**LAPORAN PRAKTIKUM**

**ANALISIS ALGORITMA**



**Alfari Sidnan Ghilmana**

**140810180011**

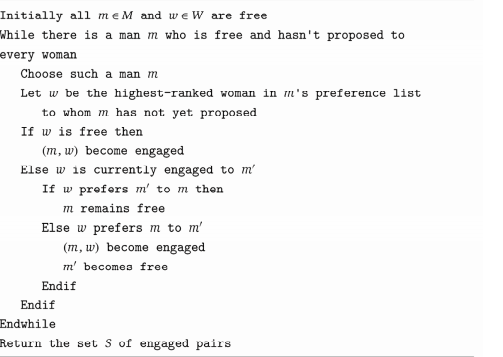
**Kelas A**

Program Studi S-1 Teknik Informatika   
Departemen Ilmu Komputer   
Fakultas Matematika dan Ilmu Pengetahuan Alam  
Universitas Padjadjaran

Selesaikan worksheet 1, program c++, dan bagian analisis di modul praktikum.

**Worksheet 1**





Iterasi 1

Men’s Preferences Profile

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
|  | 0th | 1st | 2nd | 3rd | 4th |
| Victor | Bertha | Amy | Diane | Erika | Clare |
| Wyatt | Diane | Bertha | Amy | Clare | Erika |
| Xavier | Bertha | Erika | Clare | Diane | Amy |
| Yancey | Amy | Diane | Clare | Bertha | Erika |
| Zeus | Bertha | Diane | Amy | Erika | Clare |

Women’s Preferences Profile

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
|  | 0th | 1st | 2nd | 3rd | 4th |
| Amy | Zeus | Victor | Wyatt | Yancey | Xavier |
| Bertha | Xavier | Wyatt | Yancey | Victor | Zeus |
| Clare | Wyatt | Xavier | Yancey | Zeus | Victor |
| Diane | Victor | Zeus | Yancey | Xavier | Wyatt |
| Erika | Yancey | Wyatt | Zeus | Xavier | Victor |

Iterasi 2

Men’s Preferences Profile

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
|  | 0th | 1st | 2nd | 3rd | 4th |
| Victor | Bertha | Amy | Diane | Erika | Clare |
| Wyatt | Diane | Bertha | Amy | Clare | Erika |
| Xavier | Bertha | Erika | Clare | Diane | Amy |
| Yancey | Amy | Diane | Clare | Bertha | Erika |
| Zeus | Bertha | Diane | Amy | Erika | Clare |

Women’s Preferences Profile

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
|  | 0th | 1st | 2nd | 3rd | 4th |
| Amy | Zeus | Victor | Wyatt | Yancey | Xavier |
| Bertha | Xavier | Wyatt | Yancey | Victor | Zeus |
| Clare | Wyatt | Xavier | Yancey | Zeus | Victor |
| Diane | Victor | Zeus | Yancey | Xavier | Wyatt |
| Erika | Yancey | Wyatt | Zeus | Xavier | Victor |

Iterasi 3

Men’s Preferences Profile

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
|  | 0th | 1st | 2nd | 3rd | 4th |
| Victor | Bertha | Amy | Diane | Erika | Clare |
| Wyatt | Diane | Bertha | Amy | Clare | Erika |
| Xavier | Bertha | Erika | Clare | Diane | Amy |
| Yancey | Amy | Diane | Clare | Bertha | Erika |
| Zeus | Bertha | Diane | Amy | Erika | Clare |

Women’s Preferences Profile

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
|  | 0th | 1st | 2nd | 3rd | 4th |
| Amy | Zeus | Victor | Wyatt | Yancey | Xavier |
| Bertha | Xavier | Wyatt | Yancey | Victor | Zeus |
| Clare | Wyatt | Xavier | Yancey | Zeus | Victor |
| Diane | Victor | Zeus | Yancey | Xavier | Wyatt |
| Erika | Yancey | Wyatt | Zeus | Xavier | Victor |

Iterasi 4

Men’s Preferences Profile

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
|  | 0th | 1st | 2nd | 3rd | 4th |
| Victor | Bertha | Amy | Diane | Erika | Clare |
| Wyatt | Diane | Bertha | Amy | Clare | Erika |
| Xavier | Bertha | Erika | Clare | Diane | Amy |
| Yancey | Amy | Diane | Clare | Bertha | Erika |
| Zeus | Bertha | Diane | Amy | Erika | Clare |

