Faculty of Engineering & Technology
Electrical & Computer Engineering Department

ENCS 3320 - Computer Networks

Report1 – Project 1

"**Socket Programming**"

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Abstract

This project consists of two parts. The first part is to run some commands on the terminal; ping a device in the same network, ping YouTube website, tracert and nslookup it. The second part is to implement a simple but a complete web server in python that is listening on port 900. Both html and css are used for the design of our website.

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Part1: Running Commands

1- Ping a device in the same network.

Ping is a command that can be used to troubleshoot network issues, such as network connectivity. The Ping utility uses the echo request, and echo reply messages within the Internet Control Message Protocol (ICMP). It sends 4 requests by default in Windows, it also contains information such as the bytes sent and received, time to live (TTL), how long the response took to receive, and statistics about packet loss and round trip times. Figure below shows pinging a host with received response from 192.168.1.65 with some information, different delays but an average round trip times of 125ms.

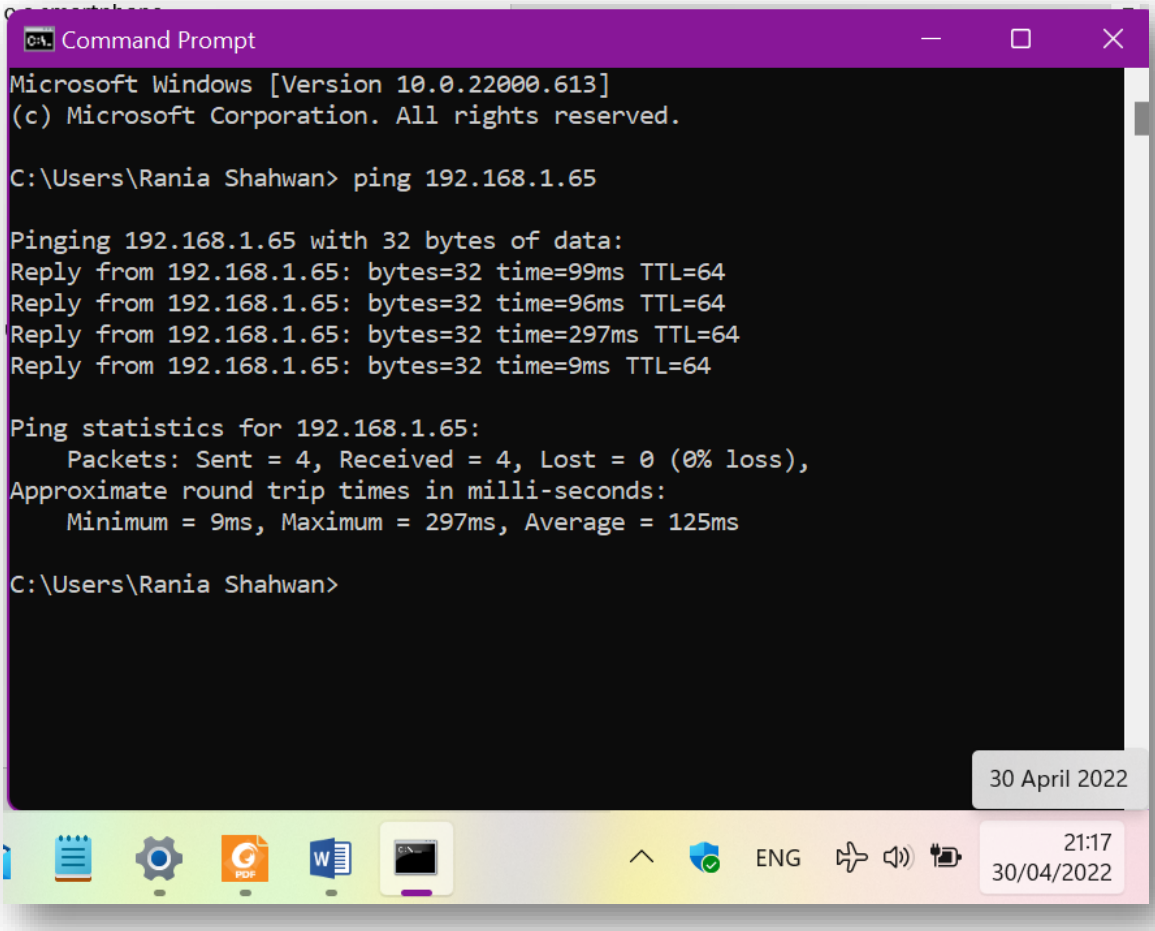

Figure 1: Ping a host

2- Ping www.youtube.com

Pinging a website is actually pinging the domain name and not its' IP address. Because also name resolution issues related to DNS is tested, as the IP address is not memorized. Here a successful reply from www.youtube.com is received, so the device is connected to the internet, and all hardware such as cables, the network card, the router and the modem are all working correctly, including the internet service provider. Four packets response were reived from 172.217.16.142 with their TTL, 75ms delay so also an average of 75ms.

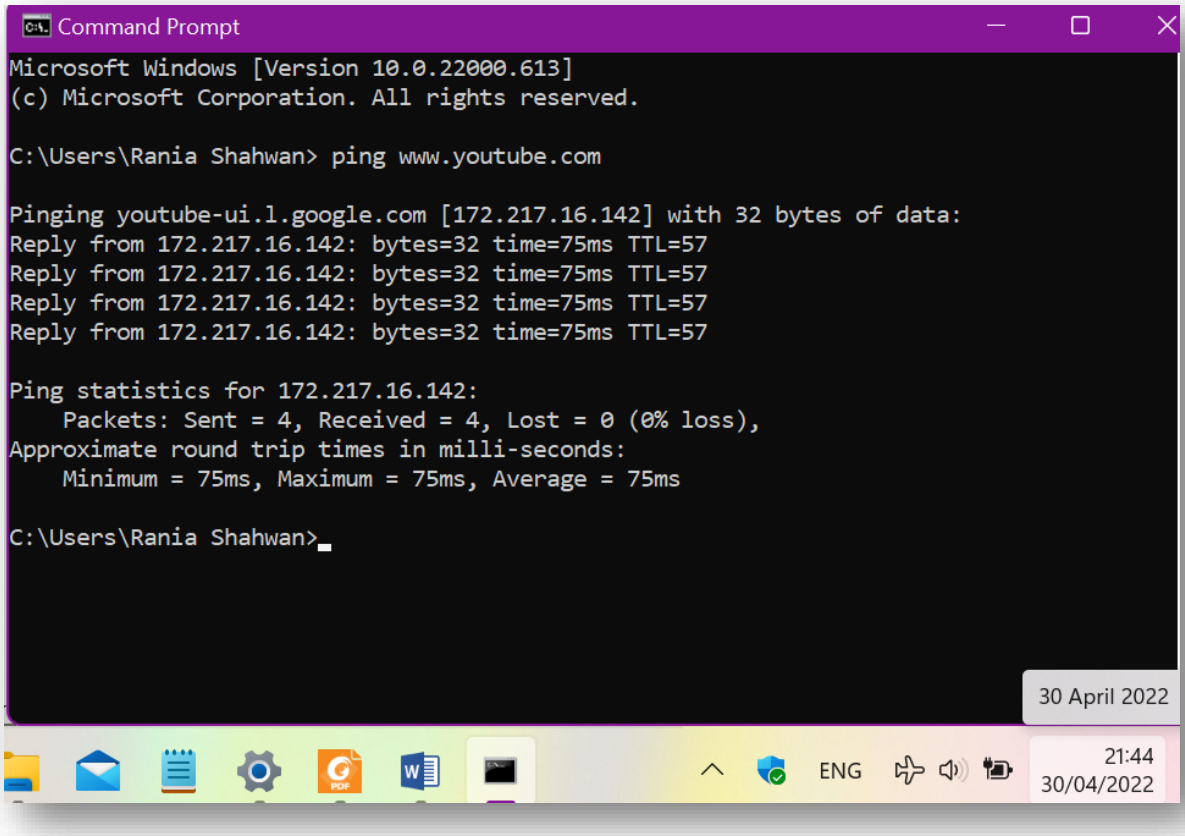

Figure 2: Ping a website (yoututbe)

3- Traceroute www.youtube.com

Traceroute command (tracert) is a utility designed can be used for troubleshooting of connection issue, displays the time it takes for a packet of information to travel between a local device and a destination of IP address or domain. After performing this command for www.youtube.com, the results displayed are the hops that data packets take along their path to destination desired. When the measurements are stars (*) in request timed out and indicates that the router at that hop doesn't respond to the traceroute requests.

The response structure is Hop RTT1 RTT2 RTT3 Name [IP Address].

Where hop number is the path from sender to receiver, and round trip time (RTT) time it takes for a packet to get to a hop and back, in milliseconds (ms).

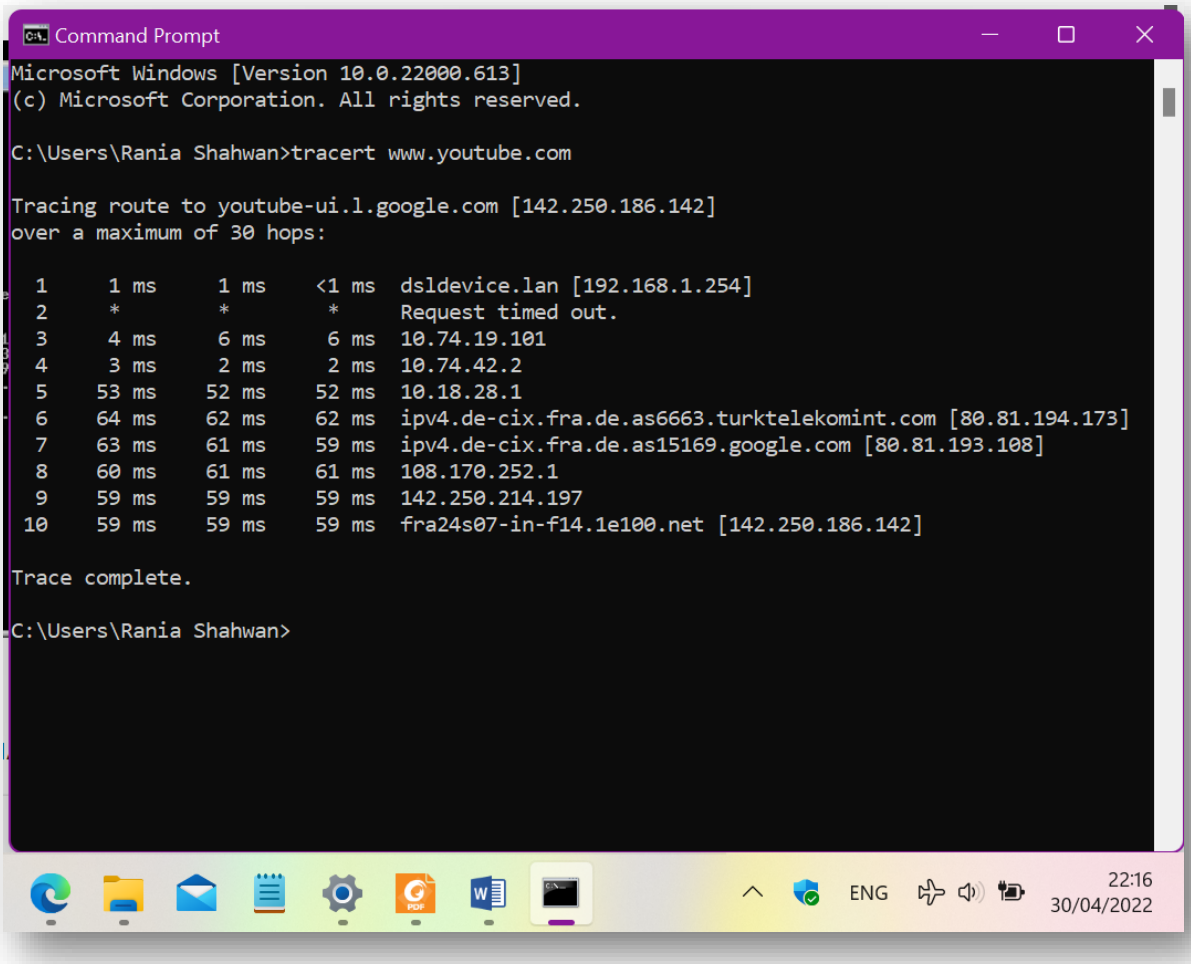

Figure 3: Traceroute command

4- nslookup www.youtube.com

Command of nslookup followed by the domain name displays a record IP address of the domain. It queries to domain name and address servers and gets the details. This can be shown in figure below.

