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

### Fixed-sized Thread Pool
- A pool of worker threads
- Deque
- Sub-Task1,2
- Sub-Task1,3
- Sub-Task1,4
- Sub-Task1,1

### Cached Thread Pool
- A pool of worker threads
- Deque
- Sub-Task1,3
- Sub-Task1,4

### Work-stealing Thread Pool
- A pool of worker threads
- Sub-Task1,1

### A Custom Thread Pool
- A pool of worker threads
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.
Overview of the Java Executor Interface

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

```java
<<Java Interface>>
interface Executor {
    void execute(Runnable task);
}
```
Overview of the Java Executor Interface

• The “execution policy” for a group of tasks defines several properties
The "execution policy" for a group of tasks defines several properties, e.g.

- In which thread will a task be executed
  - e.g., an 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

• 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?
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
  • 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