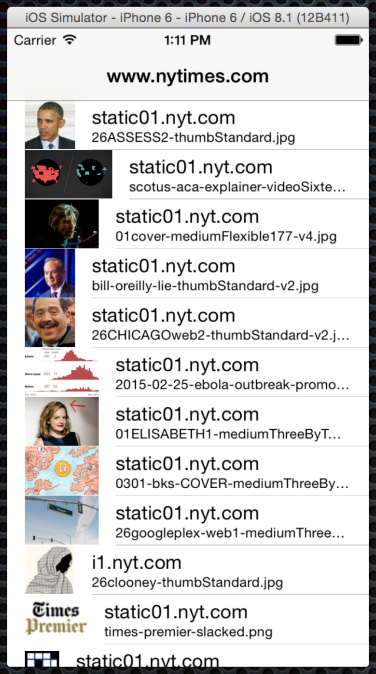
Mobile Application Programming

Asynchronous Communication

Asynchrony

UI

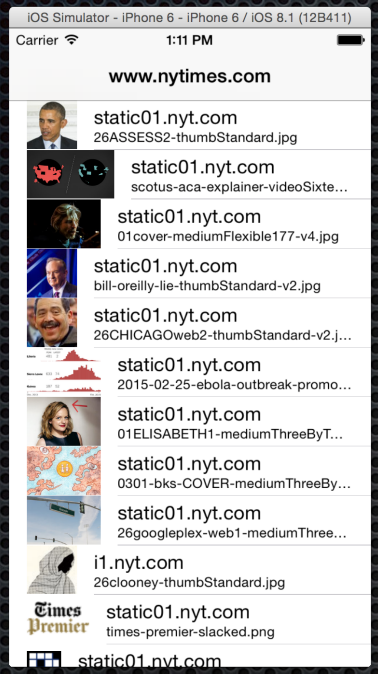


App

Server

Asynchrony

UI



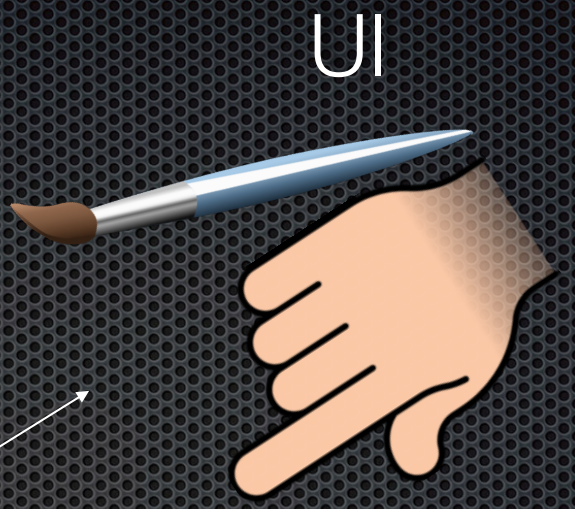
App

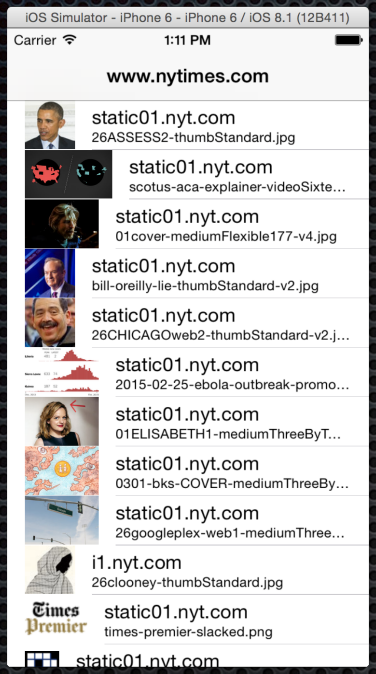
Drawing & Touch

Data
Upload / Download

Server

Asynchrony





App

UI Thread

Drawing & Touch

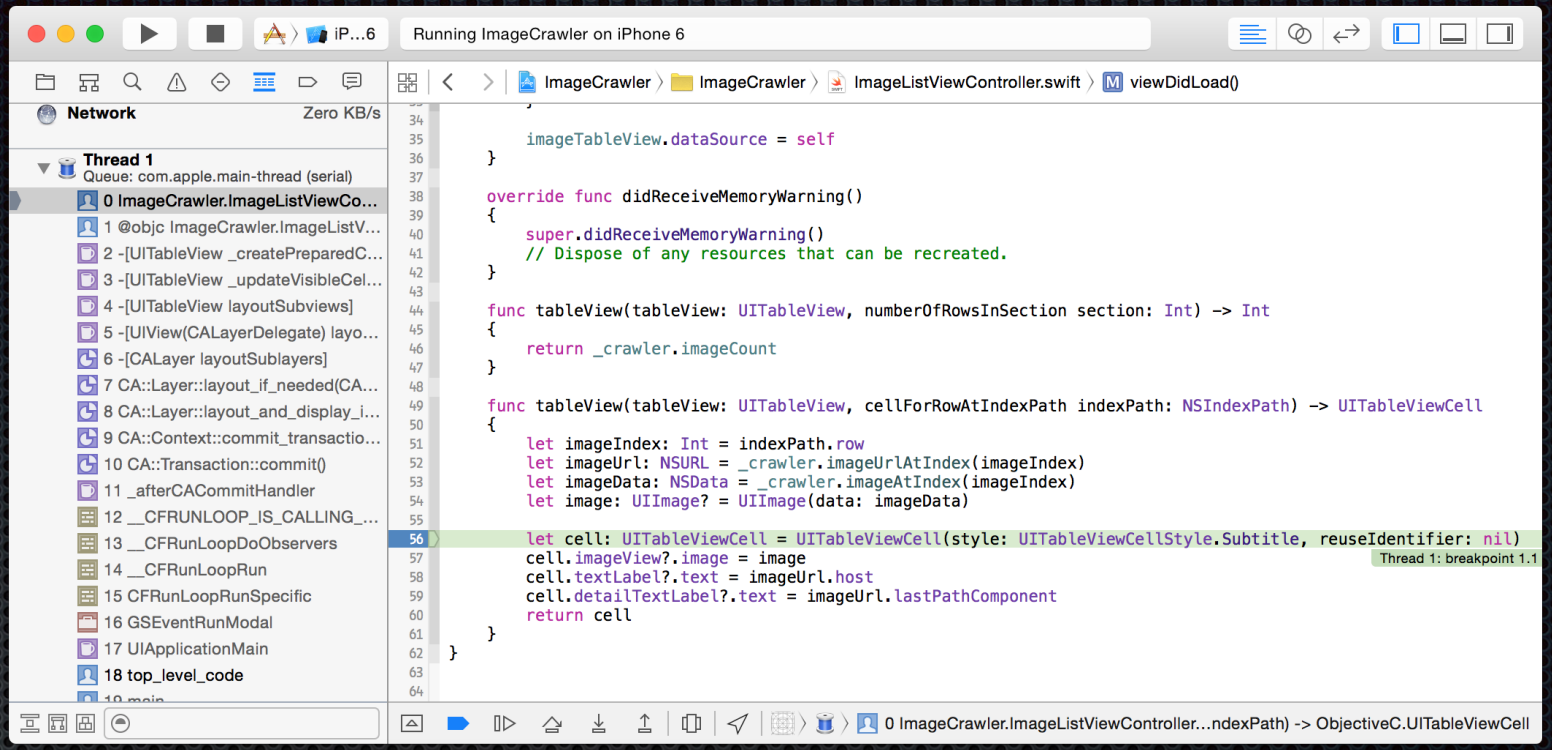
Data
Upload / Download

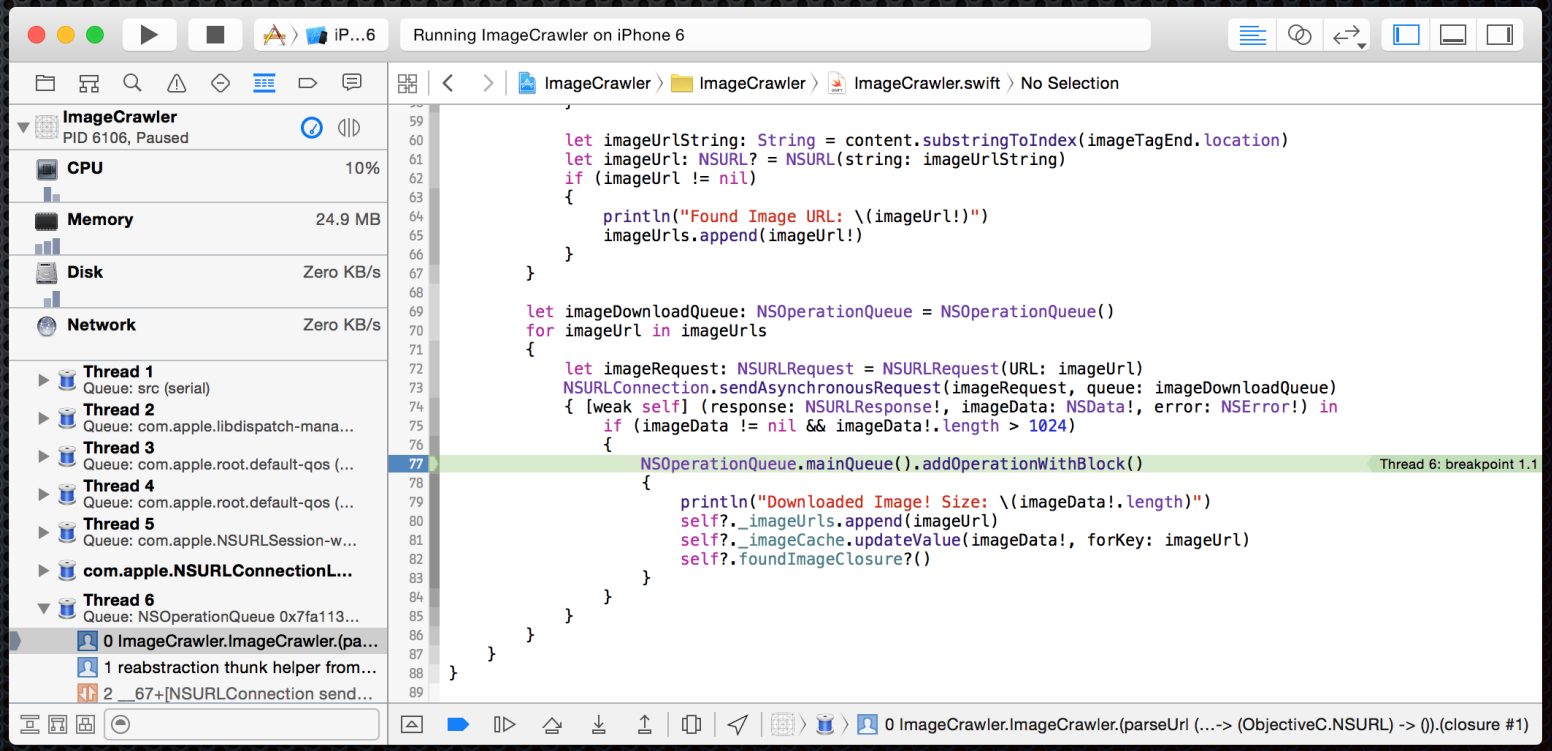
Web Thread

Server

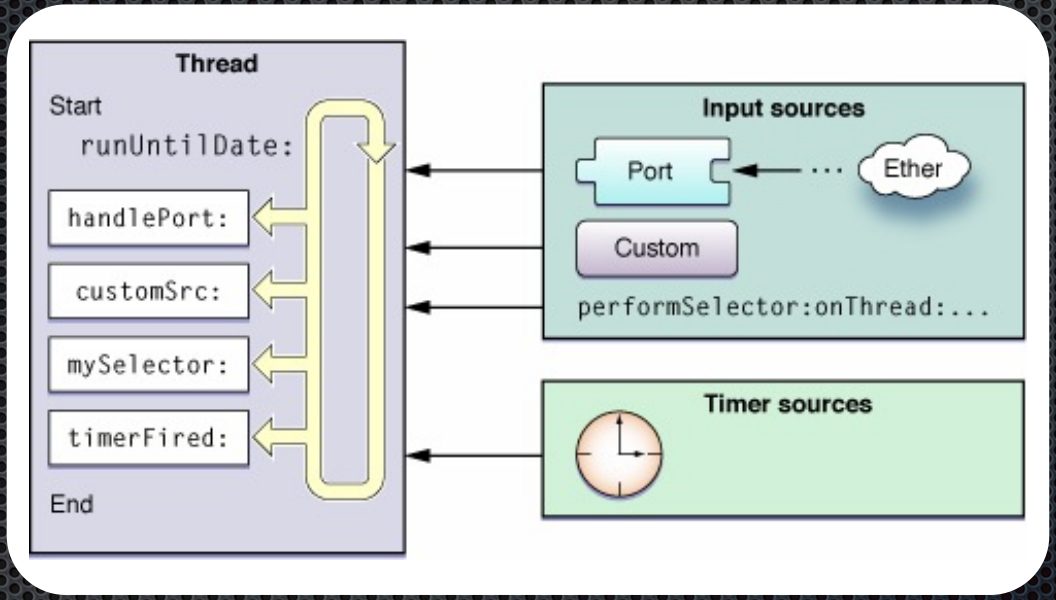
UI

Web Request





