

Mobile Application Development

Produced
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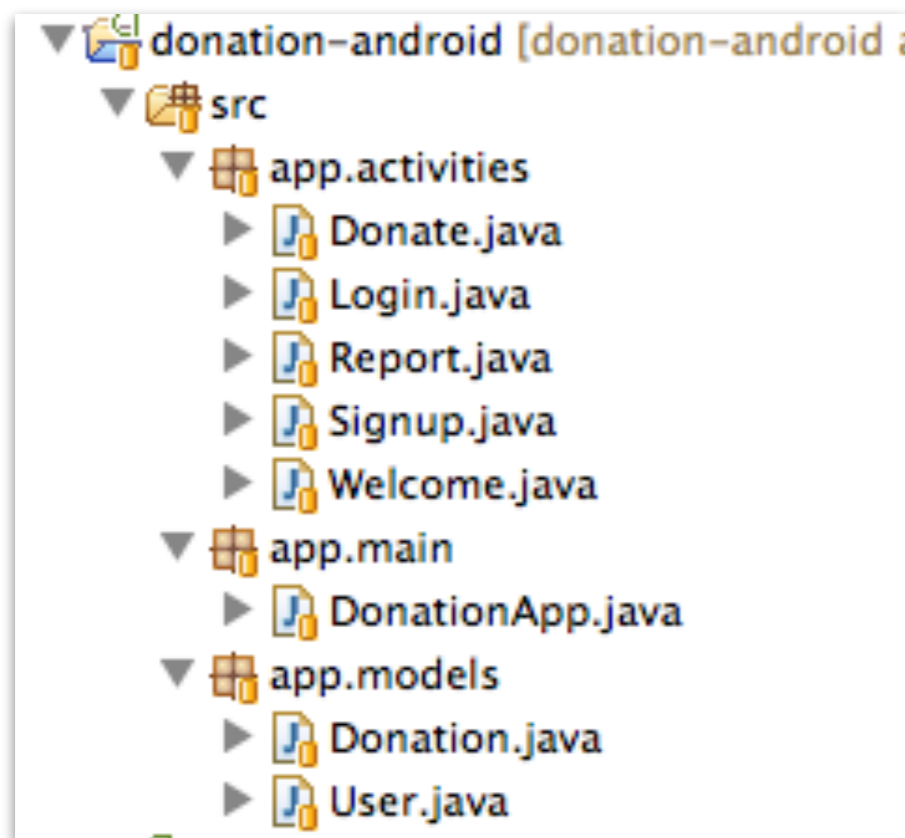


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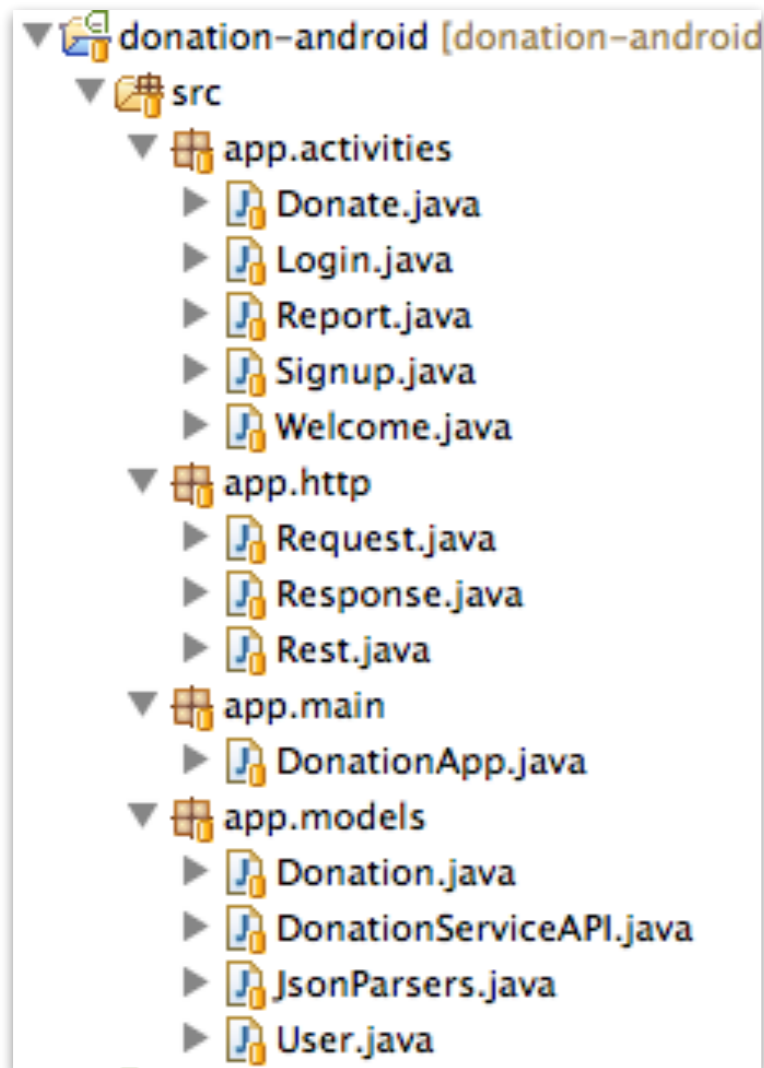
Android <-> Play (2) - Concurrency

