Syrian Arab Republic

Lattakia - Tishreen University

Department of Communication and electrical engineering

5th , Network Programming : Homework No2

الجمهورية العربية السورية

اللاذقية -جامعـة تشريـن

كلية الهندسة الكهربائية والميكانيكية

قسم هندسة الاتصالات والالكترونيات

السنة الخامسة: وظيفة2 برمجة شبكات

Name:__Braa Amoon_____, Number:_____2714_____, Submitted To GitHub:__BraaAmoon_____

Second Network Programming Homework

Question 1: TCP Server/Client Quiz App with Multi-threading?

As an improvement to previous first homework, build a TCP server and client quiz application using Python. The server should handle multiple client connections simultaneously using multi-threading. The application should allow clients to connect, participate in a quiz, and receive their quiz scores upon completion.

Requirements:

A. The server should be able to handle multiple client connections concurrently.

B. The quiz should consist of a set of pre-defined questions stored on the server.

C. Each client should connect to the server and receive the quiz questions.

D. Clients should send their answers to the server.

E. The server should keep track of the scores for each client.

F. At the end of the quiz, the server should send the final scores to each client.

Guidelines:

● Use Python's socket module "don't use 3thd-party packages".

● Implement multi-threading to handle multiple client connections concurrently.

● Store the quiz questions and correct answers on the server side.

Notes:

● Write brief report describing the design choices you made and any challenges faced during implementation.

● You can make a TCP Server/Client of your choice, such as Bank ATM, Chat application, or any other appropriate application that fulfil all requirements.

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Explanation

قمت بتخزين أسئلة الاختبار في ملف json تم استيراده في خادم ال tcp وتخزين محتواه في dictionary ، قمت بربط socket السيرفر بالحاسب المحلي عن طريق العنوان 127.0.0.1 ، إن serverTcp يعمل على mainThread وكل client جديد يقوم السيرفر بإنشاء Tread خاصة بهذا الclient ليعمل فيها ويعود هو لينتظر client جديد

في تابع العمل: handle_request نقوم بالمرور على كل أسئلة الاختبار المخزنة في d1 وإرسالها لل client ونستقبل منه إجابة كل سؤال ونخزنها في dicionary جديد d2 ونختبر إجابة كل سؤال إن كانت صحيحة نقوم بزيادة ال score ونخزن أيضاً إجابات ال client الصحيحة في dictionary مختلف correct Answer

عند الانتهاء نخزن ال score في d2 ونطبع إجابات المستخدم مع الscore وأيضاً نقوم بطباعة إجاباته الصحيحة فقط

ولإرسال كل ما سبق لل client لا نستطيع لإرسال dictionary فقمت بتعريف string فارغة تمر على كل عناصر dictionary وتخزن محتواه وفي النهاية نقوم بعمل encode() ونرسل النتائج لل client

قمت بإنشاء three client :

كل منها تستقبل الأسئلة الخاصة بالاختبار وتدخل الإجابات وترسلها للسيرفر وفي النهاية تستقبل النتيجة

The code of server:

```python
import socket,threading
import json

f1=open('D:\\project\\network
programming\\homework2\\venv\\quiz .json','r')
d1=json.load(f1)
f1.close()

ss=socket.socket(socket.AF_INET,socket.SOCK_STREAM)
ss.setsockopt(socket.SOL_SOCKET,socket.SO_REUSEADDR,1)
ss.bind(('127.0.0.1',7777))
ss.listen(5)

def handel_request(i,csocket,cadd):
```

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```python
    print('Accepted new client:',i,cadd)
    print()
    while True:
        d2 = {}
        correctAnswers={}
        score = 0
        for key, val in d1.items():
            csocket.send(key.encode())
            cmsg = csocket.recv(1024).decode()
            x=int(cmsg)
            d2[key] = [x]
            if x == d1[key]:
                score += 1
                correctAnswers[key]=[x]
        if val==400:
            d2["the score is: "] = score
            print(d2)
            print('the correct Answer of client',i,' is:
',correctAnswers)
            s=''
            for key,val in d2.items():
                s+=key
                s+=' '
                s+=str(val)
                s+=' '
            c = ''
            for key, val in correctAnswers.items():
                c += key
                c += ' '
                c += str(val)
                c += ' '
            csocket.send(s.encode())
            csocket.send('the correct Answer'.encode())
            csocket.send(c.encode())
            csocket.close()

i=1
while True:
    print('[+]TCP MultiThreads server waiting for new
clients...')
    cs,cadd=ss.accept()

client=threading.Thread(target=handel_request,args=(i,cs,
cadd))
```

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```
        client.start()
        i+=1
```