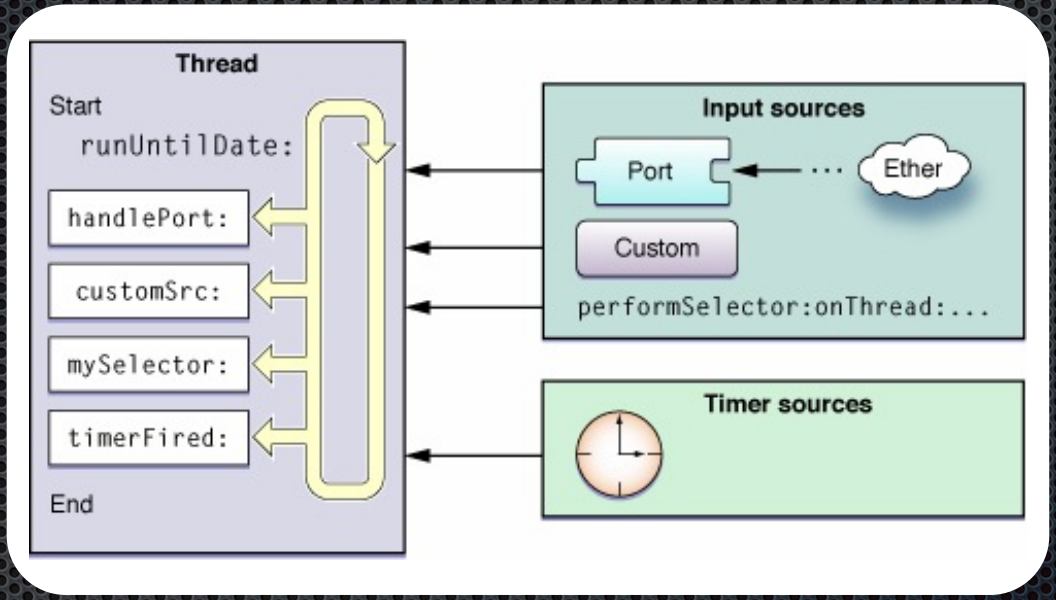
Threads and Run Loops



NSThread / NSRunLoop

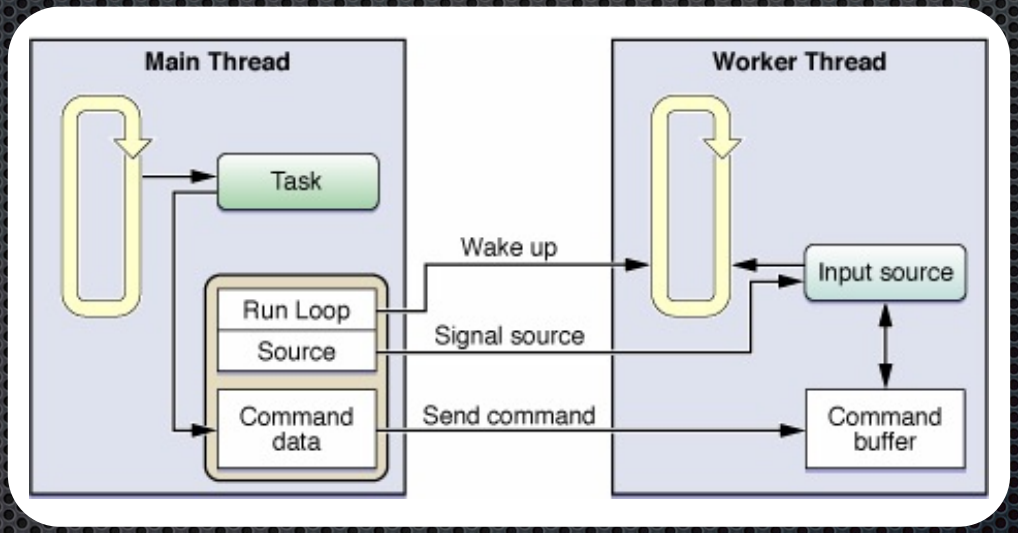
Also see NSOperationQueue and Grand Central Dispatch

