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Actividad 5.2 Programación paralela y concurrente

- Utilizando el lenguaje de programación indicado por tu profesor (Scheme, Racket, Clojure), escribe dos versiones de un programa que calcule la suma de todos los números primos menores a 5,000,000 (cinco millones)

  En la actividad se realizaron 5 pruebas:
    - Prueba 1 - Secuencial
        - 1 Hilo
        - Tiempo 3867 ms
    - Prueba 2
        - 3 Hilos
        - Tiempo 1156 ms
    - Prueba 3
        - 5 Hilos
        - Tiempo 978 ms
    - Prueba 4
        - 10 Hilos
        - Tiempo 711 ms
    - Prueba 5
        - 100 Hilos
        - Tiempo 715 ms

Para conseguir el speedup se realizo el calculo contemplando el tiempo final de un hilo contra el tiempo final de 3 hilos.

$$S_p = \frac{T_1}{T_p} \rightarrow \frac{3867ms}{1156ms} \rightarrow 3.334515571$$

Al final notamos que el tiempo disminuyo cuando se agregaban más hilos en el codigo, el resultado de la suma al final nos dios "838596693108". Al final del documento se encuentran las capturas de los resultados*

Liga a proyecto en Github

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MyHilo.java

```java
package com.mycompany.project01;

public class MyHilo extends Thread{

    private int id;

    private boolean flag;

    private int start;

    private int end;

    private long result;

    private boolean isPrime(int n) {

        if(n < 2) {

            return false;

        }

        else {

            boolean prime = true;

            for(int i=2; i<=Math.sqrt(n); i++) {

                if(n%i == 0) {

                    prime = false;

                    break;

                }

            }

            return prime;

        }

    }

    MyHilo(int id, boolean flag, int start, int end) {

        this.id = id;

        this.flag = flag;

        this.start = start;

        this.end = end;

        this.result = 0;

    }


    @Override

    public void run() {

        for(int i=this.start; i<this.end; i++) {

            if(isPrime(i)) {

                this.result += i;
```

```
        }

    }

}


    void detener() {

        this.flag = false;

    }

    public long getResult() {

        return this.result;

    }

}
```

Hilos.java

```java
public class Hilos extends javax.swing.JFrame {


    /**
     * Creates new form Hilos
     */
    public Hilos() {

        initComponents();

    }


    /**
     * This method is called from within the constructor to initialize the form.
     * WARNING: Do NOT modify this code. The content of this method is always
     * regenerated by the Form Editor.
     */
    @SuppressWarnings("unchecked")
    // <editor-fold defaultstate="collapsed" desc="Generated Code">//GEN-BEGIN:initComponents
    private void initComponents() {


        jButton1 = new javax.swing.JButton();

        jTextField1 = new javax.swing.JTextField();

        jLabel1 = new javax.swing.JLabel();


        setDefaultCloseOperation(javax.swing.WindowConstants.EXIT_ON_CLOSE);
```

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```java
addWindowListener(new java.awt.event.WindowAdapter() {

    public void windowClosed(java.awt.event.WindowEvent evt) {

        formWindowClosed(evt);

    }

});


jButton1.setText("Run!");

jButton1.addActionListener(new java.awt.event.ActionListener() {

    public void actionPerformed(java.awt.event.ActionEvent evt) {

        jButton1ActionPerformed(evt);

    }

});


jLabel1.setText("No. Hilos:");


javax.swing.GroupLayout layout = new javax.swing.GroupLayout(getContentPane());

getContentPane().setLayout(layout);

layout.setHorizontalGroup(

    layout.createParallelGroup(javax.swing.GroupLayout.Alignment.LEADING)

    .addComponent(jButton1, javax.swing.GroupLayout.DEFAULT_SIZE, 239, Short.MAX_VALUE)

    .addGroup(layout.createSequentialGroup()

        .addContainerGap()

        .addComponent(jLabel1, javax.swing.GroupLayout.DEFAULT_SIZE, javax.swing.GroupLayout.DEFAULT_SIZE, Short.MAX_VALUE)

        .addPreferredGap(javax.swing.LayoutStyle.ComponentPlacement.RELATED)

        .addComponent(jTextField1, javax.swing.GroupLayout.PREFERRED_SIZE, 127, javax.swing.GroupLayout.PREFERRED_SIZE)

        .addContainerGap())

);

layout.setVerticalGroup(

    layout.createParallelGroup(javax.swing.GroupLayout.Alignment.LEADING)

    .addGroup(layout.createSequentialGroup()

        .addGroup(layout.createParallelGroup(javax.swing.GroupLayout.Alignment.BASELINE)

            .addComponent(jTextField1, javax.swing.GroupLayout.PREFERRED_SIZE, javax.swing.GroupLayout.DEFAULT_SIZE,
javax.swing.GroupLayout.PREFERRED_SIZE)

            .addComponent(jLabel1))

        .addPreferredGap(javax.swing.LayoutStyle.ComponentPlacement.RELATED)

        .addComponent(jButton1, javax.swing.GroupLayout.PREFERRED_SIZE, 49, javax.swing.GroupLayout.PREFERRED_SIZE)

