Barrier Synchronization: Overview of Java Barrier Synchronizers

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Learning Objectives in this Lesson

- Understand what barrier synchronization is & know three different ways of using barrier synchronizers
- Note a human known use of barrier synchronization
- Recognize the three types of Java barrier synchronizers

<<Java Class>>
Phaser
- Phaser()
- Phaser(int)
- Phaser(Phaser)
- Phaser(Phaser,int)
- register():int
- bulkRegister(int):int
- arrive():int
- arriveAndDeregister():int
- arriveAndAwaitAdvance():int
- awaitAdvance(int):int
- awaitAdvanceInterruptibly(int):int
- awaitAdvanceInterruptibly(int,long,TimeUnit):int
- forceTermination():void
- getPhase():int
- getRegisteredParties():int
- getArrivedParties():int
- getUnarrivedParties():int
- getParent():Phaser
- getRoot():Phaser
- isTerminated():boolean
- onAdvance(int,int):boolean
- toString()
Learning Objectives in this Lesson

- Understand what barrier synchronization is & know three different ways of using barrier synchronizers
- Note a human known use of barrier synchronization
- Recognize the three types of Java barrier synchronizers
- Know how to categorize various type of Java barrier synchronizers

<table>
<thead>
<tr>
<th># of Iterations</th>
<th>Fixed # of Parties</th>
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Types of Java Barrier Synchronizers
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- Java supports 3 types of barrier synchronizers
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  - **CountDownLatch**
    - Allows one or more threads to wait on the completion of operations in other threads

See docs.oracle.com/javase/8/docs/api/java/util/concurrent/CountDownLatch.html
Types of Java Barrier Synchronizers

• Java supports 3 types of barrier synchronizers
  • **CountDownLatch**
    • Allows one or more threads to wait on the completion of operations in other threads
    • Supports entry & exit barriers, but not cyclic barriers

<<Java Class>>

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<th>CountDownLatch</th>
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<tr>
<td>CountDownLatch(int)</td>
</tr>
<tr>
<td>await():void</td>
</tr>
<tr>
<td>await(long, TimeUnit):boolean</td>
</tr>
<tr>
<td>countDown():void</td>
</tr>
<tr>
<td>getCount():long</td>
</tr>
<tr>
<td>toString()</td>
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DON'T BE SAD
COS
2 OUT OF 3
AIN'T BAD
Types of Java Barrier Synchronizers

- Java supports 3 types of barrier synchronizers:
  - `CountDownLatch`
  - `CyclicBarrier`

- `CyclicBarrier`:
  - Allows a set of threads to all wait for each other to reach a common barrier point

See [docs.oracle.com/javase/8/docs/api/java/util/concurrent/CyclicBarrier.html](docs.oracle.com/javase/8/docs/api/java/util/concurrent/CyclicBarrier.html)
Types of Java Barrier Synchronizers

- Java supports 3 types of barrier synchronizers
  - CountDownLatch
  - CyclicBarrier
    - Allows a set of threads to all wait for each other to reach a common barrier point
    - Supports entry, exit, & cyclic barriers

```
<<Java Class>>

CyclicBarrier

- CyclicBarrier(int,Runnable)
- CyclicBarrier(int)
- getParties():int
- await():int
- await(long, TimeUnit):int
- isBroken():boolean
- reset():void
- getNumberWaiting():int
```
Types of Java Barrier Synchronizers

- Java supports 3 types of barrier synchronizers
  - CountDownLatch
  - CyclicBarrier
  - Phaser

- A more flexible, reusable, & dynamic barrier synchronizer that subsumes CyclicBarrier & CountDownLatch

See docs.oracle.com/javase/8/docs/api/java/util/concurrent/Phaser.html
Types of Java Barrier Synchronizers

- Java supports 3 types of barrier synchronizers
  - CountDownLatch
  - CyclicBarrier
  - Phaser
    - A more flexible, reusable, & dynamic barrier synchronizer that subsumes CyclicBarrier & CountDownLatch
  - Supports entry, exit, & cyclic barriers
Categorizing Java Barrier Synchronizers
Java’s barrier synchronizers can be categorized in several ways:

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*These categories are not mutually exclusive, i.e., Phaser appears multiple times*
End of Barrier Synchronization: Overview of Java Barrier Synchronizers