Лабораторна робота №12

Регулярні вирази. Обробка тексту

Мета: Ознайомлення з принципами використання регулярних виразів для обробки тексту.

1 ВИМОГИ

1. Використовуючи програми рішень попередніх задач, продемонструвати ефективне (оптимальне) використання регулярних виразів при вирішенні прикладної задачі.
2. Передбачити можливість незначної зміни умов пошуку.
3. Продемонструвати розроблену функціональність в діалоговому та автоматичному режимах.

1.1 Розробник

- П.І.Б: Заночкин Є. Д.
- Группа: КІТ-119а
- Варіант: 7

1.2 Завдання

Знайти всі комбінації пар із різностатевих партнерів з різницею у віці не більше 5 років для ранкових пробіжок в парках Київського району (може бути вказано в довільній формі у вимогах до партнера).

2 ОПИС ПРОГРАМИ

2.1 Засоби ООП:

Scanner inInt, inStr = new Scanner(System.in) – для введення обраних опцій користувачем з клавіатури;

XMLEncoder encoder = new XMLEncoder(new BufferedOutputStream(new FileOutputStream("Lab12.xml"));

encoder.writeObject(container); – нестандартна серіалізація;

XMLDecoder decoder = new XMLDecoder(new BufferedInputStream(new FileInputStream("Lab12.xml")));

container = (ClientList<Client>) decoder.readObject(); – нестандартна десеріалізація;

ObjectOutputStream oos = new ObjectOutputStream(new BufferedOutputStream(newFileOutputStream("Lab12.ser")));

oos.writeObject(container);

oos.flush(); – стандартна серіалізація;

ObjectInputStream ois = new ObjectInputStream(new BufferedOutputStream(new FileInputStream("Lab12.ser")));

container = (ClientList<Client>) ois.readObject(); – стандартна десеріалізація;

Pattern pattern = Pattern.compile() – компілює регулярний вираз у шаблон;

Matcher matcher = pattern.matcher(data); – створює matcher, який буде відповідати даному вводу для цього шаблону.

2.2 Ієрархія та структура класів

Було створено класи Main (головний клас програми), ClientList (клас-контейнер), 4 класи, що реалізують інтерфейс Comparator для сортування за певними критеріями, а також підключено класи з попередньої роботи: Client, InfoAboutYourself, PartnerRequirements та Node.

