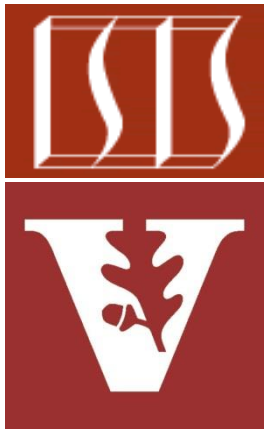
The AsyncTask Framework: Introduction



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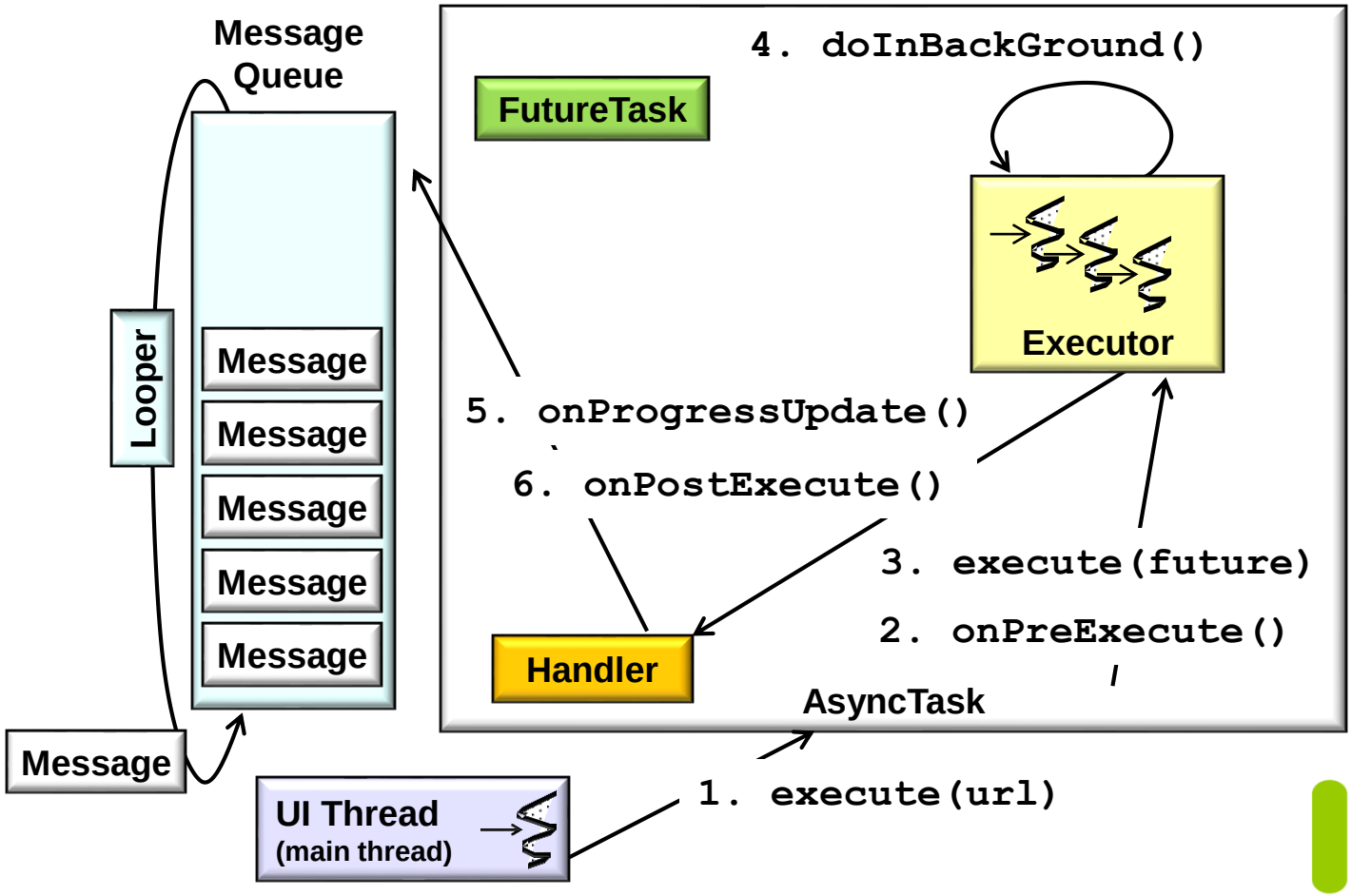
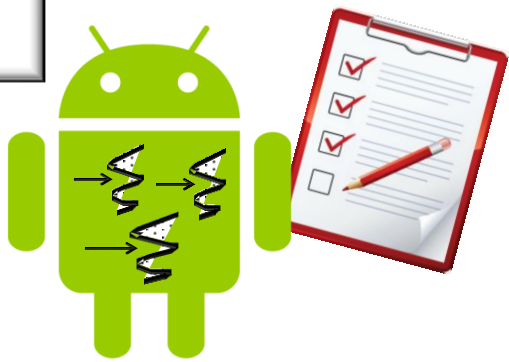
Learning Objectives in this Part of the Lesson

- Recognize the capabilities provided by the Android AsyncTask framework



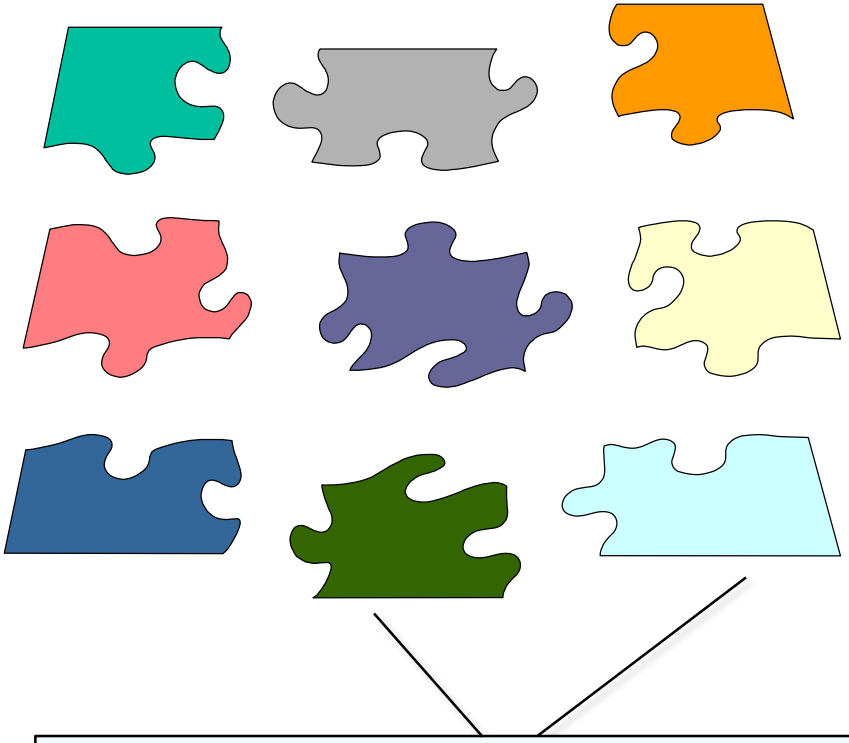


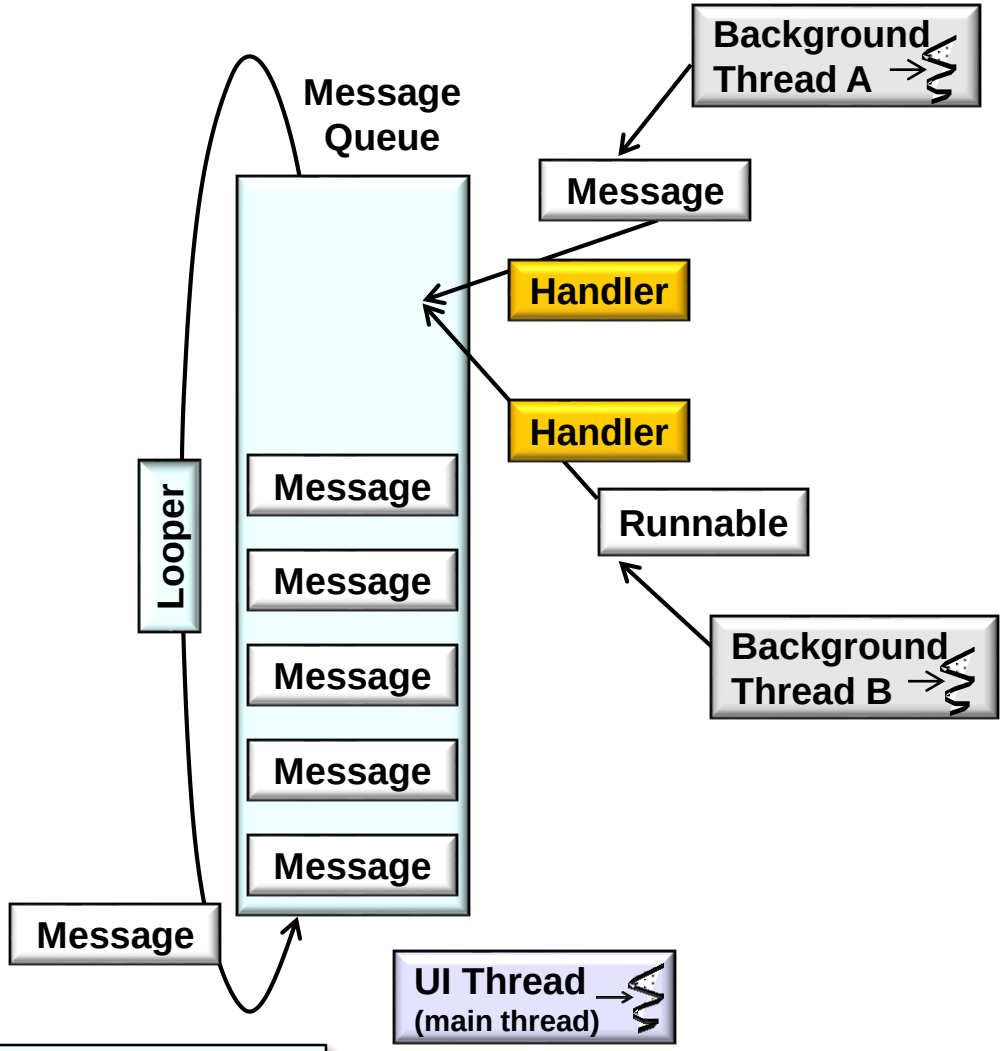
Allows apps to perform background operations & publish results on UI thread *without* manipulating threads, handlers, messages, or runnables