        .addContainerGap(javax.swing.GroupLayout.DEFAULT_SIZE, Short.MAX_VALUE))
```

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```java
        );


    pack();
}// </editor-fold>//GEN-END:initComponents



private void jButton1ActionPerformed(java.awt.event.ActionEvent evt) {//GEN-FIRST:event_jButton1ActionPerformed
    long t1 = System.currentTimeMillis();


    try {


        String s = jTextField1.getText();

        int n = Integer.parseInt(s);


        String x = String.format("HILOS: %d%n", n);

        System.out.println(x);


        int batch = 5000000/n;


        MyHilo[] hilos = new MyHilo[n];


        for(int i=0; i<n; i++) {

            hilos[i] = new MyHilo(i, true, (i*batch)+1, ((i+1)*batch)+1);

            hilos[i].start();

        }


        long result = 0;

        for(int i=0; i<n; i++) {

            try {

                hilos[i].join();

                result += hilos[i].getResult();

            }

            catch (InterruptedException ex) {

                Logger.getLogger(Hilos.class.getName()).log(Level.SEVERE, null, ex);

            }

        }

        x = String.format("RESULTADO: %d%n", result);
```

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```java
        System.out.println(x);


        long t2 = System.currentTimeMillis();

        x = String.format("TIEMPO: %d ms%n", t2 - t1);

        System.out.println(x);


    }

    catch (NumberFormatException ex) {

        Logger.getLogger(Hilos.class.getName()).log(Level.SEVERE, null, ex);

    }


}//GEN-LAST:event_jButton1ActionPerformed


private void formWindowClosed(java.awt.event.WindowEvent evt) {//GEN-FIRST:event_formWindowClosed

    System.out.println("Terminado");

}//GEN-LAST:event_formWindowClosed


/**
 * @param args the command line arguments
 */
public static void main(String args[]) {

    /* Set the Nimbus look and feel */

    //<editor-fold defaultstate="collapsed" desc=" Look and feel setting code (optional) ">

    /* If Nimbus (introduced in Java SE 6) is not available, stay with the default look and feel.

     * For details see http://download.oracle.com/javase/tutorial/uiswing/lookandfeel/plaf.html

     */

    try {

        for (javax.swing.UIManager.LookAndFeelInfo info : javax.swing.UIManager.getInstalledLookAndFeels()) {

            if ("Nimbus".equals(info.getName())) {

                javax.swing.UIManager.setLookAndFeel(info.getClassName());

                break;

            }

        }

    } catch (ClassNotFoundException ex) {

        java.util.logging.Logger.getLogger(Hilos.class.getName()).log(java.util.logging.Level.SEVERE, null, ex);

