

CSCI/ECEN 5673: Distributed Systems Spring 2022

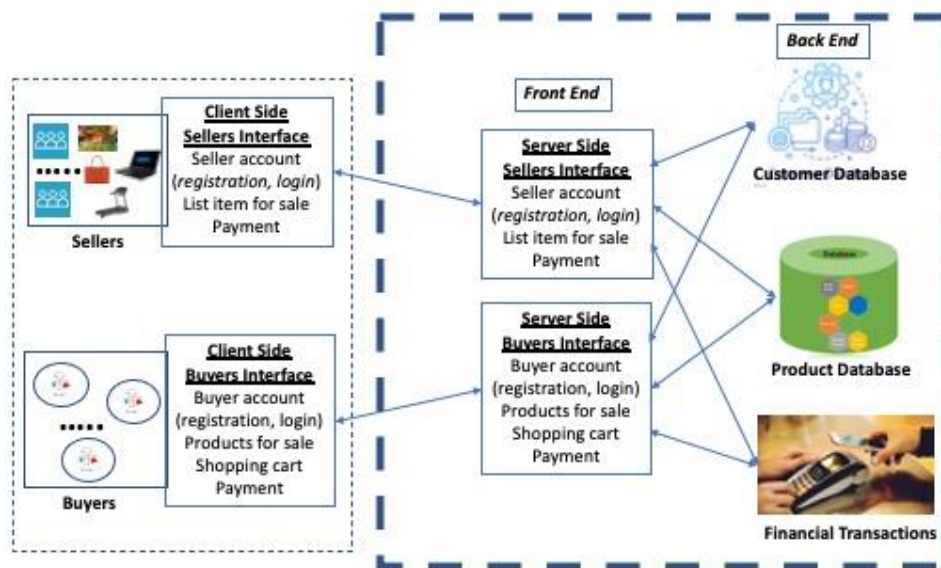
Programming Assignment One

Due Date and Time: 11:59 PM, Friday, February 04, 2022

Goal: The goal of this programming assignment is to review client-server programming using TCP/IP (using socket interface) and develop a system that you will enhance over the next 2-3 programming assignments.

You may work in teams of size two students.

An online marketplace is an e-commerce site that brings sellers and buyers together in one place. It allows sellers to put items for sale and interested buyers to purchase those items. We outlined the design of this system in class, comprised of seven logical components (See LectureSetZero - Intro.ppt): Client-side sellers interface, Client-side buyers interface, Server-side sellers interface, Server-side buyers interface, Customer database, Product database and Financial transactions. Over the first few programming assignments, you will implement and enhance this online marketplace.



Characteristics of an item put up for sale

Item name: a char string of up to 32 characters, assigned by the seller (item names may not be unique)

Item category: an integer (0 – 9), assigned by the seller

Item Id: <item category, integer>: unique id assigned by the server

Keywords: up to five keywords, assigned by the seller, each keyword is a string of up to 8 characters

Condition: New or Used, assigned by the seller

Sale price: decimal number, assigned by the seller

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Seller characteristics

Seller name: a char string of up to 32 characters, provided by the seller during account creation (Seller names may not be unique)

Seller id: an integer, a unique id provided by the server during account creation

Seller feedback: <# of thumbs up, # of thumbs down>, maintained by the server

Number of items sold: an integer maintained by the server

Buyer characteristics

Buyer name: a char string of up to 32 characters, provided by the seller during account creation (Buyer names may not be unique)

Buyer id: an integer, a unique id provided by the server during account creation

Number of items purchased: an integer maintained by the server

APIs of the logical components

Client-side sellers interface

Create an account: *sets up username and password*

Login: *provide username and password*

Logout

Get seller rating

Put an item for sale: *provide all item characteristics and quantity*

Change the sale price of an item: *provide item id and new sale price*

Remove an item from sale: *provide item id and quantity*

Display items currently on sale put up by this seller

Server-side sellers interface

Same as Client-side Sellers interface

Client-side buyers interface

Create an account: *sets up username and password*

Login: *provide username and password*

Logout

Search items for sale: *provide an item category and up to five keywords*

Add item to the shopping cart: *provide item id and quantity*

Remove item from the shopping cart: *provide item id and quantity*

Clear the shopping cart

Display shopping cart

Make purchase

Provide feedback: *thumbs up or down for each item purchased, at most one feedback per purchased item*

Get seller rating: *provide buyer id*

Get buyer history

Server-side buyers interface

Same as Client-side buyers interface

You can design the APIs of the three backend components as you see fit.

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Requirements of programming assignment one

For this assignment, implement the following subset of the systems: Client-side and Server-side sellers interface (all API functions colored blue), Client-side and Server-side buyers interface (all API functions colored blue), and the Product database. Each of these components may run on different hosts (IP addresses).

Design your own (reasonable) semantics for the search function in terms of “best” keyword match, etc. Clearly state your semantics.

You may keep the entire product database in memory, i.e. no secondary storage.

Use TCP for interprocess communication. For this assignment, assume that each buyer or seller maintains a single TCP connection, i.e. each new TCP connection from client indicates a new buyer or seller. **DO NOT USE REST OR ANY RPC MECHANISMS.**

(NOTE: You will possibly extend/modify these APIs in future assignments, so make sure that your implementation can be easily extended in future)

Evaluation

Run your server components as separate process on possibly different hosts and possibly on cloud. Measure the average response time of each client function.

What to submit

Submit a single zipfile that contains all source code files, makefiles, and a README file. In the README file, provide a brief description of your system design along with any assumptions (8-10 lines), current state of your system (what works and what not), and all round-trip latency numbers.