Лабораторна робота №10

Обробка параметризованих контейнерів

Мета: Розширення функціональності параметризованих класів.

1 ВИМОГИ

1. Розробити параметризовані методи (Generic Methods) для обробки колекцій об'єктів згідно прикладної задачі.

2. Продемонструвати розроблену функціональність (створення, управління та обробку власних контейнерів) в діалоговому та автоматичному режимах.

- Автоматичний режим виконання програми задається параметром командного рядка -auto. Наприклад, java ClassName -auto.
- В автоматичному режимі діалог з користувачем відсутній, необхідні данні генеруються, або зчитуються з файлу.

3. Забороняється використання алгоритмів з Java Collections Framework.

1.1 Розробник

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

1.2 Завдання

Реалізувати сортування за датою реєстрації, за кількістю властивостей в розділі "відомості про себе", за кількістю властивостей в розділі "вимоги 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("Lab10.xml"));

encoder.writeObject(container); – нестандартна серіалізація;

XMLDecoder decoder = new XMLDecoder(new BufferedInputStream(new FileInputStream("Lab10.xml")));

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

ObjectOutputStream oos = new ObjectOutputStream(new BufferedOutputStream(newFileOutputStream("Lab10.ser")));

oos.writeObject(container);

oos.flush(); – стандартна серіалізація;

ObjectInputStream ois = new ObjectInputStream(new BufferedOutputStream(new FileInputStream("Lab10.ser")));

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

2.2 Ієрархія та структура класів

Було створено класи Main (головний клас програми), Client (клас, що містить всі поля та методи прикладної області «Бюро знайомств»), ClientList (клас-контейнер), Node (клас-покажчик на елемент) та 4 класи, що реалізують інтерфейс Comparator для сортування за певними критеріями.

