

About multitasking

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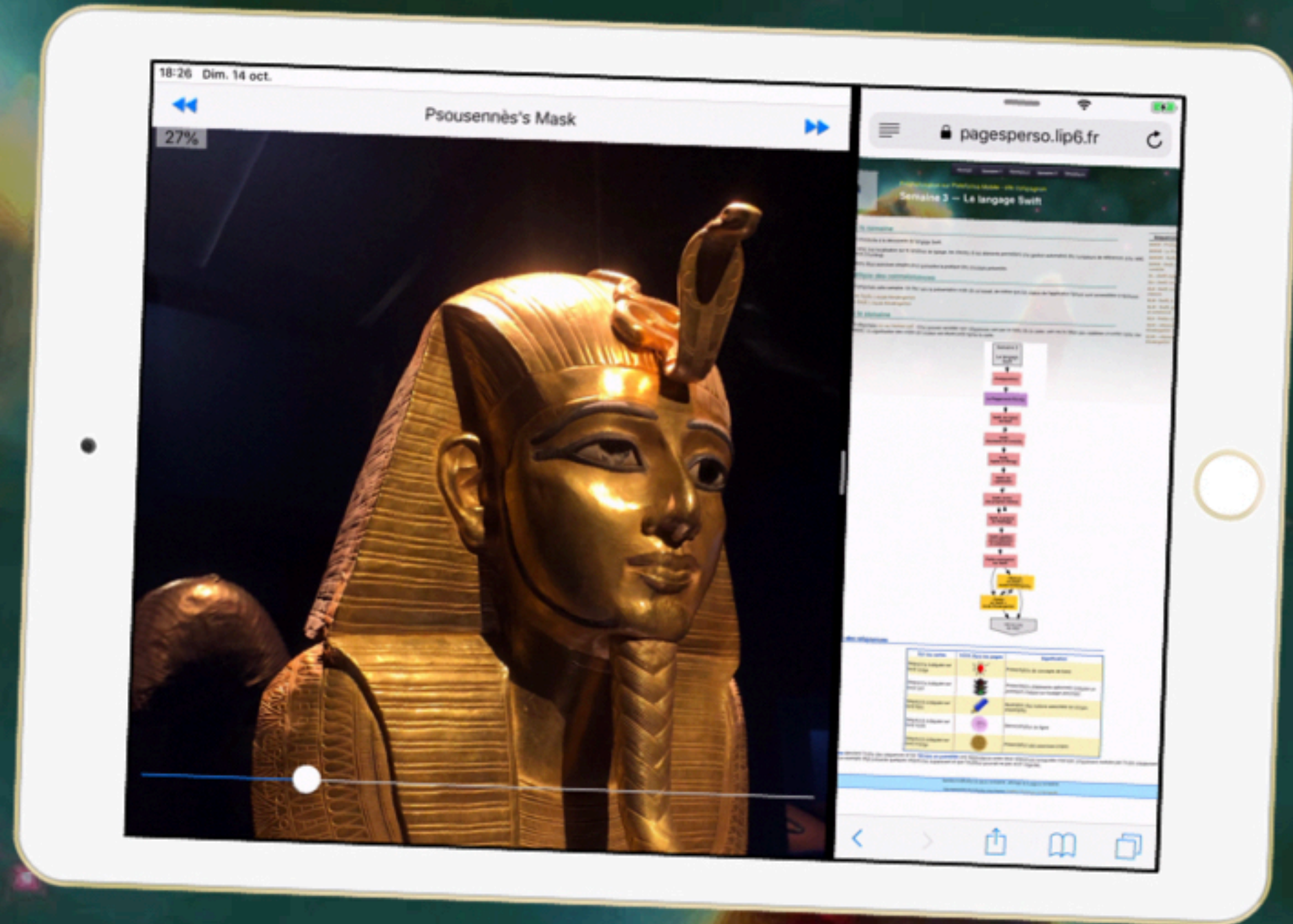
As an introduction

Since iOS4

- Fast App switch
 - ▶ Speed-up App restart

iOS9

- Two apps side-by-side
 - ▶ Favors App switches and interactions (e.g. drag&drop)



As an introduction

Since iOS4

- Fast App switch
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iOS9

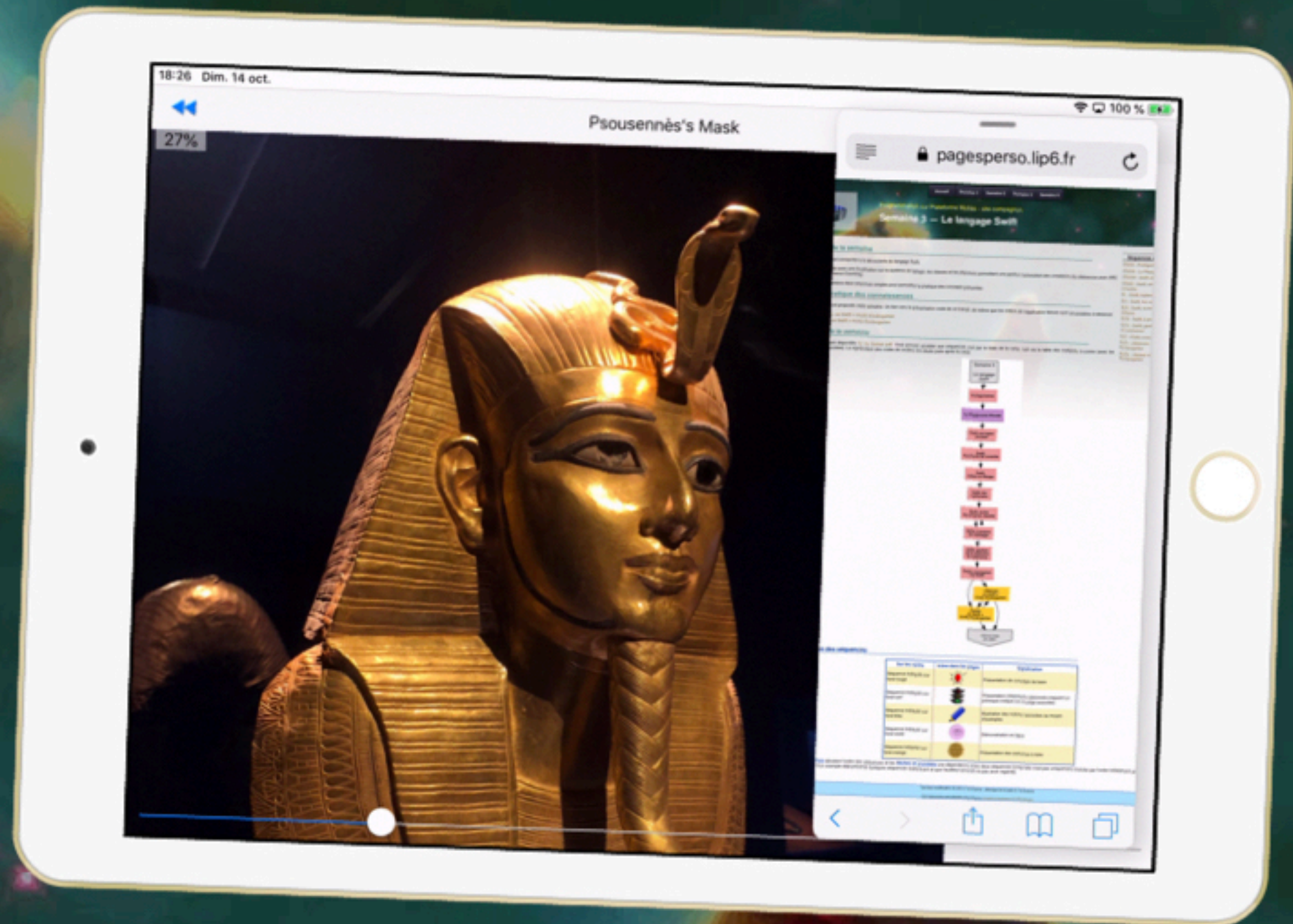
- Two apps side-by-side
 - ▶ Favors App switches and interactions (e.g. drag&drop)

iOS11

- Enhanced side-by-side
 - ▶ Several screen share & floating window

Goals

- Allow background execution
 - ▶ For Geolocation, Audio, VoIP, Network, etc.
- A protocol, UIApplicationDelegate