Women’s Preferences Profile

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
|  | 0th | 1st | 2nd | 3rd | 4th |
| Amy | Zeus | Victor | Wyatt | Yancey | Xavier |
| Bertha | Xavier | Wyatt | Yancey | Victor | Zeus |
| Clare | Wyatt | Xavier | Yancey | Zeus | Victor |
| Diane | Victor | Zeus | Yancey | Xavier | Wyatt |
| Erika | Yancey | Wyatt | Zeus | Xavier | Victor |

Iterasi 5

Men’s Preferences Profile

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
|  | 0th | 1st | 2nd | 3rd | 4th |
| Victor | Bertha | Amy | Diane | Erika | Clare |
| Wyatt | Diane | Bertha | Amy | Clare | Erika |
| Xavier | Bertha | Erika | Clare | Diane | Amy |
| Yancey | Amy | Diane | Clare | Bertha | Erika |
| Zeus | Bertha | Diane | Amy | Erika | Clare |

Women’s Preferences Profile

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
|  | 0th | 1st | 2nd | 3rd | 4th |
| Amy | Zeus | Victor | Wyatt | Yancey | Xavier |
| Bertha | Xavier | Wyatt | Yancey | Victor | Zeus |
| Clare | Wyatt | Xavier | Yancey | Zeus | Victor |
| Diane | Victor | Zeus | Yancey | Xavier | Wyatt |
| Erika | Yancey | Wyatt | Zeus | Xavier | Victor |

Iterasi 6

Men’s Preferences Profile

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
|  | 0th | 1st | 2nd | 3rd | 4th |
| Victor | Bertha | Amy | Diane | Erika | Clare |
| Wyatt | Diane | Bertha | Amy | Clare | Erika |
| Xavier | Bertha | Erika | Clare | Diane | Amy |
| Yancey | Amy | Diane | Clare | Bertha | Erika |
| Zeus | Bertha | Diane | Amy | Erika | Clare |

Women’s Preferences Profile

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
|  | 0th | 1st | 2nd | 3rd | 4th |
| Amy | Zeus | Victor | Wyatt | Yancey | Xavier |
| Bertha | Xavier | Wyatt | Yancey | Victor | Zeus |
| Clare | Wyatt | Xavier | Yancey | Zeus | Victor |
| Diane | Victor | Zeus | Yancey | Xavier | Wyatt |
| Erika | Yancey | Wyatt | Zeus | Xavier | Victor |

Iterasi 7

Men’s Preferences Profile

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
|  | 0th | 1st | 2nd | 3rd | 4th |
| Victor | Bertha | Amy | Diane | Erika | Clare |
| Wyatt | Diane | Bertha | Amy | Clare | Erika |
| Xavier | Bertha | Erika | Clare | Diane | Amy |
| Yancey | Amy | Diane | Clare | Bertha | Erika |
| Zeus | Bertha | Diane | Amy | Erika | Clare |

Women’s Preferences Profile

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
|  | 0th | 1st | 2nd | 3rd | 4th |
| Amy | Zeus | Victor | Wyatt | Yancey | Xavier |
| Bertha | Xavier | Wyatt | Yancey | Victor | Zeus |
| Clare | Wyatt | Xavier | Yancey | Zeus | Victor |
| Diane | Victor | Zeus | Yancey | Xavier | Wyatt |
| Erika | Yancey | Wyatt | Zeus | Xavier | Victor |

Iterasi 8

Men’s Preferences Profile

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
|  | 0th | 1st | 2nd | 3rd | 4th |
| Victor | Bertha | Amy | Diane | Erika | Clare |
| Wyatt | Diane | Bertha | Amy | Clare | Erika |
| Xavier | Bertha | Erika | Clare | Diane | Amy |
| Yancey | Amy | Diane | Clare | Bertha | Erika |
| Zeus | Bertha | Diane | Amy | Erika | Clare |

Women’s Preferences Profile

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
|  | 0th | 1st | 2nd | 3rd | 4th |
| Amy | Zeus | Victor | Wyatt | Yancey | Xavier |
| Bertha | Xavier | Wyatt | Yancey | Victor | Zeus |
| Clare | Wyatt | Xavier | Yancey | Zeus | Victor |
| Diane | Victor | Zeus | Yancey | Xavier | Wyatt |
| Erika | Yancey | Wyatt | Zeus | Xavier | Victor |

Iterasi 9

Men’s Preferences Profile

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
|  | 0th | 1st | 2nd | 3rd | 4th |
| Victor | Bertha | Amy | Diane | Erika | Clare |
| Wyatt | Diane | Bertha | Amy | Clare | Erika |
| Xavier | Bertha | Erika | Clare | Diane | Amy |
| Yancey | Amy | Diane | Clare | Bertha | Erika |
| Zeus | Bertha | Diane | Amy | Erika | Clare |

