PROGRAMMING ASSINNMENT # 3

Spring Semester   **CSC 36000**   **February 23, 2015**

The use of queues to <u>simulate</u> various real-life situations is a common practice in applications programming. Situations in which queues are employed include waiting lists, customer checkouts, program management in a multiprogramming operating system, traffic management, inventory control, and many more.

PROGRAM STATEMENT: You are to write a program that will employ queues to simulate customer processing at a retail store. Your program is to employ classes and linked lists. <u>Major functions are to be part of the class</u>. This program is due on **March 9, 2015.**

INPUT: Input for this program will be an unknown number of records which includes information about each customer. The name of the data file will be **queue_in.txt (or queue_in_2008.txt).** The data for each customer will appear on one line (or separate lines) and will include **the customer's arrival time, the customer's name,** and **the amount of processing time for that customer.** The **arrival time** is the instant at which the customer enters one of three checkout lines (each one represented by a queue.) **Processing Time** is the time it takes the checkout clerk to process the customer's purchases (includes all actions such as ringing up the sale, collecting the money, returning change, bagging the items purchased, etc.) The format for the input data is:

         <Arrival Time>   <**Customer Name>**   **<Processing Time>**
                                     or
         <Arrival Time>
        <**Customer Name>**
        <Processing Time>

The Arrival Time is an integer starting at 1 and increasing (non-uniformly) as the simulation proceeds. The Processing Time is an integer between 1 and 50. The **Customer's name (both first and last together)** will be a string of not more then 25 characters. A customer's Arrival Time of -99 will act as the sentinel.

PROCESSING: The program is to process customers as they enter one of THREE (3) checkout line (each line is to be represented as a queue). Each customer always wants to be processed as quickly as possible so the following rules apply:

1. Each customer arrives at the appointed arrival time.
2. If a queue is empty, place the customer in the queue and begin to process the customer.
3. If all queues have customers, place the customer in the queue with the <u>shortest total processing time for that queue</u>. In case of a tie, select the queue with the LOWEST numeric value (i.e. queue1, queue2, then queue3).
4. No processing is done until the customer is at the head of the queue. *********
5. Once a customer's processing time is zero, the customer leaves the store (remove the customer from the queue.)

When scanning queues, always start with #1 and proceed numerically to #2 then #3.

OUTPUT: Output for this program is to consist of two lists. The first list is the order in which the customers entered the queues (an echo print of the input data without arrival or processing times). The second list is the order in which each customer was processed (a list of customers as they leave the store.) (HINT: You <u>may</u> need to use an "array of pointers" to maintain each list or an array of structures.) <u>Each list needs to have a label and should be printed out vertically side-by-side as shown in the example.</u> The **END OF OUTPUT** message needs to appear after the lists are printed.

PROGRAMMING ASSINNMENT # 4

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SUPPOSE THE INPUT DATA IS:

1 Quicy McCoil	3
3 Wanda Gore	17
4 Ellen Stapeton	2
6 Roy Rogers	3
7 Tom Terrific	22
10 Yul Brenner	1
12 Ursula Anderson	1
13 Ida Lapino	12
20 Oscar Madison	8
21 Paula Abdul	6
22 Albert Hall	12
23 Sam Malone	5
24 Diana Keaton	8
28 Freddie Freeloader	3
30 Greda Garbo	16
33 Hacksaw Jones	3
39 John Wayne	5
40 Kimberly Klark	4
49 Linda Lovelace	11
-99 No More	

THEN THE OUTPUT SHOULD LOOK LIKE THIS (yes side-by-side):

The order of customer arrival is:	The order of customer departure is:
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Quicy McCoil	Quicy McCoil
Wanda Gore	Ellen Stapeton
Ellen Stapeton	Roy Rogers
Roy Rogers	Yul Brenner
Tom Terrific	Ursula Anderson
Yul Brenner	Wanda Gore
Ursula Anderson	Ida Lapino
Ida Lapino	Oscar Madison
Oscar Madison	Tom Terrific
Paula Abdul	Paula Abdul
Albert Hall	Sam Malone
Sam Malone	Freddie Freeloader
Diana Keaton	Diana Keaton
Freddie Freeloader	Albert Hall
Greda Garbo	Hacksaw Jones
Hacksaw Jones	John Wayne
John Wayne	Kimberly Klark
Kimberly Klark	Greda Garbo
Linda Lovelace	Linda Lovelace

END OF OUTPUT