Fast app switching



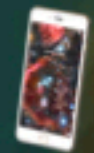
Objective

- Immediate restart of the App
- Context preserved as much as possible



Transparent to the developer

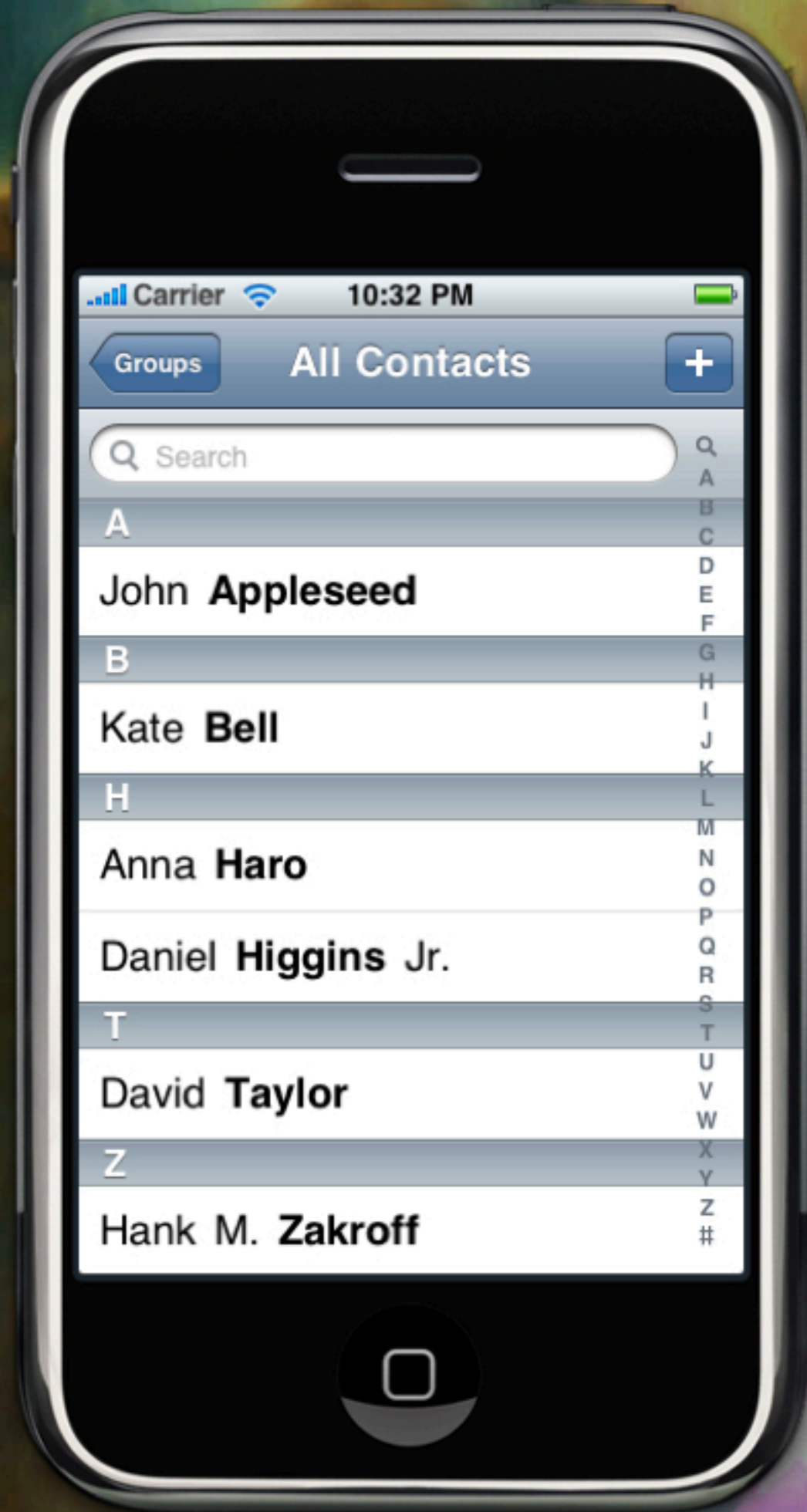
- No dedicated configuration...
- But only as long as the context can fit in memory
 - ▶ You may save it independently



Enriched App life cycle

- New situations of an iOS process (in iOS4)
 - ▶ Numerous configuration items in you project when dealing with network, geolocation, or any other «sensitive» functions
- Require some «good practice»
 - ▶ Important to have you App validated

Basic life cycle (before iOS4)



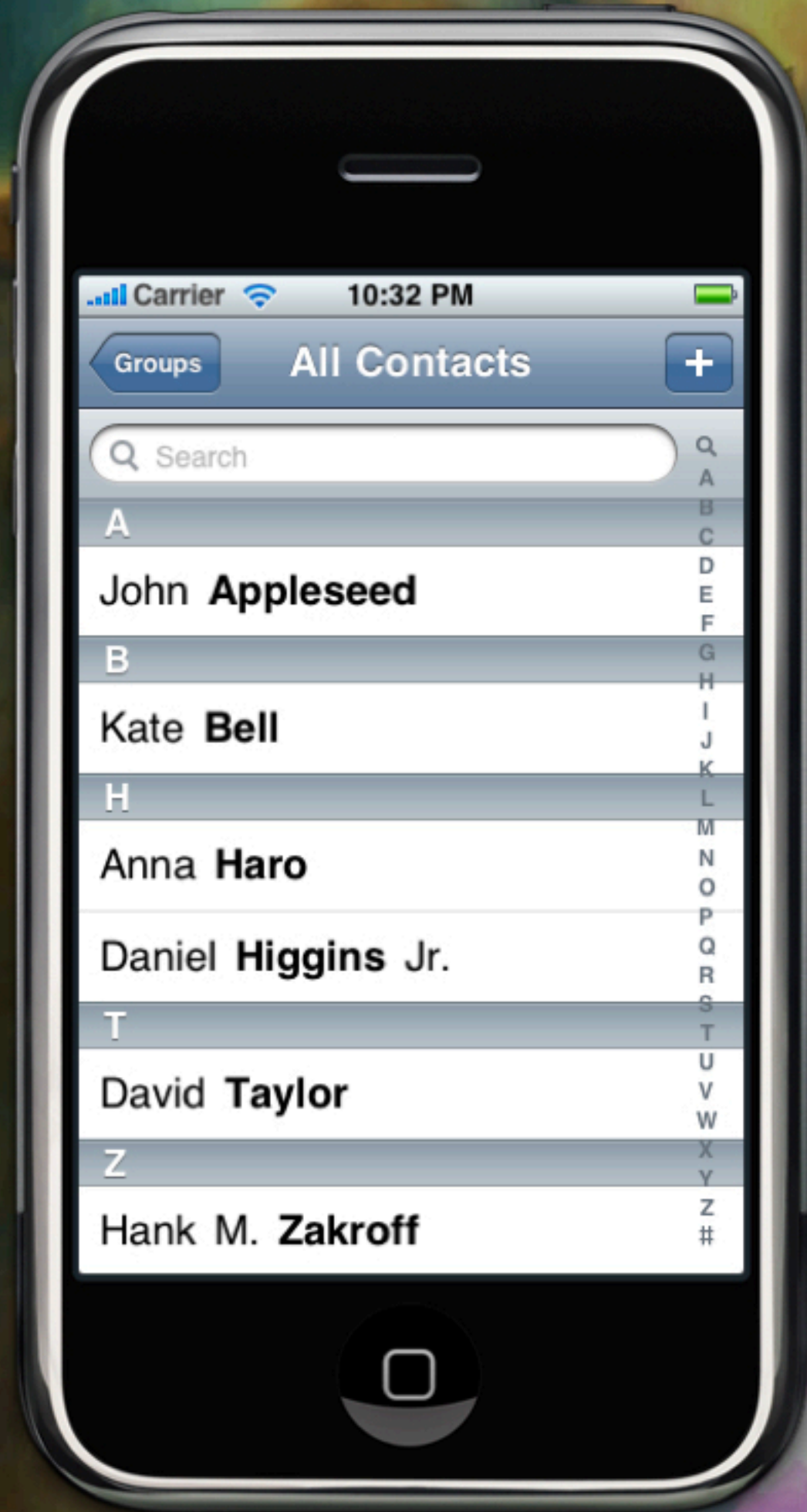
Active

Inactive

Not Running



Basic life cycle (before iOS4)

