/\*\*

\* Java Program to Implement Gale Shapley Algorithm

\*\*/

/\*\* Class GaleShapley \*\*/

import java.util.ArrayList;

import java.util.Collections;

import java.util.Arrays;

public class GaleShapley

{

private int N, engagedCount;

private String[][] menPref;

private String[][] womenPref;

private String[] men;

private String[] women;

private String[] womenPartner;

private boolean[] menEngaged;

/\*\* Constructor \*\*/

public GaleShapley(String[] m, String[] w, String[][] mp, String[][] wp)

{

N = mp.length-1;

engagedCount = 0;

men = m;

women = w;

menPref = mp;

womenPref = wp;

menEngaged = new boolean[N];

womenPartner = new String[N];

System.out.println("N is"+N);

calcMatches();

}

/\*\* function to calculate all matches \*\*/

private void calcMatches()

{

while (engagedCount < N)

{

int free;

for (free = 0; free < N; free++)

if (!menEngaged[free])

break;

for (int i = 0; i < N && !menEngaged[free]; i++)

{

int index = womenIndexOf(menPref[free][i]);

if (womenPartner[index] == null)

{

womenPartner[index] = men[free];

menEngaged[free] = true;

engagedCount++;

}

else

{

String currentPartner = womenPartner[index];

if (morePreference(currentPartner, men[free], index))

{

womenPartner[index] = men[free];

menEngaged[free] = true;

menEngaged[menIndexOf(currentPartner)] = false;

}

}

}

}

printCouples();

}

/\*\* function to check if women prefers new partner over old assigned partner \*\*/

private boolean morePreference(String curPartner, String newPartner, int index)

{

for (int i = 0; i < N; i++)

{

if (womenPref[index][i].equals(newPartner))

return true;

if (womenPref[index][i].equals(curPartner))

return false;

}

return false;

}

/\*\* get men index \*\*/

private int menIndexOf(String str)

{

for (int i = 0; i < N; i++)

if (men[i].equals(str))

return i;

return -1;

}

/\*\* get women index \*\*/

private int womenIndexOf(String str)

{

for (int i = 0; i < N; i++)

if (women[i].equals(str))

return i;

return -1;

}

/\*\* print couples \*\*/

public void printCouples()

{

System.out.println("Couples are : ");

for (int i = 0; i < N; i++)

{

System.out.println(womenPartner[i] +" "+ women[i]);

}

}

/\*\* main function \*\*/

public static void main(String[] args)

{

System.out.println("Gale Shapley Marriage Algorithm\n");

/\*\* list of men \*\*/

//String[] m = {"M1", "M2", "M3", "M4", "M5"};

/\*\* list of women \*\*/

// String[] w = {"W1", "W2", "W3", "W4", "W5"};

String v;

ArrayList<String> list1 = new ArrayList<String>();

ArrayList<String> list2 = new ArrayList<String>();

ArrayList<String> list3 = new ArrayList<String>();

ArrayList<String> list4 = new ArrayList<String>();

int count = 1;

int i=4;

int n=6;

while(count < n)

{

list1.add("M"+count);

count=count+1;

}

count = 1;

while(count < n)

{

list2.add("W"+count);

count=count+1;

}

i=0;

System.out.println(list1);

System.out.println(list2);

String[] m = new String[n];

String[] w = new String[n];

for(String s: list1){

m[i++] = s;

}

i=0;

for(String s1: list2){

w[i++] = s1;

}

for (i=0;i<n-1;i++)

{

Collections.shuffle(list1);

System.out.println("After shuffling, ArrayList contains : " + list1);

list3.addAll(list1);

}

System.out.println("After shuffling, ArrayList contains : " + list3);

String[][] wp = new String[n][n];

String[] array1 = new String[list3.size()];

i=0;

for(String s: list3){

array1[i++] = s;

}

for (i=0;i<list3.size();i++)

{

System.out.println("After array : " + array1[i]);

}

int j=0,k=0;

for(i=0;i<n-1;i++)

{

for(j=0 ;j<n-1 ;j++,k++)

{

if(k<list3.size()){

wp[i][j] = array1[k];

//k++;

}

}

}

for (i=0;i<n-1;i++)

{

for(j=0;j<n-1;j++)

{

System.out.print( wp[i][j] + " ");

}

System.out.println("");

}

for (i=0;i<n-1;i++)

{

Collections.shuffle(list2);

System.out.println("After shuffling, ArrayList contains : " + list2);

list4.addAll(list2);

}

System.out.println("After shuffling, ArrayList contains : " + list4);

String[][] mp = new String[n][n];

String[] array3 = new String[list4.size()];

i=0;

for(String s: list4){

array3[i++] = s;

}

for (i=0;i<list4.size();i++)

{

System.out.println("After array : " + array3[i]);

}

k=0;

for(i=0;i<n-1;i++)

{

for(j=0 ;j<n-1 ;j++,k++)

{

if(k<list4.size()){

mp[i][j] = array3[k];

//k++;

}

}

}

for (i=0;i<n-1;i++)

{

for(j=0;j<n-1;j++)

{

System.out.print( mp[i][j] + " ");

}

System.out.println("");

}

//System.out.println(Arrays.asList(array4));

//stockArr = stockList.toArray(stockArr);

/\*\* men preference \*\*/

/\* String[][] mp = {{"W5", "W2", "W3", "W4", "W1"},

{"W2", "W5", "W1", "W3", "W4"},

{"W4", "W3", "W2", "W1", "W5"},

{"W1", "W2", "W3", "W4", "W5"},

{"W5", "W2", "W3", "W4", "W1"}};\*/

/\*for (i=0;i<n-1;i++)

{

for(j=0;j<n-1;j++)

{

String[i][j] mp = array4[i][j];

}

System.out.println("");

}\*/

/\*\* women preference \*

String[][] wp = {{"M5", "M3", "M4", "M1", "M2"},

{"M1", "M2", "M3", "M5", "M4"},

{"M4", "M5", "M3", "M2", "M1"},

{"M5", "M2", "M1", "M4", "M3"},

{"M2", "M1", "M4", "M3", "M5"}};

\*/

GaleShapley gs = new GaleShapley(m, w, mp, wp);

}

}