Morning Warm-Up: Understanding Threads in Java

Objective:

To build a strong foundation in Java's threading model and concurrent programming concepts that will support your learning in asynchronous and reactive programming.

Instructions:

Step 1: Research Key Concepts

You will be assigned one or more of the following key concepts related to threads and concurrency in Java. Your task is to research these terms, understand their definitions, and explore how they are used in Java. Use reputable sources such as the official Java documentation, tutorials, and trusted educational websites.

1. **Thread**
    - What is a thread in the context of Java programming?
    - How do you create and start a thread in Java?
    - Why are threads useful?
2. **Runnable Interface**
    - What is the Runnable interface?
    - How do you implement and use it to create a thread?
3. **Thread States**
    - What are the different states a thread can be in?
    - How does a thread transition between these states?
4. **Synchronized Keyword**
    - What is the purpose of the synchronized keyword?
    - How does it help in preventing thread interference and memory consistency errors?

5. **Thread Pool**
    - What is a thread pool?
    - How do thread pools help in managing multiple threads efficiently?
6. **Executor Framework**
    - What is the Executor framework?
    - How does it simplify thread management in Java?
7. **Concurrency Issues**
    - What are common concurrency issues such as race conditions, deadlocks, and livelocks?
    - How can these issues be prevented or mitigated in Java?
8. **Future and CompletableFuture**
    - What are Future and CompletableFuture in Java?
    - How do they facilitate asynchronous programming?

Step 2: Prepare a Brief Presentation

Once you have researched your assigned term(s), prepare a brief presentation (3-5 minutes) to share your findings with the class. Your presentation should cover the following points:

- Definition and explanation of the term.
- How the concept is implemented or used in Java.
- Examples or scenarios where this concept is useful.
- Any important considerations or best practices.

Step 3: Share Your Findings

Present your findings to the class. Be prepared to answer questions from your classmates and engage in a discussion about the topic.