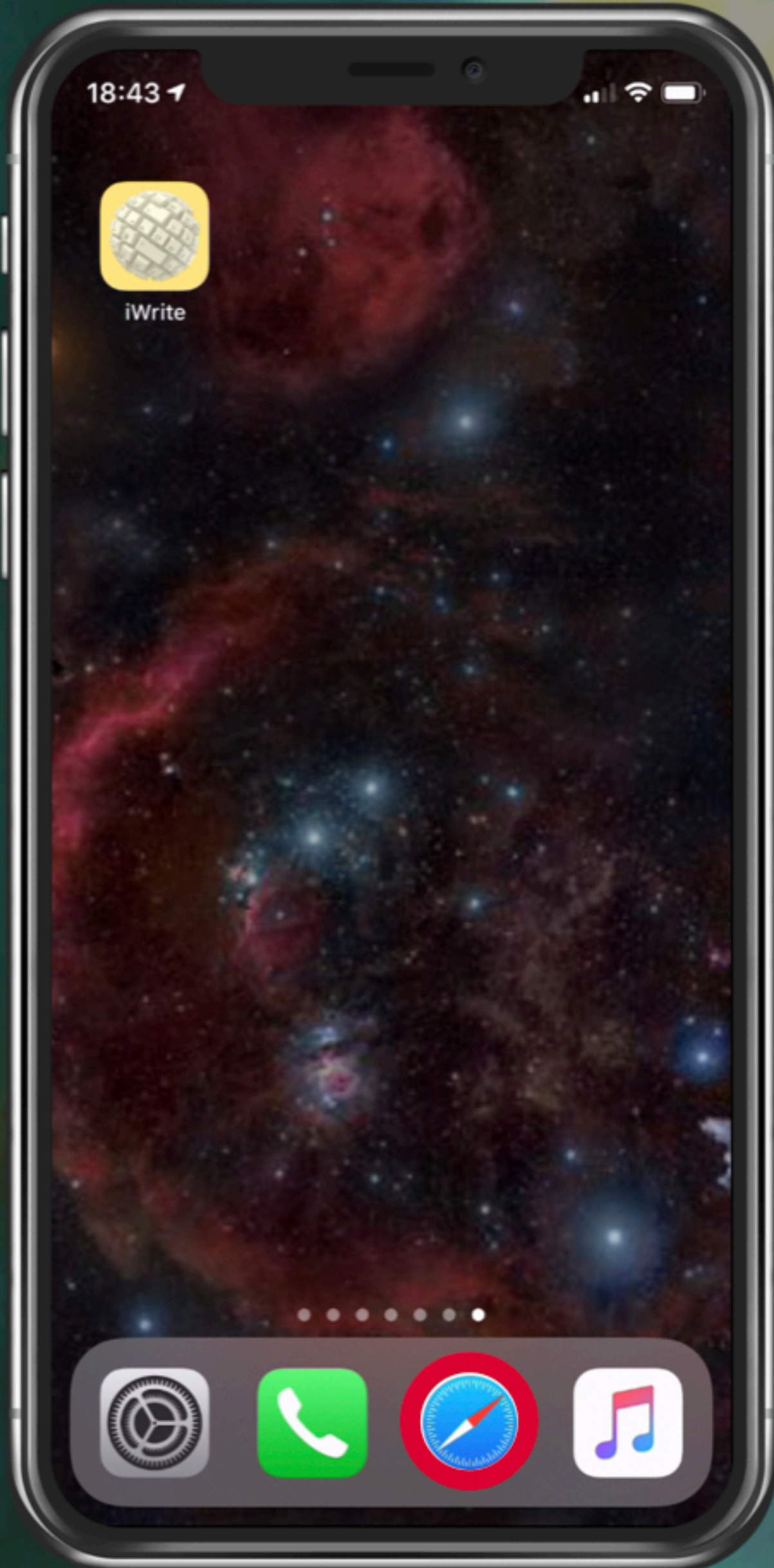


Active

Inactive

Not Running

Life Cycle (since iOS4)



Active

Inactive

Not Running

Life Cycle (since iOS4)

5



Active

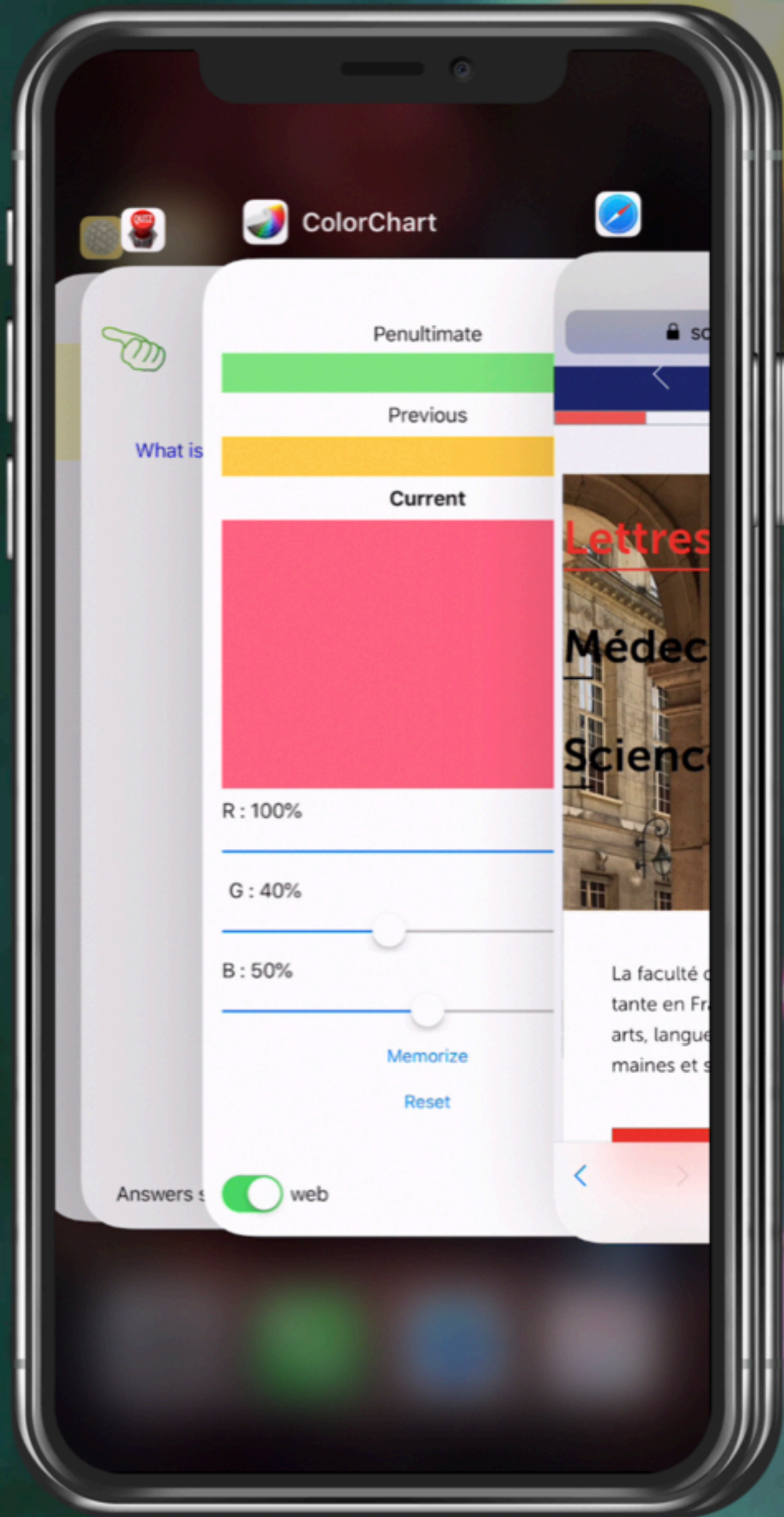
Inactive

Not Running

Life Cycle (since iOS4)



Life Cycle (since iOS4)



Foreground



Not Running

Background



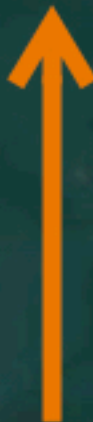
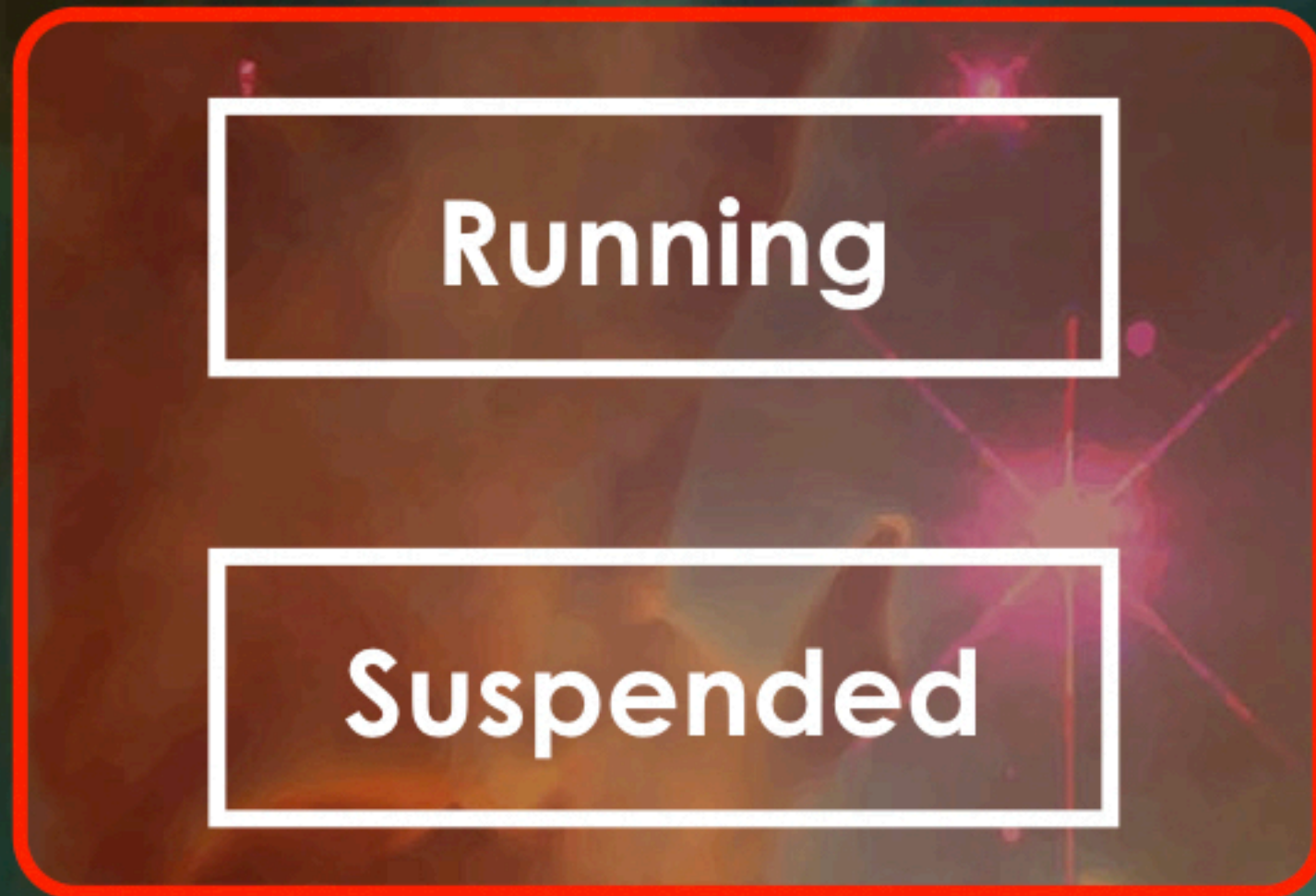
Starting execution (UIApplicationDelegate)

