

PENYELESAIAN WORD SEARCH PUZZLE DENGAN ALGORITMA BRUTE FORCE

LAPORAN TUGAS KECIL
diajukan untuk memenuhi persyaratan
IF2211 Strategi Algoritma



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2022

A. Deskripsi Algoritma

Untuk menyelesaikan *word search puzzle* masukan dari *file* milik pengguna, program akan menggunakan algoritma *brute force*. Pertama, program akan membandingkan tiap huruf pada *puzzle* yang dinyatakan dalam *Array of Array of String* dengan huruf pertama pada kata yang ingin dicari. Program akan terus melakukan perbandingan hingga ditemukan kecocokan. Setelah ditemukan kecocokan, program akan membandingkan tiap huruf lainnya pada kata dengan huruf yang bersebelahan dengan huruf awal pada *puzzle* secara beruntun. Perbandingan akan dilakukan pada delapan kemungkinan orientasi kata pada *puzzle*. Apabila program mencapai indeks tidak valid atau menemukan ketidakcocokan huruf dalam melakukan pemeriksaan sebuah arah, program akan mengabaikan arah tersebut dan melanjutkan pemeriksaan pada arah selanjutnya. Apabila program gagal menemukan kecocokan antara huruf pada kata dan huruf pada *puzzle* di semua kemungkinan arah dari huruf awal, program akan melanjutkan pencarian pada *puzzle* hingga ditemukan kembali huruf pada *puzzle* yang sama dengan huruf pertama kata dan mengulangi kembali langkah yang telah dijelaskan sebelumnya. Apabila program berhasil mencocokkan semua huruf kata dengan semua huruf di sebuah arah dari huruf awal, program akan menyimpan lokasi huruf pertama solusi serta arah orientasi kata pada *puzzle*. Program pun akan mengulangi keseluruhan proses hingga semua kata telah ditemukan pada *puzzle*.

B. Kode Sumber

1. WordSearchSolver.java

```
/*
 * The {@code WordSearchSolver} class represents the solver program being
 * used to solve a word search puzzle.
 */
public class WordSearchSolver {

    public static void main(String[] args) {
        System.out.println("Welcome to Word Search Solver!\n");
        WordSearch word_search = new WordSearch();
        word_search.inputWordSearch(args[0]);
        word_search.displayWordSearch();
        word_search.solveWordSearch();
        word_search.displaySolutions();
    }
}
```

2. WordSearch.java

```
import java.io.*;
import java.util.*;
import java.util.concurrent.atomic.*;

/**
 * The {@code WordSearch} class represents the word search puzzle being
 * solved by the program.
 */
public class WordSearch {

    private static final String[] valid_direction =
        {"north", "northeast", "east", "southeast", "south", "southwest", "west",
    "northwest"};

    private String[][] letters;
    private String[] words;
    private int[][] word_start;
    private ArrayList<String> direction;
    private ArrayList<Long> time;
    private LinkedList<AtomicInteger> comparison;
    private int row = 0;
    private int col = 0;
    private int word_count = 0;

    /**
     * Creates a new {@code WordSearch} object from an input file.
     * @param file_name The name of the file containing the word search puzzle
     */
    void inputWordSearch(String file_name) {
        String suffix = ".txt";

        if (!file_name.endsWith(suffix)) {
            file_name += suffix;
        }

        try {
            String file_path = new File("../test/" + file_name).getCanonicalPath();
            File file = new File(file_path);
            Scanner file_input = new Scanner(file);

            while (file_input.hasNextLine()) {
                String word_search_row = file_input.nextLine();
                if (this.row == 0) {
                    String[] array_row = word_search_row.split(" ");
                    this.col = array_row.length;
                } else if (Objects.equals(word_search_row, "")) {
                    break;
                }
            }
        } catch (Exception e) {
            System.out.println("An error occurred while reading the file: " + e.getMessage());
        }
    }
}
```

```

        }
        this.row += 1;
    }

    while (file_input.hasNextLine()) {
        this.word_count += 1;
        file_input.nextLine();
    }
    file_input.close();

    this.letters = new String[this.row][this.col];
    this.words = new String[this.word_count];

    Scanner word_search_input = new Scanner(file);

    for (int i = 0; i < this.row; i++) {
        for (int j = 0; j < this.col; j++) {
            this.letters[i][j] = word_search_input.next("[A-Z]");
        }
    }

    word_search_input.nextLine();
    for (int i = 0; i < this.word_count; i++) {
        this.words[i] = word_search_input.next();
    }
    word_search_input.close();
} catch (IOException error) {
    System.out.println("File cannot be accessed!");
    error.printStackTrace();
    System.exit(1);
}
}

/**
 * Displays a {@code WordSearch} object into the terminal.
 */
void displayWordSearch() {
    for (int i = 0; i < this.row; i++) {
        for (int j = 0; j < this.col; j++) {
            System.out.printf("%s ", this.letters[i][j]);
            if (i != this.row - 1 && j == this.col - 1) {
                System.out.println();
            }
        }
    }
    System.out.println("\n");
}

```

```

        for (int i = 0; i < this.word_count; i++) {
            System.out.println(this.words[i]);
        }
        System.out.println();
    }

    /**
     * Solves a {@code WordSearch} object and stores its solutions on its attributes.
     * A brute force approach is used by this method.
     */
    void solveWordSearch() {
        this.word_start = new int[this.word_count][2];
        this.direction = new ArrayList<>();
        this.time = new ArrayList<>();
        this.comparison = new LinkedList<>();
        int w = 0;

        for (String word : this.words) {
            this.comparison.add(new AtomicInteger(0));

            long start_time = System.nanoTime();
            checkWord(w, word);
            this.time.add(System.nanoTime() - start_time);
            w++;
        }
    }

    /**
     * Checks whether a letter in the word search puzzle matches with the first
     * letter of the word being searched.
     * @param w Index location in which the solution will be stored
     * @param word The word being searched
     */
    private void checkWord(int w, String word) {
        for (int i = 0; i < this.row; i++) {
            for (int j = 0; j < this.col; j++) {
                this.comparison.getLast().incrementAndGet();
                if (Objects.equals(this.letters[i][j], word.substring(0, 1))) {
                    String word_direction = this.findDirection(i, j, word);
                    if (word_direction != null) {
                        this.direction.add(word_direction);
                        this.word_start[w][0] = i;
                        this.word_start[w][1] = j;
                        return;
                    }
                }
            }
        }
    }
}

```

```

        }

    }

    /**
     * Tests for all possible direction the word being searched might be
     * oriented in the puzzle.
     * @param row The number of row in the word search puzzle
     * @param column The number of column in the word search puzzle
     * @param word The word being searched
     * @return The word's orientation or {@code null} if the word is not found
     */
    private String findDirection(int row, int column, String word) {
        String direction = null;

        for (String dir: valid_direction) {
            if (this.tryDirection(dir, row, column, word)) {
                direction = dir;
                break;
            }
        }

        return direction;
    }

    /**
     * Tests for a potential direction the word is possibly oriented in the
     * puzzle
     * @param direction The potential direction being tested
     * @param row The number of row in the word search puzzle
     * @param column The number of column in the word search puzzle
     * @param word The word being searched
     * @return {@code true} if the word is found in the direction and {@code false}
     * otherwise
     */
    private boolean tryDirection(String direction, int row, int column, String word) {
        boolean correct_direction = false;

        try {
            switch (direction) {
                case "north" -> {
                    for (int i = 1; i < word.length(); i++) {
                        this.comparison.getLast().incrementAndGet();
                        if (!Objects.equals(this.letters[row - i][column],
word.substring(i, i + 1))) {
                            break;
                        } else if (i == word.length() - 1) {
                            correct_direction = true;
                        }
                    }
                }
            }
        } catch (Exception e) {
            e.printStackTrace();
        }
        return correct_direction;
    }
}

```

```

        }
    }
}

case "northeast" -> {
    for (int i = 1; i < word.length(); i++) {
        this.comparison.getLast().incrementAndGet();
        if (!Objects.equals(this.letters[row - i][column + i],
word.substring(i, i + 1))) {
            break;
        } else if (i == word.length() - 1) {
            correct_direction = true;
        }
    }
}

case "east" -> {
    for (int i = 1; i < word.length(); i++) {
        this.comparison.getLast().incrementAndGet();
        if (!Objects.equals(this.letters[row][column + i],
word.substring(i, i + 1))) {
            break;
        } else if (i == word.length() - 1) {
            correct_direction = true;
        }
    }
}

case "southeast" -> {
    for (int i = 1; i < word.length(); i++) {
        this.comparison.getLast().incrementAndGet();
        if (!Objects.equals(this.letters[row + i][column + i],
word.substring(i, i + 1))) {
            break;
        } else if (i == word.length() - 1) {
            correct_direction = true;
        }
    }
}

case "south" -> {
    for (int i = 1; i < word.length(); i++) {
        this.comparison.getLast().incrementAndGet();
        if (!Objects.equals(this.letters[row + i][column],
word.substring(i, i + 1))) {
            break;
        } else if (i == word.length() - 1) {
            correct_direction = true;
        }
    }
}
}

```

```

        case "southwest" -> {
            for (int i = 1; i < word.length(); i++) {
                this.comparison.getLast().incrementAndGet();
                if (!Objects.equals(this.letters[row + i][column - i],
word.substring(i, i + 1))) {
                    break;
                } else if (i == word.length() - 1) {
                    correct_direction = true;
                }
            }
        }
        case "west" -> {
            for (int i = 1; i < word.length(); i++) {
                this.comparison.getLast().incrementAndGet();
                if (!Objects.equals(this.letters[row][column - i],
word.substring(i, i + 1))) {
                    break;
                } else if (i == word.length() - 1) {
                    correct_direction = true;
                }
            }
        }
        case "northwest" -> {
            for (int i = 1; i < word.length(); i++) {
                this.comparison.getLast().incrementAndGet();
                if (!Objects.equals(this.letters[row - i][column - i],
word.substring(i, i + 1))) {
                    break;
                } else if (i == word.length() - 1) {
                    correct_direction = true;
                }
            }
        }
    } catch (IndexOutOfBoundsException ignored) {
        // Loop exits and returns
    }

    return correct_direction;
}

/**
 * Displays the {@code WordSearch} object's solutions on the terminal
 */
void displaySolutions() {
    String[][] solution = new String[this.row][this.col];
}

```

```

for (int i = 0; i < this.word_count; i++) {
    System.out.println("-----");
    for (int j = 0; j < this.row; j++) {
        for (int k = 0; k < this.col; k++) {
            solution[j][k] = "-";
        }
    }
}

switch (this.direction.get(i)) {
    case "north" -> {
        for (int j = 0; j < this.words[i].length(); j++) {
            solution[this.word_start[i][0] - j][this.word_start[i][1]] =
this.words[i].substring(j, j + 1);
        }
    }
    case "northeast" -> {
        for (int j = 0; j < this.words[i].length(); j++) {
            solution[this.word_start[i][0] - j][this.word_start[i][1] + j] =
this.words[i].substring(j, j + 1);
        }
    }
    case "east" -> {
        for (int j = 0; j < this.words[i].length(); j++) {
            solution[this.word_start[i][0]][this.word_start[i][1] + j] =
this.words[i].substring(j, j + 1);
        }
    }
    case "southeast" -> {
        for (int j = 0; j < this.words[i].length(); j++) {
            solution[this.word_start[i][0] + j][this.word_start[i][1] + j] =
this.words[i].substring(j, j + 1);
        }
    }
    case "south" -> {
        for (int j = 0; j < this.words[i].length(); j++) {
            solution[this.word_start[i][0] + j][this.word_start[i][1]] =
this.words[i].substring(j, j + 1);
        }
    }
    case "southwest" -> {
        for (int j = 0; j < this.words[i].length(); j++) {
            solution[this.word_start[i][0] + j][this.word_start[i][1] - j] =
this.words[i].substring(j, j + 1);
        }
    }
    case "west" -> {
        for (int j = 0; j < this.words[i].length(); j++) {
    
```

```

        solution[this.word_start[i][0]][this.word_start[i][1] - j] =
this.words[i].substring(j, j + 1);
    }
}
case "northwest" -> {
    for (int j = 0; j < this.words[i].length(); j++) {
        solution[this.word_start[i][0] - j][this.word_start[i][1] - j] =
this.words[i].substring(j, j + 1);
    }
}
for (int j = 0; j < this.row; j++) {
    for (int k = 0; k < col; k++) {
        System.out.printf("%s ", solution[j][k]);
        if (j != this.row - 1 && k == this.col - 1) {
            System.out.println();
        }
    }
}
System.out.println();
System.out.printf("Comparison done: %s\n", this.comparison.get(i));
System.out.printf("Time elapsed: %d ns\n", this.time.get(i));
System.out.println();
}
}
}

```

C. Uji Coba Program

1. coldplay.txt (Small)

The screenshot shows the WordSearchSolver application running in IntelliJ IDEA. The main window displays a 10x10 grid of letters and a list of found words.

Word Search Grid:

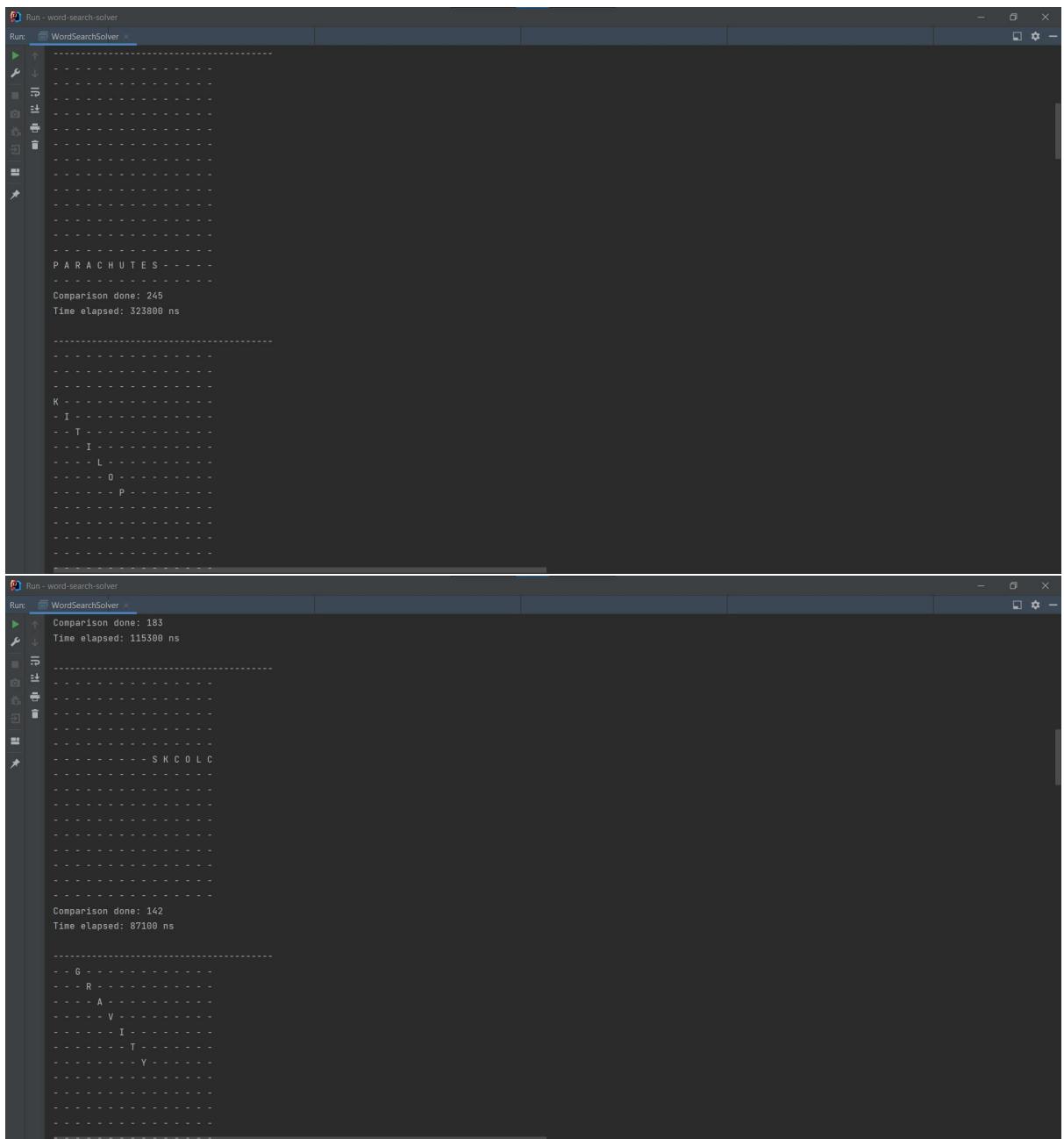
```

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

```

Found Words:

- POLITIK
- CLOCKS
- GRAVITY
- CEMETERIES
- STRAWBERRY
- TEARDROP
- CHARLIE
- MIDNIGHT
- OCEANS
- EVERGLOW
- ARABESQUE
- ORPHANS
- HUMANKIND
- UNIVERSE

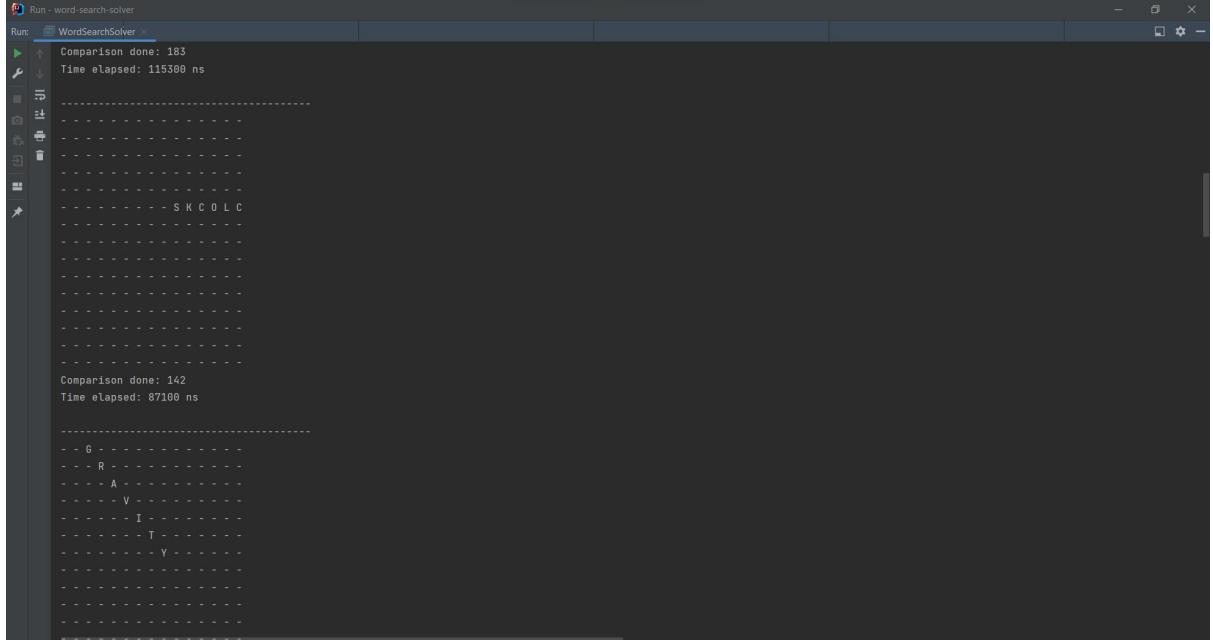
```
Run - word-search-solver
Run: WordSearchSolver >


```
P A R A C H U T E S
Comparison done: 245
Time elapsed: 323800 ns

K
I
T
I
L
O
P

```



```
Run - word-search-solver
Run: WordSearchSolver >


```
Comparison done: 183
Time elapsed: 115300 ns

-----
S K C O L C
-----
```



```
Comparison done: 142
Time elapsed: 87100 ns

-----
G
R
A
V
I
T
Y
-----
```


```


```

```
Run - word-search-solver
Run: WordSearchSolver >

-----
Comparison done: 12
Time elapsed: 19300 ns
-----
S - - - - -
- E - - - - -
- - I - - - -
- - - R - - -
- - - - E - - -
- - - - T - - -
- - - - E - - -
- - - - M - - -
- - - - - E - - -
- - - - - C - - -
- - - - - - - - -
- - - - - - - - -
Comparison done: 222
Time elapsed: 99300 ns
-----
S T R A W B E R R Y - - - -
Comparison done: 387
Time elapsed: 163500 ns
-----
- - - P O R D R A E T - - -
- - - - - - - - -
- - - - - - - - -
- - - - - - - - -
- - - - - - - - -
- - - - - - - - -
Comparison done: 41
Time elapsed: 15500 ns
-----
E - - - - - - - - -
-----
```

```
Run - word-search-solver
Run: WordSearchSolver >
I
L
R
A
H
C
Comparison done: 237
Time elapsed: 101500 ns

-----
M
I
D
N
I
G
H
T
Comparison done: 146
Time elapsed: 52900 ns

-----
O C E A N S
Comparison done: 11
Time elapsed: 16900 ns

-----
W
O
L
G
R
E
V
E
Comparison done: 283
Time elapsed: 115800 ns
```

```
Run - word-search-solver
Run: WordSearchSolver >


-----  
A  
R  
A  
B  
E  
S  
Q  
U  
E  
Comparison done: 174  
Time elapsed: 80800 ns  
-----  
O  
R  
P  
H  
A  
N  
S  
L  
-----  
Comparison done: 97



Run - word-search-solver
Run: WordSearchSolver >


Time elapsed: 42800 ns  
-----  
D  
N  
I  
K  
N  
A  
M  
U  
H  
-----  
Comparison done: 222  
Time elapsed: 27600 ns  
-----  
U  
N  
I  
V  
E  
R  
S  
E  
-----  
Comparison done: 121  
Time elapsed: 24200 ns



Process finished with exit code 0


```

2. champions.txt (Medium)

The image shows two side-by-side screenshots of the IntelliJ IDEA interface, each displaying a run configuration for a Java application named "WordSearchSolver".

