Cairo University

Faculty of Engineering

CMPS211

Assignment #1 – Java and Threading

Concurrent File Encryption and Decryption

In this assignment, you will implement a concurrent file encryption and decryption program in Java to explore the challenges and benefits of parallelizing cryptographic operations.

1. **Requirements:**
   i. Implement Caesar Cipher encryption algorithm that encrypts the contents of a file using an arbitrary shift/key. Your algorithm should handle both uppercase and lowercase letters.
   ii. Develop a decryption algorithm that decrypts the encrypted file back to its original form.
   iii. Parallelize the encryption and decryption algorithms using Java threads.
   iv. Design the program to handle synchronization challenges when multiple threads are encrypting or decrypting different segments of the file concurrently.
   v. Experiment with different thread configurations (e.g. using 5,10,25 threads) and observe how it affects the overall encryption and decryption time for files of varying sizes (e.g. 25 B,5 KB, and 1 MB)

2. **Deliverables:**
   i. *.java files for:
      1. The encryption and decryption algorithms
      2. Driver code (main function) to test your implementation and outputs the following:
         a. Runtime Statistics
         b. Two files for the decrypted text output from the sequential and parallel implementations of the algorithms.
         c. A function that asserts the above 2 files are the same.
   ii. Results : A file containing the runtime statistics for each file size and threading configuration. You may write it in a text file, a word file, or take a screenshot of the results table.

3. **Submission**
   i. Format : A zipped file of the deliverables named <Name_ID_SectionDay_SectionSlot> ex. “khalidAttia_1160927_Monday_8”