Overview of the Project Reactor
AsyncTaskBarrier Framework

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Learning Objectives in this Part of the Lesson

• Understand key classes in the Project Reactor API
• Be aware of the structure & functionality of the BigFraction case studies
• Recognize the capabilities of the AsyncTaskBarrier framework for Project Reactor

There are implementations for both Project Reactor & RxJava
Overview of the Project Reactor AsyncTaskBarrier Class
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- Most test methods in the BigFraction case studies run asynchronously via `subscribeOn()`, so these methods return before their computations complete.

```java
public static Mono<Void> testFractionReductionAsync() {
    BigFraction unreducedFraction = makeBigFraction(...);
    ...
    return Mono
        .fromCallable(() -> BigFraction.reduce(unreducedFraction))
        .subscribeOn(Schedulers.single())
        .map(result -> result.toMixedString())
        .doOnSuccess(result -> System.out.println("big fraction = "
            + result + "\n"))
        .then();
```

See Reactive/Mono/ex2/src/main/java/MonoEx.java
Overview of the Project Reactor AsyncTaskBarrier Class

- It’s therefore helpful to define a single location in the main driver program that waits for all asynchronously executing test methods to complete.

```java
public static void main (String[] argv) ... {
    AsyncTaskBarrier
        .register(MonoEx::testFractionReductionAsync);
    AsyncTaskBarrier
        .register(MonoEx::testFractionMultiplicationCallable1);
    AsyncTaskBarrier
        .register(MonoEx::testFractionMultiplicationCallable2);

    long testCount = AsyncTaskBarrier
        .runTasks()
        .block();
    ...
}
```

See Reactive/Mono/ex2/src/main/java/ex2.java
Overview of the Project Reactor AsyncTaskBarrier Class

• The AsyncTaskBarrier class provides an API to register non-blocking task methods that run *asynchronously*

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public static void main (String[] argv)
    AsyncTaskBarrier
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    long testCount = AsyncTaskBarrier
        .runTasks()
        .block();
    ...
}
```

This framework also handles task methods that run and/or block *synchronously*
Overview of the Project Reactor AsyncTaskBarrier Class

- All of the registered task methods start running (a)synchronously when `AsyncTaskBarrier.runTasks()` is called

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    long testCount = AsyncTaskBarrier
        .runTasks()
        .block();
    ...
}
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Overview of the Project Reactor AsyncTaskBarrier Class

- The driver program then calls `block()` on the Mono returned from `runTasks()` to wait for all asynchronous task processing to complete.

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    long testCount = AsyncTaskBarrier
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    ...
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```

See en.wikipedia.org/wiki/Barrier_(computer_science)

Plays the role of a barrier synchronizer
Overview of the Project Reactor AsyncTaskBarrier Class

- The AsyncTaskBarrier framework (a)synchronously registers/runs tasks & ensures the calling method doesn’t exit until all async processing completes.

Class AsyncTaskBarrier

```java
class AsyncTaskBarrier extends java.lang.Object

This class asynchronously runs tasks that use the Project Reactor framework and ensures that the calling method doesn’t exit until all asynchronous task processing is completed.
```

Method Summary

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<th>Description</th>
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<td>register</td>
<td>Register the task task so that it will be run asynchronously when runTasks() is called.</td>
</tr>
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<td>(java.util.function.Supplier&lt;reactor.core.publisher.Mono&lt;java.lang.Void&gt;&gt; task)</td>
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<td>static</td>
<td>runTasks()</td>
<td>Run all the register tasks.</td>
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