2.3 Важливі фрагменти програми

Клас Main

```
package ua.khpi.oop.zanochkyn12;

import java.beans.XMLDecoder;
import java.beans.XMLEncoder;
import java.io.BufferedInputStream;
import java.io.BufferedOutputStream;
import java.io.File;
import java.io.FileInputStream;
import java.io.FileNotFoundException;
import java.io.FileOutputStream;
import java.io.IOException;
import java.io.ObjectInputStream;
import java.io.ObjectOutputStream;
import java.util.ArrayList;
import java.util.Calendar;
import java.util.GregorianCalendar;
import java.util.Scanner;
import java.util.regex.Matcher;
import java.util.regex.Pattern;
import ua.khpi.oop.zanochkyn10.Client;
import ua.khpi.oop.zanochkyn10.InfoAboutYourself;
import ua.khpi.oop.zanochkyn10.PartnerRequirements;

public class Main
{
	public static void main(String[] args)
	{
		ClientList<Client> container = new ClientList<Client>();
		for(String str: args)
		{
			if(str.equals("-a") || str.equals("-auto"))
			{
				auto(container);
				return;
			}
			else if(str.equals("-d") || str.equals("-dialog"))
			{
				menu(container);
				return;
			}
		}
		menu(container);
	}

	private static void auto(ClientList<Client> container)
	{
		System.out.println("Size of container: " + container.getSize());
		System.out.println("\nAdding elements...");
		File file = new File("Lab12-data.txt");
		int countClientHobbies, countPartnerHobbies;
		String[] clientHobbies, partnerHobbies;
		GregorianCalendar date;
		InfoAboutYourself info;
		PartnerRequirements requirements;
		try
		{
			Scanner reader = new Scanner(file);
			while (reader.hasNextLine())
			{
			    String data = reader.nextLine();
			    Pattern pattern = Pattern.compile("^((Male|Female),\\s([a-zA-Z]+),\\s(([1-9])|([1-
9][0-9])),\\s(([1-9])|([1-9][0-9])|([1-2][0-9][0-9])),\\s([a-zA-Z]+),\\s([0-4]),\\s" +
				"([a-zA-Z]+|[a-zA-Z]+\\s[a-zA-Z]+)(,\\s([a-zA-Z]+|[a-zA-Z]+\\s[a-zA-
Z]+))*,\\s(Male|Female),\\s(([1-9])|([1-9][0-9])),\\s(([1-9])|([1-9][0-9])),\\s([0-4]),\\s" +
				"([a-zA-Z]+|[a-zA-Z]+\\s[a-zA-Z]+)(,\\s([a-zA-Z]+|[a-zA-Z]+\\s[a-zA-
Z]+))*)");
			    Matcher matcher = pattern.matcher(data);
			    if (matcher.matches())
			    {
			        String[] tmp = data.split(",\\s");
				if(Integer.parseInt(tmp[5]) == 0)
				{
				    countClientHobbies = 0;
					clientHobbies = new String[countClientHobbies];
```

```
                    }
                    else
                    {
                        countClientHobbies = Integer.parseInt(tmp[5]);
                        clientHobbies = new String[countClientHobbies];
                        for (int i = 6, j = 0; i < 6 + countClientHobbies; i++, j++)
                            clientHobbies[j] = tmp[i];
                    }
                    if(Integer.parseInt(tmp[9 + countClientHobbies]) == 0)
                    {
                        countPartnerHobbies = 0;
                        partnerHobbies = new String[countPartnerHobbies];
                    }
                    else
                    {
                        if(countClientHobbies == 0)
                        {
                            countPartnerHobbies = Integer.parseInt(tmp[9 + 1]);
                            partnerHobbies = new String[countPartnerHobbies];
                            if(countPartnerHobbies != 0)
                                for (int i = 9 + 1 + 1, j = 0; i < tmp.length;
i++, j++)
                                    partnerHobbies[j] = tmp[i];
                        }
                        else
                        {
                            countPartnerHobbies = Integer.parseInt(tmp[9 +
countClientHobbies]);
                            partnerHobbies = new String[countPartnerHobbies];
                            for (int i = 9 + countClientHobbies + 1, j = 0; i <
tmp.length; i++, j++)
                                partnerHobbies[j] = tmp[i];
                        }
                    }
                    info = new InfoAboutYourself(tmp[1], Integer.parseInt(tmp[2]),
Integer.parseInt(tmp[3]), tmp[4], clientHobbies);
                    int pos;
                    if(countClientHobbies == 0)
                        pos = 7;
                    else
                        pos = countClientHobbies + 6;
                    requirements = new PartnerRequirements(tmp[pos],
Integer.parseInt(tmp[pos+1]), Integer.parseInt(tmp[pos+2]), partnerHobbies);
                    date = new GregorianCalendar();
                    container.add(new Client(tmp[0], indexGenerator(container), date, info,
requirements));
                 }
               }
                reader.close();
            }
            catch (FileNotFoundException e)
            {
                e.printStackTrace();
            }
            System.out.println("Elements added.");
            System.out.println("\nSize of container: " + container.getSize());
            System.out.println("\nOutput the container...");
            System.out.println("\n" + container.toString());
            Pattern patternAgeDifference = Pattern.compile("^([0-5])");
            Pattern patternHobby = Pattern.compile("^(Morning runs)");
            Pattern patternMale = Pattern.compile("^(Male)");
            Pattern patternFemale = Pattern.compile("^(Female)");
            Matcher matcherHobby1, matcherHobby2, matcherAge, matcherGenderMale,
matcherGenderFemale;
            ArrayList<Integer> positions = new ArrayList<>();
            boolean hobbyCheck1 = false, foundCouple = false;
            System.out.println("Finding all combinations of couples with heterosexual partners with
an age difference of no more than 5 years for morning runs...\n");
            for(int i = 0; i < container.getSize(); i++)
            {
                clientHobbies = container.getElement(i).getInformation().getClientHobby();
                partnerHobbies = container.getElement(i).getRequirements().getPartnerHobby();
                if(clientHobbies.length != 0 && partnerHobbies.length != 0)
                {
                    for(int a = 0; a < clientHobbies.length; a++)
                    {
                        matcherHobby1 = patternHobby.matcher(clientHobbies[a]);
                        if(matcherHobby1.matches())
                        {
                            hobbyCheck1 = true;
                            break;
                        }
                    }
                    if(hobbyCheck1 == true)
                        for(int b = 0; b < partnerHobbies.length; b++)
                        {
                            matcherHobby2 =
patternHobby.matcher(partnerHobbies[b]);
                            if(matcherHobby2.matches())
                                positions.add(i);
                        }
                }
            }
            int num = 1;
            if(!positions.isEmpty())
                for(int i = 0; i < container.getSize(); i++)
                {
                    if(positions.contains(i))
                        for(int j = i + 1; j < container.getSize(); j++)
                            if(positions.contains(j))
                            {
                                int ageDifference =
Math.abs(container.getElement(i).getInformation().getAge() - container.getElement(j).getInformation().getAge());
                                matcherAge =
patternAgeDifference.matcher(Integer.toString(ageDifference));
                                if(matcherAge.matches())
                                {
                                    matcherGenderMale =
patternMale.matcher(container.getElement(i).getClientGender());
                                    if(matcherGenderMale.matches())
                                    {
                                        matcherGenderFemale =
patternFemale.matcher(container.getElement(j).getClientGender());

    if(matcherGenderFemale.matches())
                                        {

    System.out.println("Couple " + num + ":\n" + container.getElement(i).toString() + "\n" +
container.getElement(j).toString() + "\n");
```

```
                                                                        foundCouple        =
true;
                                                                        num++;
                                                                  }
                                                            }
                                                            else
                                                            {
                                                                  matcherGenderMale        =
patternMale.matcher(container.getElement(j).getClientGender());

      if(matcherGenderMale.matches())
