

CS520 Module 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.