Overview of the AsyncTask Framework

Overview of the AsyncTask Framework

- Classes in HaMeR framework are loosely connected

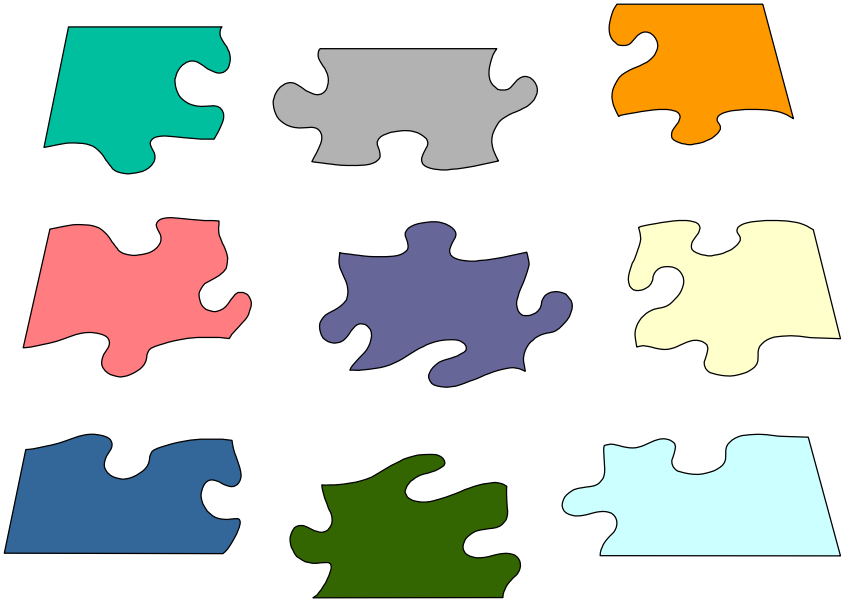


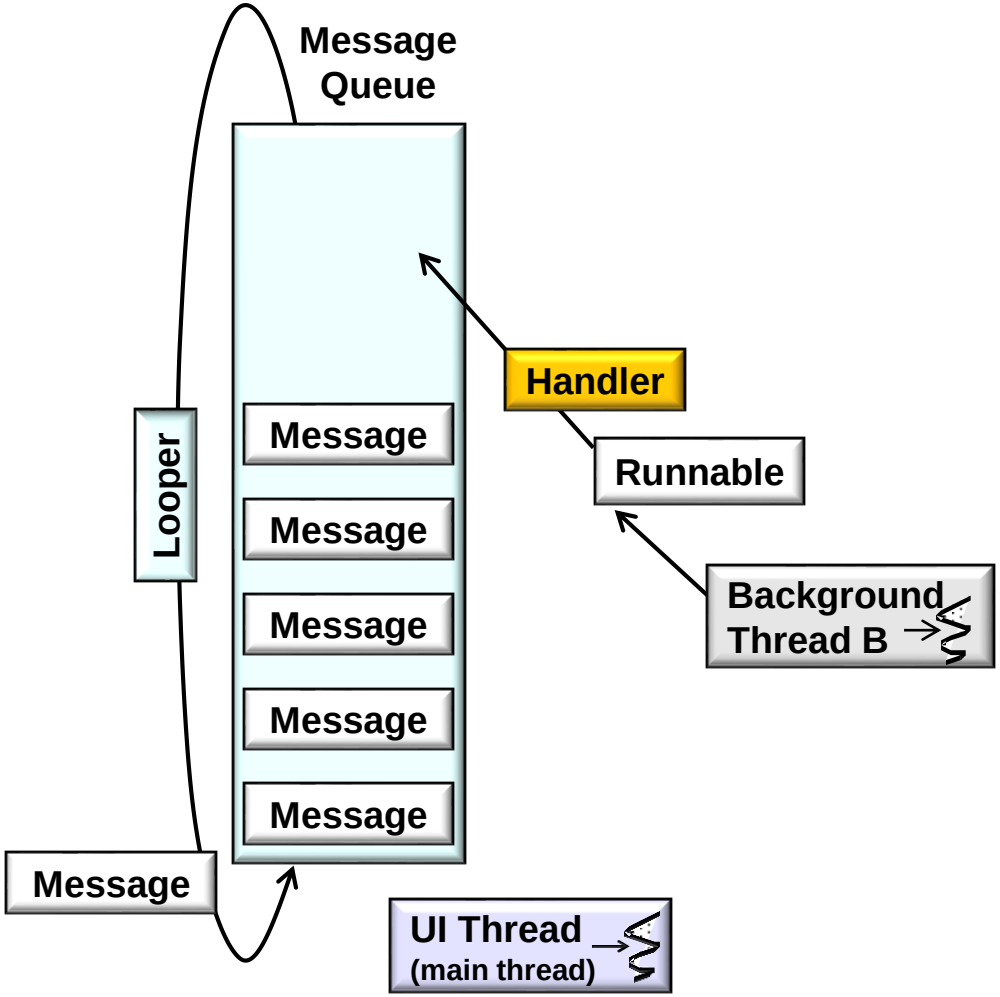


e.g., it's not clear from the Android documentation that classes in the HaMeR framework are related

Overview of the AsyncTask Framework

- Classes in HaMeR framework are loosely connected
  - This flexibility works well for simple concurrency use cases





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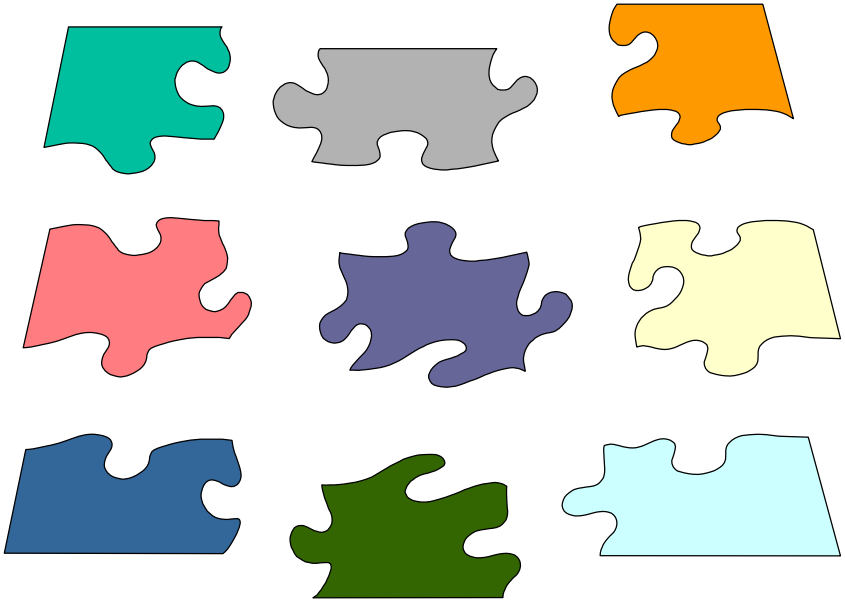

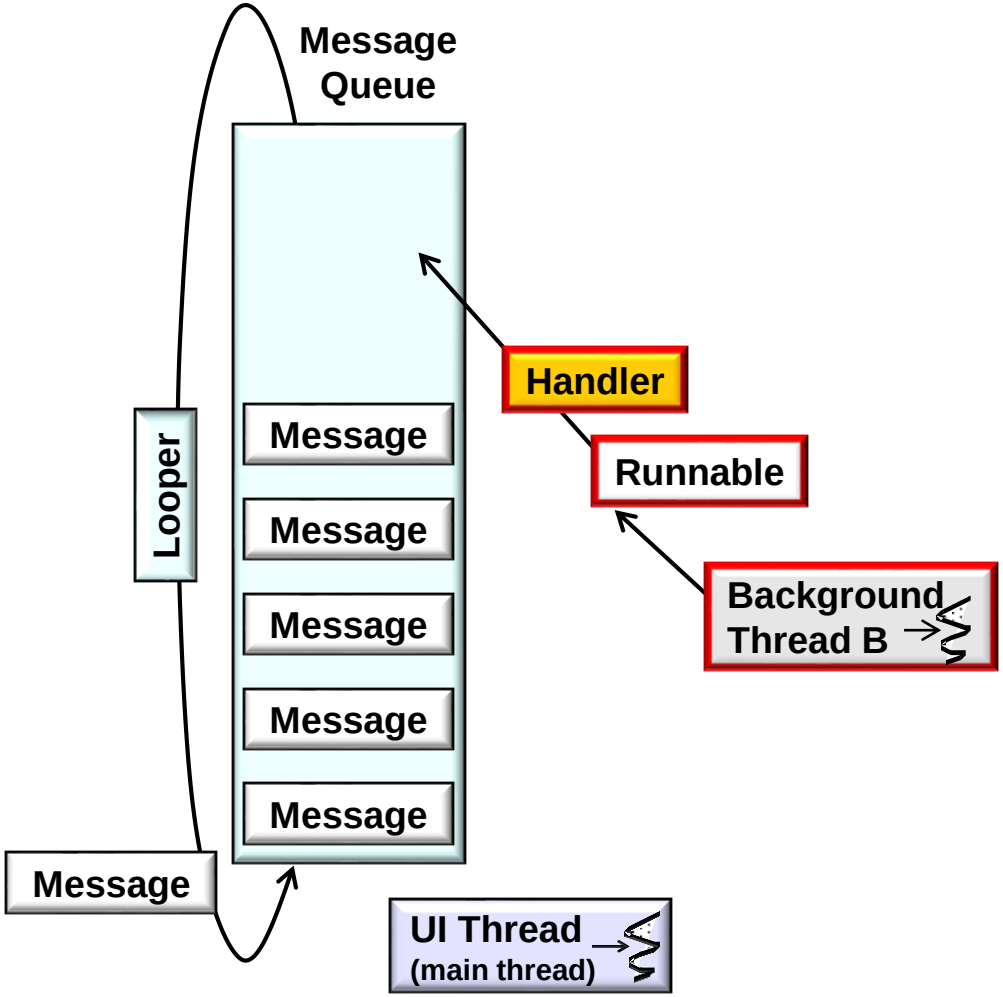

e.g., where a background thread posts a runnable to the UI thread…

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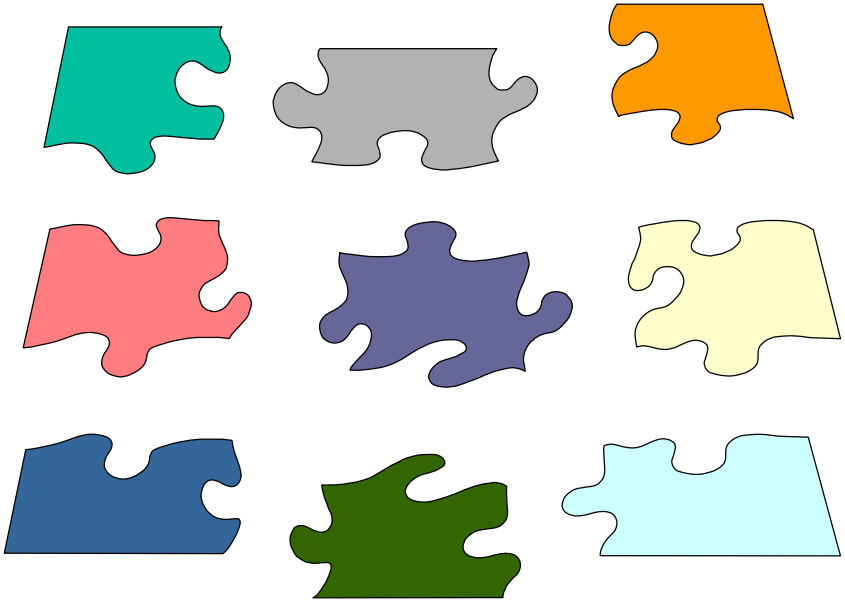