Top Window (Run - word-search-solver):

- Run: C:\Program Files\Java\jdk-17\bin\java.exe" "-javaagent:C:\Program Files\JetBrains\IntelliJ IDEA 2021.2.1\lib\idea_rt.jar=55215:C:\Program Files\JetBrains\IntelliJ IDEA 2021.2.1\bin"
- Welcome to Word Search Solver!
- Grid of letters:

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

- List of found words:

 - ZUKERTORT
 - STEINITZ
 - LASKER
 - CAPABLANCA
 - ALEKHINE
 - EUWE
 - BOTVINNIK
 - SMYSLOV
 - TAL
 - PETROSIAN

Bottom Window (Run - word-search-solver):

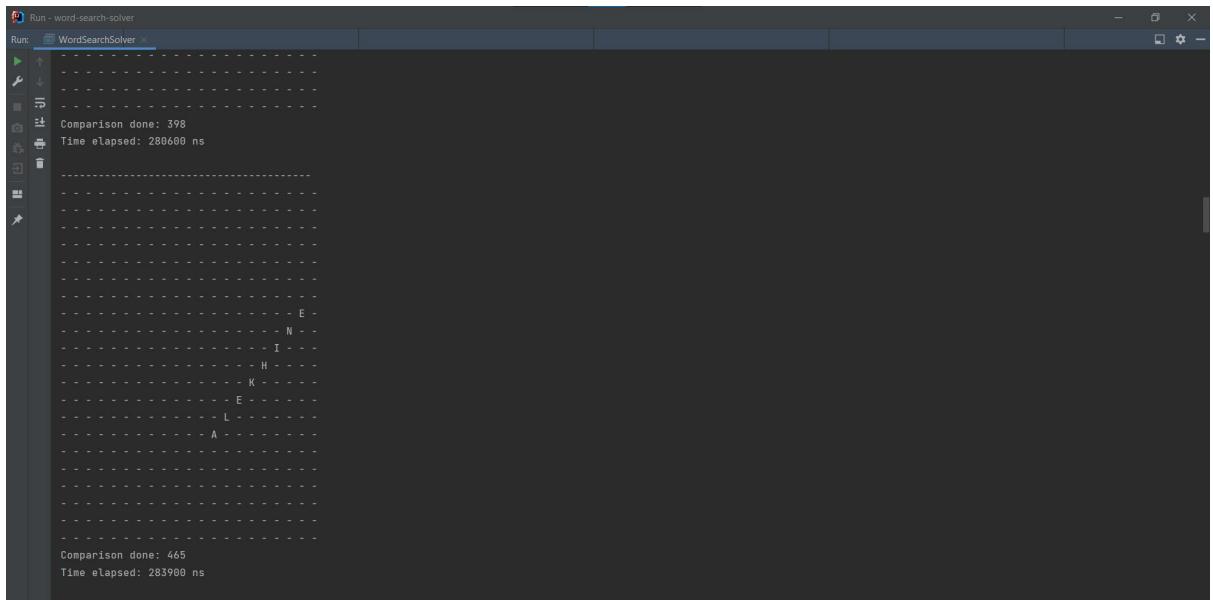
 - Run: C:\Program Files\Java\jdk-17\bin\java.exe" "-javaagent:C:\Program Files\JetBrains\IntelliJ IDEA 2021.2.1\lib\idea_rt.jar=55215:C:\Program Files\JetBrains\IntelliJ IDEA 2021.2.1\bin"
 - Welcome to Word Search Solver!
 - Grid of letters:

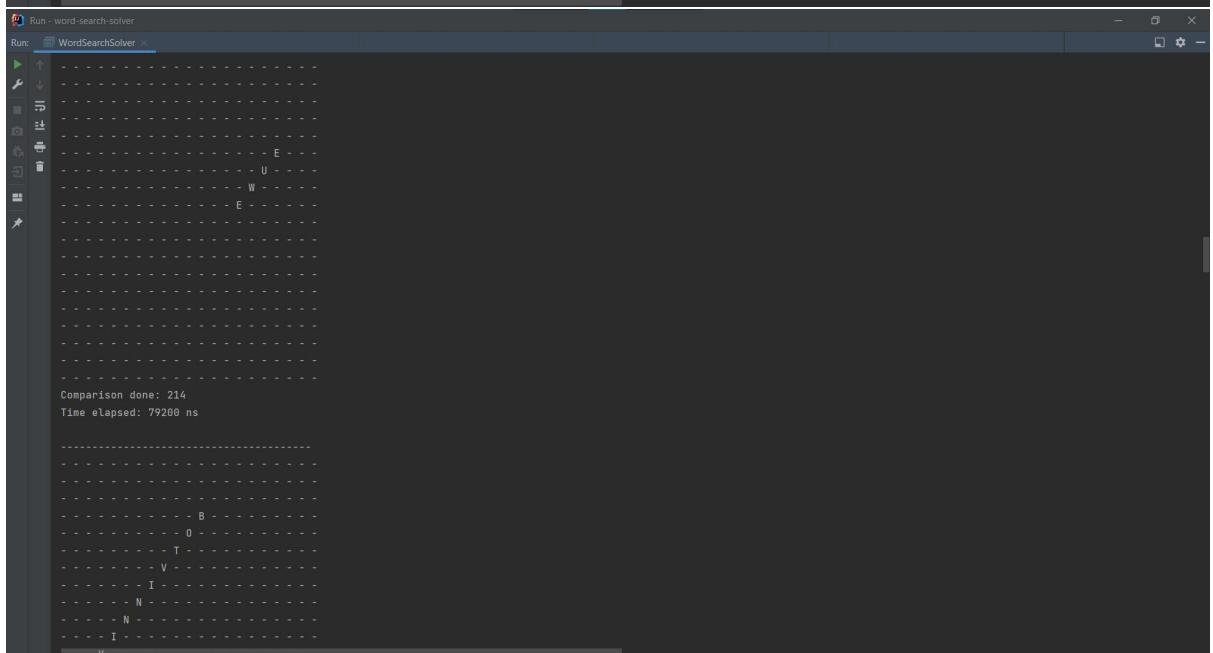
```
SPASSKY  
FISCHER  
KARPOV  
KASPAROV  
KHALIFMAN  
PONOMARIOV  
KASIMZHANOV  
TOPALOV  
KRAMNIK  
ANAND  
CARLSEN
```

 - Comparison status:

 - Comparison done: 69

```
Run - word-search-solver
Run: WordSearchSolver >
Time elapsed: 52000 ns
[REDACTED]
Z
T
I
N
I
E
T
S
Comparison done: 597
Time elapsed: 447300 ns
[REDACTED]
R
E
K
S
A
L
Comparison done: 146
Time elapsed: 96000 ns
[REDACTED]
= C A P A B L A N C A =
```

```
Run - word-search-solver
Run: WordSearchSolver >

Comparison done: 398
Time elapsed: 280660 ns

Run - word-search-solver
Run: WordSearchSolver >

Comparison done: 445
Time elapsed: 283900 ns
```

```
Run - word-search-solver
Run: WordSearchSolver >


```
Comparison done: 105
Time elapsed: 29000 ns

V
O
L
S
Y
M
S

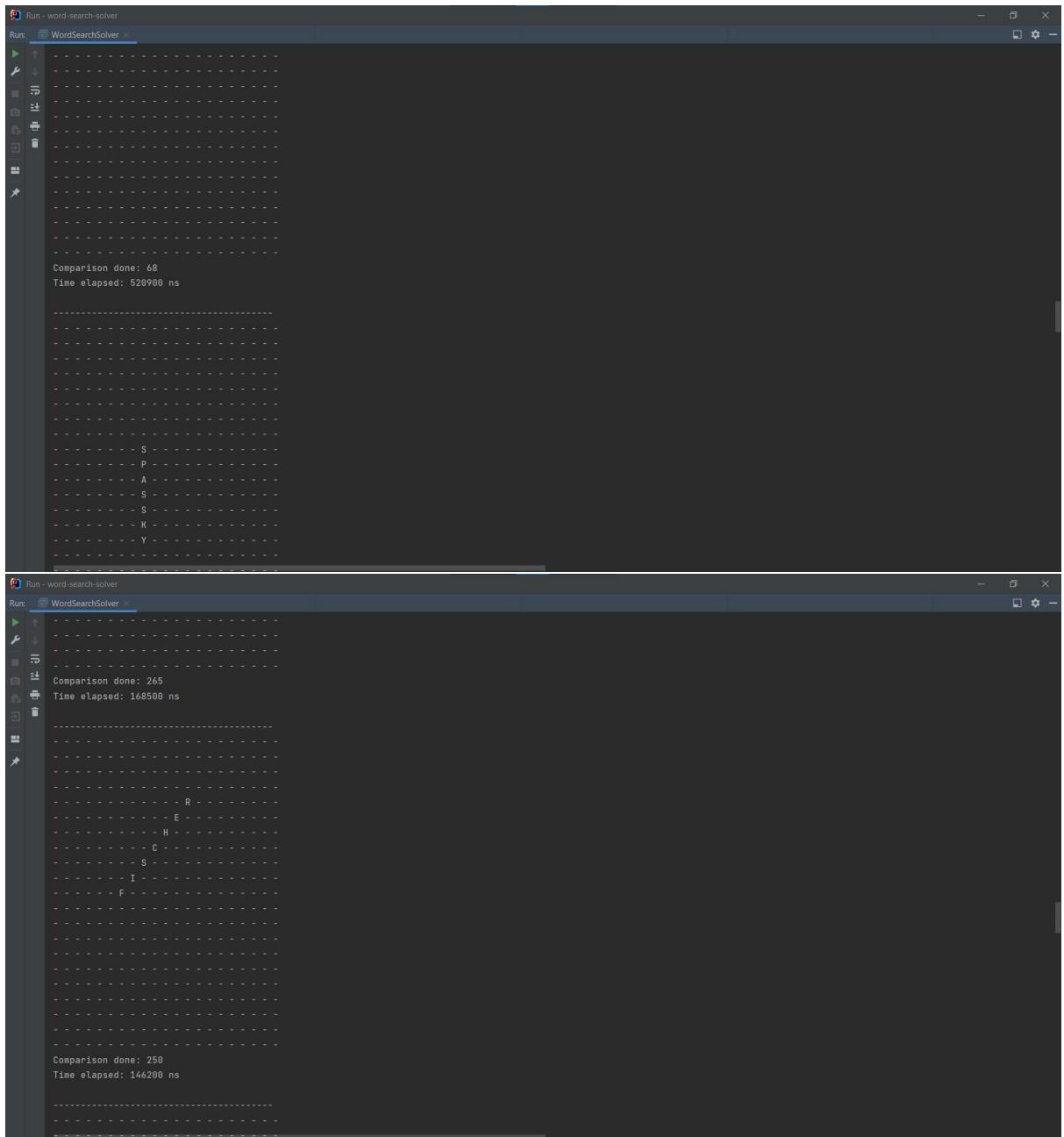
Comparison done: 282
Time elapsed: 176100 ns

L
A
T

Comparison done: 594
Time elapsed: 278880 ns

P E T R O S I A N
```


```

```
Run - word-search-solver
Run: WordSearchSolver >


```

Comparison done: 68
Time elapsed: 520900 ns

.	S	.
.	P	.
.	A	.
.	S	.
.	S	.
.	K	.
.	Y	.

Run - word-search-solver
Run: WordSearchSolver >

```



```

Comparison done: 265
Time elapsed: 168500 ns

.	.	.
.	R	.
.	E	.
.	H	.
.	C	.
.	S	.
.	I	.
.	F	.

Comparison done: 250
Time elapsed: 146200 ns
```


```

```
Run - word-search-solver
Run: WordSearchSolver >
V -
O -
P -
R -
A -
K -
J -
I -
H -
L -
M -
N -
Comparison done: 264
Time elapsed: 72888 ns
```

```
Run - word-search-solver
Run: WordSearchSolver >
V O P R A K -
V O R A P S A K -
Comparison done: 588
Time elapsed: 284188 ns
```

```
K -
H -
A -
L -
I -
F -
M -
A -
N -
Comparison done: 288
```

```
Run - word-search-solver
Run: WordSearchSolver >
Time elapsed: 72100 ns
P
O
N
O
M
A
R
I
O
V
Comparison done: 197
Time elapsed: 146400 ns
K
A
S
I
H
Comparison done: 79
Time elapsed: 33900 ns
D
Z
H
A
N
O
V
TOPALOV
```

```
Run - word-search-solver
Run: WordSearchSolver >

Comparison done: 126
Time elapsed: 81500 ns

-----K I N M A R K-----
-----K I N M A R K-----

Comparison done: 464
Time elapsed: 213600 ns

-----D-----
-----N-----
-----A-----
-----N-----
-----A-----
-----N-----
-----E-----
-----S-----
-----L-----
-----R-----
-----A-----
-----C-----
-----N-----
-----E-----

Comparison done: 697
Time elapsed: 297400 ns

-----N-----
-----E-----
-----S-----
-----L-----
-----R-----
-----A-----
-----C-----

Comparison done: 425
Time elapsed: 257400 ns

Process finished with exit code 0
```

3. himym.txt (Large)

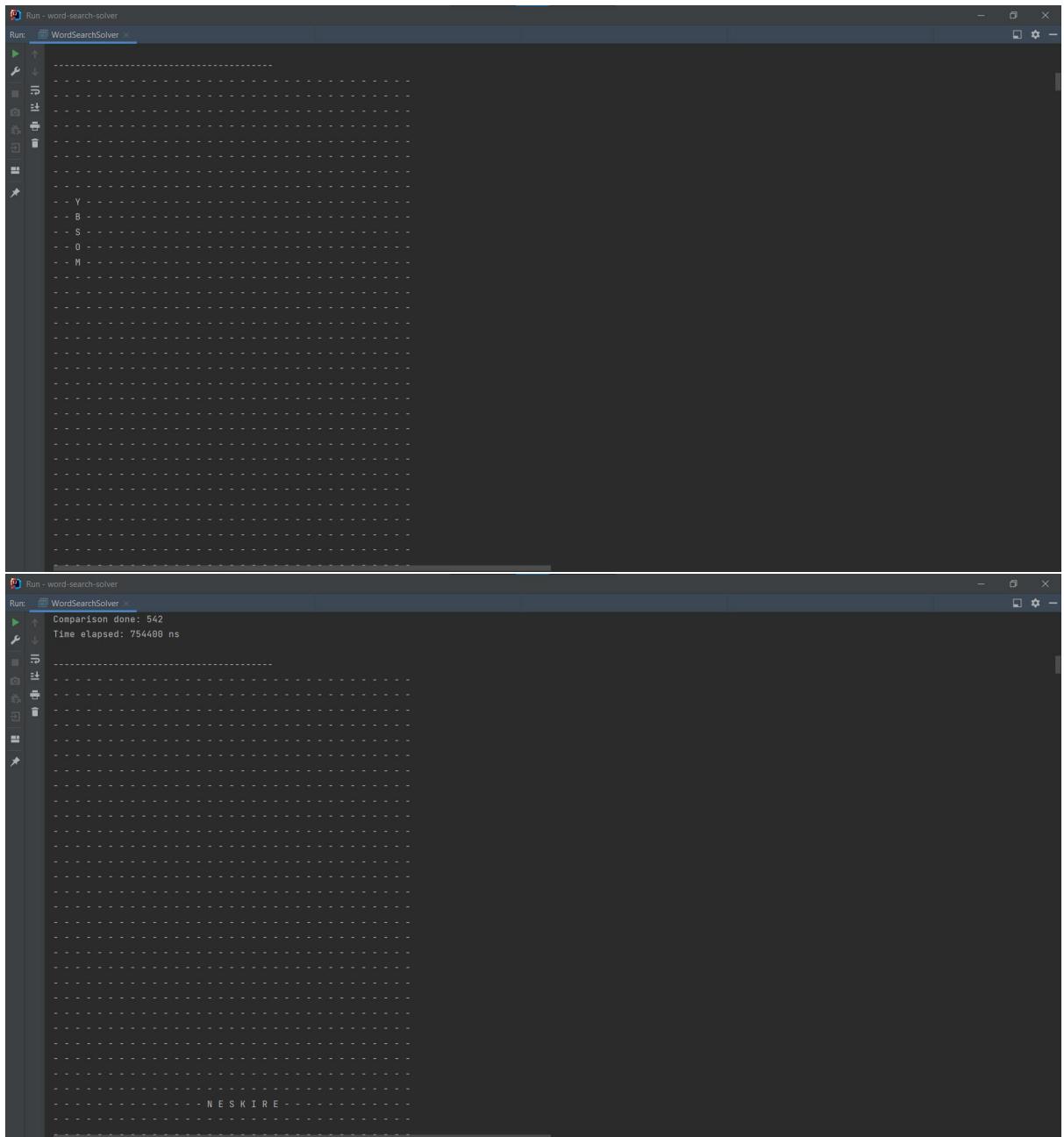
The screenshot shows two tabs in the IntelliJ IDEA interface, both titled "WordSearchSolver".

The top tab displays a large grid of letters representing the word search puzzle. The letters are arranged in a grid and include various words from the "himym.txt" file.

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

The bottom tab displays a list of found words:

```
G O X W D X O B D L M Z P L E A S E L R M S V O I N K E E P E R W  
MOSBY  
ERIKSEN  
ALDRIN  
STINSON  
SCHERBATSKY  
MCCONNELL  
LEGENDARY  
OLIVE  
SUITUP  
COCKAMOUSE  
THANKSTINI  
KWANZAPOLITAN  
BASKECBALL  
MARSHAMMON  
LAWYERED  
SLAPBET  
FREEWAY  
THEBELT  
DOWISETREPLA  
PLATINUM  
REVERTIGO  
BROCODE  
MURTAIGH  
INKEEPER  
PLAYBOOK  
SLAPSGIVING  
JENKINS  
TUTURKEYKEY  
BROATH  
BROBIRS  
LAMBORCUZZI  
PLEASE  
FIXERElixir
```



```
Run - word-search-solver
Run: WordSearchSolver >
Comparison done: 1394
Time elapsed: 992400 ns
-----
ALDORIN
Run - word-search-solver
Run: WordSearchSolver >
Comparison done: 1338
Time elapsed: 668400 ns
-----
N
O
S
N
I
T
S
```

```
Run - word-search-solver
Run: WordSearchSolver >

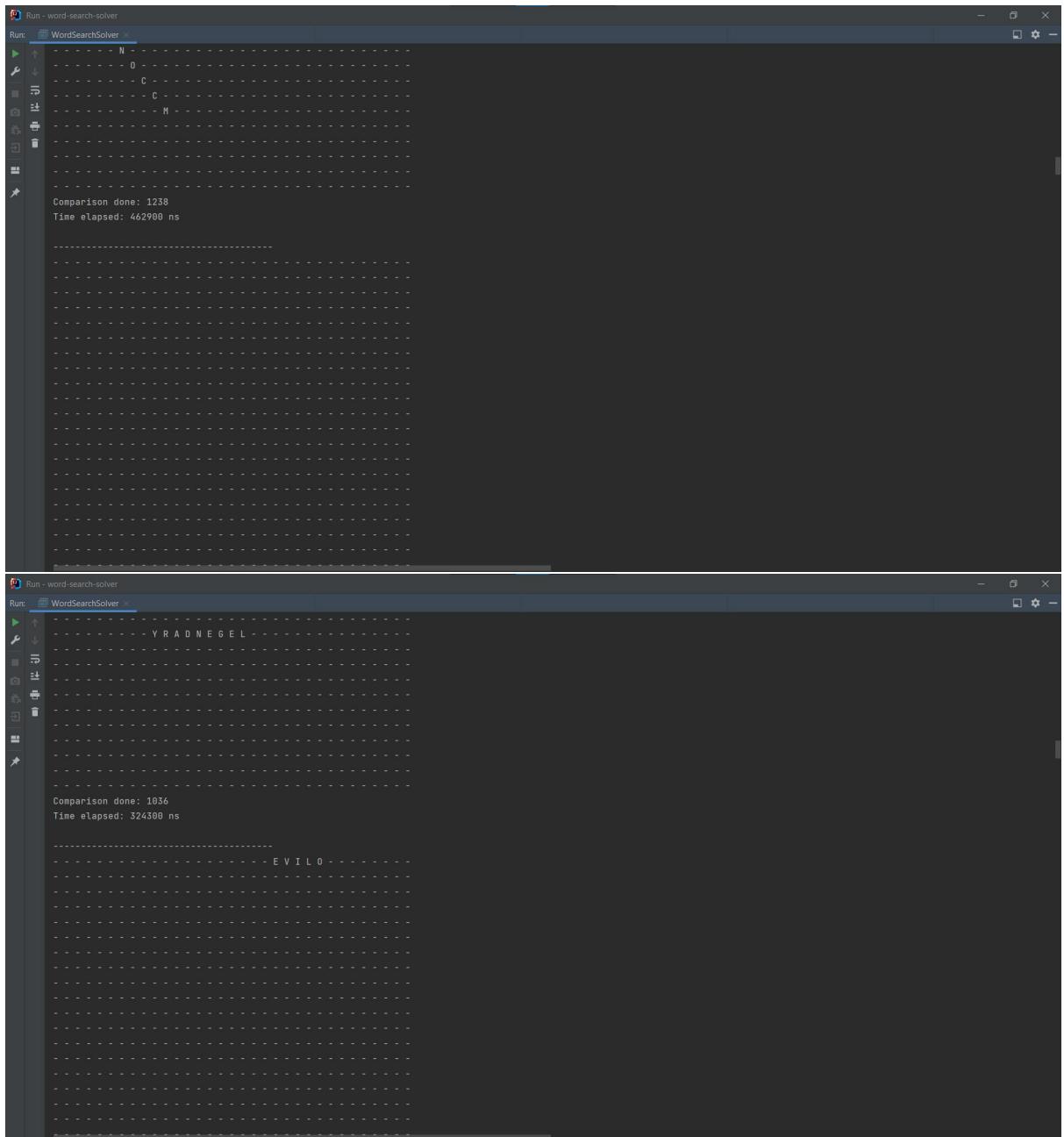
Comparison done: 370
Time elapsed: 237800 ns

----- Y K S T A B R E H C S -----
----- L L E N -----
```

```
Run - word-search-solver
Run: WordSearchSolver >

Comparison done: 39
Time elapsed: 47300 ns

----- L L E N -----
```

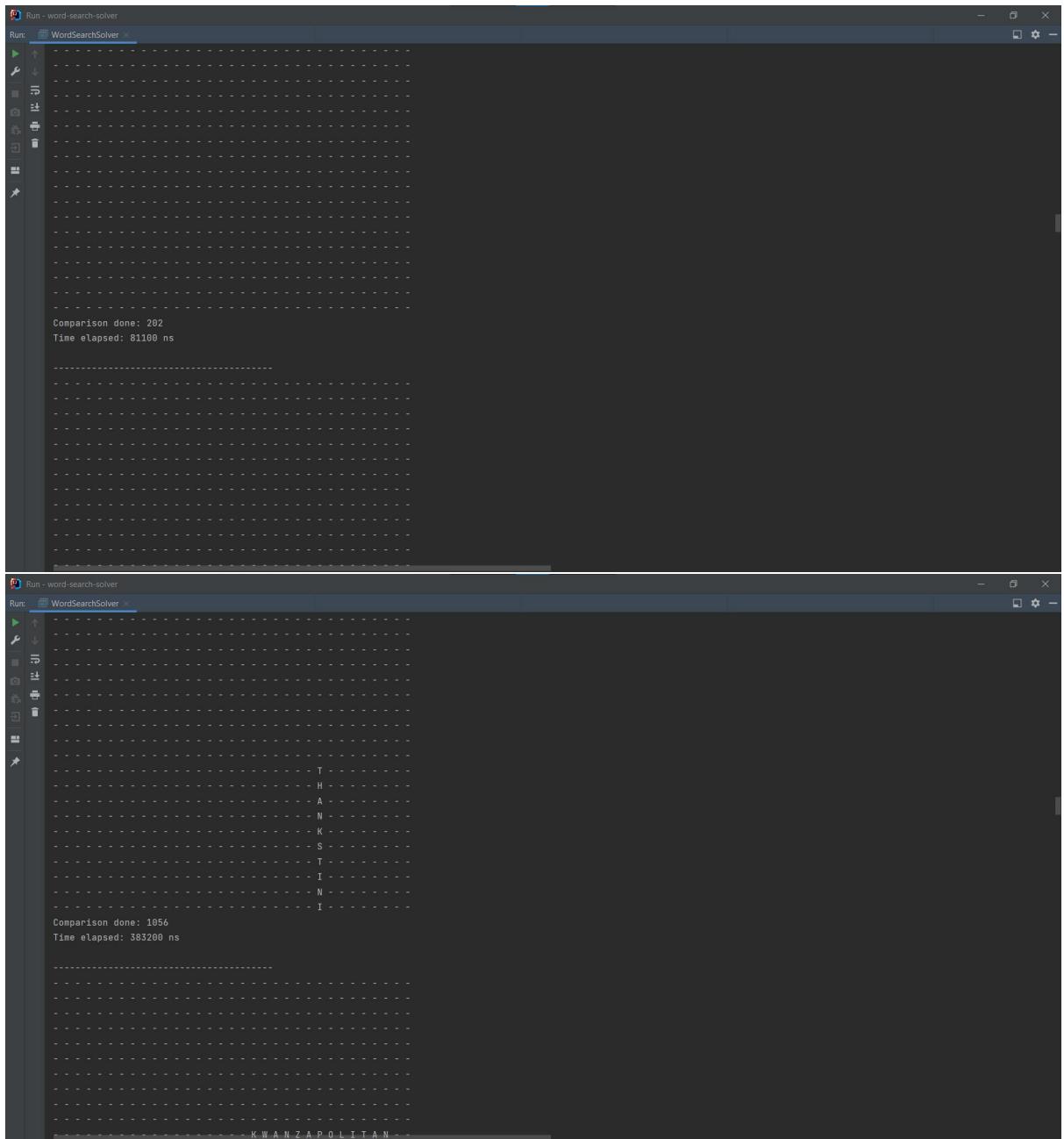


The image shows two vertically stacked terminal windows, both titled "Run - word-search-solver". The top window is labeled "WordSearchSolver" and the bottom one is also labeled "WordSearchSolver". Both windows have a dark theme with light-colored text. The top window displays the following output:

```
Run: WordSearchSolver >
Comparison done: 43
Time elapsed: 47888 ns
-----
S
U
I
T
U
P
```

The bottom window displays the following output:

```
Run: WordSearchSolver >
Comparison done: 182
Time elapsed: 173680 ns
-----
C
O
C
K
A
M
O
U
S
E
```

```
Run - word-search-solver
Run: WordSearchSolver >


