

OOPS LAB

PROGRAMMING ASSIGNMENT № 10

MULTITHREADED PROGRAMMING IN JAVA

CSE Department, JMI

17/10/2023

Read carefully before you begin:

- Total Marks: 30. Each question carries 10 marks.
- You have 2 hours to complete the assignment. Failure to have your program evaluated before you leave the lab will cause forfeiture of the grade for that lab.
- In order to receive full marks, you must demo the full working code and show the output and given an explanation of your approach where applicable.
- Please **save your code** throughout the semester in a place where you do not lose it. You will be required to submit it at the end.
- Use proper filenames conventions and commenting. Code that is hard to read or understand will incur a penalty.
- Collaboration must kept to general discussions only. Please do NOT share code or directly share answers with each other. Plagiarism is unacceptable.

Problem 1 : Port your PointN class to Java(10 marks, 30 minutes)

1. Go back to the **PointN** class in C++ from the lab session dated 10/10/2023. Port this class to Java along with the base **Element** class.

Problem 2: Merge Sort (10 marks, 60-90 minutes)

1. Now implement a single threaded merge sort algorithm using the norm of the n-dimensional points.
2. Make random arrays of sizes 100, 1000, 10000, 100000 and measure the execution time of your sort algorithm.
3. Ensure correctness of the sort using a dummy test case of size 10.

Problem 3: Multithreaded Merge Sort (10 marks, 60 minutes)

1. Implement a multithreaded merge sort in Java using polymorphic base class references.
Hint: <https://www.geeksforgeeks.org/merge-sort-using-multi-threading/>

2. Ensure correctness of the algorithm using a dummy test case of size 10.
3. Measure the performance of your multithreaded sort using the same set of test cases. Report a comparison table showing performance of both sorts. How much speedup does multithreading provide? Does it depend on the computer architecture? If so, how?