Laporan Tugas Kecil I Strategi Algoritma
Penyelesaian Word Search Puzzle dengan Algoritma Brute Force
Semester II Tahun 2021/2022

Malik Akbar Hashemi Rafsanjani

13520105

Teknik Informatika 2020

Sekolah Teknik Elektro dan Informatika

Institut Teknologi Bandung

I. Check List Status Program

Poin	Ya	Tidak
1. Program berhasil dikompilasi tanpa kesalahan (no syntax error)		
2. Program berhasil running		
3. Program dapat membaca file masukan dan menuliskan luaran.		
4. Program berhasil menemukan semua kata di dalam puzzle		

II. Langkah-langkah Algoritma Brute Force

1. Algoritma pembacaan file

- Pada pembacaan file ini, terdapat 2 state / mode program, yang pertama mode untuk membaca word puzzle dan yang kedua ialah mode membaca kata-kata yang akan dicari.
- Data word puzzle disimpan pada vektor 2 dimensi berisi pasangan karakter untuk karakter word puzzle dan integer untuk kode warna huruf ketika ditampilkan. Sedangkan data kata-kata yang akan dicari disimpan pada vektor string.
- Buka file dengan alamat berdasarkan masukan pengguna, jika file tidak ditemukan, akan ditampilkan pesan "File not found" dan program berhenti.
- Lakukan iterasi setiap baris pada file, jika baris tersebut panjangnya kurang dari atau sama dengan 1, maka ganti ke state / mode 2
- Jika baris panjangnya lebih dari 1 dan sedang di state / mode 1, maka kita lakukan pembacaan karakter yang bukan whitespace dan simpan pada vektor pasangan karakter dan integer. Setelah selesai pembacaan satu baris, maka simpan pada vektor 2 dimensi sebelumnya.
- Jika baris panjangnya lebih dari 1 dan sedang di state / mode 2, maka kita langsung masukan string baris pembacaan ke vektor string sebelumnya.

2. Algoritma pemrosesan word search puzzle

- Iterasi setiap kata yang akan dicari pada word puzzle
- Untuk setiap iterasi, kita cari kata tersebut pada word puzzle secara delapan arah secara berurutan. Delapan arah tersebut ialah horizontal ke kanan, horizontal ke kiri, vertical ke bawah, vertical ke atas, diagonal utama ke kanan bawah, diagonal utama ke kiri atas, diagonal samping ke kiri bawah dan diagonal samping ke kanan atas.
- Pencarian tersebut dengan cara mencari kata yang dicari saat itu pada setiap baris (jika horizontal), setiap kolom (jika vertical), atau setiap diagonal (jika diagonal) word puzzle.
- Pencarian pada setiap baris / kolom / diagonal tersebut diawali dengan menghitung berapa banyak kata dengan panjang sama dengan kata yang dicari, yang muat pada baris /

kolom / diagonal tersebut. Untuk setiap nilai tersebut, maka dilakukan komparasi string dengan membandingkan karakter satu per satu.

- Jika sudah berbeda karakter, maka hentikan komparasi dan lanjut ke iterasi berikutnya
- Jika benar, maka ganti kode warna huruf-huruf pada word puzzle yang bersesuaian dengan kata yang dicari dan hentikan pencarian kata tersebut. Kode warna didapatkan dari indeks / urutan kata yang dicari.
- Jika sudah ditemukan di salah satu arah (horizontal / vertical / diagonal), maka tidak dilakukan pencarian kata yang sama pada arah yang berbeda.
- Jika sudah semua kata yang dicari ditemukan, maka akan ditampilkan ke layar huruf-huruf word puzzle dengan warna yang bersesuaian dengan kata-kata yang dicari, jika ada yang bersesuaian.

3. **Algoritma output hasil**
- Iterasi setiap baris dari data word puzzle (berupa vektor 2 dimensi dari pasangan karakter dan integer)
- Iterasi setiap kolom pada baris, dan tampilkan huruf ke layar berdasarkan kode warna huruf tersebut.
- Program ini hanya memiliki 13 kombinasi warna, 12 untuk hasil kata yang dicari dan 1 untuk huruf-huruf yang tidak memiliki kata yang bersesuaian. Oleh karena itu, jika terdapat lebih dari 12 kata yang dicari, maka akan terdapat warna yang sama pada hasil pencarian karena dilakukan modulo berdasarkan kode warna dan jumlah warna yang tersedia (12).

III. Source program

Program ini dibagi menjadi 4 bagian, yaitu: main program, file reader program, word puzzle solver program, serta utils program. Dengan semua program kecuali main program, memiliki header file-nya masing-masing. Pada program ini, diterapkan konsep pemrograman berbasis objek untuk mengisolasi method dan atribut, terutama atribut untuk data global objek tersebut yang tidak seharusnya diakses oleh program lain sehingga membuat pengembangan program menjadi lebih aman.

1. Main Program

```cpp
#include "file_reader/file_reader.hpp"
#include "utils/utils.hpp"
#include "word_puzzle_solver/word_puzzle_solver.hpp"
#include <array>
#include <chrono>
#include <ctime>
#include <iostream>
#include <string>
#include <utility>
#include <vector>

int main(int argc, char **argv) {
  std::vector<std::vector<std::pair<char, int>>> word_puzzle;
  std::vector<std::string> words_searched;

  if (argc < 2) {
    std::cout << "Please add arguments for file name" << std::endl;
    return 0;
  }

  FileReader fileReader = FileReader();
  if (!fileReader.readFile(std::string("./test/") + argv[1], word_puzzle,
                           words_searched)) {
    return 0;
  }

  auto start = std::chrono::high_resolution_clock::now();
  WordPuzzleSolver wps = WordPuzzleSolver();
  wps.solve(word_puzzle, words_searched);
  auto stop = std::chrono::high_resolution_clock::now();

  Utils utils = Utils();
  utils.showOutput(word_puzzle);
  std::cout << "COMPARISONS: " << wps.getComparisons() << std::endl;

  auto duration =
      std::chrono::duration_cast<std::chrono::nanoseconds>(stop - start);
  std::cout << "Time taken by function: " << duration.count() << " nanoseconds"
            << std::endl;

  return 0;
}
```

2. File reader program
- **Header file**

```cpp
#pragma once
#include <fstream>
#include <string>
#include <vector>

malikrafsan, 3 days ago | 1 author (malikrafsan)
class FileReader {
private:
    std::ifstream fin;

public:
    bool readFile(std::string fileName,
                  std::vector<std::vector<std::pair<char, int>>> &word_puzzle,
                  std::vector<std::string> &words_searched);
};
```