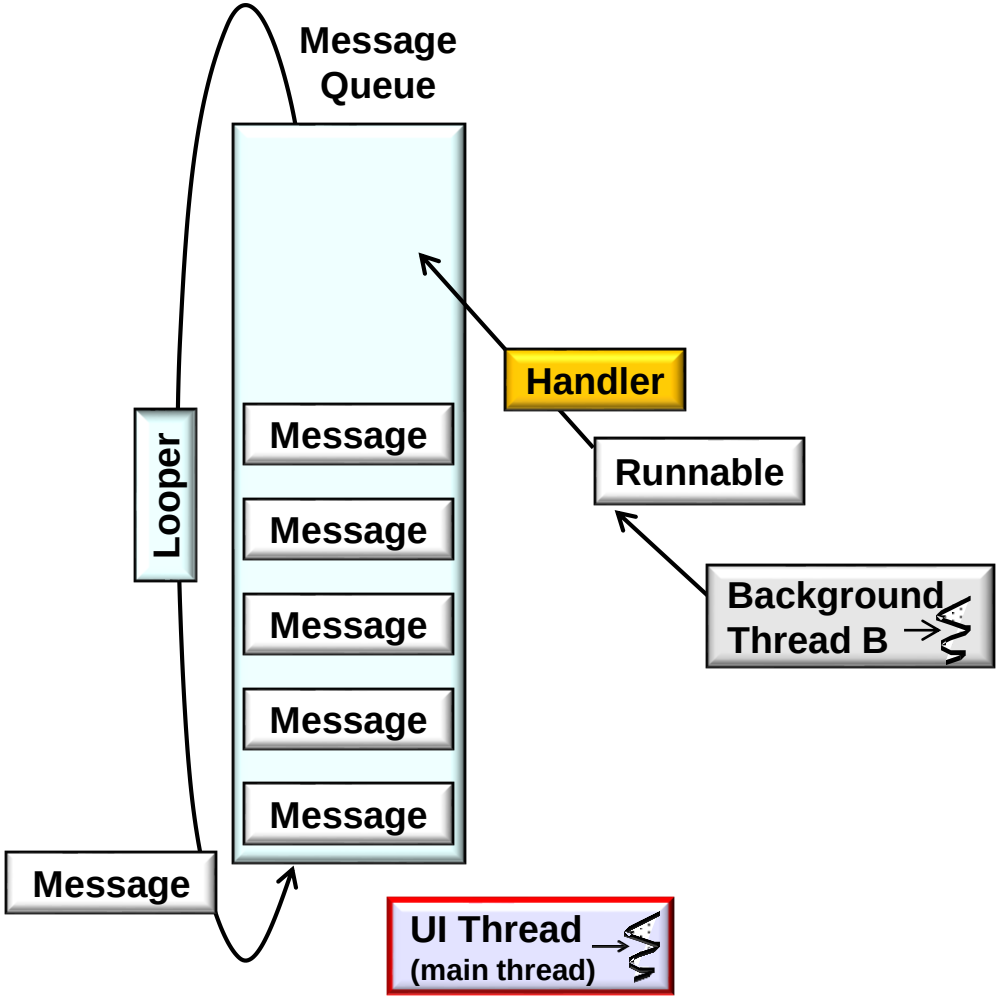

… & the UI thread dispatches the run() hook method of the runnable

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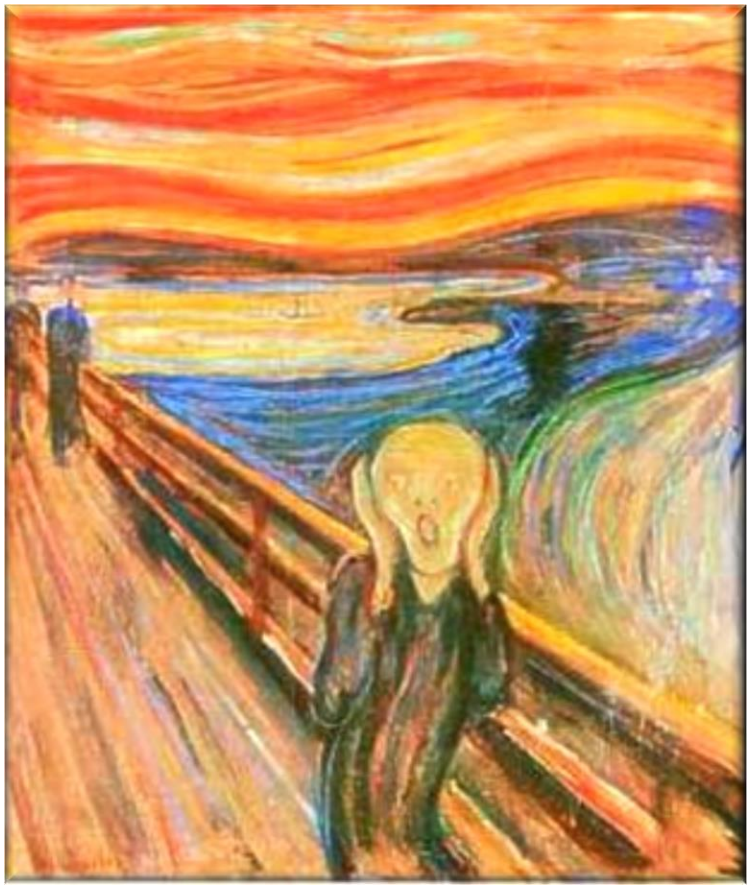
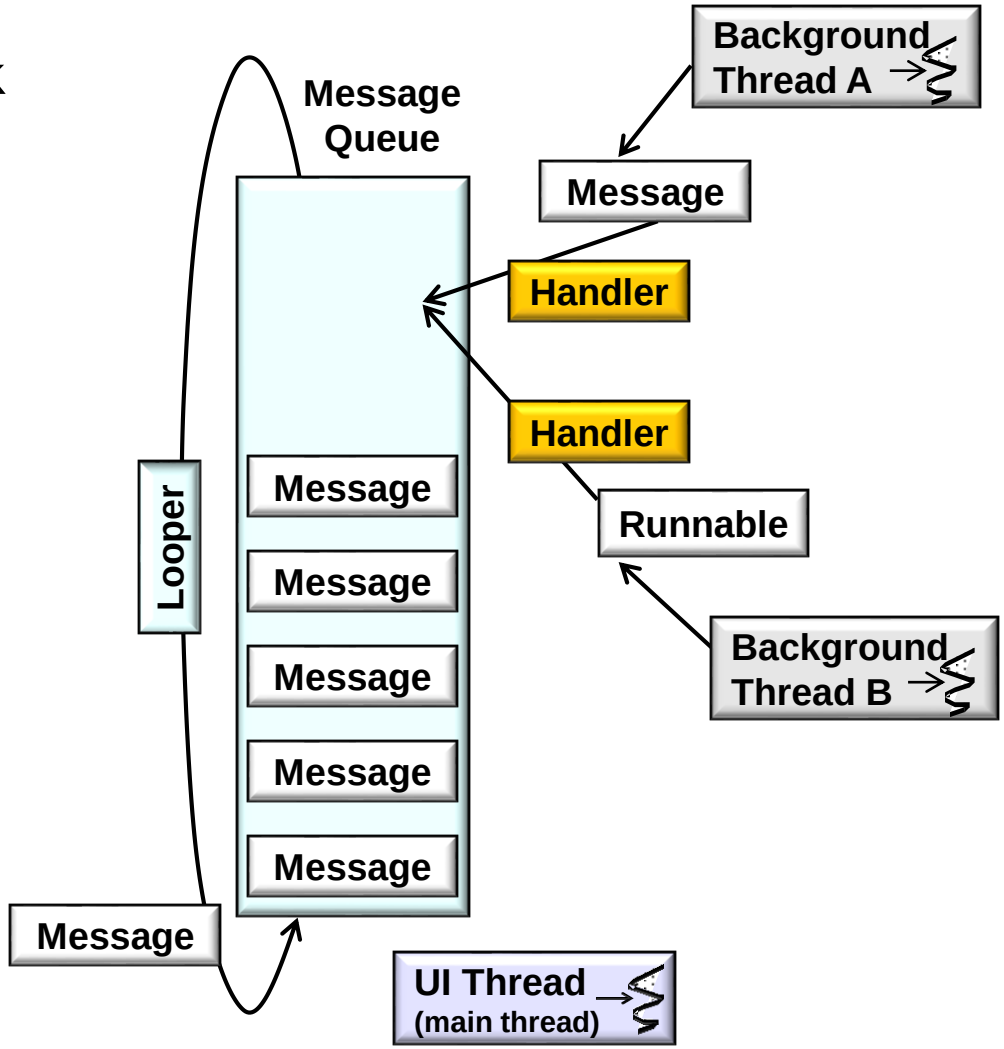
- However, there are drawbacks to the HaMeR concurrency framework