                                                                  {

      System.out.println("Couple " + num + ":\n" + container.getElement(i).toString() + "\n" +
container.getElement(j).toString() + "\n");
                                                                        foundCouple        =
true;
                                                                        num++;
                                                                  }
                                                            }

                                                      }
                                                }
                                    }
                              if(foundCouple != true)
                                    System.out.println("There is no matching couples.");
                              System.out.println("End.");
                  }

                  private static void menu(ClientList<Client> container)
                  {
                              String gender = "";
                              String partnerGender;
                              String name;
                              GregorianCalendar date;
                              InfoAboutYourself info;
                              PartnerRequirements requirements;
                              Pattern patternName = Pattern.compile("^([a-zA-Z]+)");
                              Pattern patternAge = Pattern.compile("^(([1-9])|([1-9][0-9]))");
                              Pattern patternHeight = Pattern.compile("^(([1-9])|([1-9][0-9])|([1-2][0-9][0-9]))");
                              Pattern patternEyeColour = Pattern.compile("^([a-zA-Z]+)");
                              Pattern patternHobby = Pattern.compile("^[a-zA-Z]+|[a-zA-Z]+\\s[a-zA-Z]+");
                              boolean endCheck = true;
                              Scanner inInt = new Scanner(System.in);
                              Scanner inStr = new Scanner(System.in);
                              while (endCheck)
                              {
                                    System.out.println("Menu:");
                                    System.out.println("1. Show clients");
                                    System.out.println("2. Add client");
                                    System.out.println("3. Remove client");
                                    System.out.println("4. Change information");
                                    System.out.println("5. Clear list");
                                    System.out.println("6. Serialize data");
                                    System.out.println("7. Deserialize data");
                                    System.out.println("8. Count elements in a container");
                                    System.out.println("9. Sort the container");
                                    System.out.println("10. Finding all combinations of couples with heterosexual
partners with some age difference for morning runs");
                                    System.out.println("0. Exit");
System.out.println("Enter your option:");
int option = inInt.nextInt();
System.out.println();
switch (option)
{
case 1:
        if(container.getSize() > 0)
                System.out.println(container.toString());
        else
                System.out.println("Container is empty.\n");
        break;
case 2:
        System.out.println("Choose gender:\n1. Male\n2. Female");
        int genderOption = inInt.nextInt();
        if(genderOption == 1)
        {
                gender = "Male";
                partnerGender = "Female";
        }
        else
        {
                gender = "Female";
                partnerGender = "Male";
        }
        System.out.println("\nEnter information about yourself");
        System.out.println("Name:");
        name = inStr.nextLine();
        name = stringRegexCheck(name, patternName);
        System.out.println("Age:");
        int age = inInt.nextInt();
        age = intRegexCheck(age, patternAge);
        System.out.println("Height:");
        int height = inInt.nextInt();
        height = intRegexCheck(height, patternHeight);
        System.out.println("Eye colour:");
        String eyeColour = inStr.nextLine();
        eyeColour = stringRegexCheck(eyeColour, patternEyeColour);
        System.out.println("Enter count of client's hobbies:");
        int countClientHobbies = inInt.nextInt();
        String[] clientHobbies = new String[countClientHobbies];
        if(countClientHobbies != 0)
        {
                System.out.println("Enter client's hobbies (max 2 words):");
                for(int i = 0; i < countClientHobbies; i++)
                {
                        String hobby = inStr.nextLine();
                        hobby = stringRegexCheck(hobby, patternHobby);
                        clientHobbies[i] = hobby;
                }
        }
        info = new InfoAboutYourself(name, age, height, eyeColour,
clientHobbies);
        System.out.println("\nEnter partner requirements");
        System.out.println("Min age:");
        int minAge = inInt.nextInt();
        minAge = intRegexCheck(minAge, patternAge);
        System.out.println("Max age:");
        int maxAge = inInt.nextInt();
        maxAge = intRegexCheck(maxAge, patternAge);
        System.out.println("Enter count of partner's hobbies:");
```

```
                    int countPartnerHobbies = inInt.nextInt();
                    String[] partnerHobbies = new String[countPartnerHobbies];
                    if(countPartnerHobbies != 0)
                    {
                        System.out.println("Enter partner's hobbies (max 2 words):");
                        for(int i = 0; i < countPartnerHobbies; i++)
                        {
                            String hobby = inStr.nextLine();
                            hobby = stringRegexCheck(hobby, patternHobby);
                            partnerHobbies[i] = hobby;
                        }
                    }
                    requirements = new PartnerRequirements(partnerGender, minAge,
maxAge, partnerHobbies);
                    date = new GregorianCalendar();
                    container.add(new Client(gender, indexGenerator(container), date, info,
requirements));
                    System.out.println("\n" + container.toString());
                    break;
                case 3:
                    System.out.println("Enter client's ID to remove him:");
                    int id = inInt.nextInt();
                    int size = container.getSize();
                    for(int i = 0; i < container.getSize(); i++)
                        if(container.getElement(i).getId() == id)
                        {
                            container.remove(i);
                            break;
                        }
                    if(size == container.getSize())
                        System.out.println("\nThere is no such client");
                    else
                        System.out.println("\nClient removed");
                    System.out.println();
                    break;
                case 4:
                    System.out.println("Enter client's ID to change his information:");
                    id = inInt.nextInt();
                    int index = 0;
                    for(index = 0; index < container.getSize(); index++)
                        if(container.getElement(index).getId() == id)
                            break;
                    if(index == container.getSize())
                    {
                        System.out.println("\nThere is no client with that ID.\n");
                        break;
                    }
                    boolean endCheck2 = true;
                    int option2 = 0;
                    while(endCheck2)
                    {
                        System.out.println("\n"                              +
container.getElement(index).toString() + "\n");
                        System.out.println("Which information you want to change?");
                        System.out.println("1. Gender");
                        System.out.println("2. ID");
                        System.out.println("3. Registration date");
                        System.out.println("4. Information about yourself");
                        System.out.println("5. Partner requirements");
                        System.out.println("6. End of change");
```

```
                                        System.out.println("Enter option:");
                                        option2 = inInt.nextInt();
                                        switch(option2)
                                        {
                                        case 1:
