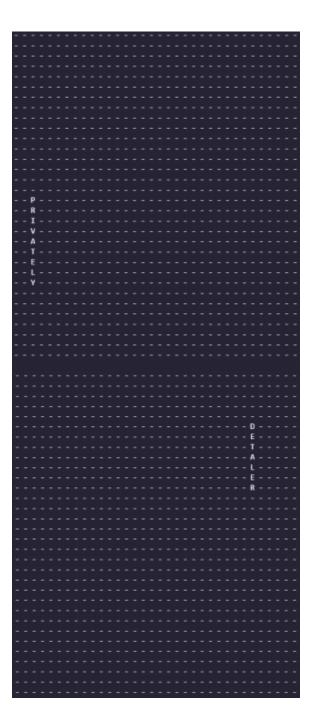


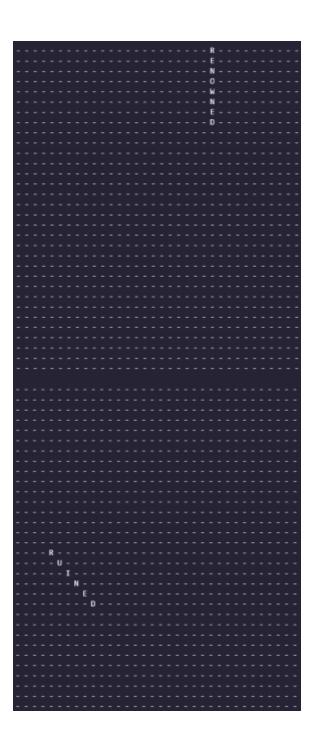


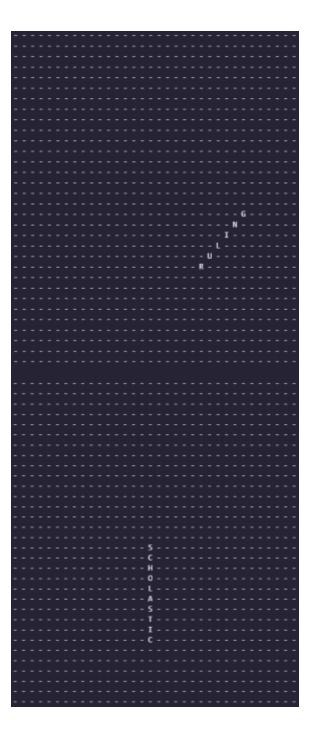


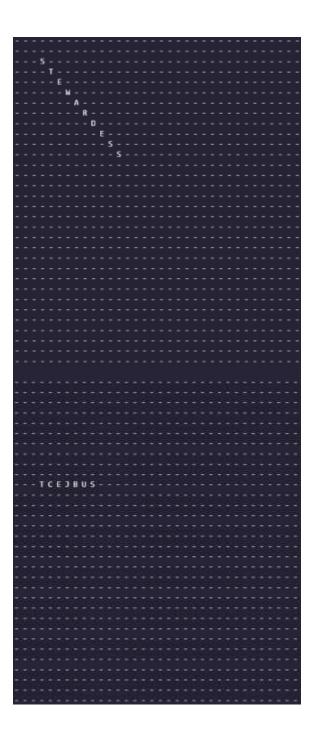


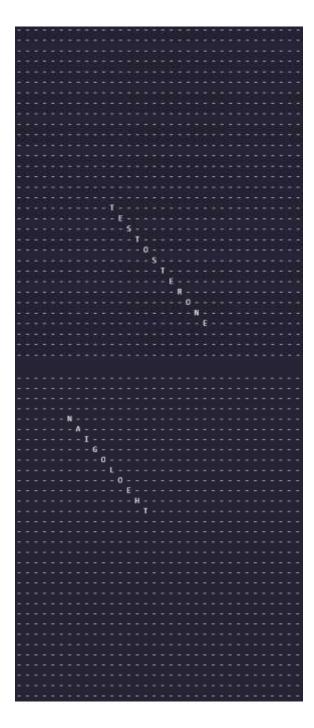












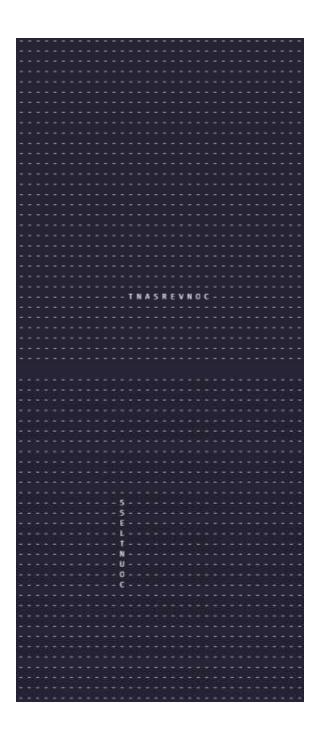
## h. Puzzle large 2 Word Search Puzzle:

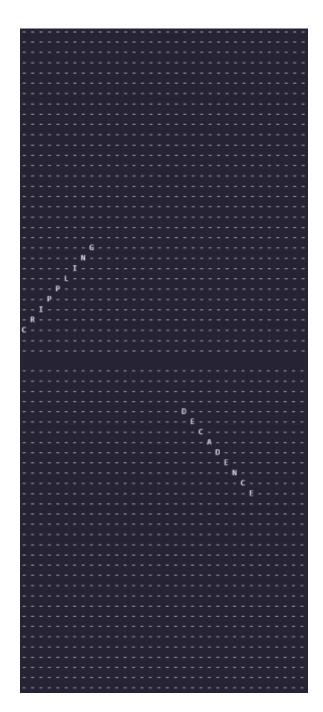
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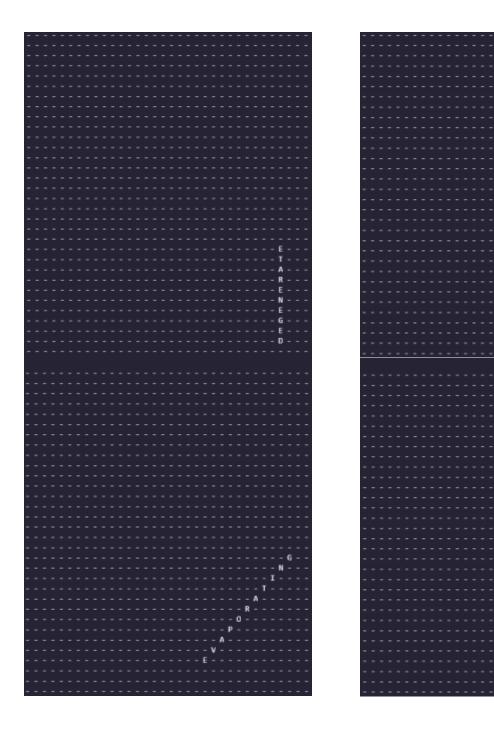
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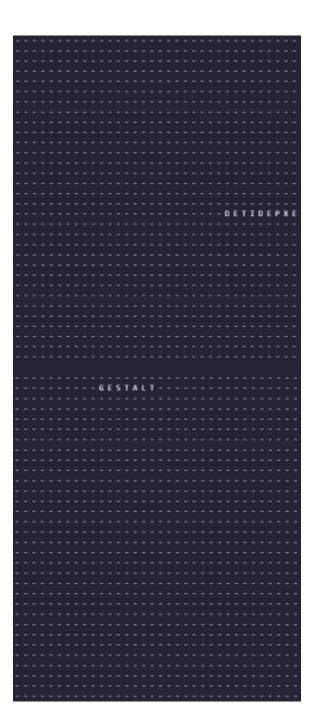
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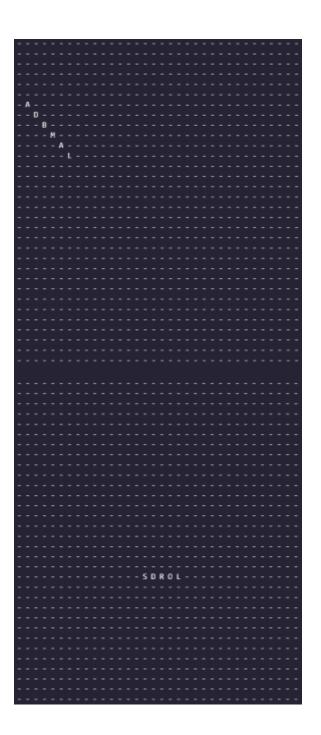