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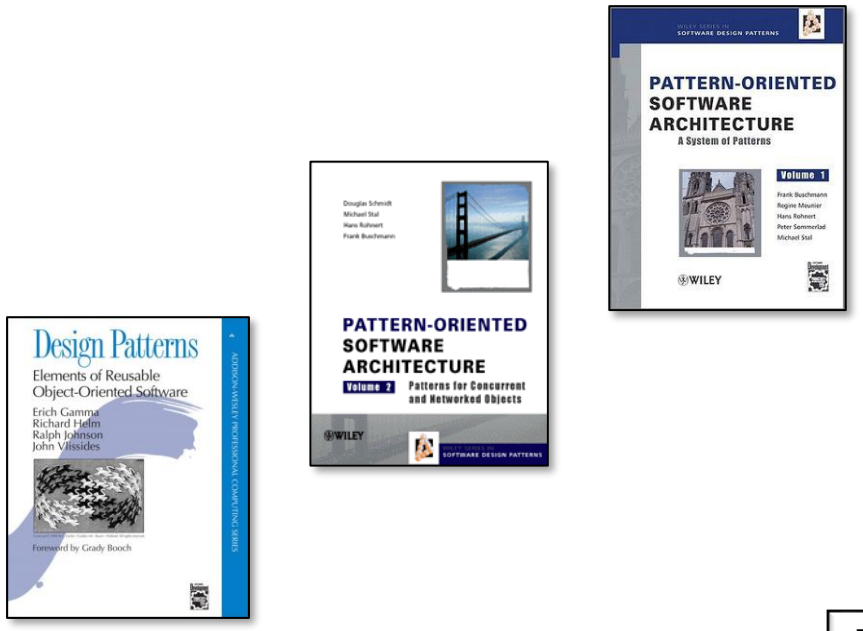
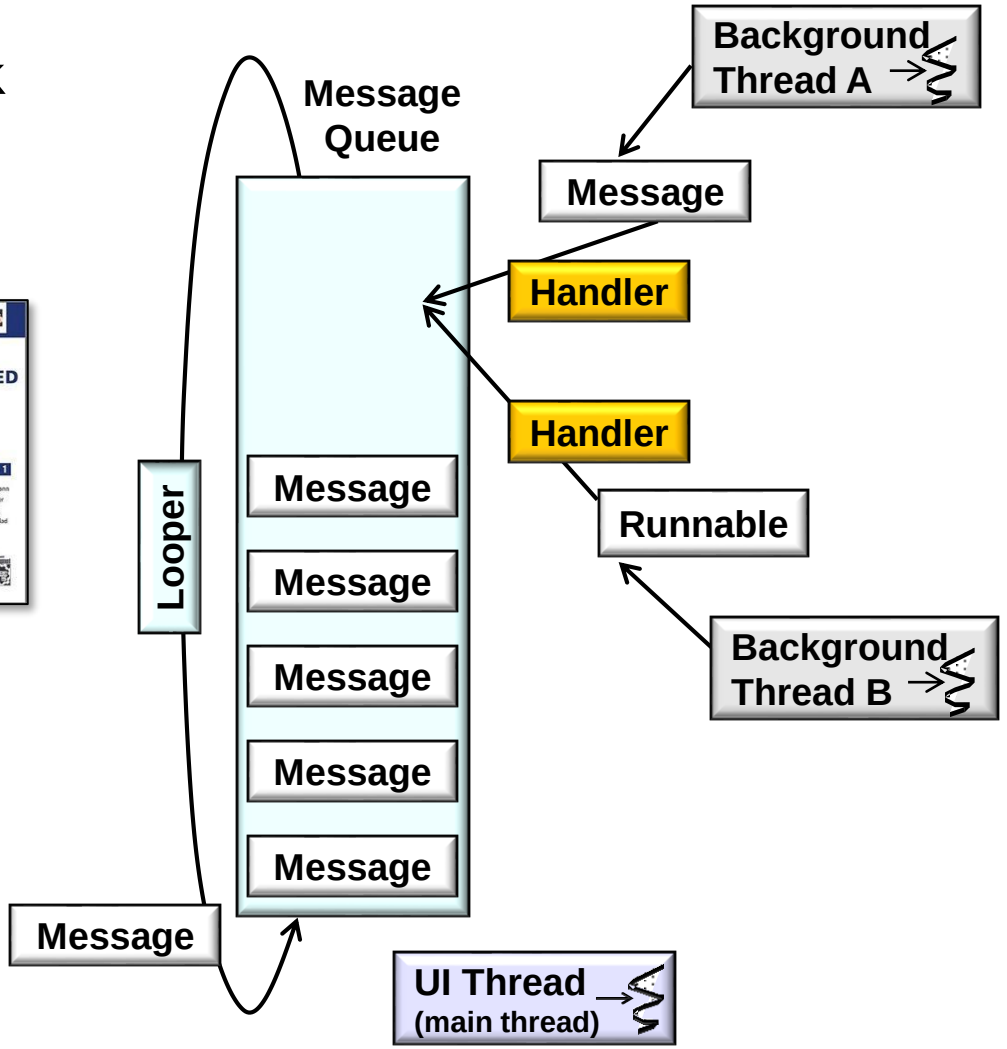
- However, there are drawbacks to the HaMeR concurrency framework
  - Must understand patterns to use this framework effectively

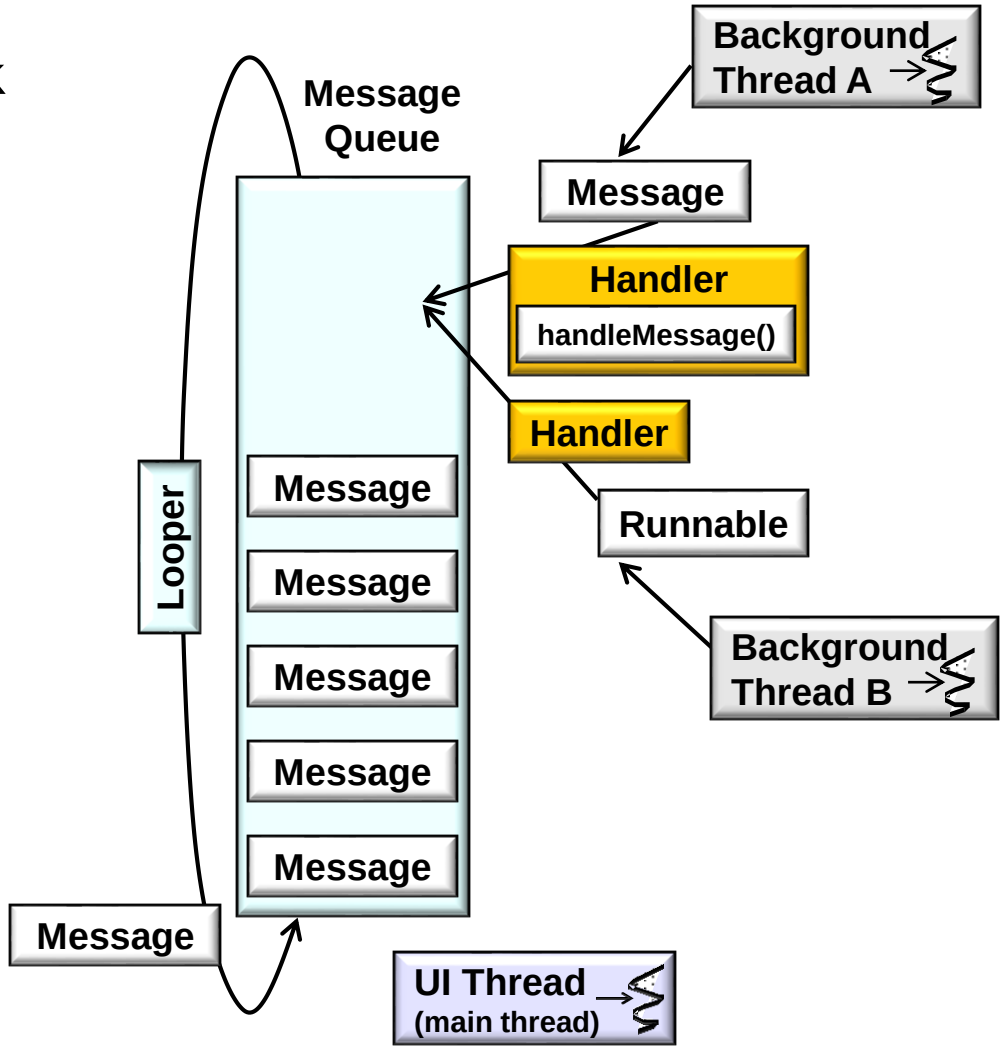




See en.wikipedia.org/wiki/Active_object & www.dre.vanderbilt.edu/~schmidt/CommandProcessor.pdf

Overview of the AsyncTask Framework

- However, there are drawbacks to the HaMeR concurrency framework
  - Must understand patterns to use this framework effectively
  - Tedious & error-prone to use



e.g., apps must understand how to manage the lifecycle of messages

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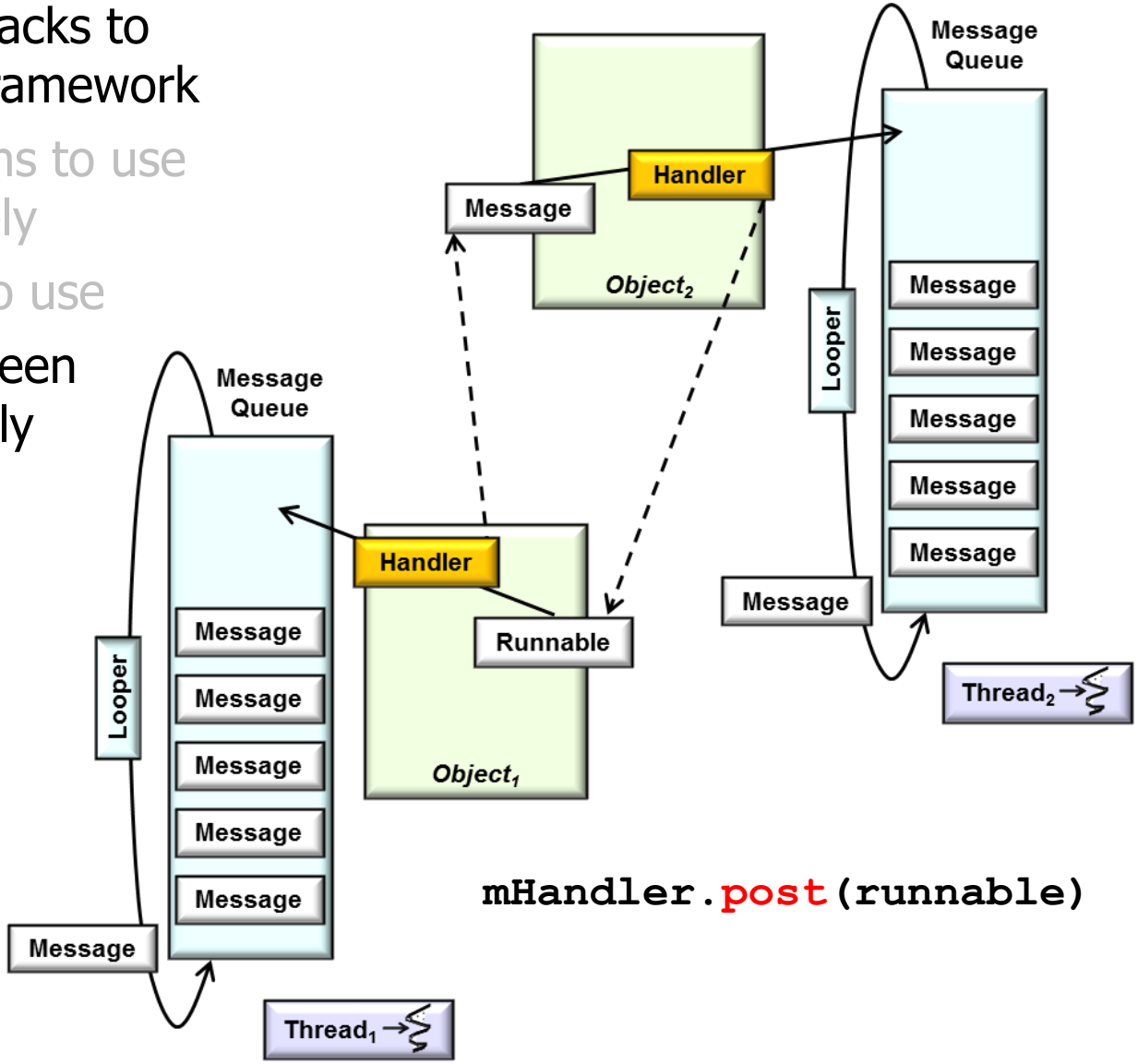
  - All communication between threads must be explicitly programmed




```
mHandler.sendMessage
        (message)
```

```
mHandler.post(runnable)
```