```

Comparison done: 262
Time elapsed: 81100 ns

T
H
A
N
K
S
T
I
N
I
----- KWANZAPOLITAN -----
```


```

```
Run - word-search-solver
Run: WordSearchSolver >

Comparison done: 476
Time elapsed: 144780 ns
-----
```

```
Run - word-search-solver
Run: WordSearchSolver >

Comparison done: 1354
Time elapsed: 381400 ns
-----
```

```
Run - word-search-solver
Run: WordSearchSolver >

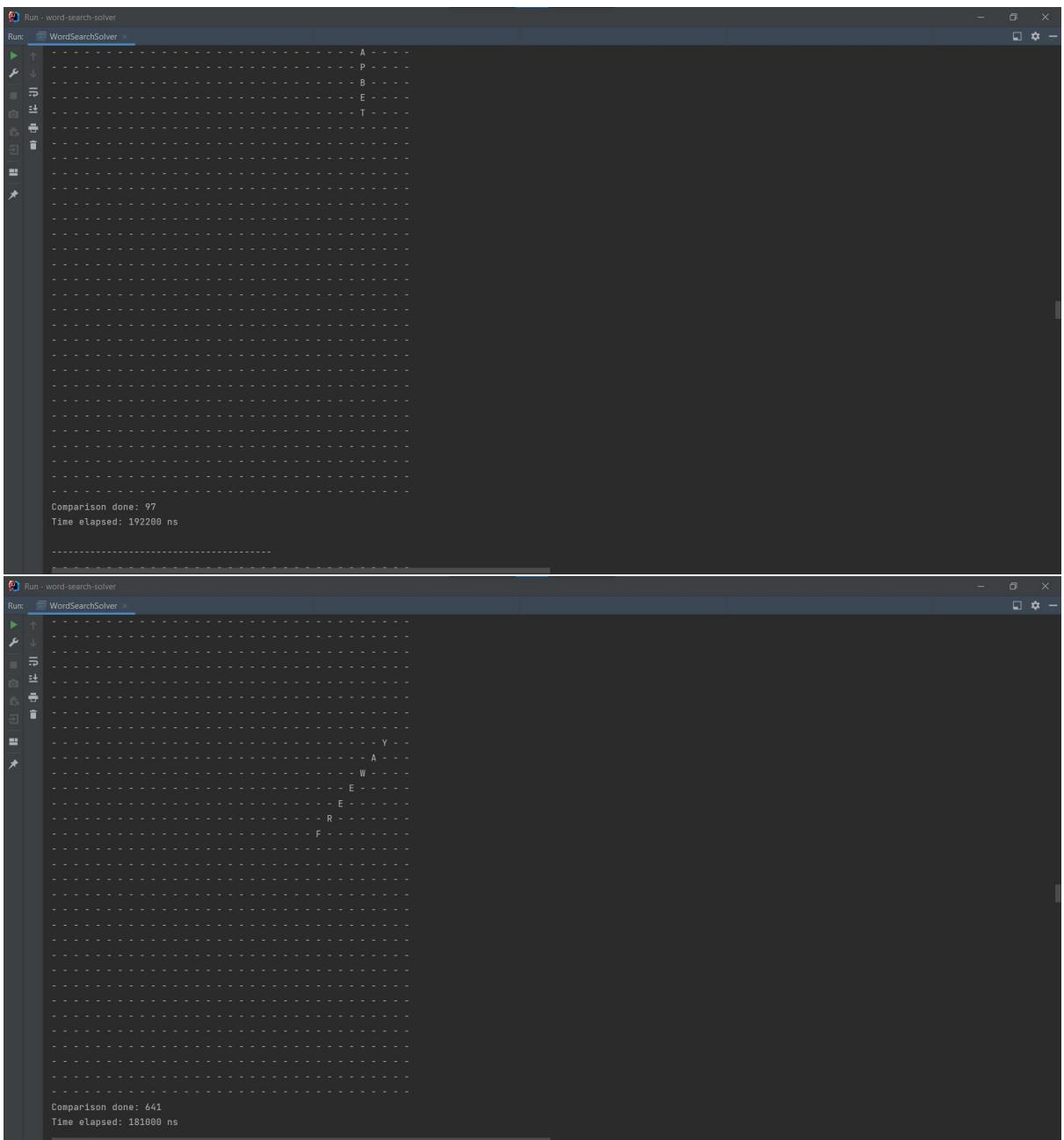
M
A
R
S
H
O
A
M
M
O
N

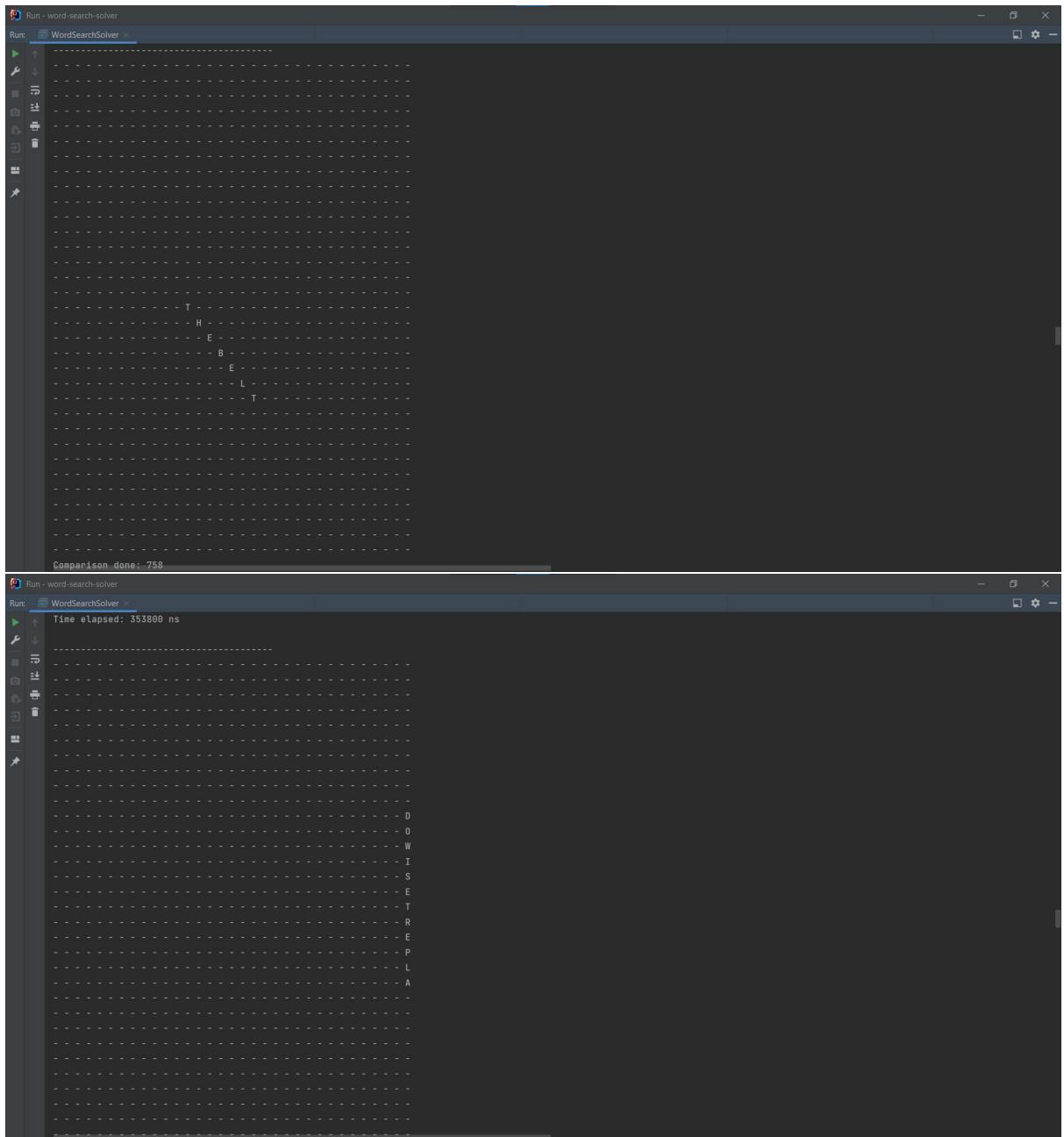
Comparison done: 679
Time elapsed: 365800 ns
-----
D
E
R

Run - word-search-solver
Run: WordSearchSolver >

E
Y
W
A
L

Comparison done: 470
Time elapsed: 207100 ns
-----
S
L
```





```
Run - word-search-solver
Run: WordSearchSolver >
Comparison done: 468
Time elapsed: 173280 ns
-----
----- M U N I T A L P -----
```



```
Run - word-search-solver
Run: WordSearchSolver >
Comparison done: 314
Time elapsed: 106280 ns
-----
----- O G I T R E V E R -----
```

```
Run - word-search-solver
Run: WordSearchSolver >
Comparison done: 683
Time elapsed: 380400 ns
-----
E
D
O
R
B
-----
```



```
Run - word-search-solver
Run: WordSearchSolver >
Comparison done: 327
Time elapsed: 102700 ns
-----
H
U
M
A
N
-----
```

```
Run - word-search-solver
Run: WordSearchSolver >
R -
T -
A -
U -
G -
H -
Comparison done: 968
Time elapsed: 539980 ns

-----
Run - word-search-solver
Run: WordSearchSolver >
I N K E E P E R -
Comparison done: 1504
Time elapsed: 511780 ns

-----
K
O
O
B
```

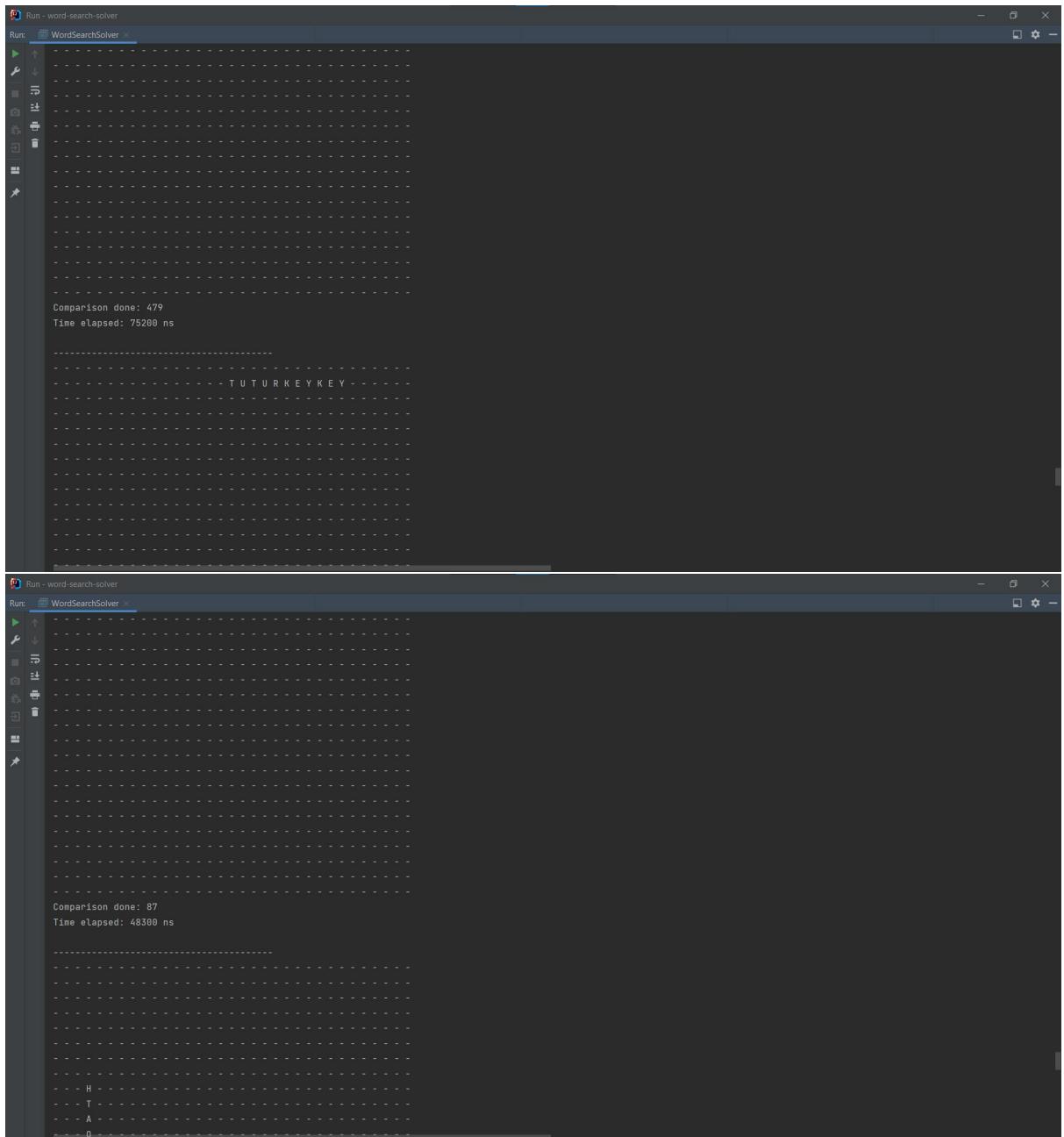
The image shows two separate windows of a "WordSearchSolver" application, likely from a debugger or IDE. Both windows have a dark theme with a light gray grid background.

Top Window (Run 1):

- Run: WordSearchSolver
- Y
A
L
P
- Comparison done: 1000
Time elapsed: 265600 ns
- SLAPS GIVING

Bottom Window (Run 2):

- Run: WordSearchSolver
- Comparison done: 747
Time elapsed: 214700 ns
- SNIKNEJ

```
Run - word-search-solver
Run: WordSearchSolver >


```

Comparison done: 479
Time elapsed: 75200 ns

T U T U R K E Y K E Y

```


```

Comparison done: 87
Time elapsed: 48300 ns

H
T
A
O
```


```

The image shows two vertically stacked terminal windows, both titled "Run - word-search-solver" and "WordSearchSolver".

The top terminal window displays the following output:

```
R  
B  
Comparison done: 573  
Time elapsed: 93400 ns
```

The bottom terminal window displays the following output:

```
B  
R  
O  
B  
I  
B  
S  
Comparison done: 968  
Time elapsed: 199500 ns
```

```
Run - word-search-solver
Run: WordSearchSolver >

-- L A M B O R C U Z Z I
Comparison done: 1416
Time elapsed: 315300 ns

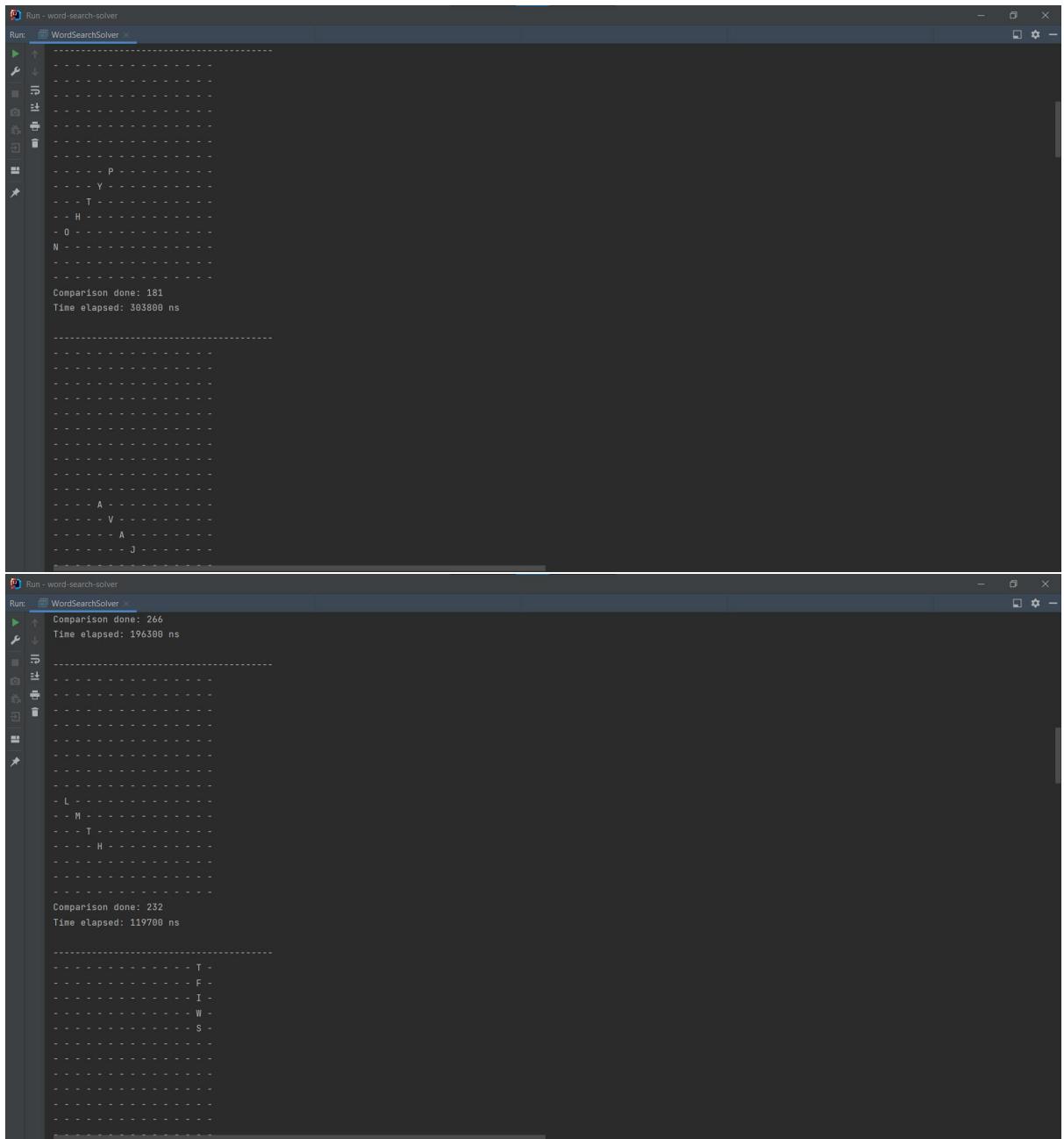
-----
Run - word-search-solver
Run: WordSearchSolver >

----- P L E A S E -----
Comparison done: 1354
Time elapsed: 256200 ns
```

```
R -  
I -  
X -  
I -  
L -  
E -  
R -  
E -  
X -  
I -  
F -  
Comparison done: 1094  
Time elapsed: 136280 ns  
Process finished with exit code 0
```

4. languages.txt (Small)

```
AZKXNMMPKEALLDTI  
ASDOAECDRPCQKFO  
QSSTTSPDMFVFSIQ  
CTLEILUMRSGDCWS  
XAPRMIIINNKAYFSV  
BAEHNBYNEFDDBHLN  
XJYOPALPQXUFPT  
OGATTPYYTGRGF  
SLHOYJOSENJIWF  
JZMTOEUTMZWKAPH  
KSHTARALOXSEPBH  
COGWHVLHTEMVBJM  
NMXXOEAZYIA TRADX  
EYOPWJCJTQWXYZO  
QAOLEGSSEVXCUXXA  
  
PYTHON  
JAVA  
HTML  
SWIFT  
ARDUINO  
MATLAB  
PHP  
DART  
SQL  
RUBY  
RUST  
ASSEMBLY  
KOTLIN  
JULIA  
SCALA
```

```
Run - word-search-solver
Run: WordSearchSolver >

Comparison done: 181
Time elapsed: 303980 ns

-----
A
V
A
J

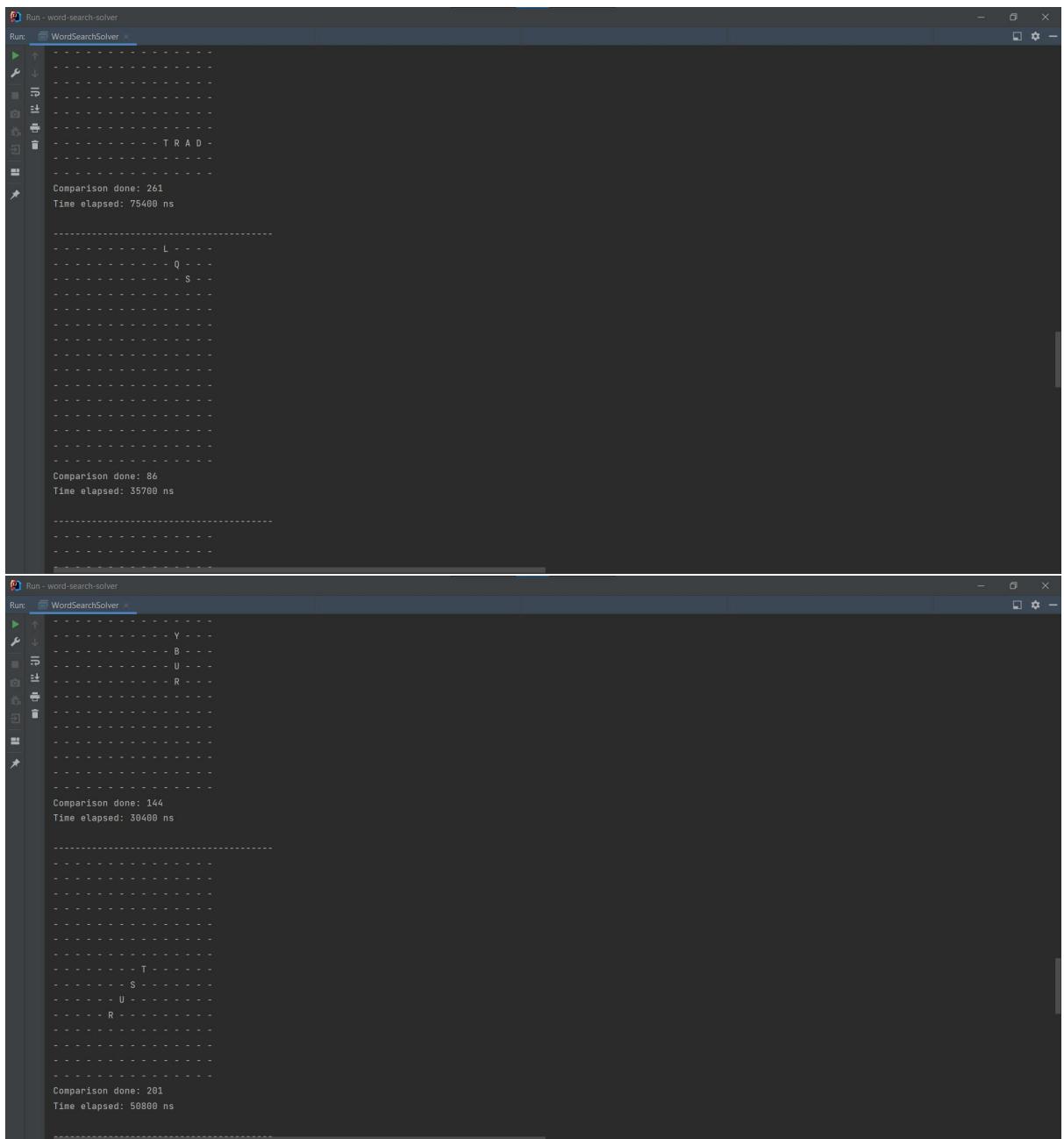
Comparison done: 266
Time elapsed: 196300 ns

-----
L
M
T
H

Comperison done: 232
Time elapsed: 119700 ns

-----
T
F
I
W
S
```

```
Run - word-search-solver
Run: WordSearchSolver >
Comparison done: 136
Time elapsed: 56300 ns
-----
- - - A - - - -
- - - R - - - -
- - - D - - - -
- - - U - - - -
- - - I - - - -
- - N - - - -
- - O - - - -
- - - - - - - -
- - - - - - - -
Comparison done: 29
Time elapsed: 57900 ns
-----
- - M - - - -
- - A - - - -
- - T - - - -
- - L - - - -
- - A - - - -
- - B - - - -
- - - - - - - -
- - - - - - - -
Comparison done: 16
Time elapsed: 16900 ns
-----
- - P - - - -
- - H - - - -
- - P - - - -
- - - - - - - -
- - - - - - - -
Comparison done: 92
Time elapsed: 50900 ns
-----
```

```
Run - word-search-solver
Run: WordSearchSolver >


```

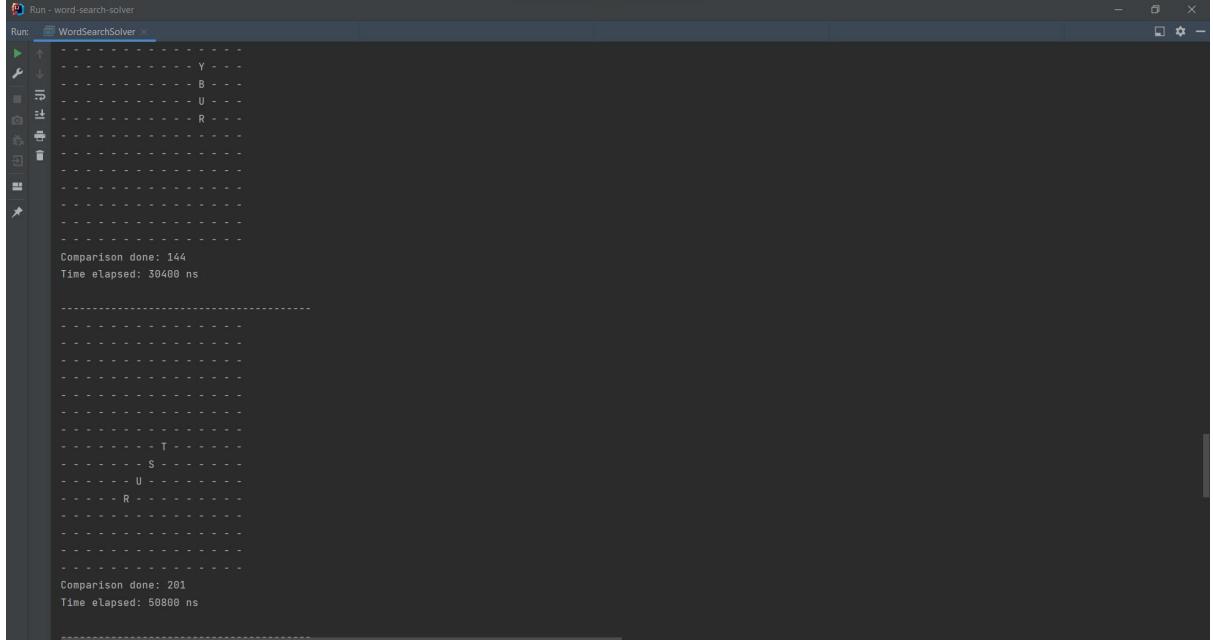
----- T R A D -----
Comparison done: 261
Time elapsed: 75400 ns

----- L -----
----- Q -----
----- S -----

Comparison done: 86
Time elapsed: 357600 ns

```


```
Run - word-search-solver
Run: WordSearchSolver >


```

----- Y -----
----- B -----
----- U -----
----- R -----
-----
-----
-----
Comparison done: 144
Time elapsed: 30400 ns
-----
```



```

----- T -----
----- S -----
----- U -----
----- R -----
-----
-----
-----
Comparison done: 201
Time elapsed: 50880 ns
-----
```


```


```

```
Run - word-search-solver
Run: WordSearchSolver >
A
- S -
- S -
E
- M -
B
- L -
Y
-
-
-
-
-
Comparison done: 11
Time elapsed: 19000 ns
-----
K
O
T
L
I
N
-
-
-
-
-
Comparison done: 11
Run - word-search-solver
Run: WordSearchSolver >
Time elapsed: 18100 ns
J
U
L
I
A
-
-
-
-
-
Comparison done: 141
Time elapsed: 31000 ns
-
-
-
-
-
A
L
A
C
S
Comparison done: 322
Time elapsed: 128300 ns
Process finished with exit code 0
```

5. g20.txt (Medium)

The image shows two side-by-side run configurations in the IntelliJ IDEA interface, both titled "WordSearchSolver".