- **C++ file**

```cpp
#include "file_reader.hpp"
#include <fstream>
#include <iostream>
#include <string>
#include <vector>

bool FileReader::readFile(
    std::string fileName,
    std::vector<std::vector<std::pair<char, int>>> &word_puzzle,
    std::vector<std::string> &words_searched) {
    bool isMode1 = true;
    std::string line;

    fin.open(fileName);
    if (!fin.is_open()) {
        std::cout << "File not found" << std::endl;
        return false;
    }

    while (fin) {
        getline(fin, line);

        if (line.length() > 1) {
            if (isMode1) {
                std::vector<std::pair<char, int>> line_vector;
                for (int i = 0; i < line.length(); i++) {
                    if (line[i] != ' ') {
                        line_vector.push_back({line[i], -1});
                    }
                }
                word_puzzle.push_back(line_vector);
            } else {
                words_searched.push_back(line);
            }
        } else {
            if (isMode1) {
                isMode1 = false;
            } else {
                break;
            }
        }
    }
    fin.close();
    return true;
}
```

3. **Word Puzzle Solver program**
   - **Header file**

```cpp
#pragma once        #pragma once in main file [-Wpragma-once-outside-header]
#include <iostream>
#include <string>
#include <vector>
```

```cpp
class WordPuzzleSolver {
private:
  int idxWord;
  long long comparisons = 0;

  bool solvePerWord(std::vector<std::vector<std::pair<char, int>>> &word_puzzle,
                    std::string &word_searched);
  int inline calcIndexWord(bool isReversed, int idx, int word_length) {
    return isReversed ? word_length - idx - 1 : idx;
  }
  bool
  solveHorizontal(std::vector<std::vector<std::pair<char, int>>> &word_puzzle,
                  std::string &word_searched, bool isReversed);
  bool
  solveVertical(std::vector<std::vector<std::pair<char, int>>> &word_puzzle,
                std::string &word_searched, bool isReversed);
  bool
  solveMainDiagonal(std::vector<std::vector<std::pair<char, int>>> &word_puzzle,
                    std::string &word_searched);
  bool solveCrossDiagonal(
      std::vector<std::vector<std::pair<char, int>>> &word_puzzle,
      std::string &word_searched);
  bool
  checkMainDiagonal(std::vector<std::vector<std::pair<char, int>>> &word_puzzle,
                    std::string &word_searched, int rowStart, int colStart,
                    bool isReversed);
  bool checkCrossDiagonal(
      std::vector<std::vector<std::pair<char, int>>> &word_puzzle,
      std::string &word_searched, int rowStart, int colStart, bool isReversed);
  void addColor(std::vector<std::vector<std::pair<char, int>>> &word_puzzle,
                const int row, const int col, const int len, const char mode);

public:
  void solve(std::vector<std::vector<std::pair<char, int>>> &word_puzzle,
             std::vector<std::string> &words_searched);
  long long inline getComparisons() { return comparisons; }
};
```

- **C++ file**

```cpp
#include "word_puzzle_solver.hpp"
#include <exception>

void WordPuzzleSolver::solve(
    std::vector<std::vector<std::pair<char, int>>> &word_puzzle,
    std::vector<std::string> &words_searched) {
  for (int i = 0; i < words_searched.size(); i++) {
    std::string word_searched = words_searched[i];
    idxWord = i;
    solvePerWord(word_puzzle, word_searched);
  }
}

bool WordPuzzleSolver::solvePerWord(
    std::vector<std::vector<std::pair<char, int>>> &word_puzzle,
    std::string &word_searched) {
  return solveHorizontal(word_puzzle, word_searched, false) ||
         solveHorizontal(word_puzzle, word_searched, true) ||
         solveVertical(word_puzzle, word_searched, false) ||
         solveVertical(word_puzzle, word_searched, true) ||
         solveMainDiagonal(word_puzzle, word_searched) ||
         solveCrossDiagonal(word_puzzle, word_searched);
}

bool WordPuzzleSolver::solveHorizontal(
    std::vector<std::vector<std::pair<char, int>>> &word_puzzle,
    std::string &word_searched, bool isReversed) {
  bool found = false;
  int col = word_puzzle[0].size() - word_searched.length() + 1;

  for (int i = 0; i < word_puzzle.size(); i++) {
    for (int j = 0; j < col; j++) {
      found = true;
      for (int k = 0; k < (word_searched.length()); k++) {
        comparisons++;
        if (word_searched[calcIndexWord(isReversed, k,
                          word_searched.length())] !=
            word_puzzle[i][j + k].first) {
          found = false;
          break;
        }
      }
      if (found) {
        addColor(word_puzzle, i, j, word_searched.length(), 'H');
        break;
      }
    }
    if (found) {
      break;
    }
  }
  return found;
}
```

```cpp
bool WordPuzzleSolver::solveVertical(
    std::vector<std::vector<std::pair<char, int>>> &word_puzzle,
    std::string &word_searched, bool isReversed) {
  bool found = false;
  int row = word_puzzle.size() - word_searched.length() + 1;

  for (int i = 0; i < word_puzzle[0].size(); i++) {
    for (int j = 0; j < row; j++) {
      found = true;
      for (int k = 0; k < (word_searched.length()); k++) {
        comparisons++;
        if (word_searched[calcIndexWord(isReversed, k,
                          word_searched.length())] !=
            word_puzzle[j + k][i].first) {
          found = false;
          break;
        }
      }
      if (found) {
        addColor(word_puzzle, j, i, word_searched.length(), 'V');
        break;
      }
    }
    if (found) {
      break;
    }
  }
  return found;
}

bool WordPuzzleSolver::solveMainDiagonal(
    std::vector<std::vector<std::pair<char, int>>> &word_puzzle,
    std::string &word_searched) {
  for (int i = 0; i < word_puzzle.size(); i++) {
    if (checkMainDiagonal(word_puzzle, word_searched, i, 0, false) ||
        checkMainDiagonal(word_puzzle, word_searched, i, 0, true)) {
      return true;
    }
  }
  if (word_puzzle[0].size() > 1) {
    for (int i = 1; i < word_puzzle[0].size(); i++) {
      if (checkMainDiagonal(word_puzzle, word_searched, 0, i, false) ||
          checkMainDiagonal(word_puzzle, word_searched, 0, i, true)) {
        return true;
      }
    }
  }
  return false;
}
```

```cpp
bool WordPuzzleSolver::solveCrossDiagonal(
    std::vector<std::vector<std::pair<char, int>>> &word_puzzle,
    std::string &word_searched) {
  for (int i = 0; i < word_puzzle.size(); i++) {
    if (checkCrossDiagonal(word_puzzle, word_searched, i, 0, false) ||
        checkCrossDiagonal(word_puzzle, word_searched, i, 0, true)) {
      return true;
    }
  }
  if (word_puzzle[0].size() > 1) {
    for (int i = 1; i < word_puzzle[0].size(); i++) {
      if (checkCrossDiagonal(word_puzzle, word_searched, word_puzzle.size() - 1,
                             i, false) ||
          checkCrossDiagonal(word_puzzle, word_searched, word_puzzle.size() - 1,
                             i, true)) {
        return true;
      }
    }
  }
  return false;
}

bool WordPuzzleSolver::checkMainDiagonal(
    std::vector<std::vector<std::pair<char, int>>> &word_puzzle,
    std::string &word_searched, int rowStart, int colStart, bool isReversed) {
  bool found = false;

  for (int i = 0;
       (i + rowStart + word_searched.length() - 1) < word_puzzle.size() &&
       (i + colStart + word_searched.length() - 1) < word_puzzle[0].size();
       i++) {
    found = true;
    for (int j = 0; j < (word_searched.length()); j++) {
      comparisons++;
      if (word_puzzle[i + j + rowStart][i + j + colStart].first !=
          word_searched[calcIndexWord(isReversed, j, word_searched.length())]) {
        found = false;
        break;
      }
    }
    if (found) {
      addColor(word_puzzle, i + rowStart, i + colStart, word_searched.length(),
               'M');
      break;
    }
  }
  return found;
}
```

```cpp
bool WordPuzzleSolver::checkCrossDiagonal(
    std::vector<std::vector<std::pair<char, int>>> &word_puzzle,
    std::string &word_searched, int rowStart, int colStart, bool isReversed) {
  bool found = false;

  for (int i = 0;
       (int(rowStart - word_searched.length() + 1 - i) >= 0 &&
        colStart + word_searched.length() - 1 + i < word_puzzle[0].size());
       i++) {
    found = true;
    for (int j = 0; j < (word_searched.length()); j++) {
      comparisons++;
      if (word_puzzle[rowStart - i - j][colStart + i + j].first !=
          word_searched[calcIndexWord(isReversed, j, word_searched.length())]) {
        found = false;
        break;
      }
    }
    if (found) {
      addColor(word_puzzle, rowStart - i, colStart + i, word_searched.length(),
               'C');
      break;
    }
  }
  return found;
}

void WordPuzzleSolver::addColor(
    std::vector<std::vector<std::pair<char, int>>> &word_puzzle, const int row,
    const int col, const int len, const char mode) {
  switch (mode) {
  case 'H':
    for (int i = 0; i < len; i++) {
      word_puzzle[row][col + i].second = idxWord;
    }
    break;
  case 'V':
    for (int i = 0; i < len; i++) {
      word_puzzle[row + i][col].second = idxWord;
    }
    break;
  case 'M':
    for (int i = 0; i < len; i++) {
      word_puzzle[row + i][col + i].second = idxWord;
    }
    break;
  case 'C':
    for (int i = 0; i < len; i++) {
      word_puzzle[row - i][col + i].second = idxWord;
    }
    break;
  }
}
```

