Syrian Arab Republic

Lattakia - Tishreen University

Department of Communication and electrical engineering

5th , Network Programming : Homework No2

الجمهورية العربية السورية

اللاذقية -جامعــة تشريـــن

كلية الهندسة الكهربائية والميكانيكية

قسم هندسة الاتصالات والالكترونيات

السنة الخامسة: وظيفة2 برمجة شبكات

Name:_ Johny Albany _____, Number: 1628_____, Submitted To GitHub:_____

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.

File Edit Format Run Options Window Help

```
import socket
import threading

quiz_questions = {
    'Python is a case sensitive language True or False?': 't',
    'Python is object-oriented language True or False?': 't',
    'Python is a scripting language True or False?': 't',
    'Python is a open source language True or False?': 't',
    'Python is a compiled language True or False?': 'f',
    'Python is a cross platform language True or False?': 't',
    'Python is a dynamically typed language True or False?': 't',
    'Python runs on the chrome browser True or False?': 'f',
    'Python is a high level language True or False?': 't',
    'Python is a hard to learn language True or False?': 'f',
    'Python is a interpreted language True or False?': 't',
    'Python django library is used for game development True or False?': 'f',
    'Python is a machine language True or False?': 'f',
    'Python is developed by Guido van Rossum True or False?': 't',
    'Python is written in c language True or False?': 't',
    'Variable declaration is implicit in python?': 't',
    'split(), splits the string at the specificed separator, and returns a list true or false?': 't',
    'strip(), returns a trimmed version of the string true or false?': 't',
    'pop() removes the elements at random position?': 'f'
}

client_scores = {}

def handle_client(client_soc, client_address):
    try:
        client_soc.send(str(len(quiz_questions)).encode())
```

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```
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    try:
        client_soc.send(str(len(quiz_questions)).encode())

        for question in quiz_questions:
            client_soc.send(question.encode())

            client_ans = client_soc.recv(1024).decode().strip()

            if client_ans.lower() == quiz_questions[question].lower():
                client_scores[client_address] = client_scores.get(client_address, 0) + 1

        score = client_scores.get(client_address, 0)
        client_soc.send(f"Score: {score}/{len(quiz_questions)}\n".encode())

    except ConnectionAbortedError:
        print(f"The connection was aborted by the client.: {client_address}")

    client_soc.close()
    print(f"The client has been disconnected...: {client_address}")

def start_server():
    server_soc = socket.socket(socket.AF_INET, socket.SOCK_STREAM)

    server_address = ('localhost', 4444)
    server_soc.bind(server_address)

    server_soc.listen(5)
    print("The server has been initialized and is now awaiting connections...")
```

```
    while True:
        client_socket, client_address = server_soc.accept()
        print(f"Connected to {client_address}")

        client_thread = threading.Thread(target=handle_client, args=(client_socket, client_address))
        client_thread.start()

if __name__ == '__main__':
    start_server()
```

يتم استيراد وحدة "socket" لإنشاء اتصال .

يتم استيراد وحدة "threading" لتمكين التنفيذ المتزامن لعملاء.

يحتوي "quiz_questions" على قاموس يحتوي على أسئلة الاختبار كمفاتيح وإجاباتها الصحيحة كقيم.

"client_scores" هو قاموس يحتفظ بنتائج العملاء.

تقوم وظيفة "handle_client" بمعالجة كل اتصال عميل. ترسل عدد أسئلة الاختبار إلى العميل، ثم ترسل كل سؤال على حدة وتستقبل إجابة العميل، وتقارنها بالإجابة الصحيحة وتحدث نتيجة العميل وفقًا لذلك.

تقوم وظيفة "start_server" بإعداد مأخذ الخادم وتربطه بعنوان ومنفذ محددين، ثم تستمع لاتصالات العملاء الواردة. بمجرد توصيل عميل، يتم إنشاء خط أحدث للتعامل مع العميل باستخدام وظيفة "handle_client".

يعمل الخادم بشكل دائم، حيث يقوم بقبول اتصالات العملاء الجديدة بشكل مستمر.

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```
File  Edit  Format  Run  Options  Window  Help
import socket

def st_client():
    server_host = 'localhost'
    server_port = 4444

    client_soc = socket.socket(socket.AF_INET, socket.SOCK_STREAM)

    try:
        client_soc.connect((server_host, server_port))
        print(f"Connected to server {server_host}:{server_port}")

        num_questions = int(client_soc.recv(1024).decode())

        for _ in range(num_questions):
            question = client_soc.recv(1024).decode()

            answer = input(f"{question}: ")

            client_soc.sendall(answer.encode())

        final_score = client_soc.recv(1024).decode()
        print(f"Your final score: {final_score}")

    except ConnectionRefusedError:
        print("Failed to connect to the server.")
    finally:
        client_soc.close()

if __name__ == '__main__':
    st_client()
```