Run Configuration 1 (Top):

- Run: "C:\Program Files\Java\jdk-17\bin\java.exe" "-javaagent:C:\Program Files\JetBrains\IntelliJ IDEA 2021.2.1\lib\idea_rt.jar=52296:C:\Program Files\JetBrains\IntelliJ IDEA 2021.2.1\bin"
- Output window content:

```
QATKECFACTRFATHUOSLWT
CPBRJPKEYSXCTAISURAJ
TURKEYGEZQXCCSKBUHIS
SEJMEXICOYDHPWFKDLBOT
UQPGSWRWVGBUSXJMABEEA
WGESETATSDETINUROAUSL
BENRNPMPXBJIAFMNTNIROIY
CYZIZNHOFPUNSSMDOMKCU
HFSMLFOQDXWEUANPPSYLW
OMWFRAANCEGJADIELFBAKJ
GTLVQILZUONQBAYDSIVSU
KKWIKEETUWBRINNABBQBXN
SOUTHKOREAXUXKEIAAJYQA
DZJSDWQSBNMODRAAMAHCD
BRAZILR0ZIPUMAEPPPEPVW
LORKVTDLOUNSIJATCSPGQ
FJPCAWJNGYUDTNEHIMFI0
AISENOONDIDUQOAIIGHNUIU
RGERMANYHASPDNRNNUWA
GADANACOSLOQATCHPQQME
RPPANITNEGRAIPUPZBMWN

ARGENTINA
AUSTRALIA
BRAZIL
CANADA
CHINA
EUROPEANUNION
FRANCE
GERMANY
INDIA
INDONESIA
```

Run Configuration 2 (Bottom):

- Run: "C:\Program Files\Java\jdk-17\bin\java.exe" "-javaagent:C:\Program Files\JetBrains\IntelliJ IDEA 2021.2.1\lib\idea_rt.jar=52296:C:\Program Files\JetBrains\IntelliJ IDEA 2021.2.1\bin"
- Output window content:

```
ITALY
JAPAN
MEXICO
RUSSIA
SAUDIARABIA
SOUTHAFRICA
SOUTHKOREA
TURKEY
UNITEDKINGDOM
UNITEDSTATES
SPAIN
```

--- A N I T N E G R A ---
Comparison done: 759

The image displays two vertically stacked terminal windows from a development environment, likely Visual Studio Code, showing the output of a word search solver application named "WordSearchSolver".

Top Terminal Window:

- Run: WordSearchSolver
- Time elapsed: 1036400 ns
- Output:

```
-----  
| A |  
| I |  
| L |  
| A |  
| R |  
| T |  
| S |  
| U |  
| A |  
-----  
Comparison done: 318  
Time elapsed: 252400 ns
```

Bottom Terminal Window:

- Run: WordSearchSolver
- Output:

```
-----  
| B |  
| R |  
| A |  
| Z |  
| I |  
| L |  
-----  
Comparison done: 418  
Time elapsed: 203900 ns
```

```
Run - word-search-solver
Run: WordSearchSolver >
- A D A N A C -
Comparison done: 528
Time elapsed: 372500 ns

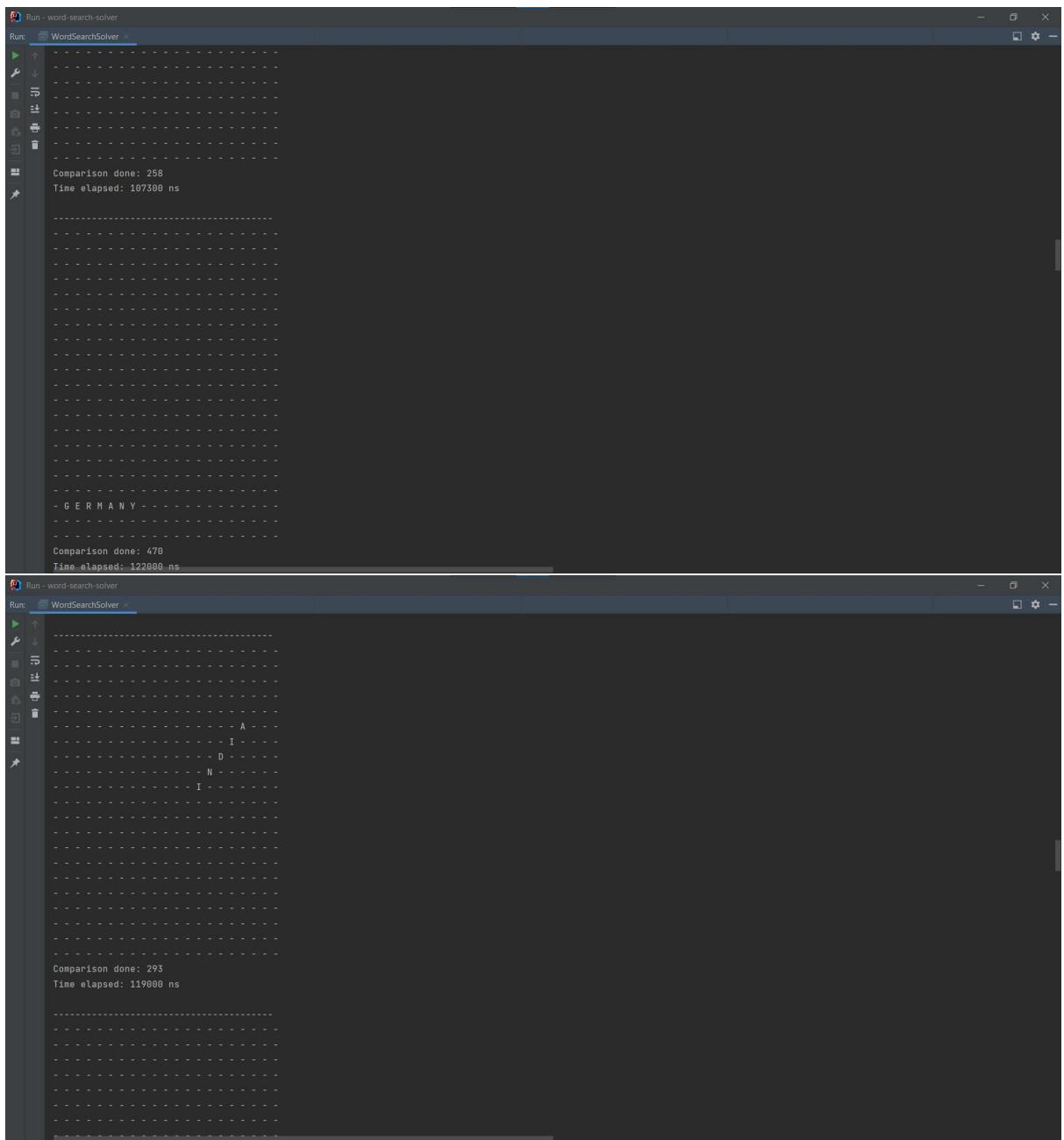
C
H
I
N
A

Comparison done: 433
Time elapsed: 255000 ns

E
U
R
O
P
E
A
N
U
N
I
O
N

Comparison done: 188
Time elapsed: 94500 ns

F R A N C E
```

```
Run - word-search-solver
Run: WordSearchSolver >

Comparison done: 258
Time elapsed: 107300 ns
-----
----- GERMANY -----
Comparison done: 478
Time elapsed: 122000 ns
Run - word-search-solver
Run: WordSearchSolver >
----- A -----
----- I -----
----- D -----
----- N -----
----- I -----
Comparison done: 293
Time elapsed: 119000 ns
```

The image shows two separate terminal windows, both titled "Run - word-search-solver" and "WordSearchSolver".

Top Terminal Window:

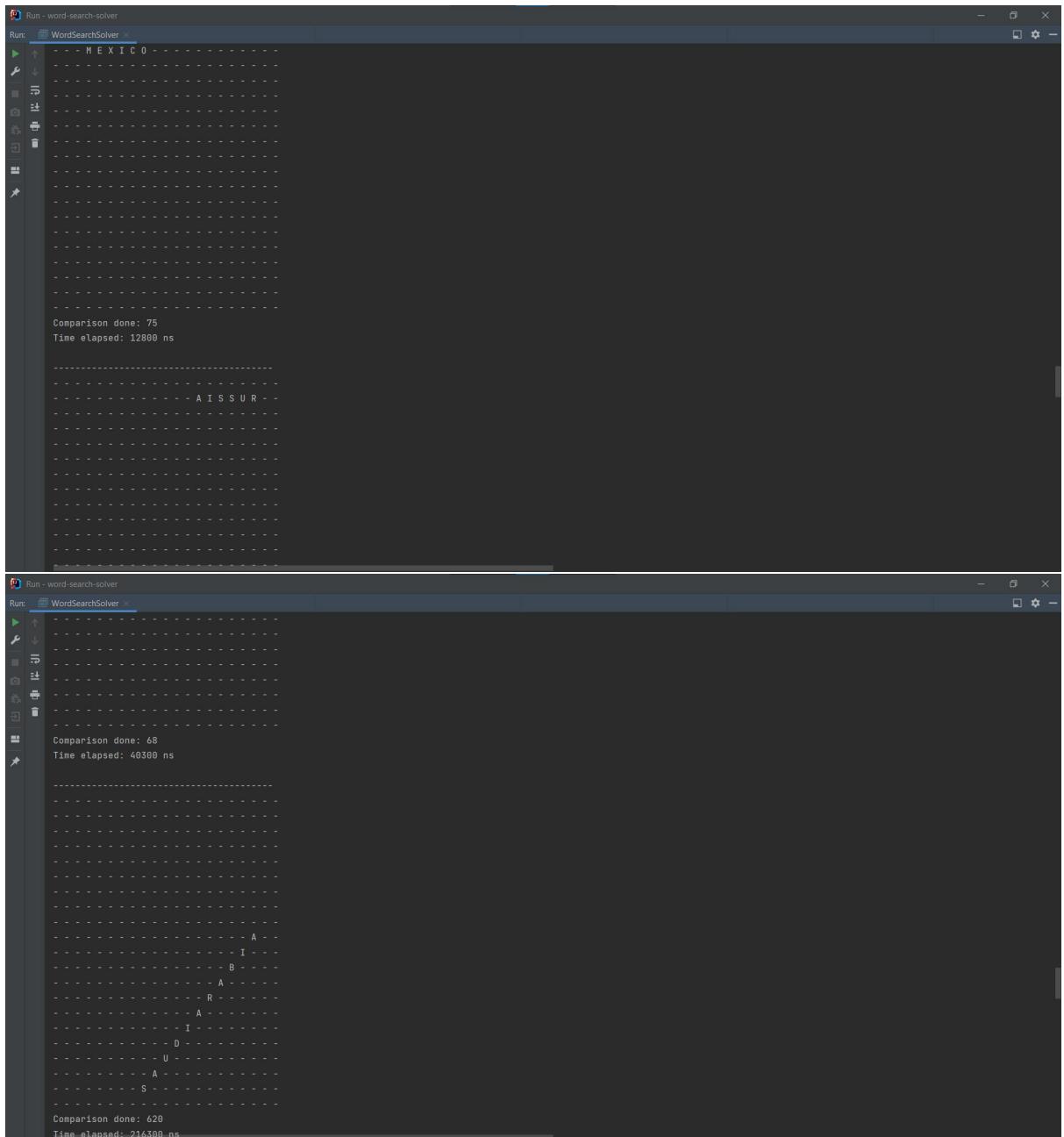
```
Run: WordSearchSolver
Comparison done: 574
Time elapsed: 240680 ns
```

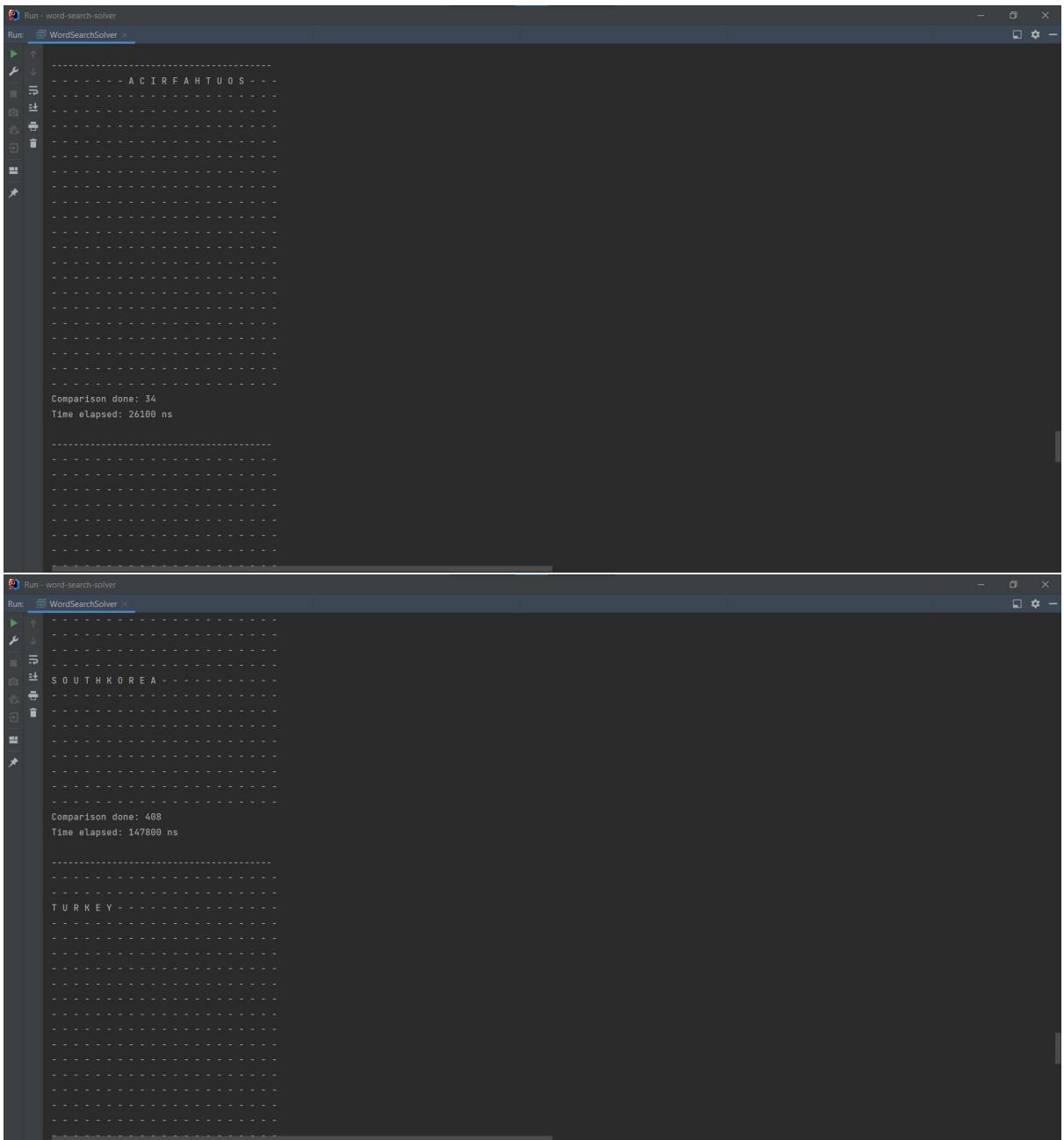
Bottom Terminal Window:

```
Run: WordSearchSolver
Comparison done: 97
Time elapsed: 114188 ns
```

In both windows, there is a large grid of letters and a vertical list of words found:

- Top Window:** The grid shows the word "TALLY" vertically. The found words list includes "I", "T", "A", "L", "Y".
- Bottom Window:** The grid shows the word "PANJA" vertically. The found words list includes "J", "A", "P", "A", "N".





```
Run - word-search-solver
Run: WordSearchSolver >

Comparison done: 91
Time elapsed: 109600 ns

M
O
D
G
N
I
K
D
E
T
I
N
U

Comparison done: 691
Time elapsed: 238600 ns

-----
```



```
Run - word-search-solver
Run: WordSearchSolver >

S E T A T S D E T I N U

Comparison done: 186
Time elapsed: 101100 ns

-----
```



```
N
I
A
P
S

Comparison done: 518
Time elapsed: 204700 ns

Process finished with exit code 0
```

6. stardewvalley.txt (Large)

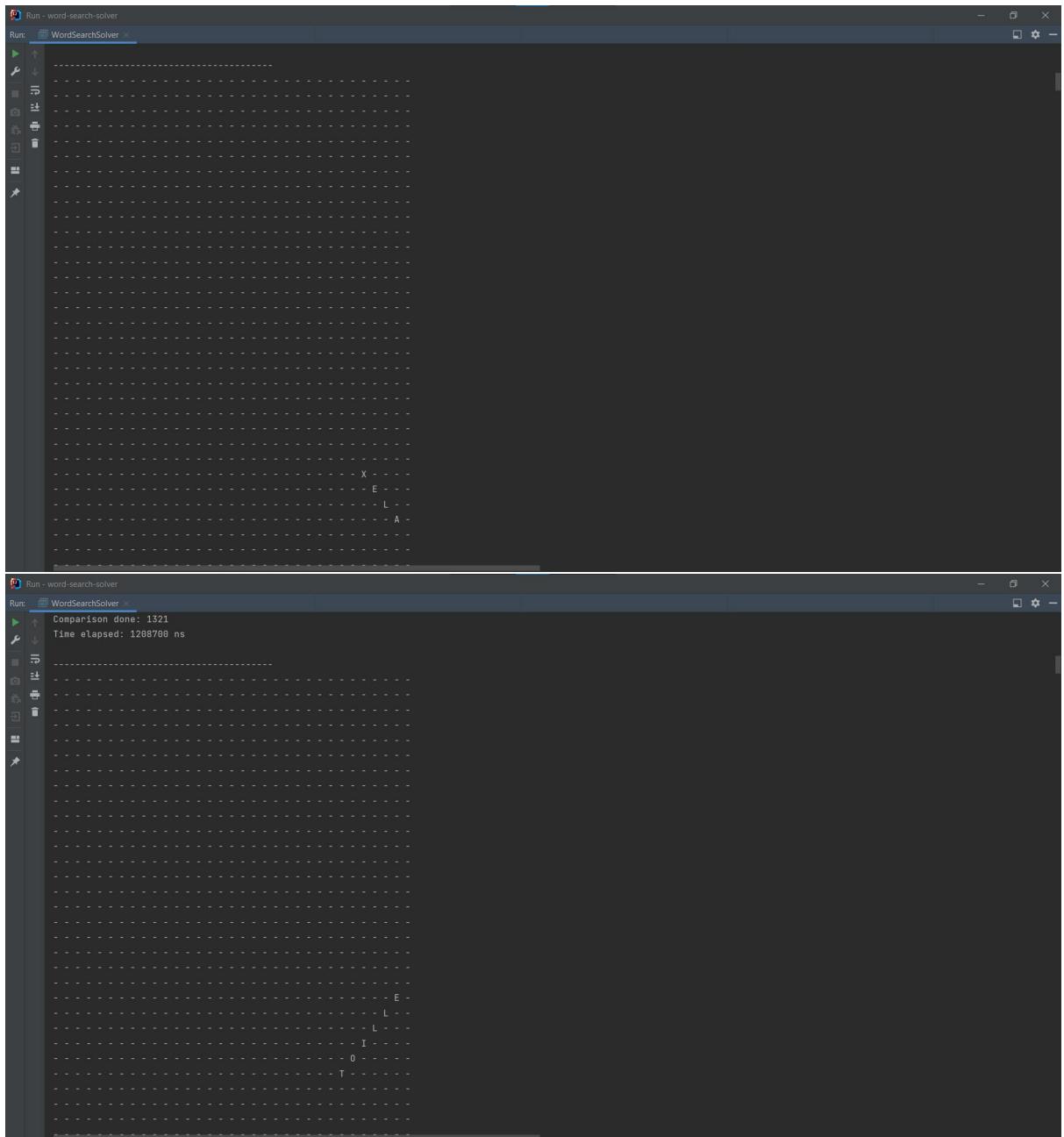
The screenshot shows two instances of the WordSearchSolver application running in IntelliJ IDEA. The top window displays a large grid of letters representing the word search puzzle, while the bottom window shows a list of names from the Stardew Valley game.