4. Utils program
- **Header file**

```cpp
#pragma once
#include <iostream>
#include <string>
#include <vector>

#define RESET "\033[0m"
#define RED "\033[31m"                    /* Red */
#define GREEN "\033[32m"                  /* Green */
#define YELLOW "\033[33m"                 /* Yellow */
#define BLUE "\033[34m"                   /* Blue */
#define MAGENTA "\033[35m"                /* Magenta */
#define CYAN "\033[36m"                   /* Cyan */
#define BOLDRED "\033[1m\033[31m"         /* Bold Red */
#define BOLDGREEN "\033[1m\033[32m"       /* Bold Green */
#define BOLDYELLOW "\033[1m\033[33m"      /* Bold Yellow */
#define BOLDBLUE "\033[1m\033[34m"        /* Bold Blue */
#define BOLDMAGENTA "\033[1m\033[35m"     /* Bold Magenta */
#define BOLDCYAN "\033[1m\033[36m"        /* Bold Cyan */

// malikrafsan, 3 days ago | 1 author (malikrafsan)
class Utils {
private:
  const int codeAmount = 12;
  const std::string colorCode[12] = {
      RED,     GREEN,     YELLOW,     BLUE,     MAGENTA,     CYAN,
      BOLDRED, BOLDGREEN, BOLDYELLOW, BOLDBLUE, BOLDMAGENTA, BOLDCYAN,
  };
  std::string inline getColor(int code) {
    return code == -1 ? RESET : colorCode[code % codeAmount];
  }

public:
  void showOutput(std::vector<std::vector<std::pair<char, int>>> &word_puzzle);
  void
  showCodeColor(std::vector<std::vector<std::pair<char, int>>> &word_puzzle);
};
// malikrafsan, 3 days ago • save refactor
```

- **C++ file**

```cpp
#include "utils.hpp"

void Utils::showOutput(
    std::vector<std::vector<std::pair<char, int>>> &word_puzzle) {
  for (int i = 0; i < word_puzzle.size(); i++) {
    for (int j = 0; j < word_puzzle[i].size(); j++) {
      std::cout << getColor(word_puzzle[i][j].second) << word_puzzle[i][j].first
                << " ";
    }
    std::cout << std::endl;
  }
  std::cout << RESET;
}

void Utils::showCodeColor(
    std::vector<std::vector<std::pair<char, int>>> &word_puzzle) {
  for (int i = 0; i < word_puzzle.size(); i++) {
    for (int j = 0; j < word_puzzle[i].size(); j++) {
      std::cout << word_puzzle[i][j].second << " ";
    }
    std::cout << std::endl;
  }
}
// malikrafsan, 3 days ago • save refactor
```

IV. Skrinshut Input dan Output

Kategori ukuran kecil

Small 1

Small 2

```
 1    C S H R U K A T G N W Q E O V
 2    M G H Y E R G N I L G N A I X
 3    J B A E A B I C F Z B W E W F
 4    I S X B N Q M I K L E E Q N D
 5    Z Q R Z E H S A B E I D O U L
 6    E A I K H C E I L B S E O N I
 7    B I W Q H P N H A U I M I S S
 8    G E E L J I K V A N U N V U A
 9    X U K F J W B O B L G V O C Y
10    L L O N N W W A K G O V C R I
11    S A U A H A R K U O D C Z O M
12    Z Y V N T S Y A N W M I X S I
13    B I B Y B U N Y A H N I O E O
14    U Y N A G G H A E L L E O N Y
15    R O S A R I A D J Z B J L V A
16
17    AMBER
18    AYAKA
19    BARBARA
20    BEIDOU
21    DIONA
22    EULA
23    FISCHL
24    GANYU
25    HUTAO
26    JEAN
27    KEQING
28    KLEE
29    KOKOMI
30    LISA
31    NINGGUANG
32    NOELLE
33    QIQI
34    BAAL
35    SAYU
36    ROSARIA
37    SHENHE
38    SUCROSE
39    XIANGLING
40    YANFEI
41    YOIMIYA
42    YUNJIN
```

```
D:\KULIAH-AKBAR\SEMESTER-4\STIMA\Tucil1
C S H R U K A T G N W Q E O V
M G H Y E R G N I L G N A I X
J B A E A B I C F Z B W E W F
I S X B N Q M I K L E E Q N D
Z Q R Z E H S A B E I D O U L
E A I K H C E I L B S E O N I
B I W Q H P N H A U I M I S S
G E E L J I K V A N U N V U A
X U K F J W B O B L G V O C Y
L L O N N W W A K G O V C R I
S A U A H A R K U O D C Z O M
Z Y V N T S Y A N W M I X S I
B I B Y B U N Y A H N I O E O
U Y N A G G H A E L L E O N Y
R O S A R I A D J Z B J L V A
COMPARISONS: 15567
Time taken by function: 0 nanoseconds
```