يتم استيراد وحدة "socket" لإنشاء اتصال شبكة.

يتم تعريف وظيفة "st_client" التي تقوم بتنفيذ عملية العميل. تحدد عنوان الخادم ومنفذه ونعمل مأخذ عميل.

يتم محاولة الاتصال بالخادم المحدد باستخدام دالة "connect" وإرسال رسالة عند الاتصال الناجح.

يتم استلام عدد أسئلة الاختبار من الخادم وفقًا لهذا العدد يتم تكرار العملية التالية:

يتم استلام سؤال من الخادم.

يتم طرح السؤال للمستخدم واستلام إجابته.

يتم إرسال إجابة المستخدم إلى الخادم.

يتم استلام النتيجة النهائية من الخادم وطباعتها على الشاشة.

يتم التعامل مع حالات الأخطاء المحتملة وإغلاق المأخذ العميل في النهاية.

عند تشغيل الكود، يتم إنشاء اتصال بالخادم ويُطلب من المستخدم الإجابة على أسئلة الاختبار، ومن ثم يتم عرض النتيجة النهائية للمستخدم.

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PROBLEMS OUTPUT TERMINAL DEBUG CONSOLE

```
Your answer (t/f): t
Question: Python is a dynamically type
d language True or False?
Your answer (t/f): t
Question: Python runs on the chrome br
owser True or False?
Your answer (t/f): t
Question: Python is a high level langu
age True or False?
Your answer (t/f): t
Question: Python is a hard to learn la
nguage True or False?
Your answer (t/f): t
Question: Python is a interpreted lang
uage True or False?
Your answer (t/f): t
Question: Python django library is use
d for game development True or False?
Your answer (t/f): t
Question: Python is a machine language
 True or False?
Your answer (t/f): t
Question: Python is developed by Guido
 van Rossum True or False?
Your answer (t/f): t
Question: Python is written in c langu
age True or False?
Your answer (t/f): t
Question: Variable declaration is impl
icit in python?
Your answer (t/f): t
Question: split(), splits the string a
t the specificed separator, and return
s a list true or false?
Your answer (t/f): t
Question: strip(), returns a trimmed v
ersion of the string true or false?
Your answer (t/f): t
Question: pop() removes the elements a
t random position?
Your answer (t/f): t
Question: Your score: 13/19
```

```
anguage True or False?
Your answer (t/f): f
Question: Python is a dynamically type
d language True or False?
Your answer (t/f): f
Question: Python runs on the chrome br
owser True or False?
Your answer (t/f): f
Question: Python is a high level langu
age True or False?
Your answer (t/f): f
Question: Python is a hard to learn la
nguage True or False?
Your answer (t/f): f
Question: Python is a interpreted lang
uage True or False?
Your answer (t/f): f
d for game development True or False?
Your answer (t/f): f
Question: Python is a machine language
 True or False?
Your answer (t/f): f
Question: Python is developed by Guido
 van Rossum True or False?
Your answer (t/f): f
Question: Python is written in c langu
age True or False?
Your answer (t/f): f
Question: Variable declaration is impl
icit in python?
Your answer (t/f): f
Question: split(), splits the string a
t the specificed separator, and return
s a list true or false?
Your answer (t/f): f
Question: strip(), returns a trimmed v
ersion of the string true or false?
Your answer (t/f): f
Question: pop() removes the elements a
t random position?
Your answer (t/f): f
Question: Your score: 6/19
```

```
Your answer (t/f): t
Question: Python is a dynamically type
d language True or False?
Your answer (t/f): t
Question: Python runs on the chrome br
owser True or False?
Your answer (t/f): t
Question: Python is a high level langu
age True or False?
Your answer (t/f): t
Question: Python is a hard to learn la
nguage True or False?
Your answer (t/f): t
Question: Python is a interpreted lang
uage True or False?
Your answer (t/f): t
Question: Python django library is use
d for game development True or False?
Your answer (t/f): t
Question: Python is a machine language
 True or False?
Your answer (t/f): t
Question: Python is developed by Guido
 van Rossum True or False?
Your answer (t/f): t
Question: Python is written in c langu
age True or False?
Your answer (t/f): t
Question: Variable declaration is impl
icit in python?
Your answer (t/f): t
Question: split(), splits the string a
t the specificed separator, and return
s a list true or false?
Your answer (t/f): t
Question: strip(), returns a trimmed v
ersion of the string true or false?
Your answer (t/f): t
Question: pop() removes the elements a
t random position?
Your answer (t/f): t
Question: Your score: 13/19
```

