21BCS052
10/31/23

MULTITHREADED PROGRAMMING IN JAVA

Objectives: The primary objective of this lab assignment was to port a C++ class to Java, implementing the PointN class along with the base Element class. Additionally, it aimed to implement merge sort algorithms, both single-threaded and multithreaded, in Java, and analyze their performance.

Learnings:

- **Porting C++ Class to Java:**
  - Translated the PointN class along with the base Element class from C++ to Java, ensuring functionality and adherence to Java syntax and principles.
- **Single-Threaded Merge Sort:**
  - Implemented the merge sort algorithm using the norm of n-dimensional points in Java.
  - Generated random arrays of different sizes and measured the execution time for sorting to evaluate the algorithm's performance.
- **Multithreaded Merge Sort:**
  - Developed a multithreaded merge sort in Java using polymorphic base class references.
  - Ensured correctness by testing the algorithm with a dummy test case and measured its performance using the same set of test cases.

Challenges:

- Porting the C++ class to Java involved adapting the syntax, understanding differences in language features, and ensuring the translated class maintains its functionality, posing challenges in code translation and syntax conversion.
- Implementing multithreaded merge sort required careful synchronization and thread management, which was challenging due to potential concurrency issues and ensuring correctness in multithreaded execution.

Key Notes:

- Porting classes from one programming language to another involves understanding language-specific syntax and principles while maintaining the original functionality.
- Single-threaded merge sort may showcase different performance characteristics based on the array size, while multithreaded merge sort's performance might vary concerning system architecture and available resources.

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Conclusion: This lab assignment encompassed porting a C++ class to Java, implementing merge sort algorithms in Java, and comparing the performance of single-threaded and multithreaded approaches. It facilitated understanding the intricacies of language translation, sorting algorithms, multithreading, and performance analysis in Java programming.

*Note: All the outputs are in **output.txt** file of **source_code** folder.*