

Project 4— Multithread Programming (in Java)-**100 points****(Due date: 11/22/2011/Tuesday Midnight at Moodle)**

Your name:	Date:
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=====How To Submit—Read Carefully, Please!=====

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  $sum = 0 + 1 + 2 + 3 + \dots + N$ ); 2) another for multiplication (i.e., given a positive integer  $N$ , to calculate  $product = 1 * 2 * 3 * \dots * N$ ).
  - 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

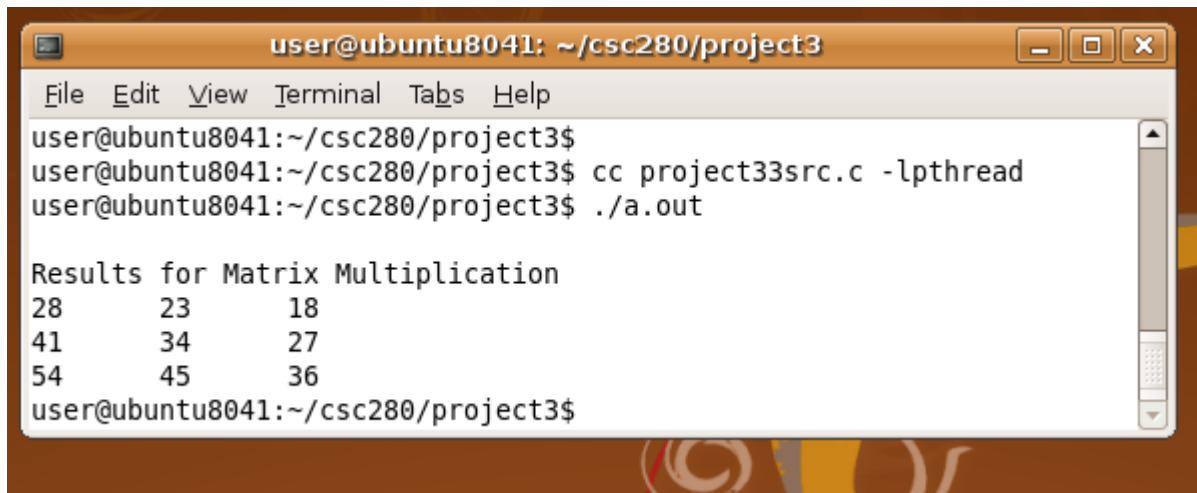
D:\Salem\2010Fall\CSC280\assignments\project3\project31src>java Project31src 10
The sum of 0, 1, ... through 10 is 55
The product of 1, 2, through 10 is 3628800
```

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  $M \times N$  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.java
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:



```
user@ubuntu8041: ~/csc280/project3
File Edit View Terminal Tabs Help
user@ubuntu8041:~/csc280/project3$
user@ubuntu8041:~/csc280/project3$ cc project33src.c -lpthread
user@ubuntu8041:~/csc280/project3$ ./a.out

Results for Matrix Multiplication
28      23      18
41      34      27
54      45      36
user@ubuntu8041:~/csc280/project3$
```