AY: 2023-2024
EXAM | **ECUE0412**
June 2024

L2-S4: Dept. of Electrical Engineering
Teacher: A. Mhamdi
Time Limit: 1½ h

This document contains **6** pages numbered from **1/6** to **6/6**. As soon as it is handed over to you, make sure it is complete. The **3** tasks are independent and can be treated in the order that suits you.

The following rules apply:

❶ **No document** is allowed in the examination room.

❷ **Any electronic material**, except basic calculator, is prohibited.

❸ **Mysterious or unsupported answers** will not receive full credit.

❹ **Round results** to the nearest thousandth *(i.e., third digit after the decimal point)*.

❺ **Task N°3:** Each correct answer will grant a mark with no negative scoring.

Task N°1

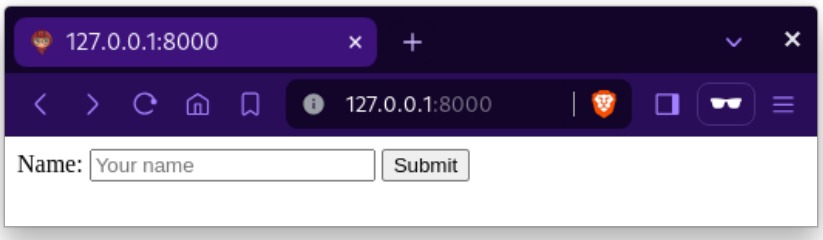
⌛ 45mn | (6 points)

We provide the following code for reference.

```
using Genie, Genie.Renderer.Html, Genie.Requests
Genie.Generator.newapp("myapp") # Create a new Genie app
form = """
   <form action="/greet" method="POST">
      <label for="name">Name: </label>
      <input type="text" id="name" name="name" placeholder="Your name">
      <input type="submit" value="Submit">
   </form>
"""
route("/") do
   html(form)
end
route("/greet", method=POST) do
   name = params(:name)
   greeting = "Hello, \$(name)!"
   html(greeting)
end

Genie.Server.up() # Run the app
```

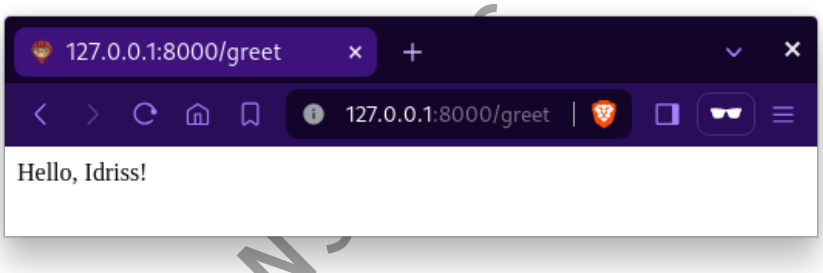
(a) (2 points) Draw a sketch of the app. Let's say the web server is starting at `http://127.0.0.1:8000`



(b) (1 point) What happens when the user submits the form in the given code?

The form data is sent to the server using a POST request.

(c) (2 points) Draw the webpage redirected by the app, if we fill in the `Name` field by the text `Idriss`. *(Indicate the full URL at the top of your page)*



(d) (1 point) Describe succinctly the overall goal of the app.

This app allows a user to enter their name in a form, submits it, and then displays a greeting message with their name. The app uses the Genie framework to handle HTTP requests and render HTML responses.

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L2-S4: Dept. of Electrical Engineering	ID: ....
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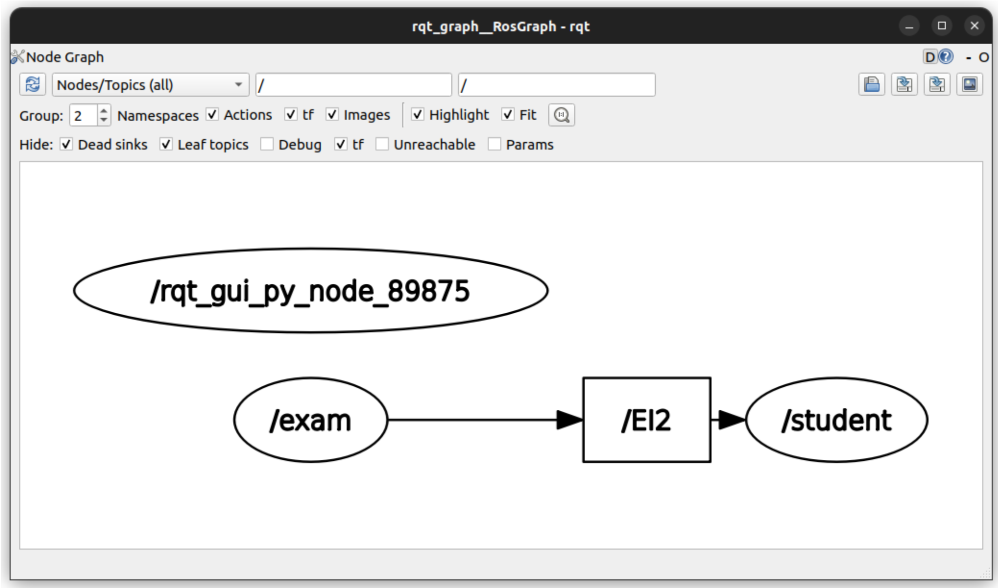
Teacher: A. Mhamdi	Time Limit: $1\frac{1}{2}$ h

ANSWER SHEET

Task N°2 ⌛ 15mn | (4 points)

Given the `rqt_graph` as in the image below, complete the code snippets hereafter in each case.



