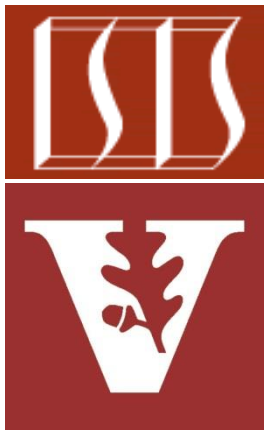
Java CyclicBarrier: Key Methods



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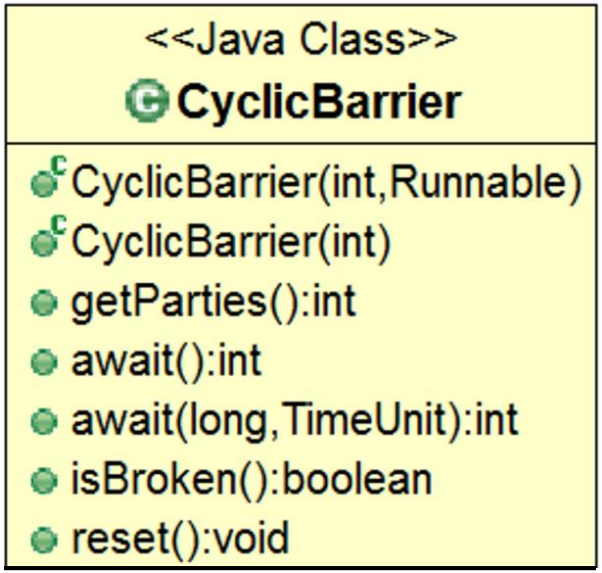
Learning Objectives in this Part of the Lesson

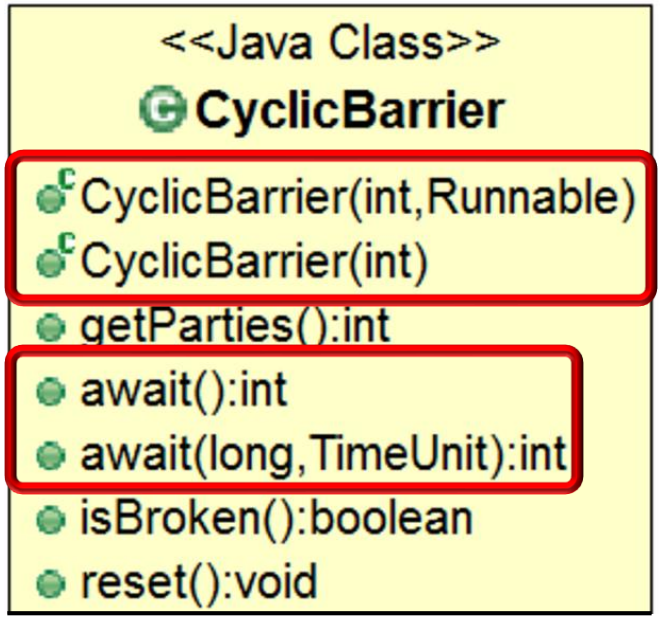
- Understand the structure & functionality of Java CyclicBarrier
- Recognize the key methods in the Java CyclicBarrier



Key Methods in Java CyclicBarrier

Overview of Java CyclicBarrier

- CyclicBarrier has a very simple API
  - i.e., only a handful of methods are commonly used



Overview of Java CyclicBarrier

- Constructor initializes the object to "trip" when the given # of parties wait on it

```
public class CyclicBarrier {
  ...
  public CyclicBarrier
       (int parties) {
  }

  public CyclicBarrier
      (int parties,
       Runnable barrierAction) {
    ...
  }
  ...
```

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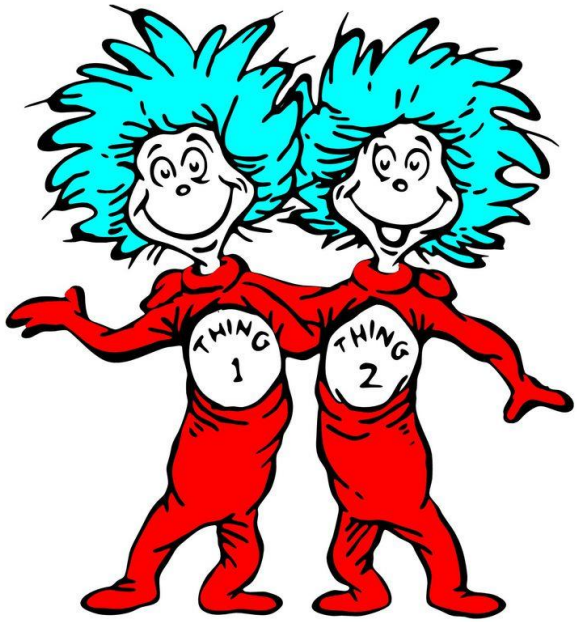
"Parties" == "Threads"



CyclicBarrier requires a fixed # of threads that is identical to the # of parties..