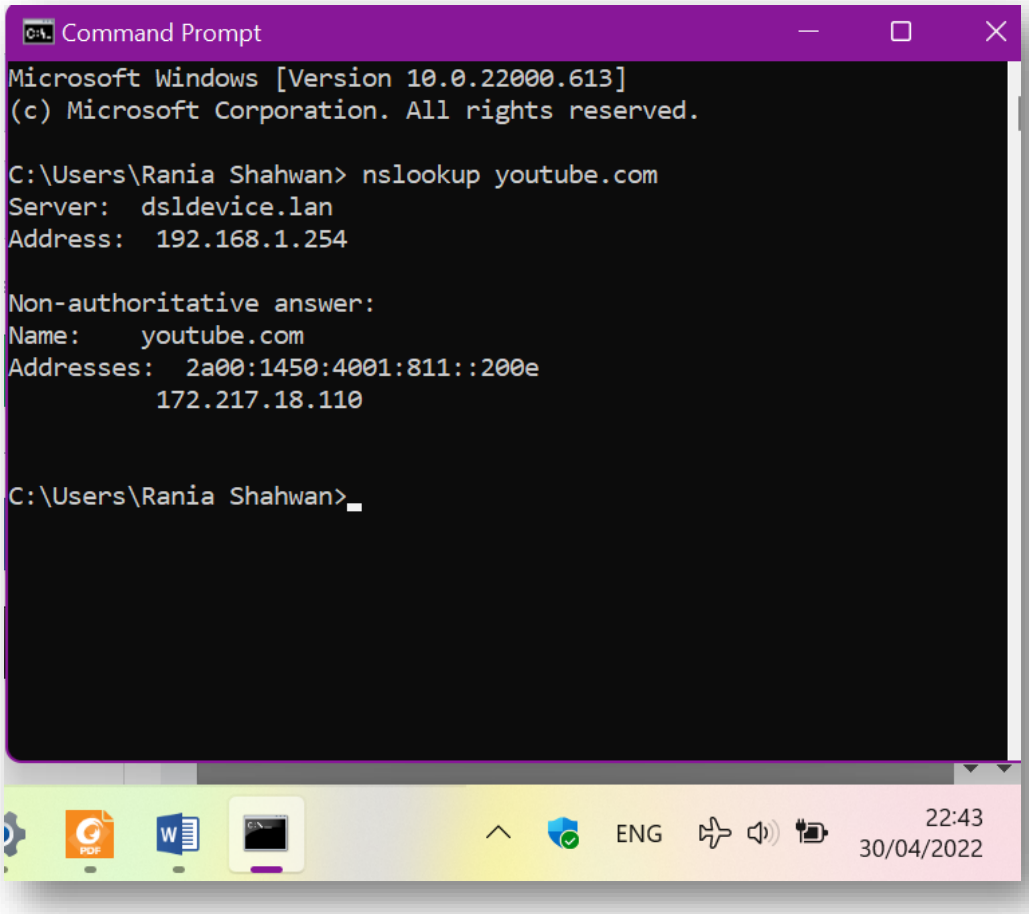

Figure 4: Nslookup Command

Part2: Creating a webserver

In this part of the project, the socket programming in Python language was applied to carry out a simple web server that server eight different requests specified and shows the HTTP requests on the terminal window.

- First Page English Version Website
- If the request is sent with /, en, then the server sends main_en.html file with content-type: text/html.

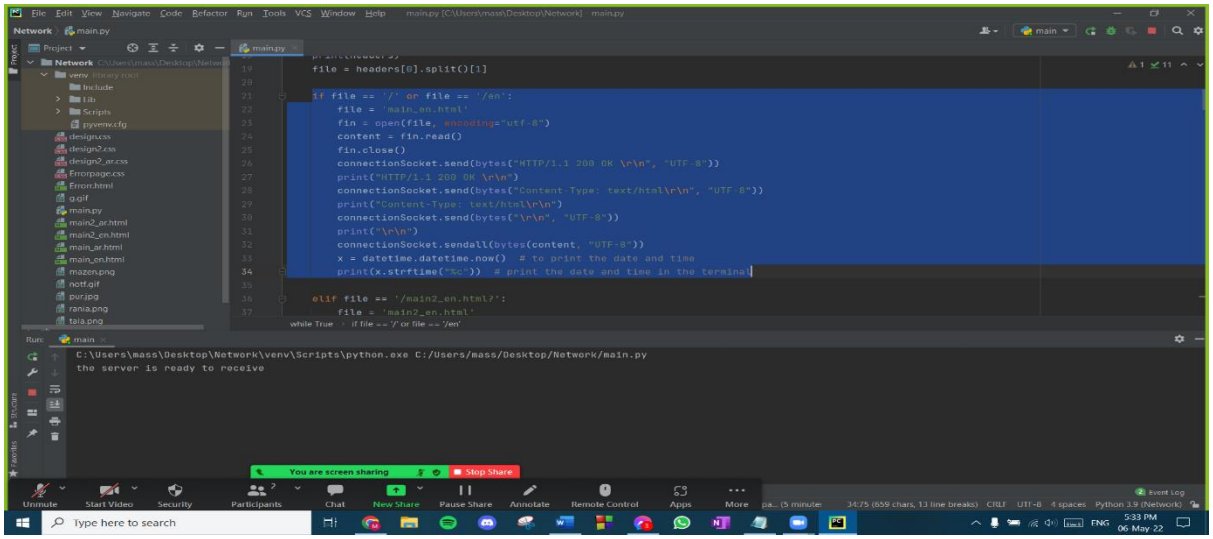

Figure 5: Page 1 English Version request

- The following website appears, it was styled using html and css

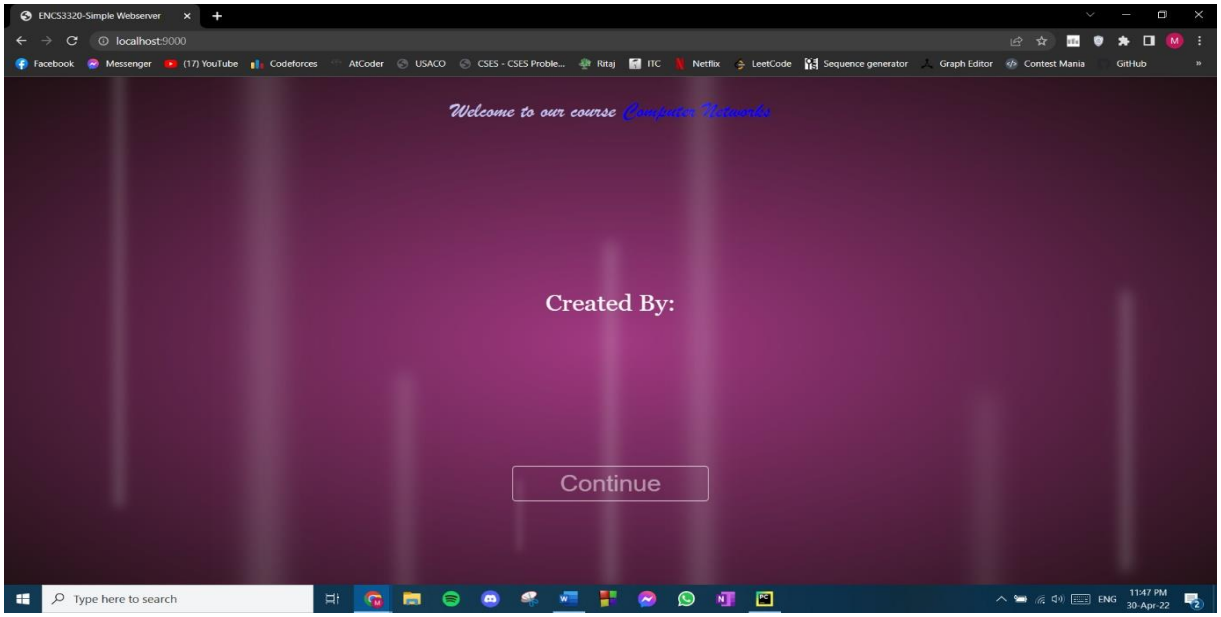

Figure 6: Page 1 English Version website

- HTML section for the first page of English version website

For the HTML code, “Welcome to our course computer networks” and “created by our team names and IDs, stay tuned” were printed on the first page of our website. And a “continue” button was added with a link to the second page of the website. This is the first page of the English version of the website. All these texts were styled in the CSS code. A link for the CSS code was added to the HTML code shown above.

```
<!DOCTYPE html>
<html>
    <html>
        <head>
            <link rel="stylesheet" href="design.css">
    <title>ENCS3320-Simple Webserver </title>
        </head>
        <body>

            <p id='part1' class='main'> Welcome to our course <span class='part2'>Computer Networks</span></p>

<p id='head1' class='header'>Network Project </p>
<p id='head2' class='header'>Created By:  </p>
<p id='head3' class='header'> Tala Dweikat 1191590 </p>
<p id='head4' class='header'> Rania Shahwan 1190585 </p>
<p id='head5' class='header'> Mazen Batrawi 1190102 </p>
<p id='head6' class='header'>Stay Tuned! </p>

<form action="main_en.html" method="get">
    <button type="submit" formaction="main2_en.html">Continue</button>
  </form>
  <div class='light x1'></div>
  <div class='light x2'></div>
  <div class='light x3'></div>
  <div class='light x4'></div>
  <div class='light x5'></div>
  <div class='light x6'></div>
  <div class='light x7'></div>
  <div class='light x8'></div>
  <div class='light x9'></div>
        </body>
    </html>
```

Figure 7: Main_en.html code

- CSS section for the first page of English version website

The CSS code shown below is the one which styles the website and texts. For the background image, a GIF image was chosen with the purple colour, as shown in figure 6 above. “Welcome to our course” was written in white, “computer networks” was written in blue as required. A timer was set for each name and ID. When one of the names and numbers disappear the other appears after 4 seconds. When we press the “continue” button that was styled in white, we will get to the second page of the English version website.