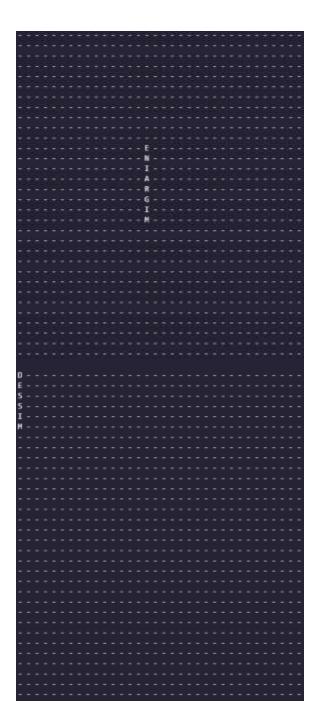


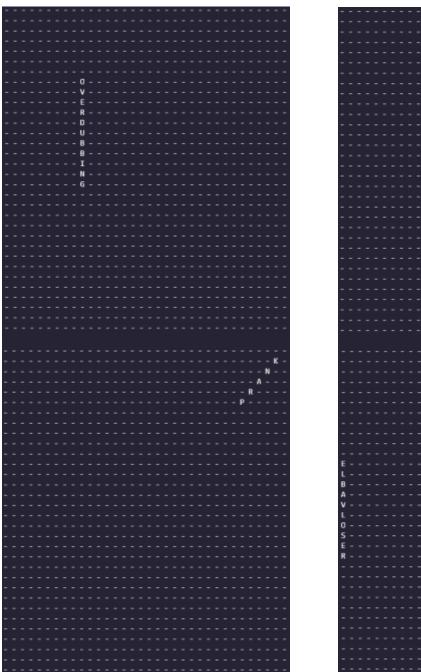


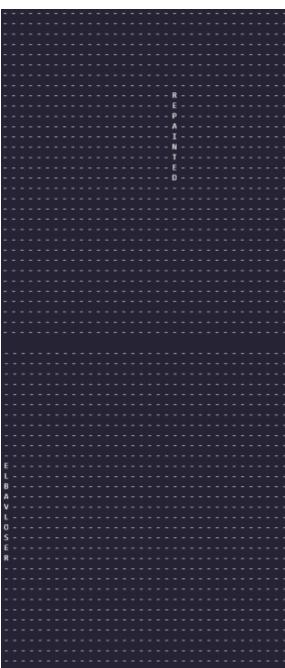


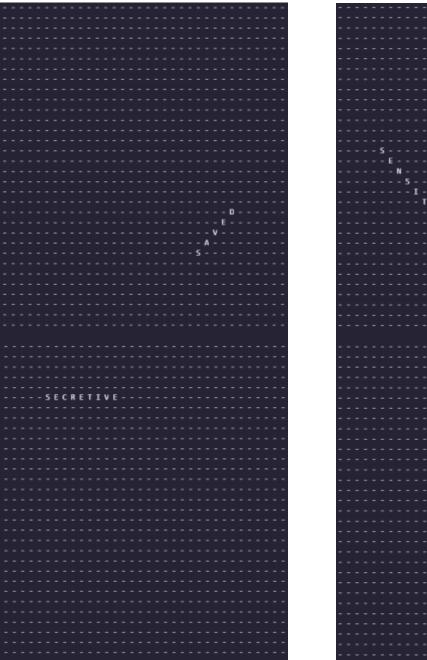
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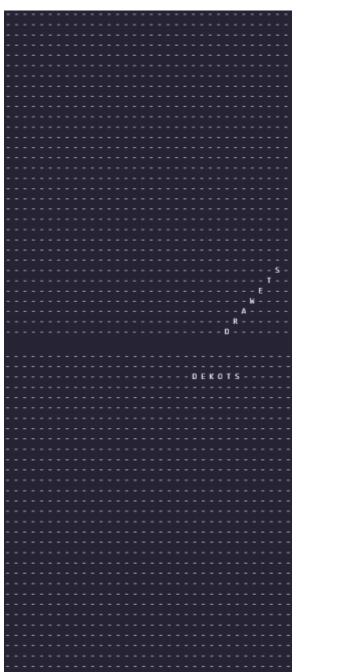