Foreground



Not Running

Background



```
application(_:  
willFinishLaunchingWithOptions:)
```

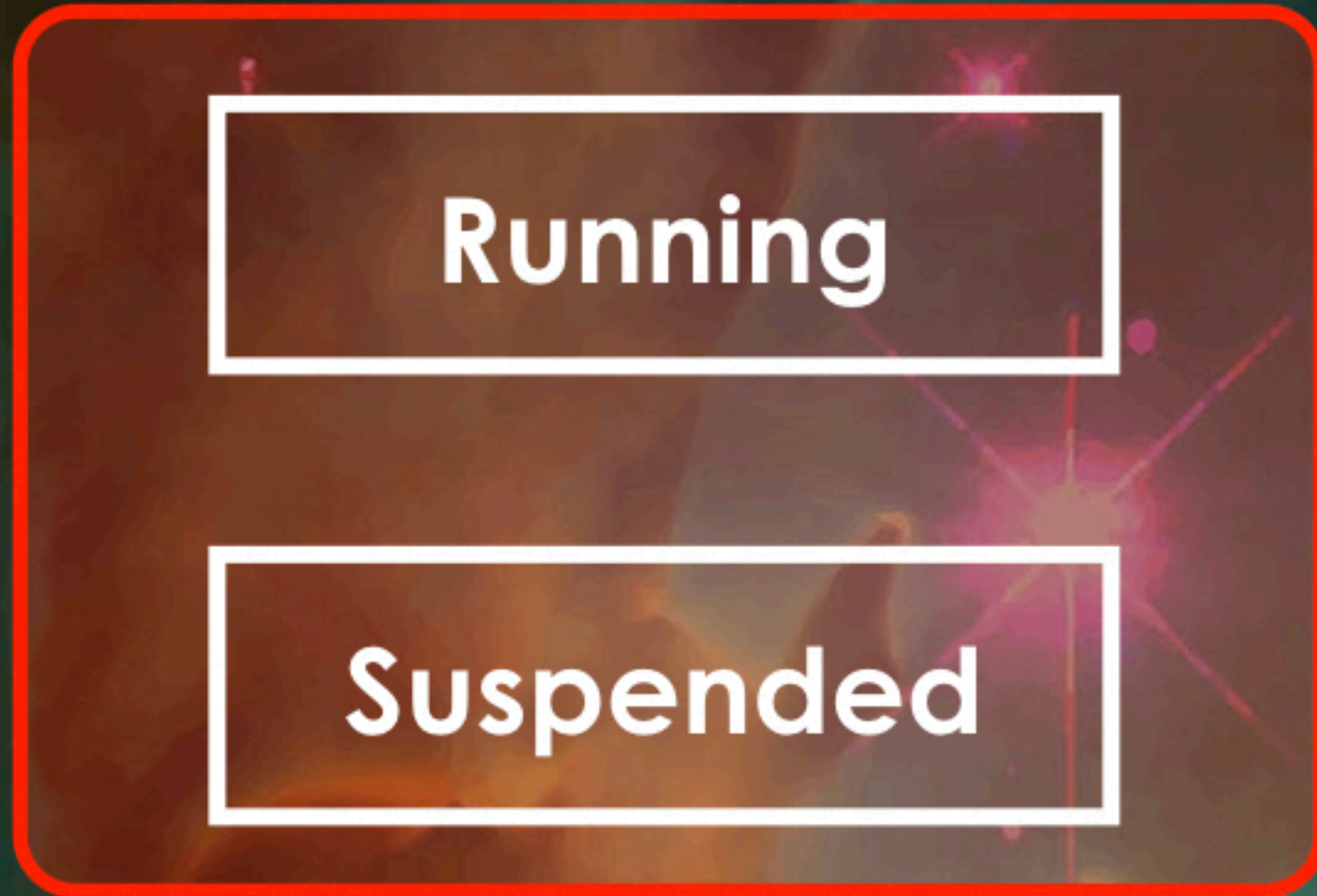
Starting execution (UIApplicationDelegate)

Foreground



Not Running

Background



```
application(_:  
didFinishLaunchingWithOptions:)
```

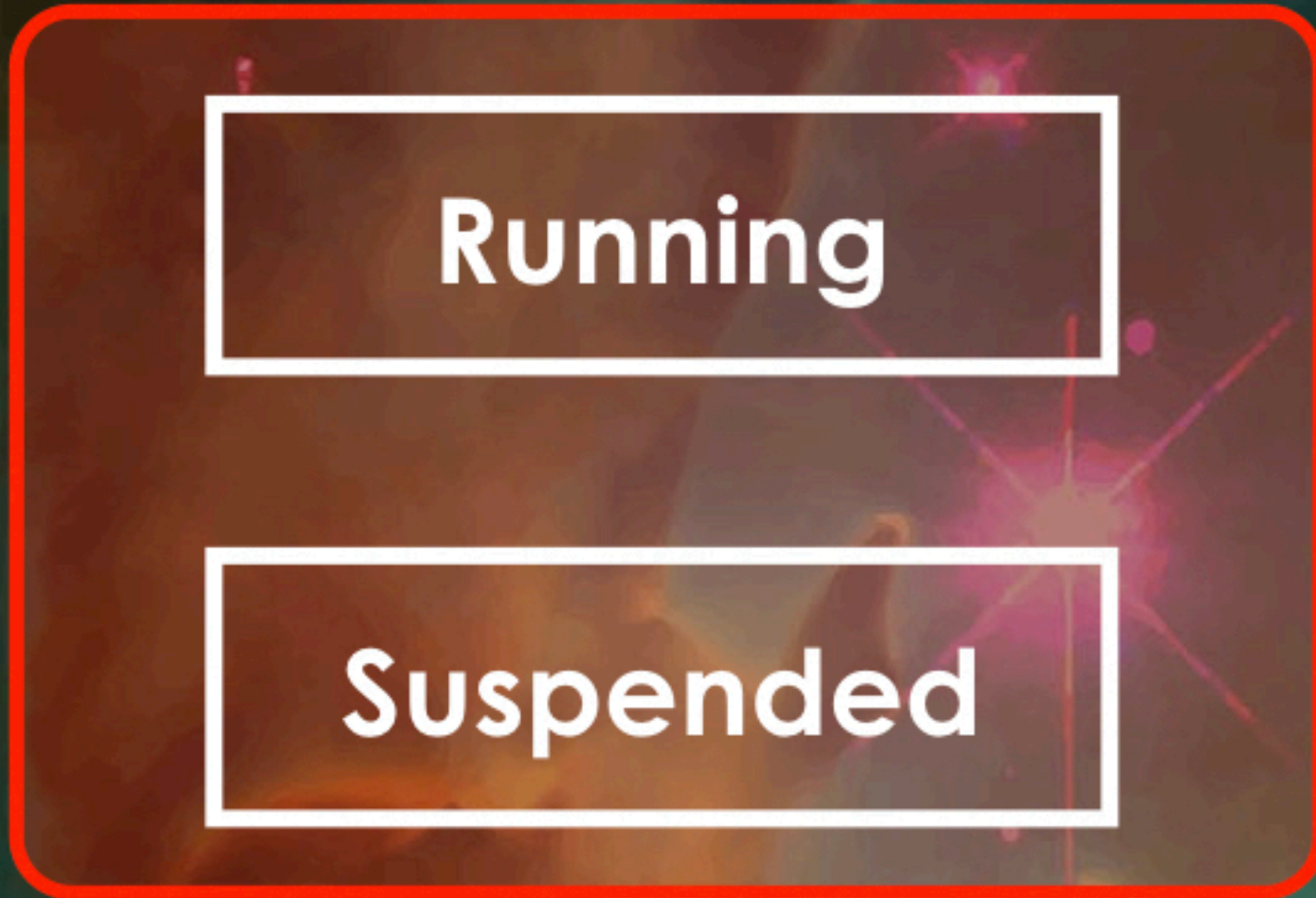
Starting execution (UIApplicationDelegate)