Small 3

```
 1    Y L H Z E T B J N E P V N L A
 2    Z G C R E M R A F E H F O I S
 3    U I X N W E Z N J S W M I T B
 4    B X N S F A O W T D A S T E U
 5    L I U I I I G H W H A A A R M
 6    S G W J T S T E D C C D N A T
 7    C V Y I G B Y A O I D V I T E
 8    O I B F A M I L Y I T E G U H
 9    Q M W W Z V L T A M H R A R Q
10    A O L C T E I H R N Q T M E E
11    D U T M G O U Y E S A I I A I
12    U X K E K U S V G X X S R I L
13    A R T I C L E F N U X I B V G
14    C A N K B N H I I P M N R Y Z
15    G N B Q T F J O S E D G R K O
16    |
17    HEALTH
18    TENNIS
19    FARMER
20    ANALYSIS
21    SINGER
22    AMBITION
23    FAMILY
24    NEWS
25    ADVERTISING
26    COLLEGE
27    IMAGINATION
28    WIFE
29    ARTICLE
30    LITERATURE
31    EVENT
```

```
D:\KULIAH-AKBAR\SEMESTER-4\STIMA\Tucil
Y L H Z E T B J N E P V N L A
Z G C R E M R A F E H F O I S
U I X N W E Z N J S W M I T B
B X N S F A O W T D A S T E U
L I U I I I G H W H A A A R M
S G W J T S T E D C C D N A T
C V Y I G B Y A O I D V I T E
O I B F A M I L Y I T E G U H
Q M W W Z V L T A M H R A R Q
A O L C T E I H R N Q T M E E
D U T M G O U Y E S A I I A I
U X K E K U S V G X X S R I L
A R T I C L E F N U X I B V G
C A N K B N H I I P M N R Y Z
G N B Q T F J O S E D G R K O
COMPARISONS: 8357
Time taken by function: 0 nanoseconds
```

Kategori Ukuran Sedang

Medium 1

```
 1   O F B S A G O L Y Z R D E K T A D Y E I B L
 2   A M N N T A A A S Q B W H C I G T N Z M A S
 3   M B I P Q G M Q V R S D R S J U Q O X P A G
 4   B H W P U A G S J V N E E T E A P D C Y Z F
 5   C D Z T N W S O A D N N P G B T U P M J M Q
 6   F L R J G N A E E A O U R F M E Y R W A F W
 7   A O K I D C I X T D R D A V F M H U E H Z U
 8   P I E H W X S O N K I P N Z G A A E Y P F I
 9   F G G A S A U I Y E S Y C X O L N A E R O K
10   M H M L I P R X D Y E X I O B A I A U Y H U
11   W U S H E E A P B Y M T S E H W T I Y U U W
12   Z F O T E B I N T A H I L A H F N L A N V C
13   M A L A Y S I A Y O N A N U M W E O A A R F
14   B U L G A R I A N O N G V A A E G G Q N Y L
15   W D F R S Q J D O D L W L E T M R N L I G Y
16   G D Z W A W U J A A X Q C A N A A O Z D U Q
17   F S G C Z R Q Z J M Z A G D D E L M H B Y L
18   J U Y B A I K R U T J H X X P E Z E F C Z Z
19   E G R S I R U S J G M R I W G D S U S R F U
20   E G A U P T C U U A A K R H W B L H E S I Z
21   C Z F C G M G B Y N E B G D D R J W C L F D
22   A I L A R T S U A S I N G A P U R A K O A E
23
24   ARGENTINA
25   INDONESIA
26   MALAYSIA
27   SPANYOL
28   PRANCIS
29   BELANDA
30   AUSTRALIA
31   BELGIA
32   RUSIA
33   CHINA
34   BULGARIA
35   BANGLADESH
36   GUATEMALA
37   HONDURAS
38   MONGOLIA
39   PORTUGAL
40   SINGAPURA
41   VENEZUELA
42   YUNANI
43   YAMAN
44   TURKI
45   PERU
46   MESIR
```



```
D:\KULIAH-AKBAR\SEMESTER-4\STIMA\Tucil1_13520
O F B S A G O L Y Z R D E K T A D Y E I B L
A M N N T A A A S Q B W H C I G T N Z M A S
M B I P Q G M Q V R S D R S J U Q O X P A G
B H W P U A G S J V N E E T E A P D C Y Z F
C D Z T N W S O A D N N P G B T U P M J M Q
F L R J G N A E E A O U R F M E Y R W A F W
A O K I D C I X T D R D A V F M H U E H Z U
P I E H W X S O N K I P N Z G A A E Y P F I
F G G A S A U I Y E S Y C X O L N A E R O K
M H M L I P R X D Y E X I O B A I A U Y H U
W U S H E E A P B Y M T S E H W T I Y U U W
Z F O T E B I N T A H I L A H F N L A N V C
M A L A Y S I A Y O N A N U M W E O A A R F
B U L G A R I A N O N G V A A E G G Q N Y L
W D F R S Q J D O D L W L E T M R N L I G Y
G D Z W A W U J A A X Q C A N A A O Z D U Q
F S G C Z R Q Z J M Z A G D D E L M H B Y L
J U Y B A I K R U T J H X X P E Z E F C Z Z
E G R S I R U S J G M R I W G D S U S R F U
E G A U P T C U U A A K R H W B L H E S I Z
C Z F C G M G B Y N E B G D D R J W C L F D
A I L A R T S U A S I N G A P U R A K O A E
COMPARISONS: 32138
Time taken by function: 0 nanoseconds
```