the code of clients:

```python
import socket
cs=socket.socket(socket.AF_INET,socket.SOCK_STREAM)
cs.settimeout(150)
try:
    cs.connect(('127.0.0.1',7777))

    while True:
        data = cs.recv(1024).decode()
        print(data)
        req=input()
        cs.sendall(req.encode())

except socket.error as err:
    print(err)
finally:
    cs.close()

print('end')
```

the output of server:

```
"D:\project\network programming\homework2\venv\Scripts\python.exe" "D:\project\network programming\homework2\venv\TCPServer.py"

[+]TCP MultiThreads server waiting for new clients...

Accepted new client: 1 ('127.0.0.1', 15086)


[+]TCP MultiThreads server waiting for new clients...

Accepted new client:[+]TCP MultiThreads server waiting for new clients...

2 ('127.0.0.1', 15087)


Accepted new client: 3 ('127.0.0.1', 15088)


[+]TCP MultiThreads server waiting for new clients...

{'Q1:what is the square of the number 1 ? ': [1], 'Q2:what is the square of the number 2 ? ': [4], 'Q3:what is the square of the number 3 ? ': [9], 'Q4:what

the correct Answer of client 1  is: {'Q1:what is the square of the number 1 ? ': [1], 'Q2:what is the square of the number 2 ? ': [4], 'Q3:what is the squar
```

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```
3 ? ': [9], 'Q4:what is the square of the number 4 ? ': [16], 'Q5:what is the square of the number 5 ? ': [25], 'Q6:what is the square of the number 6 ? ': [
'Q3:what is the square of the number 3 ? ': [9], 'Q4:what is the square of the number 4 ? ': [16], 'Q5:what is the square of the number 5 ? ': [25], 'Q6:what
```

```
TCPServer ×     TCPClient1 ×     TCPClient2 ×     TCPClient3 ×

 ? ': [36], 'Q7:what is the square of the number 7 ? ': [49], 'Q8:what is the square of the number 8 ? ': [64], 'Q9:what is the square of the number 9 ? ': [9
 6:what is the square of the number 6 ? ': [36], 'Q7:what is the square of the number 7 ? ': [49], 'Q8:what is the square of the number 8 ? ': [64], 'Q20:what
```

```
TCPServer ×     TCPClient1 ×     TCPClient2 ×     TCPClient3 ×

 : [9], 'Q10:what is the square of the number 10 ? ': [10], 'Q11:what is the square of the number 11 ? ': [11], 'Q12:what is the square of the number 12 ? '
 what is the square of the number 20 ? ': [400]}
```

```
TCPServer ×     TCPClient1 ×     TCPClient2 ×     TCPClient3 ×
Traceback (most recent call last):
  File "C:\Users\cham.tech\AppData\Local\Programs\Python\Python310\lib\threading.py", line 1016, in _bootstrap_inner
    self.run()
  File "C:\Users\cham.tech\AppData\Local\Programs\Python\Python310\lib\threading.py", line 953, in run
    self._target(*self._args, **self._kwargs)
  File "D:\project\network programming\homework2\venv\TCPServer.py", line 21, in handel_request
    csocket.send(key.encode())
OSError: [WinError 10038] An operation was attempted on something that is not a socket
{'Q1:what is the square of the number 1 ? ': [1], 'Q2:what is the square of the number 2 ? ': [4], 'Q3:what is the square of the number 3 ? ': [9], 'Q4:what
the correct Answer of client 3  is:  {'Q1:what is the square of the number 1 ? ': [1], 'Q2:what is the square of the number 2 ? ': [4], 'Q3:what is the squar
Exception in thread Thread-2 (handel_request):
Traceback (most recent call last):
  File "C:\Users\cham.tech\AppData\Local\Programs\Python\Python310\lib\threading.py", line 1016, in _bootstrap_inner
    self.run()
  File "C:\Users\cham.tech\AppData\Local\Programs\Python\Python310\lib\threading.py", line 953, in run
    self._target(*self._args, **self._kwargs)
  File "D:\project\network programming\homework2\venv\TCPServer.py", line 21, in handel_request
    csocket.send(key.encode())
OSError: [WinError 10038] An operation was attempted on something that is not a socket
{'Q1:what is the square of the number 1 ? ': [1], 'Q2:what is the square of the number 2 ? ': [4], 'Q3:what is the square of the number 3 ? ': [9], 'Q4:what
the correct Answer of client 2  is: {'Q1:what is the square of the number 1 ? ': [1], 'Q2:what is the square of the number 2 ? ': [4], 'Q3:what is the squar
```

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```
?], 'Q4:what is the square of the number 4 ? ': [16], 'Q5:what is the square of the number 5 ? ': [25], 'Q6:what is the square of the number 6 ? ': [36], 'Q7
 is the square of the number 3 ? ': [9], 'Q4:what is the square of the number 4 ? ': [16], 'Q5:what is the square of the number 5 ? ': [25], 'Q6:what is the
```

```
?], 'Q4:what is the square of the number 4 ? ': [16], 'Q5:what is the square of the number 5 ? ': [25], 'Q6:what is the square of the number 6 ? ': [36], 'Q7
 is the square of the number 3 ? ': [9], 'Q4:what is the square of the number 4 ? ': [16], 'Q5:what is the square of the number 5 ? ': [25], 'Q6:what is the
```

```
: [36], 'Q7:what is the square of the number 7 ? ': [7], 'Q8:what is the square of the number 8 ? ': [8], 'Q9:what is the square of the number 9 ? ': [95],
 at is the square of the number 6 ? ': [36], 'Q10:what is the square of the number 10 ? ': [100], 'Q12:what is the square of the number 12 ? ': [144], 'Q20:
```

```
: [36], 'Q7:what is the square of the number 7 ? ': [49], 'Q8:what is the square of the number 8 ? ': [8], 'Q9:what is the square of the number 9 ? ': [95],
 at is the square of the number 6 ? ': [36], 'Q7:what is the square of the number 7 ? ': [49], 'Q10:what is the square of the number 10 ? ': [100], 'Q11:what
```

