

Java ConditionObject: Key Class Methods



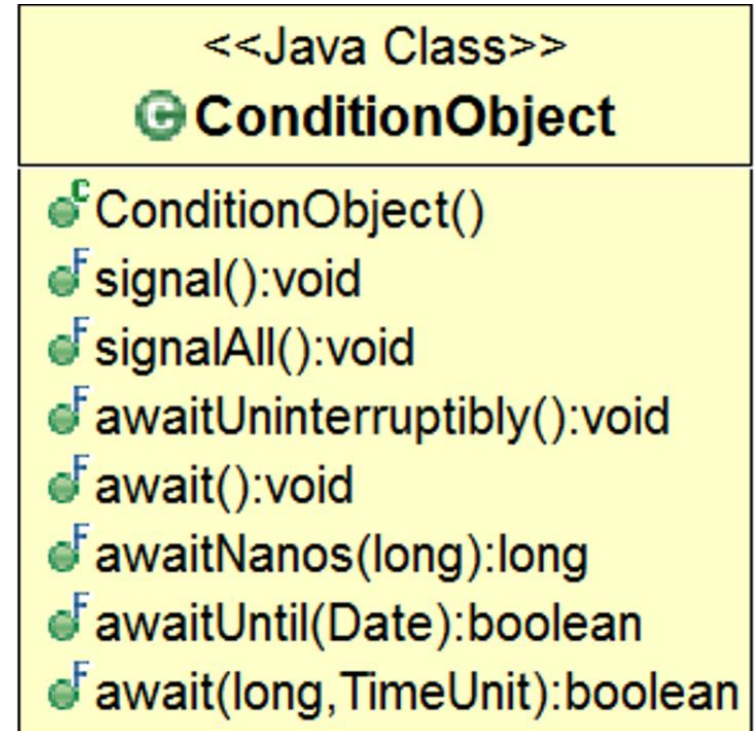
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Learning Objectives in this Part of the Lesson

- 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

```
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()
    { ... }

    ...
}
```

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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*"

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```
public class ConditionObject
    implements Condition,
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    ...

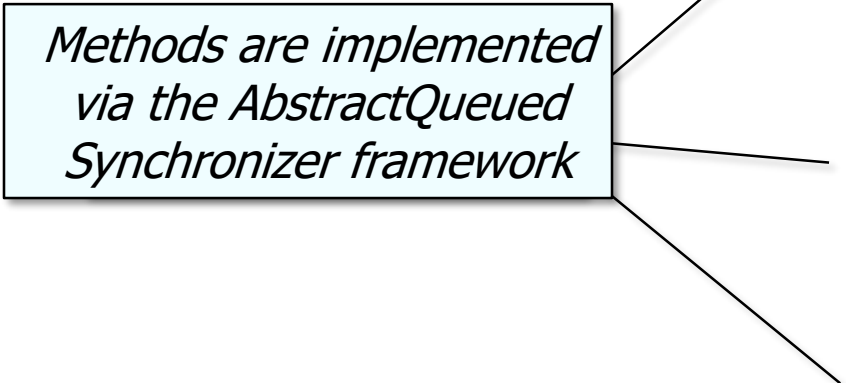
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    /** Wakeup all waiting threads. */
    public final void signalAll()
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    ...
}
```

*Methods are implemented
via the AbstractQueued
Synchronizer framework*



See gee.cs.oswego.edu/dl/papers/aqs.pdf

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)

```
public class ConditionObject
    implements Condition,
        java.io.Serializable {
    ...
    /** Implement interruptible
        condition wait. */
    public final void await() ...
    { ... }
    ...
}
```

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

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

    ...
    /** Implement interruptible
        condition wait. */
    public final void 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)
 - `signal()` moves the longest waiting thread from the queue for this condition object to the queue for the owning lock

```
public class ConditionObject
    implements Condition,
        java.io.Serializable {
    ...
    /** Wakeup longest waiting thread.
     */
    public final void signal()
    { ... }
    ...
}
```

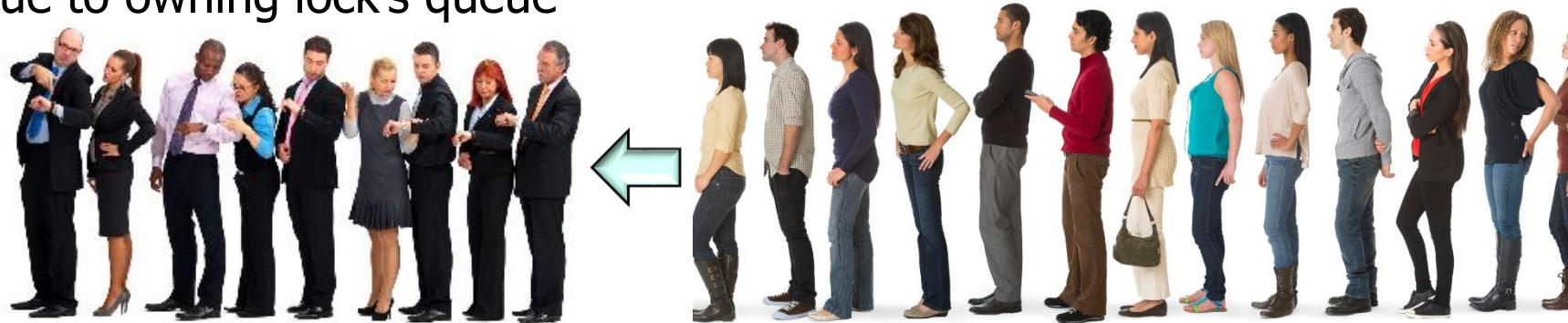


See docs.oracle.com/javase/8/docs/api/java/util/concurrent/locks/AbstractQueuedSynchronizer.ConditionObject.html#signal

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

```
public 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

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!!

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



See en.wikipedia.org/wiki/Thundering_herd_problem

Other Methods of Java ConditionObject

Other Methods of Java ConditionObject

- ConditionObject has several await() methods

void	<u>await()</u> – Causes the current thread to wait until it is signalled or interrupted
boolean	<u>await(long time, TimeUnit unit)</u> – Causes the current thread to wait until it is signalled or interrupted, or the specified waiting time elapses
long	<u>awaitNanos(long nanosTimeout)</u> – Causes the current thread to wait until it is signalled or interrupted, or the specified waiting time elapses
void	<u>awaitUninterruptibly()</u> – Causes the current thread to wait until it is signalled
boolean	<u>awaitUntil(Date deadline)</u> – Causes the current thread to wait until it is signalled or interrupted, or the specified deadline elapses

Other Methods of Java ConditionObject

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

void	<code>await()</code> – Causes the current thread to wait until it is signalled or interrupted
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Other Methods of Java ConditionObject

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

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

void	await() – Causes the current thread to wait until it is signalled or interrupted
boolean	await (long time, TimeUnit unit) – Causes the current thread to wait until it is signalled or interrupted, or the specified waiting time elapses
long	awaitNanos (long nanosTimeout) – Causes the current thread to wait until it is signalled or interrupted, or the specified waiting time elapses
void	awaitUninterruptibly () – Causes the current thread to wait until it is signalled
boolean	awaitUntil (Date deadline) – Causes the current thread to wait until it is signalled or interrupted, or the specified deadline elapses

See stackoverflow.com/questions/3397722/how-to-differentiate-when-waitlong-timeout-exit-for-notify-or-timeout

End of Java ConditionObject: Key Class Methods