donation-android project v3



- **activities**
 - display and handler all UI
- **main**
 - retain application wide data structures (users + donations)
- **models**
 - core information models for the application

donation-android Project v4



- **activities**

- display and handle all UI

- **main**

- retain application wide data structures (users + donations)

- **models**

- Gateway object for accessing donation-service application
- Local copies of core information models for the application (download from donation-play)
- Parsers (transformers) for converting objects into format suitable for upload/download to/from donation-service

- **http**

- General purpose classes to support asynchronous http request/response to/from donation-service

HTTP Requests

- A HTTP request is inherently indeterminate and subject to various error conditions:
 - The URL may be incorrect
 - The Network may be slow or intermittent
 - The DNS may be slow
 - The service itself may be slow
 - The service may crash, or return incorrect or badly formatted results
- For all of these reasons, Android does not permit HTTP requests to be performed directly in Activities
- In order to connect to a web service for any reason, you must initiate another *'Thread of Execution'*

Concurrency

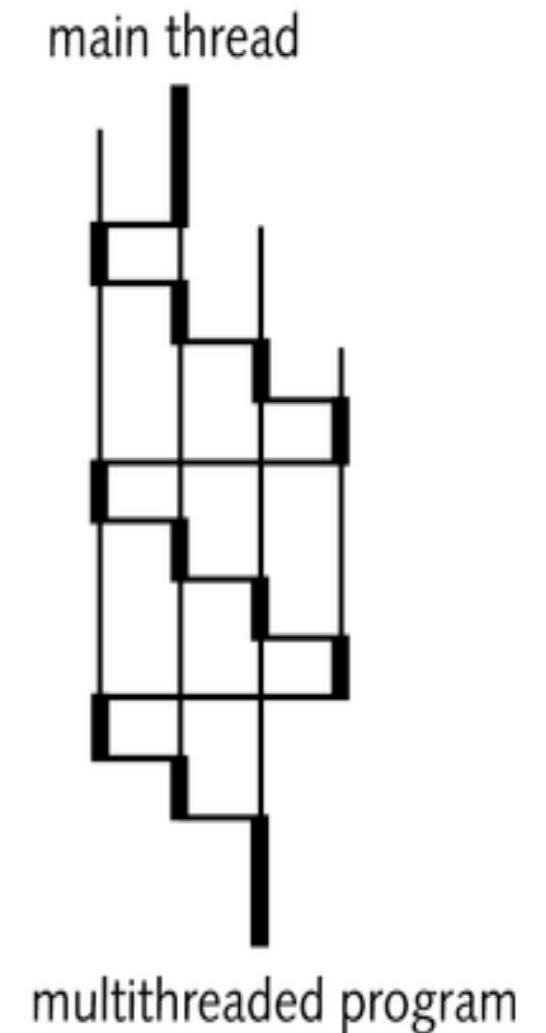
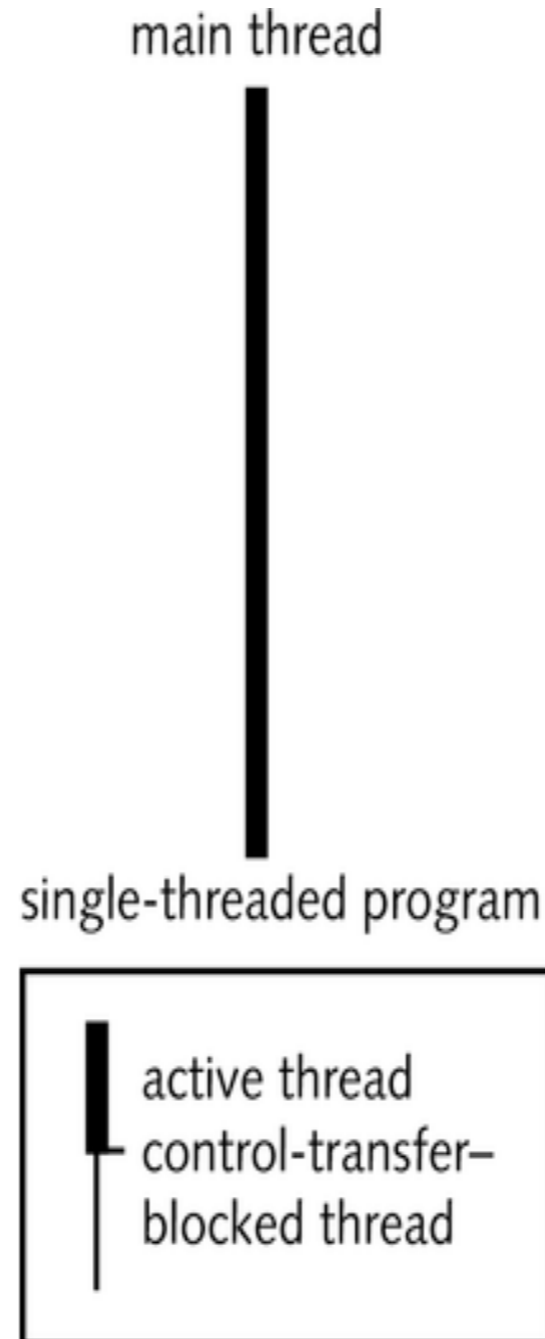
- Concurrency is the ability to run several programs or several parts of a program in parallel.
- If a time consuming task can be performed asynchronously or in parallel, this improves the throughput and the interactivity of the program.
- A modern computer has several CPU's or several cores within one CPU. The ability to leverage these multi-cores can be the key for a successful high-volume application.

Process & Threads

- A process runs independently and isolated of other processes.
 - It cannot directly access shared data in other processes.