                                                if(container.getElement(index).getClientGender()    ==
"Male")

        container.getElement(index).setClientGender("Female");
                                                else

        container.getElement(index).setClientGender("Male");
                                                break;
                                        case 2:
                                                System.out.println("\nEnter new ID (e.g. 10):");
                                                container.getElement(index).setId(inInt.nextInt());
                                                break;
                                        case 3:
                                                Pattern                    patternYear                    =
Pattern.compile("^(?!^0)\\d{4}$");

                                                Pattern    patternMonth    =    Pattern.compile("^(([1-
9])|([1][0-2]))");

                                                Pattern     patternDay     =     Pattern.compile("^(([1-
9])|([12][0-9])|([3][01]))");

                                                Pattern     patternHour     =     Pattern.compile("^(([0-
9])|([1][0-9])|([2][0-4]))");

                                                Pattern    patternMinute    =    Pattern.compile("^(([0-
9])|([1-5][0-9])|([6][0]))");

                                                GregorianCalendar         newDate         =         new
GregorianCalendar();

                                                System.out.println("\nEnter registration year:");
                                                int value = inInt.nextInt();
                                                value = intRegexCheck(value, patternYear);
                                                newDate.set(Calendar.YEAR, value);
                                                System.out.println("Enter registration month:");
                                                value = inInt.nextInt();
                                                value = intRegexCheck(value, patternMonth);
                                                newDate.set(Calendar.MONTH, value-1);
                                                System.out.println("Enter registration day:");
                                                value = inInt.nextInt();
                                                value = intRegexCheck(value, patternDay);
                                                newDate.set(Calendar.DAY_OF_MONTH, value);
                                                System.out.println("Enter registration hour:");
                                                value = inInt.nextInt();
                                                value = intRegexCheck(value, patternHour);
                                                newDate.set(Calendar.HOUR_OF_DAY, value);
                                                System.out.println("Enter registration minute:");
                                                value = inInt.nextInt();
                                                value = intRegexCheck(value, patternMinute);
                                                newDate.set(Calendar.MINUTE, value);
                                                newDate.set(Calendar.SECOND, 0);
                                                container.getElement(index).setDate(newDate);
                                                break;
                                        case 4:
                                                System.out.println("\nInformation about yourself:");
                                                System.out.println("1. Name");
                                                System.out.println("2. Age");
                                                System.out.println("3. Height");
                                                System.out.println("4. Eye colour");
                                                System.out.println("5. Hobbies");
```

```
                            System.out.println("6. Change all information");
                            System.out.println("Enter option:");
                            int option3 = inInt.nextInt();
                            System.out.println();
                            switch(option3)
                            {
                            case 1:
                                System.out.println("Enter new name:");
                                name = inStr.nextLine();
                                name = stringRegexCheck(name,
patternName);

    container.getElement(index).getInformation().setName(name);
                                break;
                            case 2:
                                System.out.println("Enter new age:");
                                age = inInt.nextInt();
                                age = intRegexCheck(age, patternAge);

    container.getElement(index).getInformation().setAge(age);
                                break;
                            case 3:
                                System.out.println("Enter new height:");
                                height = inInt.nextInt();
                                height = intRegexCheck(height,
patternHeight);

    container.getElement(index).getInformation().setHeight(height);
                                break;
                            case 4:
                                System.out.println("Enter new eye colour:");
                                eyeColour = inStr.nextLine();
                                eyeColour = stringRegexCheck(eyeColour,
patternEyeColour);

    container.getElement(index).getInformation().setEyeColour(eyeColour);
                                break;
                            case 5:
                                System.out.println("Enter new count of
client's hobbies:");

                                countClientHobbies = inInt.nextInt();
                                clientHobbies = new
String[countClientHobbies];

                                if(countClientHobbies != 0)
                                {
                                    System.out.println("Enter client's
hobbies (max 2 words):");

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

                                    {
                                        String hobby =
inStr.nextLine();

                                        hobby =
stringRegexCheck(hobby, patternHobby);

                                        clientHobbies[i] = hobby;
                                    }
                                }

    container.getElement(index).getInformation().setClientHobby(clientHobbies);
                                break;
                            case 6:
                                System.out.println("Enter new name:");
                                name = inStr.nextLine();
                                name = stringRegexCheck(name,
patternName);
                                System.out.println("Enter new age:");
                                age = inInt.nextInt();
                                age = intRegexCheck(age, patternAge);
                                System.out.println("Enter new height:");
                                height = inInt.nextInt();
                                height = intRegexCheck(height,
patternHeight);
                                System.out.println("Enter new eye colour:");
                                eyeColour = inStr.nextLine();
                                eyeColour = stringRegexCheck(eyeColour,
patternEyeColour);
                                System.out.println("Enter new count of
client's hobbies:");
                                countClientHobbies = inInt.nextInt();
                                clientHobbies = new
String[countClientHobbies];
                                if(countClientHobbies != 0)
                                {
                                    System.out.println("Enter client's
hobbies (max 2 words):");
                                    for(int i = 0; i < countClientHobbies;
i++)
                                    {
                                        String hobby =
inStr.nextLine();
                                        hobby =
stringRegexCheck(hobby, patternHobby);
                                        clientHobbies[i] = hobby;
                                    }
                                }
                                info = new InfoAboutYourself(name, age,
height, eyeColour, clientHobbies);

    container.getElement(index).setInformation(info);
                                break;
                            default:
                                System.out.println("Wrong command.");
                                break;
                            }
                            break;
                        case 5:
                            System.out.println("\nPartner requirements:");
                            System.out.println("1. Gender");
                            System.out.println("2. Min age");
                            System.out.println("3. Max age");
                            System.out.println("4. Hobbies");
                            System.out.println("5. Change all requirements");
                            System.out.println("Enter option:");
                            option3 = inInt.nextInt();
                            switch(option3)
                            {
                            case 1:

    if(container.getElement(index).getRequirements().getPartnerGender() == "Male")
    container.getElement(index).getRequirements().setPartnerGender("Female");
                                                            else

    container.getElement(index).getRequirements().setPartnerGender("Male");
                                                            break;
                                                      case 2:
                                                            System.out.println("\nEnter new min age:");
                                                            minAge = inInt.nextInt();
                                                            minAge     =     intRegexCheck(minAge,
patternAge);

    container.getElement(index).getRequirements().setMinAge(minAge);
                                                            break;
                                                      case 3:
                                                            System.out.println("\nEnter new max age:");
                                                            maxAge = inInt.nextInt();
                                                            maxAge     =     intRegexCheck(maxAge,
patternAge);

    container.getElement(index).getRequirements().setMaxAge(maxAge);
                                                            break;
                                                      case 4:
                                                            System.out.println("\nEnter   new   count   of
partner's hobbies:");
                                                            countPartnerHobbies = inInt.nextInt();
                                                            partnerHobbies          =          new
String[countPartnerHobbies];
                                                            {
                                                                  System.out.println("Enter   partner's
hobbies (max 2 words):");
                                                                  for(int   i   =   0;   i   <
countPartnerHobbies; i++)
                                                                  {
                                                                        String     hobby     =
inStr.nextLine();
                                                                        hobby              =
stringRegexCheck(hobby, patternHobby);
                                                                        partnerHobbies[i] = hobby;
                                                                  }
                                                            }

    container.getElement(index).getRequirements().setPartnerHobby(partnerHobbies);
                                                            break;
                                                      case 5:

    if(container.getElement(index).getRequirements().getPartnerGender() == "Male")
                                                                  partnerGender = "Female";
                                                            else
                                                                  partnerGender = "Male";
                                                            System.out.println("\nEnter new min age:");
                                                            minAge = inInt.nextInt();
                                                            minAge     =     intRegexCheck(minAge,
patternAge);
                                                            System.out.println("Enter new max age:");
                                                            maxAge = inInt.nextInt();
                                                            maxAge     =     intRegexCheck(maxAge,
patternAge);
                                                            System.out.println("Enter   new   count   of
partner's hobbies:");
```

```
										countPartnerHobbies = inInt.nextInt();
										partnerHobbies = new String[countPartnerHobbies];
										{
											System.out.println("Enter partner's hobbies (max 2 words):");
											for(int i = 0; i < countPartnerHobbies; i++)
											{
												String hobby = inStr.nextLine();
												hobby = stringRegexCheck(hobby, patternHobby);
												partnerHobbies[i] = hobby;
											}
										}
										requirements = new PartnerRequirements(partnerGender, minAge, maxAge, partnerHobbies);
	container.getElement(index).setRequirements(requirements);
										break;
									default:
										System.out.println("\nWrong command.");
										break;
									}
									break;
								case 6:
									endCheck2 = false;
									System.out.println();
									break;
								default:
									System.out.println("\nWrong command.");
									break;
								}
							}
							break;
						case 5:
							container.clear();
							System.out.println("Container cleared.\n");
							break;
						case 6:
							System.out.println("Choose the method");
							System.out.println("1. Standard serialization");
							System.out.println("2. XML serialization");
							System.out.println("3. End");
							System.out.println("Enter your option:");
							option2 = inInt.nextInt();
							System.out.println();
							switch(option2)
							{
							case 1:
								try(ObjectOutputStream oos = new ObjectOutputStream(new BufferedOutputStream(new FileOutputStream("Lab12.ser"))))
								{
									oos.writeObject(container);
									oos.flush();
									System.out.println("Serialization successful.\n");
								}
								catch(Exception ex)
								{
```

```
								System.out.println(ex.getMessage() + "\n");
							}
							break;
						case 2:
							try(XMLEncoder encoder = new XMLEncoder(new
BufferedOutputStream(new FileOutputStream("Lab12.xml"))))
							{
								encoder.writeObject(container);
								System.out.println("Serialization successful.\n");
							}
							catch(Exception ex)
							{
								System.out.println(ex.getMessage() + "\n");
							}
							break;
						case 3:
							break;
						default:
							System.out.println("Wrong command.\n");
							break;
						}
						break;
					case 7:
						System.out.println("Choose the method");
						System.out.println("1. Standard deserialization");
						System.out.println("2. XML deserialization");
						System.out.println("3. End");
						System.out.println("Enter your option");
						option2 = inInt.nextInt();
						System.out.println();
						switch(option2)
						{
						case 1:
							try(ObjectInputStream ois = new ObjectInputStream(new
BufferedInputStream(new FileInputStream("Lab12.ser"))))
							{
								container.clear();
								container = (ClientList<Client>) ois.readObject();
								System.out.println("Deserialization successful.\n");
							}
							catch(Exception ex)
							{
								System.out.println(ex.getMessage());
							}
							break;
						case 2:
							try(XMLDecoder decoder = new XMLDecoder(new
BufferedInputStream(new FileInputStream("Lab12.xml"))))
							{
								container.clear();
								container = (ClientList<Client>)
decoder.readObject();
								System.out.println("Deserialization successful.\n");
							}
							catch(IOException ex)
							{
								System.out.println(ex.getMessage());
							}
							break;
						case 3:
```

```
                break;
            default:
                System.out.println("Wrong command.\n");
                break;
            }
            break;
        case 8:
            System.out.println("There is/are " + container.getSize() + " elements in 
a container\n");
            break;
        case 9:
            if(container.getSize() == 0)
            {
                System.out.println("Empty container.\n");
                break;
            }
            System.out.println("Choose the method:");
            System.out.println("1. Sort by ID");
