جامعة بيرزيت
BIRZEIT UNIVERSITY

Department of Electrical and Computer Engineering

ENCS3320-Computer Networks

Project#1 due 6/1/2023

1- **This is a group project, so you are allowed to work in groups of max 3 students**
2- **Do not use libraries to implement the project. Use socket programming**
3- **Important: Each screenshot should include the date and time of your computer.**

You have to submit

1- **A report in pdf format (only pdf format) on moodle (itc.birzeit.edu) that contains Screenshots** with **detailed explanation, codes, runs, etc.**
2- The code with comments (include the code in the pdf file and as text file .py or .java or .c as well)
3- You are allowed to send compressed file (e.g., .zip). But you have to send the report as pdf file separately.

Part1:

1- In your own words, what are ping, tracert, nslookup (write one sentence for each one)
2- Make sure that your computer is connected to the internet and then run the following commands:
   1- Ping a device in the same network, e.g. from a laptop to a smartphone
   2- ping www.yale.edu
   3- tracert www.yale.edu
   4- nslookup www.yale.edu

Provide a screenshot of the runs and brief explanation of the output.

Part2:

Implement the following server and client application both for TCP and for UDP: A client continuously sends the numbers from 0 to 1000,000 to a server listening on port 5566. The server counts the received messages.

Run the programs

1- on same computer
2- on 2 different computers connected by a cable directly or through a switch
3- on 2 different computers connected through WiFi

For each run, provide screenshots of the run and provide how many packets have been received. Also measure the time required to send the packets and the time required to receive the packets (from first packet to last packet).

When using different computers, make sure that the computers are within the same subnet for example, the IP of the first computer is 192.168.1.10, subnet mask 255.255.255.0 and the IP of the second computer is 192.168.1.11 and the subnet mask 255.255.255.0

Part3:

Using socket programming, implement a simple but a complete web server in go, python, java or C that is listening on port 7788. The user types in the browser something like http://localhost:7788/ar or http://localhost:7788/en

The program should check

1- if the request is **/ or /index.html or /main_en.html or /en (for example localhost:7788/ or localhost:7788/en)** then the server should send main_en.html file with Content-Type: text/html.

The main_en.html file should contain

HTML webpage that contains

a. "ENCS3320-My First Webserver" in the title
b. "Welcome to our course **Computer Networks"** **(**part of the phrase is in **Blue)**
c. Group members names and IDs
d. Some information about the group members. For instance, projects you have done during different course (programming, electrical, math, etc), skills, hobbies, etc.
e. Use CSS to make the page looks nice
f. Divide the page in different boxes and put student's information in the different boxes
g. Include CSS as a separate file
h. An image with extention.jpg and an image with extension .png
i. A link to a local html file (an html file)
j. a link to https://www.w3schools.com/python/gloss_python_multi_line_strings.asp

2- If the request is /ar then the server response with main_ar.html which is an Arabic version of main_en.html
3- if the request is an .**html** file then the server should send the requested html file with Content-Type: text/html. You can use any html file.
4-
5- if the request is a **.css** file then the server should send the requested css file with Content-Type: text/css. You can use any CSS file
6-
7- if the request is a **.png** then the server should send the png image with Content-Type: image/png. You can use any image.
8- if the request is a **.jpg** then the server should send the jpg image with Content-Type: image/jpeg. You can use any image.
9- Use the status code 307 Temporary Redirect to redirect the following
   a. If the request is /go then redirect to google website
   b. If the request is /so then redirect to stackoverflow.com website
   c. If the request is /bzu then redirect to birzeit university website

10- If the request is wrong or the file doesn’t exist the server should return a simple HTML webpage that contains (Content-Type: text/html)

1- “HTTP/1.1 404 Not Found” in the response status
2- “Error” in the title
3- “The file is not found” in the body in **red**
4- Your names and IDs in **Bold**
5- The IP and port number of the client

11- The program should print the HTTP requests on the terminal window (command line window).

Provide screenshots of the browser to show that your project works as expected. **(/main_en.html /imagename.png, /go, etc.)** . Test the project from a browser on the **same computer** and from **a different computer or phone**.

Provide also a screenshot of the HTTP request printed on the command line.

Hint: Have a look on HTTP response in Listing 1 and the HTML code In Listing 2. You may use the minimal header and HTML code. Have a look also on rfc2616 (https://tools.ietf.org/html/rfc2616)

```
HTTP/1.1 200 OK
Connection: close
Date: Fri, 03 Mar 2017 06:19:37 GMT
Server: Apache/2.4.6 (CentOS) OpenSSL/1.0.1e-fips PHP/5.4.16
Last-Modified: Fri, 03 Mar 2017 05:28:07 GMT
Content-Length: 6821
Content-Type: text/html
data data data data data ...
```

Listing 1: HTTP Response

```
<!DOCTYPE html>
<html>
<head><title >XYZ Company INC.</ title ></head>
<body><h1>Welcome <b>XYZ</b> Company</h1>
<img src="http:www. xyz.com/ images / logo.gif " ALT="XYZ Logo"><br>
We are so happy that you have chosen to visit our website.
</body>
</html>
```

Listing 2: Simple HTML Code