Medium 2

```
 1    A T I M P I G N I G N I R B P U W M K V B T
 2    Q G B E W H I M S I C A L L E X V G X R G G
 3    H I J G F W X V V L Z D E U G R E Z O D N U
 4    H E A O S A Y Y H S I U G N A C C T X I L L
 5    N N F B I M U N U D S M W E Z Z H A H Y K I
 6    F I Y D L K T Q J N X R Y P I E Y D S Y V V
 7    X V K E I N R D E J Q L Y P R J L V A S K R
 8    R I G U Q E C N A H C R E P V L T N L R A T
 9    A D R G R D Y W U Y Q J B X W B N N B K N M
10    C F C O R D L C S R A A D U Q Q I Y N Q P S
11    M E X L T Q E U Q A T Y A Z W C A G V P T X
12    I B Q A S C M R L I Z X F I U B U H G D G D
13    G R U T R S O E W N V V U B Z P Q S T J O T
14    F K Q A W U H D I U R O T A L U M I T S S W
15    P Q Q C R N Q E B C D S T P F O P P D M Q E
16    T P U X F B O J I E X K I X I L N R P C K W
17    N D E T C E J E R P E Y E T P L Y N V M I V
18    T X Z D Z A Y A A B K Q C O N F A F I I B Y
19    G N I C A M I R G W B E E L Y M P H O M A D
20    X T C B V I J O H F O L D G C T O T E C A F
21    
22    ANGUISH
23    BROTHER
24    CATALOGUED
25    CURED
26    DARNS
27    DECEIT
28    DIVINE
29    FACET
30    GRIMACING
31    HOMELY
32    LYMPHOMA
33    MASSACRE
34    PECUNIARY
35    PERCHANCE
36    QUAINTLY
37    REJECTED
38    STIMULATOR
39    SUNBEAM
40    UPBRINGING
41    WHIMSICAL
```



```
D:\KULIAH-AKBAR\SEMESTER-4\STIMA\tucil-1>bin
A T I M P I G N I G N I R B P U W M K V B T
Q G B E W H I M S I C A L L E X V G X R G G
H I J G F W X V V L Z D E U G R E Z O D N U
H E A O S A Y Y H S I U G N A C C T X I L L
N N F B I M U N U D S M W E Z Z H A H Y K I
F I Y D L K T Q J N X R Y P I E Y D S Y V V
X V K E I N R D E J Q L Y P R J L V A S K R
R I G U Q E C N A H C R E P V L T N L R A T
A D R G R D Y W U Y Q J B X W B N N B K N M
C F C O R D L C S R A A D U Q Q I Y N Q P S
M E X L T Q E U Q A T Y A Z W C A G V P T X
I B Q A S C M R L I Z X F I U B U H G D G D
G R U T R S O E W N V V U B Z P Q S T J O T
F K Q A W U H D I U R O T A L U M I T S S W
P Q Q C R N Q E B C D S T P F O P P D M Q E
T P U X F B O J I E X K I X I L N R P C K W
N D E T C E J E R P E Y E T P L Y N V M I V
T X Z D Z A Y A A B K Q C O N F A F I I B Y
G N I C A M I R G W B E E L Y M P H O M A D
X T C B V I J O H F O L D G C T O T E C A F
COMPARISONS: 17635
elapsed time: 0 nanoseconds
```

Medium 3

```
 1    S B B E A A F X R M R P Z T A B H P W G
 2    W U M T D Q Z G Y W L P K R R N K X B P
 3    Y Y G K I S T Z K M R X I A S X Q L K V
 4    Z E D D S L Q W I X H W N O D D H P C S
 5    X R Q E N I N R U P L U D X F B H A R H
 6    H Z V O Z Z W V A U O T D E X C N R R N
 7    T I X B X X Q Y N R I R H U P I K P U B
 8    C E L L H I I X A V K P C G G T W X L J
 9    B R P U T R T N R A X T C H I R H Z C A
10    P Q G U T R G E W I A F T K B L C U R S
11    O W P G O E Y T A O R H T L S Y F I R A
12    W Z B F N A B R D R D E Q F D U S M X M
13    L I F K L I J W K O L M O D E D O O W P
14    A E W P S C K X G V L R Y H X S Z C L L
15    E U Y C Q A F L Y N W E A I T U L J O E
16    M L W N U W L C U X D N N N A S A Q H J
17    E P T J Y A W A O T J N C D G C B I C I
18    U P R H D M C U D C I I A X R U J N E C
19    U B U F O N K Q I T Q W T V R J E M I M
20    W J X K D S L Q F V K Z S R K G N T U O
21    [                                       ]
22    FLIGHT
23    ART
24    EFFORT
25    MODE
26    DEPTH
27    SAMPLE
28    NIGHT
29    WOOD
30    PIZZA
31    WINNER
32    PLAYER
33    CELL
34    SALAD
35    BUYER
36    ORANGE
37    THROAT
38    KING
39    MEAL
```

```
D:\KULIAH-AKBAR\SEMESTER-4\STIMA\Tucil1_13
S B B E A A F X R M R P Z T A B H P W G
W U M T D Q Z G Y W L P K R R N K X B P
Y Y G K I S T Z K M R X I A S X Q L K V
Z E D D S L Q W I X H W N O D D H P C S
X R Q E N I N R U P L U D X F B H A R H
H Z V O Z Z W V A U O T D E X C N R R N
T I X B X X Q Y N R I R H U P I K P U B
C E L L H I I X A V K P C G G T W X L J
B R P U T R T N R A X T C H I R H Z C A
P Q G U T R G E W I A F T K B L C U R S
O W P G O E Y T A O R H T L S Y F I R A
W Z B F N A B R D R D E Q F D U S M X M
L I F K L I J W K O L M O D E D O O W P
A E W P S C K X G V L R Y H X S Z C L L
E U Y C Q A F L Y N W E A I T U L J O E
M L W N U W L C U X D N N N A S A Q H J
E P T J Y A W A O T J N C D G C B I C I
U P R H D M C U D C I I A X R U J N E C
U B U F O N K Q I T Q W T V R J E M I M
W J X K D S L Q F V K Z S R K G N T U O
COMPARISONS: 22907
Time taken by function: 0 nanoseconds
```

Kategori ukuran besar

Large 1

#	Word
36	AKIROSE
37	AME
38	ANYA
39	AQUA
40	AYAME
41	AZKI
42	BAELS
43	BOTAN
44	CALLI
45	CERES
46	CHLOE
47	CHOCO
48	COCO
49	FLARE
50	FUBUKI
51	GURA
52	HAACHAMA
53	INA
54	IOFI
55	IROHA
56	IRYS
57	KANATA
58	KIARA
59	KORONE
60	KOYORI
61	KRONII
62	LAMY
63	LAPLUS
64	LUI
65	LUNA
66	MARINE
67	MATSURI
68	MEL
69	MIKO
70	MIO
71	MOONA
72	MUMEI
73	NENE
74	NOEL
75	OKAYU
76	OLLIE
77	PEKORA
78	POLKA
79	REINE
80	RISU
81	ROBOCO
82	RUSHIA
83	SANA
84	SHION
85	SORA
86	SUBARU
87	SUISEI
88	TOWA
89	WATAME

