

Computer Networks

Season 2024-III

Workshop No. 2 — Sockets and Services

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You made a good job in packet tracer. So, it means you understand how to use the tool and how to setup a simple network using concepts as *IP Addressing*, *Cables*, *Routing*, and *Services*. Now, you are going to learn about *Sockets* and *Services*, so you should start on your first workshop work and add a couple of things.

The main goal of this workshop is to use sockets and determine how OSI model works here:

1. You are the new computer engineer at *Universidad Distrital Francisco José de Caldas*. You need to increase your *backend* network services. As follows some indications about it.
2. Create a new server. This server should have the following characteristics:
 - (a) Has been recognized by the name **BackendPython**.
 - (b) Has a *public static IP address*, and a default gateway. In this sense, next values should be used:
 - IPv4 Address: 193.168.100.201
 - Default Gateway: 193.168.100.1
 - Subnet Mask: 255.255.255.0
 - (c) In the *Programming* section add a new **Project** with the name of your preference, but it must be **Template: Empty — Python**. In the `main.py` file add the following code:

```
"""
```

```
This is a simple example of a web service for Python into PacketTracer.
```

```
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```

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Any comment or concern related to this document could be send to Carlos A. Sierra at e-mail: *cavirguezs@udistrital.edu.co*

```

"""

from http import *
from time import *

def on_route_networks(url: str, response):
    """
    This function is called when the URL is /healthcheck.

    Args:
        url (str): The URL of the request.
        response (HTTPResponse): The response object to send data to the client.
    """
    print("Test Services")
    response.send("This is a verification about python services.")

def main():
    """This is the main function of the program."""
    HTTPServer.route("/healthcheck", on_route_networks)
    # start server on port 80
    print(HTTPServer.start(80))
    # don't let it finish
    while True:
        sleep(3600)

if __name__ == "__main__":
    main()

```

3. Create another new server. This server should have the following characteristics:

- (a) Has been recognized by the name **BackendJavaScript**.
- (b) Has a *public static IP address*, and a default gateway. In this sense, next values should be used:
 - IPv4 Address: 193.168.100.202
 - Default Gateway: 193.168.100.1
 - Subnet Mask: 255.255.255.0
- (c) In the *Programming* section add a new **Project** with the name of your preference, but it must be **Template: Empty — Javascript**. In the `main.js` file add the following code:

```

/*
This is a simple example of a web service for Python into PacketTracer.

```

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```

*/

function setup() {
  HTTPServer.route("/healthcheck", function(url, res) {
    Serial.println("Test services");
    res.setContentType("text/plain");
    res.send("This is a verification about javascript services");
  });

  // start server on port 80
  HTTPServer.start(80);
}

```

4. The frontend server, same you build next with, should change a little bit. Be creative, improve the *Look & Feel*, even you could create better services. It is part of your work too.

- (a) You could use next *HTML* code in a `index.html` file to create a simple web page:

```

<html>
  <head>
    <title>Workshop 4 - Networks</title>
    <meta charset="UTF-8">
    <meta name="description" content="This is a simple example to explore OSI L
    <link rel="stylesheet" type="text/css" href="styles.css">
    <script src="functions.js"></script>
  </head>
  <body>
    <h1>Workshop 4 - Networks</h1>
    <h2>OSI Layers</h2>
    <p>Click on the buttons to explore services on the network</p>
    <div>
      <button onclick="callPython()">Python Message</button>
      <button onclick="callJavaScript()">JavaScript Message</button>
    </div>
    <div id="result"></div>
  </body>
</html>

```

- (b) You could use next *CSS* code in a `styles.css` file to create a simple style for the web page:

```

body {
  font-family: "Arial", sans-serif;
  font-size: 16px;
}

```

```
}

h1 {
  color: #ea0909;
  font-size: 24px;
  margin-bottom: 20px;
}

h2 {
  color: #333;
  font-size: 20px;
  margin-bottom: 10px;
}

button {
  background-color: #e6ea09;
  color: rgba(215, 21, 21, 0.697);
  border: none;
  padding: 10px 20px;
  font-size: 16px;
  cursor: pointer;
  border-radius: 10px;
}

.result {
  margin-top: 20px;
  padding: 10px;
  border: 1px solid #333;
  border-radius: 10px;
}
```

- (c) You could use next *JavaScript* code in a `functions.js` file to create a simple style for the web page:

```
function callPython() {
  fetch('http://193.168.100.201/healthcheck')
    .then(response => response.text())
    .then(data => {
      const resultDiv = document.getElementById('result');
      resultDiv.innerText = data;
    })
    .catch(error => {
      console.error('Error:', error);
    });
}
```

```
function callJavaScript() {  
    fetch('http://193.168.100.202/healthcheck')  
    .then(response => response.text())  
    .then(data => {  
        const resultDiv = document.getElementById('result');  
        resultDiv.innerText = data;  
    })  
    .catch(error => {  
        console.error('Error:', error);  
    });  
}
```

To test the network, you need to access to a web browser in the **StudentLaptop** and type the URL `www.udistrital.edu.co`. Same test should be done in the **WorkerPC**.

The output should be the *university home page* you created into the server with the *buttons* to call the web services

As final result of this workshop you should deliver a *PDF* file with a screenshot of the network, the decisions you make to build the networks, and you analysis using *Simulation* option in *PacketTracer* to validate how the network works across the *OSI Model*.

Bonus: Create a VLAN where servers *BackendPython* and *BackendJavaScript* are accessible just for *FrontEnd Server*, but not from laptop or pc on the other side of the network.

Deadline: **Monday, Februry 3, 2025, 8:00 PM.**