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er 9 ? ': [95], 'Q10:what is the square of the number 10 ? ': [100], 'Q11:what is the square of the number 11 ? ': [47], 'Q12:what is the square of the numbe
': [144], 'Q20:what is the square of the number 20 ? ': [400]}

ber 9 ? ': [95], 'Q10:what is the square of the number 10 ? ': [100], 'Q11:what is the square of the number 11 ? ': [121], 'Q12:what is the square of the nu
[100], 'Q11:what is the square of the number 11 ? ': [121], 'Q12:what is the square of the number 12 ? ': [144], 'Q20:what is the square of the number 20 ?

2 ? ': [144], 'Q13:what is the square of the number 13 ? ': [14], 'Q14:what is the square of the number 14 ? ': [14], 'Q15:what is the square of the number

12 ? ': [144], 'Q13:what is the square of the number 13 ? ': [52], 'Q14:what is the square of the number 14 ? ': [15], 'Q15:what is the square of the numbe
[400]}

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The output of client1:

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```
TCPServer ×   TCPClient1 ×   TCPClient2 ×   TCPClient3 ×

Q11:what is the square of the number 11 ?
11
Q12:what is the square of the number 12 ?
12
Q13:what is the square of the number 13 ?
13
Q14:what is the square of the number 14 ?
14
Q15:what is the square of the number 15 ?
15
Q16:what is the square of the number 16 ?
16
Q17:what is the square of the number 17 ?
17
Q18:what is the square of the number 18 ?
18
Q19:what is the square of the number 19 ?
19
Q20:what is the square of the number 20 ?
400
Q1:what is the square of the number 1 ?  [1] Q2:what is the square of the number 2 ?  [4] Q3:what is the square of the number 3 ?  [9] Q4:what is the squar
```

```
TCPServer ×   TCPClient1 ×   TCPClient2 ×   TCPClient3 ×




he number 19 ?  [19] Q20:what is the square of the number 20 ?  [400] the score is:  9 the correct AnswerQ1:what is the square of the number 1 ?  [1] Q2:wh
```

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The output of client2:

```
TCPServer ×    TCPClient1 ×    TCPClient2 ×    TCPClient3 ×

"D:\project\network programming\homework2\venv\Scripts\python.exe" "D:\project\network programming
Q1:what is the square of the number 1 ?
1
Q2:what is the square of the number 2 ?
4
Q3:what is the square of the number 3 ?
9
Q4:what is the square of the number 4 ?
16
Q5:what is the square of the number 5 ?
25
Q6:what is the square of the number 6 ?
36
Q7:what is the square of the number 7 ?
49
Q8:what is the square of the number 8 ?
8
Q9:what is the square of the number 9 ?
95
Q10:what is the square of the number 10 ?
100
Q11:what is the square of the number 11 ?
121
Q12:what is the square of the number 12 ?
144
```

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TCPServer ×   TCPClient1 ×   TCPClient2 ×   TCPClient3 ×   ✿ —