(a) (2 points) `publisher` sample code

```
#= PUBLISHER =#
node = rclpy.create_node("exam")
pub = node.create_publisher(str.String, "EI2", 10)
```

(b) (2 points) `subscriber` sample code.

```
#= SUBSCRIBER =#
node = rclpy.create_node("student")
sub = node.create_subscription(str.String, "EI2", callback, 10)
```

DO NOT WRITE ANYTHING HERE

✂----------

Task N°3 ⏳ 30mn | (10 points)

(a) (½ point) What is Julia?

√ A programming language

◯ A text editor

◯ A version control system

◯ A database management system

(b) (½ point) Which of the following is a key feature of Julia?

◯ Static typing

◯ Dynamic typing

◯ Automatic memory management

√ All of the above.

(c) (½ point) What is the output of the following code?

```
x, y = 4, 1
z = x/y
print(z, ' ', typeof(z))
```

◯ 4Int64 ◯ 4 Int64 ◯ 4.0Float64 √ 4.0 Float64

(d) (½ point) Which package manager is used in Julia for installing and managing packages?

◯ pip √ Pkg ◯ npm ◯ conda

(e) (½ point) What is the REPL in Julia?

◯ A programming language

◯ A text editor

√ A Read-Eval-Print Loop

◯ A package manager

(f) (½ point) Julia supports multiple dispatch. What does this mean?

◯ Julia does not support function dispatch

◯ Julia can dispatch functions based on the number of arguments

◯ Julia can dispatch functions based on the types of arguments

√ Julia can dispatch functions based on both the number and types of arguments

DO NOT WRITE ANYTHING HERE

✂----------

(g) (½ point) In Julia, how to concatenate the two strings: `str1` and `str2`.

√ `str1 * str2` ◯ `str1 + str2` ◯ `str1 & str2` ◯ `str1, str2`

(h) (½ point) What will be printed by the following code snippet?

```
x, y = true, Bool(0)
print(x == 1, ", ", y == 0)
```

◯ false, false ◯ false, true ◯ true, false √ true, true

(i) (½ point) The output variable `result` in the code below is "1.0".

```
result = -1. |> (x -> x+2) |> (x -> x^2) |> println
```

(j) (½ point) How can we repeat a string multiple times in Julia?

◯ Use the + operator

◯ Use the * operator

√ Use the ^ operator

◯ We can't

(k) (½ point) What is the output of the following code?

```
x = 10; str = "The number is $x"; print(str)
```

◯ The number is x

◯ The number is $x

√ The number is 10

(l) (½ point) The value displayed is "128.0".

```
add_five(x) = x + 5
square(x) = x^2
double(x) = 2x
result = 3. |> add_five |> square |> double
```

(m) (½ point) What is Git?

◯ A programming language

◯ A text editor

√ A version control system

◯ A database management system

(n) (½ point) Which function can be used to get the imaginary part of a complex number?

◯ `real()` √ `imag()` ◯ `conj()` ◯ `complex()`

DO NOT WRITE ANYTHING HERE

✂----------

(o) (½ point) What is the index number of the last element in the string "$\alpha\Sigma\beta\Delta$".

◯ 3 √ 4 ◯ Strings cannot contain Unicode.

(p) (½ point) What is the type of the variable `z` in `z = 5//7`?

◯ `Int64` ◯ `Float64` √ `RationalInt64` ◯ `ComplexInt64`

(q) (1½ points) What will be the output of the `greet` function after each call.

```julia
function greet(name::String)
    println("Hello, $(name)!")
end

function greet(age::Int)
    println("Hey, you're $age years old!")
end

function greet(x::Float64, y::Float64)
    println("You are at this location ($x, $y)!")
end

greet("Hamdi"); greet(21); greet(37.2348478, 9.8854808)
```


The code snippet given before demonstrates multiple dispatch and function overloading in Julia

```
Hello, Hamdi!
Hey, you're 21 years old!
You are at this location (37.2348478, 9.8854808)!
```

(r) (½ point) Which of the following is true about Julia's performance?

√ Julia is faster than Python.

◯ Julia is slower than Python.

◯ Julia has similar performance to Python.

◯ Julia's performance depends on the specific use case.