Java ExecutorCompletionService: Evaluating Pros & Cons

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Learning Objectives in this Part of the Lesson

- Understand how the Java CompletionService interface defines a framework for handling the completion of asynchronous tasks
- Know how to instantiate the Java ExecutorCompletionService
- Recognize key methods in the Java CompletionService interface
- Visualize the ExecutorCompletionService in action
- Be aware of how the Java ExecutorCompletionService implements the CompletionService interface
- Know how to apply the Java ConcurrentHashMap class to design a "memoizer"

- Master how to implement the Memoizer class with Java ConcurrentHashMap
- See how Java ExecutorCompletionService & Memoizer are integrated into the "PrimeChecker" app
- Evaluate the pros & cons of this PrimeChecker app implementation

Evaluating this PrimeChecker App

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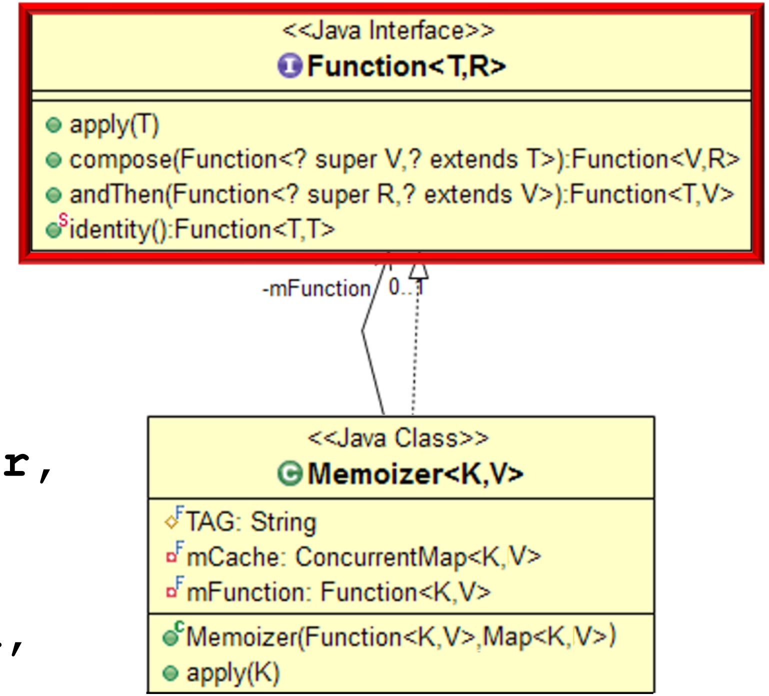
  - Futures are processed as they complete

```
...
private class CompletionRunnable
  implements Runnable {
  int mCount; ...

 public void run() {
   for (int i = 0; i < mCount; ++i) {
     PrimeResult pr =
       ...mExecutorCompletionService.take().get();

     if (pr.mSmallestFactor != 0) ...
     else ...
```

This benefit stems from ExecutorCompletionService's "async future" processing model

Evaluating this PrimeChecker App

- This PrimeChecker implementation fixes problems w/the earlier versions, e.g.
  - Futures are processed as they complete
  - Memoizer enables transparent optimization w/out changing PrimeCallable




```
mMemoizer = new Memoizer<>
      (PrimeCheckers::bruteForceChecker,
       new ConcurrentHashMap());
new Random()
      .longs(count, sMAX_VALUE - count,
             sMAX_VALUE)
      .mapToObj(ranNum -> new PrimeCallable(ranNum, mMemoizer))
      .forEach(callable ->
               mRetainedState.mExecutorCompService::submit); ...
```