Women’s Preferences Profile

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
|  | 0th | 1st | 2nd | 3rd | 4th |
| Amy | Zeus | Victor | Wyatt | Yancey | Xavier |
| Bertha | Xavier | Wyatt | Yancey | Victor | Zeus |
| Clare | Wyatt | Xavier | Yancey | Zeus | Victor |
| Diane | Victor | Zeus | Yancey | Xavier | Wyatt |
| Erika | Yancey | Wyatt | Zeus | Xavier | Victor |

Iterasi 10

Men’s Preferences Profile

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
|  | 0th | 1st | 2nd | 3rd | 4th |
| Victor | Bertha | Amy | Diane | Erika | Clare |
| Wyatt | Diane | Bertha | Amy | Clare | Erika |
| Xavier | Bertha | Erika | Clare | Diane | Amy |
| Yancey | Amy | Diane | Clare | Bertha | Erika |
| Zeus | Bertha | Diane | Amy | Erika | Clare |

Women’s Preferences Profile

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
|  | 0th | 1st | 2nd | 3rd | 4th |
| Amy | Zeus | Victor | Wyatt | Yancey | Xavier |
| Bertha | Xavier | Wyatt | Yancey | Victor | Zeus |
| Clare | Wyatt | Xavier | Yancey | Zeus | Victor |
| Diane | Victor | Zeus | Yancey | Xavier | Wyatt |
| Erika | Yancey | Wyatt | Zeus | Xavier | Victor |

Iterasi 11

Men’s Preferences Profile

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
|  | 0th | 1st | 2nd | 3rd | 4th |
| Victor | Bertha | Amy | Diane | Erika | Clare |
| Wyatt | Diane | Bertha | Amy | Clare | Erika |
| Xavier | Bertha | Erika | Clare | Diane | Amy |
| Yancey | Amy | Diane | Clare | Bertha | Erika |
| Zeus | Bertha | Diane | Amy | Erika | Clare |

Women’s Preferences Profile

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
|  | 0th | 1st | 2nd | 3rd | 4th |
| Amy | Zeus | Victor | Wyatt | Yancey | Xavier |
| Bertha | Xavier | Wyatt | Yancey | Victor | Zeus |
| Clare | Wyatt | Xavier | Yancey | Zeus | Victor |
| Diane | Victor | Zeus | Yancey | Xavier | Wyatt |
| Erika | Yancey | Wyatt | Zeus | Xavier | Victor |

Iterasi 12

Men’s Preferences Profile

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
|  | 0th | 1st | 2nd | 3rd | 4th |
| Victor | Bertha | Amy | Diane | Erika | Clare |
| Wyatt | Diane | Bertha | Amy | Clare | Erika |
| Xavier | Bertha | Erika | Clare | Diane | Amy |
| Yancey | Amy | Diane | Clare | Bertha | Erika |
| Zeus | Bertha | Diane | Amy | Erika | Clare |

Women’s Preferences Profile

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
|  | 0th | 1st | 2nd | 3rd | 4th |
| Amy | Zeus | Victor | Wyatt | Yancey | Xavier |
| Bertha | Xavier | Wyatt | Yancey | Victor | Zeus |
| Clare | Wyatt | Xavier | Yancey | Zeus | Victor |
| Diane | Victor | Zeus | Yancey | Xavier | Wyatt |
| Erika | Yancey | Wyatt | Zeus | Xavier | Victor |

Iterasi 13

Men’s Preferences Profile

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
|  | 0th | 1st | 2nd | 3rd | 4th |
| Victor | Bertha | Amy | Diane | Erika | Clare |
| Wyatt | Diane | Bertha | Amy | Clare | Erika |
| Xavier | Bertha | Erika | Clare | Diane | Amy |
| Yancey | Amy | Diane | Clare | Bertha | Erika |
| Zeus | Bertha | Diane | Amy | Erika | Clare |

Women’s Preferences Profile

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
|  | 0th | 1st | 2nd | 3rd | 4th |
| Amy | Zeus | Victor | Wyatt | Yancey | Xavier |
| Bertha | Xavier | Wyatt | Yancey | Victor | Zeus |
| Clare | Wyatt | Xavier | Yancey | Zeus | Victor |
| Diane | Victor | Zeus | Yancey | Xavier | Wyatt |
| Erika | Yancey | Wyatt | Zeus | Xavier | Victor |

