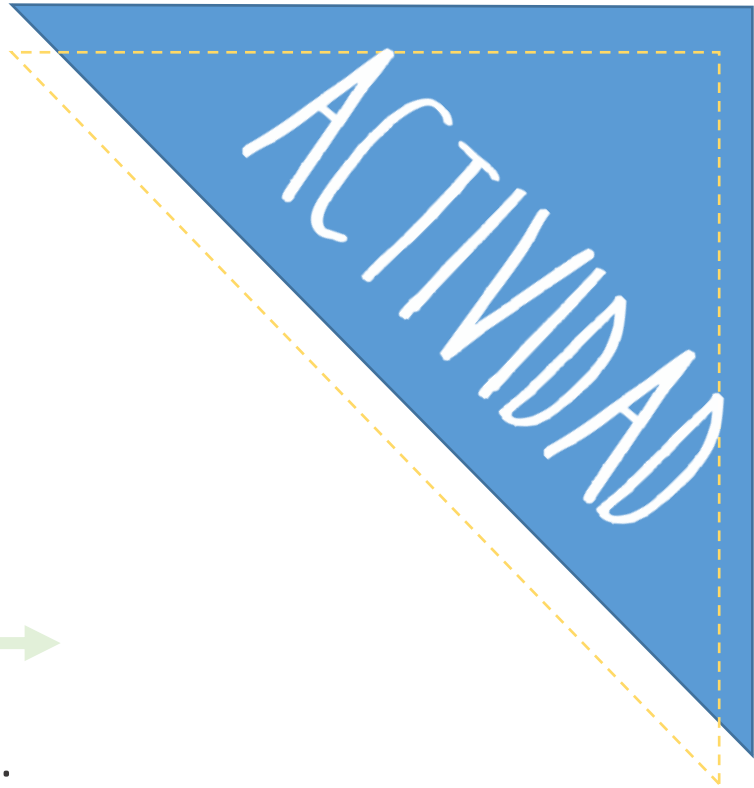

Dosier de Actividades del Tema 4:
Servicios en red

Desarrollo de Aplicaciones Multiplataforma

Programación de Servicios y Procesos

Linkia FP

Ejercicio 1:

Se desea programar un servidor de cálculos matemáticos utilizando la arquitectura RMI. Las funciones que deberán implementarse son:

- Conversión de un número a binario.
- Calcular si un número es primo.
- Calcular el factorial de un número.
- Calcular la suma de 1 hasta el número introducido.
- Calcular los divisores de un determinado número.

El proceso será el siguiente:

- El cliente introducirá un número
- Escogeremos la operación a realizar.
- El cliente que utilizará objetos remotos visualizará el resultado.

El cliente debe enviar números hasta que finalice el proceso con la palabra E. Para obtener la máxima nota deberemos que todos los datos sean correctos.

Ejemplo de funcionamiento del ServidorRMI

```
H:\Mi unidad\java\act2324>java NumerosServer
-- Operaciones en linea --
```

Ejemplo de funcionamiento del Cliente RMI

```
H:\Mi unidad\java\act2324>java NumerosCliente
Escribe la operacion a realizar (B)inario, (P)rimo, (F)actorial, (S)uma, (D)ivisores, (E)nd: B
Escribe la cantidad en decimal: 12
El numero decimal 12 en binario es 1100
Escribe la operacion a realizar (B)inario, (P)rimo, (F)actorial, (S)uma, (D)ivisores, (E)nd: P
Escribe la cantidad en decimal: 13
El numero 13 es primo
Escribe la operacion a realizar (B)inario, (P)rimo, (F)actorial, (S)uma, (D)ivisores, (E)nd: P
Escribe la cantidad en decimal: 14
El numero 14 no es primo
Escribe la operacion a realizar (B)inario, (P)rimo, (F)actorial, (S)uma, (D)ivisores, (E)nd: F
Escribe la cantidad en decimal: 12
El factorial de 12 es 479001600
Escribe la operacion a realizar (B)inario, (P)rimo, (F)actorial, (S)uma, (D)ivisores, (E)nd: S
Escribe la cantidad en decimal: 8
La suma de 1 hasta el 8 es 36
Escribe la operacion a realizar (B)inario, (P)rimo, (F)actorial, (S)uma, (D)ivisores, (E)nd: D
Escribe la cantidad en decimal: 12
Los divisores son 1 2 3 4 6 12
Escribe la operacion a realizar (B)inario, (P)rimo, (F)actorial, (S)uma, (D)ivisores, (E)nd:
```