Threads and Run Loops



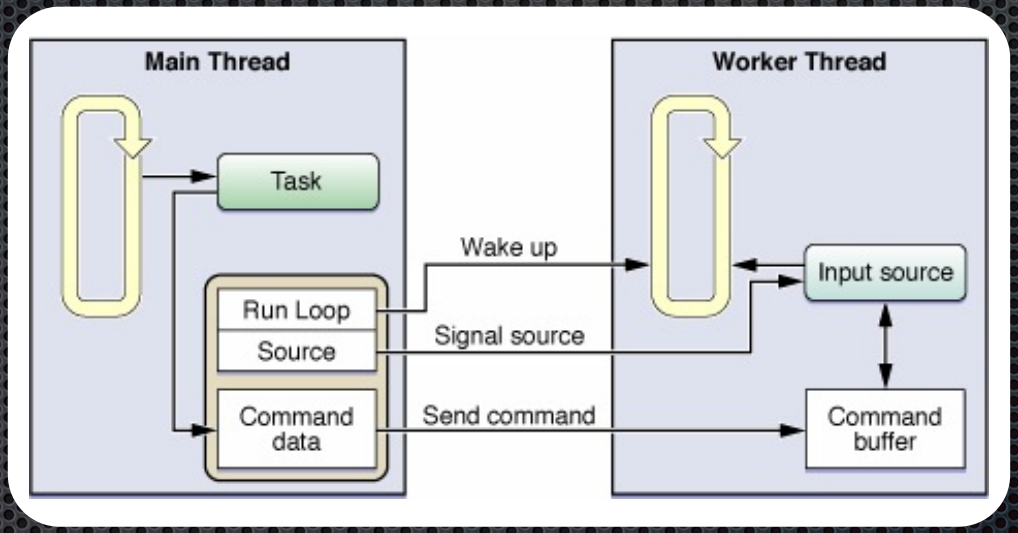
Can only do one task at a time!

Threads and Run Loops

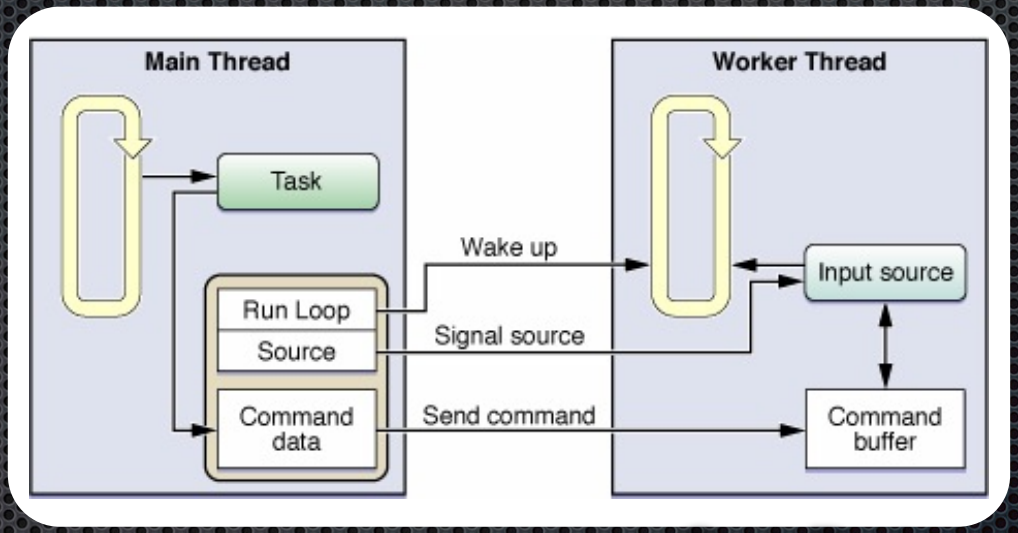


Threads and Run Loops

Get Data at URL

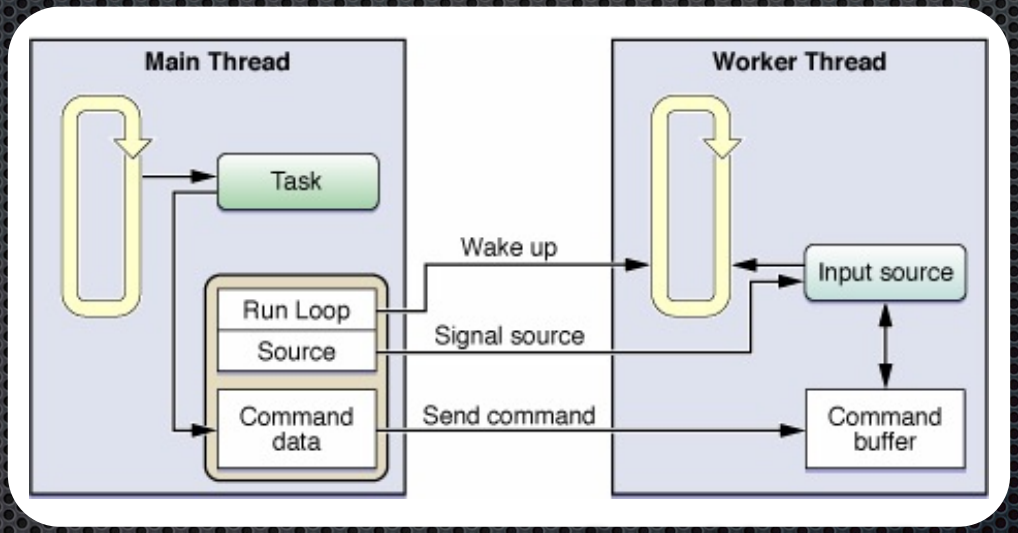


Threads and Run Loops



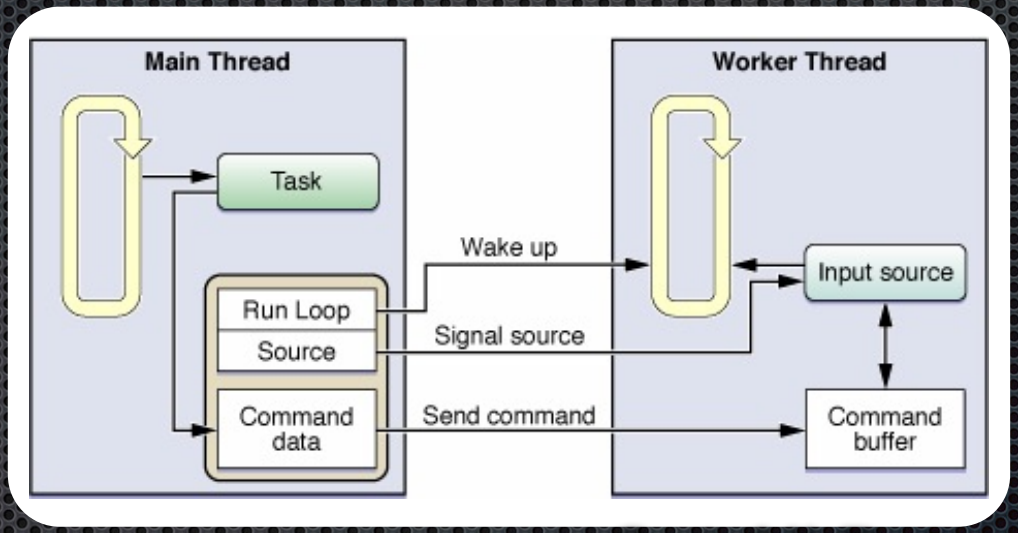
Got Data

Threads and Run Loops



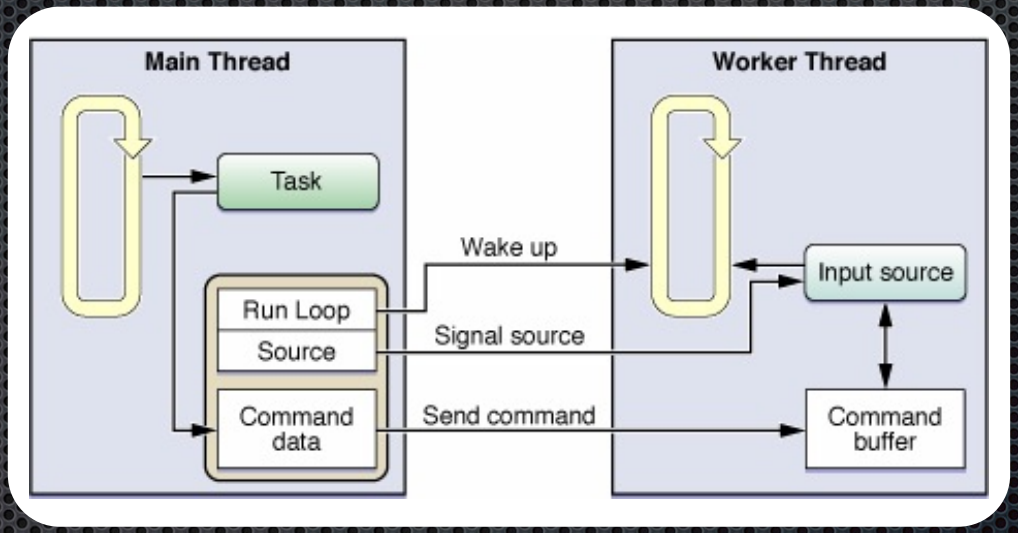
Got More Data

Threads and Run Loops



Got All Data

Threads and Run Loops



Update UI

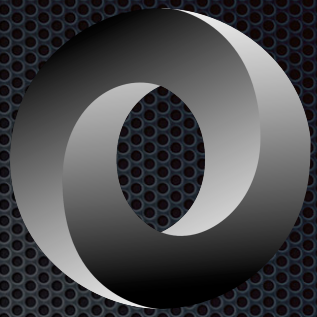
HTTP

- Retrieving information from the internet using HTTP
  - NSURLRequest - Collects data about a request
  - NSURLConnection - Executes a request
  - NSHTTPURLResponse - Contains response codes & header
  - NSData - Contains the actual data received

HTTP - Asynchronous

- Retrieving content takes time! Need to thread work.
- NSURLConnection - Has facilitates for threading work
  - Uses Grand Central Dispatch internally
  - Offers delegate with methods to handle task setup, execution, progress updates, and finish actions

Cross-Platform? JSON



Read

```