Figure 8: Design.css code

- Second page of English version
- When the ‘continue’ button on the first page on English version is pressed. Then a link to the second page will be open, and the server sends main2_en.html file with content-type: text/html.

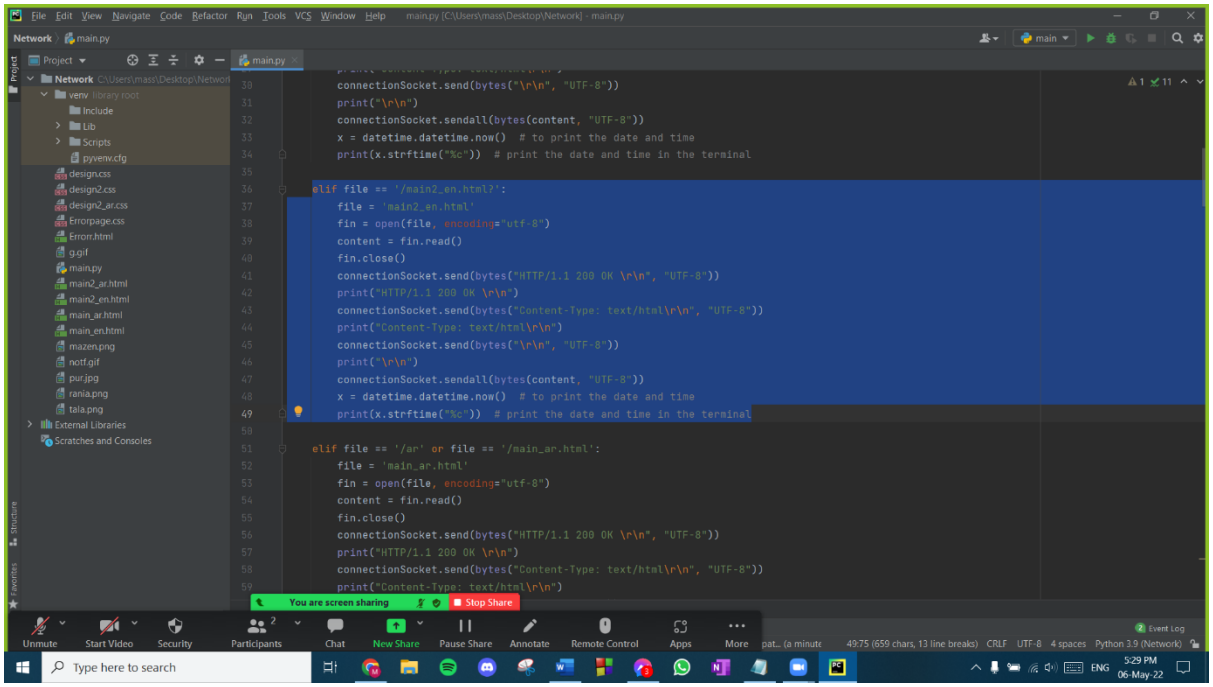

Figure 9: Page 2 English Version request

- The following website appears, it was styled using html and CSS

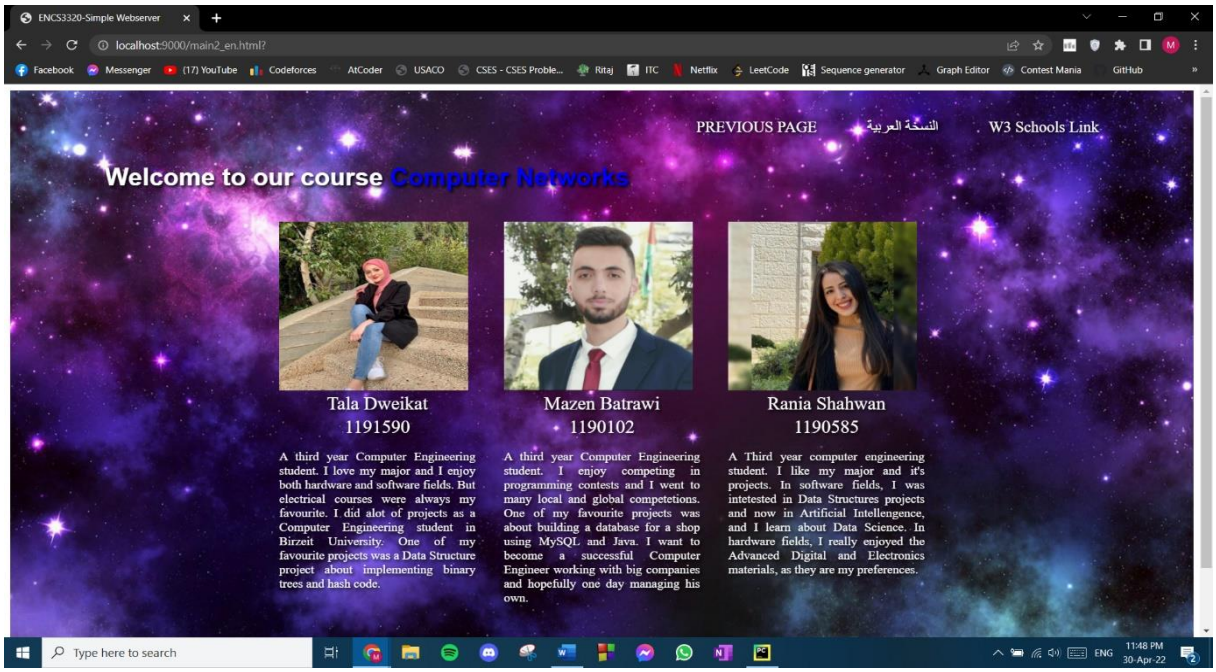

Figure 10: Page 2 English version website

- HTML section for the second page of English version website

After pressing the 'continue' button, the second page of the English version website appears. This page consists of three sections which have the names, information and pictures (with .png extension) of group members, each section has information about a single member of the team. Links of social media accounts will be associated with a hover propriety on the pictures of the group members. 'Welcome to our course computer networks' was written on the page. On the top of the page, some links were associated; a link to the previous page (leads to the first page on English version website), a link to the Arabic version website (leads to the first page of Arabic version website), and a link to WS schools website. A background image with the .jpg extension was chosen.

```
<!DOCTYPE html>
<html>
<html>
<head>
    <link rel="stylesheet" href="design2.css">
    <title> ENCS3320-Simple Webserver  </title>
</head>
<body>
    <div class="container">
        <div class="nabvar">
            <nav>
                <ul>
                    <li><a href="main_en.html">PREVIOUS PAGE</a> </li>
                    <li><a href="main_ar.html">النسخة العربية</a> </li>
                    <li><a href="https://www.w3schools.com/tags/att_img_src.asp?fbclid=IwAR3KUUbX4L0iJeN43kmoW_qOhjPa0c
                </ul>
            </nav>
        </div>
        <div class="row">
            <div class="col">
                <h1 id='part1' class='main'> Welcome to our course <span class='part2'>Computer Networks</span></h1>
            </div>
        </div>
        <div class="row2">
            <div class="col1">
                <div class="image1">
                <img class="img" src="tala.png">
                <div class="img1_overlay img1_overlay_blur">
                    <div class="img1_title">Social Media Acoounts</div>
                    <p class="img1_descpiction">
                        <a href="https://www.facebook.com/tala.dweikat.39" target="_blank">
                            <ion-icon name="logo-facebook" size="large" color="blue"></ion-icon>  </a>
        <a href="https://www.instagram.com/tala_dweikat/" target="_blank">
            <ion-icon name="logo-instagram" size="large" color="blue"></ion-icon></a>
        </p>
    </div>
    </div>
    <p class="names">Tala Dweikat</p>
    <p class="numbers">1191590</p>
    <p>A third year Computer Engineering student. I love my major and I enjoy both hardware and software
        fields. But electrical courses were always my favourite. I did alot of projects as a Computer
        Engineering student in Birzeit University. One of my favourite projects was a Data Structure project
        about implementing binary trees and hash code.</p>
</div>
<div class="col2">
    <div class="image2">
        <img class="img2" src="mazen.png">
        <div class="img2_overlay img2_overlay_blur">
            <div class="img2_title">Social Media Acoounts</div>
            <p class="img2_descpiction">
                <a href="https://www.facebook.com/mazen.batrawi" target="_blank">
                    <ion-icon name="logo-facebook" size="large"  color="blue"></ion-icon>  </a>
                <a href="https://www.instagram.com/mazenbatrawi/" target="_blank">
                    <ion-icon name="logo-instagram" size="large" color="blue"></ion-icon> </a>
            </p>
        </div>
        </div>
    <p class="names">Mazen Batrawi</p>
    <p class="numbers">1190102</p>
    <p>A third year Computer Engineering student. I enjoy competing in programming contests and I went to
        many local and global competetions. One of my favourite projects was about building a database for a
        shop using MySQL and Java.
        I want to become a successful Computer Engineer working with big companies and hopefully one day
        managing his own.</p>
            </div>
            <div class="col3">
                <div class="image3">
                    <img class="img3" src="rania.png">
                    <div class="img3_overlay img3_overlay_blur">
                        <div class="img3_title">Social Media Acoounts</div>
                        <p class="img3_descpiction">
                            <a href="https://www.facebook.com/rania185" target="_blank">
                                <ion-icon name="logo-facebook" size="large" color="blue"></ion-icon> </a>
                            <a href="https://www.instagram.com/rania_t_shahwan/" target="_blank">
                                <ion-icon name="logo-instagram" size="large" color="blue"></ion-icon>  </a>
                            </p>
                        </div>
                        </div>
                    <p class="names">Rania Shahwan</p>
                    <p class="numbers">1190585</p>
                    <p> A Third year computer engineering student. I like my major and it's projects. In software fields, I
                        was intetested in Data Structures projects and now in Artificial Intellengence, and I learn about
                        Data Science. In hardware fields, I really enjoyed the Advanced Digital and Electronics materials,
                        as they are my preferences.</p>
                </div>
            </div>
        </div>
    </div>
    <script type="module" src="https://unpkg.com/ionicons@5.5.2/dist/ionicons/ionicons.esm.js"></script>
    <script nomodule src="https://unpkg.com/ionicons@5.5.2/dist/ionicons/ionicons.js"></script>
</body>
</html>
```