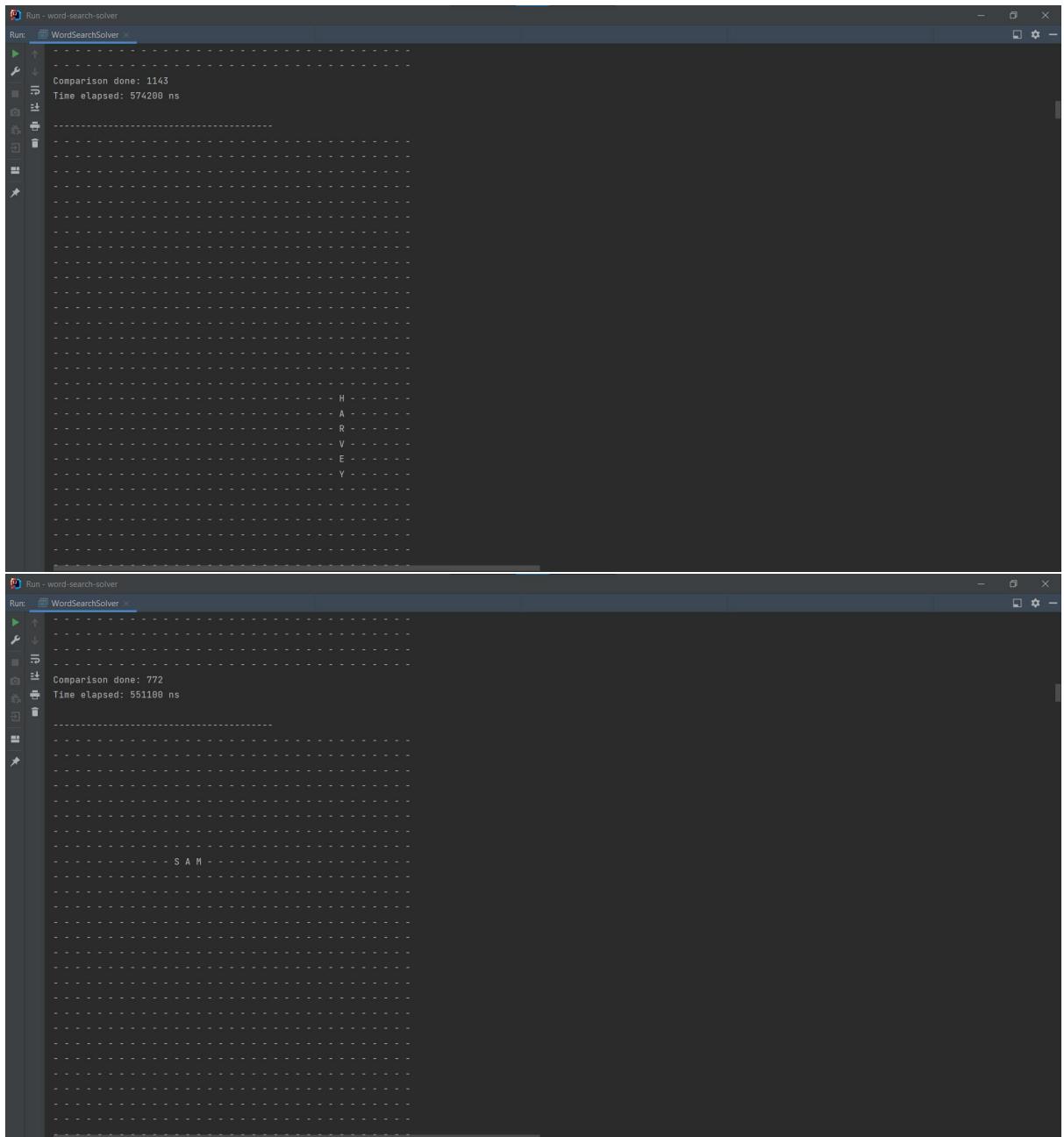
Top Window (WordSearchSolver):

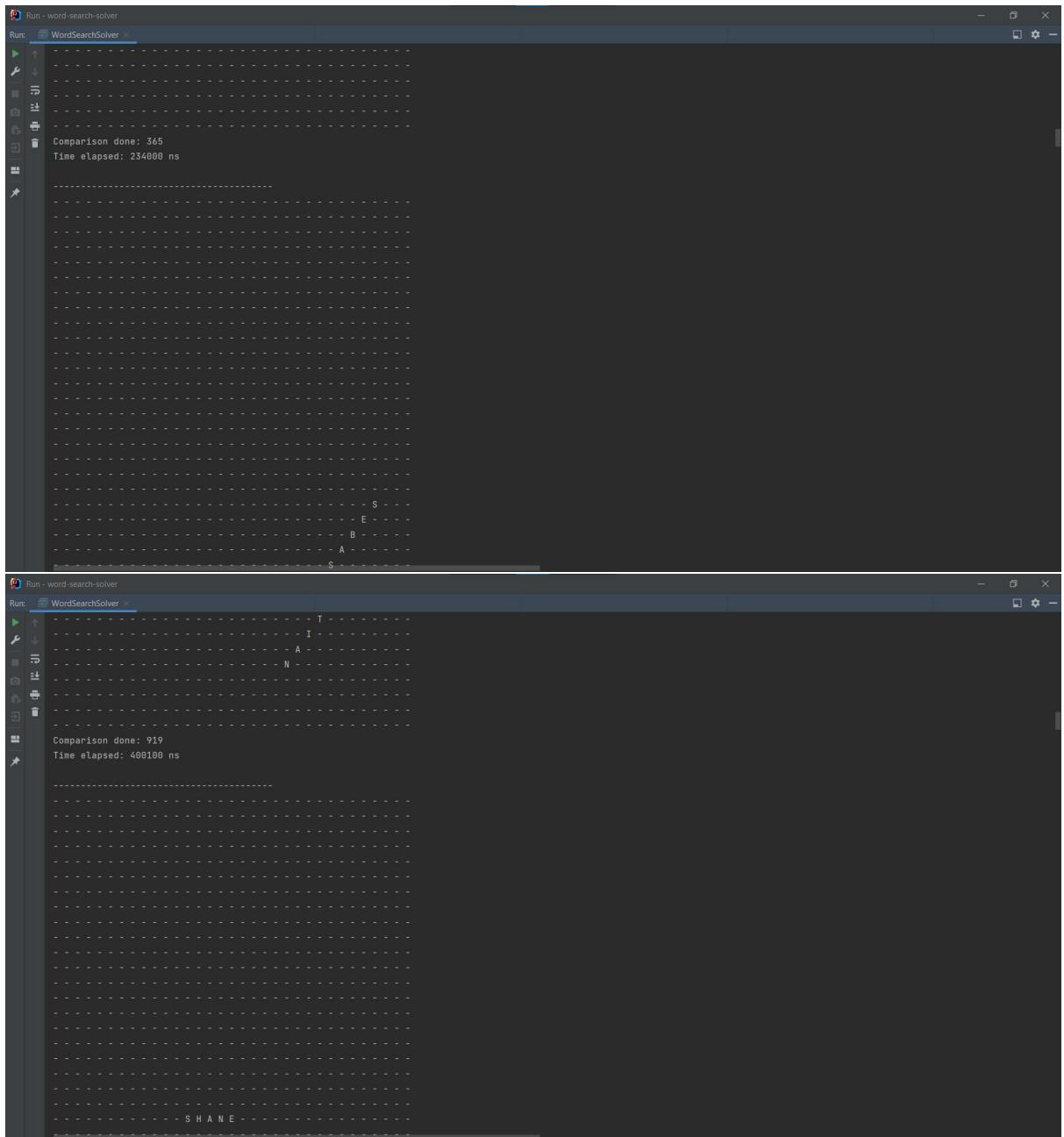
```
G M T Q Y W I M S T F N A G Z B B M L D P H R H M M L Q W Y W C Y  
Q M F X V Q C L M T A N N B L G G M E Z Q M A F Z J K X Z D D B K  
P N Q E A D V Y B T W J C W I M R M E Q N L E O E P D F T K L P C  
K S P X W J R U Q A R L T C Z G E G J Q E B A T A O C T D Z Z P P  
A I H N Z O R P K D K H Z L T A K F F V F J S B N W U N N E Z  
G H D T B A B T Q W Z Q I E R T R I S E G T F O P F I G G P M C E  
U Y B I X M A R N I E J W I O R S K L Z T I V Y Q H J H J K E W  
S T N E L D L M L Q A I U T H S U G E W H O Y O Q T G K L U O Z B  
G W V S M E W Q V Y S S S A M V V J N H Y E A N M E L N Y C T E Q W  
L C S X A B M H J V J N V Y H T Y O G E S O M Y C Y T R Q Y E J H  
P E V B R Z M K L P G J W H G D O Q Q F N I B E L L U L C W H G J  
C S D L U E A C U E H H J B N S V H N F J P E E Q L U M M N D Z W  
L M C S T Y S V I D A Q I A B G S F R W Z A V A K V O E E B C O X  
V T A G D N P K N T D H S A D U O I C S J E W B E Q K T H J V K T  
R L V P E Z B V P A C K G D J G P S C Y D J Q I S D X X G S G V R  
E G Z N Q E Y M V V J R B J C N J W H Z Z Z E W U P F N B K N W T  
M W I L L Y P O K B O Z W L W Q A G T U K D G U B R D P U R O Y T  
T P Y O E L O T O N A S R D X P I K G E O R G E M R H R V W S L C  
G T X F R R I B J P Z U J G A U B B J F A I R O I Z A H V G F O H  
N T F N K R X N G W J E R R E I P J M U E L J C F W R F D P K F Y  
E N S L L I D E U V R D O H F T J O E G G F O N Z T V C B S Y V Z  
R I T L E R T T S I B S H A N E D O C T G M F X H G E G E R W E V  
N L Q I A I F V N Y F N P P B S C I K A Z S P T Y X Y B X J L M Z  
B C Z Z Y K E N T T C E C O D F J V N I G L D S S N A L S L B B Z  
X T I G S B Q K Z H N K C E I W Y T H E Q O X M U S R H I S H Y Q  
A W I D T V E L C N R D A P N Q U D N M F A C W T C E 0 0 0 0 V 0  
U T K H M O P Z Y E D D N Q K T Z F I W V D R I U R T X X S T P S  
J L U O O D C U B Z Y F T W D O E S W I T O T A P J Y C R G E B R O  
U I D N B O Z F R S F V W K M Y O M R W Z N X P L P K J H I L W B  
V X X D S H D A B A S A K R O B U S P G T X G N J B N J H W W A A  
U K F U J O W F B M R K U H S W T K G K X U K P A Z Z E O B P L Q  
C L C M K T P B Q F E X Q C A R O L I N E S V X K Z Z I S P D I C
```

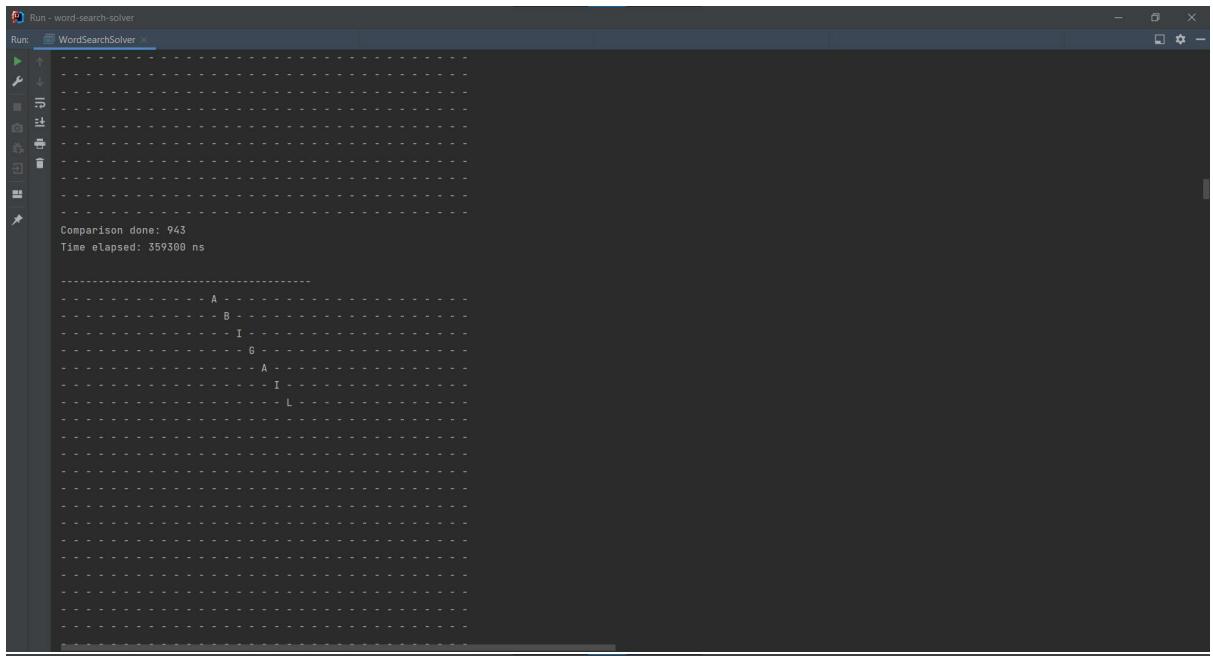
Bottom Window (WordSearchSolver):

Run:	WordSearchSolver
	N T J I J L L Q D X F O X Z X F Z I D H J R A Z J M P K O M L B N
	ALEX
	ELLIOT
	HARVEY
	SAM
	SEBASTIAN
	SHANE
	ABIGAIL
	EMILY
	HALEY
	LEAH
	MARU
	PENNY
	CAROLINE
	CLINT
	DEMETRIUS
	DWARF
	EVELYN
	GEORGE
	GUS
	JAS
	JODI
	KENT
	KROBUS
	LEWIS
	LINUS
	MARNIE
	PAM
	PIERRE
	ROBIN
	SANDY
	VINCENT
	WILLY
	WIZARD







```
Run - word-search-solver
Run: WordSearchSolver >


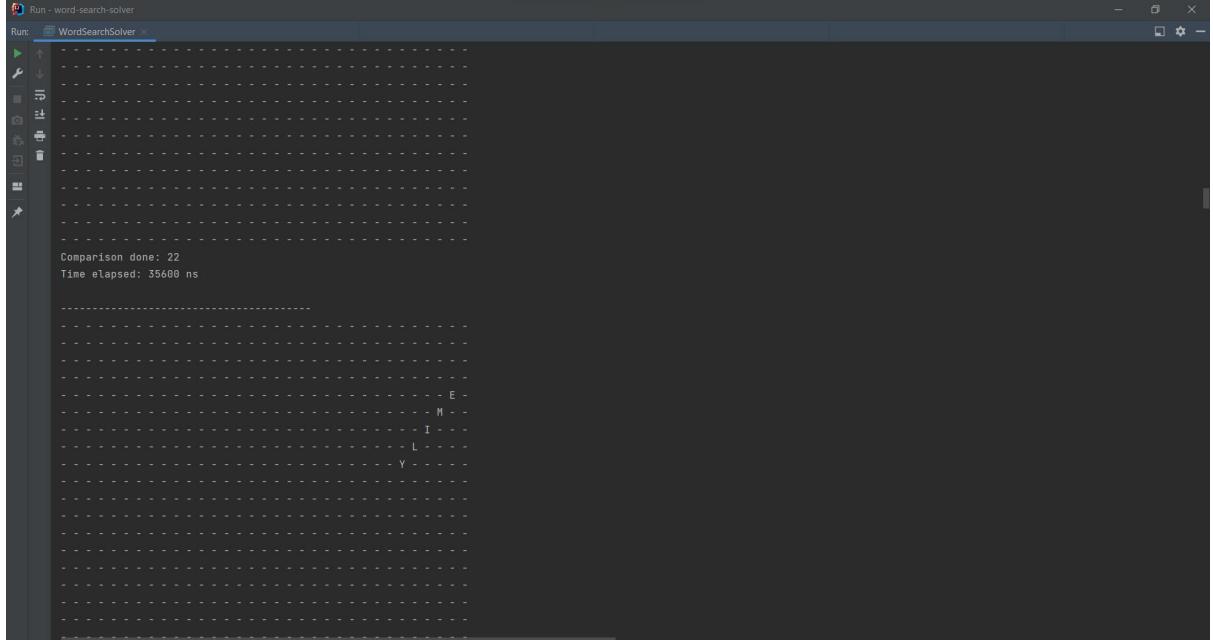
```
Comparison done: 943
Time elapsed: 359300 ns
```



```

| A |
| B |
| I |
| G |
| A |
| I |
L
```


```
Run - word-search-solver
Run: WordSearchSolver >


```
Comparison done: 22
Time elapsed: 35600 ns
```



```
-----  
| E |  
| M |  
| I |  
| L |  
| Y |  
-----
```


```

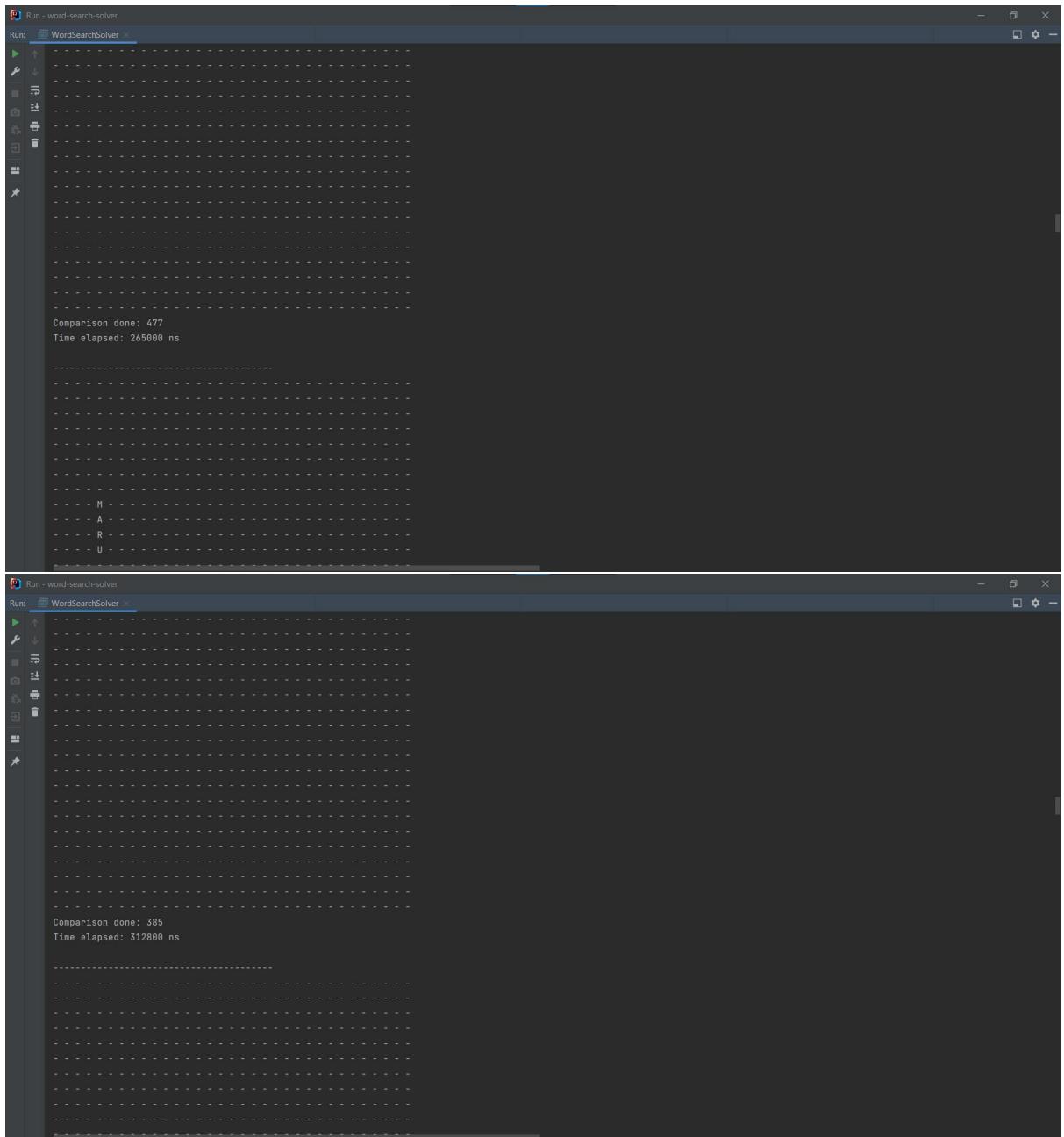

```

```
Run - word-search-solver
Run: WordSearchSolver >

Comparison done: 237
Time elapsed: 98200 ns
-----
H
A
L
E
Y

Run - word-search-solver
Run: WordSearchSolver >

Comparison done: 42
Time elapsed: 69300 ns
-----
L
E
A
H
```

```
Run - word-search-solver
Run: WordSearchSolver >


```
Comparison done: 477
Time elapsed: 265000 ns

M A R U

Comparison done: 385
Time elapsed: 312800 ns

```


```

```
Run - word-search-solver
Run: WordSearchSolver >

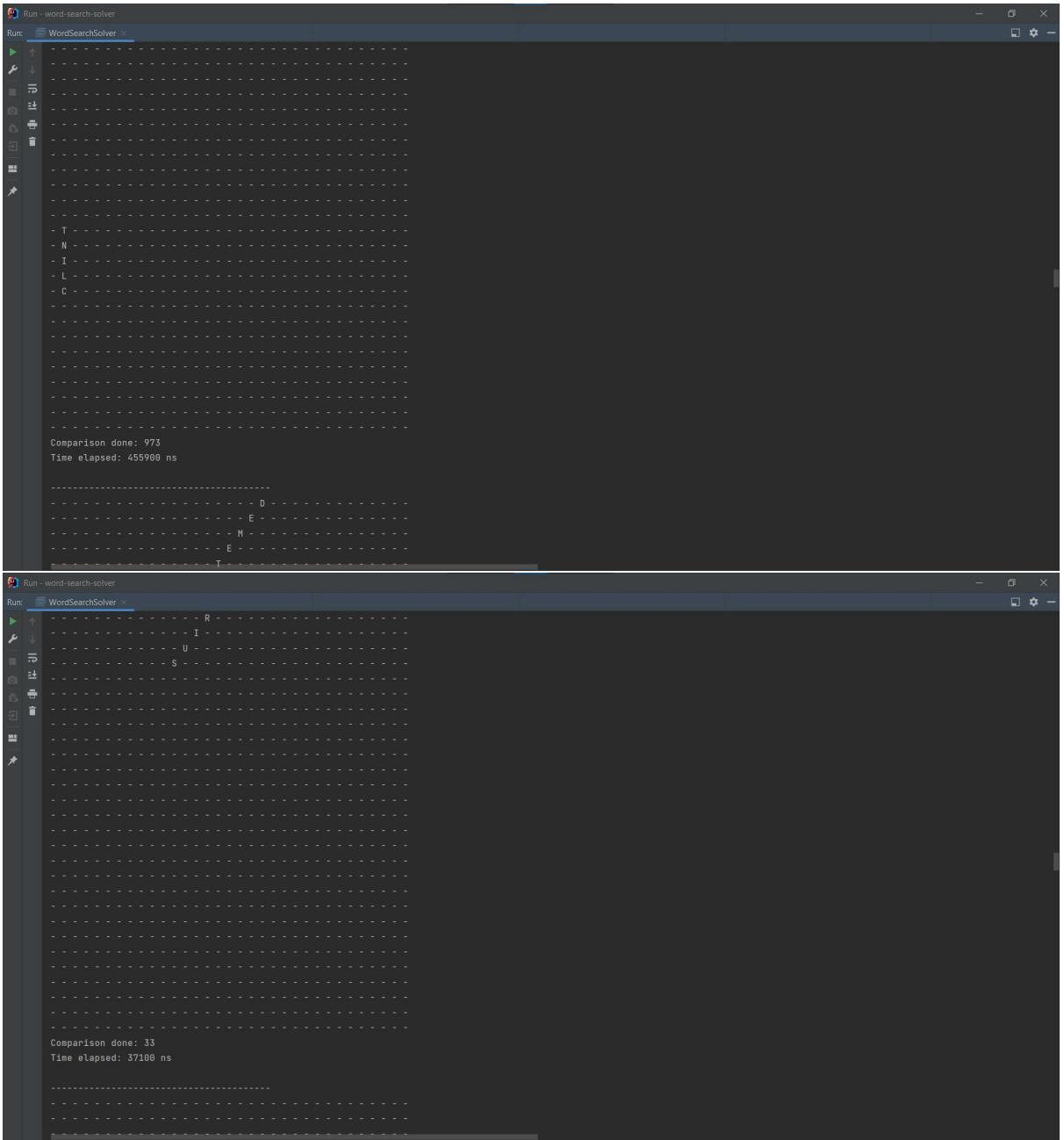
P
E
N
N
Y

Comparison done: 957
Time elapsed: 460300 ns

*****
Run - word-search-solver
Run: WordSearchSolver >

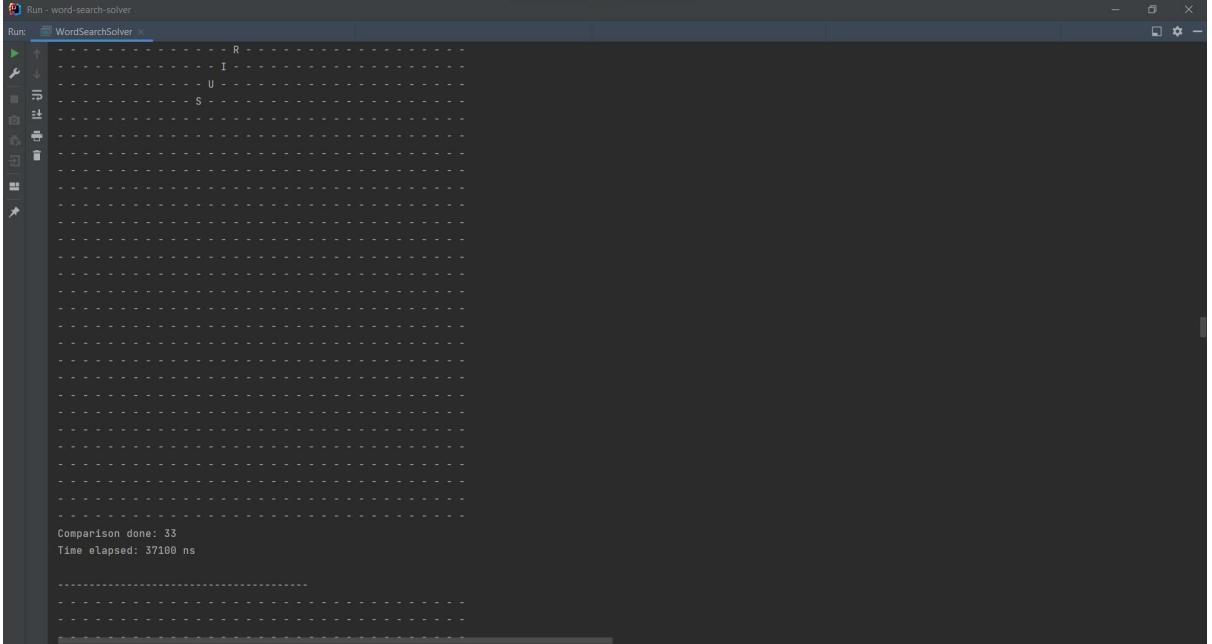
C A R O L I N E

Comparison done: 1332
Time elapsed: 578100 ns
```

```
Run - word-search-solver
Run: WordSearchSolver >


