Summary:

This project will continue to assist you in the use of the Java development environment. This project will introduce the concept of thread programming with message queues/mailboxes. You can use the NetBeans/JAVA development environment available on the Internet from Sun Microsystems and should consult a standard Java reference to assist you in the completion of this assignment. Note: that this program is command line-based and not GUI centric, so use of the Netbeans environment is not required.

Description:

You are to create a Java program called dispenser.java. The program should print your complete name, student ID, current date and time when the main program is executed, and a text string that identifies this course “INFS601-1 Spring 2006, Project Assignment 3” as a first action.

Implement the solution to the mid-term exam question #7 with the following characteristics:

- Use mailbox or message queues to implement synchronization and critical resource access control. Do not use semaphores. Use threads for the clerk and customers.
- The milk items in the dispenser are numbered (IDs) consecutively from 1 to the total number of milk items placed into the dispenser by the clerk.
- The clerk has an infinite supply of milk items.
- There is a single milk dispenser in the store.
- Milk IDs are not be reused once placed into the dispenser.
- Create a single clerk who fills the milk dispenser whenever it is not full.
- Create a random number of customers (between 1-20) to take a milk item(s) from the dispenser.
- The time it takes to clerk to fill the milk dispenser per milk item is random and between 1-10 seconds.
- The clerk cannot fill an already full milk dispenser.
- The total number milk items that will fill up the milk container is 200.
- The clerk does not have to wait for the milk dispenser to be completely empty before starting to fill the dispenser.
- The time it takes the customer to take the milk item from the dispenser is random and between 1-10 seconds.
- When a customer obtains a milk item from the dispenser, indicate which milk item the customer obtained as part of the trace output.
- After a customer takes a milk item that customer sleeps for a random amount of time (1-20 seconds, which is different for each time that customer sleeps) before attempting to get another milk item from the dispenser.
• As customers get milk items, indicate that on standard output (to develop a trace of the program’s execution) with an ID of that customer and the milk item ID taken. Each customer has a unique ID.
• Each customer will get a random number of milk items (1-10) from the dispenser before the customer leaves the store for that day will not return.
• When a customer leaves the store, indicate that in the program execution trace.
• Once all of the customers have left the store, that is the end of the day and the program terminates.

The program is to have no command line arguments.

Use the Math.random() to generate random numbers.

Prior to starting the first customer thread, the main program indicates on standard output, the total number customers that will be created.

The final action that the main program performs is to issue a statement on the standard output device indicating the “main program “is complete”.

Your program will be graded with the Java 5.0 JDK (JSEE/JRE). If you use any non-standard packages you do so at your own risk. In addition, you program must use standard thread methods that are available within the JAVA environment. Ensure that your program properly handles any exceptions that could be generated when your program is executing.

Your program will be graded upon properly executing when the TA uses various execution runs.

Programming Practices Requirements:

Your source code is to be properly commented and follow standard programming practices Points will be deducted at the discretion of the TA for poorly commented and written code.

JAVA code guidelines can be found here:

How to Write Doc Comments for the Javadoc
http://java.sun.com/j2se/javadoc/writedoccomments/

Java Programming Style Guidelines
http://geosoft.no/development/javastyle.html

Submission Information:

Submit your source code, executable code, build/compile information, screen capture or log (script) of the output from the program’s execution, readme file, and notes (if any) in a single zip file to the TA before the assigned TA due date and time. Ensure that you receive an acknowledgement from the TA that you project submission has been received on time. At a minimum, submit your source code and a screen capture / log of the program’s execution trace to the instructor on the assigned due date.

21 March 2006