Figure 11: main2_en.html code

- CSS section for the second page of English version website

This section is for styling the website. All information about the group members are separated in three boxes, box for each. They were written in white with pictures of the group members. When you get the mouse over the three pictures of the group members, the pictures with be hovered and the social media accounts for each of them will appear on the picture. When you press on the Facebook logo, a link will be associated with it and it will open a new website with the page of Facebook account, the same will happen when pressing on the Instagram logo. 'Welcome to our course' was written in white, 'computer networks' was written in blue as required. On the top of the page, some links were associated; when pressing on them, a new website will be open with the link associated in the HTML section. They were written in white.

```
.main {
    color: rgb(255, 255, 255);
    margin: 0;
    padding: 0;
    font-family: 'Roboto', sans-serif;
    text-shadow: 2px 2px 4px #000000;
    padding-bottom: 30px;}
.part2 {
    color: blue;
    text-align: left;
    padding-bottom: 30px;}
.body {
    margin: 0;
    padding: 0;}
.row {
    width: 900px;
    color: rgb(255, 255, 255);
    text-shadow: 2px 2px 4px #000000;}
.container {
    width: 100%;
    height: 110vh;
    background-image: url(pur.jpg);
    background-color: black;
    background-position: center;
    background-size: cover;
    padding-left: 8%;
    padding-right: 8%;
    box-sizing: border-box;}
.nabvar {
    height: 12%;
    display: flex;
    align-items: center;}
nav {
    flex: 1;
    text-align: right;}
nav ul li {
    list-style: none;
    display: inline-block;
    margin-left: 60px;}
nav ul li a {
    text-decoration: none;
    color: #fff;
    font-size: 20px;
    text-shadow: 2px 2px 4px #000000;}
.row2 {
    justify-content: center;
    gap: 1rem;
    display: flex;
    margin: auto;
    width: 840px;
    overflow: hidden;}
.col1 {
    float: left;
    width: 280px;
    color: rgb(255, 255, 255);
    text-shadow: 2px 2px 4px #000000;
    margin: 10px;
    text-align: justify;
    text-justify: inter-word;}
.col2 {
    float: left;
    width: 280px;
    color: rgb(255, 255, 255);
    text-shadow: 2px 2px 4px #000000;
    margin: 10px;
    text-align: justify;
    text-justify: inter-word;}
.col3 {
    float: left;
    width: 280px;
    color: rgb(255, 255, 255);
    text-shadow: 2px 2px 4px #000000;
    margin: 10px;
    text-align: justify;
    text-justify: inter-word;}
.names,
.numbers {
    font-size: 1.5rem;
    font-weight: 500;
    text-align: center;
    margin-bottom: 0.2rem;
    margin-top: 0.2rem;}
.image1{
    position: relative;
    width: 240px;
    height: 220px;}
img{
    width: 240px;
    height: 220px;}
.img1_overlay{
    position: absolute;
    top: 0;
    left: 0;
    width: 100%;
    height: 100%;
    background-color: rgba(0,0,0,0.6);
    color: white;
    font-family: 'Quicksand',sans-serif;
    display: flex;
    flex-direction: column;
    align-items: center;
    justify-content: center;
    opacity: 0;
    transition: opacity 0.5s;}
.img1_overlay:hover{
    opacity: 1;}
.img1_overlay > * {
    transform: translateY(20px);
    transition: transform 0.5s;}
.img1_overlay:hover > * {
    transform: translateY(0);}
.img1_title{
    font-size: 1.2em;
    font-weight: bold;
    color: blue;}
.img1_description{
    font-size: 1.25em;
    margin-top: 0.25em;}
.img1_overlay_blur{
    backdrop-filter: blur(5px);}
.image2{
    position: relative;
    width: 240px;
    height: 220px;}
img2{
    width: 240px;
    height: 220px;}
.img2_overlay{
    position: absolute;
    top: 0;
    left: 0;
    width: 100%;
    height: 100%;
    background-color: rgba(0,0,0,0.6);
    color: white;
    font-family: 'Quicksand',sans-serif;
    display: flex;
    flex-direction: column;
    align-items: center;
    justify-content: center;
    opacity: 0;
    transition: opacity 0.5s;}
.img2_overlay:hover{
    opacity: 1;}
.img2_overlay > * {
    transform: translateY(20px);
    transition: transform 0.5s;}
.img2_overlay:hover > * {
    transform: translateY(0);}
.img2_title{
    font-size: 1.2em;
    font-weight: bold;
    color: blue;}
.img2_description{
    font-size: 1.25em;
    margin-top: 0.25em;}
.img2_overlay_blur{
    backdrop-filter: blur(5px);}
.image3{
    position: relative;
    height: 220px;}
.img3_overlay{
    position: absolute;
    top: 0;
    left: 0;
    width: 100%;
    height: 100%;
    background-color: rgba(0,0,0,0.6);
    color: white;
    font-family: 'Quicksand',sans-serif;
    display: flex;
    flex-direction: column;
    align-items: center;
    justify-content: center;
    opacity: 0;
    transition: opacity 0.5s;}
.img3_overlay:hover{
    opacity: 1;}
.img3_overlay > * {
    transform: translateY(20px);
    transition: transform 0.5s;}
.img3_overlay:hover > * {
    transform: translateY(0);}
.img3_title{
    font-size: 1.2em;
    font-weight: bold;
    color: blue;}
.img3_description{
    font-size: 1.25em;
    margin-top: 0.25em;}
.img3_overlay_blur{
    backdrop-filter: blur(5px);}
```

Figure 12: design2.css code

- First page of Arabic version
- If the request is sent with /ar then the server response with main_ar.html which is an Arabic version of main_en.html

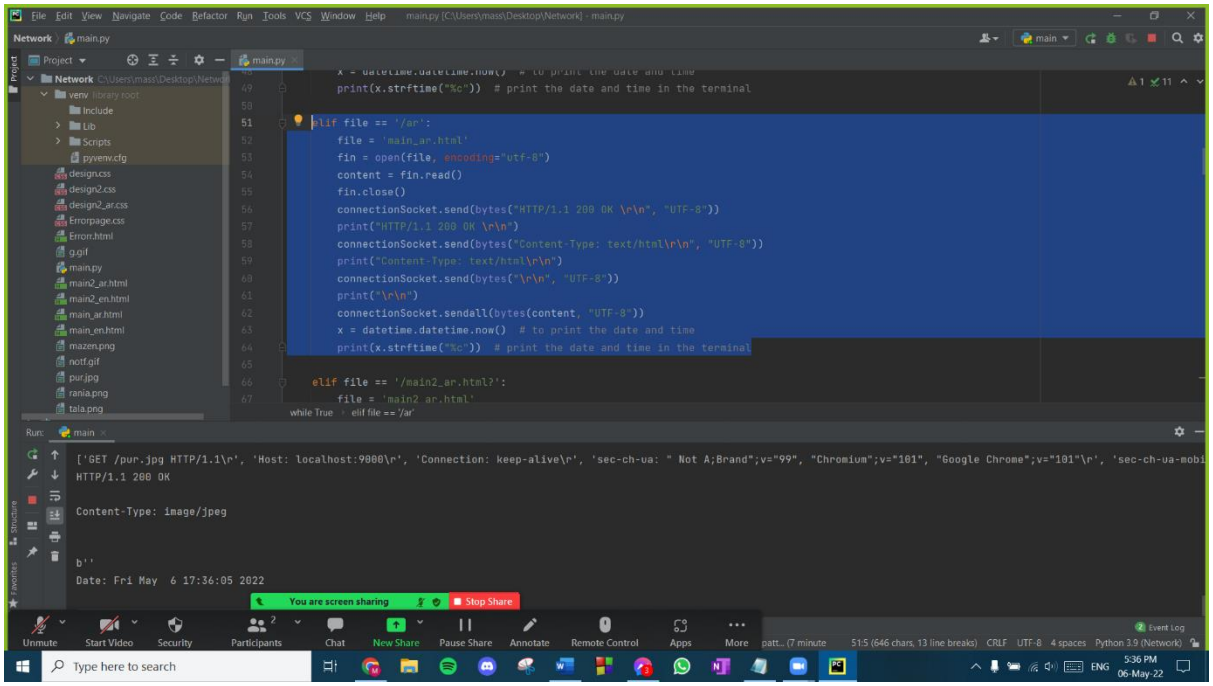

Figure 13: Page 1 Arabic version request

- The following website will appear, it was styled with HTML and CSS:

Figure 14: first page of Arabic version website

- HTML section for the first page of Arabic version website

For the HTML code, "اهلا بكم في مساق شبكات الحاسوب" and " باتمام الطلبة: مع اسماء والارقام الجامعية لاعضاء الفريق" were printed on the first page of our website. And "استمرار" button was added with a link to the second page of the website. This is the first page of the Arabic version of the website. All these texts were styled in the CSS code. A link for the CSS code was added to the HTML code shown above.

```
<!DOCTYPE html>
<html>
    <html>
        <head>
            <link rel="stylesheet" href="design.css">
    <title>
        ENCS3320-ويب سيرفر
    </title>
        </head>
        <body>
            <p id='part1' class='main'> أهلًا وسهلًا بكم في مساق <span class='part2'> شبكات الحاسوب </span></p>

<p id='head1' class='header'>مشروع شبكات الحاسوب </p>
<p id='head2' class='header'> :بإتمام الطلبة </p>
<p id='head3' class='header'> 1191590 تالا دويكات </p>
<p id='head4' class='header'> 1190585 رانيا شهوان </p>
<p id='head5' class='header'> 1190102 مازن بطرواي </p>
<p id='head6' class='header'>!ترقبوا المزيد </p>
<form action="main_ar.html" method="get">
    <button type="submit" formaction="main2_ar.html">استمرار</button>
  </form>
  <div class='light x1'></div>
  <div class='light x2'></div>
  <div class='light x3'></div>
  <div class='light x4'></div>
  <div class='light x5'></div>
  <div class='light x6'></div>
  <div class='light x7'></div>
  <div class='light x8'></div>
  <div class='light x9'></div>
        </body>
  </html>
```

