CS520 Week 6 Assignment

General Rules for Homework Assignments

- You are strongly encouraged to add comments throughout the program. Doing so will help your facilitator to understand your programming logic and grade you more accurately.
- You must work on your assignments individually. You are not allowed to copy the answers from the others. *However*, you are encouraged to discuss the approaches to the homework assignments with your section mates and the facilitator in your section via the discussion board.
- Each assignment has a strict deadline. However, you are still allowed to submit your assignment within 2 days after the deadline with a penalty. 15% of the credit will be deducted unless you made previous arrangements with your facilitator and professor. Assignments submitted 2 days after the deadline will not be graded.
- When the term *lastName* is referenced in an assignment, please replace it with your last name.

You are strongly encouraged to add comments into your program!

Create a new Java Project in Eclipse named HW6_*lastName* and complete the following requirements based on the Threads. Several threads will share a single object and contribute their individual result to the shared object. The shared object accumulates the partial results.

Create a package named *cs520.hw6.* Using this package, create the following classes.

1. Create a class named *SharedResults* as follows. The class keeps track of the shared *result*.

   a. The instance (or member) private variable – *result* (int).
   b. A void *addToResult* method which takes the given integer argument and adds it to the shared *result*. This method then prints to the console the name of the current thread, the value it added, and the cumulative result. Handle the synchronization issue with this method.
   c. The *getResult* method with no arguments which returns the shared *result*. Handle the synchronization issue with this method.

2. Create a class named *LongTask* which extends the *Thread* class.

   a.   The instance (or member) private variables – *sharedData* (of type *SharedResults*), *start* (integer) and *end* (integer).
   b.   A single constructor which takes the above three arguments and stores them in the instance values. Also, create a name for this thread as *Thread_<start>_<end>*

c. In the *run* method, add the integer numbers from *start* to *end* (both inclusive) using a *for* loop. Also, sleep for a random time (up to 10 milliseconds) in each iteration of the loop. After the loop, invoke the *addToResult* method of the shared object and provide this accumulated sum.

3. Create a *Test* class to test the following functionality in its *main* method.
   a.   Create the *SharedResults* object and assign it to a variable.
   b.   Create five *LongTask* objects by passing the above shared object and the *start* and *end* values for each as (1, 100), (101, 200), (201, 300), (301, 400), and (401, 500) respectively.
   c. Start each thread as it is created.
   d.   Wait for all the threads to complete using the *join* method.
   e.   Print the *result* from the shared object.

Sample Output:

Different runs of the program will produce the output in different sequences, but the final result would be the same. Two runs of the program are shown below.

```
Thread_1_100 is adding 5050, Cumulative Result is 5050
Thread_301_400 is adding 35050, Cumulative Result is 40100
Thread_101_200 is adding 15050, Cumulative Result is 55150
Thread_201_300 is adding 25050, Cumulative Result is 80200
Thread_401_500 is adding 45050, Cumulative Result is 125250
Result = 125250
```

```
Thread_401_500 is adding 45050, Cumulative Result is 45050
Thread_201_300 is adding 25050, Cumulative Result is 70100
Thread_301_400 is adding 35050, Cumulative Result is 105150
Thread_1_100 is adding 5050, Cumulative Result is 110200
Thread_101_200 is adding 15050, Cumulative Result is 125250
Result = 125250
```

Submission:

Create an archive of your Eclipse project using the following steps. Select the HW6_*lastName* project in the Eclipse IDE's *Package Explorer* or the *Navigator* window.

Click *File->Export*. Select the *General->Archive File* option. Click *Next*.

Specify the "*To archive file:*" entry as say, C:\Temp\HW6_*lastName*.zip.

The zip file will be created and stored in the C:\Temp folder.

Submit this zip file as an attachment in the Assignment Section.