```

- T -
- N -
- I -
- L -
- C -
-
-
Comparison done: 973
Time elapsed: 455988 ns

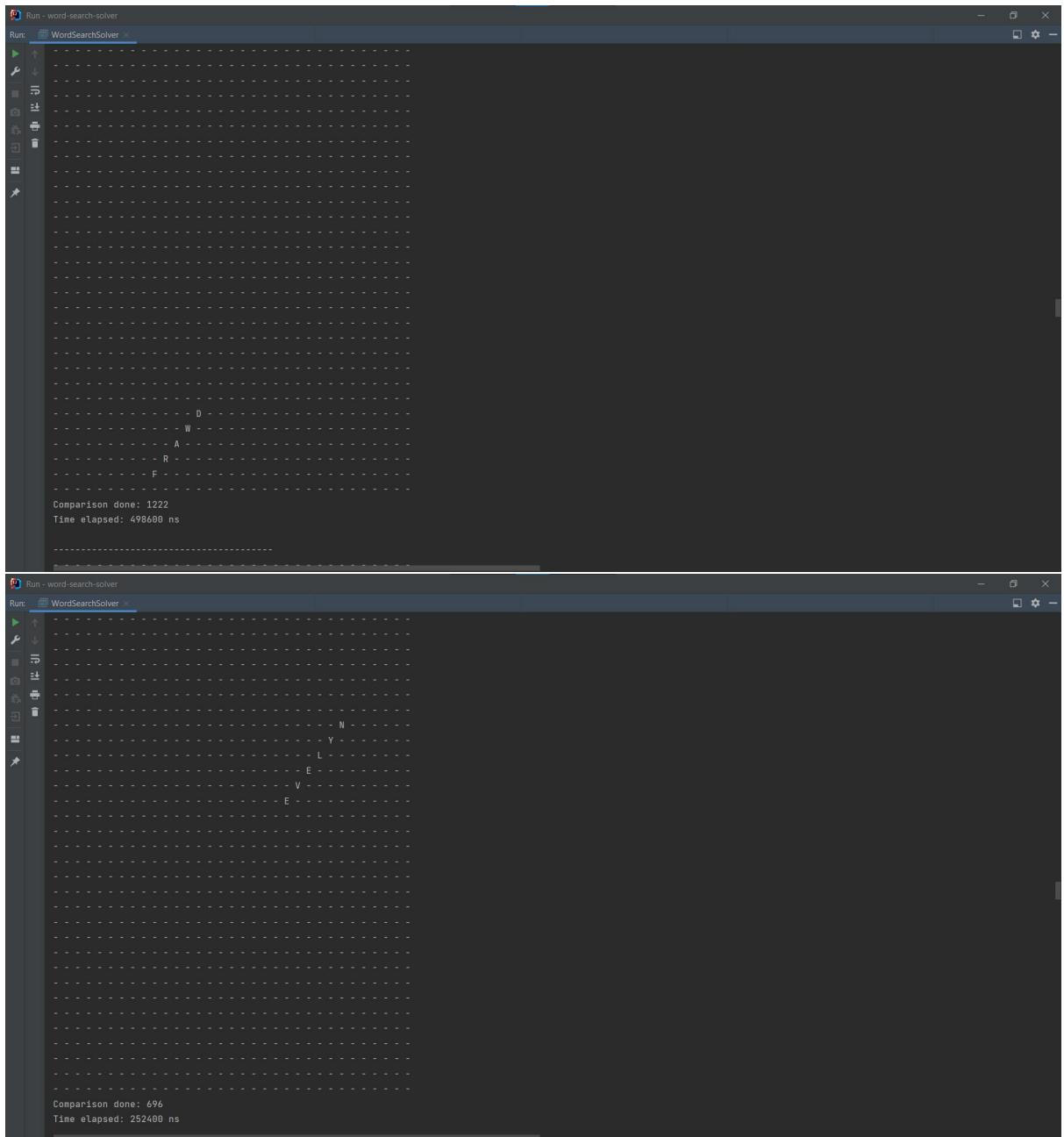
- D -
- E -
- M -
- E -
T
Run - word-search-solver
Run: WordSearchSolver >


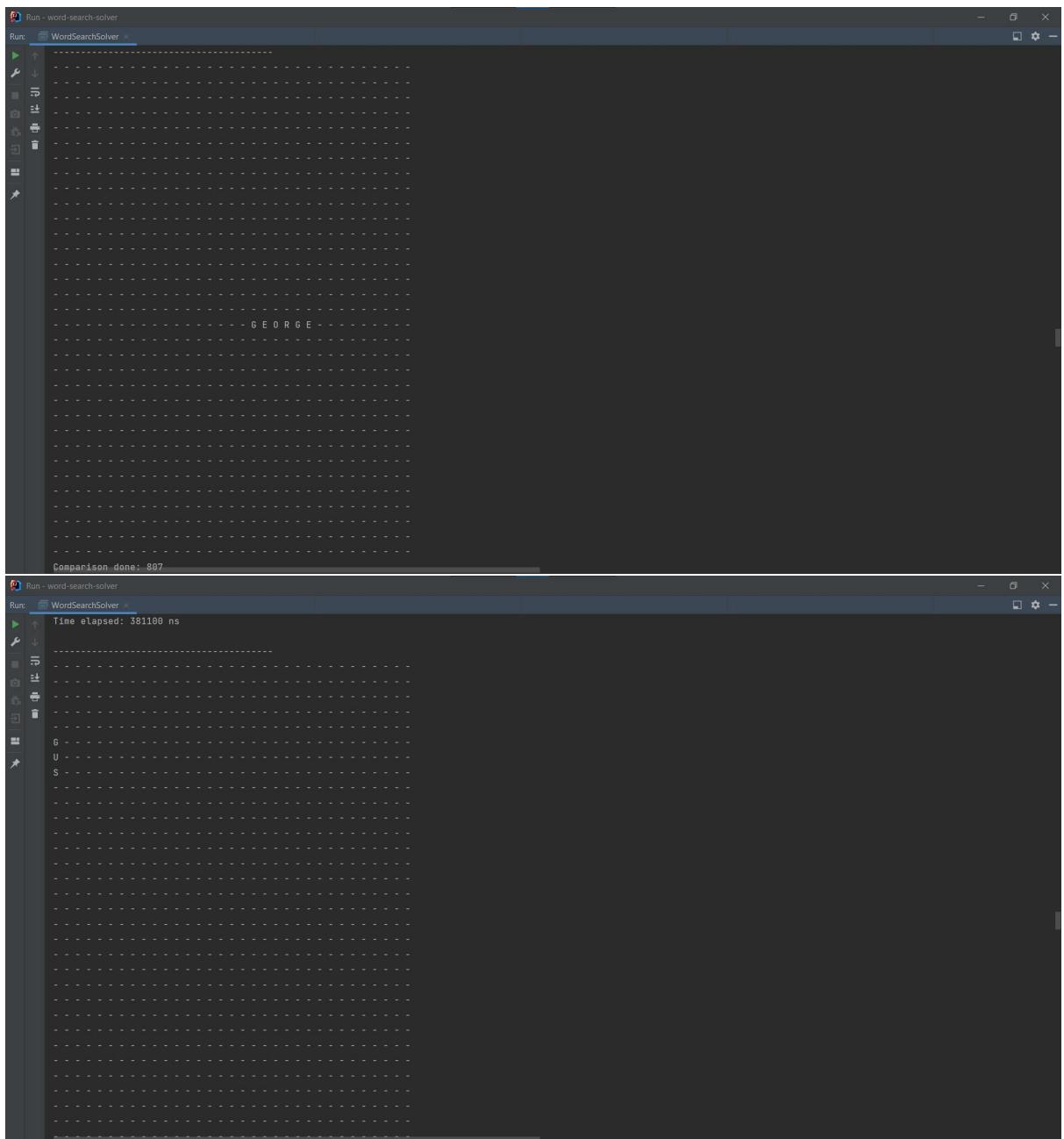
```

R
I
U
S
-
-
Comparison done: 33
Time elapsed: 37108 ns
-----
```


```


```





```
Run - word-search-solver
Run: WordSearchSolver >
Comparison done: 228
Time elapsed: 131500 ns
-----
J
A
S
-----
Run - word-search-solver
Run: WordSearchSolver >
Comparison done: 270
Time elapsed: 59900 ns
-----
J
O
D
I
```

The image displays two side-by-side terminal windows from a dark-themed IDE or terminal application. Both windows are titled "Run - word-search-solver" and show a "WordSearchSolver" tab.

The top window shows the following output:

```
Comparison done: 888
Time elapsed: 2221200 ns
```

The bottom window shows the following output:

```
Comparison done: 962
Time elapsed: 2644800 ns
```

Both windows have a toolbar at the top with icons for file operations, and a large text area below containing a grid pattern of small dots. In the bottom-left corner of the text area, the word "KENT" is printed in capital letters, centered horizontally and vertically within the grid.

```
Run - word-search-solver
Run: WordSearchSolver >

-----K R O B U S-----
Comparison done: 1239
Time elapsed: 352900 ns
-----
-----L-----I-----E-----W-----I-----S-----
Comparison done: 215
Time elapsed: 117100 ns
-----L-----I-----N-----
```

The image shows two vertically stacked terminal windows, both titled "Run - word-search-solver".

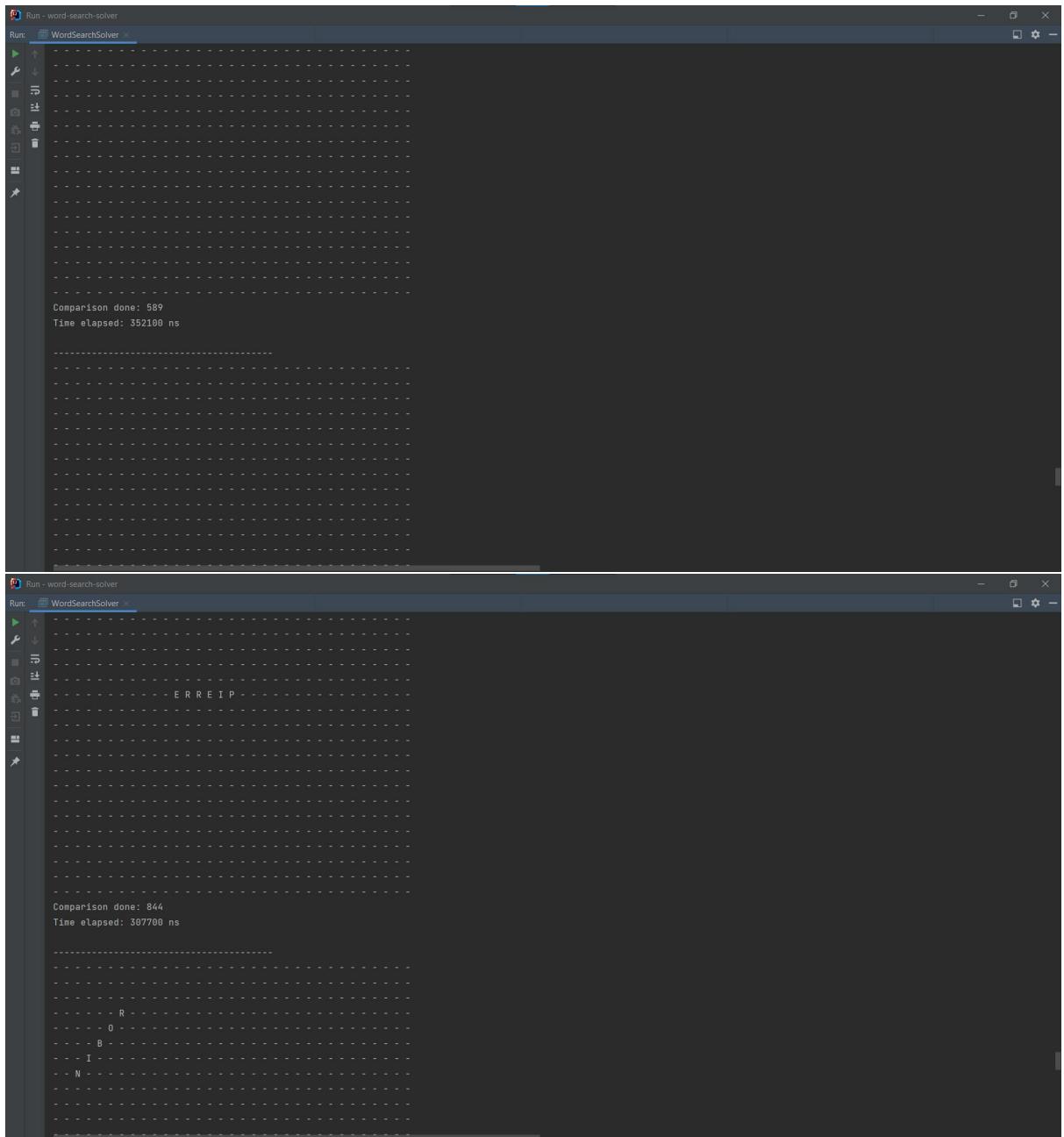
The top terminal window displays the following output:

```
Run: WordSearchSolver >
U
S
Comparison done: 797
Time elapsed: 321100 ns
```

The bottom terminal window displays the following output:

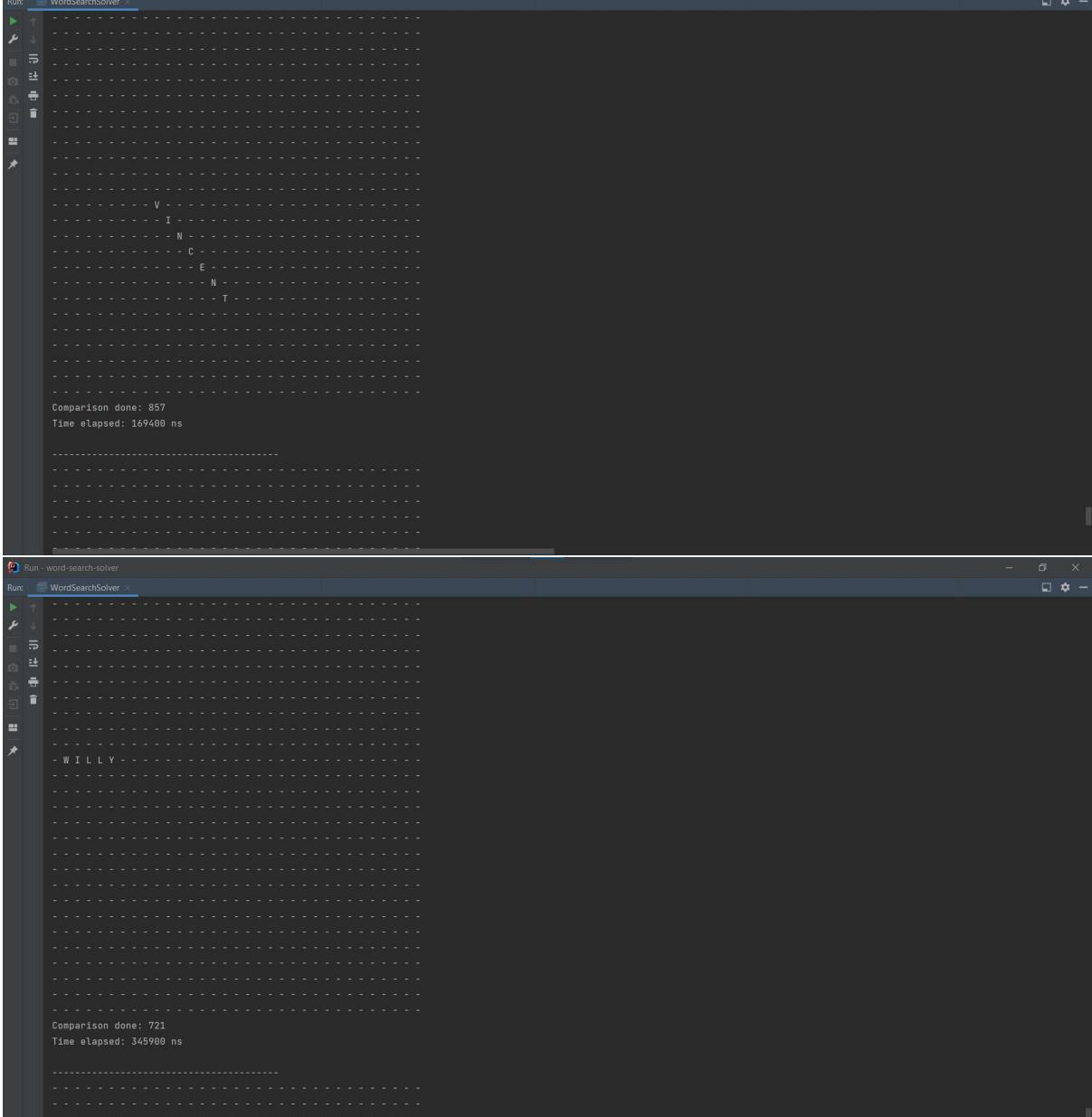
```
Run: WordSearchSolver >
Comparison done: 301
Time elapsed: 216600 ns
```

In the background of both windows, there is a faint grid pattern and some scattered letters (U, S, M, A, P) which appear to be part of a word search puzzle.

```
Run - word-search-solver
Run: WordSearchSolver >

Comparison done: 589
Time elapsed: 352180 ns
-----
-----
----- E R R E I P -----
-----
-----
----- R
----- O
----- B
----- I
----- N
```

```
Run - word-search-solver
Run: WordSearchSolver >
Comparison done: 131
Time elapsed: 54800 ns
-----
Run - word-search-solver
Run: WordSearchSolver >
D
N
A
S
-----
Comparison done: 691
Time elapsed: 166700 ns
-----
```

```
Run - word-search-solver
Run: WordSearchSolver >



V  
I  
N  
C  
E  
N  
T



Comparison done: 857  
Time elapsed: 169400 ns



-----



W I L L Y



Comparison done: 721  
Time elapsed: 345900 ns


```

Run - word-search-solver
Run: WordSearchSolver >

D
R
A
Z
I
W

Comparison done: 1085
Time elapsed: 319800 ns

Process finished with exit code 0

7. instruments.txt (Small)

Run - word-search-solver
Run: WordSearchSolver >
"C:\Program Files\Java\jdk-17\bin\java.exe" "-javaagent:C:\Program Files\JetBrains\IntelliJ IDEA 2021.2.1\lib\idea_rt.jar=49795:C:\Program Files\JetBrains\IntelliJ IDEA 2021.2.1\bin"
Welcome to Word Search Solver!

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

HARPEJJI
REACTABLE
VOCODER
THEREMIN
GLOCKENSPIEL
NOVACHORD
OCARINA
KALIMBA
ANGKLUNG
DIGERIDOO
STYLOPHONE
CRWTH
CAJON
LASERHARP
KAOSSILATOR

```
Run - word-search-solver
Run: WordSearchSolver >
-----
| I |
| J |
| J |
| E |
| P |
| R |
| A |
| H |
|   |
|   |
|   |
|   |
|   |
Comparison done: 236
Time elapsed: 429400 ns
-----
| R |
| E |
| A |
| C |
| T |
| A |
| B |
| L |
|   |
| E |
|   |
Run - word-search-solver
Run: WordSearchSolver >
Comparison done: 147
Time elapsed: 385500 ns
-----
| V |
| O |
| C |
| O |
| D |
| E |
| R |
|   |
|   |
|   |
Comperison done: 114
Time elapsed: 61000 ns
-----
| N |
| I |
| M |
| E |
| R |
| E |
| H |
| T |
|   |
```

```
Run - word-search-solver
Run: WordSearchSolver >
[Run] [Stop] [Minimize] [Maximize] [Close]
[New] [Open] [Save] [Save As] [Print] [Find] [Find Next] [Replace] [Copy] [Cut] [Paste] [Delete] [Select All] [Properties]
[Run] [Stop] [Minimize] [Maximize] [Close]
Comparison done: 164
Time elapsed: 117400 ns
-----
----- G L O C K E N S P I E L -----
Comparison done: 244
Time elapsed: 73700 ns
-----
----- D R O H C A V O N -----
-----
-----
-----
----- A N I R A C O -----
Comparison done: 299
Time elapsed: 179600 ns
-----
----- K -----
```

```
Run - word-search-solver
Run WordSearchSolver x
A . . . . L . . .
. . . . I . . .
. . . . M . . .
. . . . B . . .
. . . . A . . .

Comparison done: 106
Time elapsed: 43400 ns

-----
A . . . . N . . .
. . . . G . . .
. . . . K . . .
. . . . L . . .
. . . . U . . .
. . . . N . . .
. . . . G . . .

Comparison done: 137
Time elapsed: 79400 ns

-----
. . . . 0 0 D I R E D G C I D
```

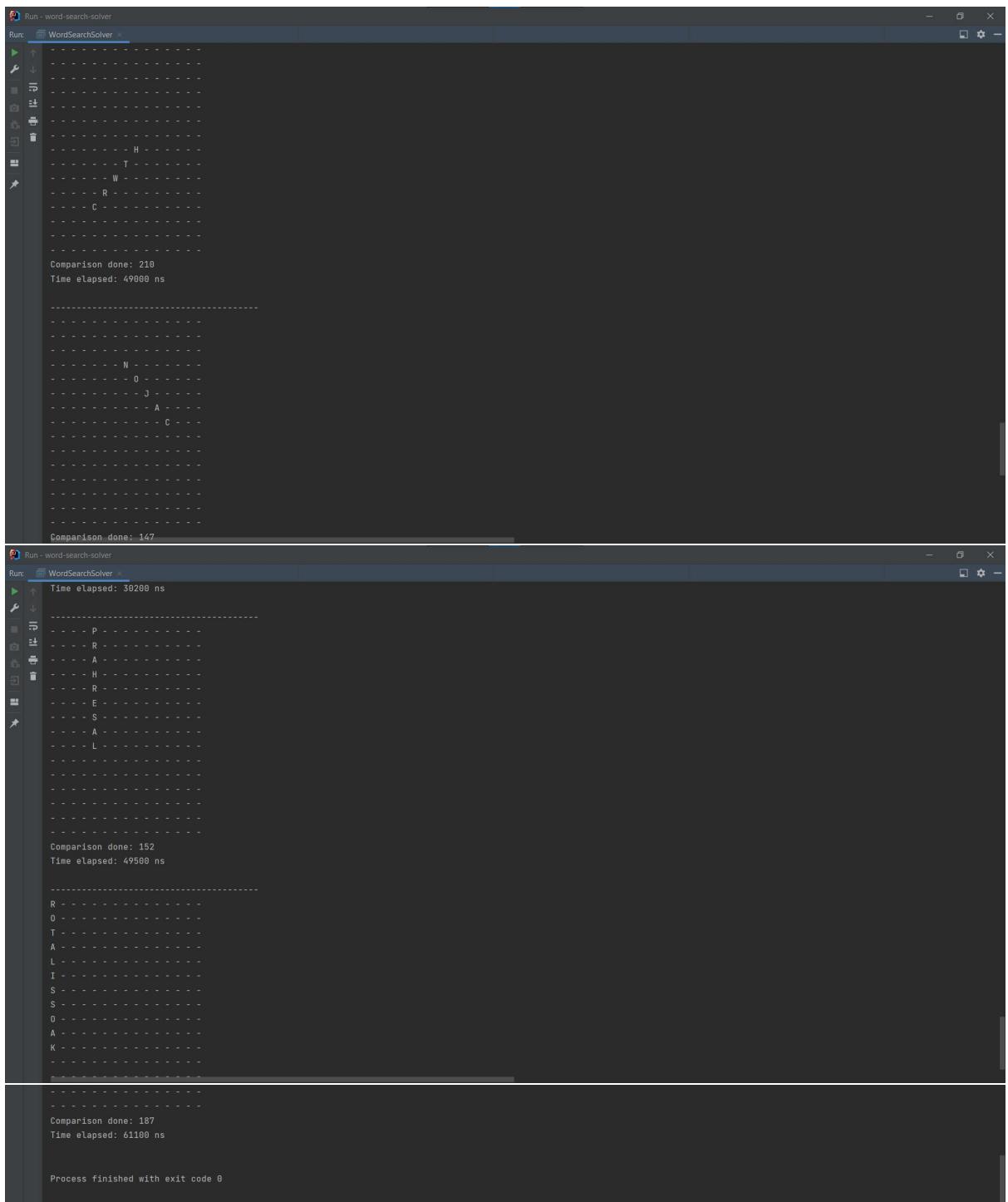


```
Run - word-search-solver
Run WordSearchSolver x
. . . . . . . . . .
. . . . . . . . . .
. . . . . . . . . .
. . . . . . . . . .
. . . . . . . . . .
. . . . . . . . . .
. . . . . . . . . .
. . . . . . . . . .
. . . . . . . . . .
. . . . . . . . . .

Comparison done: 85
Time elapsed: 44000 ns

-----
E . . . . N . . .
. . . . O . . .
. . . . H . . .
. . . . P . . .
. . . . O . . .
. . . . L . . .
. . . . Y . . .
. . . . T . . .
. . . . S . . .

Comparison done: 217
Time elapsed: 97600 ns
```

```
Run - word-search-solver
Run: WordSearchSolver >


The image shows two terminal windows side-by-side, both titled "Run - word-search-solver".



The left terminal window displays a 5x5 grid of letters:



```

| H |
| T |
| W |
| R |
C
Comparison done: 210
Time elapsed: 49000 ns

```



The right terminal window displays a 5x5 grid of letters:



```

| N |
| O |
| J |
| A |
C
Comparison done: 147
Time elapsed: 30200 ns

```



Both windows show the message "Comparison done" followed by a number and "Time elapsed" followed by a time value in nanoseconds.



At the bottom of the right terminal window, the message "Process finished with exit code 0" is displayed.