Figure 15: main_ar.html code

- HTML section for the second page of Arabic version website

Figure 16: second page of Arabic version website

After pressing 'استمرار' button, the second page of the Arabic version website appears. This page consists of three sections which have the names, information and pictures (with .png extension) of group members all in Arabic, each section has information about a single member of the team. Links of social media accounts will be associated with a hover propriety on the pictures of the group members. 'اهلا بكم في مساق شبكات الحاسوب' was written on the page. On the top of the page, some links were associated; a link to the previous page (leads to the first page on English version website), a link to the English version website (leads to the first page of English version website), and a link to WS schools website. A background image with the .jpg extension was chosen.

```
<!DOCTYPE html>
<html><html>
<head> <link rel="stylesheet" href="design2_ar.css">
    <title>
        ENCS3320-ويب سيرفر
    </title></head>
<body>
    <div class="container">
        <div class="nabvar"> <nav> <ul>
                    <li><a href="main_ar.html">الصفحة السابقة</a> </li>
                    <li><a href="main_en.html">English Version</a> </li>
                    <li><a href="https://www.w3schools.com/tags/att_img_src.asp?fbclid=IwAR3KUUbX4L0iJeN43kmoW_qOhjPa0dw
                </ul></nav>  </div>
        <div class="row">
            <div class="col">
                <h1 id='part1' class='main'> أهلًا وسهلًا بكم في مساق <span class='part2'>شبكات الحاسوب</span></h1>
            </div> </div>
        <div class="row2">
            <div class="col1">
                <div class="image1">
                    <img class="img" src="tala.png">
                    <div class="img1_overlay img1_overlay_blur">
                        <div class="img1_title">مواقع التواصل الاجتماعي</div>
                        <p class="img1_descpiction">
                            <a href="https://www.facebook.com/tala.dweikat.39" target="_blank">
                                <ion-icon name="logo-facebook" size="large" color="blue"></ion-icon> </a>
                            <a href="https://www.instagram.com/tala_dweikat/" target="_blank">
                                <ion-icon name="logo-instagram" size="large" color="blue"></ion-icon></a> </p> </div> </div>
                <p class="names">تالا دويكات</p>
                <p class="numbers">1191590</p>
                <p>طالبة هندسة حاسوب في سنتها الثالثة في جامعة بيرزيت. أحب تخصصي واستمتع بكلا مجالي البرمجيات والهارديوير. لكن مواد الإلكترونيات تبقى المفضلة لدي. قمت بالكثير من المشاريع في الجامعة، والمفضلين لدي كانوا مشاريع الخوارزميات وتطبيق شتى أنواع الالغوريثم.
            <div class="col2">
                                <div class="image2">
                                    <img class="img2" src="mazen.png">
                                    <div class="img2_overlay img2_overlay_blur">
                                        <div class="img2_title">مواقع التواصل الاجتماعي</div>
                                        <p class="img2_descpiction">
                                            <a href="https://www.facebook.com/mazen.batrawi" target="_blank">
                                                <ion-icon name="logo-facebook" size="large" color="blue"></ion-icon></a>
                                            <a href="https://www.instagram.com/mazenbatrawi/" target="_blank">
                                                <ion-icon name="logo-instagram" size="large" color="blue"></ion-icon>  </a>
                                        </p> </div> </div>
                                <p class="names">مازن بطراوي</p>
                                <p class="numbers">1190102</p>
                                <p>طالب هندسة حاسوب في سنته الثالثة في جامعة بيرزيت. أحب مسابقات البرمجة وقد شاركت في المحلية والعالمية منها. واحدة من مشاريعي المفضلة كانت إنشاء قاعدة بيانات لمتجر باستخدام لغة الجافا وال مي اسكيول. أود أن أصبح مهندسًا يعلم في كبرى الشركات، وربما يملك واحدة يومًا ما.
                            </div>
                            <div class="col3">
                                <div class="image3">
                                    <img class="img3" src="rania.png">
                                    <div class="img3_overlay img3_overlay_blur">
                                        <div class="img3_title">مواقع التواصل الاجتماعي</div>
                                        <p class="img3_descpiction">
                                            <a href="https://www.facebook.com/rania185" target="_blank">
                                                <ion-icon name="logo-facebook" size="large" color="blue"></ion-icon> </a>
                                            <a href="https://www.instagram.com/rania_t_shahwan/" target="_blank">
                                                <ion-icon name="logo-instagram" size="large" color="blue"></ion-icon> </a>
                                        </p></div> </div>
                                <p class="names">رانيا شهوان</p>
                                <p class="numbers">1190585</p>
                                <p>طالبة هندسة حاسوب في سنتها الثالثة في جامعة بيرزيت. أحب تخصصي وما فيه من مشاريع، ففي مجال البرمجيات كنت مهتمة في مشاريع مساق الخوارزميات والان في مساق الذكاء الاصطناعي، كما أني أتعلم علوم البيانات. أما في مجال الهارديوير، فأفضل جدًا مساقي الأنظمة الرقمية المتقدمة والإلكترونيات وأستمتع في مشاريعهم .
                            </div></div></div>
        <script type="module" src="https://unpkg.com/ionicons@5.5.2/dist/ionicons/ionicons.esm.js"></script>
        <script nomodule src="https://unpkg.com/ionicons@5.5.2/dist/ionicons/ionicons.js"></script>
</body></html>
```

Figure 17: main2_ar.html code

- CSS section for the first and second page of Arabic version website

The CSS code shown below is the one which styles the website and texts. For the background image, a GIF image was chosen with the purple colour, as shown in figure 13 above. “ اهلا بكم في مساق” was written in white, “شبكات الحاسوب” was written in blue as required. A timer was set for each name and ID which were written in Arabic. When one of the names and numbers disappear the other appears after 4 seconds. When we press the “استمرار” button that was styled in white, we will get to the second page of the Arabic version website. In the second page: all information about the group members are separated in three boxes, box for each. They were written in white and arabic with pictures of the group members. When you get the mouse over the three pictures of the group members, the pictures with be hovered and “ مواقع التواصل الاجتماعي” for each of them will appear on the picture. When you press on the Facebook logo, a link will be associated with it and it will open a new website with the page of Facebook account, the same will happen when pressing on the Instagram logo. ‘اهلا بكم في مساق’ was written in white, ‘شبكات الحاسوب’ was written in blue as required. On the top of the page, some links were associated; when pressing on them, a new website will be open with the link associated in the HTML section. They were written in white.

```
.main {    color: rgb(255, 255, 255);
    margin: 0;
    padding: 0;
    text-align: right;
    font-family: 'Roboto', sans-serif;
    text-shadow: 2px 2px 4px #000000;
    padding-bottom: 30px;}
.part2 {    color:blue;
    text-align: right;
    padding-bottom: 30px;}
.body {    margin: 0;
    padding: 0;}
.row {    width: 900px;
    color: rgb(255, 255, 255);
    text-shadow: 2px 2px 4px #000000;}
.container {    width: 100%;
    height: 100vh;
    background-image: url(pur.jpg);
    background-color: black;
    background-position: center;
    background-size: cover;
    padding-left: 8%;
    padding-right: 8%;
    box-sizing: border-box;}
.nabvar {    height: 12%;
    display: flex;
    align-items: center;}
nav {    flex: 1;
    text-align: left;}
nav ul li {    list-style: none;
    display: inline-block;
    margin-left: 60px;}
nav ul li a {    text-decoration: none;
    color: #fff;
    font-size: 20px;
    text-shadow: 2px 2px 4px #000000;}
.row2 {    justify-content: center;
    gap: 1rem;
    display: flex;
    margin: auto;
    width: 840px;
    overflow: hidden;}
.col1 {    float: left;
    width: 280px;
    color: rgb(255, 255, 255);
    text-shadow: 2px 2px 4px #000000;
    margin: 10px;
    text-align: justify;
    text-align-last: right;
    text-justify: inter-word;}
.col2 {    float: left;
    width: 280px;
    color: rgb(255, 255, 255);
    text-shadow: 2px 2px 4px #000000;
    margin: 10px;
    text-align: justify;
    text-align-last: right;
    text-justify: inter-word;}
.col3 {    float: left;
    width: 280px;
    color: rgb(255, 255, 255);
    text-shadow: 2px 2px 4px #000000;
    margin: 10px;
    text-align: justify;
    text-align-last: right;
    text-justify: inter-word;}
.names,
.numbers {    font-size: 1.5rem;
    font-weight: 500;
    text-align: center;
    margin-bottom: 0.2rem;
    margin-top: 0.2rem;}
img{    width: 250px;
    height: 240px;}
.image1{    position: relative;
    width: 250px;
    height: 240px;}
.img1_overlay{    position: absolute;
    top: 0;
    left: 0;
    width: 100%;
    height: 100%;
    background-color: rgba(0,0,0,0.6);
    color: white;
    font-family: 'Quicksand',sans-serif;
    display: flex;
    flex-direction: column;
    align-items: center;
    justify-content: center;
    opacity: 0;
    transition: opacity 0.5s;}
.img1_overlay:hover{    opacity: 1;}
.img1_overlay > * {    transform: translateY(20px);
    transition: transform 0.5s;}
.img1_overlay:hover > * {    transform: translateY(0);}
.img1_title{    font-size: 1.2em;
```

```
.img1_description{    font-size: 1.25em;
    margin-top: 0.25em;}
.img1_overlay_blur{    backdrop-filter: blur(5px);}
.image2{    position: relative;
    width: 250px;
    height: 240px;}
img2{    width: 250px;
    height: 240px;}
.img2_overlay{    position: absolute;
    top: 0;
    left: 0;
    width: 100%;
    height: 100%;
    background-color: rgba(0,0,0,0.6);
    color: white;
    font-family: 'Quicksand',sans-serif;
    display: flex;
    flex-direction: column;
    align-items: center;
    justify-content: center;
    opacity: 0;
    transition: opacity 0.5s;}
.img2_overlay:hover{    opacity: 1;}
.img2_overlay > * {    transform: translateY(20px);
    transition: transform 0.5s;}
.img2_overlay:hover > * {    transform: translateY(0);}
.img2_title{    font-size: 1.2em;
    font-weight: bold;
    color: blue;}
.img2_description{    font-size: 1.25em;
    margin-top: 0.25em;}
.img2_overlay_blur{    backdrop-filter: blur(5px);}
.image3{    position: relative;
    width: 250px;
    height: 240px;}
img3{    width: 250px;
    height: 240px;}
.img3_overlay{    position: absolute;
    top: 0;
    left: 0;
    width: 100%;
    height: 100%;
    background-color: rgba(0,0,0,0.6);
    color: white;
    font-family: 'Quicksand',sans-serif;
    display: flex;
    flex-direction: column;
    align-items: center;
    justify-content: center;
    opacity: 0;
    transition: opacity 0.5s;}
.img3_overlay:hover{    opacity: 1;}
.img3_overlay > * {    transform: translateY(20px);
    transition: transform 0.5s;}
.img3_overlay:hover > * {    transform: translateY(0);}
.img3_title{    font-size: 1.2em;
    font-weight: bold;
    color: blue;}
.img3_description{    font-size: 1.25em;
    margin-top: 0.25em;}
.img3_overlay_blur{ backdrop-filter: blur(5px);}
```