Código Servidor

```
import java.rmi.registry.Registry;
import java.rmi.server.UnicastRemoteObject;

import static java.rmi.registry.LocateRegistry.createRegistry;

public class Server {
    public static void main(String[] args) {
        try {
            ICalculator calculator = new CalculatorImpl();
            ICalculator stub = (ICalculator)
UnicastRemoteObject.exportObject(calculator, 8069);
            Registry registry = createRegistry(8069);
            registry.rebind("Calculator", stub);
            System.err.println("Server online!");
        } catch (Exception e) {
            System.err.println("Server error: " + e);
            e.printStackTrace();
        }
    }
}
```

Código Cliente

```
import java.io.BufferedReader;
import java.io.IOException;
import java.io.InputStreamReader;
import java.nio.charset.StandardCharsets;
import java.rmi.NotBoundException;
import java.rmi.registry.LocateRegistry;
import java.rmi.registry.Registry;

public class Client {
    private static BufferedReader userReader;
    public static void main(String[] args) {
        try {
            Registry registry = LocateRegistry.getRegistry("localhost", 8069);
            ICalculator calculator = (ICalculator) registry.lookup("Calculator");
            userReader = new BufferedReader(new InputStreamReader(System.in,
StandardCharsets.UTF_8));
            String action;
            do {
                System.out.print(calculator.getMenu());
                System.out.print("\nYour selection: ");
                switch ((action = userReader.readLine().toUpperCase())) {
                    case "B":
System.out.println(calculator.getIntToBin(askForInteger()));
                        break;
                    case "P":
System.out.println(calculator.getIntIsPrimeOrOdd(askForInteger()));
                        break;
                    case "F":
System.out.println(calculator.getIntToFactorial(askForInteger()));
                        break;
                    case "S":
System.out.println(calculator.getIntSumStartingBy1(askForInteger()));
                        break;
                    case "D":
System.out.println(calculator.getIntAllPossibleDivisors(askForInteger()));
                        break;
                    case "E": System.out.println("Bye!");
                        break;
                    default: System.out.println("Error. That's not an available
action.");
                        break;
                }

            } while(!action.equals("E"));
        } catch (NotBoundException | IOException e) {
```

```
            throw new RuntimeException(e);
        }
    }

    private static int askForInteger() throws IOException {
        System.out.println("Perfect, give me an integer.");
        Integer userInt;
        do {
            System.out.print("Your answer: ");
            try {
                userInt = Integer.parseInt(userReader.readLine());
            } catch (NumberFormatException e) {
                System.out.println("Error. You've not introduced an integer!");
                userInt = null;
            }
        }
        while(userInt == null);
        return userInt;
    }
}
```

Código Interfaz

```
import java.rmi.Remote;
import java.rmi.RemoteException;

public interface ICalculator extends Remote {
    String getMenu() throws RemoteException;
    String getIntToBin(int num) throws RemoteException;
    String getIntIsPrimeOrOdd(int num) throws RemoteException;
    String getIntToFactorial(int num) throws RemoteException;
    String getIntSumStartingBy1(int num) throws RemoteException;
    String getIntAllPossibleDivisors(int num) throws RemoteException;
}
```

```
import java.rmi.RemoteException;

public class CalculatorImpl implements ICalculator {    @Override
    public String getMenu() throws RemoteException {
        return  "\nChoose the operation to perform:"+
                "\n (B)inary    - Convert the given integer number to binary"+
                "\n (P)rime     - Assert if the given integer is prime or odd"+
                "\n (F)actorial - Calculate the factorial of the given integer"+
                "\n (S)um       - Calculates the result of the sum among all the
numbers between 1 and the given integer"+
                "\n (D)ivisors  - Get all possible divisors from 1 to the given
integer"+
                "\n (E)nd       - Closes the connection with the server"
                ;
    }

    @Override
    public String getIntToBin(int num) throws RemoteException {
        return " -> The integer "+num+" in binary equals to
"+Integer.toBinaryString(num);
    }

    @Override
    public String getIntIsPrimeOrOdd(int num) throws RemoteException {
        return " -> The integer "+num+" is an "+(num % 2 == 0 ? "odd" : "prime"
)+" number";
    }

    @Override
    public String getIntToFactorial(int num) throws RemoteException {
        int factorial = 1;
        for (int i = 1; i <= num; i++) factorial *= i;
        return " -> The factorial of the integer "+num+" is "+factorial;
    }

    @Override
    public String getIntSumStartingBy1(int num) throws RemoteException {
        int accumulated = 0;
        for (int i = 1; i <= num; i++) accumulated += i;
        return " -> The result of the sum of all the numbers between 1 and "+num+"
is "+accumulated;
    }

    @Override
    public String getIntAllPossibleDivisors(int num) throws RemoteException {
```

```
        String result = " -> All possible divisors of the integer are:";
        for (int i = 1; i <= num; i++) if(num % i == 0) result += " "+i;
        return result;
    }
}
```