```

8. ingredients.txt (Medium)

The image shows two side-by-side IntelliJ IDEA run configurations. Both have the title "Run - word-search-solver".

The left configuration's terminal window displays a large grid of letters and a list of words:

```
"C:\Program Files\Java\jdk-17\bin\java.exe" "-javaagent:C:\Program Files\JetBrains\IntelliJ IDEA 2021.2.1\lib\idea_rt.jar=59509:C:\Program Files\JetBrains\IntelliJ IDEA 2021.2.1\bin"
Welcome to Word Search Solver!

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

ACEROLA
BOLETES
CARDON
DURIAN
ELVERS
FUGU
GEODUCK
HYSSOP
ISINGLASS
JAGGERY
```

The right configuration's terminal window displays a list of words and a 5x5 grid of letters:

```
"C:\Program Files\Java\jdk-17\bin\java.exe" "-javaagent:C:\Program Files\JetBrains\IntelliJ IDEA 2021.2.1\lib\idea_rt.jar=59509:C:\Program Files\JetBrains\IntelliJ IDEA 2021.2.1\bin"
Run: WordSearchSolver

KUDZU
LQUAT
MATCHA
NORI
OPAH
PHYSALIS
QUINOA
RHUBARB
SPICEBERRY
TRUFFLE
UBE

-----
A
C
E
R
O
L
A
```

At the bottom of the right terminal window, the message "Comparison done: 305" is visible.

```
Run - word-search-solver
Run: WordSearchSolver >
Time elapsed: 540000 ns
B
O
L
E
T
E
S
Comparison done: 396
Time elapsed: 21500 ns

N O O D R A C
Comparison done: 222
Time elapsed: 158000 ns

N
A
I
R
U
D
```

```
Run - word-search-solver
Run: WordSearchSolver >

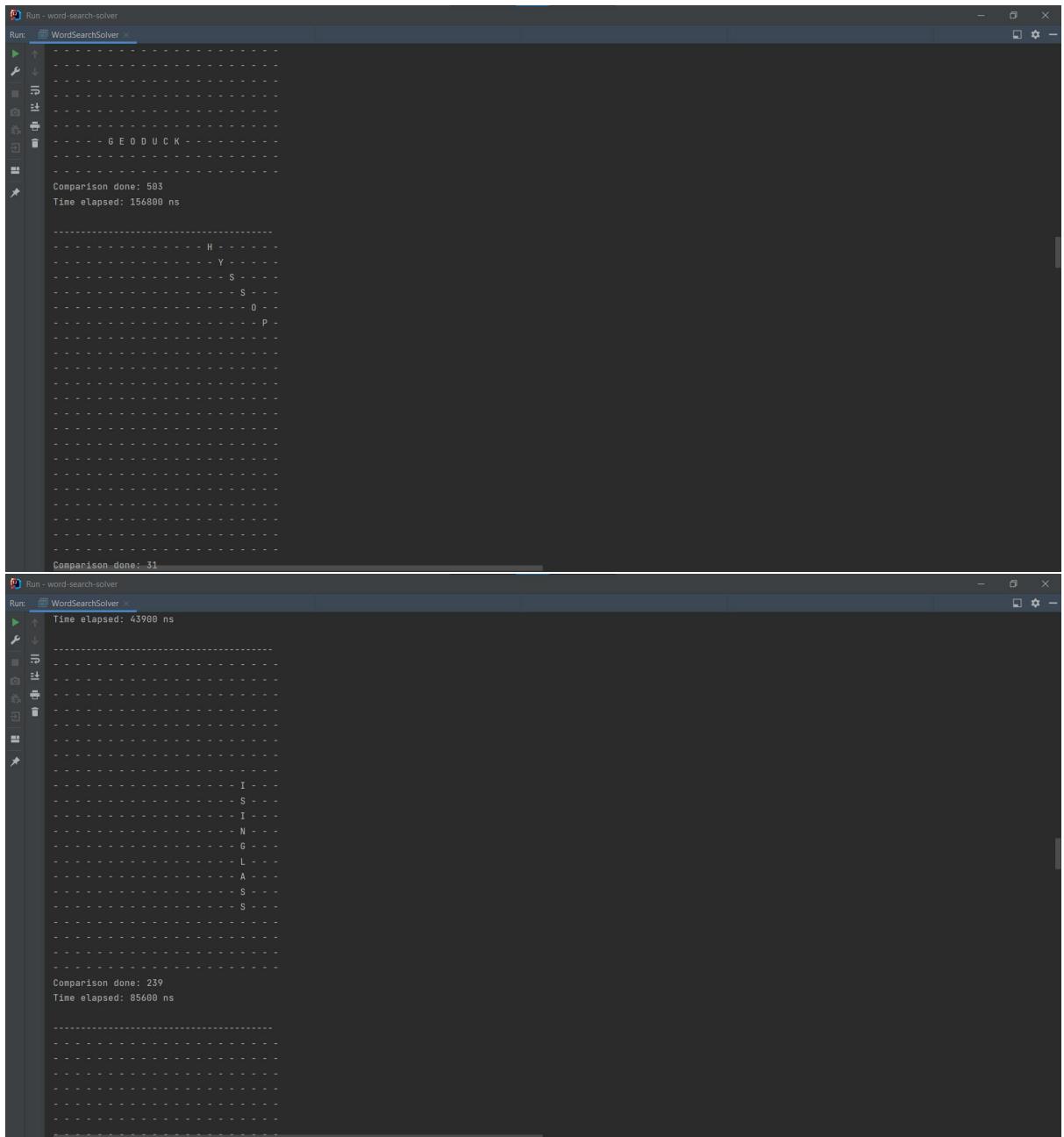
Comparison done: 417
Time elapsed: 287988 ns

S
R
E
V
L
E

Comparison done: 337
Time elapsed: 237480 ns

U
G
U
F

Comperision done: 198
Time elapsed: 141980 ns
```



```
Run - word-search-solver
Run: WordSearchSolver >
J
A
G
E
R
Y
Comparison done: 240
Time elapsed: 48500 ns
U Z D U K

Run - word-search-solver
Run: WordSearchSolver >
Comparison done: 66
Time elapsed: 59600 ns
T
A
U
Q
O
L
Comparison done: 393
Time elapsed: 148300 ns
A
```

```
Run - word-search-solver
Run: WordSearchSolver >
H
C
T
A
M
Comparison done: 184
Time elapsed: 72760 ns

I
R
O
N
Comparison done: 80
Time elapsed: 48360 ns

O P A H
Comparison done: 272
```

```
Run - word-search-solver
Run WordSearchSolver x
Time elapsed: 65800 ns
P
H
Y
S
A
L
I
S

Comparison done: 277
Time elapsed: 88600 ns

Q
U
I
N
O
A

Run - word-search-solver
Run WordSearchSolver x
Comparison done: 28
Time elapsed: 19700 ns

R
H
U
B
A
R
B
```

```
Run - word-search-solver
Run: WordSearchSolver >

Comparison done: 184
Time elapsed: 78400 ns

Y R R E B E C I S .
Comparison done: 532
Time elapsed: 266100 ns

E L F U R R T
Comparison done: 535
Time elapsed: 245300 ns

E B U
Comparison done: 615
Time elapsed: 329300 ns

Process finished with exit code 0
```

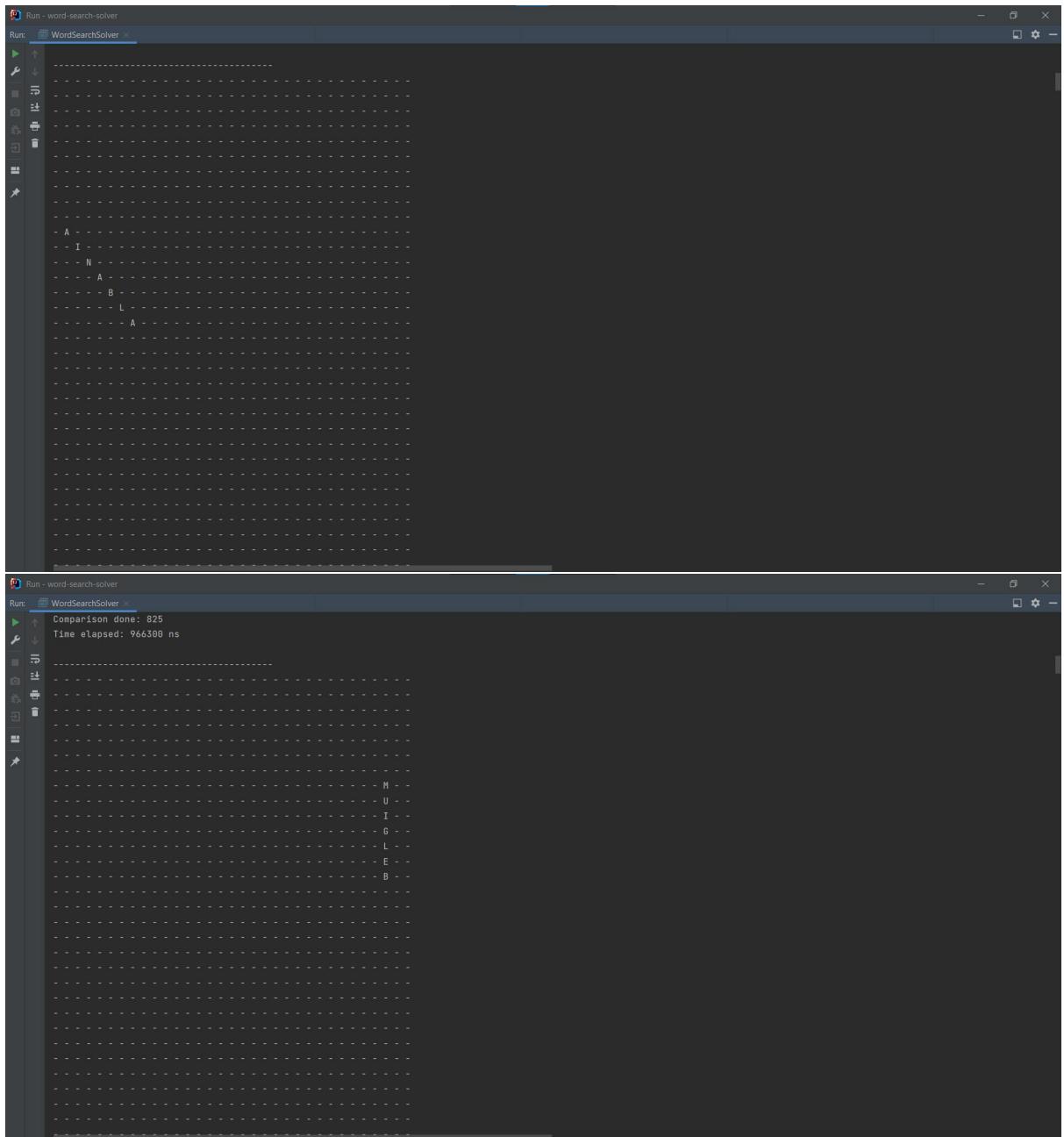
9. nato.txt (Large)

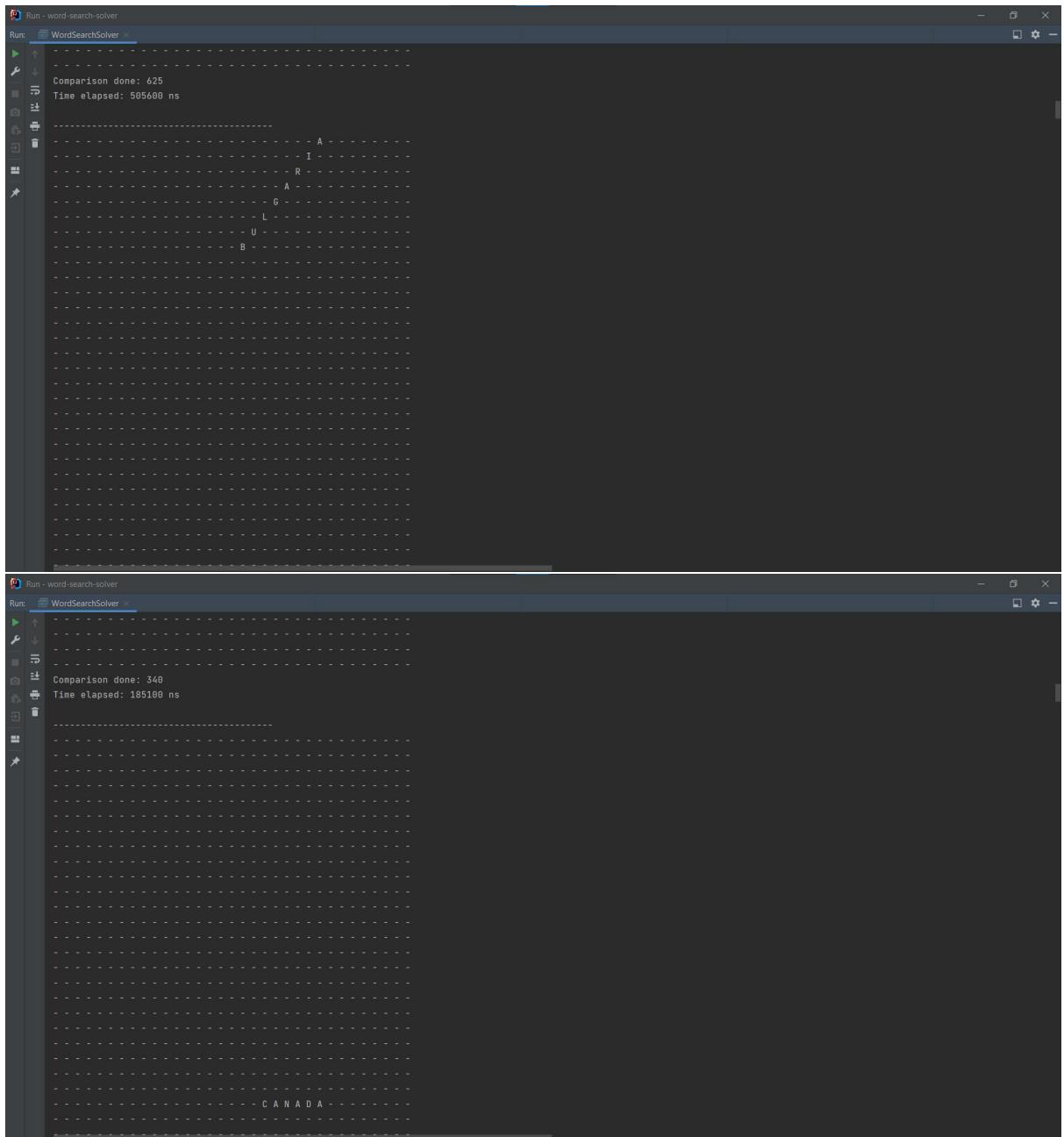
The image shows two side-by-side IntelliJ IDEA windows. Both windows have a title bar "Run - word-search-solver" and a status bar at the bottom indicating the run configuration is "WordSearchSolver".

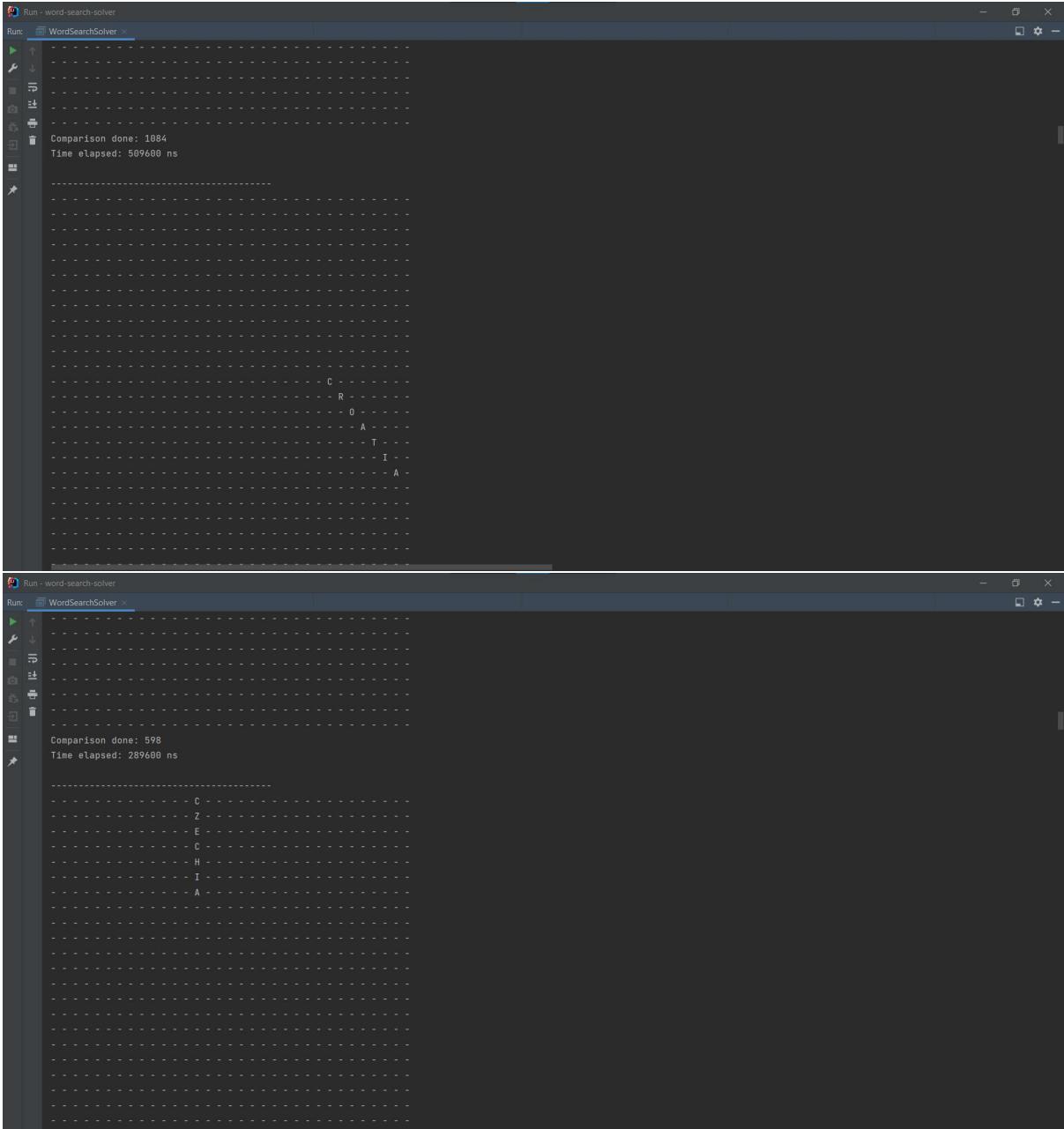
The left window displays a large amount of text, which is a grid of letters representing the NATO cipher key. The text is organized into approximately 10 rows of 10 columns each, with letters ranging from A to Z and some punctuation.

The right window displays a list of 34 countries, each preceded by a small icon representing the country's flag or a map outline. The countries listed are:

- ALBANIA
- BELGIUM
- BULGARIA
- CANADA
- CROATIA
- CZECHIA
- DENMARK
- ESTONIA
- FRANCE
- GERMANY
- GREECE
- HUNGARY
- ICELAND
- ITALY
- LATVIA
- LITHUANIA
- LUXEMBOURG
- MONTENEGRO
- NETHERLANDS
- NORTHMACEDONIA
- NORWAY
- POLAND
- PORTUGAL
- ROMANIA
- SLOVAKIA
- SLOVENIA
- SPAIN
- TURKEY
- UNITEDKINGDOM
- UNITEDSTATES
- BOSNIA
- HERZEGOVINA
- GEORGIA





```
Run - word-search-solver
Run: WordSearchSolver >

Comparison done: 1084
Time elapsed: 509600 ns
-----
C
R
O
A
T
I
A

Comparison done: 598
Time elapsed: 289600 ns
-----
C
Z
E
C
H
I
A
```

```
Run - word-search-solver
Run: WordSearchSolver >

Comparison done: 24
Time elapsed: 28300 ns

D
E
N
M
A
R
K

Run - word-search-solver
Run: WordSearchSolver >

Comparison done: 43
Time elapsed: 44400 ns


```

The image shows two vertically stacked terminal windows, both titled "Run - word-search-solver".