Overview of the AsyncTask Framework

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  - Must understand patterns to use this framework effectively
  - Tedious & error-prone to use
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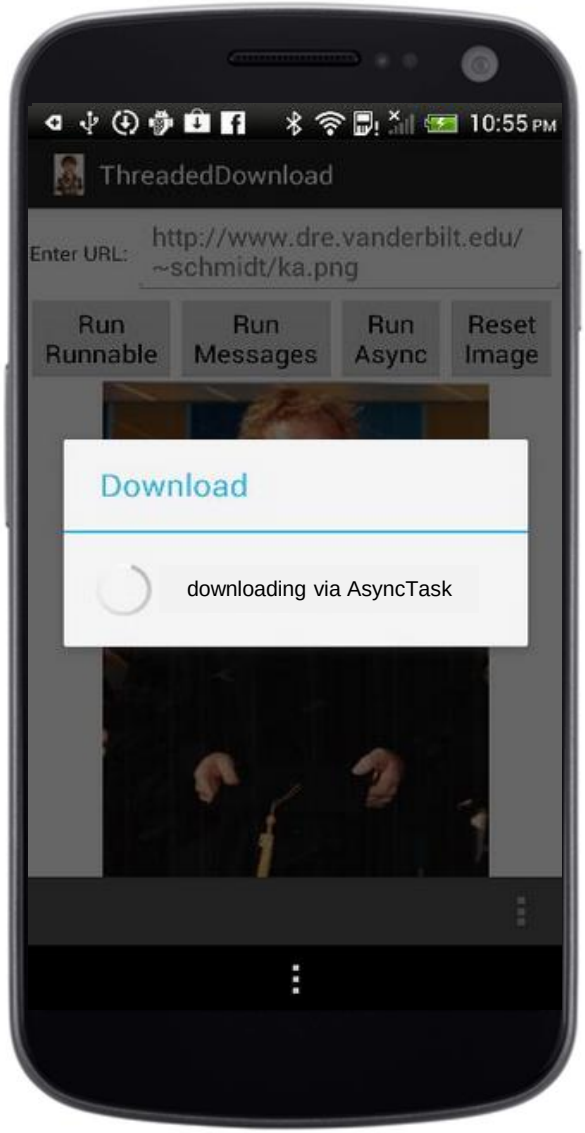
  - Any "pre" and/or "post" processing must also be explicitly programmed
    - e.g., starting & stopping a progress dialog box



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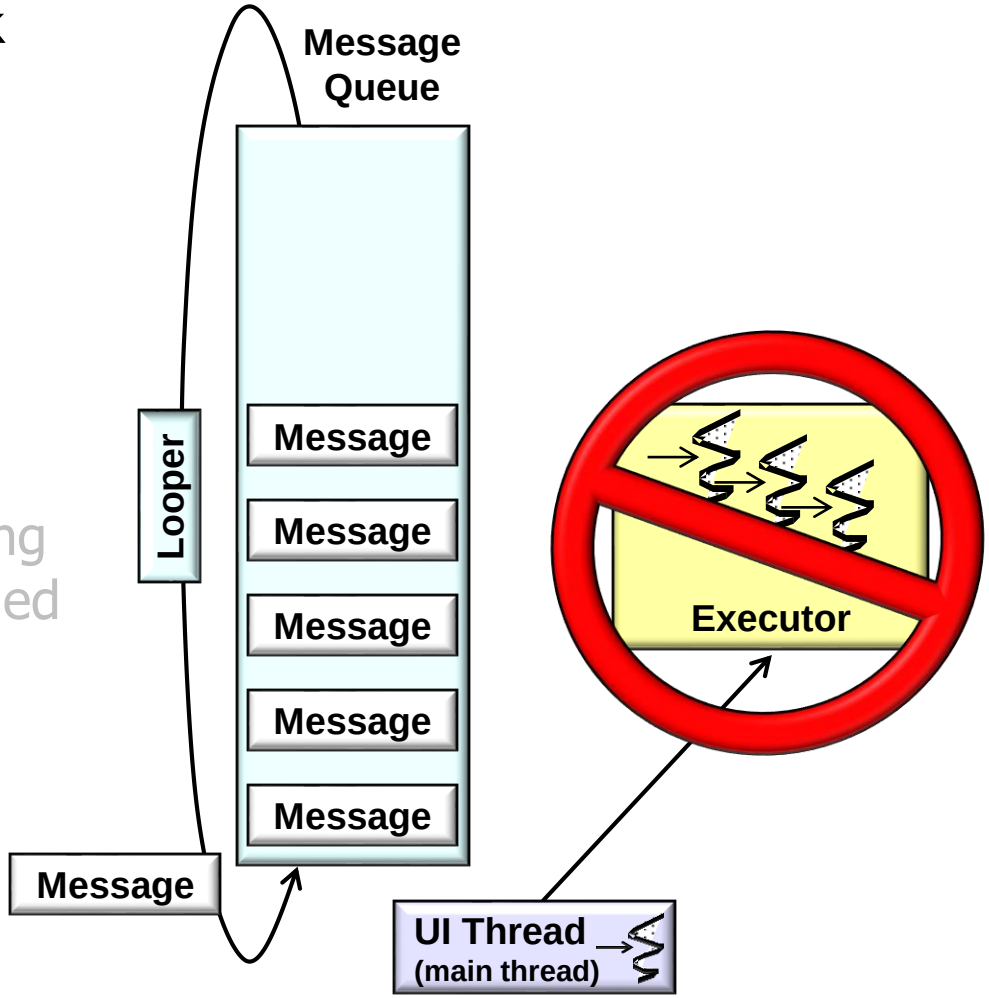
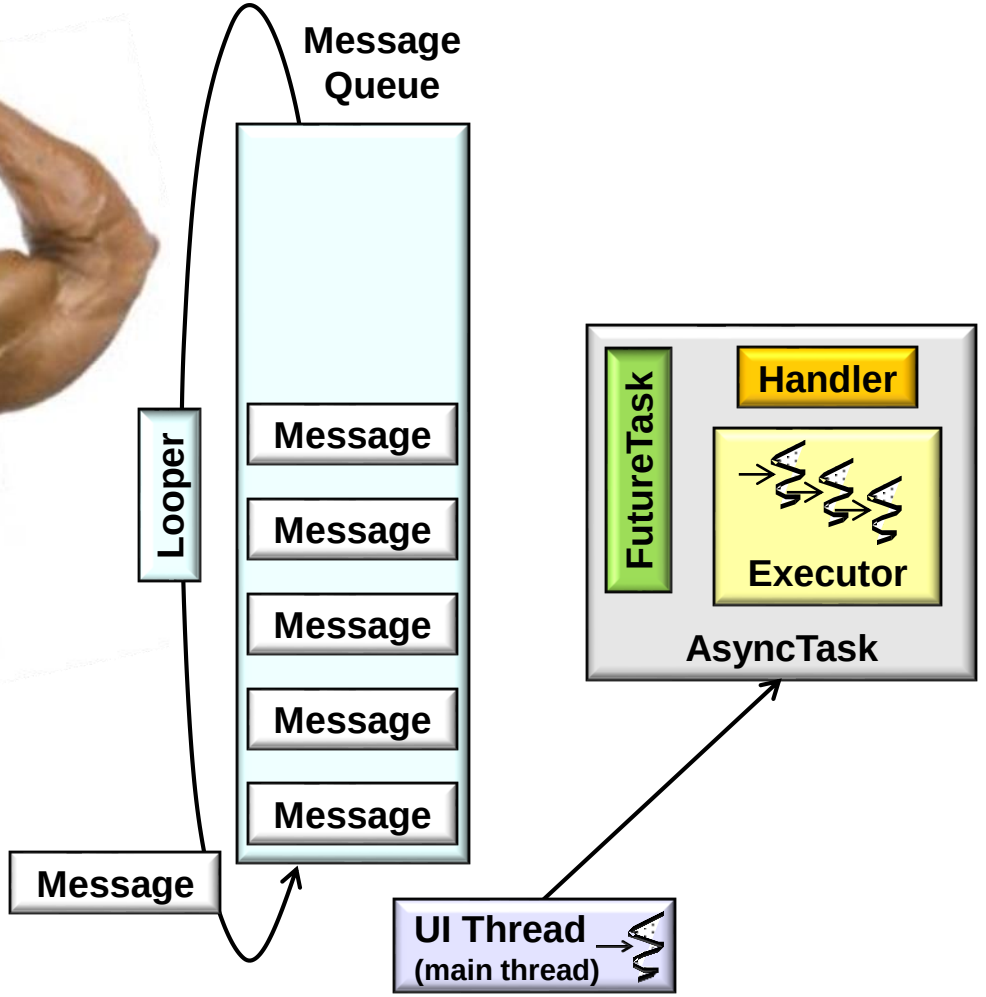
  - Performance can't be scaled up transparently



Overview of the AsyncTask Framework

- In contrast, AsyncTask framework classes are more strongly connected



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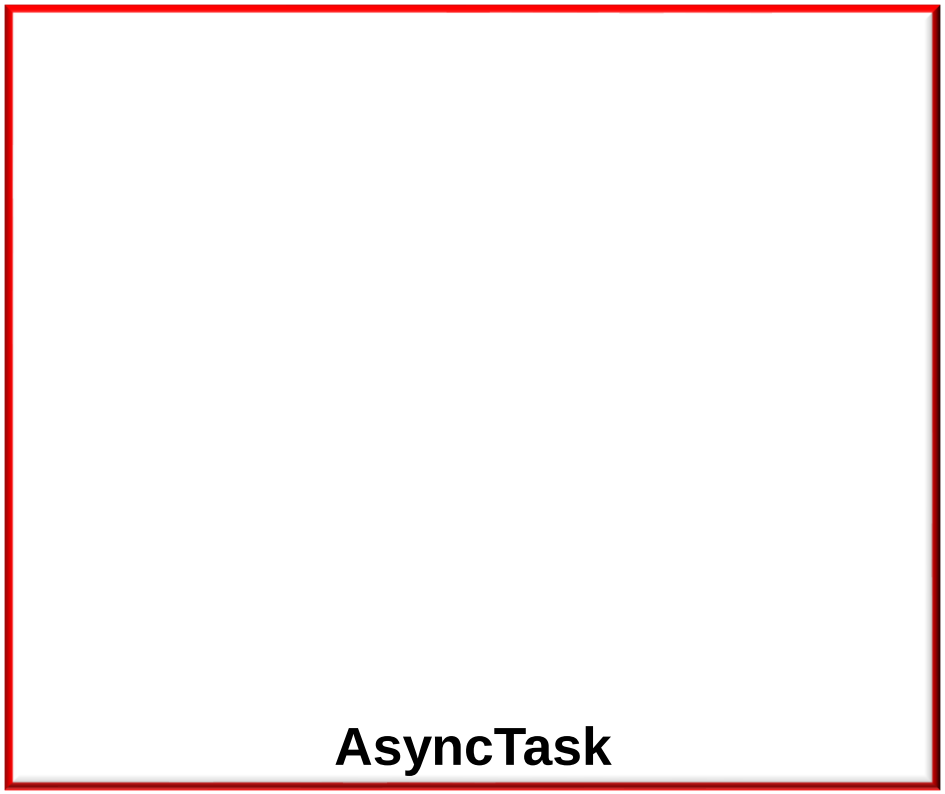
- In contrast, AsyncTask framework classes are more strongly connected
  - Complex framework details hidden via *Façade* pattern