 - The resources of the process, e.g. memory and CPU time, are allocated to it via the operating system.
- A thread is a lightweight process.
 - It has its own call stack, but can access shared data of other threads in the same process. Every thread has its own memory cache.
 - If a thread reads shared data it stores this data in its own memory cache.
 - A thread can re-read the shared data.

Java Programs & Threads

- A Java application runs by default in one process.
- Within a Java application you work with several threads to achieve parallel processing or asynchronous behavior.



Android Processes and Threads

- When an application starts the Android system starts a new Linux process for the application with a single thread of execution.
- By default, all components of the same application run in the same process and thread (called the "main" thread).
- However, you can arrange for different components in your application to run in separate processes, and you can create additional threads for any process.

Android Threads

- When an application is launched, the system creates a thread of execution for the application, called “the main thread.”
- This thread is very important because it is in charge of dispatching events to the appropriate user interface widgets, including drawing events.
- It is also the thread in which your application interacts with components from the Android UI toolkit (components from the `android.widget` and `android.view` packages).
- As such, the main thread is also sometimes called the “UI thread”.

Main (UI) Threads

- The system does not create a separate thread for each instance of a component.
- All components that run in the same process are instantiated in the UI thread, and system calls to each component are dispatched from that thread.
- Consequently, methods that respond to system callbacks (such as `onKeyDown()` to report user actions or a lifecycle callback method) always run in the UI thread of the process.