2.3 Важливі фрагменти програми

Клас Main

```
package ua.khpi.oop.zanochkyn10;

import java.beans.XMLDecoder;
import java.beans.XMLEncoder;
import java.io.BufferedInputStream;
import java.io.BufferedOutputStream;
import java.io.FileInputStream;
import java.io.FileOutputStream;
```

```
import java.io.IOException;
import java.io.ObjectInputStream;
import java.io.ObjectOutputStream;
import java.util.Calendar;
import java.util.GregorianCalendar;
import java.util.Scanner;

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...");
		String gender;
		GregorianCalendar date;
		InfoAboutYourself info;
		PartnerRequirements requirements;
		gender = "Male";
		String name = "Yehor";
		int age = 19;
		int height = 185;
		String eyeColour = "Blue";
		String[] clientHobbies = {"Video games", "Music"};
```

```
                info = new InfoAboutYourself(name, age, height, eyeColour, clientHobbies);
                String partnerGender = "Female";
                int minAge = 18;
                int maxAge = 25;
                String[] partnerHobbies = {};
                requirements = new PartnerRequirements(partnerGender, minAge, maxAge,
partnerHobbies);
                date = new GregorianCalendar();
                container.add(new Client(gender, indexGenerator(container), date, info, requirements));
                gender = "Female";
                name = "Katya";
                age = 18;
                height = 175;
                eyeColour = "Green";
                String[] clientHobbies2 = {"Music"};
                info = new InfoAboutYourself(name, age, height, eyeColour, clientHobbies2);
                partnerGender = "Male";
                minAge = 18;
                maxAge = 25;
                String[] partnerHobbies2 = {"Music"};
                requirements = new PartnerRequirements(partnerGender, minAge, maxAge,
partnerHobbies2);
                date = new GregorianCalendar();
                container.add(new Client(gender, indexGenerator(container), date, info, requirements));
                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());
                System.out.println("Change the second client's hobby...");
                String[] clientHobbies3 = {"Art"};
                container.getElement(1).getInformation().setClientHobby(clientHobbies3);
                System.out.println("Second client's hobby - changed.");
                System.out.println("\nOutput the container...");
                System.out.println("\n" + container.toString());
                System.out.println("Sorting the container by date (descending)...");
                container.sort(new RegistrationDateComparator(), 2);
                System.out.println("Container sorted");
                System.out.println("\nOutput the container...");
                System.out.println("\n" + container.toString());
                System.out.println("Removing first client from the container...");
                container.remove(0);
                System.out.println("First client removed.");
```

```
        System.out.println("\nOutput the container...");
        System.out.println("\n" + container.toString());
        System.out.println("End.");
}

private static void menu(ClientList<Client> container)
{
        String gender;
        GregorianCalendar date;
        InfoAboutYourself info;
        PartnerRequirements requirements;
        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("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("Enter gender:");
                        gender = inStr.nextLine();
                        System.out.println("\nEnter information about yourself");
```

```
System.out.println("Name:");
String name = inStr.nextLine();
System.out.println("Age:");
int age = inInt.nextInt();
System.out.println("Height:");
int height = inInt.nextInt();
System.out.println("Eye colour:");
String eyeColour = inStr.nextLine();
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:");
	for(int i = 0; i < countClientHobbies; i++)
		clientHobbies[i] = inStr.nextLine();
}
info = new InfoAboutYourself(name, age, height, eyeColour, clientHobbies);
System.out.println("\nEnter partner requirements");
System.out.println("Gender:");
String partnerGender = inStr.nextLine();
System.out.println("Min age:");
int minAge = inInt.nextInt();
System.out.println("Max age:");
int maxAge = inInt.nextInt();
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:");
	for(int i = 0; i < countPartnerHobbies; i++)
		partnerHobbies[i] = inStr.nextLine();
}
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("There 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();
                System.out.println();
                switch(option2)
                {
                case 1:
                        System.out.println("Enter new gender:");

container.getElement(index).setClientGender(inStr.nextLine());
                        break;
                case 2:
                        System.out.println("Enter new ID:");
                        container.getElement(index).setId(inInt.nextInt());
                        break;
                case 3:
                        GregorianCalendar newDate = new
GregorianCalendar();
                        System.out.println("Enter registration year:");
                        int value = inInt.nextInt();
                        newDate.set(Calendar.YEAR, value);
                        System.out.println("Enter registration month:");
                        value = inInt.nextInt();
                        newDate.set(Calendar.MONTH, value-1);
                        System.out.println("Enter registration day:");
                        value = inInt.nextInt();
                        newDate.set(Calendar.DAY_OF_MONTH, value);
                        System.out.println("Enter registration hour:");
                        value = inInt.nextInt();
                        newDate.set(Calendar.HOUR_OF_DAY, value);
                        System.out.println("Enter registration minute:");
                        value = inInt.nextInt();
                        newDate.set(Calendar.MINUTE, value);
                        newDate.set(Calendar.SECOND, 0);
                        container.getElement(index).setDate(newDate);
                        break;
                case 4:
                        System.out.println("Information 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:");

        container.getElement(index).getInformation().setName(inStr.nextLine());
                                                break;
                                        case 2:
                                                System.out.println("Enter new age:");

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

        container.getElement(index).getInformation().setHeight(inInt.nextInt());
                                                break;
                                        case 4:
                                                System.out.println("Enter new eye colour:");

        container.getElement(index).getInformation().setEyeColour(inStr.nextLine());
                                                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("\nEnter new
client's hobbies:");
                                                        for(int i = 0; i < countClientHobbies;
i++)
                                                                clientHobbies[i] =
inStr.nextLine();
                                                }

        container.getElement(index).getInformation().setClientHobby(clientHobbies);
```

```
                    break;
                case 6:
                    System.out.println("Enter new name:");
                    name = inStr.nextLine();
                    System.out.println("Enter new age:");
                    age = inInt.nextInt();
                    System.out.println("Enter new height:");
                    height = inInt.nextInt();
                    System.out.println("Enter new eye colour:");
                    eyeColour = inStr.nextLine();
                    System.out.println("Enter new count of
client's hobbies:");
                    countClientHobbies = inInt.nextInt();
                    clientHobbies = new
String[countClientHobbies];
                    if(countClientHobbies != 0)
                    {
                        System.out.println("\nEnter new
client's hobbies:");
                        for(int i = 0; i < countClientHobbies;
i++)
                            clientHobbies[i] =
inStr.nextLine();
                    }
                    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("Partner 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();
                                        System.out.println();
                                        switch(option3)
                                        {
                                        case 1:
                                                System.out.println("Enter new gender:");

        container.getElement(index).getRequirements().setPartnerGender(inStr.nextLine());
                                                break;
                                        case 2:
                                                System.out.println("Enter new min age:");

        container.getElement(index).getRequirements().setMinAge(inInt.nextInt());
                                                break;
                                        case 3:
                                                System.out.println("Enter new max age:");

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

        container.getElement(index).getRequirements().setPartnerHobby(partnerHobbies);
                                                break;
                                        case 5:
                                                System.out.println("Enter new gender:");
                                                partnerGender = inStr.nextLine();
                                                System.out.println("Enter new min age:");
                                                minAge = inInt.nextInt();
```

```
                                                    System.out.println("Enter new max age:");
                                                    maxAge = inInt.nextInt();
                                                    System.out.println("Enter new count of partner's hobbies:");
                                                    countPartnerHobbies = inInt.nextInt();
                                                    partnerHobbies = new String[countPartnerHobbies];
                                                    if(countPartnerHobbies != 0)
                                                    {
                                                        System.out.println("\nEnter partner's hobbies:");
                                                        for(int i = 0; i < countPartnerHobbies; i++)
                                                            partnerHobbies[i] = inStr.nextLine();
                                                    }
                                                    requirements = new PartnerRequirements(partnerGender, minAge, maxAge, partnerHobbies);

                    container.getElement(index).setRequirements(requirements);
                                                    break;
                                                default:
                                                    System.out.println("Wrong command.");
                                                    break;
                                                }
                                                break;
                                            case 6:
                                                endCheck2 = false;
                                                break;
                                            default:
                                                System.out.println("Wrong 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("Lab10.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("Lab10.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("Lab10.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("Lab10.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 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;
        }
}
```

