Java ConditionObject:
Key Class Methods

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Learning Objectives in this Part of the Lesson

- Understand what condition variables are
- Note a human known use of condition variables
- Know what pattern they implement
- Recognize common use cases where condition variables are applied
- Recognize the structure & functionality of Java ConditionObject
- Know the key methods defined by the Java ConditionObject class
Key Methods of Java
ConditionObject
Key Methods of Java ConditionObject

- Its key methods allow threads to wait & notify each other.

```java
public class ConditionObject implements Condition, java.io.Serializable {

    ... 

    /** Implement interruptible condition wait. */
    public final void await() throws InterruptedException {
        ... }

    /** Wakeup the longest waiting thread. */
    public final void signal() {
        ... }

    /** Wakeup all waiting threads. */
    public final void signalAll() {
        ... }

    ... 

    ...
```
Key Methods of Java ConditionObject

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```

Method names are similar to Java’s built-in monitor object methods, but these Java Object final methods can’t be overridden

See lesson on “Java Built-in Monitor Objects”
Key Methods of Java ConditionObject

- Its key methods allow threads to wait & notify each other

```java
public class ConditionObject
    implements Condition,
    java.io.Serializable {

    // Methods are implemented via the AbstractQueuedSynchronizer framework

    /** Implement interruptible condition wait. */
    public final void await()
        throws InterruptedException
    { ... }

    /** Wakeup the longest waiting thread. */
    public final void signal()
    { ... }

    /** Wakeup all waiting threads. */
    public final void signalAll()
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    ...}
```

See [gee.cs.oswego.edu/dl/papers/aqs.pdf](gee.cs.oswego.edu/dl/papers/aqs.pdf)
• Its key methods allow threads to wait & notify each other
• await() suspends the calling thread until it’s signaled (or interrupted)

See docs.oracle.com/javase/8/docs/api/java/util/concurrent/locks/AbstractQueuedSynchronizer.ConditionObject.html#await
Key Methods of Java ConditionObject

- Its key methods allow threads to wait & notify each other
  - `await()` suspends the calling thread until it’s signaled (or interrupted)
  - The thread is “parked” on the condition object’s queue

```java
public class ConditionObject implements Condition, java.io.Serializable {

  ...
  /** Implement interruptible condition wait. */
  public final void await() {
    ...
  }

  ...
}
```

See [www.docjar.com/docs/api/sun/misc/Unsafe.html#park(boolean, long)](http://www.docjar.com/docs/api/sun/misc/Unsafe.html#park(boolean, long))
Key Methods of Java ConditionObject

- Its key methods allow threads to wait & notify each other
  - `await()` suspends the calling thread until it’s signaled (or interrupted)
  - `signal()` moves the longest waiting thread from the queue for this condition object to the queue for the owning lock

```java
public class ConditionObject implements Condition, java.io.Serializable {

    /** Wakeup longest waiting thread. */
    public final void signal() {
        // ...'
    }

    // ...
}
```

See [docs.oracle.com/javase/8/docs/api/java/util/concurrent/locks/AbstractQueuedSynchronizer.ConditionObject.html#signal](https://docs.oracle.com/javase/8/docs/api/java/util/concurrent/locks/AbstractQueuedSynchronizer.ConditionObject.html#signal)
Key Methods of Java ConditionObject

- Its key methods allow threads to wait & notify each other
  - `await()` suspends the calling thread until it’s signaled (or interrupted)
  - `signal()` moves the longest waiting thread from the queue for this condition object to the queue for the owning lock
  - `signalAll()` moves all threads from the ConditionObject’s queue to owning lock’s queue

```java
class ConditionObject implements Condition, java.io.Serializable {
    ...  
    /** Wakeup all waiting threads. */
    public final void signalAll() {
        ...  
    }
}
```

See [docs.oracle.com/javase/8/docs/api/java/util/concurrent/locks/AbstractQueuedSynchronizer.ConditionObject.html#signalAll](https://docs.oracle.com/javase/8/docs/api/java/util/concurrent/locks/AbstractQueuedSynchronizer.ConditionObject.html#signalAll)
Key Methods of Java ConditionObject

- Its key methods allow threads to wait & notify each other
  - `await()` suspends the calling thread until it’s signaled (or interrupted)
  - `signal()` moves the longest waiting thread from the queue for this condition object to the queue for the owning lock
  - `signalAll()` moves all threads from the ConditionObject’s queue to owning lock’s queue
  - `signalAll()` may cause the “thundering herd” problem, so use it sparingly!!
Other Methods of Java ConditionObject
### Other Methods of Java ConditionObject

- ConditionObject has several `await()` methods

<table>
<thead>
<tr>
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<th>Method</th>
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<td>boolean</td>
<td><code>await(long time, TimeUnit unit)</code></td>
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<td>long</td>
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<tr>
<td>boolean</td>
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## Other Methods of Java ConditionObject

- ConditionObject has several `await()` methods
  - e.g., interruptible, non-interruptible, & timed operations

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*Unlike Java's built-in monitor object timed wait() calls, these timed await*() calls gives a sensible return value.*

See [stackoverflow.com/questions/3397722/how-to-differentiate-when-waitlong-timeout-exit-for-notify-or-timeout](https://stackoverflow.com/questions/3397722/how-to-differentiate-when-waitlong-timeout-exit-for-notify-or-timeout)
End of Java ConditionObject: Key Class Methods