Project 4— Multithread Programming (in Java)-**100 points**

(**Due date: 11/22/2011/Tuesday Midnight at Moodle**)

Your name:	Date:

==========How To Submit—Read Carefully, Pease!!==========

1. Create a directory "**project4_YourLastName**" (you must use this format for the directory name for this project; **Use Your Last Name. For example, if your** last name is Smith, you should create directory with the name of "project4_Smith"
2. Create "**project41src**", "and "**project42src**", and **project43src**" subdirectories under "project3_YourLastName" directory.
3. When having finished your project, copy the **source files (*.java, or *.c)** to these subdirectories, respectively—you should keep this folders clean: ***only source code*** files included.
4. A "**readMe**" file is required for the project write-up that tells how to compile/run the programs and result screenshots … keep this readme simple!
5. Compress the "**project4_YourLastName**" directory and its contents into a **zip** or **rar** file with same name.
6. Submit the compressed file to the instructor by email.
7. **Penalty** for NOT following these submission instructions (10% ~100%).

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1. (**45 points**) Write a Java thread program that creates **2 threads**: 1) one for summation (i.e., given a positive integer ***N***, to calculate *sum* = 0 + 1 + 2 + 3 +……+ ***N***); 2) another for multiplication (i.e., given a positive integer ***N***, to calculate *product* = 1 * 2 * 3 *……* ***N***).

- The sample code (Figure 4.11 on page 165 of the textbook and/or the last Slide of Chapter 4 on the course website) is a good source to an easy start-up.
- The program will read an integer input from the command line and then display the results with brief explanation (for example, "thread one: for the summation of 1 through N, the result is …"), like the following:

```
D:\Salem\2010Fall\CSC280\assignments\project3\project31src>
D:\Salem\2010Fall\CSC280\assignments\project3\project31src>java Project31src 2
The sum of 0, 1, ... through 2 is 3
The product of 1, 2, through 2 is 2

D:\Salem\2010Fall\CSC280\assignments\project3\project31src>java Project31src 10
The sum of 0, 1, ... through 10 is 55
The product of 1, 2, through 10 is 3628800
```

2. (**55 points**) Complete the Matrix Multiplication Project as described in the textbook (pages 188—191 or the electronic photocopies on the course website).

- You need first read through the text for this project. Pay attention to those parts for Java programming. These parts (together with Figure 4.11) provide sufficient information on writing a Java program for this project.
- You need to create **M x N** threads (refer to the text for what **M** and **N** are).
- Java GUI is not required. Standard input/output are enough—or to make things simple, you don't have to read, just declare variables with initial values shown in the text.
- The output (on a command line/terminal) should be formatted like a matrix shown in the following (a 3x3 matrix) (using "\t" , and spaces in the standard output):

```
D:\Salem\2010Fall\CSC280\assignments\project3\project32src>javac Project32src.ja
va

D:\Salem\2010Fall\CSC280\assignments\project3\project32src>java Project32src
Matrix Multiplication Results
28      23      18
41      34      27
54      45      36
```

3. **(Bonus, 60 points**) Redo the Matrix Multiplication Project in Ubuntu (on the VMware player) in C with Pthread (you should use "cc project43.c -lpthread" to generate the executable file—assuming that your source file is named as "project43.c"). The output will like the following: