Advanced Java CompletableFuture Features: Introducing Completion Stage Methods (Part 2)

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Learning Objectives in this Part of the Lesson

• Understand advanced features of completable futures, e.g.
  • Factory methods initiate async computations
  • Completion stage methods chain together dependent actions
    • Perform async result processing & composition
  • These methods also avoid blocking
Avoiding Blocking with Completion Stage Methods
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- Completion stages are used to minimize and/or avoid blocking calling thread.
Avoiding Blocking with Completion Stage Methods

- Completion stages are used to minimize and/or avoid blocking calling thread
- Improves responsiveness by not blocking the caller

See en.wikipedia.org/wiki/Responsiveness
Avoiding Blocking with Completion Stage Methods

- Completion stages are used to minimize and/or avoid blocking calling thread
- Improves responsiveness by not blocking the caller
- Blocking impedes inherent parallelism, underutilizes cores, & complicates program structure

CALLER

searchForWord₁

return result₁

caller

searchForWord₂

return result₂

caller

searchForWord₃

return result₃

caller

CALLER

See [en.wikipedia.org/wiki/Responsiveness](http://en.wikipedia.org/wiki/Responsiveness)
See [www.nastel.com/10-reasons-your-java-apps-are-slow](http://www.nastel.com/10-reasons-your-java-apps-are-slow)
Avoiding Blocking with Completion Stage Methods

- Completion stages are used to minimize and/or avoid blocking calling thread
- Improves responsiveness by not blocking the caller
  - Blocking impedes inherent parallelism, underutilizes cores, & complicates program structure
  - Avoid calling join() or get() until absolutely necessary
Avoiding Blocking with Completion Stage Methods

- Completion stages are used to minimize and/or avoid blocking calling thread
- Improves responsiveness by not blocking the caller
- Clients can often avoid blocking until a result *must* be obtained

See github.com/douglascraigschmidt/LiveLessons/tree/master/ImageCounter
Avoiding Blocking with Completion Stage Methods

• Completion stages are used to minimize and/or avoid blocking calling thread
  • Improves responsiveness by not blocking the caller
  • Clients can often avoid blocking until a result *must* be obtained
  • *e.g.*, GUIs needn’t/shouldn’t block to ensure responsiveness

See [github.com/ReactiveX/RxAndroid](https://github.com/ReactiveX/RxAndroid)
### Avoiding Blocking with Completion Stage Methods

- Completion stages are used to minimize and/or avoid blocking calling thread
  - Improves responsiveness by not blocking the caller
  - Clients can often avoid blocking until a result *must* be obtained
  - Servers may be able to avoid blocking altogether

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```
Client  Client  Client
       
Thread

Request
handler

Push request
event

Trigger
callback

Push operation
complete event

Register
callback

Event loop

Intensive
operation

Network,
database,
file system,
calculation,
etc

```

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Avoiding Blocking with Completion Stage Methods

- Completion stages are used to minimize and/or avoid blocking calling thread
  - Improves responsiveness by not blocking the caller
  - Clients can often avoid blocking until a result *must* be obtained
  - Servers may be able to avoid blocking altogether
    - e.g., decouple request reception, processing, & response
End of Advanced Java CompletableFuture Features: Introducing Completion Stage Methods (Part 2)