See en.wikipedia.org/wiki/Facade_pattern

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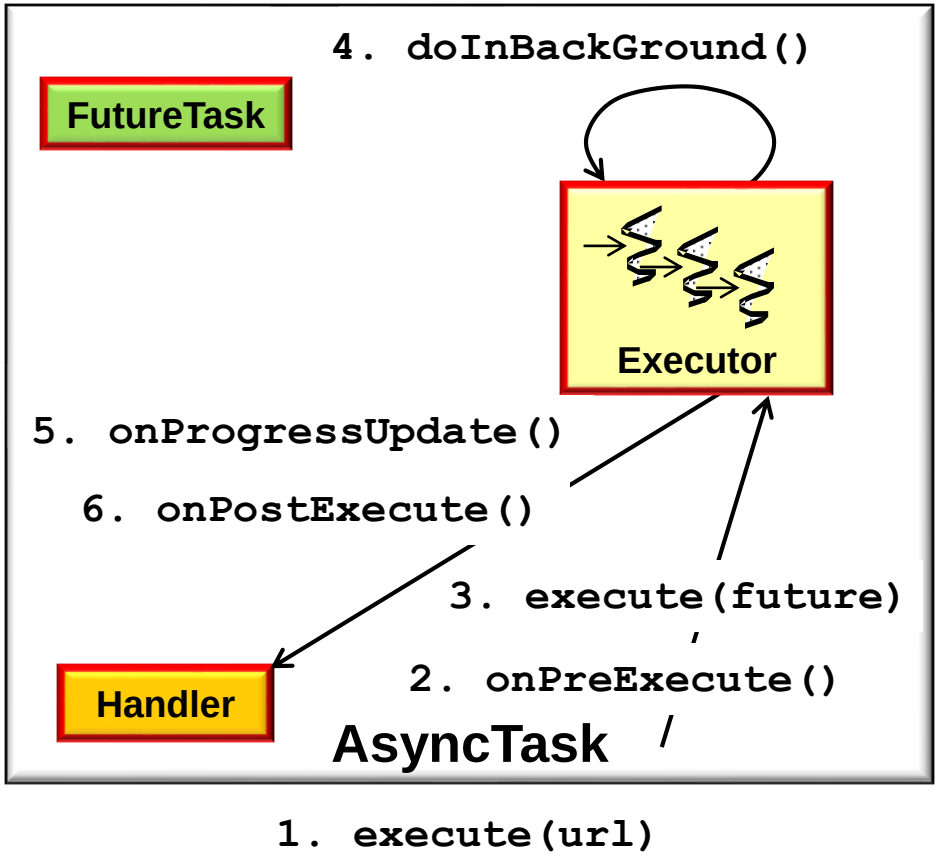
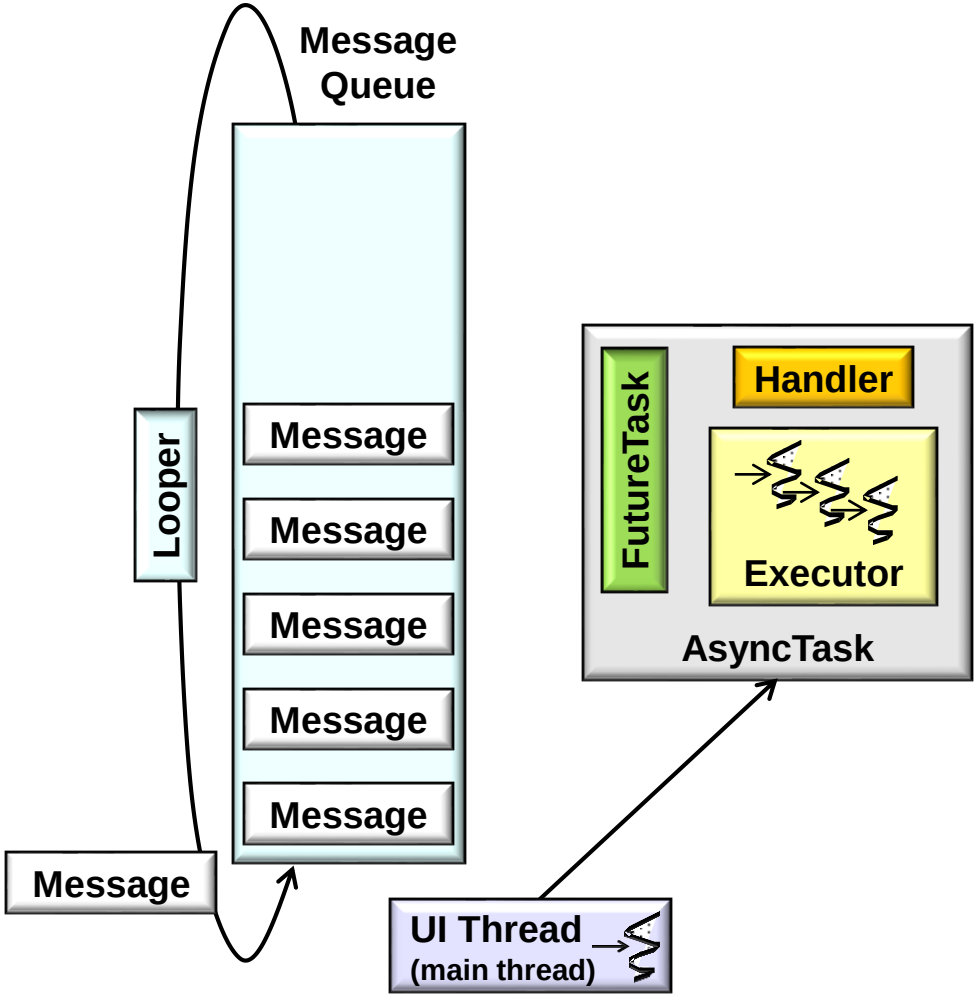
  - Complex framework details hidden via *Façade* pattern
    - Encapsulates the complicated classes in AsyncTask framework with a simpler interface



See developer.android.com/reference/android/os/AsyncTask.html

Overview of the AsyncTask Framework

- In contrast, AsyncTask framework classes are more strongly connected
  - Complex framework details hidden via *Façade* pattern
  - Yields a smaller "surface area"



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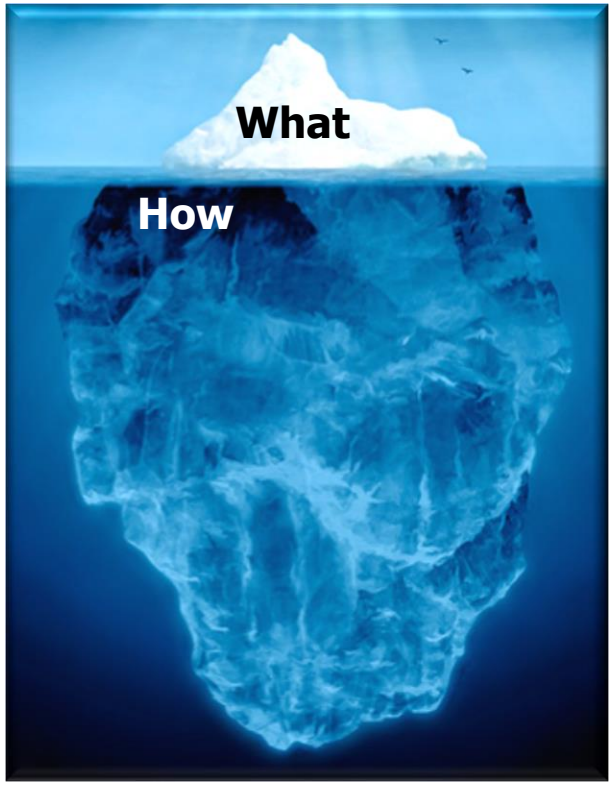

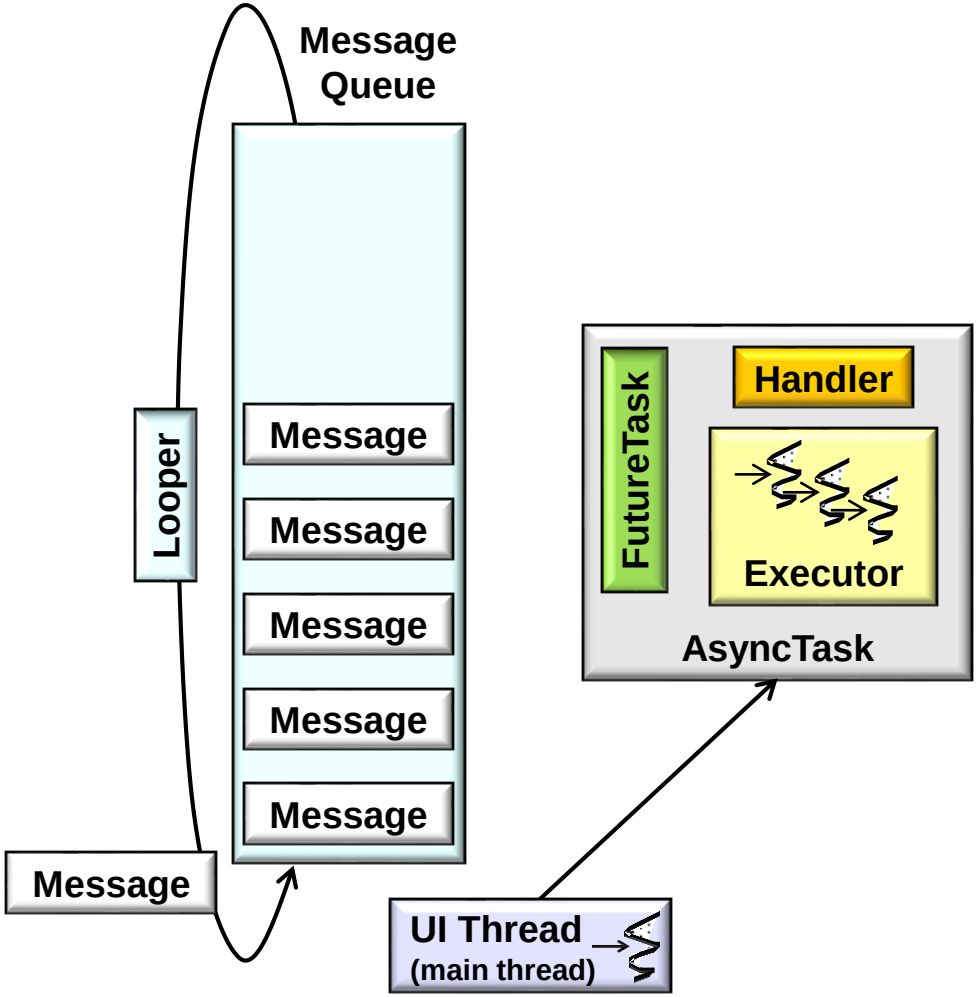

i.e., programmers can focus on the "what" not the "how"