            System.out.println("2. Sort by registration date");
            System.out.println("3. Sort by count of client's hobbies");
            System.out.println("4. Sort by count of partner's hobbies");
            System.out.println("Enter your option:");
            option = inInt.nextInt();
            System.out.println("\n1. Ascending");
            System.out.println("2. Descending");
            option2 = inInt.nextInt();
            System.out.println();
            switch (option)
            {
            case 1:
                container.sort(new IdComparator(), option2);
                System.out.println("Container sorted\n");
                break;
            case 2:
                container.sort(new RegistrationDateComparator(), option2);
                System.out.println("Container sorted\n");
                break;
            case 3:
                container.sort(new ClientHobbiesComparator(), option2);
                System.out.println("Container sorted\n");
                break;
            case 4:
                container.sort(new PartnerHobbiesComparator(), option2);
                System.out.println("Container sorted\n");
                break;
            default:
                System.out.println("Wrong command\n");
                break;
            }
            break;
        case 10:
            if(container.getSize() == 0)
            {
                System.out.println("Empty container.\n");
                break;
            }
            System.out.println("Enter the max age difference (max 9 years):");
            maxAge = inInt.nextInt();
            if(maxAge > 9)
            {
```

```
                        System.out.println("\nYou enter wrong max age.\n");
                        break;
                    }
                    System.out.println();
                    String str = "^([" + 0 + "-" + maxAge + "])";
                    Pattern patternAgeDifference = Pattern.compile(str);
                    Pattern patternHobbyRuns = Pattern.compile("^(Morning runs)");
                    Pattern patternMale = Pattern.compile("^(Male)");
                    Pattern patternFemale = Pattern.compile("^(Female)");
                    Matcher matcherHobby1, matcherHobby2, matcherAge,
matcherGenderMale, matcherGenderFemale;
                    ArrayList<Integer> positions = new ArrayList<>();
                    boolean hobbyCheck1 = false, foundCouple = false;
                    for(int i = 0; i < container.getSize(); i++)
                    {
                        clientHobbies =
container.getElement(i).getInformation().getClientHobby();
                        partnerHobbies =
container.getElement(i).getRequirements().getPartnerHobby();
                        if(clientHobbies.length != 0 && partnerHobbies.length != 0)
                        {
                            for(int a = 0; a < clientHobbies.length; a++)
                            {
                                matcherHobby1 =
patternHobbyRuns.matcher(clientHobbies[a]);
                                if(matcherHobby1.matches())
                                {
                                    hobbyCheck1 = true;
                                    break;
                                }
                            }
                            if(hobbyCheck1 == true)
                                for(int b = 0; b < partnerHobbies.length; b++)
                                {
                                    matcherHobby2 =
patternHobbyRuns.matcher(partnerHobbies[b]);
                                    if(matcherHobby2.matches())
                                        positions.add(i);
                                }
                        }
                    }
                    int num = 1;
                    if(!positions.isEmpty())
                        for(int i = 0; i < container.getSize(); i++)
                        {
                            if(positions.contains(i))
                                for(int j = i + 1; j < container.getSize(); j++)
                                    if(positions.contains(j))
                                    {
                                        int ageDifference =
Math.abs(container.getElement(i).getInformation().getAge() - container.getElement(j).getInformation().getAge());
                                        matcherAge =
patternAgeDifference.matcher(Integer.toString(ageDifference));
                                        if(matcherAge.matches())
                                        {

    matcherGenderMale = patternMale.matcher(container.getElement(i).getClientGender());

    if(matcherGenderMale.matches())
                                            {
```

```
        matcherGenderFemale = patternFemale.matcher(container.getElement(j).getClientGender());

        if(matcherGenderFemale.matches())
                                                                                                {

        System.out.println("Couple  " + num + ":\n" + container.getElement(i).toString() + "\n" +
container.getElement(j).toString() + "\n");

        foundCouple = true;

        num++;
                                                                                                }
                                                                                        }
                                                                                        else
                                                                                        {

        matcherGenderMale = patternMale.matcher(container.getElement(j).getClientGender());

        if(matcherGenderMale.matches())
                                                                                                {

        System.out.println("Couple  " + num + ":\n" + container.getElement(i).toString() + "\n" +
container.getElement(j).toString() + "\n");

        foundCouple = true;

        num++;
                                                                                                }
                                                                                        }

                                                                                }
                                                                        }
                                                        }
                                                if(foundCouple != true)
                                                        System.out.println("There is no matching couples.\n");
                                                break;
                                        case 0:
                                                endCheck = false;
                                                container.clear();
                                                inInt.close();
                                                inStr.close();
                                                break;
                                        default:
                                                System.out.println("Wrong command\n");
                                                break;
                                        }
                                }
                                System.out.println("End.");
                        }

                        public static int indexGenerator(ClientList<Client> arr)
                        {
                                arr.sort(new IdComparator(), 1);
                                int index = 1;
                                for(int i = 0; i < arr.getSize(); i++)
                                        if(index == arr.getElement(i).getId())
                                                index++;
                                        else
                                                return index;
```

```
		return index;
	}

	public static int intRegexCheck(int value, Pattern pattern)
	{
		Matcher matcher;
		Scanner in = new Scanner(System.in);
		boolean ready = false;
		do
		{
			matcher = pattern.matcher(Integer.toString(value));
			if(!matcher.matches())
			{
				System.out.println("You've entered the wrong data. Try again:");
				value = in.nextInt();
			}
			else
				ready = true;
		}
		while(!ready);
		return value;
	}

	public static String stringRegexCheck(String value, Pattern pattern)
	{
		Matcher matcher;
		Scanner in = new Scanner(System.in);
		boolean ready = false;
		do
		{
			matcher = pattern.matcher(value);
			if(!matcher.matches())
			{
				System.out.println("You've entered the wrong data. Try again:");
				value = in.nextLine();
			}
			else
				ready = true;
		}
		while(!ready);
		return value;
	}
}
```