Figure 18: Design2_ar.css code

- Request ends with **.html:**

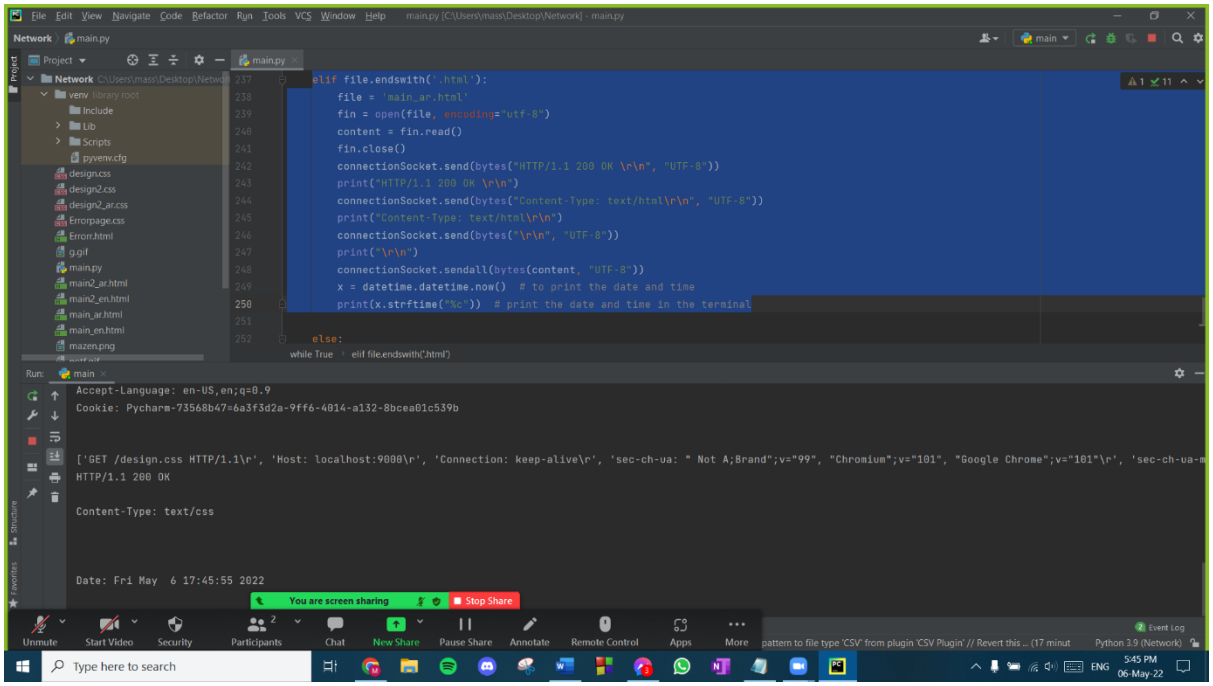

Figure 19: A .html request

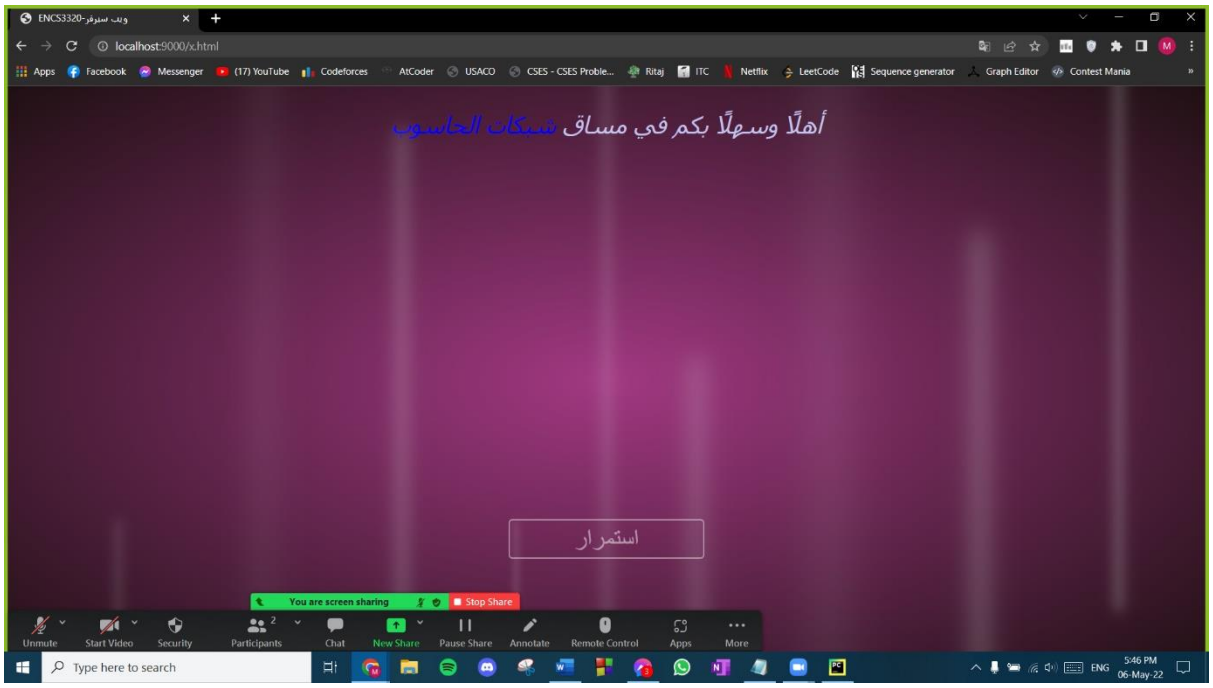

Figure 20: Response of a .html request

- Request ends with **.css:**

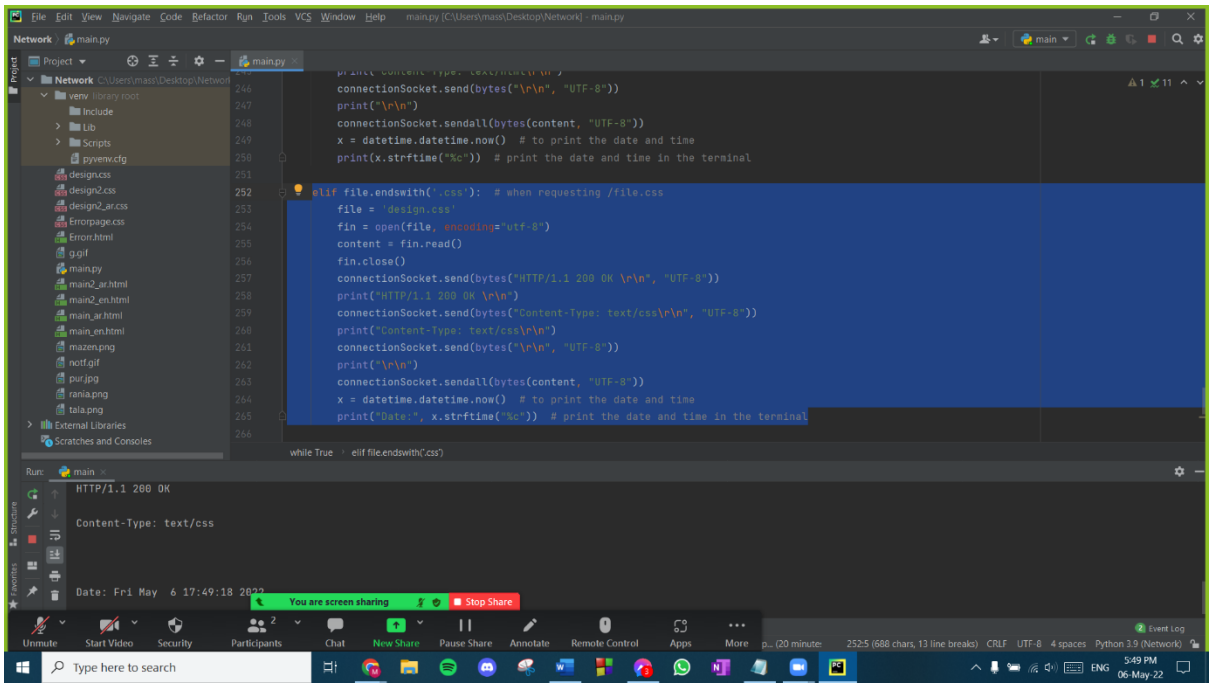

Figure 21: A .css request

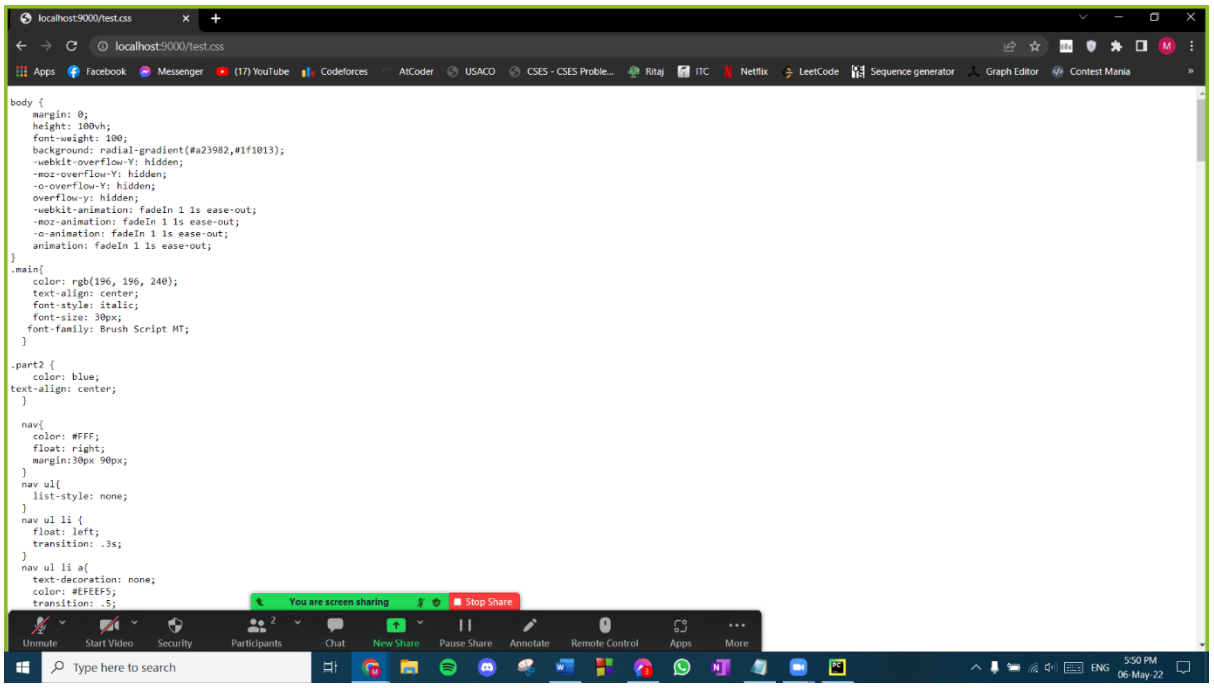

Figure 22: Response of a .css request

- JPG request

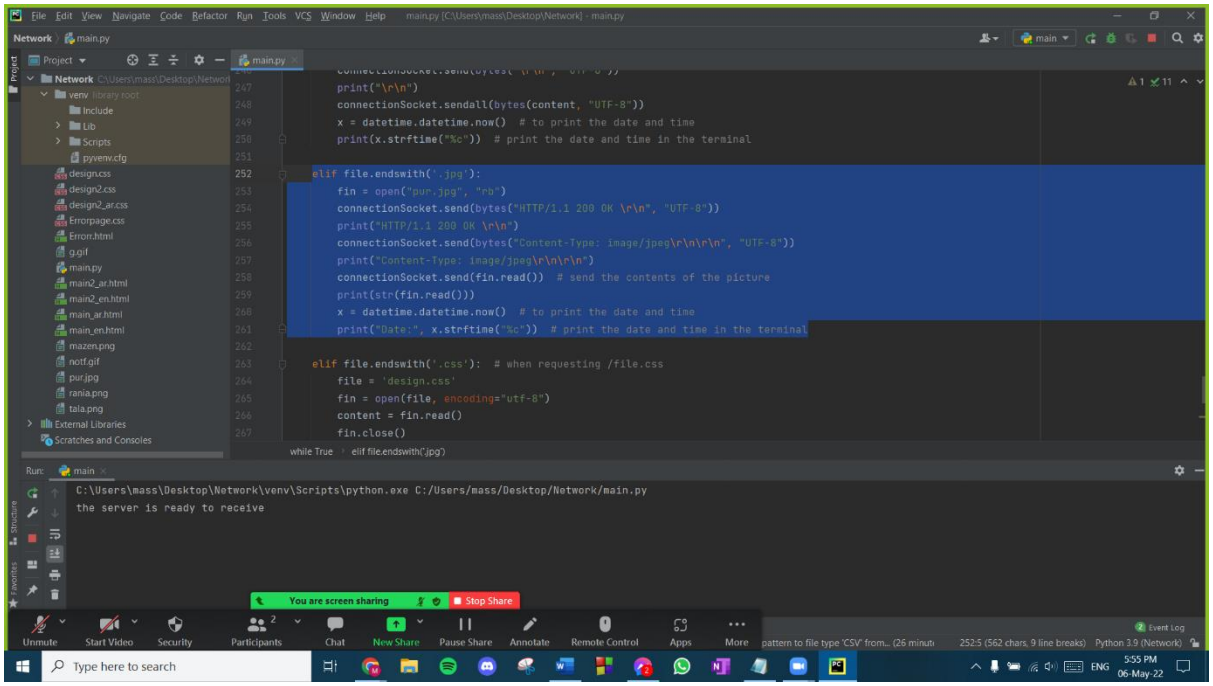

Figure 23: A .jpg request

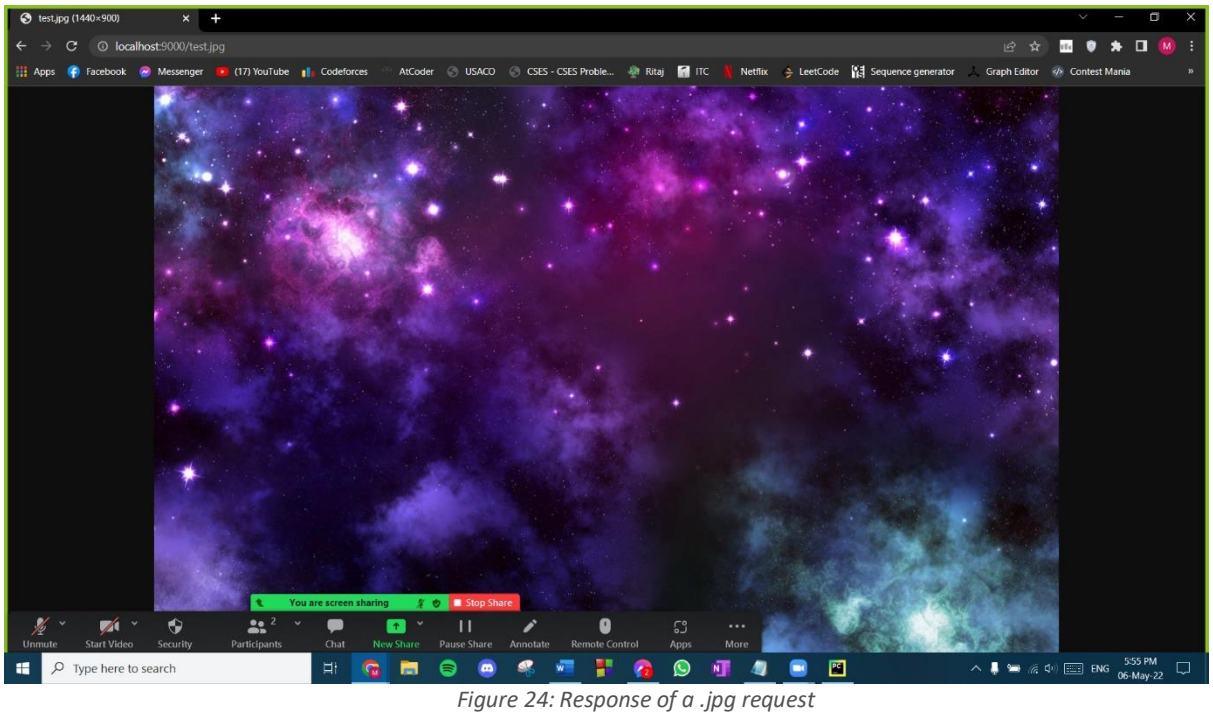

Figure 24: Response of a .jpg request

- Request ends with **PNG**:

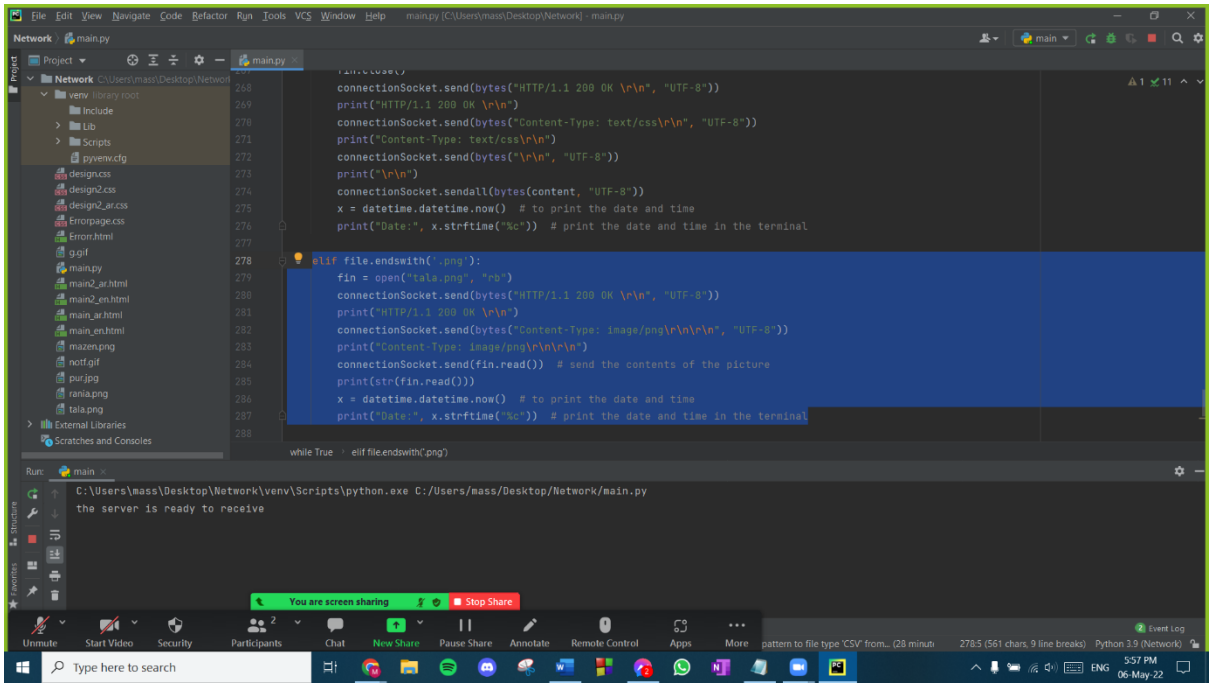

Figure 25: A .png request

Figure 26: Response of a .png request