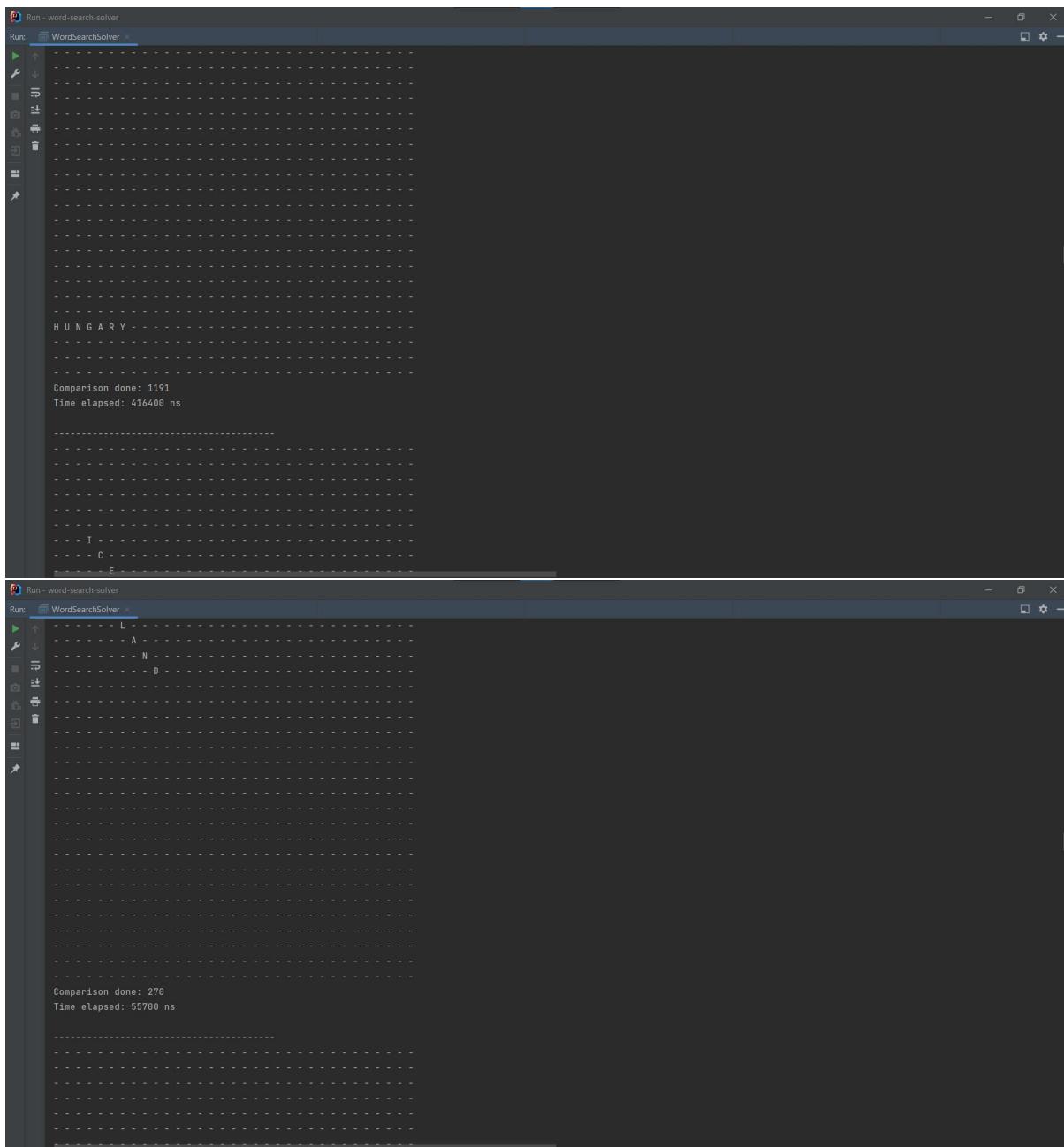
The top terminal window displays the following output:

```
Run: WordSearchSolver >
A I N O T S E
Comparison done: 1090
Time elapsed: 307500 ns
-----
E
C
N
A
R
F
```

The bottom terminal window displays the following output:

```
Run: WordSearchSolver >
Comparison done: 423
Time elapsed: 119400 ns
-----
```

```
Run - word-search-solver
Run: WordSearchSolver >
Y
N
A
M
R
E
G
Comparison done: 940
Time elapsed: 274400 ns
-----
E
C
E
R
G
Comparison done: 1387
Time elapsed: 457100 ns
```

```
Run - word-search-solver
Run: WordSearchSolver >


```

H U N G A R Y

Comparison done: 1191
Time elapsed: 416400 ns

```


```

L A D O N

Comparison done: 270
Time elapsed: 55700 ns

```


```

```
Run - word-search-solver
Run: WordSearchSolver >

I
T
A
L
Y

Comparison done: 565
Time elapsed: 142280 ns
-----
-----
```

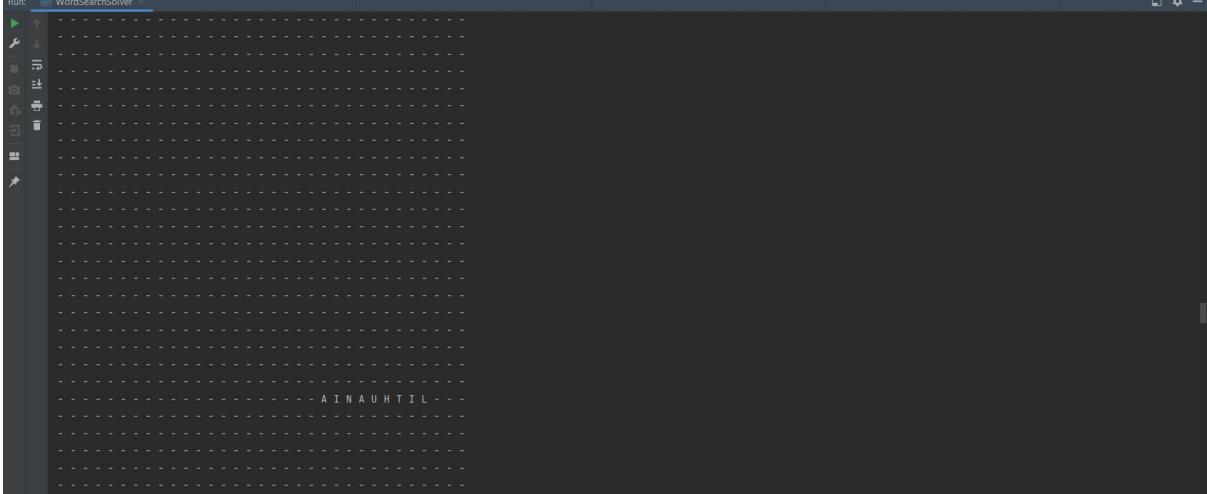


```
Run - word-search-solver
Run: WordSearchSolver >

L
A
T
V
I
A

Comparison done: 998
Time elapsed: 341500 ns
-----
```

```
Run - word-search-solver
Run: WordSearchSolver >



- A I N A U H T I L -



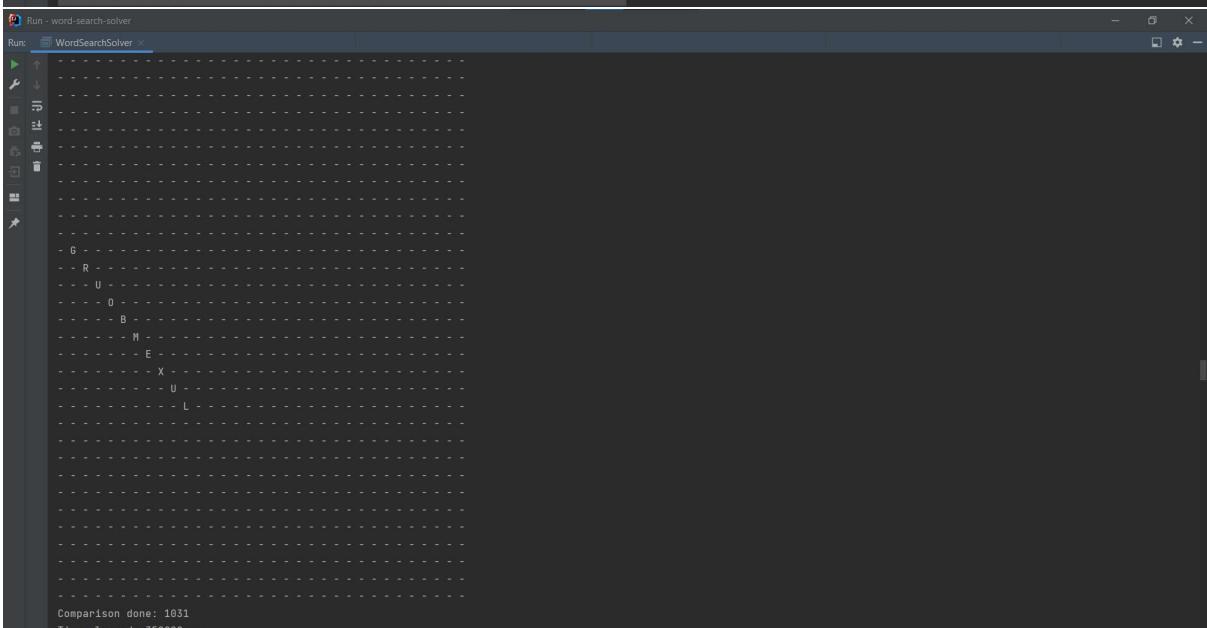
Comparison done: 1219  
Time elapsed: 404100 ns



---



```
Run - word-search-solver
Run: WordSearchSolver >

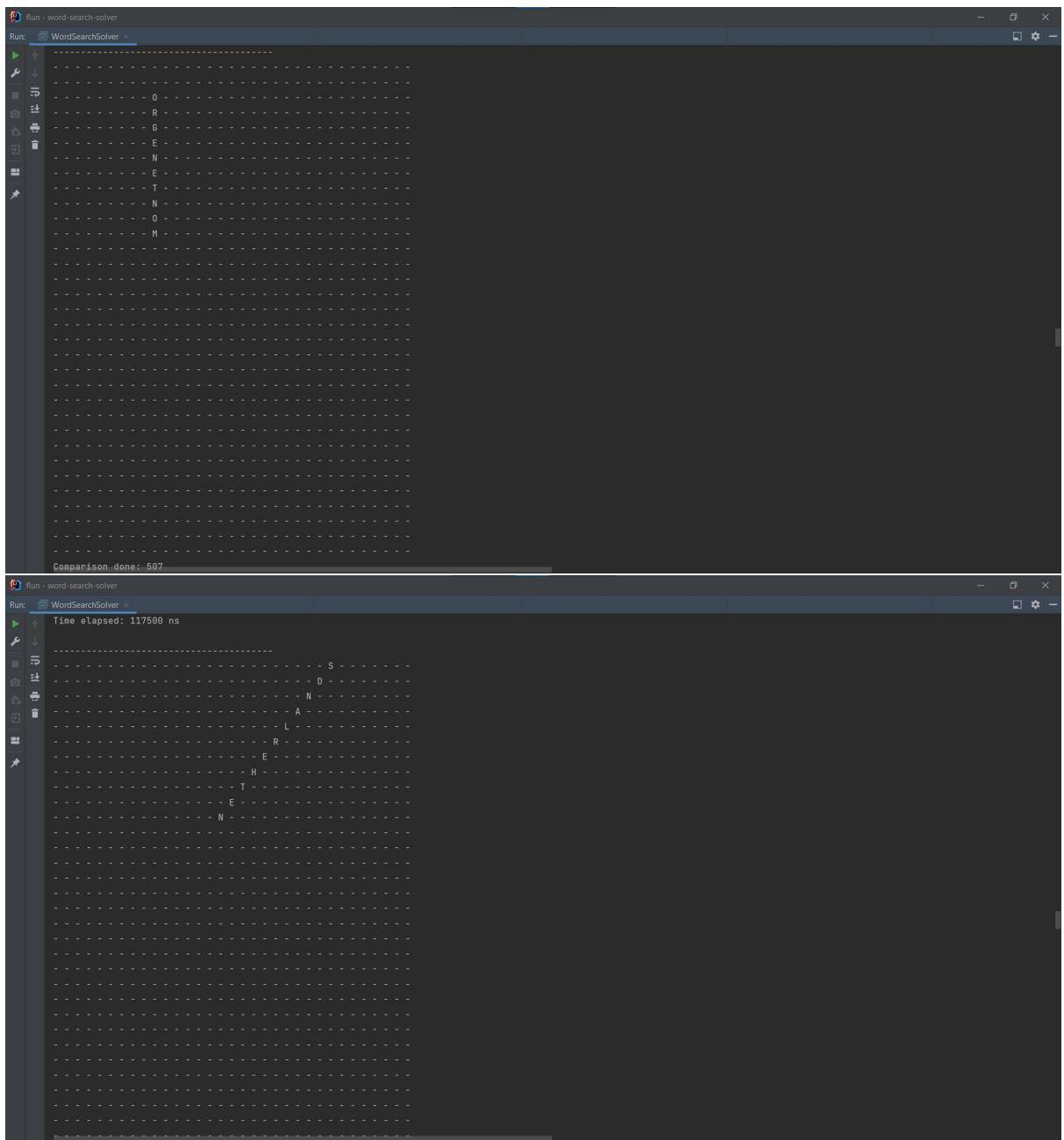


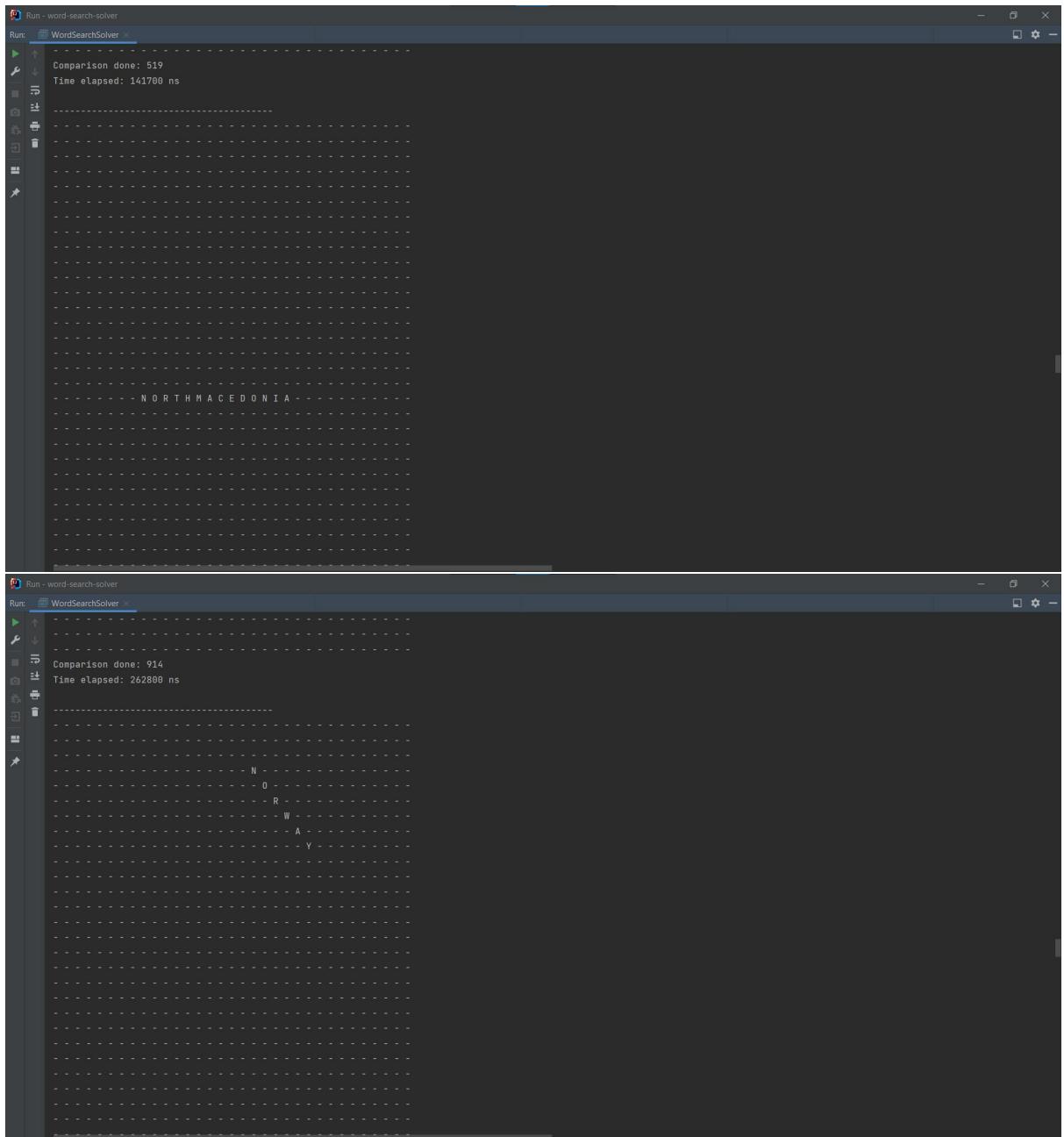
- G
- R
- U
- O
- B
- M
- E
- X
- U
- L

Comparison done: 1831
Time elapsed: 350000 ns


```


```



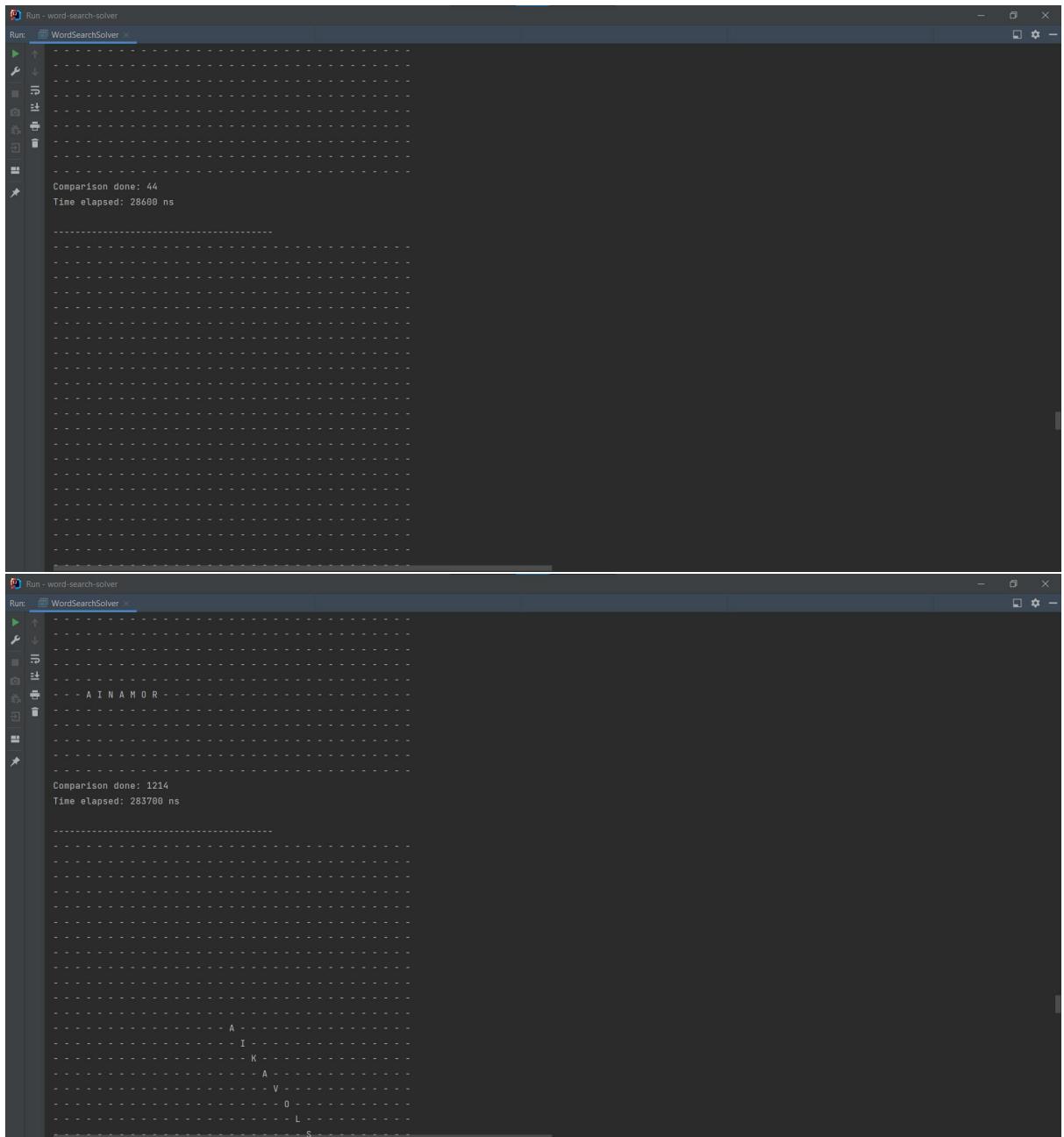


```
Run - word-search-solver
Run: WordSearchSolver >
Comparison done: 519
Time elapsed: 142780 ns
-----
----- N O R T H M A C E D O N I A -----
```



```
Run - word-search-solver
Run: WordSearchSolver >
Comparison done: 914
Time elapsed: 262880 ns
-----
----- N
----- O
----- R
----- W
----- A
----- Y -----
```

```
Run - word-search-solver
Run: WordSearchSolver >
▶ ⌛ ⌂ 📸 🗑
Comparison done: 192
Time elapsed: 59880 ns
-----
P
O
L
A
N
Run - word-search-solver
Run: WordSearchSolver >
▶ ⌛ ⌂ 📸 🗑
Comparison done: 870
Time elapsed: 169680 ns
-----
P
O
R
U
G
A
L
```

```
Run - word-search-solver
Run: WordSearchSolver >


```

Comparison done: 44
Time elapsed: 28600 ns

```



```

----- A I N A M O R -----
Comparison done: 1214
Time elapsed: 283700 ns
----- A I K A V O L S -----

```


```

```
Run - word-search-solver
Run: WordSearchSolver >

Comparison done: 849
Time elapsed: 232300 ns

-----
-----
```

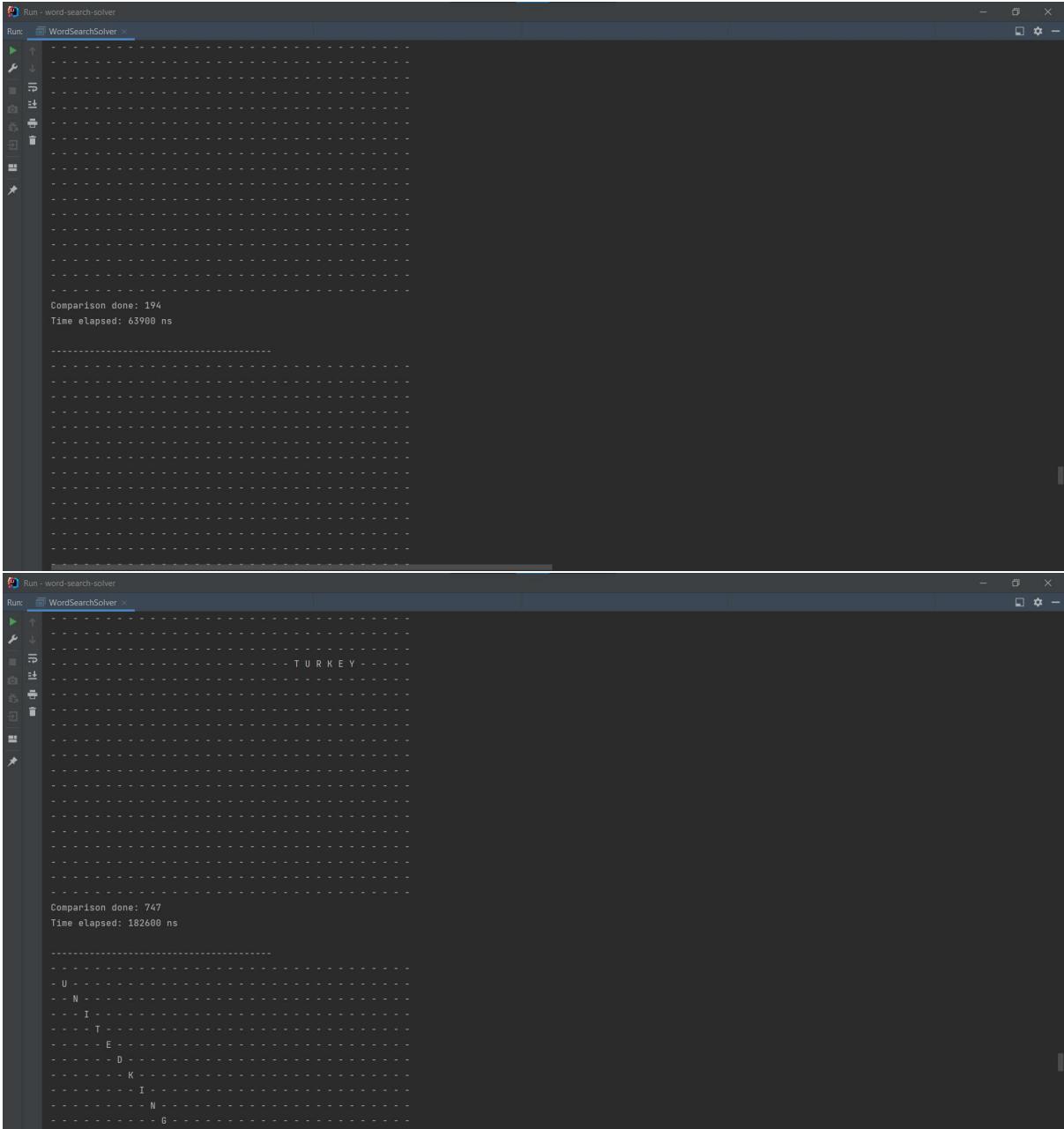
```
Run - word-search-solver
Run: WordSearchSolver >

A
I
N
E
V
O
L
S

Comparison done: 1151
Time elapsed: 382000 ns

-----
-----
```

A	I	N
E	V	O
O	L	S
L	S	P
S	P	S

```
Run - word-search-solver
Run: WordSearchSolver >


```
Comparison done: 194
Time elapsed: 63900 ns


```



```
TURKEY
```



```

```



```
Comparison done: 747
Time elapsed: 182600 ns


```



```
U
- N
- I
- T
- E
- D
- K
- I
- N
- G
- D
```


```

The image shows two vertically stacked terminal windows, both titled "Run - word-search-solver".

The top terminal window displays a 10x10 grid of letters. The letters visible are O, M, and several dashes. At the bottom of the grid, the following text is displayed:

```
Comparison done: 74
Time elapsed: 63700 ns
```

The bottom terminal window also displays a 10x10 grid of letters. The letters visible are U, N, I, T, E, D, S, T, A, T, E, and S. At the bottom of the grid, the following text is displayed:

```
Comparison done: 593
Time elapsed: 116300 ns
```

The image shows two identical terminal windows side-by-side, both titled "Run - word-search-solver". Each window has a dark background with white text. The top window displays a 10x10 grid of letters with some words found: "S", "N", "I", and "A". Below the grid, the text "Comparison done: 336" and "Time elapsed: 123600 ns" is shown. The bottom window also shows a 10x10 grid but with a different set of found words: "A", "N", "I", "V", "O", "G", "E", "Z", "R", and "H". Below this grid, the text "Comparison done: 420" and "Time elapsed: 88300 ns" is displayed. Both windows have standard operating system window controls (minimize, maximize, close) at the top right.

```
Run - word-search-solver
WordSearchSolver x
0
S
N
I
A

Comparison done: 336
Time elapsed: 123600 ns

-----
Run - word-search-solver
WordSearchSolver x
A N I V O G E Z R E H

Comparison done: 420
Time elapsed: 88300 ns
```

The screenshot shows a terminal window titled "Run - word-search-solver". The window displays a grid of letters representing a puzzle board. The letters are arranged in a 6x6 pattern:

A					
I					
G					
R					
O					
E					G

Below the grid, the terminal shows the following text:

```
Comparison done: 996
Time elapsed: 229000 ns

Process finished with exit code 0
```

D. Repotori Program

Kode sumber dari program ini dapat diakses pada repositori GitHub yang terdapat pada laman <https://github.com/tastytypist/word-search-solver>.

E. Lampiran

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