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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.

File Edit Format Run Options Window Help

```
from flask import Flask, render_template

app = Flask(__name__)

@app.route('/')
def index():
    return render_template('index.html')

@app.route('/about')
def about():
    return render_template('about.html')

@app.route('/contact')
def contact():
    return render_template('contact.html')

if __name__ == '__main__':
    app.run(debug=True , port=9999)
```

يتم استيراد الوحدات اللازمة: Flask و render_template. Flask هي الوحدة الرئيسية لإنشاء التطبيق و render_template تستخدم لتقديم قوالب HTML.
يتم إنشاء تطبيق Flask باستخدام البناء Flask(__name__). يتم تعيين الاسم __name__ ليكون اسم الملف الحالي.
يتم تعريف مسارات التطبيق باستخدام الزخرفة @ هناك ثلاثة مسارات محددة: '/' و '/about' و '/contact'.
يتم تعريف وظيفة لكل مسار. عندما يتم طلب المسار عبر المتصفح، يتم استدعاء الوظيفة المرتبطة به وتقديم كود HTML ذو صفحة واجهة المستخدم.
يتم تشغيل التطبيق باستخدام app.run() وتعيين debug=True يعني تشغيل التطبيق في وضع التصحيح لعرض الأخطاء، وتعيين port=9999 لاستخدام المنفذ 9999.
عند تشغيل الكود، سيقوم التطبيق بالاستماع على المنفذ المحدد (9999) وعند طلب مسار الموقع الرئيسي ('/') سيتم عرض الصفحة الرئيسية، وعند طلب المسارات '/about' و '/contact' سيتم عرض صفحات About و Contact على التوالي.

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Client.py index.html server.py