Клас Client

```
package ua.khpi.oop.zanochkyn10;

import java.io.Serializable;
import java.util.GregorianCalendar;

public class Client implements Serializable
{
        private static final long serialVersionUID = 8633968308489911794L;

        /*
         * Змінні
         */
        private String gender;
```

```
		private int id;
		private GregorianCalendar registrationDate;
		private InfoAboutYourself information;
		private PartnerRequirements requirements;

		/*
		 * Конструктори класу
		 */
		public Client(String gender, int id, GregorianCalendar date, InfoAboutYourself info, PartnerRequirements requirements)
		{
			this.gender = gender;
			this.id = id;
			this.registrationDate = date;
			this.information = info;
			this.requirements = requirements;
		}

		public Client()
		{

		}
		/*
		 * Геттери та сеттери
		 */
		public String getClientGender()
		{
			return gender;
		}

		public void setClientGender(String gender)
		{
			this.gender = gender;
		}

		public int getId()
		{
			return id;
		}

		public void setId(int id)
		{
```

```
		this.id = id;
	}

	public GregorianCalendar getDate()
	{
		return registrationDate;
	}

	public void setDate(GregorianCalendar date)
	{
		this.registrationDate = date;
	}

	public InfoAboutYourself getInformation()
	{
		return information;
	}

	public void setInformation(InfoAboutYourself info)
	{
		this.information = info;
	}

	public PartnerRequirements getRequirements()
	{
		return requirements;
	}

	public void setRequirements(PartnerRequirements requirements)
	{
		this.requirements = requirements;
	}

	public String toString()
	{
		return "ID - " + id + "\nRegistration date - " + registrationDate.getTime() + "\nGender - "
+ gender + "\n\n" +
					"Information about yourself:\nName - " + getInformation().getName() +
"\nAge - " + getInformation().getAge() +
					"\nHeight - " + getInformation().getHeight() + "\nEye colour - " +
getInformation().getEyeColour() +
```

```
                                        "\nHobbies - " + hobbiesToString(getInformation().getClientHobby()) +
"\n\n" +
                                        "Partner requirements:\nGender - " +
getRequirements().getPartnerGender() + "\nMin age - " + getRequirements().getMinAge() +
                                        "\nMax age - " + getRequirements().getMaxAge() + "\nHobbies - " +
hobbiesToString(getRequirements().getPartnerHobby()) +
                                        "\n----------------------------------------";
                }

                public String hobbiesToString(String[] arr)
                {
                        int size = arr.length;
                        if(size == 0)
                                return "No hobbies";
                        StringBuilder sb = new StringBuilder();
                        int i = 1;
                        for(String temp : arr)
                        {
                                if(i != size)
                                        sb.append(temp + ", ");
                                else
                                        sb.append(temp);
                                i++;
                        }
                        return sb.toString();
                }
        }
```