Foreground



Not Running

Background



`applicationDidBecomeActive(_:)`

Starting execution (UIApplicationDelegate)

Foreground

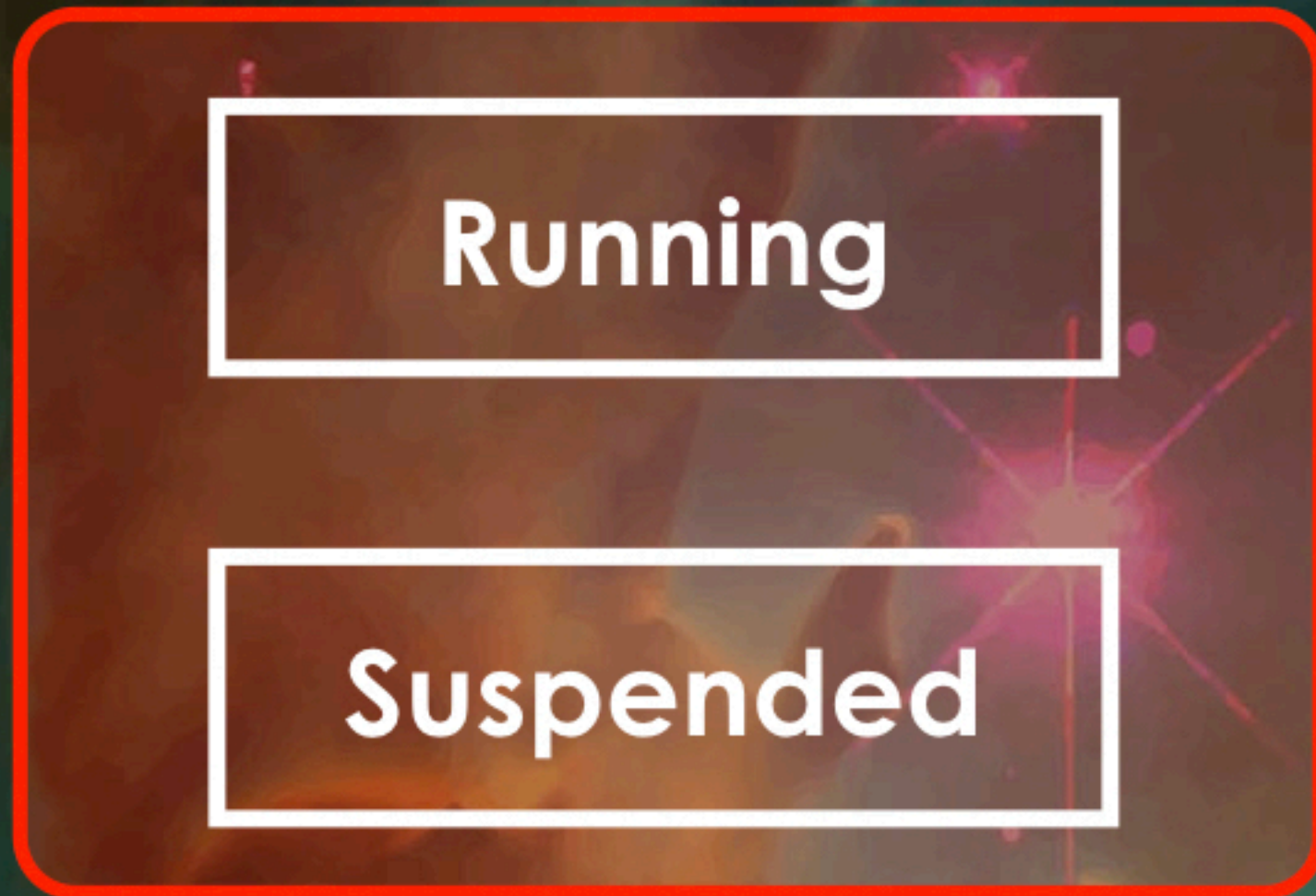


```
applicationWillResignActive(_:):
```



Not Running

Background



Suspension (UIApplicationDelegate)

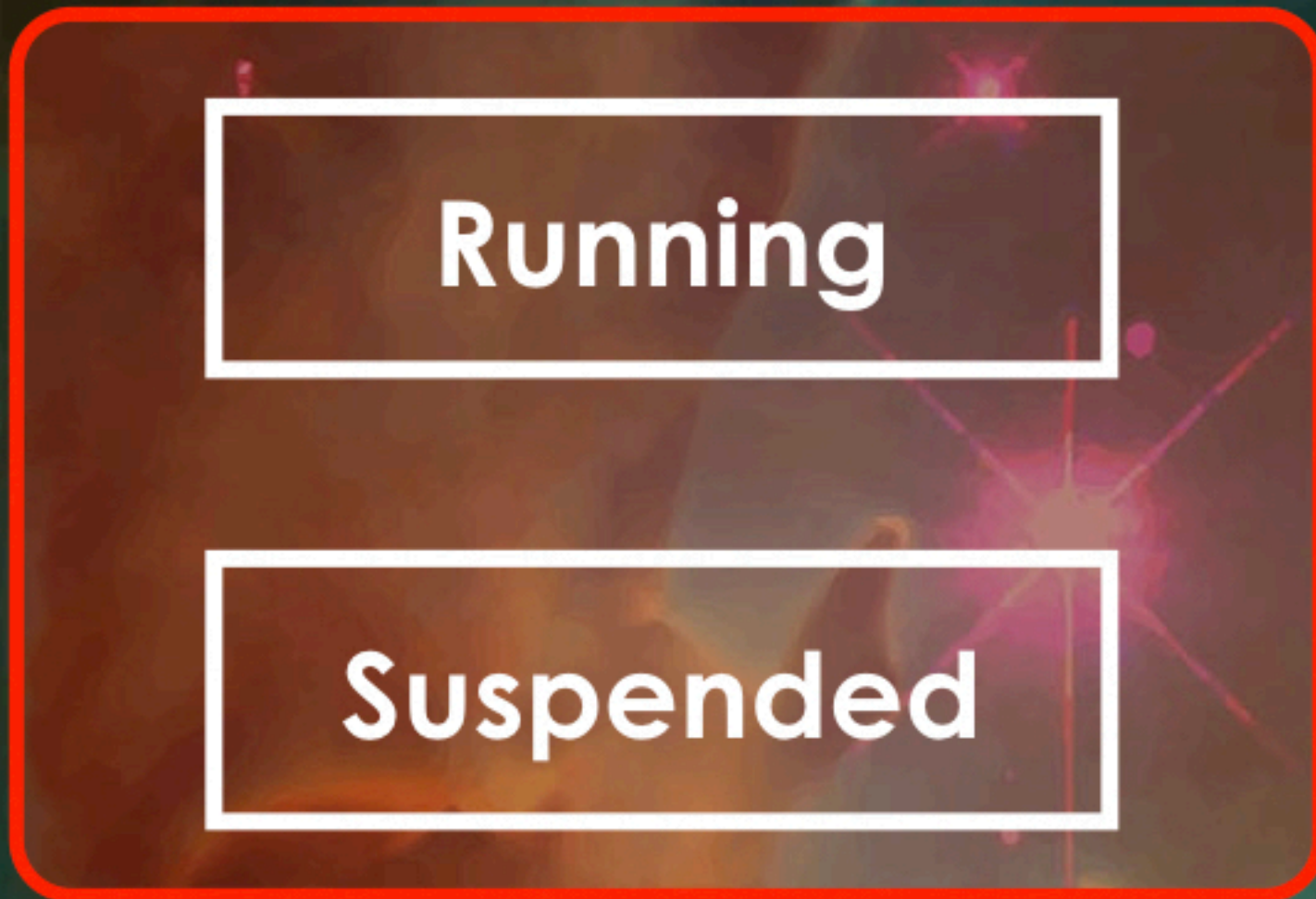
Foreground



```
applicationWillResignActive(_:)
```