Iterasi 14

Men’s Preferences Profile

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
|  | 0th | 1st | 2nd | 3rd | 4th |
| Victor | Bertha | Amy | Diane | Erika | Clare |
| Wyatt | Diane | Bertha | Amy | Clare | Erika |
| Xavier | Bertha | Erika | Clare | Diane | Amy |
| Yancey | Amy | Diane | Clare | Bertha | Erika |
| Zeus | Bertha | Diane | Amy | Erika | Clare |

Women’s Preferences Profile

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
|  | 0th | 1st | 2nd | 3rd | 4th |
| Amy | Zeus | Victor | Wyatt | Yancey | Xavier |
| Bertha | Xavier | Wyatt | Yancey | Victor | Zeus |
| Clare | Wyatt | Xavier | Yancey | Zeus | Victor |
| Diane | Victor | Zeus | Yancey | Xavier | Wyatt |
| Erika | Yancey | Wyatt | Zeus | Xavier | Victor |

Iterasi 15

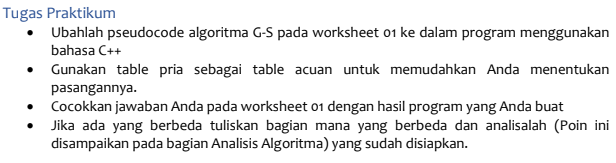
Men’s Preferences Profile

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
|  | 0th | 1st | 2nd | 3rd | 4th |
| Victor | Bertha | Amy | Diane | Erika | Clare |
| Wyatt | Diane | Bertha | Amy | Clare | Erika |
| Xavier | Bertha | Erika | Clare | Diane | Amy |
| Yancey | Amy | Diane | Clare | Bertha | Erika |
| Zeus | Bertha | Diane | Amy | Erika | Clare |

Women’s Preferences Profile

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
|  | 0th | 1st | 2nd | 3rd | 4th |
| Amy | Zeus | Victor | Wyatt | Yancey | Xavier |
| Bertha | Xavier | Wyatt | Yancey | Victor | Zeus |
| Clare | Wyatt | Xavier | Yancey | Zeus | Victor |
| Diane | Victor | Zeus | Yancey | Xavier | Wyatt |
| Erika | Yancey | Wyatt | Zeus | Xavier | Victor |

**Program C++**



*/\**

*Nama        : Alfari Sidnan Ghilmana*

*NPM         : 140810180011*

*Kelas       : A*

*Deskripsi   : Gale-Shapley Algorithm*

*\*/*

*#include* <algorithm>

*#include* <iostream>

*#include* <map>

*#include* <queue>

*#include* <string>

*#include* <vector>

using namespace std;

const char \*men\_data[][6] = {

    { "victor", "bertha", "amy", "diane", "erika", "clare" },

    { "wyatt",  "diane", "bertha", "amy", "clare", "erika" },

    { "xavier", "bertha", "erika", "clare", "diane", "amy" },

    { "yancey", "amy", "diane", "clare", "bertha", "erika" },

    { "zeus",   "bertha", "diane", "amy", "erika", "clare" }

};

const char \*women\_data[][6] = {

    { "amy",    "zeus", "victor", "wyatt", "yancey", "xavier" },

    { "bertha", "xavier", "wyatt", "yancey", "victor", "zeus" },

    { "clare",  "wyatt", "xavier", "yancey", "zeus", "victor" },

    { "diane",  "victor", "zeus", "yancey", "xavier", "wyatt" },

    { "erika",  "yancey", "wyatt", "zeus", "xavier", "victor" }

};

typedef vector<string> PrefList;

typedef map<string, PrefList> PrefMap;

typedef map<string, string> Couples;

bool prefers(const PrefList &prefer, const string &first, const string &second){

*for* (PrefList::const\_iterator it = prefer.begin(); it != prefer.end(); ++it){

*if* (\*it == first) *return* true;

*if* (\*it == second) *return* false;

    }

*return* false;

}

void check\_stability(const Couples &engaged, const PrefMap &men\_pref, const PrefMap &women\_pref){

    cout << "Stablility:\n";

    bool stable = true;

*for* (Couples::const\_iterator it = engaged.begin(); it != engaged.end(); ++it){

        const string &bride = it->first;

        const string &groom = it->second;

        const PrefList &preflist = men\_pref.at(groom);

*for* (PrefList::const\_iterator it = preflist.begin(); it != preflist.end(); ++it){

*if* (\*it == bride)

*break*;