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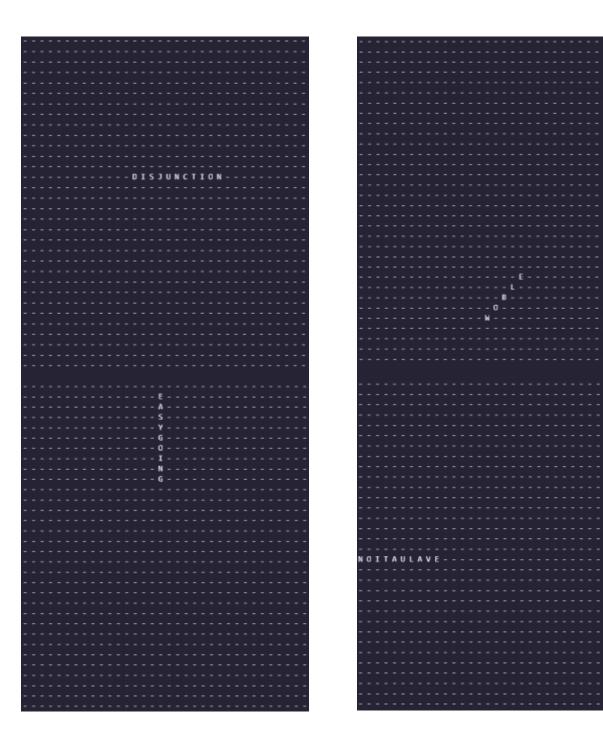


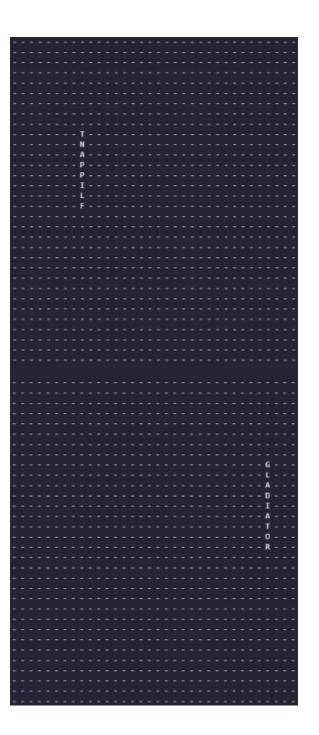
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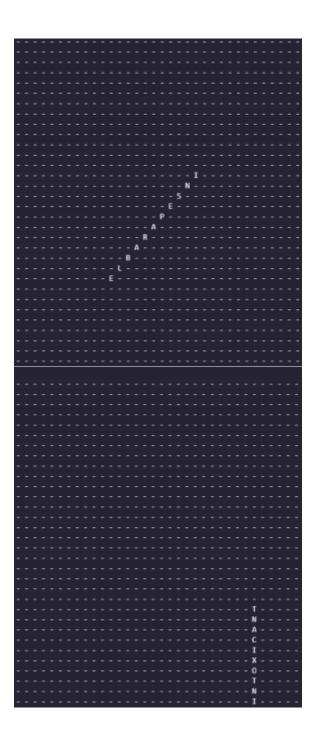
i. Puzzle large 3Word search puzzle:

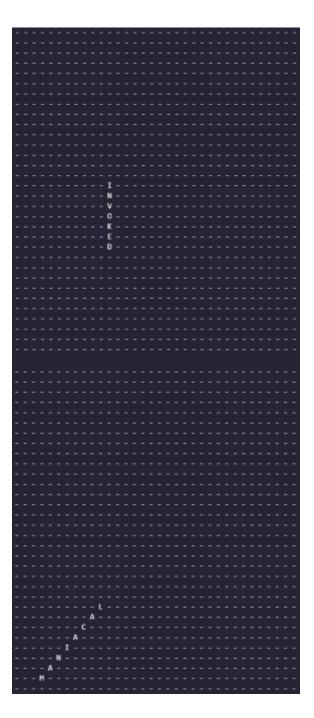
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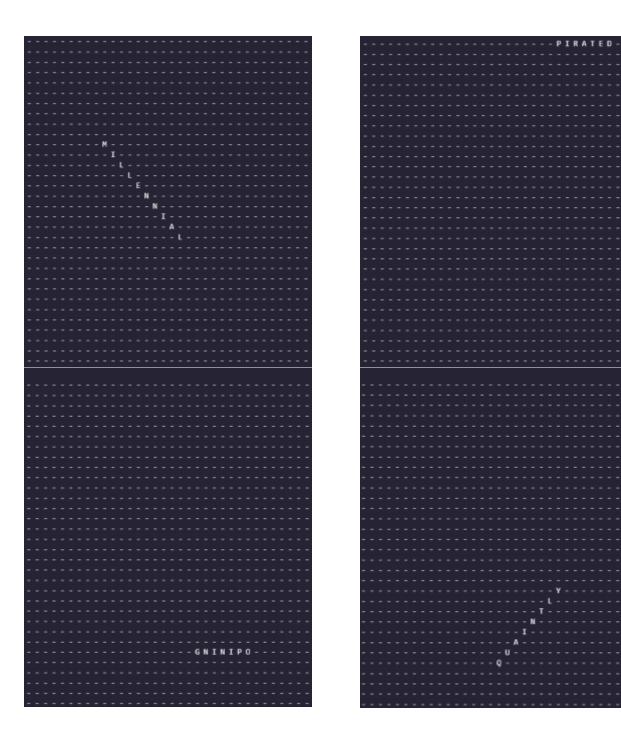


