Extracted from:

iOS Recipes

Tips and Tricks for Awesome iPhone and iPad Apps

The Pragmatic Bookshelf

Dallas, Texas • Raleigh, North Carolina

The Pragmatic Programmers

iOS Recipes

Tips and Tricks for Awesome iPhone and iPad Apps

Matt Drance
Paul Warren

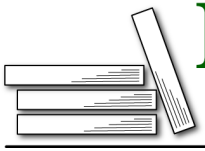
Edited by Jill Steinberg

iOS Recipes

Tips and Tricks for Awesome iPhone and iPad Apps

Matt Drance
Paul Warren

The Pragmatic Bookshelf
Dallas, Texas • Raleigh, North Carolina



Pragmatic Bookshelf

Our Pragmatic courses, workshops, and other products can help you and your team create better software and have more fun. For more information, as well as the latest Pragmatic titles, please visit us at *http://pragprog.com*.

The team that produced this book includes:

Jill Steinberg (editor)
Potomac Indexing, LLC (indexer)
Kim Wimpsett (copyeditor)
David J Kelly (typesetter)
Janet Furlow (producer)
Juliet Benda (rights)
Ellie Callahan (support)

Printed in the United States of America.
ISBN-13: 978-1-934356-74-6
Printed on acid-free paper.
Book version: P1.0—July 2011

Recipe 31

Tame the Network Activity Indicator

Problem

Your application performs downloads and uploads in multiple places, queuing or parallelizing them under heavy user activity. You need to reliably display network status without actively tracking every network operation.

Solution

We can use the networkActivityIndicatorVisible property on UIApplication to conveniently show and hide the network "spinner" in the status bar. This binary switch has no context, however. If we write an application that performs concurrent uploads and downloads, it quickly becomes hard to accurately report ongoing activity. Showing the indicator when every transaction starts is easy, but how do we know when to hide it? Whether we're using NSURLConnection or NSStream, our networking code should not necessarily be responsible for maintaining the context required to manage the network activity indicator. We'll solve this problem with a category on UIApplication that tracks network connections, automatically showing the indicator when activity begins and hiding it when it is finished. By using a category, we can call the existing UIApplication instance rather than managing another object. This especially makes sense since the activity indicator itself is managed by UIApplication.

This PRPNetworkActivity category maintains a read-only count of active connections. Two methods, -prp_pushNetworkActivity and -prp_popNetworkActivity, allow any code to notify the application of network activity. A -prp_resetNetworkActivity method clears the current state and starts from scratch.

Download NetworkActivityCenter/Classes/UIApplication+PRPNetworkActivity.h

```
@interface UIApplication (PRPNetworkActivity)

@property (nonatomic, assign, readonly) NSInteger prp_networkActivityCount;

- (void)prp_pushNetworkActivity;
- (void)prp_popNetworkActivity;
- (void)prp_resetNetworkActivity;

@end
```

Remember that because this is a category, it's important to prefix all of the method names to ensure they don't conflict with any methods Apple adds to UIApplication in future SDK releases.

The implementation is very simple: we declare a static prp_networkActivityCount variable, which the -prp_pushNetworkActivity and -prp_popNetworkActivity methods respectively increment and decrement. A simple getter method exposes the count in a read-only fashion.

Download NetworkActivityCenter/Classes/UIApplication+PRPNetworkActivity.m

```
- (NSInteger)prp_networkActivityCount {
    @synchronized(self) {
        return prp_networkActivityCount;
    }
}

- (void)prp_pushNetworkActivity {
    @synchronized(self) {
        prp_networkActivityCount++;
    }
    [self prp_refreshNetworkActivityIndicator];
}

- (void)prp_popNetworkActivity {
    @synchronized(self) {
        if (prp_networkActivityCount > 0) {
            prp_networkActivityCount--;
        } else {
            prp_networkActivityCount = 0;
            NSLog(@"%s Unbalanced network activity: count already 0.",
                  __PRETTY_FUNCTION__);
        }
    }
    [self prp_refreshNetworkActivityIndicator];
}
```

A few notes about this approach:

- We use a global to store the activity count, but our category methods operate on an instance of UIApplication. Always be careful when sharing statics between object instances. An ideal solution might use the associated object approach explained in Recipe 40, *Store Data in a Category*, on page ?, but since there is only a single UIApplication instance in a given app, we stuck with the global in the interest of simplicity.
- The methods listed earlier access the activity count while synchronizing on self, which is the shared application instance since we've written a category on UIApplication. We have added this synchronization because

networking code that uses these category methods is likely to run on multiple threads. There is more than one way to synchronize Objective-C code, so we've chosen what we saw as the clearest solution.

The -prp_refreshNetworkActivityIndicator method sets the standard networkActivityIndicatorVisible property on UIApplication according to the current activity count: if the count is positive, the network activity indicator is shown; when it goes back down to 0, the indicator is hidden. Because most of the UIKit is not understood to be thread-safe and the networkActivityIndicatorVisible property is not explicitly documented as such, we write a check to ensure the network activity indicator is touched only from the main thread.

Download NetworkActivityCenter/Classes/UIApplication+PRPNetworkActivity.m

```
- (void)prp_refreshNetworkActivityIndicator {
    if (![NSThread isMainThread]) {
        SEL sel_refresh = @selector(prp_refreshNetworkActivityIndicator);
        [self performSelectorOnMainThread:sel_refresh
                               withObject:nil
                            waitUntilDone:NO];
        return;
    }

    BOOL active = (self.prp_networkActivityCount > 0);
    self.networkActivityIndicatorVisible = active;
}
```

We now have reliable network state management accessible from anywhere in our application and completely decoupled from the rest of our code. Just call -prp_pushNetworkActivity whenever starting a connection, and call -prp_popNetworkActivity whenever the connection terminates.

The NetworkActivityCenter sample project demonstrates this code in action. We've modified the PRPDownload class from an earlier recipe to push and pop activity based on the status of each download. Neither these download objects nor the test app's view controller has any idea of one another, let alone what each is doing with the network. Each object reports its state to the UIApplication category methods, which decide when the network activity indicator should be activated or deactivated.

This project illustrates an application of the asynchronous PRPConnection mechanism from Recipe 32, *Simplify Web Service Connections*, on page ?. We've tied a download to each row in the table and modified the PRPConnection class to use the category methods from this recipe. The network activity indicator shows as soon as downloads begin and automatically hides when the last download is finished or interrupted. The code you see in this class stays the same whether 1 or 100 downloads are in progress.