Key Methods in Java Phaser

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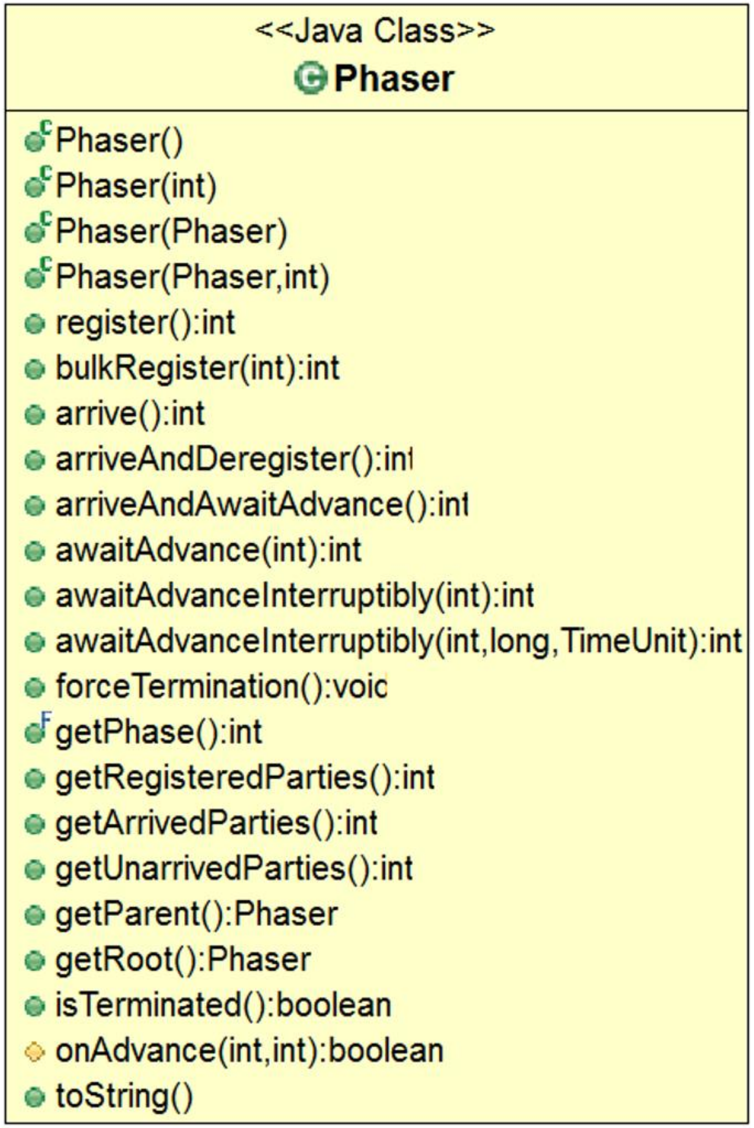
Learning Objectives in this Part of the Lesson

- Understand the structure & functionality of the Java Phaser barrier synchronizer
- Recognize the key methods in the Java Phaser



<<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():voic
- getPhase():int
- getRegisteredParties():int
- getArrivedParties():int
- getUnarrivedParties():int
- getParent():Phaser
- getRoot():Phaser
- isTerminated():boolean
- onAdvance(int,int):boolean
- toString()

Key Methods in Java Phaser

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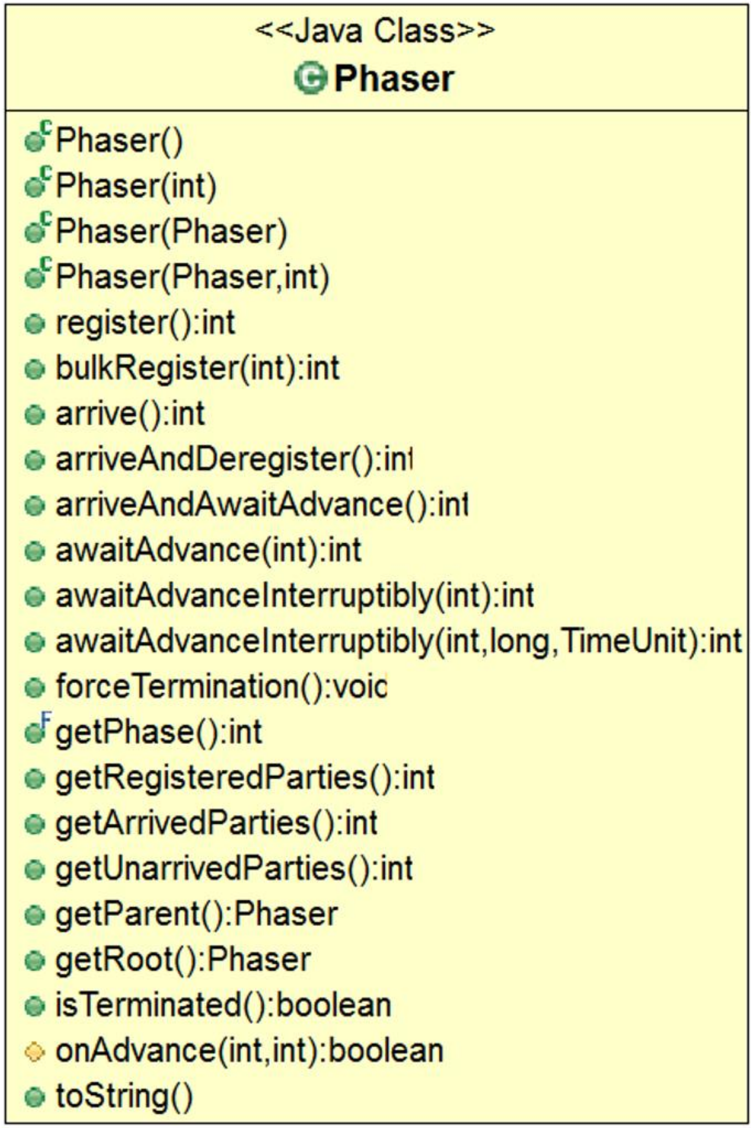
- Phaser has a more complex API than CountDownLatch or CyclicBarrier
  - i.e., it has many methods that support a range of use cases



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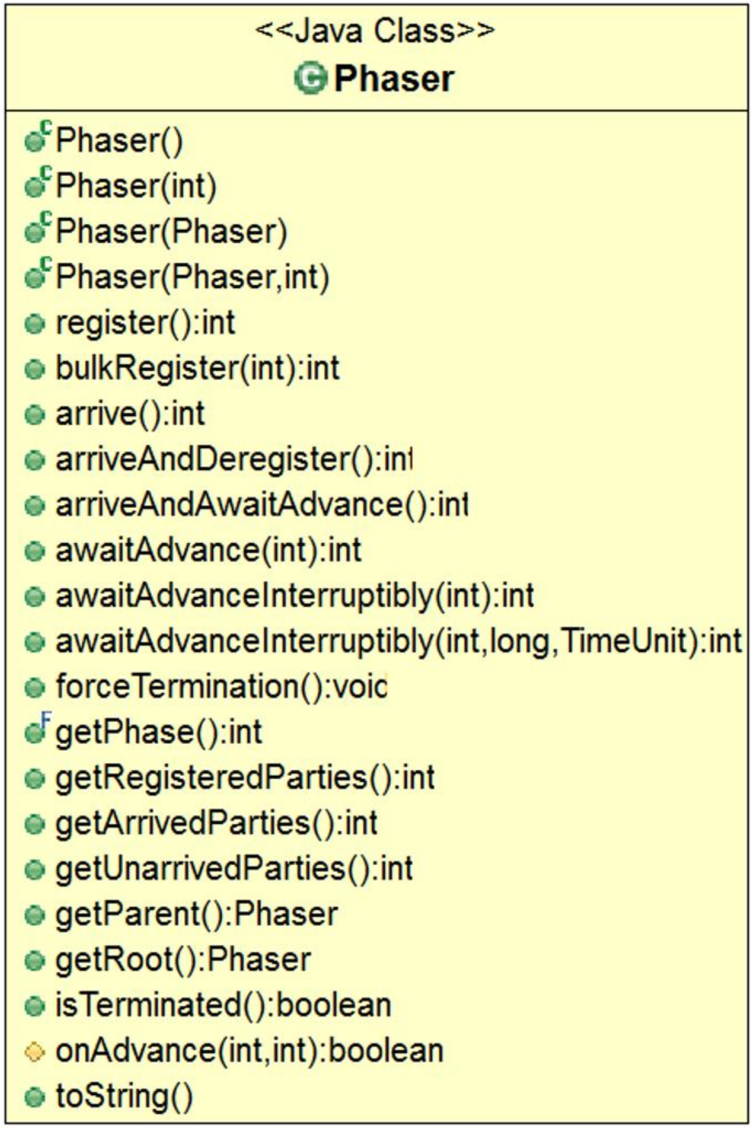

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Phaser

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forceTermination():voic
getPhase():int
getRegisteredParties():int
getArrivedParties():int
getUnarrivedParties():int
getParent():Phaser
getRoot():Phaser
isTerminated():boolean
onAdvance(int,int):boolean
toString()
```

Fortunately, many of these methods are rarely used in practice

Key Methods in Java Phaser

- Constructor initializes the phase # to 0

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

  public Phaser() { ... }
  ...
```

Key Methods in Java Phaser

- Constructor initializes the phase # to 0
  - This constructor specifies the # of parties needed to advance to the next phase

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

  public Phaser() { ... }
  ...
```

# of registered parties dictates when a phaser can advance to the next phase

Key Methods in Java Phaser

- Constructor initializes the phase # to 0
  - This constructor specifies the # of parties needed to advance to the next phase
    - This constructor is optional since parties can always register later

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

  public Phaser() { ... }
  ...
```

With Java Phaser the # of parties need not match the # of threads

Key Methods in Java Phaser

- Constructor initializes the phase # to 0
  - This constructor specifies the # of parties needed to advance to the next phase
  - This constructor doesn't specify any parties initially

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

  public Phaser() { ... }
  ...
```

Key Methods in Java Phaser

- Constructor initializes the phase # to 0
  - This constructor specifies the # of parties needed to advance to the next phase
  - This constructor doesn't specify any parties initially
    - Any phaser created via this constructor therefore needs to register with it before using it

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

  public Phaser() { ... }
  ...
```

Key Methods in Java Phaser

- Phaser's key methods enable parties to register, synchronize, & terminate

```
public class Phaser {
  ...
  public int register() { ... }

  public int bulkRegister
    (int parties) { ... }

  public int
    arriveAndAwaitAdvance()
    { ... }

  public int ArriveAndDeregister()
  { ... }

  protected boolean onAdvance
    (int phase,
     int registeredParties) {
    return registeredParties == 0;
  }
  ...
```

Key Methods in Java Phaser

- Phaser's key methods enable parties to register, synchronize, & terminate
  - Adds unarrived parties to phaser

```
public class Phaser {
  ...
  public int register() { ... }

  public int bulkRegister
    (int parties) { ... }
```

# of registered parties dictates when a phaser can advance to the next phase

Key Methods in Java Phaser

- Phaser's key methods enable parties to register, synchronize, & terminate
  - Adds unarrived parties to phaser
  - Arrive & await advance

```
public class Phaser {
  ...
  public int arrive() { ... }

  public int awaitAdvance
                 (int phase)
  { ... }

  public int
    arriveAndAwaitAdvance()
  { ... }
```

Having multiple methods provides flexibility wrt arrival & waiting to advance

Key Methods in Java Phaser

- Phaser's key methods enable parties to register, synchronize, & terminate
  - Adds unarrived parties to phaser
  - Arrive & await advance
    - Arrives at phaser, but does not block until other parties arrive

```
public class Phaser {
  ...
  public int arrive() { ... }
```

Can be used similarly to the countdown() method in CountDownLatch

Key Methods in Java Phaser

- Phaser's key methods enable parties to register, synchronize, & terminate
  - Adds unarrived parties to phaser
  - Arrive & await advance
    - Arrives at phaser, but does not block until other parties arrive
      - Returns current phase # or a negative value if the phaser has already terminated

```
public class Phaser {
  ...
  public int arrive() { ... }
```

This method is rarely used in practice

Key Methods in Java Phaser

- Phaser's key methods enable parties to register, synchronize, & terminate
  - Adds unarrived parties to phaser
  - Arrive & await advance
    - Arrives at phaser, but does not block until other parties arrive
    - Blocks until the phase of this phaser advances from the given phase value

```
public class Phaser {
  ...
  public int arrive() { ... }

  public int awaitAdvance
                    (int phase)
  { ... }
```

Can be used similarly to the await() method in CountDownLatch

Key Methods in Java Phaser

- Phaser's key methods enable parties to register, synchronize, & terminate
  - Adds unarrived parties to phaser
  - Arrive & await advance
    - Arrives at phaser, but does not block until other parties arrive
    - Blocks until the phase of this phaser advances from the given phase value
      - Returns immediately if current phase != given phase

```
public class Phaser {
  ...
  public int arrive() { ... }

  public int awaitAdvance
                   (int phase)
  { ... }
```

This method is rarely used in practice

Key Methods in Java Phaser

- Phaser's key methods enable parties to register, synchronize, & terminate
  - Adds unarrived parties to phaser
  - Arrive & await advance
    - Arrives at phaser, but does not block until other parties arrive
    - Blocks until the phase of this phaser advances from the given phase value
    - Arrives at phaser & blocks until other parties arrive

```
public class Phaser {
  ...
  public int arrive() { ... }

  public int awaitAdvance
                 (int phase)
  { ... }

  public int
    arriveAndAwaitAdvance()
  { ... }
```