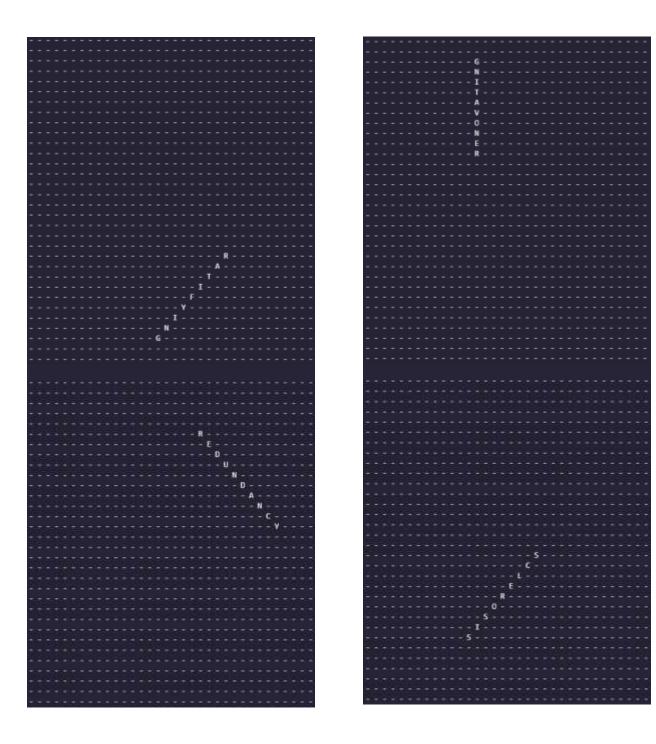


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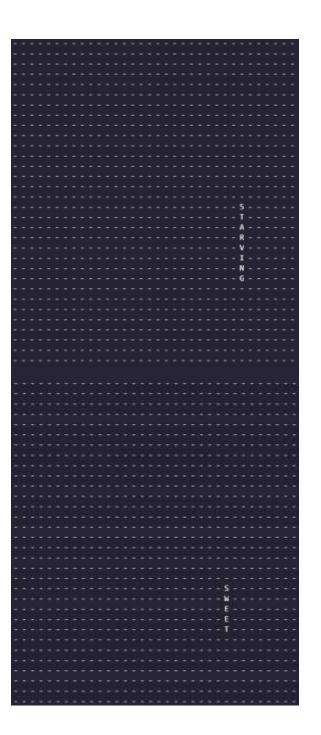


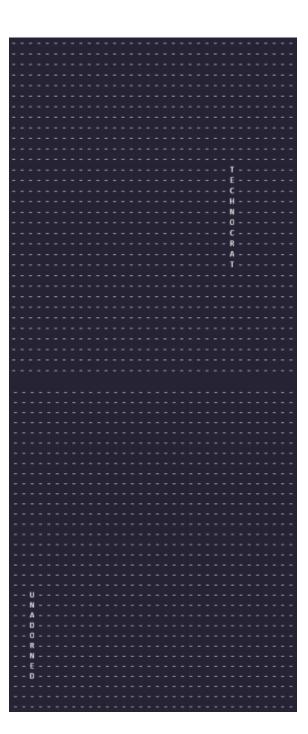


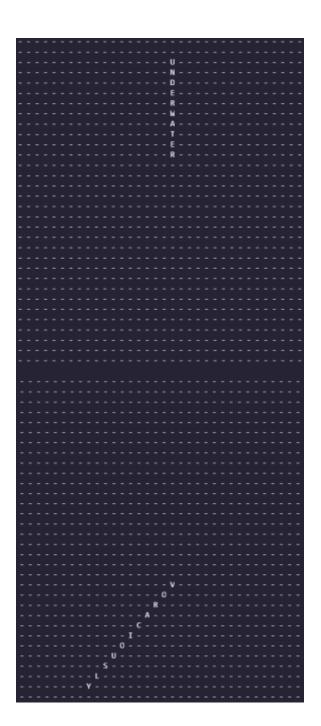


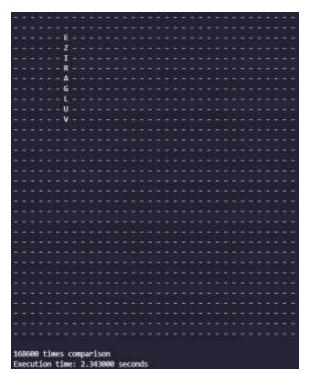
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Pada screenshot hasil eksekusi puzzle large, tidak semua kata dapat ditampilkan karena keterbatasan terminal, sehingga pada hasil screenshot tidak terdapat kata-kata yang terletak di awal list. Saya terlambat membaca QnA, sehingga waktu eksekusi yang diperoleh adalah waktu pencarian dan pencetakan solusi (bukan waktu pencarian saja).

## 4. Kode program <a href="https://github.com/VionieNovencia/Word-Search-Puzzle-Solver">https://github.com/VionieNovencia/Word-Search-Puzzle-Solver</a>

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4. Program berhasil	<b>√</b>	
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