Capturas Funcionamiento

Esto es lo unico que muestro a traves del servidor

```
C:\Users\Joel\.jdks\openjdk-21.0.1\bin\java.exe "-javaagent:C:\Program Files\JetBrains\IntelliJ IDEA Communi
Server online!
```

Conversion binario

```
Choose the operation to perform:
 (B)inary    - Convert the given integer number to binary
 (P)rime     - Assert if the given integer is prime or odd
 (F)actorial - Calculate the factorial of the given integer
 (S)um       - Calculates the result of the sum among all the numbers between 1 and the given integer
 (D)ivisors  - Get all possible divisors from 1 to the given integer
 (E)nd       - Closes the connection with the server
Your selection: b
Perfect, give me an integer.
Your answer: 12
 -> The integer 12 in binary equals to 1100
```

Comprobar numero primo

```
Choose the operation to perform:
 (B)inary    - Convert the given integer number to binary
 (P)rime     - Assert if the given integer is prime or odd
 (F)actorial - Calculate the factorial of the given integer
 (S)um       - Calculates the result of the sum among all the numbers between 1 and the given integer
 (D)ivisors  - Get all possible divisors from 1 to the given integer
 (E)nd       - Closes the connection with the server
Your selection: p
Perfect, give me an integer.
Your answer: 13
 -> The integer 13 is an prime number
```

```
Choose the operation to perform:
 (B)inary    - Convert the given integer number to binary
 (P)rime     - Assert if the given integer is prime or odd
 (F)actorial - Calculate the factorial of the given integer
 (S)um       - Calculates the result of the sum among all the numbers between 1 and the given integer
 (D)ivisors  - Get all possible divisors from 1 to the given integer
 (E)nd       - Closes the connection with the server
Your selection: p
Perfect, give me an integer.
Your answer: 12
 -> The integer 12 is an odd number
```

Calcular factorial

```
Choose the operation to perform:
 (B)inary    - Convert the given integer number to binary
 (P)rime     - Assert if the given integer is prime or odd
 (F)actorial - Calculate the factorial of the given integer
 (S)um       - Calculates the result of the sum among all the numbers between 1 and the given integer
 (D)ivisors  - Get all possible divisors from 1 to the given integer
 (E)nd       - Closes the connection with the server
Your selection: f
Perfect, give me an integer.
Your answer: 12
 -> The factorial of the integer 12 is 479001600
```

Calcular el acarreo desde 1

```
Choose the operation to perform:
 (B)inary    - Convert the given integer number to binary
 (P)rime     - Assert if the given integer is prime or odd
 (F)actorial - Calculate the factorial of the given integer
 (S)um       - Calculates the result of the sum among all the numbers between 1 and the given integer
 (D)ivisors  - Get all possible divisors from 1 to the given integer
 (E)nd       - Closes the connection with the server
Your selection: s
Perfect, give me an integer.
Your answer: 8
 -> The result of the sum of all the numbers between 1 and 8 is 36
```

Calcular divisores

```
Choose the operation to perform:
 (B)inary    - Convert the given integer number to binary
 (P)rime     - Assert if the given integer is prime or odd
 (F)actorial - Calculate the factorial of the given integer
 (S)um       - Calculates the result of the sum among all the numbers between 1 and the given integer
 (D)ivisors  - Get all possible divisors from 1 to the given integer
 (E)nd       - Closes the connection with the server
Your selection: d
Perfect, give me an integer.
Your answer: 12
 -> All possible divisors of the integer are: 1 2 3 4 6 12
```

Cerrar conexion con el server

```
Choose the operation to perform:
 (B)inary    - Convert the given integer number to binary
 (P)rime     - Assert if the given integer is prime or odd
 (F)actorial - Calculate the factorial of the given integer
 (S)um       - Calculates the result of the sum among all the numbers between 1 and the given integer
 (D)ivisors  - Get all possible divisors from 1 to the given integer
 (E)nd       - Closes the connection with the server
Your selection: e
Bye!

Process finished with exit code 0
```

Formato de entrega.

Un archivo comprimido (en formato zip o rar) con el siguiente contenido:

- Archivos .java y jar de los diferentes ejercicios.
- Un documento en formato pdf con las capturas del código y una prueba de funcionamiento de cada actividad.