Equivalent in effect to awaitAdvance(arrive())

Key Methods in Java Phaser

- Phaser's key methods enable parties to register, synchronize, & terminate
  - Adds unarrived parties to phaser
  - Arrive & await advance
    - Arrives at phaser, but does not block until other parties arrive
    - Blocks until the phase of this phaser advances from the given phase value
    - Arrives at phaser & blocks until other parties arrive

```
public class Phaser {
  ...
  public int arrive() { ... }

  public int awaitAdvance
                 (int phase)
  { ... }

  public int
    arriveAndAwaitAdvance()
  { ... }
```

This method is commonly used & is similar to await() on a Java CyclicBarrier

Key Methods in Java Phaser

- Phaser's key methods enable parties to register, synchronize, & terminate
  - Adds unarrived parties to phaser
  - Arrive & await advance
  - Arrive at the phaser & deregister without waiting for others to arrive

```
public class Phaser {
  ...
  public int arriveAndDeregister()
  { ... }
```

Key Methods in Java Phaser

- Phaser's key methods enable parties to register, synchronize, & terminate
  - Adds unarrived parties to phaser
  - Arrive & await advance
  - Arrive at the phaser & deregister without waiting for others to arrive
    - Reduces # of parties required to advance in future phases

```
public class Phaser {
  ...
  public int arriveAndDeregister()
  { ... }
```

Often used by the party that controls the initialization of a phaser

Key Methods in Java Phaser

- Phaser's key methods enable parties to register, synchronize, & terminate
  - Adds unarrived parties to phaser
  - Arrive & await advance
  - Arrive at the phaser & deregister without waiting for others to arrive
  - Hook method performs an action upon pending phase advance

```
public class Phaser {
  ...
  protected boolean onAdvance
    (int phase,
     int registeredParties) {
   return registeredParties == 0;
  }
```

This method is invoked upon arrival of the party advancing the phaser

All other waiting parties are "dormant" when this hook method runs

Key Methods in Java Phaser

- Phaser’s key methods enable parties to register, synchronize, & terminate
  - Adds unarrived parties to phaser
  - Arrive & await advance
  - Arrive at the phaser & deregister without waiting for others to arrive
  - Hook method performs an action upon pending phase advance

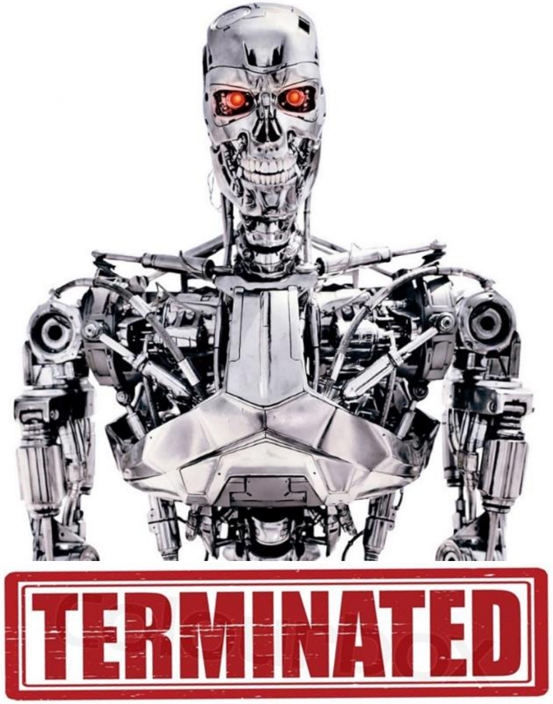
```
public class Phaser {
  ...
  protected boolean onAdvance
    (int phase,
     int registeredParties) {
   return registeredParties == 0;
  }
```

This hook method is similar to the barrier action on a Java CyclicBarrier

Key Methods in Java Phaser

- Phaser's key methods enable parties to register, synchronize, & terminate
  - Adds unarrived parties to phaser
  - Arrive & await advance
  - Arrive at the phaser & deregister without waiting for others to arrive
  - Hook method performs an action upon pending phase advance
    - Also terminates a Phaser by returning a 'true' boolean value

```
public class Phaser {
  ...
  protected boolean onAdvance
     (int phase,
      int registeredParties) {
    return registeredParties == 0;
  }
```



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  - Arrive at the phaser & deregister without waiting for others to arrive
  - Hook method performs an action upon pending phase advance
    - Also terminates a Phaser by returning a 'true' boolean value

```
public class Phaser {
  ...
  protected boolean onAdvance
     (int phase,
      int registeredParties) {
    return registeredParties == 0;
  }
```

The default implementation terminates the phaser if there are no more registered parties

End of Key Methods in Java Phaser