tests > large_1.txt

```
 1    C V L U X G E L L B Z Z R D S W E N D T I E M Z G Z Q X I U Y X
 2    P E Q G Y N L I O A Y V X K R I H M Z W N T N H V B M R A Y I E
 3    X M I S T A C Q L C A L L I M J V Z A I Z K D U Z A O S T S D Z
 4    C D H S T U K A G L O I R U S T A M E T S L S G N Y B O O P M E
 5    S E J Y F I A O K C O A L P Y U L R D I A H K U O H C Y C S Y N
 6    U B G I F I K Z M I Y U L K B F L S Y G D W L K L O R W N C Z Q
 7    B K T U H X D U K K E X B F E I A P Y N S P W O B R Z E E S Y G
 8    J Y G O E K A S T I F C H M M V U F A R I Q X O N H B S E D T F
 9    W C F E B B E X L O D K F F S M U E A L I B R O I C W W S Y X P
10    W V K I X U F J J Q P A A E W B J N U A A X E A L N J M Y Y S G
11    D N S E M Y A K Y B D E C M U T U O O M M L N X F B H A Q M T U
12    L O Y M F R V Y Z H E A T K A N X R R E A M K J H N M Z I R S X
13    A X K U O C K V A I M H I Z R R Q O F P H K N O A M Y V P E Y A
14    G S Q K R W R L S M D O C P O S I K H Z C M C K N G U H U F X N
15    T Z E A R I X E N D E R J C J B K N B X A G H T E Z D M L N X A
16    E P I W Z S R O A Z R I P N X N N B E H A V N I N A S X E Z E S
17    Y S Q O W E T Z K I L U A F X Y M O G U H Q F C E N I D V I Q H
18    O S O T C K R O N I I L A R J A G J Y X L F P W Z P V E W R Y F
19    Y R C R O J M Z M S G J G J O N O Z K O S Q O G F U K I V P S L
20    Y D A H I M E A R A I K L I W S K W R Z A H K M S I S H K U P A
21    R N K Y V K L J X C P K C T H M E V Z H A U N E F P A J B A Z R
22    A T A N A K A L U I O X V Y W Q V A H A R O I Y L U B A W G U E
23    L L B E B Y S H I O N S D C Z E D O J R J L N Q C A R A K L O P
24    M Q Z D W L A V A Q Z F P Q I O S U I S E I U J H U M M T M L O
25    G T L V M U P B G A K Z Z X X F F R T U Y M Z S O W Y Y O R P T
26    Q A T I Q E U R B K J N L E G S I H I O T V G X C U R O D D A G
27    S Z P A Q I U C X H F F C O C O C N G U L Y I U O K N B V Q M S
28    M R N C L G X X F B O A M U R N B H K T G N G U R A C O N M D H
29    B I E X Q I Z Z P G W R J F R I I X L P A G O N W A K Y U K V A
30    B S A Z J D A V V O R U S H I A B R Q O B I L H C B O A D Y C Y
31    A U L M B K E A K K H J X H O O K S R G E H P O O F M I E F D N
32    E W B K E N X C C I T K U P T N O I M P D V X M F D U E A F I A
33    L L D J C X C K Y M E V N A G J U B G N X V L H R Z I F O I D T
34    Z I M A Z J E T J Q C I N S H I A K A P C I F O D K I C S T M Z
35
```

```
D:\KULIAH-AKBAR\SEMESTER-4\STIMA\Tucil1_13520105>bin\main.exe larg

C V L U X G E L L B Z Z R D S W E N D T I E M Z G Z Q X I U Y X
P E Q G Y N L I O A Y V X K R I H M Z W N T N H V B M R A Y I E
X M I S T A C Q L C A L L I M J V Z A I Z K D U Z A O S T S D Z
C D H S T U K A G L O I R U S T A M E T S L S G N Y B O O P M E
S E J Y F I A O K C O A L P Y U L R D I A H K U O H C Y C S Y N
U B G I F I K Z M I Y U L K B F L S Y G D W L K L O R W N C Z Q
B K T U H X D U K K E X B F E I A P Y N S P W O B R Z E E S Y G
J Y G O E K A S T I F C H M M V U F A R I Q X O N H B S E D T F
W C F E B B E X L O D K F F S M U E A L I B R O I C W W S Y X P
W V K I X U F J J Q P A A E W B J N U A A X E A L N J M Y Y S G
D N S E M Y A K Y B D E C M U T U O O M M L N X F B H A Q M T U
L O Y M F R V Y Z H E A T K A N X R R E A M K J H N M Z I R S X
A X K U O C K V A I M H I Z R R Q O F P H K N O A M Y V P E Y A
G S Q K R W R L S M D O C P O S I K H Z C M C K N G U H U F X N
T Z E A R I X E N D E R J C J B K N B X A G H T E Z D M L N X A
E P I W Z S R O A Z R I P N X N N B E H A V N I N A S X E Z E S
Y S Q O W E T Z K I L U A F X Y M O G U H Q F C E N I D V I Q H
O S O T C K R O N I I L A R J A G J Y X L F P W Z P V E W R Y F
Y R C R O J M Z M S G J G J O N O Z K O S Q O G F U K I V P S L
Y D A H I M E A R A I K L I W S K W R Z A H K M S I S H K U P A
R N K Y V K L J X C P K C T H M E V Z H A U N E F P A J B A Z R
A T A N A K A L U I O X V Y W Q V A H A R O I Y L U B A W G U E
L L B E B Y S H I O N S D C Z E D O J R J L N Q C A R A K L O P
M Q Z D W L A V A Q Z F P Q I O S U I S E I U J H U M M T M L O
G T L V M U P B G A K Z Z X X F F R T U Y M Z S O W Y Y O R P T
Q A T I Q E U R B K J N L E G S I H I O T V G X C U R O D D A G
S Z P A Q I U C X H F F C O C O C N G U L Y I U O K N B V Q M S
M R N C L G X X F B O A M U R N B H K T G N G U R A C O N M D H
B I E X Q I Z Z P G W R J F R I I X L P A G O N W A K Y U K V A
B S A Z J D A V V O R U S H I A B R Q O B I L H C B O A D Y C Y
A U L M B K E A K K H J X H O O K S R G E H P O O F M I E F D N
E W B K E N X C C I T K U P T N O I M P D V X M F D U E A F I A
L L D J C X C K Y M E V N A G J U B G N X V L H R Z I F O I D T
Z I M A Z J E T J Q C I N S H I A K A P C I F O D K I C S T M Z
COMPARISONS: 198295
Time taken by function: 1009000 nanoseconds
```

Large 2

tests > large_2.txt

```
 1   X O T B J Q A L B R F K C C Z E F T U P E K O Y F E H E L I W Y D A
 2   I P P O L X X C V X A M H T K G N I T O O K Y Y X R I B Q K T D Z B
 3   Y T S U E B V P G L B U F D U A T O X C K L I V V G Y K X G J A G T
 4   L R E M N V T Q F B O E N G R E E R H M V X B X G U G I Z Q A P C V
 5   R K Y A A C O U T T Z G R O Y A L C W P R P F B E M C M N Y J N R G
 6   I F C Q R E I L P U I L D D U J E Z D U D A K C D G F X U G C C Y K
 7   M U G G S G V R T G M O I N P W V D J T R N S P E G A D E B P I E Q
 8   V M P P T R F W P N E I N Q M F I R C X S N A U O K P Q D H W A J N
 9   L W O B O U S C C D T B R G F I S H O H A X I H V M F Y Y O P Z N B
10   E Y P Q V X T L D C Z S G J T S I A H E A W M D A Y J Q Z U O R K B
11   L A A E E N O T R T L R E T S L O B J R G I L L U G D C C K O B K V
12   R V P F Q C H H L C E O I H J Z N B K W I J R V I W D Y E E N B Y X
13   F U E L K V G N M F K O A A J P V K S S B G C C V E O S O V A R W Q
14   J I R D D W X S R O P V L G D Q L H K C M T C D H E U H A M O S A H
15   M F U P Q O V I D D L R M O L V O N F D N R K J H I B Y H T R T R W
16   X B N J P N G S E H T O L C T V L R T L V I S E T I X B I Z O N D O
17   D Q I C Z E G I K P O R K N Q O C U F S Q H V C T D Y N X E K A R D
18   F K Y C R E T T R D V P X O B R B U A O L S A H W A O A X Z D P O N
19   E I S A Y M M H J I Y A T C S C Z F C B L S K M D M L T A B L E B I
20   L H T S O C D U A A M F S V V O L H Z Z E K K S K L W P O N V M E W
21   C O L B A B L Z F R G I A O M B G K D R Z Q C G V D O N Q U M K E A
22   R B A Z R L I E F R O E J E S Z E O J Y V U L Y U R Q V X C L D T R
23   R G S U E H G M J S A R O U T E R D O W Y J S Z N K P W T B X O O A
24   W O M O T T T E D U E P S B N R M D S W Q O F F U X F V S K J K Y M
25   L L O U U C B W I Z K O C G R F N U P B E C O F F S R Z M R R Z A R
26   O R C D P S L E O M R R Z A Y T T V X Y A Z F A P X U L J H B H K Q
27   J C A D M K C R A W A Y G S V O T E A Q L T B U N I M M B A J C R U
28   V O R A O P I L L O W A Q B D X Y R O F N K Z L A A W W R O Y J S N
29   L D F Z C L V V A M M S B K S A O A W W P P N L B N P B U U O W W F
30   O L E P X Y A X E Z Z K F B K I V V X X L I M J Y D E N S S P K J N
31   W U E M H G N S S G G D D F R L D Z H I H L N X D L F Q H N B R O O
32   C O B C G M I I B P U E W H T Y E L D G X M N I J V F C E P L O C K
33   Z Q G U L K O K U N U F K L F U A M W L V Q F O L T B S L I P H R A
34   M F O O H V F Y H V U N T F X B D I H G P A H T R N K V F S N O L L
35
```

36	TABLE
37	CHAIR
38	WARDROBE
39	REFRIGERATOR
40	DOOR
41	WINDOW
42	LAMP
43	BROOM
44	BICYCLE
45	STOVE
46	CLOCK
47	BOLSTER
48	HANDPHONE
49	COMPUTER
50	MONITOR
51	PILLOW
52	BOOK
53	TELEVISION
54	BAG
55	CLOTHES
56	PARFUME
57	SHIRT
58	JEANS
59	ROUTER
60	BOTOL
61	PAPER
62	SUITCASE
63	BOWL
64	PLATE
65	MUG
66	DEODORANT
67	PORK
68	FRYINGPAN
69	SHELF
70	BARBEL
71	BED
72	GLASS
73	PANTS
74	SPOON

```
D:\KULIAH-AKBAR\SEMESTER-4\STIMA\Tucil1_13520105>bin\main.exe large_2
X O T B J Q A L B R F K C C Z E F T U P E K O Y F E H E L I W Y D A
I P P O L X X C V X A M H T K G N I T O O K Y Y X R I B Q K T D Z B
Y T S U E B V P G L B U F D U A T O X C K L I V V G Y K X G J A G T
L R E M N V T Q F B O E N G R E E R H M V X B X G U G I Z Q A P C V
R K Y A A C O U T T Z G R O Y A L C W P R P F B E M C M N Y J N R G
I F C Q R E I L P U I L D D U J E Z D U D A K C D G F X U G C C Y K
M U G G S G V R T G M O I N P W V D J T R N S P E G A D E B P I E Q
V M P P T R F W P N E I N Q M F I R C X S N A U O K P Q D H W A J N
L W O B O U S C C D T B R G F I S H O H A X I H V M F Y Y O P Z N B
E Y P Q V X T L D C Z S G J T S I A H E A W M D A Y J Q Z U O R K B
L A A E E N O T R T L R E T S L O B J R G I L L U G D C C K O B K V
R V P F Q C H H L C E O I H J Z N B K W I J R V I W D Y E E N B Y X
F U E L K V G N M F K O A A J P V K S S B G C C V E O S O V A R W Q
J I R D D W X S R O P V L G D Q L H K C M T C D H E U H A M O S A H
M F U P Q O V I D D L R M O L V O N F D N R K J H I B Y H T R T R W
X B N J P N G S E H T O L C T V L R T L V I S E T I X B I Z O N D O
D Q I C Z E G I K P O R K N Q O C U F S Q H V C T D Y N X E K A R D
F K Y C R E T T R D V P X O B R B U A O L S A H W A O A X Z D P O N
E I S A Y M M H J I Y A T C S C Z F C B L S K M D M L T A B L E B I
L H T S O C D U A A M F S V V O L H Z Z E K K S K L W P O N V M E W
C O L B A B L Z F R G I A O M B G K D R Z Q C G V D O N Q U M K E A
R B A Z R L I E F R O E J E S Z E O J Y V U L Y U R Q V X C L D T R
R G S U E H G M J S A R O U T E R D O W Y J S Z N K P W T B X O O A
W O M O T T T E D U E P S B N R M D S W Q O F F U X F V S K J K Y M
L L O U U C B W I Z K O C G R F N U P B E C O F F S R Z M R R Z A R
O R C D P S L E O M R R Z A Y T T V X Y A Z F A P X U L J H B H K Q
J C A D M K C R A W A Y G S V O T E A Q L T B U N I M M B A J C R U
V O R A O P I L L O W A Q B D X Y R O F N K Z L A A W W R O Y J S N
L D F Z C L V V A M M S B K S A O A W W P P N L B N P B U U O W W F
O L E P X Y A X E Z Z K F B K I V V X X L I M J Y D E N S S P K J N
W U E M H G N S S G G D D F R L D Z H I H L N X D L F Q H N B R O O
C O B C G M I I B P U E W H T Y E L D G X M N I J V F C E P L O C K
Z Q G U L K O K U N U F K L F U A M W L V Q F O L T B S L I P H R A
M F O O H V F Y H V U N T F X B D I H G P A H T R N K V F S N O L L
COMPARISONS: 153442
Time taken by function: 999000 nanoseconds
```