```
95
Q10:what is the square of the number 10 ?
100
Q11:what is the square of the number 11 ?
121
Q12:what is the square of the number 12 ?
144
Q13:what is the square of the number 13 ?
52
Q14:what is the square of the number 14 ?
15
Q15:what is the square of the number 15 ?
225
Q16:what is the square of the number 16 ?
16
Q17:what is the square of the number 17 ?
14
Q18:what is the square of the number 18 ?
47
Q19:what is the square of the number 19 ?
85
Q20:what is the square of the number 20 ?
400
Q1:what is the square of the number 1 ?  [1] Q2:what is the square of the number 2 ?  [4] Q3:what is the square of the number 3 ?  [9] Q4:what is the square
```

TCPServer ×   TCPClient1 ×   TCPClient2 ×   TCPClient3 ×   ✿

```
of the number 19 ?  [85] Q20:what is the square of the number 20 ?  [400] the score is:  11 the correct AnswerQ1:what is the square of the number 1 ?  [1]
```

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The output of client3:

```
 TCPServer ×        TCPClient1 ×        TCPClient2 ×        TCPClient3 ×

"D:\project\network programming\homework2\venv\Scripts\python.
Q1:what is the square of the number 1 ?
1
Q2:what is the square of the number 2 ?
4
Q3:what is the square of the number 3 ?
9
Q4:what is the square of the number 4 ?
16
Q5:what is the square of the number 5 ?
25
Q6:what is the square of the number 6 ?
36
Q7:what is the square of the number 7 ?
7
Q8:what is the square of the number 8 ?
8
Q9:what is the square of the number 9 ?
95
Q10:what is the square of the number 10 ?
100
Q11:what is the square of the number 11 ?
47
```

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Question 2: Simple Website with Python Flask Framework

Create a simple website with multiple pages using Flask, HTML, CSS, and Bootstrap. The website should demonstrate your understanding of web design principles.

Requirements:

A. Set up a local web server using XAMPP, IIS, or Python's built-in server (using Flask).

B. Apply CSS and Bootstrap to style the website and make it visually appealing.

C. Ensure that the website is responsive and displays correctly on different screen sizes.

D. Implement basic server-side functionality using Flask to handle website features.

The code of flask:

```python
from flask import Flask,render_template

app=Flask(__name__)
@app.route('/')
def info():
    return (render_template('bootstr.html'))

if __name__=="__main__":
    app.run(debug=True)
```

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Bootstr.html:

```html
<!DOCTYPE html>
<html lang="en">
<head>
    <meta charset="UTF-8">
    <meta http-equiv="X-UA-Compatible" content="IE=edge">
    <meta name="viewport" content="width=device-width, initial-
scale=1.0">
    <link rel="stylesheet"
href="https://cdn.jsdelivr.net/npm/bootstrap-
icons@1.3.0/font/bootstrap-icons.css">
    <link
href="https://cdn.jsdelivr.net/npm/bootstrap@5.1.0/dist/css/bootstrap.m
in.css" rel="stylesheet" >
     <title>Bootstrap Tutorial</title>
</head>
<body>
    <div class="navbar navbar-expand-md bg-dark navbar-dark text-
white">
        <div class="container">
    <a href="#" class="navbar-brand">Bootstrap Tutorial</a>
          <button
          class="navbar-toggler"
          type="button"
          data-bs-toggle="collapse"
          data-bs-target="#mainmenu">
          <span class="navbar-toggler-icon"></span>
          </button>
          <div class="collapse navbar-collapse" id="mainmenu">
              <ul class="navbar-nav ms-auto">
                  <li class="nav-item"><a href="#hero" class="nav-
link">Features</a></li>

                  <li class="nav-item dropdown">
                      <a href="#learn" class="nav-link drpodown-
toggle">Learn

                      </a></li>
```

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```html
                <li class="nav-item"><a href="#faq" class="nav-
link">Mistakes</a></li>

            </ul>
        </div>
    </div>
</div>

<section id="hero" class="bg-dark text-light text-center text-sm-
start py-5">
    <div class="container">
        <div>
            <div class="py-3">
                <h1 class="display-4"><span class="text-info">Learn
Bootstrap</span></h1>

                <p class="py-1 lead">Bootstrap is a free framework
used to facilitate the process of designing web pages for the
developer, as it provides him with ready-made CSS classes that he can
use to show the components that we add in the pages in a very beautiful
and responsive manner with the page size (Buttons) , Text Fields, Drop
Down Menus, and other helpful things such as alert messages that we
show to the user. So the design that you rely on Bootstrap to build,
will appear beautifully on the user's device, whether he is using a
phone, computer, tablet, or any other device. This framework is
supported by the Twitter company and is readily available and free for
all and is always being developed and adding more features to it, and
until this moment version 4.4.1 is its latest official version</p>
                <button class="btn btn-info">Get Started</button>

            </div>
            <img class="img-fluid w-50" src="//hero.svg" alt="">
        </div>
    </div>
</section>

<section class="py-5">
    <div class="container">
        <h2 class="text-center mb-3">
            Features
        </h2>
        <div class="row text-center">
```

