

iOS Background Execution Limits

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I regularly see questions, both here on DevForums and in my Day Job™ at DTS, that are caused by a fundamental misunderstanding of how background execution works on iOS. These come in many different variants, for example:

- How do I keep my app running continuously in the background?
- If I schedule a timer, how do I get it to fire when the screen is locked?
- How do I run code in the background every 15 minutes?
- How do I set up a network server that runs in the background?
- How can my app provide an IPC service to another one of my app while it's in the background?

The short answer to all of these is **You can't**. iOS puts strict limits on background execution. Its default behaviour is to suspend your app shortly after the user has moved it to the background; this suspension prevents the process from running any code.

There's no general-purpose mechanism for:

- Running code continuously in the background
- Running code at some specific time in the background
- Running code periodically at a guaranteed interval
- Resuming in the background in response to a network or IPC request

However, iOS does provide a *wide* range of special-purpose mechanisms for accomplishing specific user goals. For example:

- If you're building a music player, use the `audio background mode` to continue playing after the user has moved your app to the background.
- If you're building a timer app, use a `local notification` to notify the user when your timer has expired.
- If you're building a video player app, use AVFoundation's `download support`.

Keep in mind that the above is just a short list of examples. There are many other special-purpose background execution mechanisms, so you should search the documentation for something appropriate to your needs.

IMPORTANT Each of these mechanisms fulfils a specific purpose. Do not attempt to use them for some other purpose. Before using a background API, read clause 2.5.4 of the `App Store Review Guidelines`.

Additionally, iOS provides some general-purpose mechanisms for background execution:

- To resume your app in the background in response to an event on your server, use a background notification (aka a 'silent' push). For more information, see `Pushing Background Updates to Your App`.
- To request a small amount of periodic background execution time to refresh your UI, use `BGAppRefreshTaskRequest`.
- To request extended background execution time, use `BGProcessingTaskRequest`.
- To prevent your app from being suspended for a short period of time so that you can complete some user task, use a `UIApplication` background task. For more information on this, see `UIApplication Background Task Notes`.
- To download or upload a large HTTP resource, use an `NSURLSession` `background session`.

All of these mechanisms prevent you from abusing them to run arbitrary code in the background. As an example, consider the `NSURLSession resume rate limiter`.

For more information about these limitations, and background execution in general, I *strongly* recommend that you watch WWDC 2020 Session 10063 `Background execution demystified`. It's an excellent resource.

Finally, if you have questions about background execution that aren't covered by the resources listed here, please open a new thread on DevForums with the details. Tag it appropriately for the technology you're using; if nothing specific springs to mind, use `BackgroundTasks`. Also, make sure to include details about the specific problem you're trying to solve because, when it comes to background execution, the devil really is in the details.

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Change history:

- 22 Jul 2021 — First posted.
- 26 Jul 2021 — Extended the statement about what's not possible to include "running code periodically at a guaranteed interval".
- 12 Aug 2021 — Added more entries to the common questions list, this time related to networking and IPC. Made minor editorial changes.

Background Tasks

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Posted 1 year ago by eskimo

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