Large 3

test > 📄 large_3.txt

You, 2 hours ago | 1 author (You)

```
 1   S U I I H A P E F M A C E F J S A I Y C C A J W Q E X D C Z A A R Y
 2   G K E U U A R P X F Q M S A I L C G K E F X K S F I I T D C H V M J
 3   L Z M M U M A I K C B D R A E B A O U Y H A X G A S G N C E N B J Y
 4   I N S R L F I A C R H E O Z P R C T E G E I D J S O L C K R B O P M
 5   R I Z M Q S S N A G C A H D G J X E Q Y J E I O V E A T E X D V Y Y
 6   X U H T T B E C R R E M N V E Z U D I R U I L Y N P E N N N I R W U
 7   K X L H X Z E T U H L P B G N U C E F F R V X X A Q E V A H T G N M
 8   V W Y H L S Y I G X I I C L E Z L O C S E B C Q M U I T R B D H B R
 9   R C C L R G T E O I G K Z E C D T F L K U T L K E J Y X I I T B L J
10   M Y D E U V U G A E W R K E I N H B T O S U E J K G C F S S G X J L
11   S L P P X L E E D M H L E F B B R W Z W U P A S T T I P H B U X Q N
12   S X X Z I L V I U C G T U T O A U U H F D R N Y R E S V Q J H U T E
13   N A E M K A R Y I B U D Z Z N D S N B O F F R M E S X T B A X O C P
14   K X B C Q F P F D T U O Y J G E T B L O S S O M V C A A G C I V O Y
15   M P R E S I S A H P M E R O S P E N D L R P L E N Y U P M P D I N U
16   K G Q A I Z A D D N F F R A F H G I L P U S H X O E M L L P Z G N F
17   Y N Y Y R J F W X U V V Y J E Q M O J O R B N T C K V N A Y Z M E A
18   Z Z I T Y W D E Z D P M M G D L R J W O G F V F C O O O G Z H B C R
19   U A U N L T W N J Q L P S F I T C S Z B H W D I P V G A I A A Q T A
20   E X N U T E S I L T E S I C R E X E J Q A Q Y V X F V T D L G L Y R
21   P K V I S E L U T N I B V G J U L F S N W W W S N F I K G U Y U W W
22   C V U O H K R E R H A B A D N U C N D T D U Q L O U F F Q E V C D F
23   V S O X J R R R A P D W I T O N Q E D D D I C N M X B R Y R K I Y N
24   R H T P J R T V U Z R R W H X I R R D V S N H H X Z W E L A S L N Q
25   C R P U M S L U Z P G I A A X T I J O K P O C O E V T M S P Z D E X
26   C L T E P J C G P Q T O S W G E D T H B Z M Y R U E Q L O V G C S E
27   C Y T S Y W O R R O B I D E N T I F Y V F E C S X R U S P S L W Q G
28   H F U I V Q R V K E Y C K A Z P Z O P K Y E S E B A E L D R A K R B
29   O O Y L R C P W B A R Q A J B S O T X D D T F N I P R A G K N S G K
30   T I C A Q E I Q L X D U R M F Q S I E P I Z W M M M R M B M B I P C
31   Q G Z E O O T E Z K L V S J E I V F M E P G L I X O V V R G U R T S
32   F K X R H W D T A U W V M A Q N E C O N T R A S T C Y G S X K W U P
33   U I A C U H Y V U T B Z Q Q E A D I W Y D L P S B Q G M A L P T E L
34   M J E H Z K S U P M T O S S T M T B I K I L V J T M I Q C A I Q O K
35
```

36	PRAISE
37	DISSOLVE
38	HAVE
39	EXHIBIT
40	REALISE
41	CHOOSE
42	TOSS
43	WITHDRAW
44	UNITE
45	DEFEAT
46	EXERCISE
47	ENTER
48	RISK
49	SUIT
50	CONTRAST
51	SURPRISE
52	THRUST
53	YIELD
54	EMPHASISE
55	MEASURE
56	COMPARE
57	ECHO
58	BLOSSOM
59	AMEND
60	MISS
61	DISPOSE
62	BORROW
63	SIT
64	FALL
65	MIX
66	IDENTIFY
67	COLOUR
68	CONNECT
69	RECRUIT
70	BEAR
71	MUTTER
72	CONVERT
73	RIDE
74	PUSH
75	INTERRUPT
76	CLEAN
77	WANDER
78	MEAN
79	CLEAR
80	FEEL
81	DELAY
82	SPEND
83	EXCHANGE
84	DIP
85	EMBRACE

```
D:\KULIAH-AKBAR\SEMESTER-4\STIMA\Tucil1_13520105>bin\main.exe large_3
S U I I H A P E F M A C E F J S A I Y C C A J W Q E X D C Z A A R Y
G K E U U A R P X F Q M S A I L C G K E F X K S F I I T D C H V M J
L Z M M U M A I K C B D R A E B A O U Y H A X G A S G N C E N B J Y
I N S R L F I A C R H E O Z P R C T E G E I D J S O L C K R B O P M
R I Z M Q S S N A G C A H D G J X E Q Y J E I O V E A T E X D V Y Y
X U H T T B E C R R E M N V E Z U D I R U I L Y N P E N N N I R W U
K X L H X Z E T U H L P B G N U C E F F R V X X A Q E V A H T G N M
V W Y H L S Y I G X I I C L E Z L O C S E B C Q M U I T R B D H B R
R C C L R G T E O I G K Z E C D T F L K U T L K E J Y X I I T B L J
M Y D E U V U G A E W R K E I N H B T O S U E J K G C F S S G X J L
S L P P X L E E D M H L E F B B R W Z W U P A S T T I P H B U X Q N
S X X Z I L V I U C G T U T O A U U H F D R N Y R E S V Q J H U T E
N A E M K A R Y I B U D Z Z N D S N B O F F R M E S X T B A X O C P
K X B C Q F P F D T U O Y J G E T B L O S S O M V C A A G C I V O Y
M P R E S I S A H P M E R O S P E N D L R P L E N Y U P M P D I N U
K G Q A I Z A D D N F F R A F H G I L P U S H X O E M L L P Z G N F
Y N Y Y R J F W X U V V Y J E Q M O J O R B N T C K V N A Y Z M E A
Z Z I T Y W D E Z D P M M G D L R J W O G F V F C O O O G Z H B C R
U A U N L T W N J Q L P S F I T C S Z B H W D I P V G A I A A Q T A
E X N U T E S I L T E S I C R E X E J Q A Q Y V X F V T D L G L Y R
P K V I S E L U T N I B V G J U L F S N W W W S N F I K G U Y U W W
C V U O H K R E R H A B A D N U C N D T D U Q L O U F F Q E V C D F
V S O X J R R R A P D W I T O N Q E D D D I C N M X B R Y R K I Y N
R H T P J R T V U Z R R W H X I R R D V S N H H X Z W E L A S L N Q
C R P U M S L U Z P G I A A X T I J O K P O C O E V T M S P Z D E X
C L T E P J C G P Q T O S W G E D T H B Z M Y R U E Q L O V G C S E
C Y T S Y W O R R O B I D E N T I F Y V F E C S X R U S P S L W Q G
H F U I V Q R V K E Y C K A Z P Z O P K Y E S E B A E L D R A K R B
O O Y L R C P W B A R Q A J B S O T X D D T F N I P R A G K N S G K
T I C A Q E I Q L X D U R M F Q S I E P I Z W M M M R M B M B I P C
Q G Z E O O T E Z K L V S J E I V F M E P G L I X O V V R G U R T S
F K X R H W D T A U W V M A Q N E C O N T R A S T C Y G S X K W U P
U I A C U H Y V U T B Z Q Q E A D I W Y D L P S B Q G M A L P T E L
M J E H Z K S U P M T O S S T M T B I K I L V J T M I Q C A I Q O K
COMPARISONS: 195816
Time taken by function: 1003000 nanoseconds
```

V. Alamat Kode Program

https://github.com/malikrafsan/Word-Search-Puzzle-Solver_Stima-Tucil-1