Клас ClientList

```
        package ua.khpi.oop.zanochkyn10;

        import java.io.Serializable;
        import java.util.Comparator;
        import java.util.Iterator;
        import java.util.NoSuchElementException;

        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
 */
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
 */
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;
	}
}
```

Клас Node

```
package ua.khpi.oop.zanochkyn10;
import java.io.Serializable;
public class Node<T> implements Serializable
{
	private static final long serialVersionUID = -2673405972360871471L;
	public T element;
	public Node<T> next;
	public Node() {}
	public Node(T el)
	{
		super();
		this.element = el;
```

```
        }
}
```

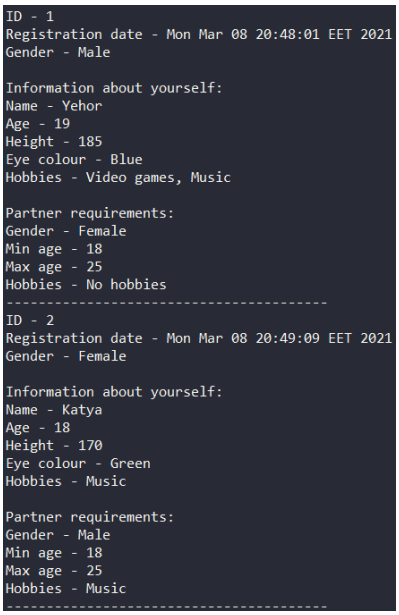
3 ВАРІАНТИ ВИКОРИСТАННЯ

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

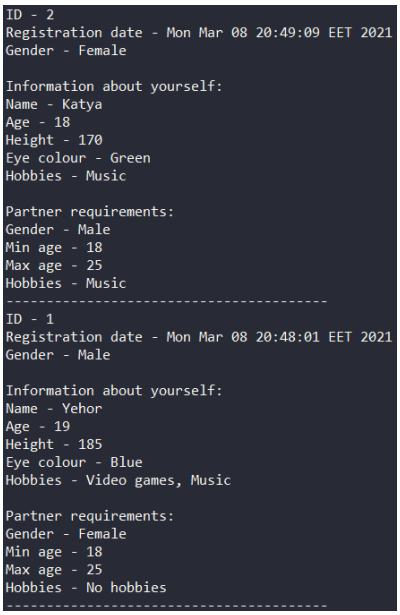
У діалоговому режимі було розроблено меню, яке дозволяє користувачу:

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. Закінчити виконання програми (0 команда меню).

4 РЕЗУЛЬТАТИ РОБОТИ ПРОГРАМИ



а)



б)

Рисунок 10.1 – Результат роботи програми (сортування) у середовищі Eclipse

Висновок

Під час виконання лабораторної роботи було набуто навички роботи з розробки параметризованих методів в середовищі Eclipse IDE.