templates > index.html > html > head

```
<!DOCTYPE html>
<html>
<head>
    <title>Learn Python</title>
    <link rel="stylesheet" href="{{ url_for('static', filename='css/bootstrap.min.css') }}">
    <link rel="stylesheet" href="static/css/style.css">
</head>
<body>
    <header>
        <nav>
            <ul>
                <li><a href="{{ url_for('index') }}">Home</a></li>
                <li><a href="{{ url_for('about') }}">About</a></li>
                <li><a href="{{ url_for('contact') }}">Contact</a></li>
            </ul>
        </nav>
    </header>
    <section class="container">
        <h1 class="text-center">Welcome to Learn Python</h1>
        <p class="lead">Python is a powerful and versatile programming language. It is widely used in various domains such as web development, dat
        <h2>Getting Started</h2>
        <p>To start learning Python, you can follow these steps:</p>
        <ol>
            <li>Install Python on your computer.</li>
            <li>Choose an Integrated Development Environment (IDE) or code editor.</li>
            <li>Learn the basic syntax and data types.</li>
            <li>Practice writing simple programs.</li>
            <li>Explore Python libraries and frameworks.</li>
        </ol>
        <h2>Learning Levels</h2>
        <ul>
            <li>Beginner</li>
            <li>Intermediate</li>
            <li>Advanced</li>
        </ul>
        <h2>Python Domains</h2>
        <h2>Python Domains</h2>
        <ul>
            <li>Web Development</li>
            <li>Data Analysis</li>
            <li>Machine Learning</li>
            <li>Artificial Intelligence</li>
            <li>Game Development</li>
            <li>Scripting</li>
        </ul>
        <h2>Example Code</h2>
        <p>Here's a simple Python code snippet:</p>
        <pre><code class="python">
def greet(name):
    print("Hello, " + name + "!")

greet("John")
        </code></pre>
    </section>
</body>
</html>
```

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Client.py | index.html | contact.html | server.py

templates > contact.html > html > body > section.container > ul > li

```
<!DOCTYPE html>
<html>
<head>
    <title>Contact - Learn Python</title>
    <link rel="stylesheet" href="{{ url_for('static', filename='css/bootstrap.min.css') }}">
    <link rel="stylesheet" href="static/css/style.css">
</head>
<body>
    <header>
        <nav>
            <ul>
                <li><a href="{{ url_for('index') }}">Home</a></li>
                <li><a href="{{ url_for('about') }}">About</a></li>
                <li><a href="{{ url_for('contact') }}">Contact</a></li>
            </ul>
        </nav>
    </header>
    <section class="container">
        <h1 class="text-center">Contact Learn Python</h1>
        <p class="lead">We would love to hear from you. Please feel free to reach out to us with any questions, suggestions, or feedback.</p>
        <h2>Contact Information</h2>
        <ul>
            <li>Email: info@learnpython.com</li>
            <li>Phone: +1212332233</li>
        </ul>
    </section>
</body>
</html>
```

Client.py | index.html | contact.html | about.html | server.py

templates > about.html > html > head

```
<!DOCTYPE html>
<html>
<head>
    <title>About - Learn Python</title>
    <link rel="stylesheet" href="{{ url_for('static', filename='css/bootstrap.min.css') }}">
    <link rel="stylesheet" href="static/css/style.css">
</head>
<body>
    <header>
        <nav>
            <ul>
                <li><a href="{{ url_for('index') }}">Home</a></li>
                <li><a href="{{ url_for('about') }}">About</a></li>
                <li><a href="{{ url_for('contact') }}">Contact</a></li>
            </ul>
        </nav>
    </header>
    <section class="container">
        <h1 class="text-center">About Learn Python</h1>
        <p class="lead">Learn Python is a website dedicated to providing resources and tutorials for learning the Python programming language.</p
        <h2>Our Mission</h2>
        <p>Our mission is to make learning Python accessible to everyone, from beginners to experienced programmers. We strive to provide compreh
        <h2>Why Learn Python?</h2>
        <p>Python has gained popularity due to its simplicity, readability, and versatility. It is used in a wide range of applications, includin
        <h2>Our Team</h2>
        <p>Our team consists of experienced Python developers and educators who are passionate about teaching and sharing their knowledge.</p>

    </section>
</body>
</html>
```

