MIDDLE EAST TECHNICAL UNIVERSITY, NORTHERN CYPRUS CAMPUS
CNG445 Software Development with Scripting Languages

Assignment 2: Coffee Shop Application

This assignment aims to help you practice multithreading and concurrent programming, network programming, and graphical user interface components in Python. On the successful completion of this assignment, you will also practice Python basics. Your main task in this assignment is to develop a client-server application for a coffee shop based on Transmission Control Protocol (TCP).

The client application will be used by both baristas and managers, and multiple barista panels and manager panels should be able to be opened at the same time, so the server should be able to communicate with multiple clients at the same time as illustrated in Figure 1.

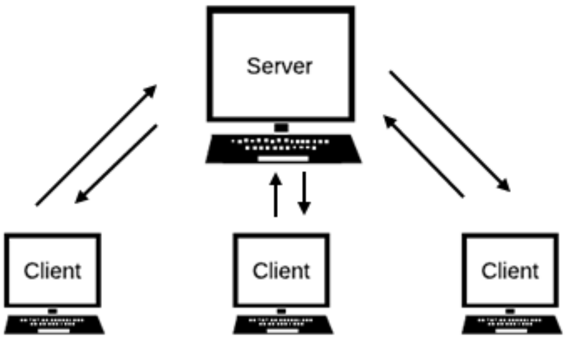


Figure 1: Client-Server Model

Overview

In this assignment, you will develop a client-server application for a coffee shop that sells coffees and cakes. The client application will be used by the baristas and managers of the coffee shop. The baristas will be responsible for entering the details of the orders and sending them to the server, and the managers will be responsible for requesting some statistics related to the orders, which will be generated on the server.

The coffee shop sells the following coffees:

- Latte
- Cappuccino
- Americano
- Expresso

It also sells the following cakes:

- San Sebastian Cheesecake
- Mosaic Cake
- Carrot Cake

An order may include multiple coffees and multiple cakes, for example, two lattes and two mosaic cakes. If a customer has a discount code, s/he will also receive a discount. By using the client application, the managers can request the following statistics related to the orders.

Table 1. Statistics Reports

Code	Statistics
1	What is the most popular coffee overall? If there are multiple of them, all of them should be reported.
2	Which barista has the highest number of orders? If there are multiple of them, all of them should be reported.

3	What is the most popular product for the orders with the discount code? If there are multiple of them, all of them should be reported.
4	What is the most popular cake that is bought with expresso? If there are multiple of them, all of them should be reported.

Both baristas and managers should login to the client application to perform their operations.

The server should manage four text files: **users.txt**, **prices.txt**, **discountcodes.txt**, and **orders.txt**.

1. The **users.txt** file will keep track of the details of the baristas and managers as follows (username;password;role):
```
greg;b123;barista
dave;k343;barista
simon;7684;manager
```

2. The **prices.txt** file will keep track the prices of the products as follows (product;price):
```
latte;50
cappuccino;50
americano;40
expresso;35
sansebastian;50
mosaic;45
carrot;45
```

3. The **discountcodes.txt** file will keep track the discount codes as follows (discountcodes;discountrate):
```
12a345;10
678b91;10
23c456;20
789d10;25
```

   These discount codes can be used only once and should be deleted from the file once they are used.

4. The **orders.txt** file will keep track the details of the orders as follows (totalprice;discountrate;barista;product-quantity;product-quantity;...)
   140;0;greg;cappuccino-1;americano-1;sansebastian-1
   90;10;greg;latte-2
   160;20;dave;latte-2;sansebastian-2

Requirements

Authentication: When the client application is started and the connection is established with the server, the server will send a confirmation message to the client (message: `connectionsuccess`). Once this message is received, the client will then show the following login screen to take the username and password from the user (See Figure 2).

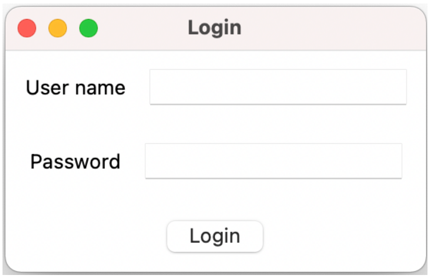


Figure 2: Login screen

Once the client sends the username and password to the server (message format: `login;`*`username`*`;`*`password`*), the server will check the **users.txt** file and send an approval message (message format: `loginsuccess;`*`username`*`;`*`role`*) or rejection message (message format: `loginfailure`) back to the client. If the login is not successful, then the error message box will be shown on the client side. However, if the login is successful, then the appropriate user panel will be shown based on the user role.

