CS 2413 - 501/503 - Project 1

This is the first programming assignment of the semester, it is designed to test your programming abilities before the first exam. It will heavily involve pointers, functions, strings, structs, and linear data structures. Do not worry about non-linear data structures yet.

Your assignment must be submitted as a .c file, any other format will result in a penalty to your grade, the assignment is due by 9/22 at midnight.

Project Specification

You are to implement a system that tracks customers checking out at a grocery store.
Our store has an express register, and a regular register.

Customers will have the following:
- A list of groceries they want to purchase, grocery items consist of
  - Name - the name of the item
  - Price - the marked price (in dollars) of one item
  - Number - the number of said items in one customer's list
- Balance
  - Amount of cash they have on them
- Name

The customers form a queue to get into the registers, there is only one queue and it will not have customers added to it once it is formed. Customers from the front of the queue are led into one register at a time, if a customer has less than 10 items then they go to the express register, otherwise they go to the normal register.

The register will check each item in the customer's grocery list sequentially, keep a running total, and then take payment from the customer once all items are bagged. If the customer does not have enough money, they will be rejected and their items will be removed.

Your program will read in customers from a file "input.txt", parse them as structs then place them into your queue for processing by the register or express register. Your program should maintain a log file that records which customer went to the register.

The log for each customer should contain:
- Their name
- What their total was
- A complete account of which items they had
- If they were rejected or if they paid
  - If they were rejected, simply note they were rejected and ignore total/items
- Which register the customer went to (express/regular)

When your program is complete, write this log to a file "output.txt" in the same directory as your .c file.

You must use a *queue* as defined in the book/slides to use for the customers' queue. You can use any implementation (array, linked list, circular, etc) that you wish so long as it works and *is a queue*.

You must use **structs** *"Customer"* and *"Grocery_Item"* as defined in the book/slides to store the customer data, and grocery items respectively.

You must use a **linked list** with value *"Grocery_Item"* as defined in the book/slides in the *"Customer"* **struct**. You can use any implementation (doubly-linked, header, etc) that you wish so long as it works and *is a linked list*.

Example input:

```
{"Karen", 15.00, [{"Bananas", 5.00, 1}, {"Cookies", 3.50, 1}, {"Eggs", 1.25, 2}]}
{"Bill", 50.00, [{"Water", 3.99, 3}, {"Hamburger Meat", 8.50, 2}, {"Eggs", 1.25, 6}]}
{"Jimmy", 5.00, [{"Wine", 16.00, 1}]}
```

This would indicate:

Karen has $15.00, 4 items in her inventory:
- Bananas at $5.00 per unit, 1 unit
- Cookies at $3.50 per unit, 1 unit
- Eggs at $1.25 per unit, 2 units

Bill has $50.00, 11 items in his inventory:
- Water at $3.99 per unit, 3 units
- Hamburger Meat at $8.50 per unit, 2 units
- Eggs at $1.25 per unit, 6 units

Jimmy has $5.00, 1 item in his inventory:
- Wine at $16.00 per unit, 1 unit

The customers should be checked out as follows:

The queue is filled first with karen, then successively through the input file. Karen would be eligible for the express lane, her total was $11.00.

The next customer in the queue is bill. He goes to the regular register since he has more than 10 items, his total was $36.47.

The next customer in the queue is jimmy. He goes to the express register, his total was $16.00. He doesn't have enough money and was rejected.

The log output for these three people would be:

"Karen paid $11.00 for 1 Bananas, 1 Cookies, 1 Eggs at the express register"
"Bill paid $36.47 for 3 Water, 2 Hamburger, 6 Eggs at the regular register"
"Jimmy was rejected at the express register"

Submission Instructions

Upload your program as *[eraider]_checkout.c* where [eraider] is your eraider id. Upload your program to Blackboard where you found this specification.

Your program should run without any user input, as all input will come from "input.txt". I will open your .c file, make sure the correct input file is there for me to test, and run your program. You may include any functions or print statements as you wish to help you. Make sure you output the log as defined above to "output.txt" in the same directory as the .c file.

The only libraries (.h file) you are allowed to use are stdlib.h, stdio.h.