Клас ClientList

```
package ua.khpi.oop.zanochkyn12;

import java.io.Serializable;
import java.util.Comparator;
import java.util.Iterator;
import java.util.NoSuchElementException;
import ua.khpi.oop.zanochkyn10.Client;
import ua.khpi.oop.zanochkyn10.Node;

public class ClientList<T> implements Serializable, Iterable<T>
{
	private static final long serialVersionUID = 5493313651067238933L;
	public Node<T> head;
```

```
private int size;

/*
 * Getter and setter for size
 */
public int getSize() { return size; }
public void setSize(int size) { this.size = size; }

/*
 * Method (add) that add a new client into container
 */
public void add(T el)
{
        Node<T> temp = new Node<T>();
        if(head == null)
                head = new Node<T>(el);
        else
        {
                temp = head;
                while(temp.next != null)
                        temp = temp.next;
                temp.next = new Node<T>(el);
        }
        size++;
}

/*
 * Method (remove) that remove a client from container
 */
public void remove(int id)
{
        Node<T> temp = head;
        if(head != null)
        {
                if(id == 0)
                        head = head.next;
                else
                {
                        for(int i = 0; i < id - 1; i++)
                                temp = temp.next;
                        if(temp.next != null)
                                temp.next = temp.next.next;
                        else
                                temp.next = null;
                }
                size--;
        }
        else
                System.out.println("Container is empty.");
}

/*
 * Method (clear) that clear the container
 */
public void clear()
{
        this.head = null;
        size = 0;
}
```

```
/*
 * Method (toArray[]) that return container as an array
 */
public Object[] toArray()
{
        Object[] arr = new Object[size];
        for(int i = 0; i < size; i++)
                arr[i] = getElement(i);
        return arr;
}

/*
 * Method (getElement) that return a specific element from container
 */
public T getElement(int id)
{
        if(id < 0 || id >= size)
        {
                System.out.println("Wrong id.");
                return null;
        }
        Node<T> temp = head;
        for(int i = 0; i < id; i++)
                temp = temp.next;
        return temp.element;
}

/*
 * Method (toString) that return a container as a string
 */
public String toString()
{
        StringBuilder sb = new StringBuilder();
        for(T value : this)
                sb.append(value + "\n");
        return sb.toString();
}

@SuppressWarnings("unchecked")
public void sort(Comparator<T> comp, int option)
{
        Object[] arr = this.toArray();
        Object temp;
        boolean flag;
        if(option == 1)
                do
                {
                        flag = false;
                        for(int i = 0; i < size - 1; i++)
                                if(comp.compare((T)arr[i], (T)arr[i+1]) == 1)
                                {
                                        flag = true;
                                        temp = arr[i];
                                        arr[i] = arr[i+1];
                                        arr[i+1] = temp;
                                }
                }
                while(flag == true);
        else
                do
                {
                    flag = false;
                    for(int i = 0; i < size - 1; i++)
                        if(comp.compare((T)arr[i], (T)arr[i+1]) == -1)
                        {
                            flag = true;
                            temp = arr[i+1];
                            arr[i+1] = arr[i];
                            arr[i] = temp;
                        }
                }
                while(flag == true);
            this.clear();
            for (Object i : arr)
                this.add((T) i);
        }

        public Iterator<T> iterator()
        {
            return new Iterator<T>()
            {
                int index = 0;
                boolean check = false;

                /*
                 * Method that returns true if the iteration has more elements
                 */
                @Override
                public boolean hasNext()
                {
                    return index < size;
                }

                /*
                 * Method that returns the next element in the iteration
                 */
                @Override
                public T next()
                {
                    if (index == size)
                        throw new NoSuchElementException();
                    check = true;
                    return getElement(index++);
                }

                /*
                 * Method that removes from the container the last element returned by this
iterator
                 */
                @Override
                public void remove()
                {
                    if (check)
                    {
                        ClientList.this.remove(index - 1);
                        check = false;
                    }
                    else
                        throw new IllegalStateException();
                }
```

```
				};
			}
		}

		class RegistrationDateComparator implements Comparator<Client>
		{
			public int compare(Client o1, Client o2)
			{
				if(o1.getDate().getTimeInMillis() > o2.getDate().getTimeInMillis())
					return 1;
				else if(o1.getDate().getTimeInMillis() < o2.getDate().getTimeInMillis())
					return -1;
				else
					return 0;
			}
		}

		class ClientHobbiesComparator implements Comparator<Client>
		{
			public int compare(Client o1, Client o2)
			{
				if(o1.getInformation().getClientHobby().length                    >
o2.getInformation().getClientHobby().length)
					return 1;
				else              if(o1.getInformation().getClientHobby().length            <
o2.getInformation().getClientHobby().length)
					return -1;
				else
					return 0;
			}
		}

		class PartnerHobbiesComparator implements Comparator<Client>
		{
			public int compare(Client o1, Client o2)
			{
				if(o1.getRequirements().getPartnerHobby().length                    >
o2.getRequirements().getPartnerHobby().length)
					return 1;
				else             if(o1.getRequirements().getPartnerHobby().length            <
o2.getRequirements().getPartnerHobby().length)
					return -1;
				else
					return 0;
			}
		}

		class IdComparator implements Comparator<Client>
		{
			public int compare(Client o1, Client o2)
			{
				if(o1.getId() > o2.getId())
					return 1;
				else if(o1.getId() < o2.getId())
					return -1;
				else
					return 0;
			}
		}
```