Memoizer can be used wherever a Function is expected

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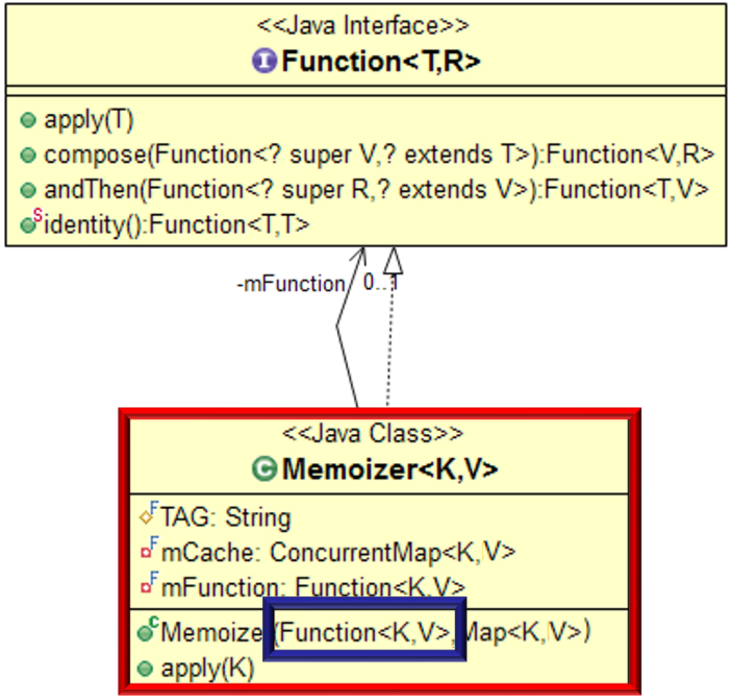
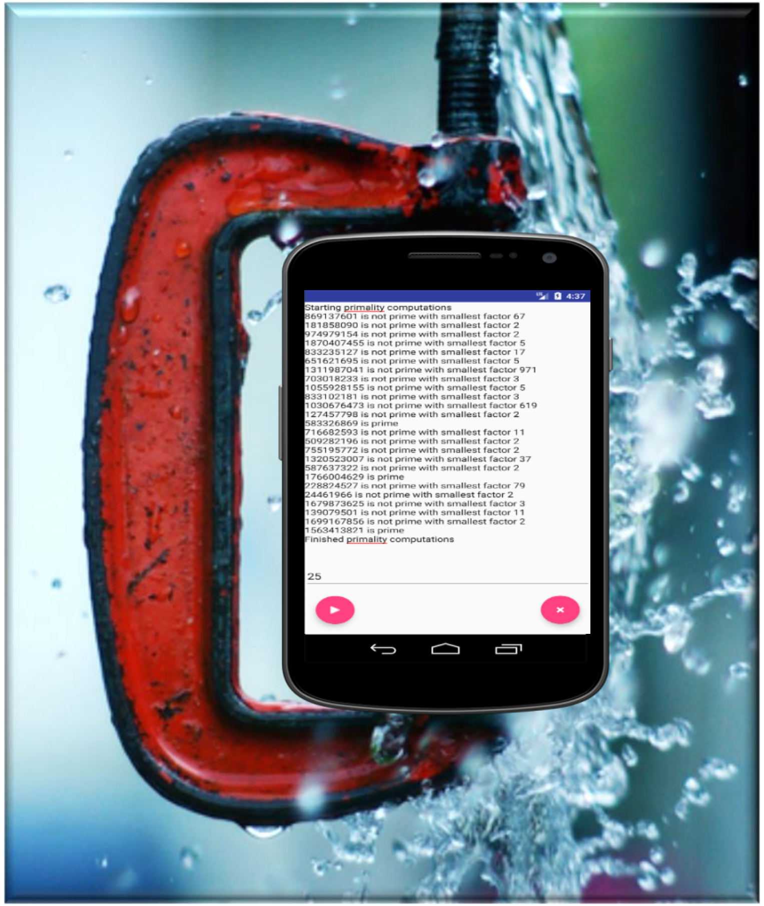



```
mMemoizer = new Memoizer<>
    (PrimeCheckers::efficientChecker,
     new ConcurrentHashMap());
new Random()
    .longs(count, sMAX_VALUE - count,
           sMAX_VALUE)
    .mapToObj(ranNum -> new PrimeCallable(ranNum, mMemoizer))
    .forEach(callable ->
             mRetainedState.mExecutorCompService::submit); ...
```

bruteForceChecker() can easily be replaced with a different method reference

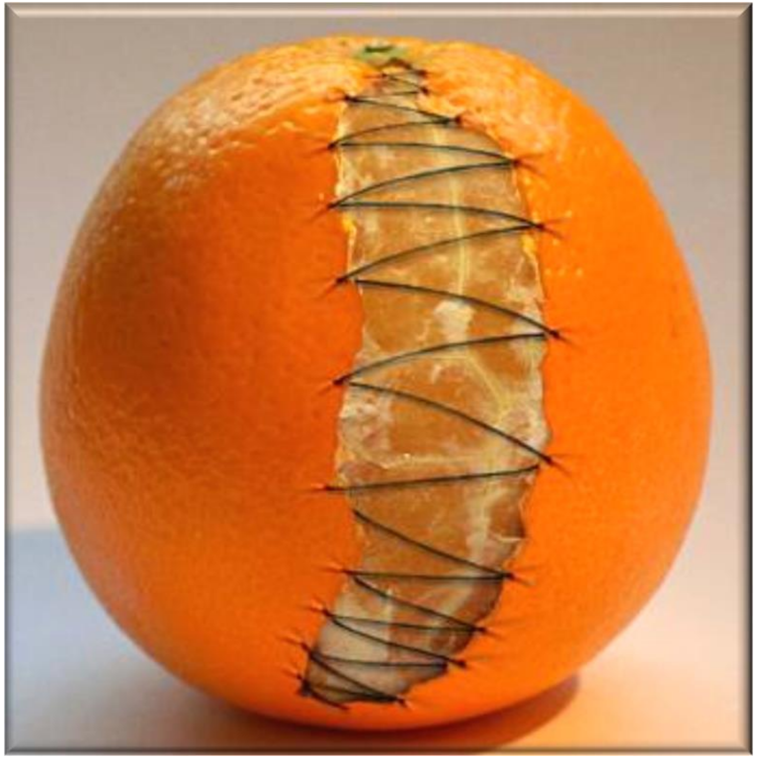
Evaluating this PrimeChecker App

- However, there are still limitations



Evaluating this PrimeChecker App

- However, there are still limitations, e.g.
  - If the Memoizer is used for a long period of time for a wide range of inputs it will continue to grow & never clean itself up!



We fix this limtiation in the upcoming lesson on the "*Java ScheduledExecutorService*"

Evaluating this PrimeChecker App

- However, there are still limitations, e.g.
  - If the Memoizer is used for a long period of time for a wide range of inputs it will continue to grow & never clean itself up!
  - This implementation of Memoizer depends on ConcurrentHashMap features available only with Java 8 & beyond

We fix this limitation in the upcoming lesson on the "*Java FutureTask*"

End of Java Executor CompletionService: Evaluating Pros & Cons