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اللاذقية –جامعة تشريـن

كلية الهندسة الكهربائية والميكانيكية

قسم هندسة الاتصالات والالكترونيات

السنة الخامسة: وظيفة2 برمجة شبكات

Name:__Braa Amoon_____, Number:_____2714_____, Submitted To GitHub:__BraaAmoon_____

```html
            <div class="col-sm-12 col-md-6 col-lg-4">
                <div class="card bg-dark text-light mb-3">
                    <div class="h1 mt-3">
                        <i class="bi bi-arrow-down-left-square-fill"></i>
                    </div>
                    <div class="card-body text-center">
                        <h4 class="card-title"> <span class="text-info">Responsive</span></h4>
                        <p class="card-text">It is compatible with various screens</p>
                        <a href="#" class="btn btn-info">Learn More</a>
                    </div>
                </div>
            </div>
            <div class="col-sm-12 col-md-6 col-lg-4">
                <div class="card bg-dark text-light mb-3">
                <div class="h1 mt-3">
                    <i class="bi bi-bounding-box"></i>
                </div>
                <div class="card-body text-center">
                    <h4 class="card-title"> <span class="text-info">Easy Styling</span></h4>
                        <p class="card-text">It has css templates ready</p>
                        <a href="#" class="btn btn-info">Learn More</a>
                    </div>
                </div></div>
                <div class="col-sm-12 col-md-6 col-lg-4"><div class="card bg-dark text-light">
                    <div class="h1 mt-3">
                        <i class="bi bi-bricks"></i>
                    </div>
                    <div class="card-body text-center">
                        <h4 class="card-title"> <span class="text-info">Fast Working</span></h4>
                        <p class="card-text">It saves a lot of effort</p>
                        <a href="#" class="btn btn-info">Learn More</a>
                    </div>
                </div></div>
```

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```html
                </div>
            </div>
        </section>


        <section id="learn" class="py-5">
            <div class="container">
                <div class="row align-items-center justify-content-center">
                    <div class="col-md">


                        <h2>Technical Information</h2>
                        <p>The Bootstrap framework is considered Front-End
because it is used in the design of the user interface, not in its
programming. In general, the Bootstrap framework consists of HTML, CSS
and Javascript, and it depends on other available libraries such as
Jquery and PopperJs, but of course you as a developer do not care at
all about the nature of the relationship between them because it is the
responsibility of the Bootstrap developers and not the developers who
use it. For information, Bootstrap relies on Jquery for the effects it
adds to designs and anything related to hiding and showing, and relies
on PopperJs in order to improve the user experience for touch screens
(Touch Screen), such as the user dealing with your page through his
phone or any tablet.</p>
                    </div>
                    <div class="col-md">
                        <h2>A good editor for Bootstrap </h2>
                        <p> When working with the Bootstrap framework, you
can use any editor that has comfortable colors and has plugins that
make writing commands easier, such as VSCode, Atom, or any other
editor.</p>
                    </div>
                </div>
            </div>
        </section>


        <section id="next" class="py-5 bg-dark text-light">
            <div class="container">
                <div class="row align-items-center justify-content-center
flex-row-reverse">
                    <div class="col-md">
                        <h2>How to include the Bootstrap framework</h2>
```

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```
                <p> Before starting with Bootstrap, you must
include the Bootstrap libraries in any page you want to use it on.
There are two main ways to do this: You download its files and add them
to the project. You only include links to its files in the project so
that it is automatically uploaded to it</p>
                </div>
                <div class="col-md">
                    <h2>Bootstrap rules</h2>
                    <p>1-Row classes must be inside .container for
fixed width of the page or .container-fluid for full width 2-Row is
used to make a horizontal group of columns. 3-Content is preferably
placed inside the columns only</p>
                </div>
            </div>
        </section>


        <section id="faq" class="py-5">
            <div class="container">
                <h2 class="text-center mb-3">
                    Mistakes
                </h2>
                <div class="accordion accordion-flush" id="bt-faq">
                    <div class="accordion-item">
                        <h5 class="accordion-header" id="question-one"
data-bs-parent="#bt-faq">
                            <button class="accordion-button collapsed"
type="button" data-bs-toggle="collapse" data-bs-target="#answer-one">
                                Mistake 1
                            </button>
                        </h5>
                        <div class="accordion-collapse px-4 " id="answer-
one">
                            Believing that you don't need to know CSS to
use this framework and that you don't need a designer.
                        </div>
                    </div>

                    <h5 class="accordion-header" id="question-Two" data-bs-
parent="#bt-faq">
                        <button class="accordion-button collapsed"
type="button" data-bs-toggle="collapse" data-bs-target="#answer-one">
```