    } catch (InstantiationException ex) {

        java.util.logging.Logger.getLogger(Hilos.class.getName()).log(java.util.logging.Level.SEVERE, null, ex);
```

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```java
        } catch (IllegalAccessException ex) {

            java.util.logging.Logger.getLogger(Hilos.class.getName()).log(java.util.logging.Level.SEVERE, null, ex);

        } catch (javax.swing.UnsupportedLookAndFeelException ex) {

            java.util.logging.Logger.getLogger(Hilos.class.getName()).log(java.util.logging.Level.SEVERE, null, ex);

        }

        //</editor-fold>


        /* Create and display the form */

        java.awt.EventQueue.invokeLater(new Runnable() {

            public void run() {

                new Hilos().setVisible(true);

            }

        });

    }


    // Variables declaration - do not modify//GEN-BEGIN:variables

    private javax.swing.JButton jButton1;

    private javax.swing.JLabel jLabel1;

    private javax.swing.JTextField jTextField1;

    // End of variables declaration//GEN-END:variables

}
```
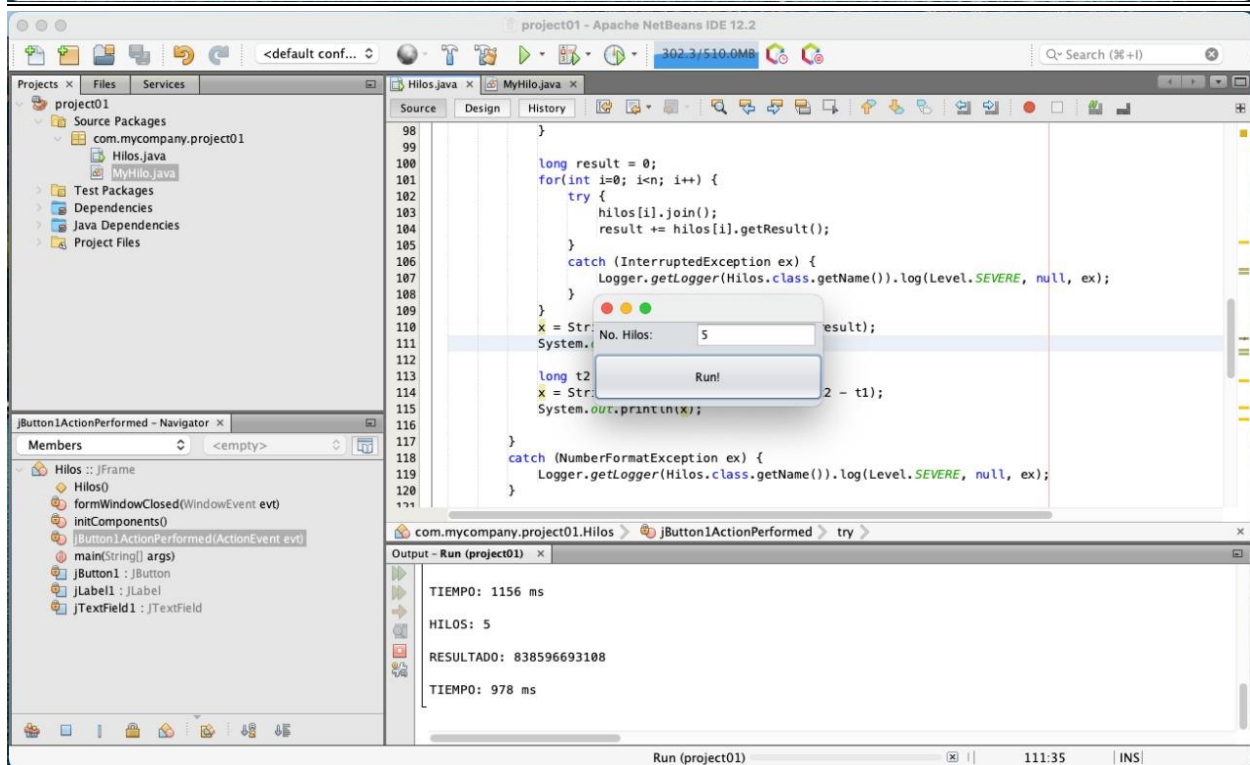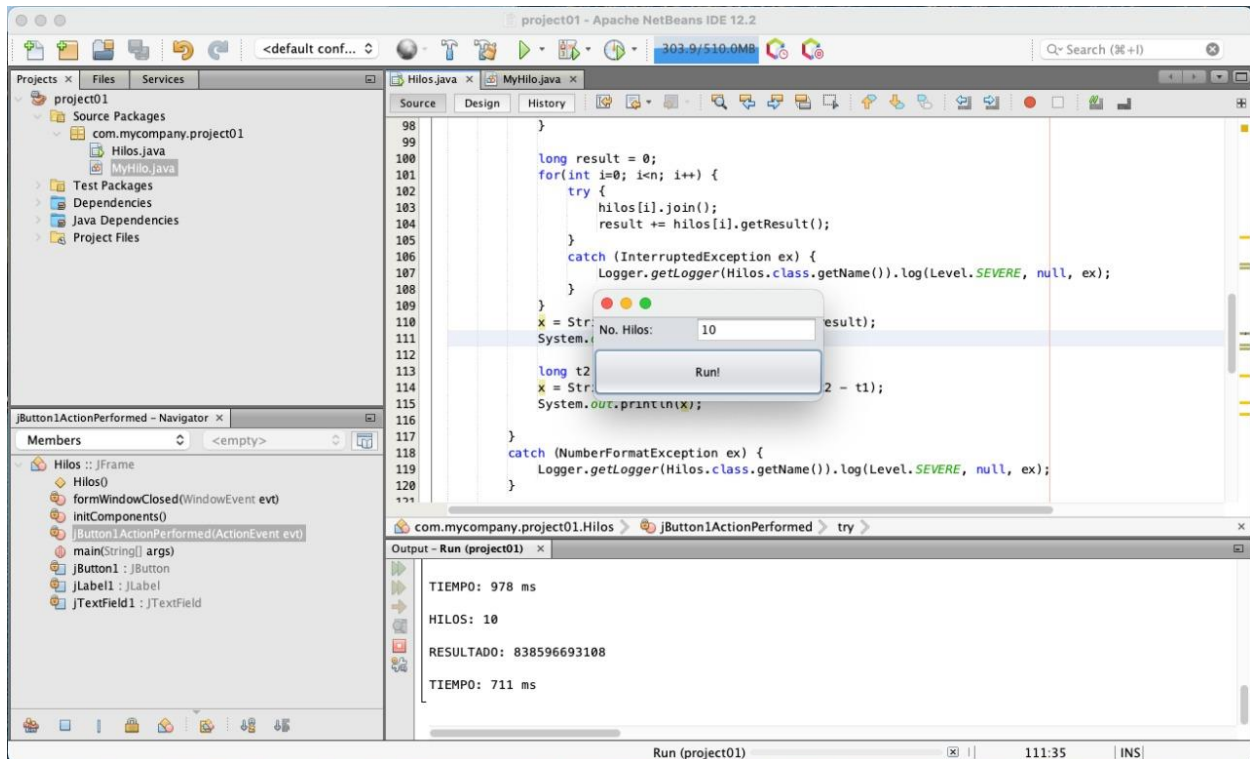
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Capturas

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