let d: NSDictionary = NSJSONSerialization.JSONObjectWithData(jsonData, options: .allZeros, error: nil)
let c: ConcreteObject = ConcreteObject(dictionary: d)
```

Write

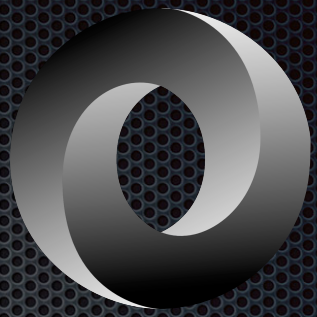
```
let d: NSDictionary = c.dictionaryRepresentation
let jsonData: NSData = NSJSONSerialization.dataWithJSONObject(d, options: .allZeros, error: nil)
```

Reads / Writes

Property List objects except NSData and NSDate

(Resultant data object still needs to be written to file or network connection)

Cross-Platform? JSON



An object that may be converted to JSON must have the following properties:

- The top level object is an `NSArray` or `NSDictionary`.
- All objects are instances of `NSString`, `NSNumber`, `NSArray`, `NSDictionary`, or `NSNull`.
- All dictionary keys are instances of `NSString`.
- Numbers are not NaN or infinity.

Other rules may apply. Calling `isValidJSONObject:` or attempting a conversion are the definitive ways to tell if a given object can be converted to JSON data.