Not Running

Background



Running

Suspended

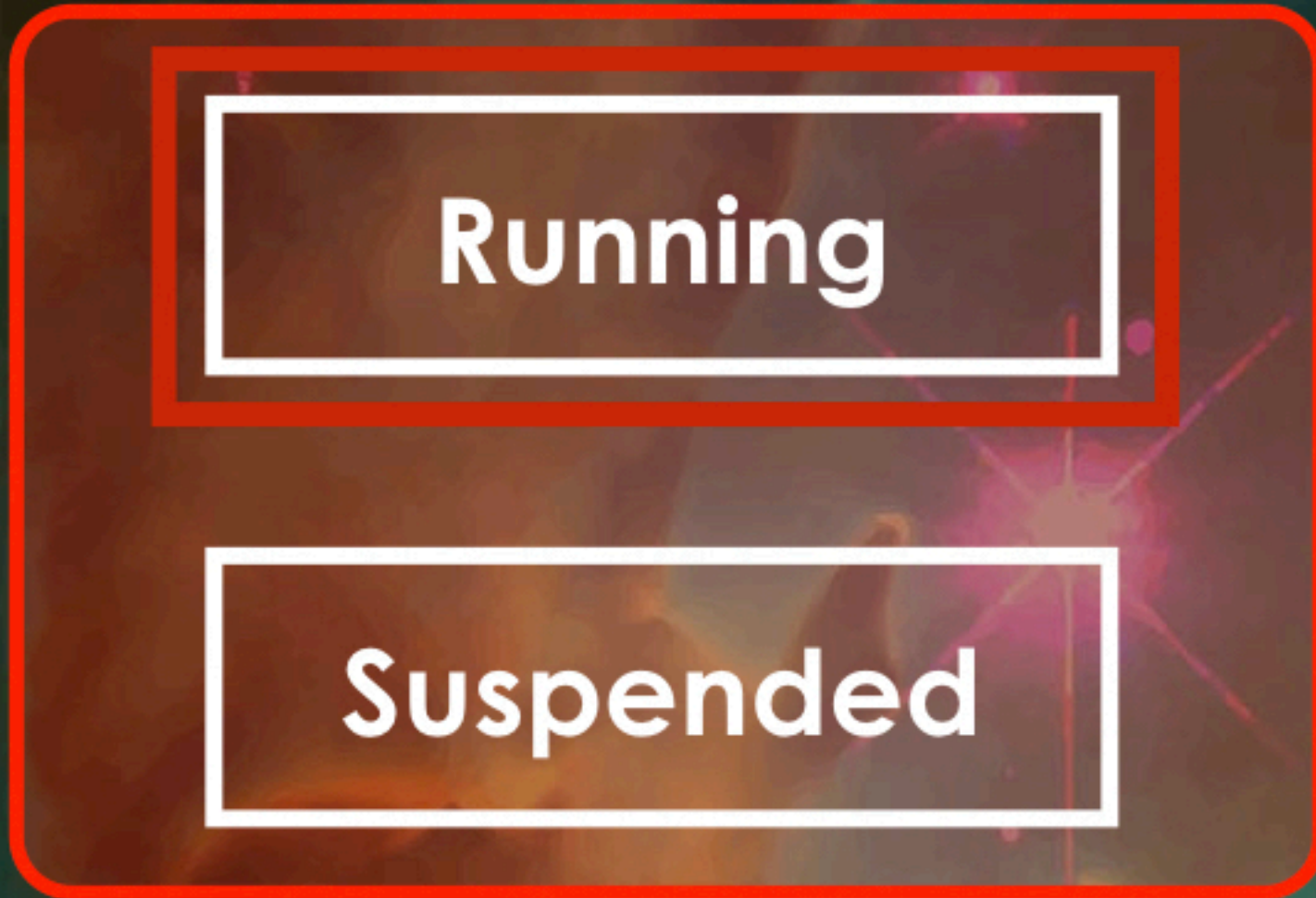
Suspension (UIApplicationDelegate)

Foreground



Not Running

Background



`applicationDidEnterBackground(_:)`



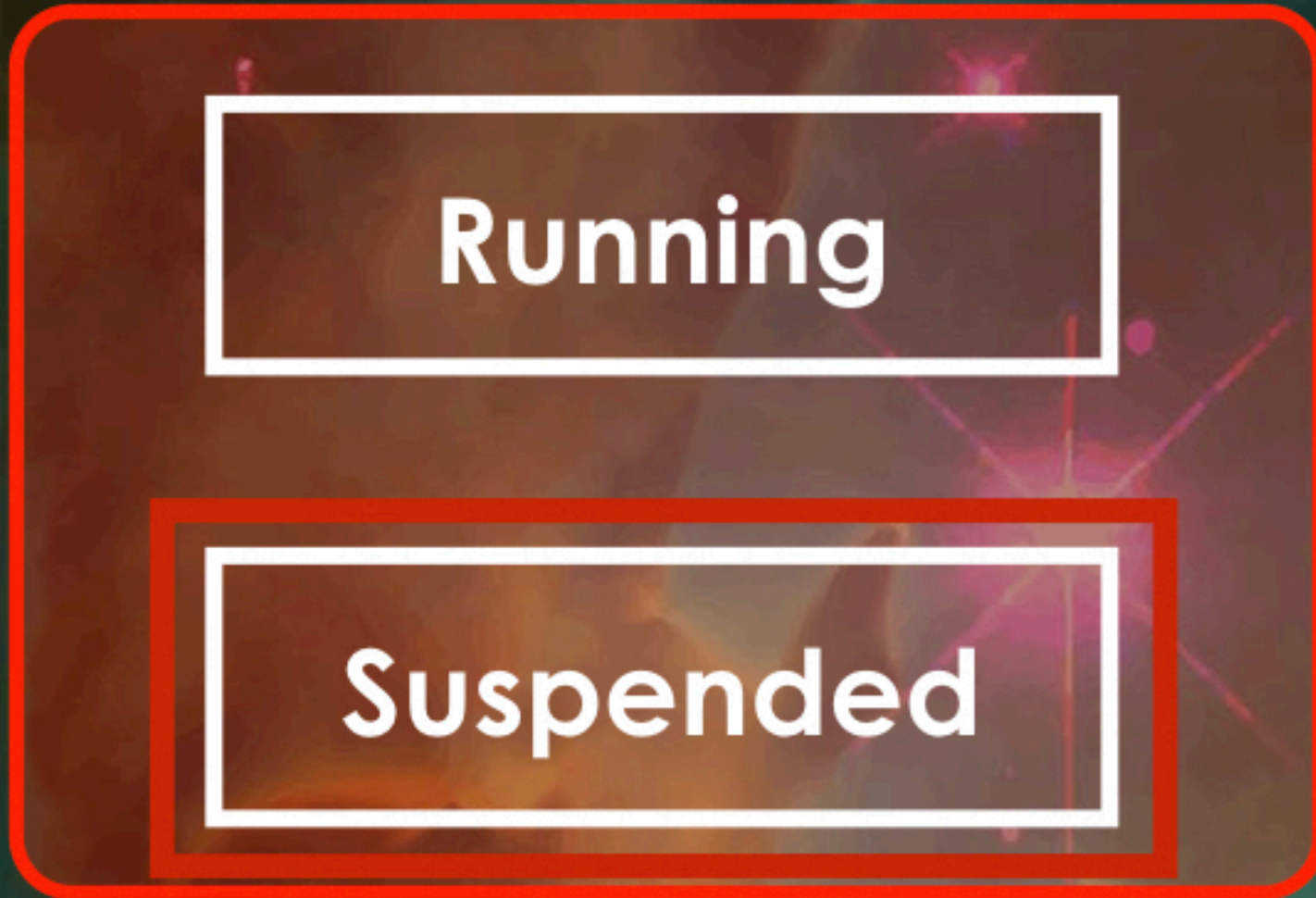
Suspension (UIApplicationDelegate)