Barista Panel: Figure 3 shows the user panel for a barista. When a barista wants to add an order, s/he needs to select the products and enter their quantitates. If the customer has a discount code, then the barista also has to add the discount code. When the "Create" button is clicked, the details of the order will be sent to the server as follows: (message format: **`order`**`;`*`discountcode`*`;`*`barista`*`;`*`product-quantity`*`;`*`product-quantity`*`;`…)

```
order;nodiscountcode;greg;cappuccino-1;americano-1;sansebastian-1
order;12a345;greg;latte-2
```

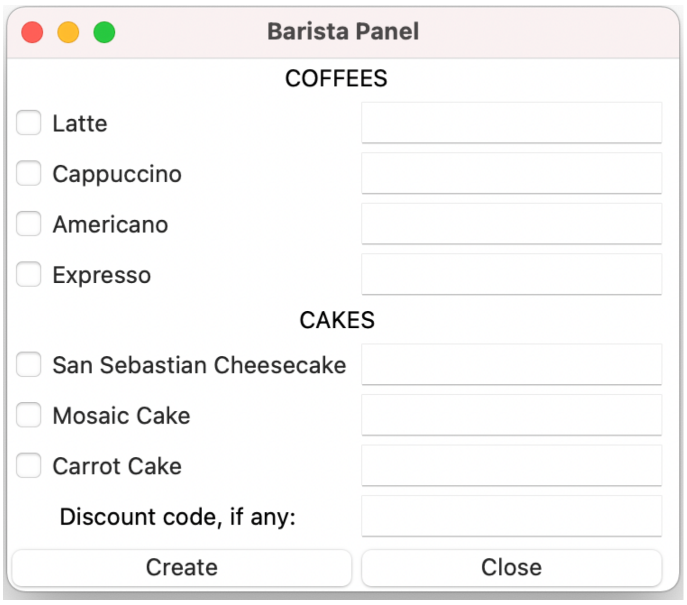
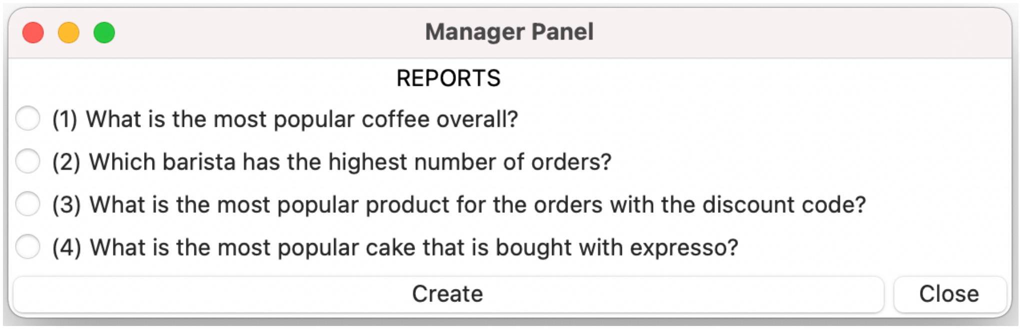


Figure 3: Barista Panel

The server then computes the total price by using the prices available in **prices.txt**, and applies the discount if the discount is provided and available in **discountcodes.txt**. If a discount code is used, the code will be removed from **discountcodes.txt.** The server then adds the details of the order to **orders.txt**, and finally sends the confirmation message for the order with total price to the client (message format: **`orderconfirmation`**`;`*`totalprice`*). The total price will be shown in a message box on the client side.

When the "Close" button is clicked, the connection between the client and the server will be terminated.

Manager Panel: Figure 4 shows the user panel for a manager. When the manager selects one of the available statistics reports, the report code will be sent to the server such as **`report2`**. The server will then generate and send back (message format: **`report2`**`;`*`answer`* or **`report2`**`;`*`answer1`*`;`*`answer2`*`;`… if there are multiple answers). The answer should be shown in a message box appropriately on the manager's side.



Manager Panel
REPORTS
(1) What is the most popular coffee overall?
(2) Which barista has the highest number of orders?
(3) What is the most popular product for the orders with the discount code?
(4) What is the most popular cake that is bought with expresso?
Create
Close

Figure 5: Manager Panel

When the "Close" button is clicked, the connection between the client and the server will be terminated.

Thread Synchronisation: You should consider the RLock thread synchronization technique to deal with any problems caused by attempting to access the shared data at the same file.

Rules

- You need to write your program by using **Python 3.x**.
- You can **only** use all built-in functions and modules.
- You also need to create a file called ReadMe.txt which contains the following items. Please note that **if you do not submit ReadMe.txt, your submission will not be evaluated.**
    - Team members
    - Which version of Python 3.x you have used
    - Which operating system you have used
    - How you have worked as a team, especially how you have divided the tasks among the team members (who was responsible for what?), how you have communicated, how you have tested the program, etc.
- You should name your server as **server.py** and name your client as **client.py**.
- You should not forget to submit your **users.txt**, **prices.txt**, **discountcodes.txt** and **orders.txt** files.
- You need to put all your files into a folder that is named with your student id(s) and submit the compressed version of the folder in the **.zip** format.
- **Only one team member** should submit the assignment.
- **Code quality, modularity, efficiency, maintainability, and appropriate comments** will be part of the grading.

Grading Policy

The assignment will be graded as follows:

Grading Item	**Mark (out of 100)**
Login	10
Order	20
Thread Synchronisation	10
Report 1	10
Report 2	10
Report 3	10
Report 4	10
Barista Screen	10
Manager Screen	10