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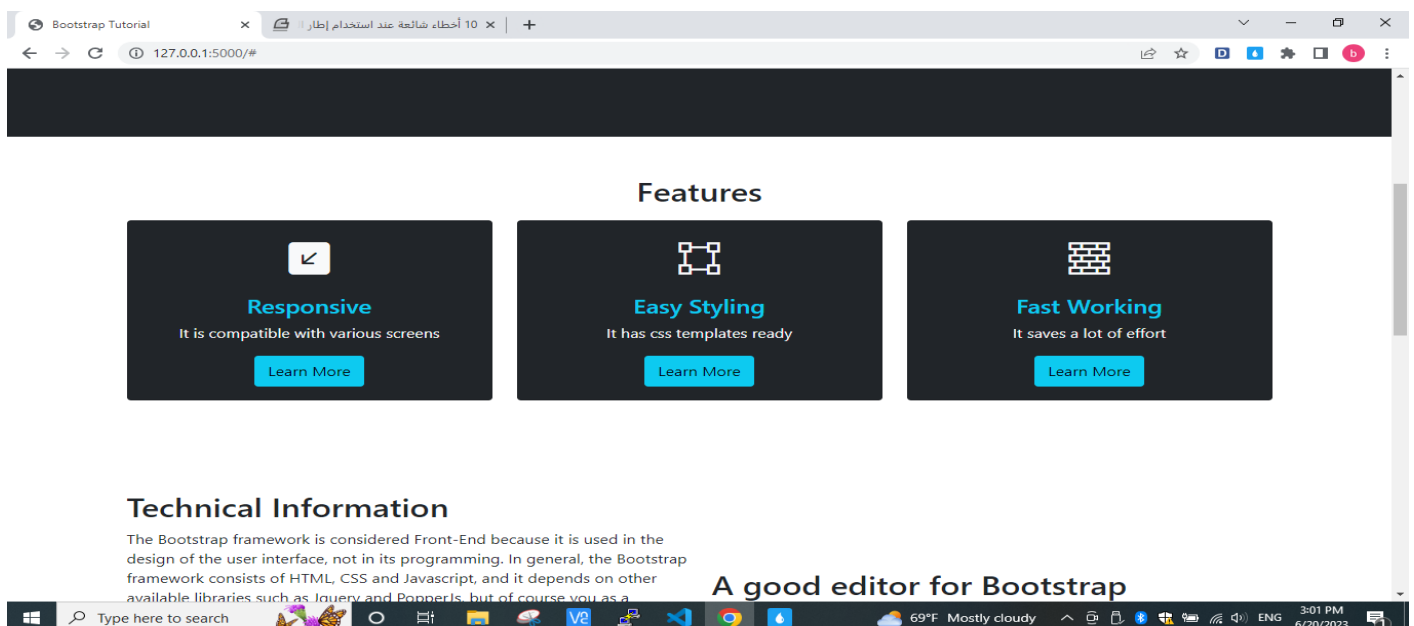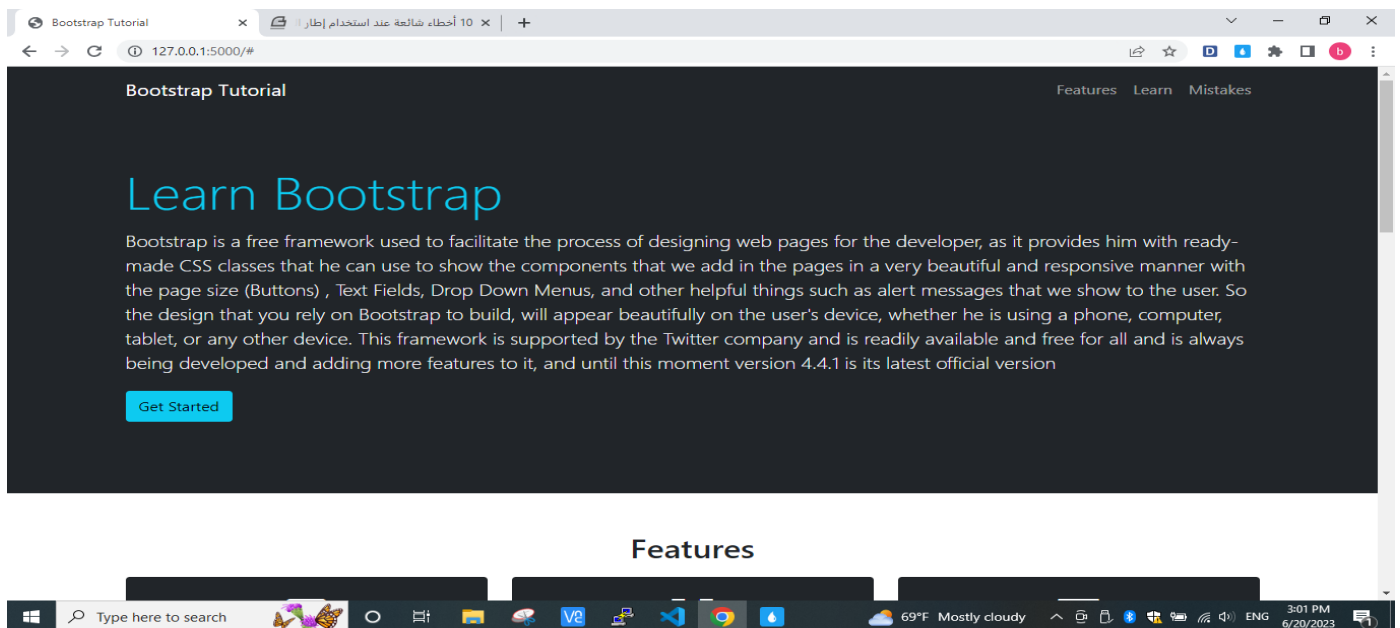اللاذقية -جامعة تشريـن