Foreground



Not Running

Background



Nothing

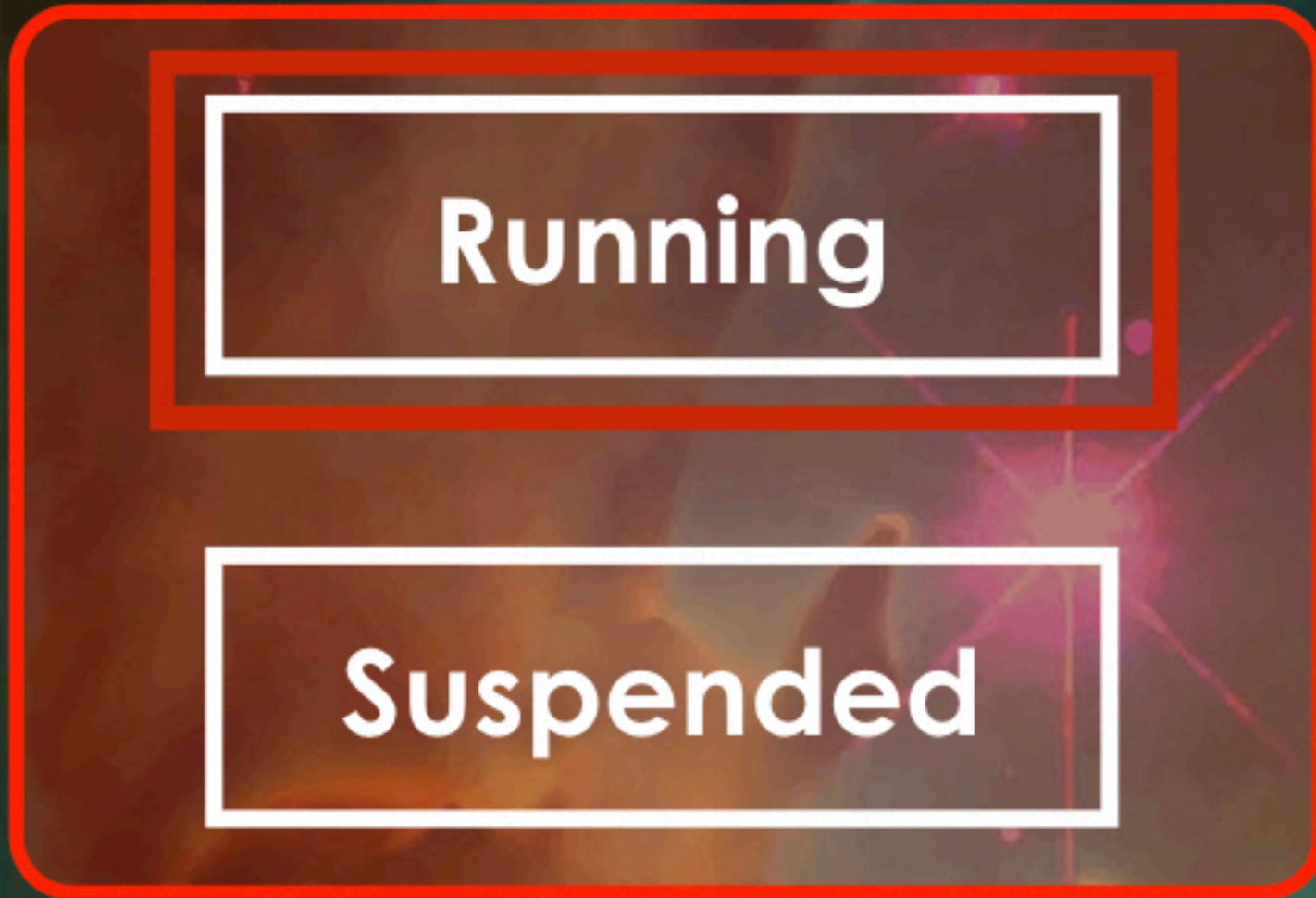
Restauration (UIApplicationDelegate)

Foreground



Not Running

Background



Nothing

An orange arrow pointing upwards from the word 'Nothing' towards the 'Running' state box in the background section.

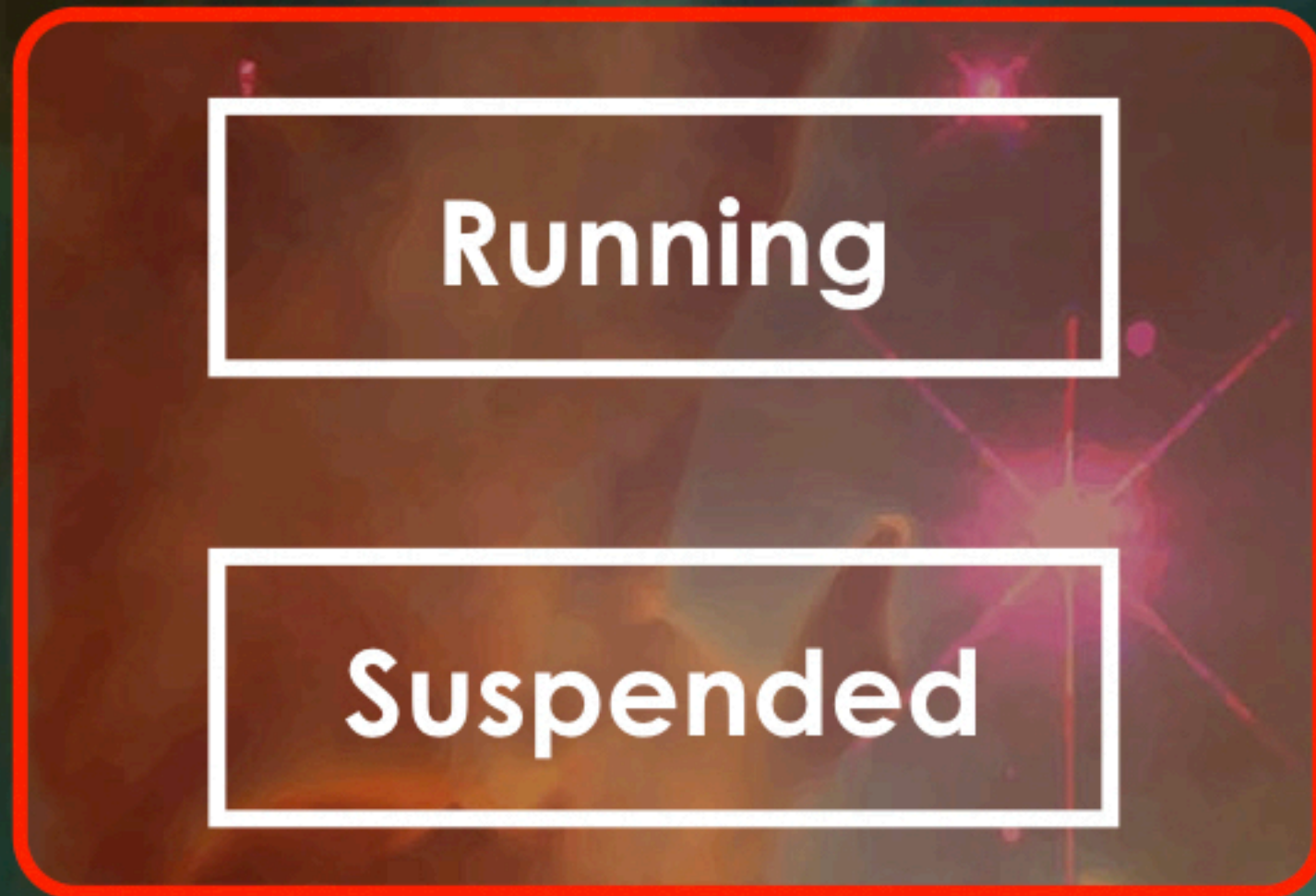
Restauration (UIApplicationDelegate)

Foreground



Not Running

Background



`applicationWillEnterForeground(_:)`



Restauration (UIApplicationDelegate)

Foreground



`applicationDidBecomeActive(_:)`

Not Running

Background



Termination (UIApplicationDelegate)