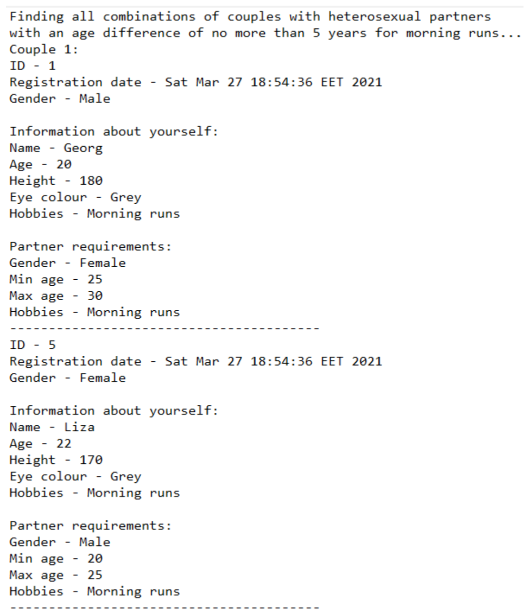
3 ВАРІАНТИ ВИКОРИСТАННЯ

Можливість виконання програми в автоматичному режимі, якщо ввести у командному рядку аргументи –a або –auto та у діалоговому режимі – аргументи –d або –dialog.

У діалоговому режимі було розроблено меню, яке дозволяє користувачу:

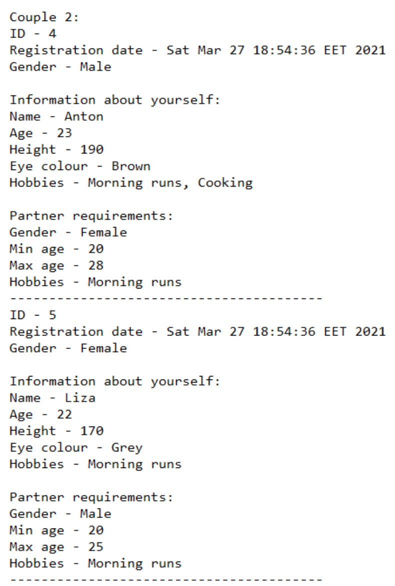
1. Вивести усі елементи у консоль (1 команда меню) ;
2. Додати елемент у контейнер (2 команда меню);
3. Видалити елемент з контейнеру (3 команда меню);
4. Редагувати один з елементів (4 команда меню);
5. Очистити контейнер (5 команда меню);
6. Серіалізувати контейнер у файл (6 команда меню);
7. Десеріалізувати контейнер (7 команда меню);
8. Визначити кількість елементів у контейнері (8 команда меню);
9. Сортування контейнера (9 команда меню);
10. Знайти всі комбінації пар (10 команда меню);
11. Закінчити виконання програми (0 команда меню).

4 РЕЗУЛЬТАТИ РОБОТИ ПРОГРАМИ



```
Finding all combinations of couples with heterosexual partners
with an age difference of no more than 5 years for morning runs...
Couple 1:
ID - 1
Registration date - Sat Mar 27 18:54:36 EET 2021
Gender - Male

Information about yourself:
Name - Georg
Age - 20
Height - 180
Eye colour - Grey
Hobbies - Morning runs

Partner requirements:
Gender - Female
Min age - 25
Max age - 30
Hobbies - Morning runs
----------------------------------------
ID - 5
Registration date - Sat Mar 27 18:54:36 EET 2021
Gender - Female

Information about yourself:
Name - Liza
Age - 22
Height - 170
Eye colour - Grey
Hobbies - Morning runs

Partner requirements:
Gender - Male
Min age - 20
Max age - 25
Hobbies - Morning runs
----------------------------------------
```

а)



```
Couple 2:
ID - 4
Registration date - Sat Mar 27 18:54:36 EET 2021
Gender - Male

Information about yourself:
Name - Anton
Age - 23
Height - 190
Eye colour - Brown
Hobbies - Morning runs, Cooking

Partner requirements:
Gender - Female
Min age - 20
Max age - 28
Hobbies - Morning runs
----------------------------------------
ID - 5
Registration date - Sat Mar 27 18:54:36 EET 2021
Gender - Female

Information about yourself:
Name - Liza
Age - 22
Height - 170
Eye colour - Grey
Hobbies - Morning runs

Partner requirements:
Gender - Male
Min age - 20
Max age - 25
Hobbies - Morning runs
----------------------------------------
```

б)

Рисунок 12.1 – Результат роботи програми у середовищі Eclipse

Висновок

Під час виконання лабораторної роботи було набуто навички роботи з розробки регулярних виразів та обробки тексту за їх допомогою в середовищі Eclipse IDE.