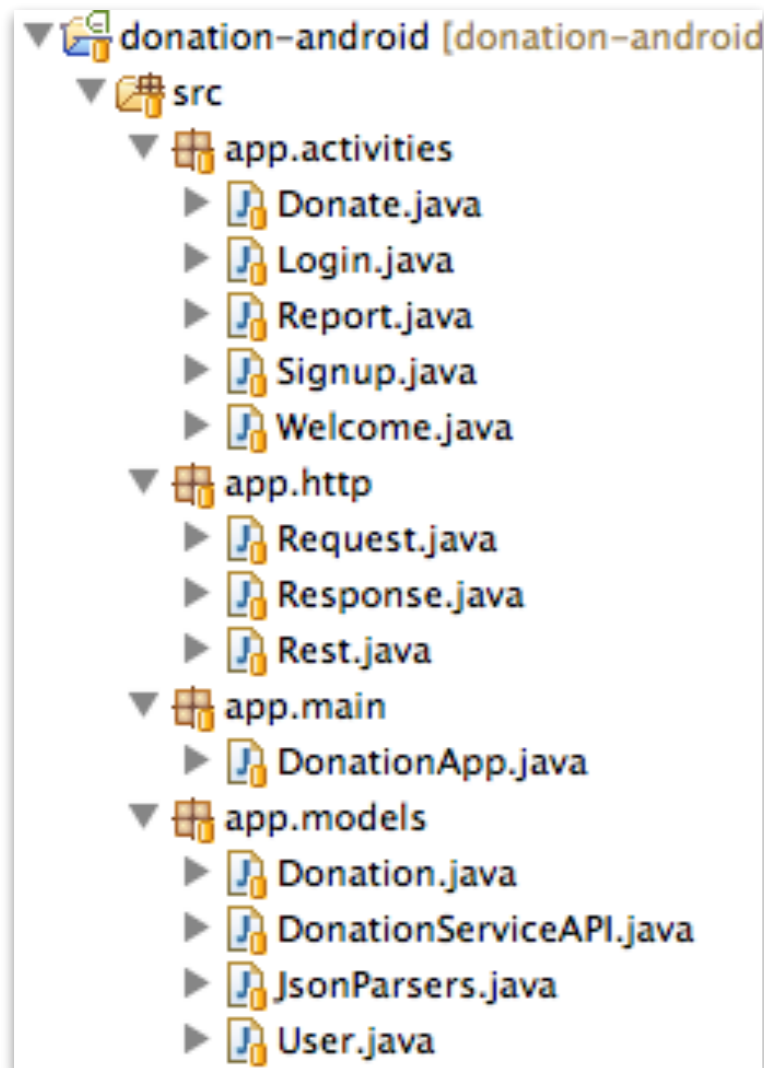
Blocking the Main Thread

- If everything is happening in the UI thread, performing long operations such as network access or database queries will block the whole UI.
- When the thread is blocked, no events can be dispatched, including drawing events.
- From the user's perspective, the application appears to hang.
- If the UI thread is blocked for more than a few seconds (about 5 seconds currently) the user is presented with the infamous "application not responding" (ANR) dialog.

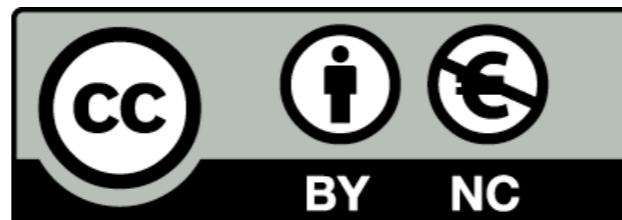
Android AsyncTask Class

- AsyncTask allows you to perform asynchronous work on your user interface.
- It performs the blocking operations in a **worker thread** and then publishes the results on the UI thread.
- You subclass AsyncTask and implement the doInBackground() callback method, which runs in a pool of background threads.
- To update your UI, you implement onPostExecute(), which delivers the result from doInBackground() and runs in the UI thread, so you can safely update your UI..

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- **http**
 - General purpose classes to support **asynchronous** http request/response to/from donation-service
 - These requests are performed in a separate thread of execution



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<http://www.vogella.com/articles/JavaConcurrency/article.html>
An excellent source for well structured tutorials and explanations of all thing related ot Java, Eclipse and Android development