*if* (prefers(preflist, \*it, bride) && prefers(women\_pref.at(\*it), groom, engaged.at(\*it))){

                cout << "\t" << \*it <<

                    " prefers " << groom <<

                    " over " << engaged.at(\*it) <<

                    " and " << groom <<

                    " prefers " << \*it <<

                    " over " << bride << "\n";

                stable = false;

            }

        }

    }

*if* (stable) cout << "\t(all marriages stable)\n";

}

int main(){

    PrefMap men\_pref, women\_pref;

    queue<string> bachelors;

*for* (int i = 0; i < 5; ++i){

*for* (int j = 1; j < 6; ++j){

        men\_pref[men\_data[i][0]].push\_back(men\_data[i][j]);

            women\_pref[women\_data[i][0]].push\_back(women\_data[i][j]);

        }

        bachelors.push(men\_data[i][0]);

    }

    Couples engaged;

    cout << "Matchmaking:\n";

*while* (!bachelors.empty()){

        const string &suitor = bachelors.front();

        const PrefList &preflist = men\_pref[suitor];

*for* (PrefList::const\_iterator it = preflist.begin(); it != preflist.end(); ++it){

            const string &bride = \*it;

*if* (engaged.find(bride) == engaged.end()){

                cout << "\t" << bride << " and " << suitor << "\n";

                engaged[bride] = suitor;

*break*;

            }

            const string &groom = engaged[bride];

*if* (prefers(women\_pref[bride], suitor, groom)){

                cout << "\t" << bride << " dumped " << groom << " for " << suitor << "\n";

                bachelors.push(groom);

                engaged[bride] = suitor;

*break*;

            }

        }

        bachelors.pop();

    }

    cout << "Engagements:\n";

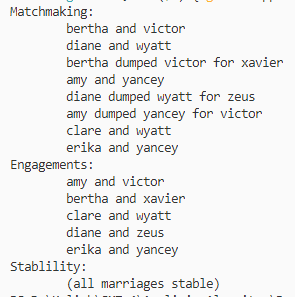
*for* (Couples::const\_iterator it = engaged.begin(); it != engaged.end(); ++it){

        cout << "\t" << it->first << " and " << it->second << "\n";

    }

    check\_stability(engaged, men\_pref, women\_pref);

}



**Analisis Algoritma**

Jawablah pertanyaan berikut:

1. Apakah jawaban Anda di Worksheet 01 dan Program sama persis? Jika Tidak? Kenapa?

= Ya

Anda diminta untuk membuktikan algoritma G-S benar dengan menjawab pertanyaan berikut:

Fakta (1.1):

Seorang wanita tetap bertunangan dari titik di mana dia menerima proposal pertamanya; dan

urutan mitra yang bertunangan dengannya menjadi lebih baik dan lebih baik lagi (hal ini sesuai

dengan daftar preferensi wanita). =>tidak perlu dipertanyakan

Fakta (1.2):

Urutan wanita yang dilamar pria lebih buruk dan lebih buruk lagi (hal ini sesuai dengan daftar

preferensi pria). => tidak perlu dipertanyakan

Teorema (1.3):

Algoritma G-S berakhir setelah paling banyak n2 iterasi menggunakan While Loop.

Buktikan!

= Jika ada n laki laki dan n perempuan, dengan greedy method(try & error) maka worst case nya adalah setiap laki-laki di pasangkan ke semua perempuan dengan maksimal iterasi yaitu n2 iterasi

Teorema (1.4):

Jika seorang pria bebas di beberapa titik dalam eksekusi algoritma, maka ada seorang wanita

yang belum dia ajak bertunangan.

Buktikan!

= Jika terdapat n laki-laki dan n perempuan, maka terdapat maksimal iterasi yaitu n2 iterasi . Jika iterasi yang dilakukan < n2 maka bias saja terdapat wanita yang belum diajak bertunangan

Teorema (1.5):

Himpunan S yang dikembalikan saat terminasi adalah perfect matching

Buktikan!

= Algortma G-S akan menghasilkan pasangan dengan kemungkinan referensi pria maupun wanita paling tinggi yang mungkin,sehingga pasangan pasangan tersebut dapat di katakana perfect matching

Teorema (1.6):

Sebuah eksekusi algoritma G-S mengembalikan satu set pasangan S. Set S adalah pasangan yang

stabil.

Buktikan!

= Terbukti karena algoritma G-S merupakan algoritma “mencoba dan gagal” untuk mencari pasangan untuk setiap n laki-laki ke n perempuan dengan acuan list referensi laki-laki dan perempuan