- 307 Temporary redirect

  We send the server the status 307 and specify the redirect location and the content type as text/html and the encoding. Then, the server redirects to the specified location based on the given request.

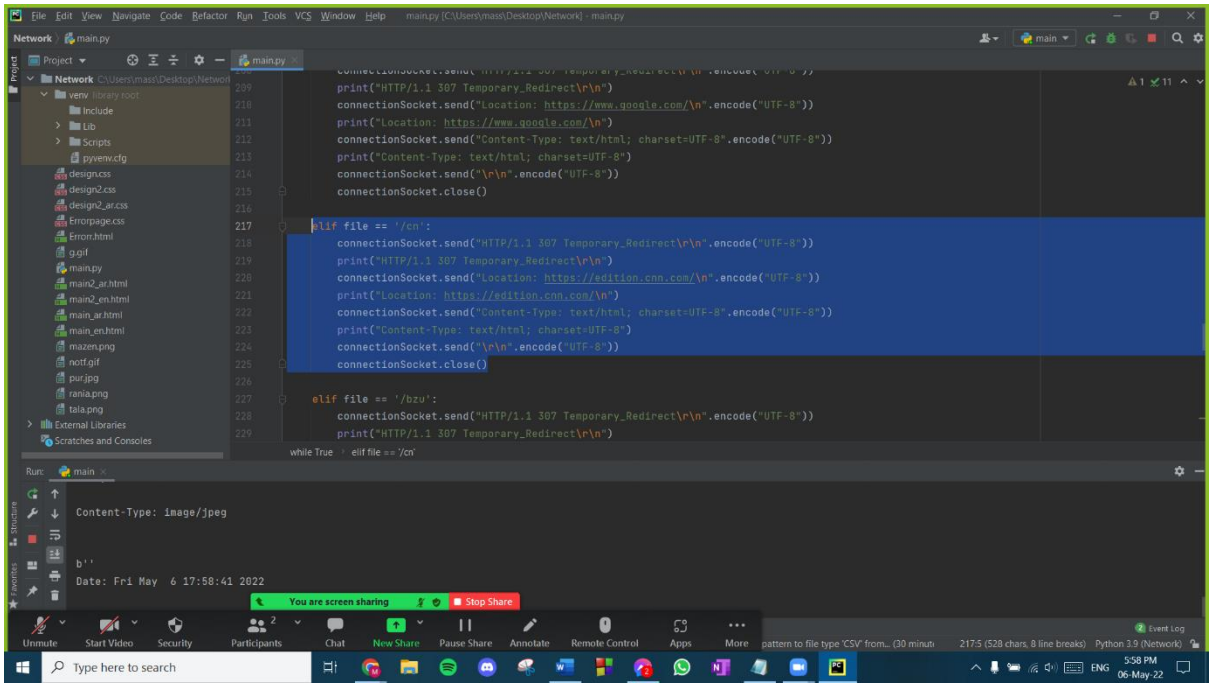

Figure 27: Requests of a 307 temporary redirect to CNN website

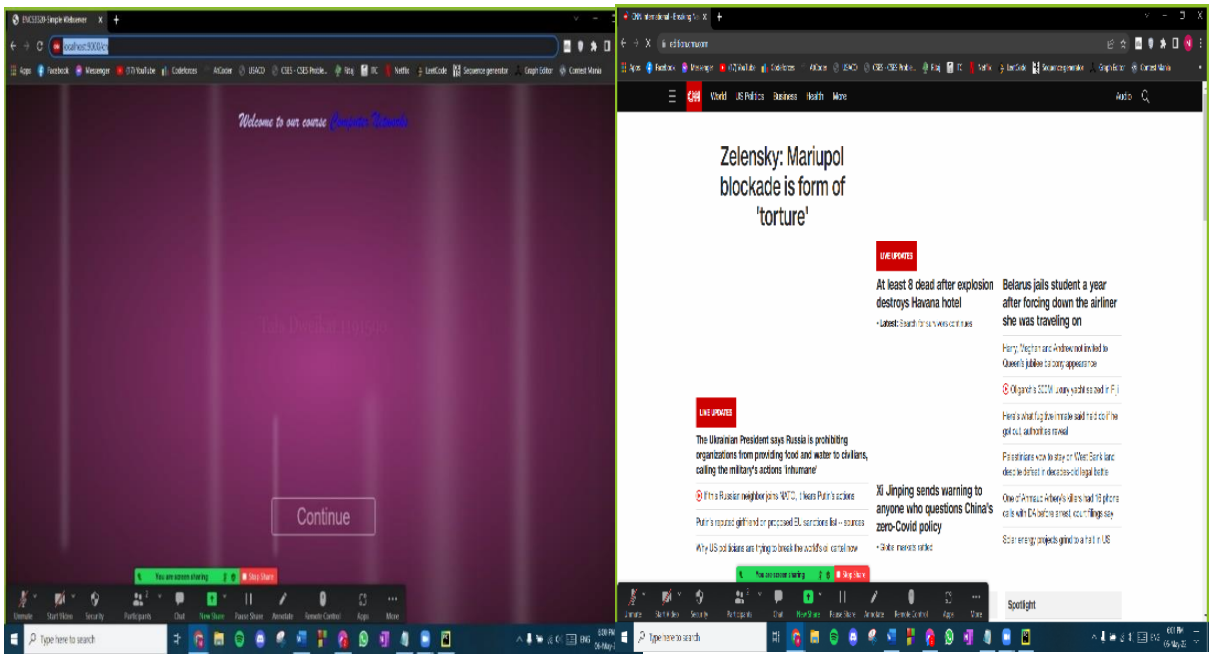

Figure 28: CNN Redirect

- Error page

  If the request is not defined then we redirect to the error page with content type text/html and response status of HTTP/1.1 404 Not Found. It contains the details of the IP and port number of the client. The html code was written in the editor of the python to get the IP and the port.