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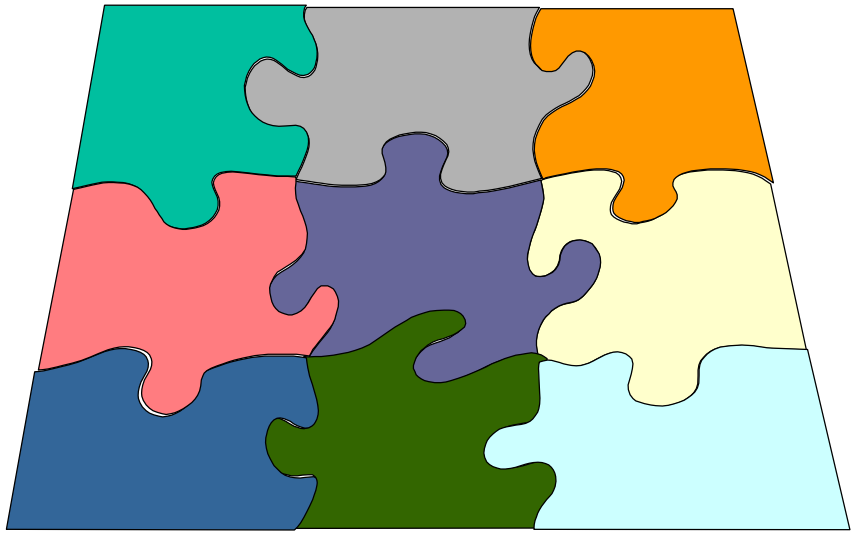
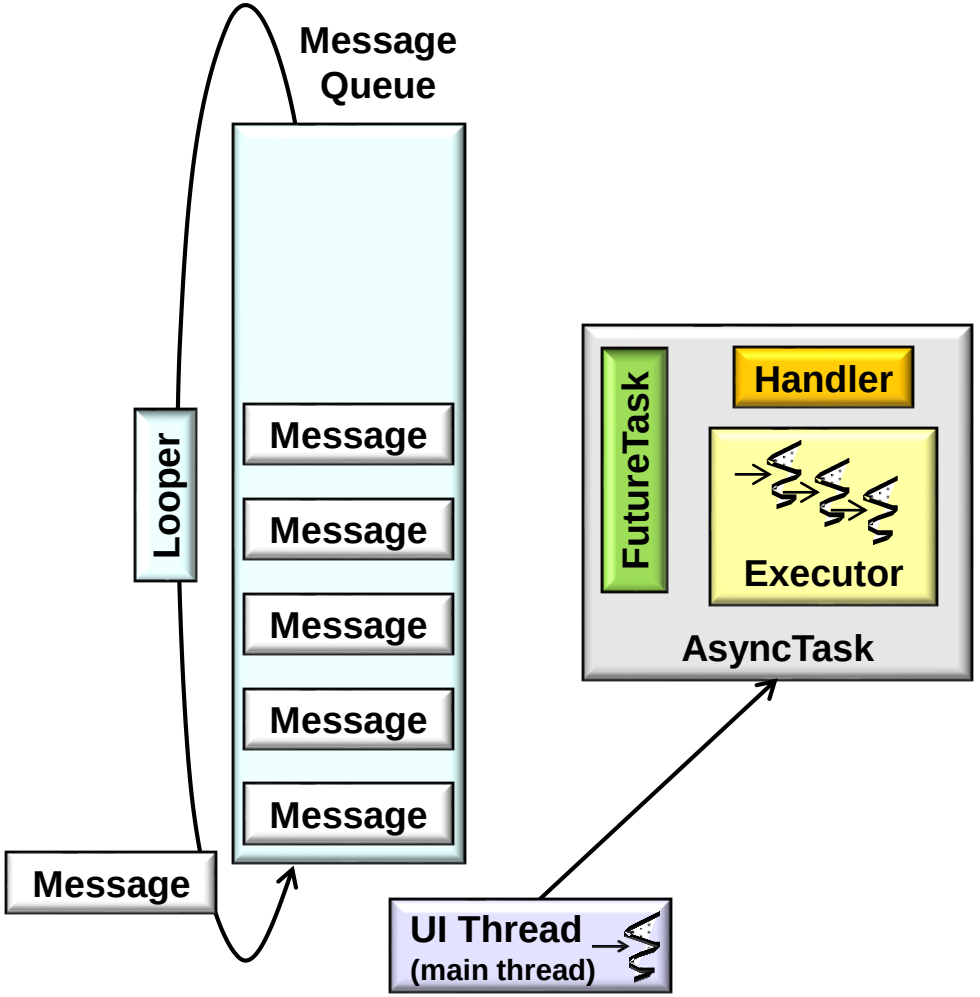
  - Tasks run concurrently, *without* manipulating threads, handlers, messages, or runnables directly





See en.wikipedia.org/wiki/Template_Method_pattern

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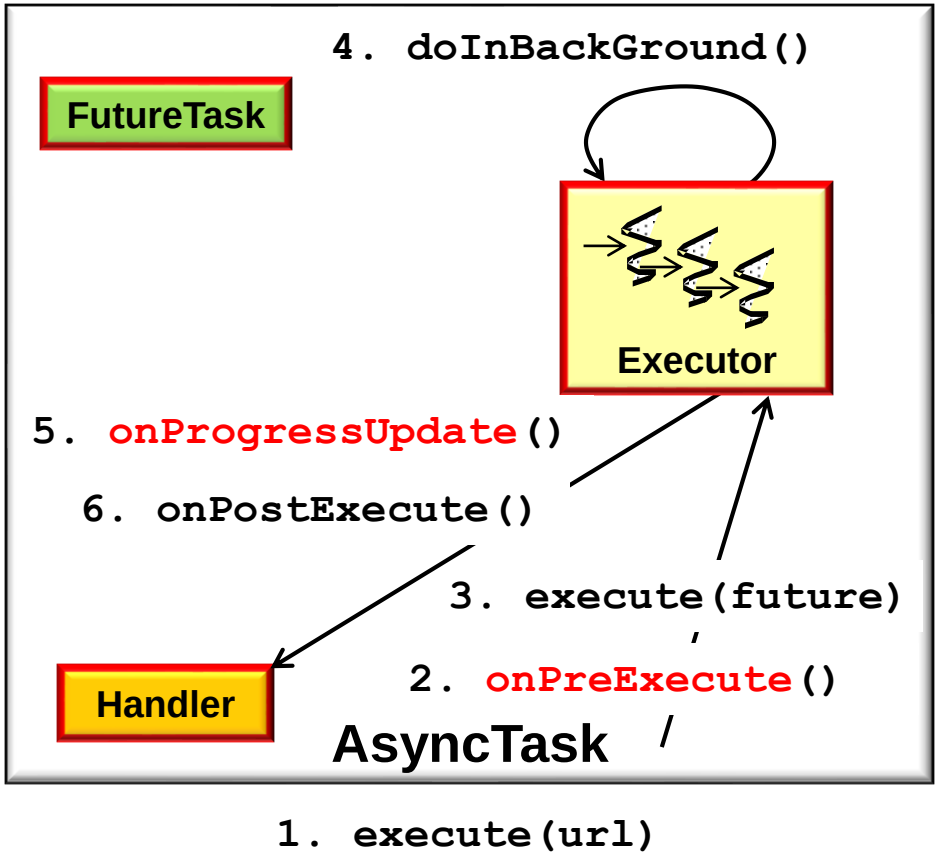
  - Hook methods can automatically
    - Perform pre-processing & post-processing in the UI thread



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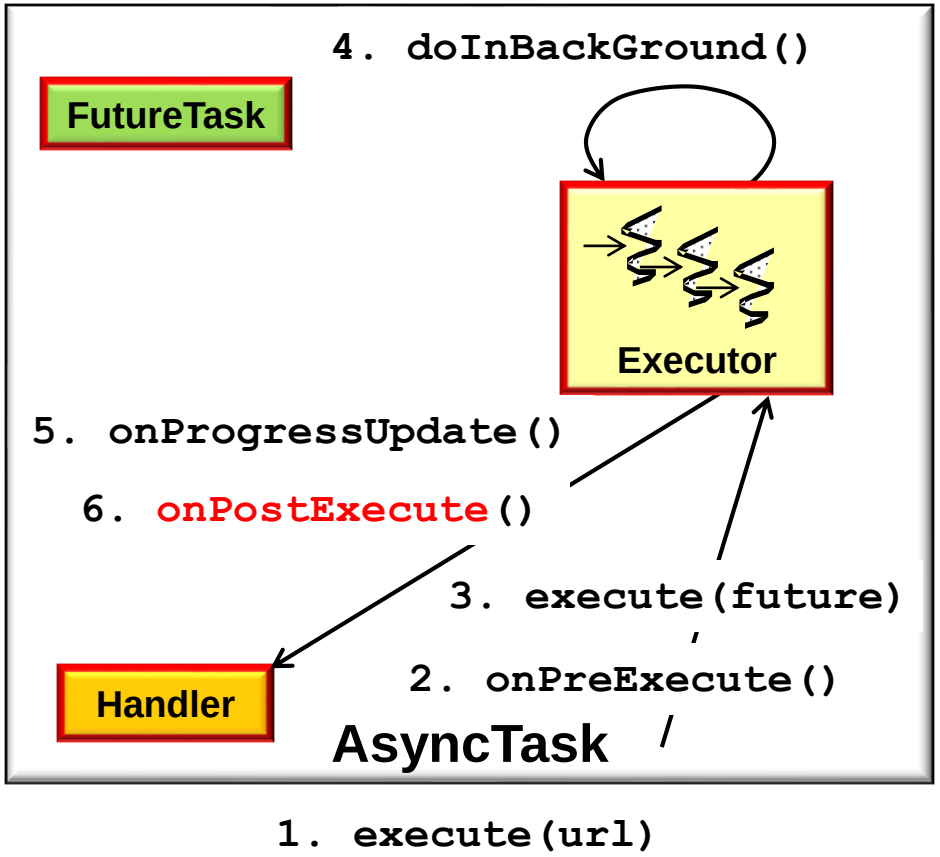
    - Perform pre-processing & post-processing in the UI thread
    - Pass typed date between background & UI threads



