

**МІНІСТЕРСТВО ОСВІТИ І НАУКИ УКРАЇНИ  
НАЦІОНАЛЬНОМУ УНІВЕРСИТЕТУ “ЛЬВІВСЬКА ПОЛІТЕХНІКА”**

**Кафедра систем штучного інтелекту**

**Лабораторна робота №13**  
з дисципліни  
«ООП»

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## Завдання

Паралельне виконання. Багатопоточність. Ефективність використання.

## Код програми

```
package com.pylyp.lpnu.lab13;

import java.time.Clock;
import java.time.DateTimeException;
import java.time.Instant;
import java.util.*;

public class Maiiin {
    public static void main(String[] args) {
        LinkedList<String> ls = new LinkedList<String>();
        ls.push("12");
        ls.push("53");
        ls.push("3");
        ls.push("1");
        ls.push("45");
        try {
            Instant t = Clock.systemUTC().instant();
            System.out.println("Begin time: " +t);
        }
        catch (DateTimeException ex){}

        First d = new First("First");
        d.start();

        Second second = new Second(ls,"Second");
        second.start();

        Third third = new Third(ls,"Third");
        third.start();
    }
}

package com.pylyp.lpnu.lab13;

class First extends Thread {
    Thread t;
    String name;
    First (String name) {
        this.name = name;
    }
    public void run () {
        try {
            System.out.println("The FIRST --- Thread began");
            Thread.sleep(5000);
            System.out.println("The FIRST --- Thread ended");
        }
    }
}
```

```

        catch (InterruptedException e) {
        }
    }
    public void start () {
        if (t == null) {
            t = new Thread(this, name);
            t.start();
        }
    }
}

package com.pylyp.lpnu.lab13;

import java.time.Clock;
import java.time.DateTimeException;
import java.time.Instant;
import java.util.LinkedList;
import java.util.Random;

class Second extends Thread{
    Thread two;
    LinkedList<String> list;
    String name;
    Second(LinkedList<String> ls, String name){
        list = ls;
        this.name = name;
    }
    public void run() {
        try {
            Instant t = Clock.systemUTC().instant();
            System.out.println("SECOND THREAD - time: " +t);
        } catch (DateTimeException ex)
        {
        }

        Random rand = new Random();
        for(int i = 0; i < 10; i++) {

            String k = new Integer(rand.nextInt(20) +
1).toString();
            list.push(k);

        }

        System.out.println("SECOND THREAD - add element: "+
list);
    }

    public void start() {
        if(two == null) {
            two = new Thread(this,name);

```

```

        two.start();
    }
}

```

```

package com.pylyp.lpnu.lab13;

```

```

import java.util.Collections;
import java.util.LinkedList;
import java.util.Random;

```

```

class Third extends Thread{
    Thread three;
    String name;
    LinkedList<String> list;

```

```

    Third(LinkedList<String> ls, String name){
        this.name = name;
        list = ls;
    }

```

```

    public void run() {
        list.push("Q");
        list.push("W");
        list.push("E");
        list.push("U");
        list.push("I");

```

```

        LinkedList<Integer> arr = new LinkedList<>();
        Random rand = new Random();
        for(int i = 0; i < list.size(); i++) {

            Integer k = rand.nextInt(1000);
            arr.add(k);

```

```

        }
        list.push("W");
        list.push("F");
        list.push("A");
        list.push("E");

```

```

        Integer max = Collections.max(arr);
        Integer min = Collections.min(arr);
        System.out.println("THIRD THREAD : "+arr);

```

```

        System.out.println("THIRD THREAD - max element: "+max);
        System.out.println("THIRD THREAD - min element:
"+min);
    }
    public void start() {

```

```

        if(three == null) {
            three = new Thread(this, name);
            three.start();
        }
    }
}

```

## Робота програми

```

Begin time: 2018-06-05T18:51:55.690Z
The FIRST --- Thread began
SECOND THREAD - time: 2018-06-05T18:51:55.876Z
SECOND THREAD - add element: 110, 6, 10, 14, 18, 7, 15, 6, 10, 11, 45, 1, 3, 53, 121
THIRD THREAD : 1396, 134, 511, 940, 503, 677, 213, 101, 122, 144, 864, 211, 937, 500, 325, 569, 670, 666, 863, 690]
THIRD THREAD - max element: 997
THIRD THREAD - min element: 101
The FIRST --- Thread ended

```