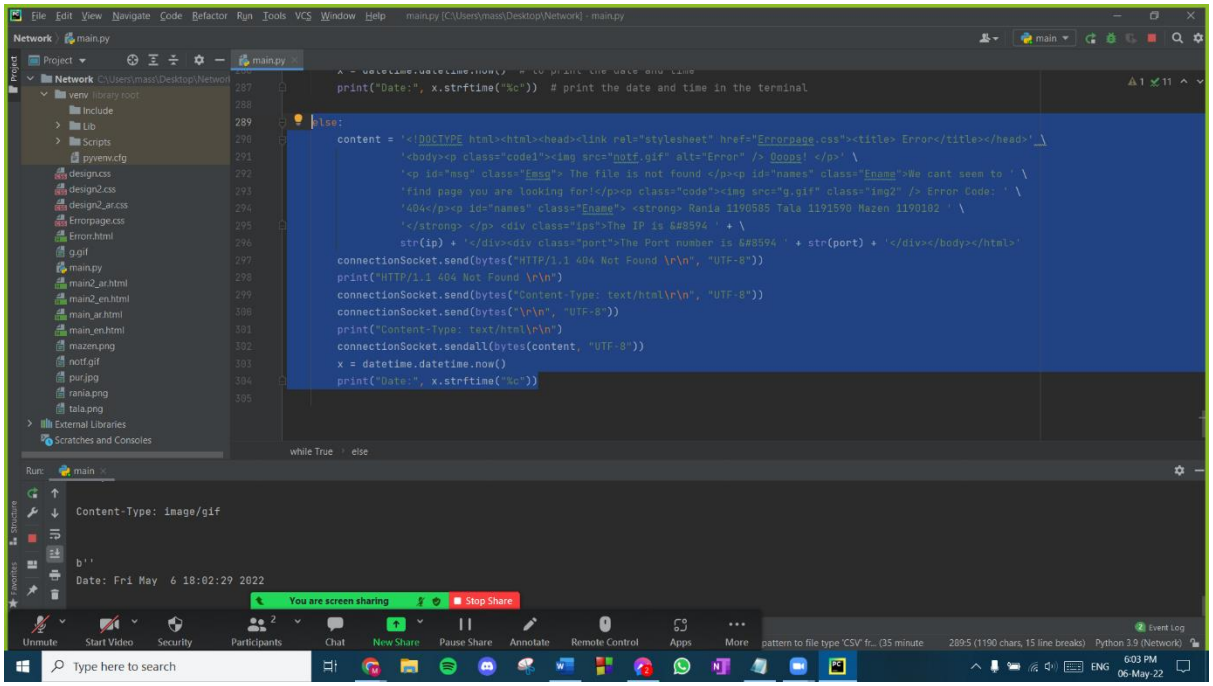

Figure 29: code of error page

- Here is the error page:

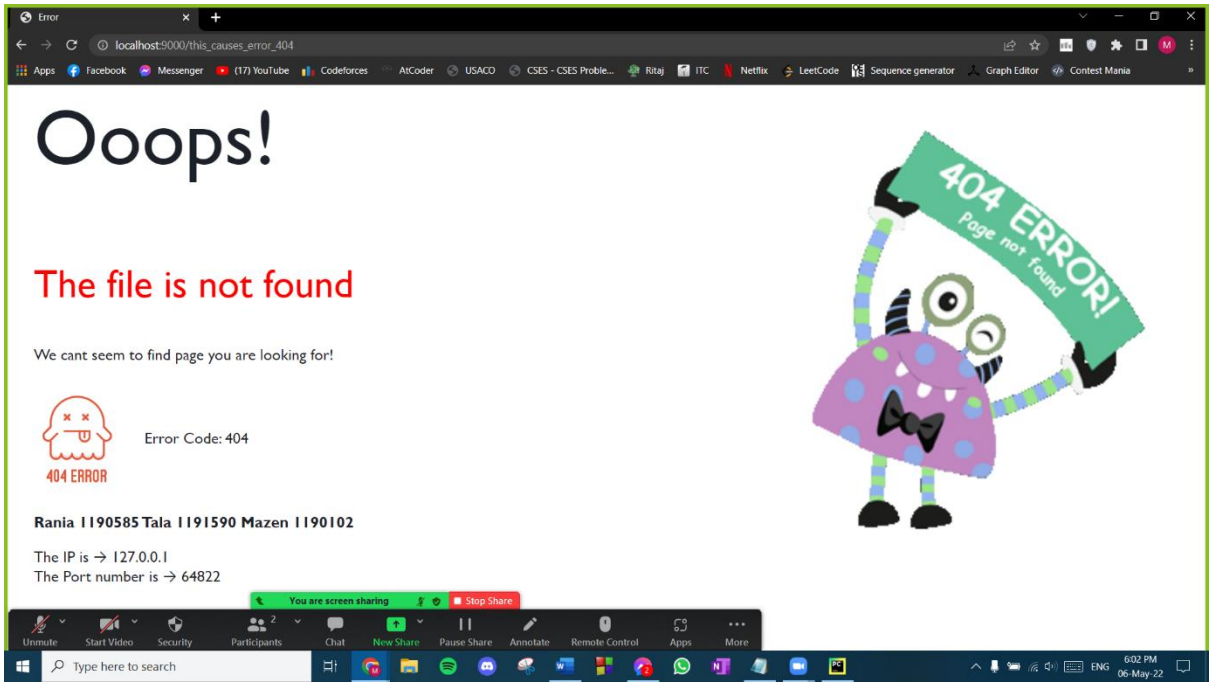

Figure 30: Error Page

As shown in the figures above, a request was sent to **localhost:9000/** The message contents tell that the data was sent to the server using the **GET** method, the HTTP type is **HTTP/1.1**, the content type is specified like text/html, text/css, image/png, etc. The connection type for the request is **persistent** since that was told from the **keep-alive** statement. Similarly, for the other requests, the same operations happen but with different content types and destinations. Here are some requests for CSS files and images. The code and the response of every request was shown.

- Testing from another device
  - We tested the project from a phone, everything was going well:

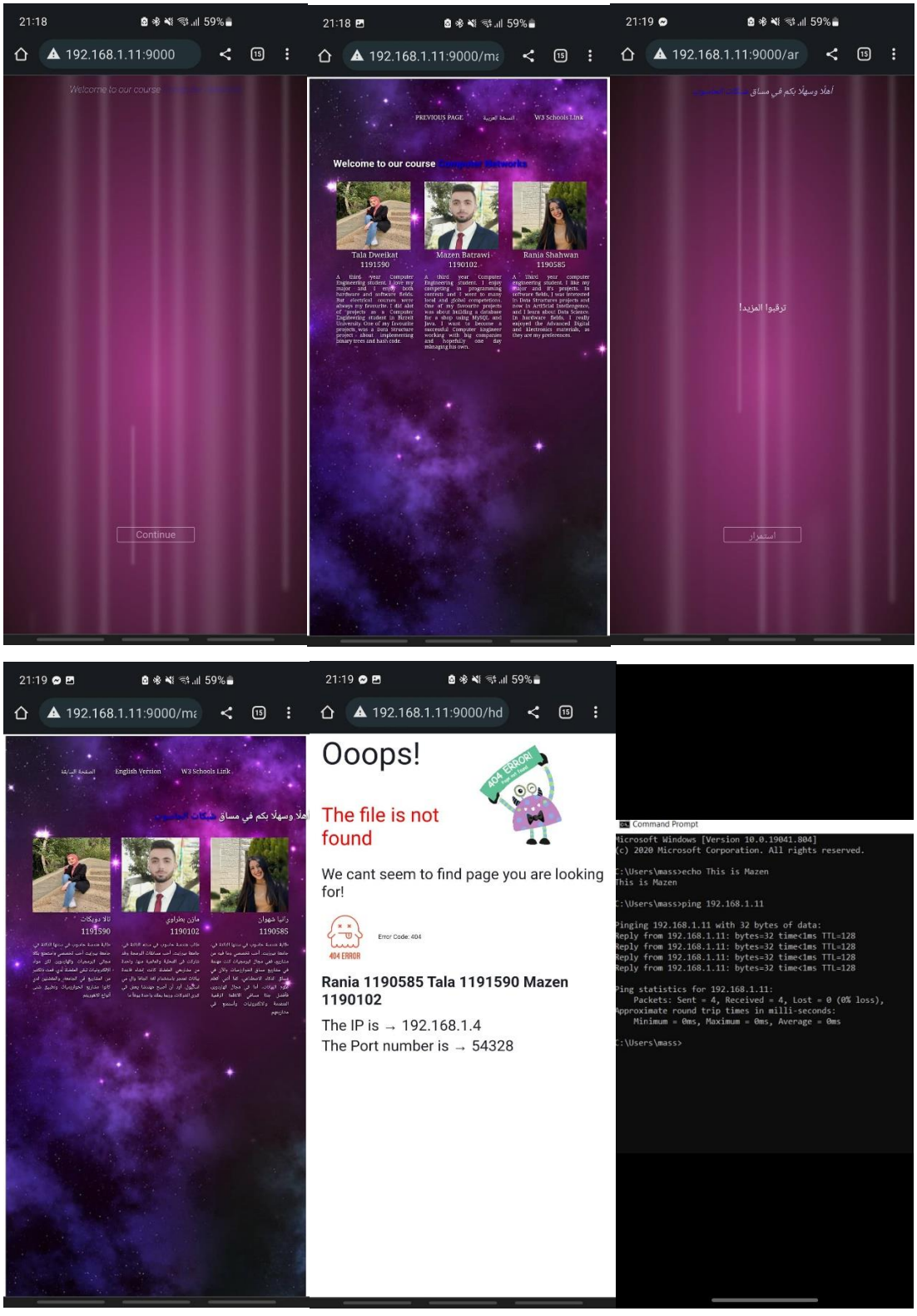

Figure 31: Testing project from a phone

- # Appendix

code.txt