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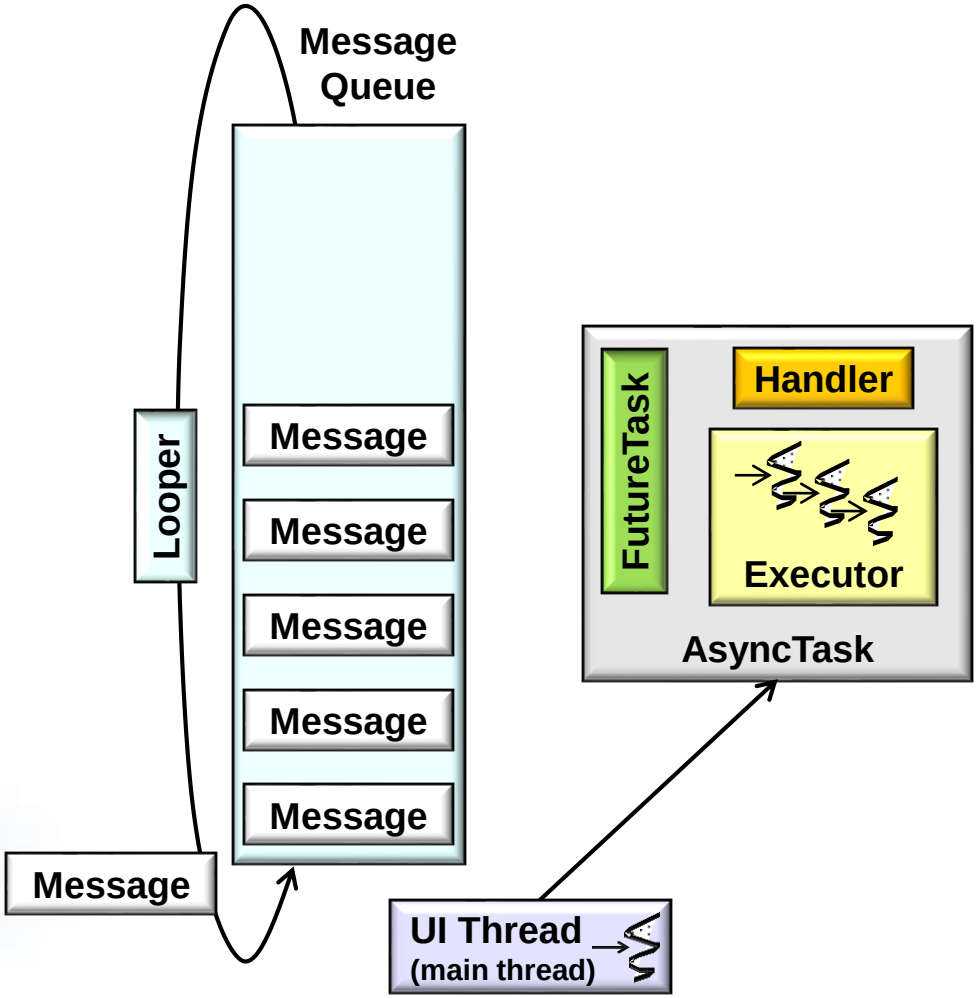
- Likewise, AsyncTask performance can be scaled up transparently



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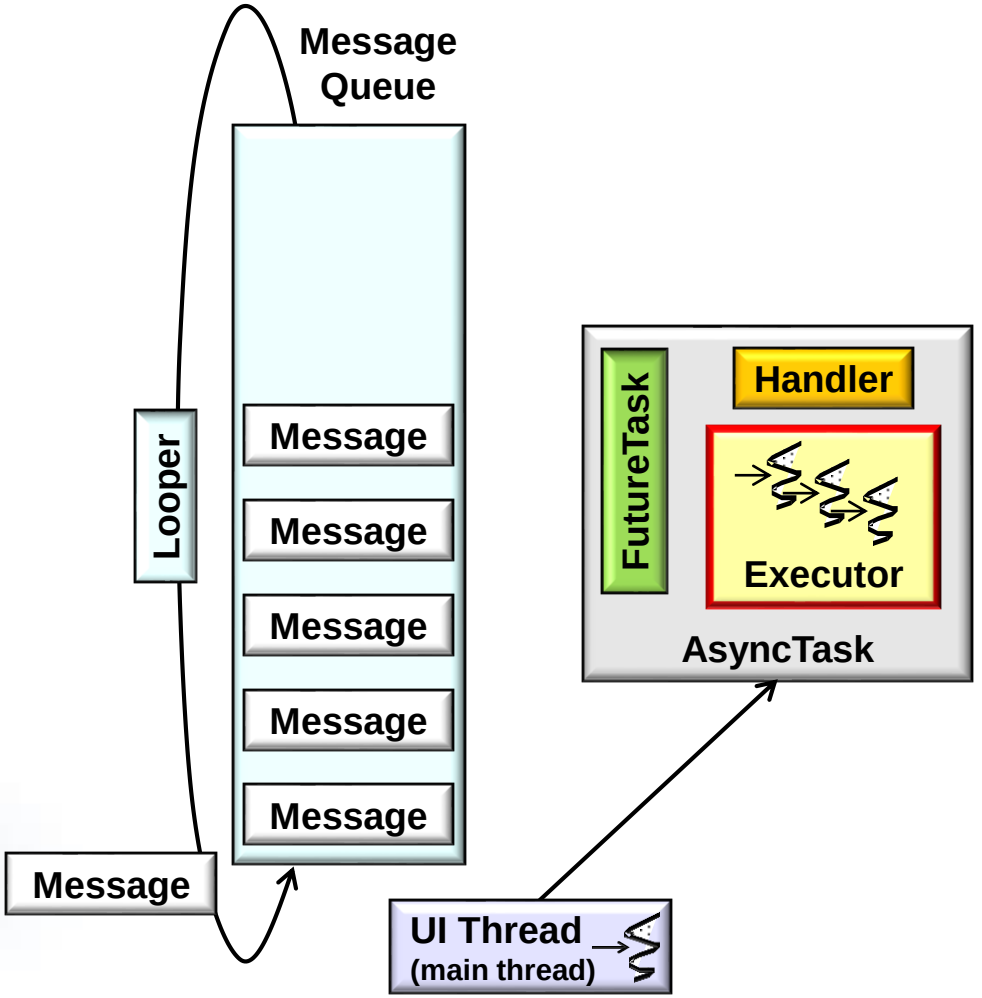

See en.wikipedia.org/wiki/Thread_pool

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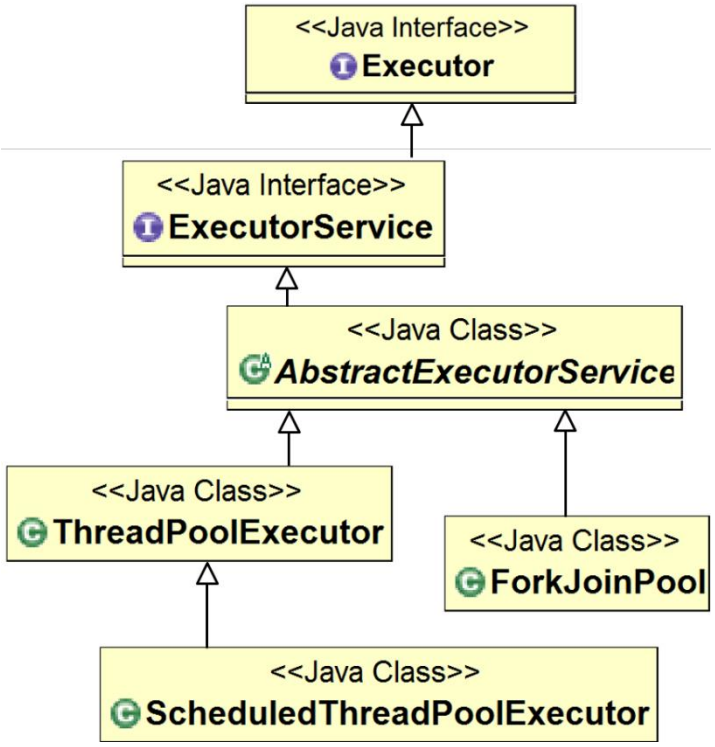
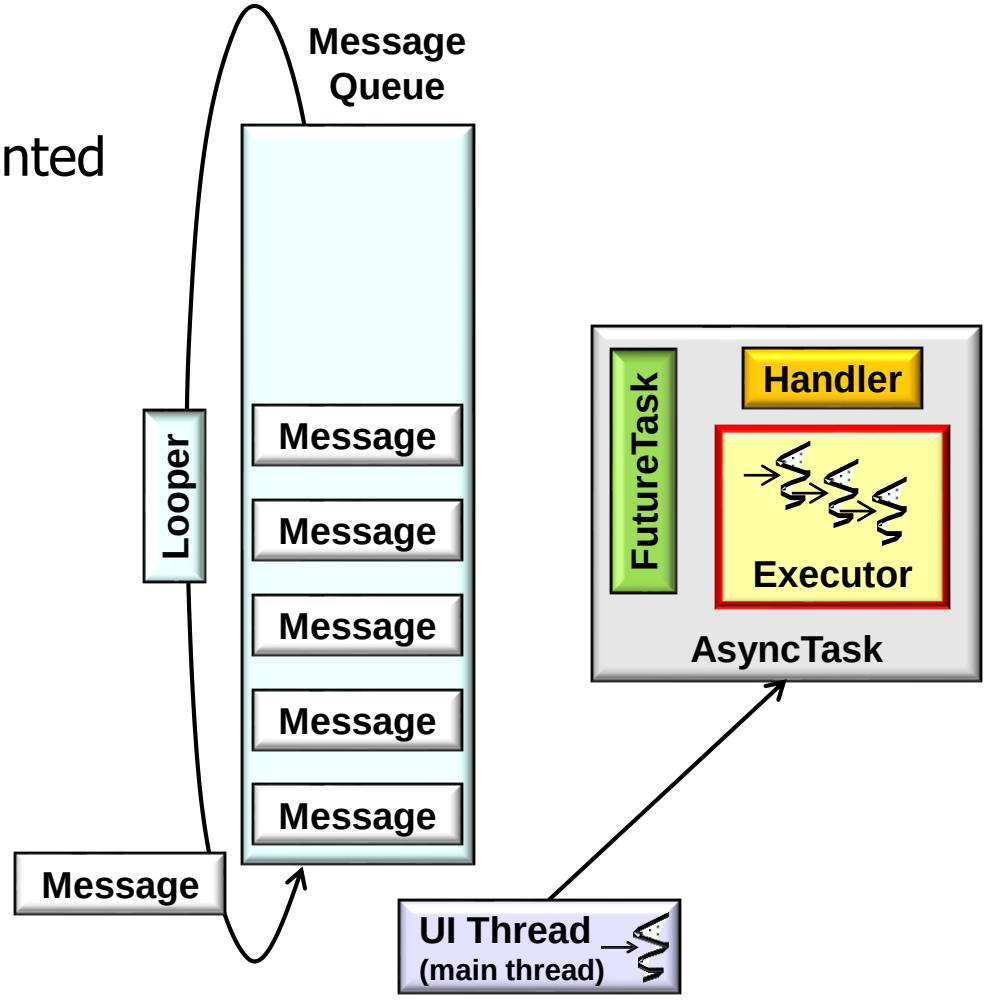
  - This thread pool can be implemented via the Java Executor framework





See docs.oracle.com/javase/tutorial/essential/concurrency/executors.html

End of the AsyncTask Framework: Introduction