Overview of Java CyclicBarrier

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  - Optionally given a *barrier action* to execute when barrier's tripped

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    - Performed by the last thread entering the barrier

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Parties are suspended when barrier action is run to avoid race conditions

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- Constructor initializes the object to "trip" when the given # of parties wait on it
  - Optionally given a *barrier action* to execute when barrier's tripped
    - Performed by the last thread entering the barrier
    - Useful for updating any mutable shared state before any parties continue with their processing

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- Constructor initializes the object to "trip" when the given # of parties wait on it
  - Optionally given a *barrier action* to execute when barrier's tripped
    - Performed by the last thread entering the barrier
    - Useful for updating any mutable shared state before any parties continue with their processing
    - The barrier's count is automatically reset to initial # of parties after the barrier is tripped

```
public class CyclicBarrier {
  ...
  public CyclicBarrier
       (int parties) {
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  public CyclicBarrier
      (int parties,
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    ...
  }...
```

Overview of Java CyclicBarrier

- Key methods block until all parties wait on the barrier & then reset it automatically after it's tripped

```
public class CyclicBarrier {
  ...
  public int await() { ... }

  public int await(long timeout,
                   TimeUnit unit)
  { ... }
```

Threads calling await() decide whether to continue to the next cycle or not

Overview of Java CyclicBarrier

- Key methods block until all parties wait on the barrier & then reset it automatically after it's tripped
  - Block until all parties arrive & barrier resets
    - *Unless* the thread is interrupted

```
public class CyclicBarrier {
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Overview of Java CyclicBarrier

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  - Block until all parties arrive & barrier resets
    - *Unless* the thread is interrupted

```
public class CyclicBarrier {
  ...
  public int await() { ... }
  ...
```

Returns arrival index of the thread at the barrier:

```
if (barrier.await() == 0) {
  // log completion of this iteration
}
```

Can be used in lieu of barrier action if parties need not be suspended when run

Overview of Java CyclicBarrier

- Key methods block until all parties wait on the barrier & then reset it automatically after it's tripped
  - Block until all parties arrive & barrier resets
    - *Unless* the thread is interrupted
    - *Unless* the timeout elapses

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Overview of Java CyclicBarrier

- Key methods block until all parties wait on the barrier & then reset it automatically after it's tripped
  - Block until all parties arrive & barrier resets

```
public class CyclicBarrier {
   ...
   public int await() { ... }

   public int await(long timeout,
                    TimeUnit unit)
   { ... }
   ...
```

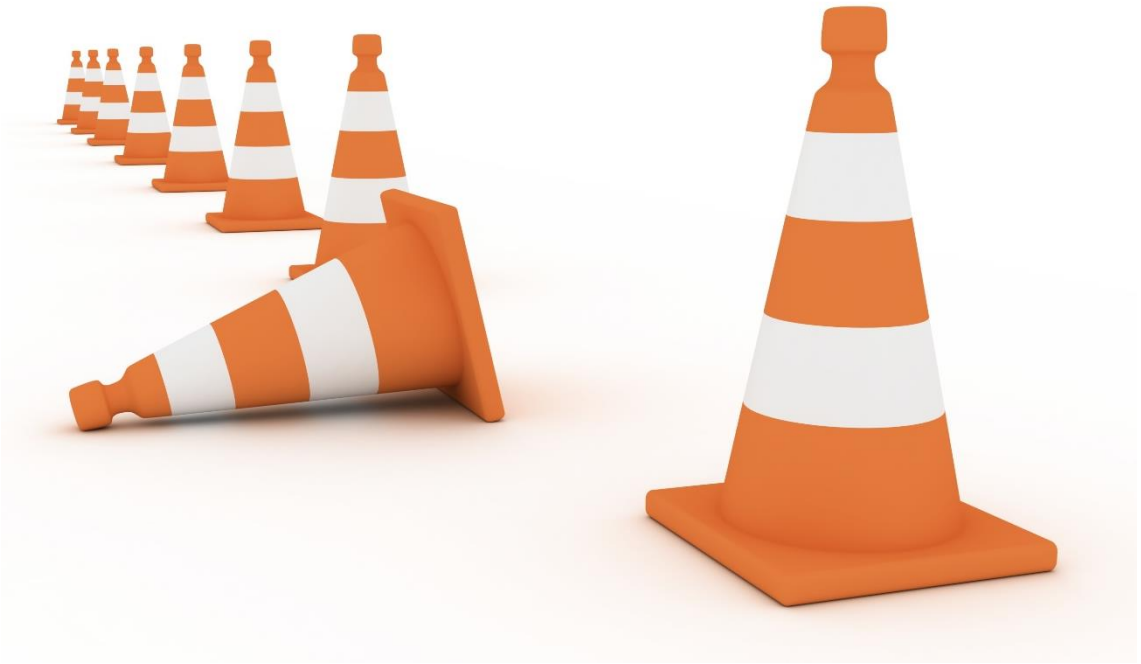
There is no "non-interruptible" version of await()

Overview of Java CyclicBarrier

- It's possible to manually reset a cyclic barrier to its initial state

```
public class CyclicBarrier {
   ...
   public void reset() { ... }
   ...
```

If any parties are waiting at the barrier, they will return via a BrokenBarrierException rather than the "normal" return



See docs.oracle.com/javase/8/docs/api/java/util/concurrent/BrokenBarrierException.html

End of Java CyclicBarrier: Key Methods