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```
                            Mistake 2
                        </button>
                </h5>
                <div class="accordion-collapse px-4 " id="answer-Two">
                        Using everything that Bootstrap has to offer
                </div>
            </div>

            <h5 class="accordion-header" id="question-Three" data-bs-
parent="#bt-faq">
                    <button class="accordion-button collapsed"
type="button" data-bs-toggle="collapse" data-bs-target="#answer-one">
                        Mistake 3
                    </button>
                </h5>
                <div class="accordion-collapse px-4" id="answer-Three">
                        Neglecting tools that make development easier with
Bootstrap
                </div>
        </div>

            </div>
        </div>
    </section>

    <section>
        <footer class="py-5 bg-dark text-white text-center">
            <div class="containter">
                <p class="lead">
                    graduate &copy; 2023 Braa Amoon
                </p>
                <a href="#">
                    <i class="bi bi-arrow-up-circle h2"></i>
                </a>
            </div>
        </footer>
    </section>

    <script
src="https://cdn.jsdelivr.net/npm/bootstrap@5.1.0/dist/js/bootstrap.bun
dle.min.js" integrity="sha384-
```

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```
MrcW6ZMFYlzcLA8Nl+NtUVF0sA7MsXsP1UyJoMp4YLEuNSfAP+JcXn/tWtIaxVXM"
crossorigin="anonymous"></script>
</body>
</html>
```

Website:

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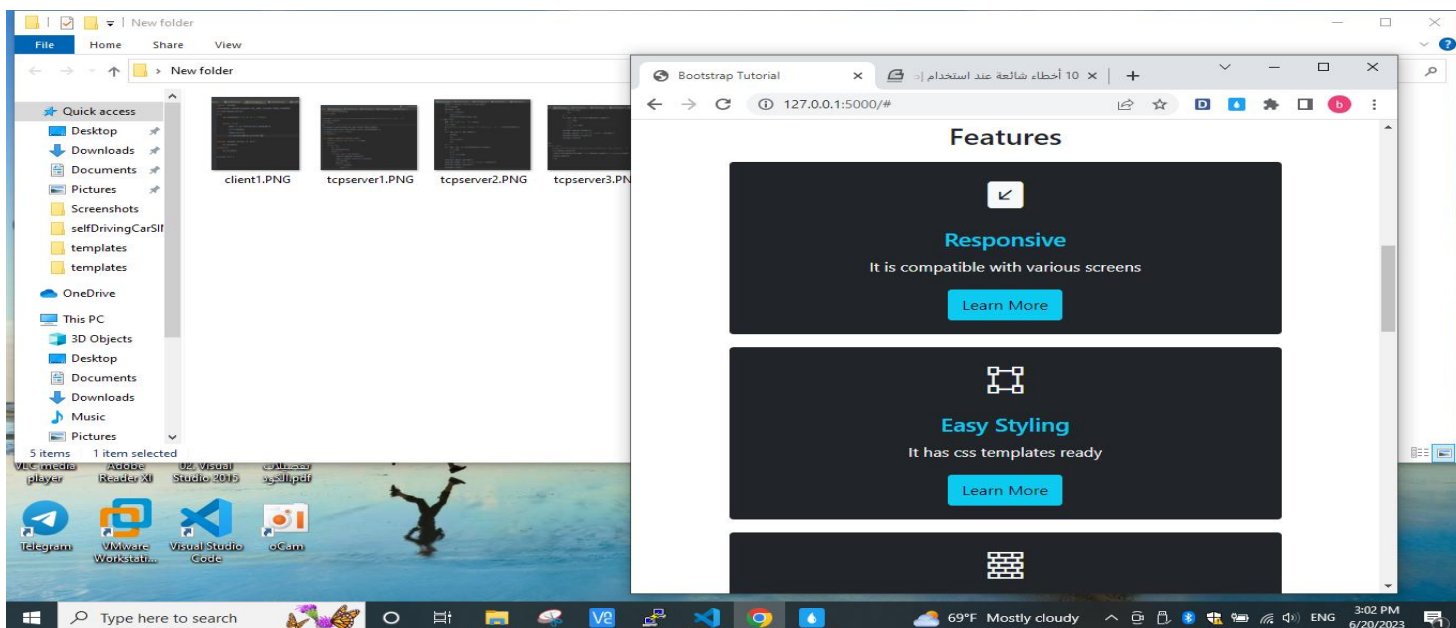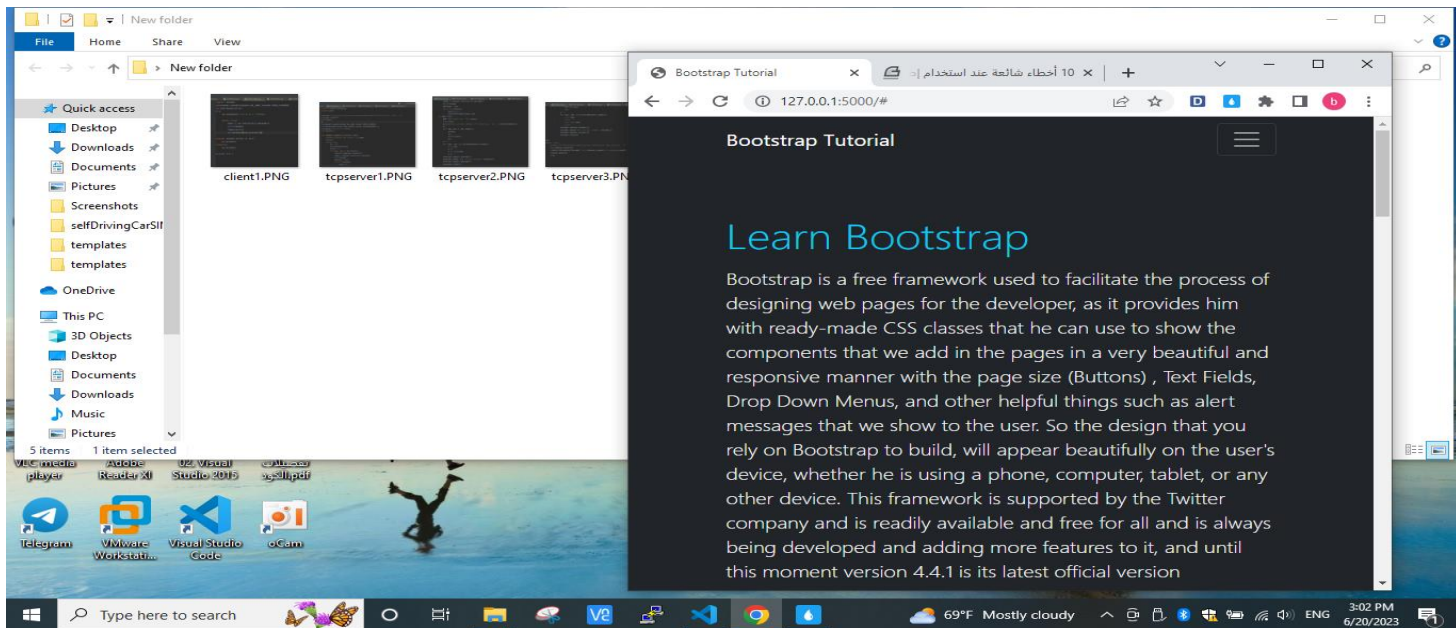
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