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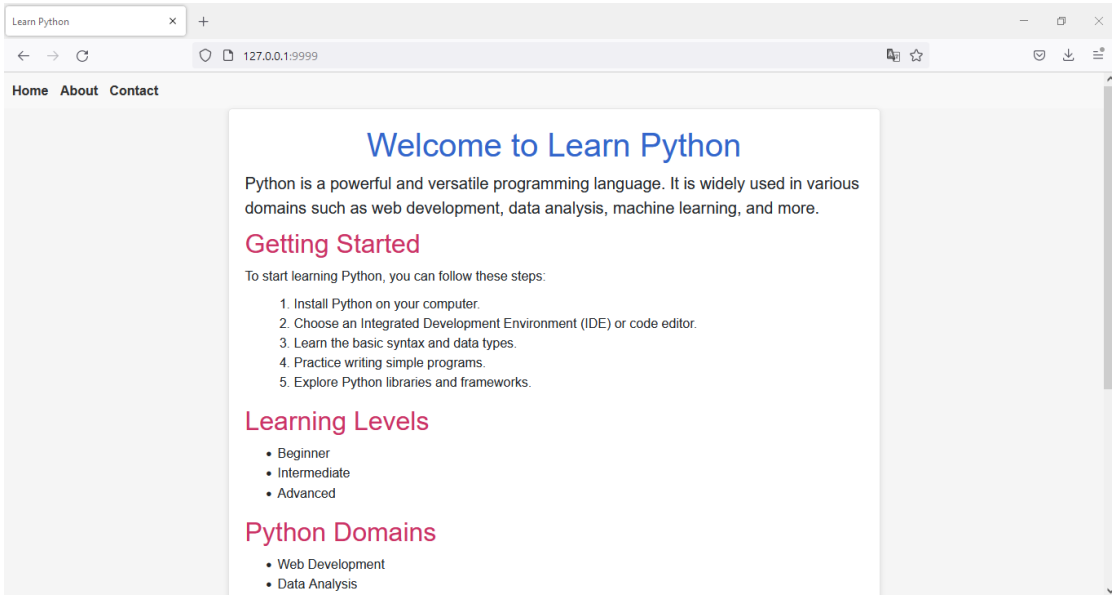

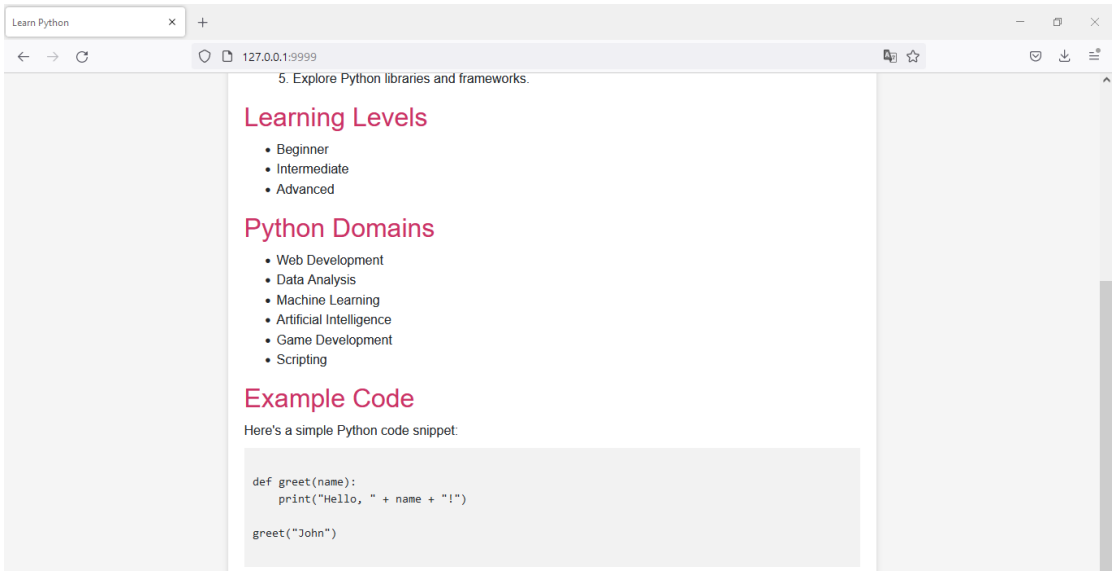

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