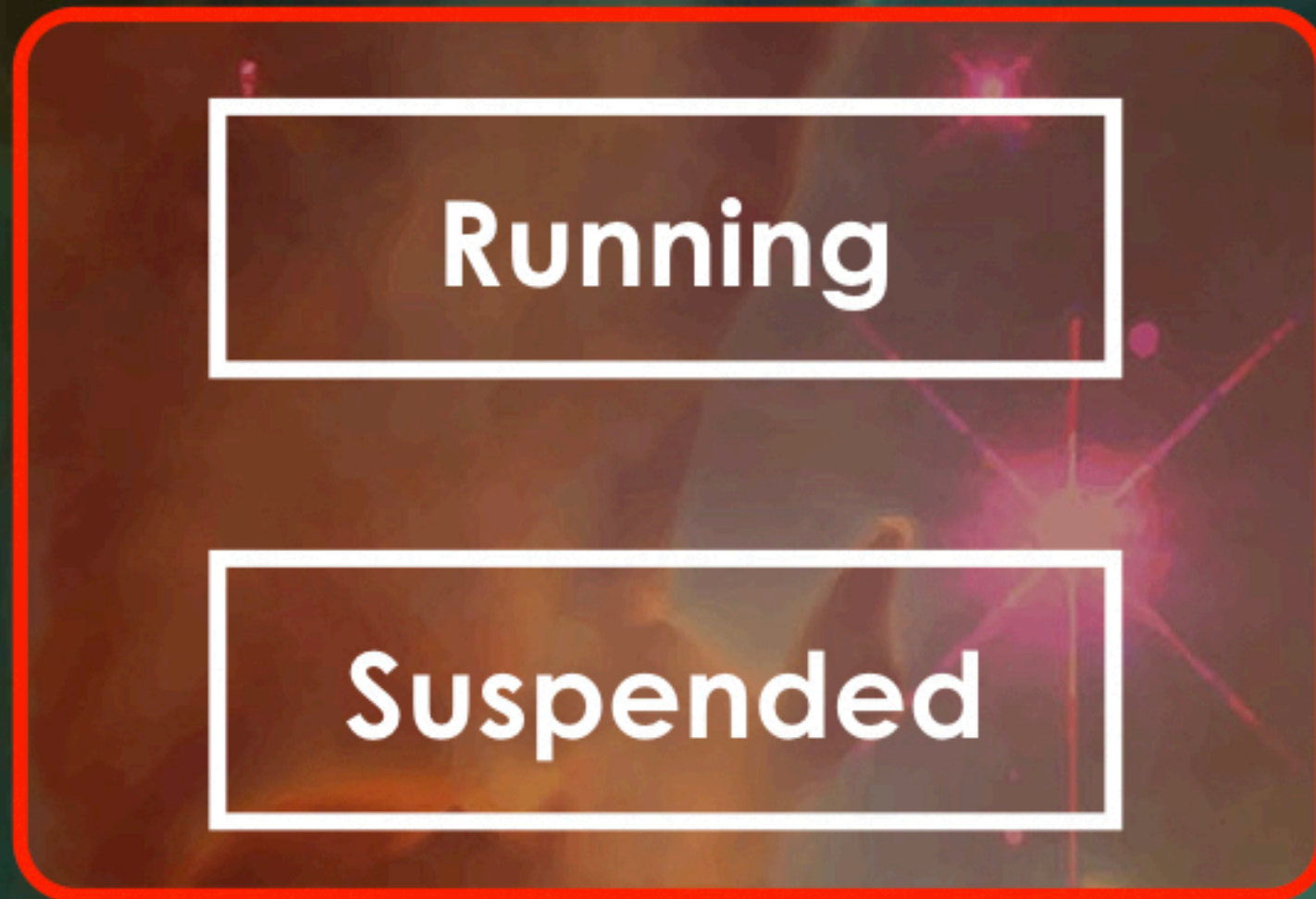
Foreground



From Active or Inactive
`applicationWillTerminate(_:)`



Background



What to do?



At suspension

- Save the App's current state
 - ▶ If it is killed later
- Free unused memory
- Close network connections
 - ▶ Unless you handle remote network activity



When restarting

- Reload the App's saved state
- Restore network connections when necessary

Good practices

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You may need to respond to Notifications & events

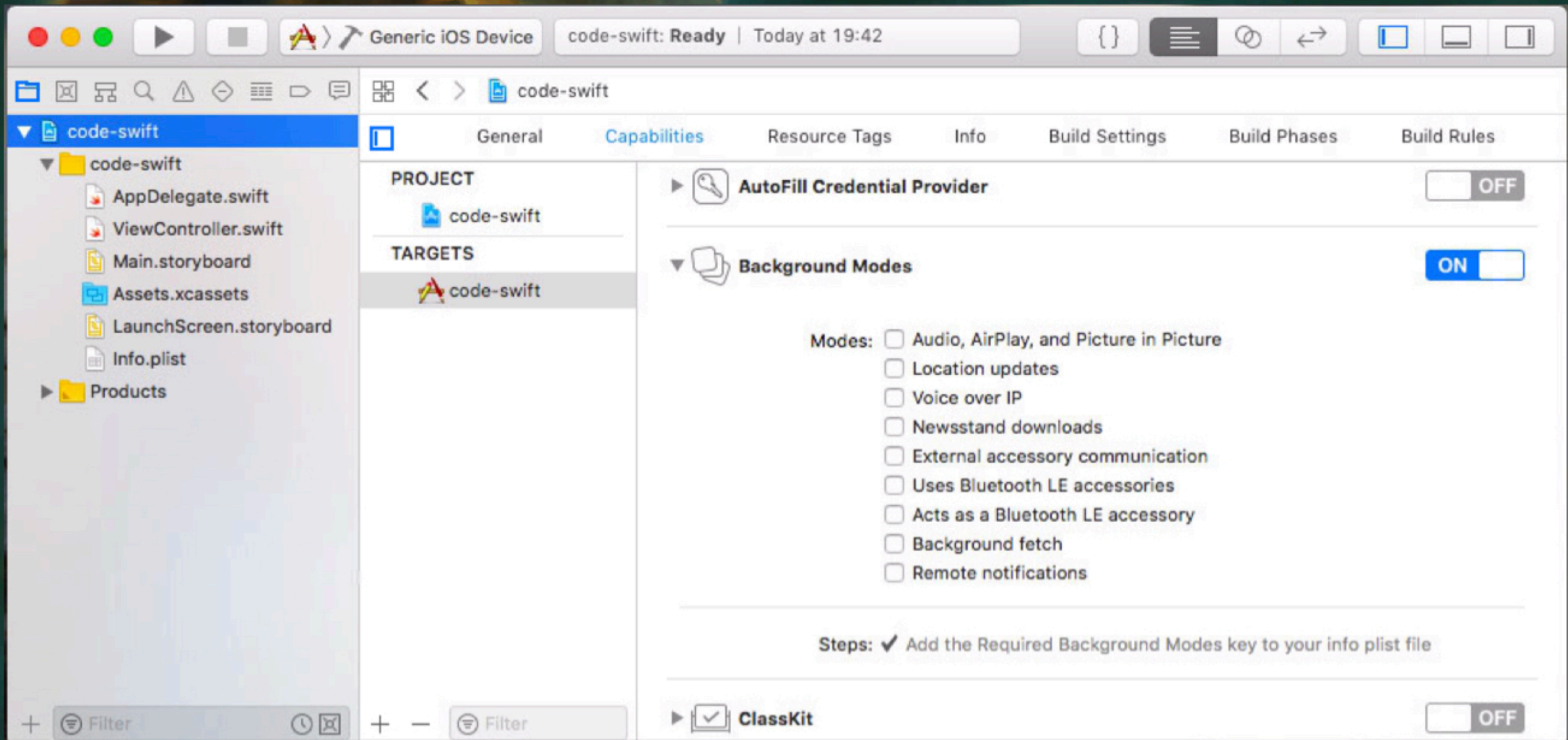
- Methods of UIApplicationDelegate
 - background downloads
 - ▶ `application(_:performFetchWithCompletionHandler:)`
 - Use of URLSession
 - ▶ `application(_:handleEventsForBackgroundURLSession:completionHandler:)`
 - Memory management
 - ▶ `applicationDidReceiveMemoryWarning(_:)`
 - Significant change in time
 - ▶ `applicationSignificantTimeChange(_:)`
 - Device locked
 - ▶ `applicationProtectedDataWillBecomeUnavailable(_:)`
 - ▶ `applicationProtectedDataDidBecomeAvailable(_:)`

Caution

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 You might need to configure your project/App

 Depending of your App's activity



The screenshot shows the Xcode interface for a project named 'code-swift'. The 'Capabilities' tab is selected, showing the following settings:

- AutoFill Credential Provider:** OFF
- Background Modes:** ON
 - Modes:
 - Audio, AirPlay, and Picture in Picture
 - Location updates
 - Voice over IP
 - Newsstand downloads
 - External accessory communication
 - Uses Bluetooth LE accessories
 - Acts as a Bluetooth LE accessory
 - Background fetch
 - Remote notifications
- ClassKit:** OFF

Steps: ✓ Add the Required Background Modes key to your info plist file

iOS is the



 **It does not like you to waste memory**

-  iOS terminates first processes greedy with memory

 **Priority in killing processes**

1. Background Suspended (large memory footprint)
2. Background Running (large memory footprint)
3. Background Suspended (low memory footprint)
4. Background Running (low memory footprint)
5. Foreground... (didReceiveMemoryWarning)

 **Such a termination is «normal»**

As a conclusion...

Have a look at the AppDelegate file...



```
import UIKit

@UIApplicationMain
class AppDelegate: UIResponder, UIApplicationDelegate {

    var window: UIWindow?

    func application(_ application: UIApplication, didFinishLaunchingWithOptions launchOptions: [UIApplication.LaunchOptionsKey: Any]?) -> Bool {
        // Override point for customization after application launch.
        return true
    }

    func applicationWillResignActive(_ application: UIApplication) {
        // Sent when the application is about to move from active to inactive state. This can occur for certain types of temporary
        // interruptions (such as an incoming phone call or SMS message) or when the user quits the application and it begins the transition to the
        // background state.
        // Use this method to pause ongoing tasks, disable timers, and invalidate graphics rendering callbacks. Games should use this
        // method to pause the game.
    }

    func applicationDidEnterBackground(_ application: UIApplication) {
        // Use this method to release shared resources, save user data, and deactivate timers. You should add code here to save enough application state information
        // to restore your application to its current state in case it is terminated later. For more information on applicationWillTerminate: when the user
        // quits.
    }

    func applicationWillEnterForeground(_ application: UIApplication) {
        // Called as part of the transition from the background to the active state; here you can undo many of the changes made on
        // entering the background.
    }

    func applicationDidBecomeActive(_ application: UIApplication) {
        // Restart any tasks that were paused (or not yet started) while the application was inactive. If the application was previously
        // in the background, optionally refresh the user interface.
    }

    func applicationWillTerminate(_ application: UIApplication) {
        // Called when the application is about to terminate. Save data if appropriate. See also applicationDidEnterBackground:.
    }
}
```

RTFM!

