Java Barrier Synchronizers: Usage Considerations

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Learning Objectives in this Lesson

• Appreciate Java barrier synchronizer usage considerations
Java Barrier
Usage Considerations
Java Barrier Usage Considerations

- Java’s barrier synchronizers can be used for several purposes

See [stackoverflow.com/questions/6830904/java-tutorials-explanations-of-jsr166y-phaser/6831171#6831171](https://stackoverflow.com/questions/6830904/java-tutorials-explanations-of-jsr166y-phaser/6831171#6831171)
Java Barrier Usage Considerations

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    - It can be used as an on/off latch for an entry barrier
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  e.g., all video rendering threads invoking await() block at the latch until the main thread invokes countDown()
Java Barrier Usage Considerations

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  - CountDownLatch focuses on actions
    - It can be used as an on/off latch for an entry barrier
    - It can also be used for more sophisticated exit barrier use cases
Java Barrier Usage Considerations

• Java’s barrier synchronizers can be used for several purposes
  • CountDownLatch focuses on actions
    • It can be used an on/off latch for an entry barrier
    • It can also be used for more sophisticated exit barrier use cases, e.g.
      • 1 thread waits until $N$ threads have completed an action
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  - CountDownLatch focuses on actions
    - It can be used an on/off latch for an entry barrier
    - It can also be used for more sophisticated exit barrier use cases, e.g.
      - 1 thread waits until $N$ threads have completed an action
      - 1 thread waits until some action has completed $N$ times

  e.g., the main thread waits until the worker threads are finished rendering the video
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  - CountDownLatch focuses on actions
  - CyclicBarrier focuses on threads
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  - CountDownLatch focuses on actions
  - CyclicBarrier focuses on threads
    - It enables a set of threads to all wait for each other to reach a common barrier point
Java’s barrier synchronizers can be used for several purposes:

- **CountDownLatch** focuses on actions,
- **CyclicBarrier** focuses on threads.

It enables a set of threads to all wait for each other to reach a common barrier point.

*Example*: a barrier can be used to wait for one or more algorithm iterations to finish before deciding to move on to the next cycle.
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  - CyclicBarrier focuses on threads
    - It enables a set of threads to all wait for each other to reach a common barrier point
    - It requires a fixed # of threads
Java Barrier Usage Considerations

- Java’s barrier synchronizers can be used for several purposes
  - CountDownLatch focuses on actions
  - CyclicBarrier focuses on threads
    - It enables a set of threads to all wait for each other to reach a common barrier point
    - It requires a fixed # of threads
    - This may be overly limited
Java Barrier Usage Considerations

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  - CountDownLatch focuses on actions
  - CyclicBarrier focuses on threads
  - Phaser focuses on a variable (or fixed) # of threads
  - It enables threads to wait for each other to complete processing in cycles
Java’s barrier synchronizers can be used for several purposes:

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- Phaser focuses on a variable (or fixed) number of threads
  - It enables threads to wait for each other to complete processing in cycles

Using Phasers for a fixed number of threads is typically overkill!
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  - CyclicBarrier focuses on threads
  - Phaser focuses on a variable (or fixed) # of threads
    - It enables threads to wait for each other to complete processing in cycles
    - It’s more flexible than the two other types of Java barrier synchronizers
Java Barrier Usage Considerations

- Java’s barrier synchronizers can be used for several purposes:
  - CountDownLatch focuses on actions
  - CyclicBarrier focuses on threads
  - Phaser focuses on a variable (or fixed) # of threads
    - It enables threads to wait for each other to complete processing in cycles
  - It’s more flexible than the two other types of Java barrier synchronizers
    - However, they are also more complex to program
End of Java Barrier Synchronizers: Usage Considerations