Java Executor Implementation Choices

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Learning Objectives in this Part of the Lesson

- Recognize the single simple feature provided by the Java Executor interface
- Understand various implementation choices for the Executor interface
Implementation Choices for the Java Executor Interface
Overview of the Java Executor Interface

- The Executor interface can be implemented via different types of thread pooling mechanisms.

<<Java Interface>>

1. Executor

   - execute(Runnable):void

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**Fixed-sized Thread Pool**

A pool of worker threads

**Cached Thread Pool**

A pool of worker threads

**Work-stealing Thread Pool**

A pool of worker threads

**A Custom Thread Pool**

A pool of worker threads
Overview of the Java Executor Interface

- Executor configuration is often performed just once to select the “execution policy” for tasks passed to it.

```
<<Java Interface>>
Executor
execute(Runnable): void
```

**Fixed-sized Thread Pool**

**Cached Thread Pool**

**Work-stealing Thread Pool**

**A Custom Thread Pool**
Overview of the Java Executor Interface

• The “execution policy” for a group of tasks defines several properties
Overview of the Java Executor Interface

- The “execution policy” for a group of tasks defines several properties, e.g.
  - In which thread will a task be executed
    - e.g., a existing thread in the pool, a new thread created/added to the pool, etc.

There’s even a single threaded implementation of Executor!
The “execution policy” for a group of tasks defines several properties, e.g.

- In which thread will a task be executed
- In which order will tasks be executed
  - e.g., FIFO, LIFO, priority order, etc.

Overview of the Java Executor Interface

<table>
<thead>
<tr>
<th>FIFO</th>
<th>LIFO</th>
<th>Priority order</th>
</tr>
</thead>
<tbody>
<tr>
<td>Back</td>
<td>Front</td>
<td>Greatest Element</td>
</tr>
<tr>
<td>Dequeue</td>
<td>Pop</td>
<td>Least Element</td>
</tr>
<tr>
<td>Insert (enqueue)</td>
<td>Remove (dequeue)</td>
<td>Rear</td>
</tr>
</tbody>
</table>
Overview of the Java Executor Interface

• The “execution policy” for a group of tasks defines several properties, e.g.
  • In which thread will a task be executed
  • In which order will tasks be executed
  • How many tasks can run concurrently
    • e.g., is the maximum # of tasks limited by the # of CPU cores or by some other factor?
• The “execution policy” for a group of tasks defines several properties, e.g.
  • In which thread will a task be executed
  • In which order will tasks be executed
  • How many tasks can run concurrently
  • If not all tasks can be executed due to system overload which task(s) should be rejected & how should an app be notified
    • e.g., should execute() fail silently vs. throw RejectedExecutionException

See docs.oracle.com/javase/8/docs/api/java/util/concurrent/RejectedExecutionException.html
The "execution policy" for a group of tasks defines several properties, e.g.

- In which thread will a task be executed
- In which order will tasks be executed
- How many tasks can run concurrently
- If not all tasks can be executed due to system overload which task(s) should be rejected & how should an app be notified
- What actions (if any) should be performed before and/or after executing a task
  - e.g., Android AsyncTask’s onPreExecute() & onPostExecute() hook methods

See developer.android.com/reference/android/os/AsyncTask
End of Java Executor Implementation Choices