

# Mobile Application Testing

Xcode, Simulators, and more

# Topics

- ▶ TestFlight
- ▶ Xcode
- ▶ Apple Simulator
- ▶ Control Simulators from Command Line
- ▶ Emulator vs Simulator
- ▶ Real devices

# TestFlight

- ▶ TestFlight is an online service for over-the-air installation and testing of mobile applications
- ▶ Testers will use the TestFlight app to install your app and provide feedback
- ▶ TestFlight supports apps for iOS, iPadOS, macOS, tvOS, watchOS, and iMessage
- ▶ Automatic updates to ensure that testers always test the latest available build
- ▶ Up to 100 apps can be tested at a time, internally or externally, and multiple builds can be tested simultaneously
- ▶ Builds remain active for 90 days after upload
- ▶ Two ways the users (testers) can be added to TestFlight:
  - ▶ Users can be invited by adding emails to the list
  - ▶ A public link can be shared
- ▶ More info: <https://developer.apple.com/testflight/>

# Prerequisites for Testing Mobile Applications developed for Apple devices

- ▶ MacBook
- ▶ A supported version of Xcode is installed on the MacBook
- ▶ If you want to test your application on a physical iOS device, ensure the following:
  - ▶ The device is connected to the MacBook
  - ▶ The device has a supported version of iOS (iPadOS,...)
- ▶ If you want to test your application on an iOS Simulator, ensure the following:
  - ▶ The Apple Simulator image is installed on the MacBook
  - ▶ The Apple Simulator image has a supported version of iOS (iPadOS,...)

# Device connection

- ▶ Make sure that you have a version on Xcode that will work with your device.
- ▶ Example:
  - ▶ Xcode 13 - iOS 15
  - ▶ Xcode 14 - iOS 16

# Xcode

Apple Developer: [Introducing Xcode](#)

# Xcode

- ▶ Xcode is the developer toolset for iPhone, iPad, Apple Watch, Apple TV and Mac.
- ▶ It includes the Xcode IDE, iOS Simulator, and all required tools and frameworks for building iOS, watchOS, tvOS, and macOS applications.
- ▶ Xcode 14: [Release Notes](#)
  - ▶ Includes SDKs for iOS 16, iPadOS 16, tvOS 16, watchOS 9, and macOS Monterey 12.3
  - ▶ Supports on-device debugging in iOS 11 and later, tvOS 11 and later, and watchOS 4 and later.
  - ▶ Requires a Mac running macOS Monterey 12.5 or later.

# Apple Simulator

Apple Developer: [Simulator Overview](#)



# Simulator

- ▶ Simulator runs on your Mac and behaves like a standard Mac app while simulating iPhone, iPad, Apple Watch, or Apple TV environments.
- ▶ Each simulator has its own simulation environment, independent of the others, with its own settings and files.
- ▶ Multiple simulators can be run at the same time.

# What can you do with simulator?

- ▶ Interact with your apps on iOS, watchOS, and tvOS using your pointer and keyboard.
- ▶ Prototype and debug your apps.
- ▶ Optimize your graphics.
- ▶ Test your apps.

# How to start a simulator?

- ▶ Xcode. Build and run an app on a simulator  
Set the active scheme -> Build and run the active scheme
- ▶ Xcode. Start the simulator  
Xcode -> Open Developer Tool -> Simulator
- ▶ Simulator app.  
File -> Open Simulator -> [select iOS version]  
->[Select Simulator]

# How to check logs?

- ▶ Xcode
- ▶ Console Application

# Xcode and simulator practice

- ▶ Create new project
- ▶ Build and run on a simulator
- ▶ Check logs
- ▶ Take a screenshot
- ▶ Record video
- ▶ Start simulator
- ▶ Create new simulator

# simctl: Control Simulators from Command Line

xcrun simctl help

# How to start, stop, and check if simulator is booted?

- ▶ Shows list of all simulators  
`xcrun simctl list`
- ▶ Shows list of booted simulators  
`xcrun simctl list | grep Booted`
- ▶ Starts a simulator  
`xcrun simctl boot <device>`
- ▶ Shuts down simulator  
`xcrun simctl shutdown <device>`

# How to capture Video Recording from simulator?

- ▶ Screenshot

xcrun simctl io booted screenshot \*.png

- ▶ Video Recording

xcrun simctl io booted recordVideo \*.mp4



# How to check logs using Terminal?

- ▶ Terminal

```
tail -f ~/Library/Logs/CoreSimulator/<simulator-  
hash>/system.log
```

# Emulator vs Simulator



# Emulator vs Simulator

- ▶ Android Emulator. It duplicates every aspect of the original device's behavior, both hardware and software.
- ▶ Apple Simulator. It simulates devices OS, but it doesn't attempt to simulate the real device's hardware.

# Emulators: Advantages and Disadvantages

- ▶ Advantages
  - ▶ Can simulate both software and hardware
  - ▶ Run the code without any modification
  - ▶ Help you find unexpected behavior
- ▶ Disadvantages
  - ▶ Very slow
  - ▶ Hard to configure and maintain
  - ▶ Don't take into consideration factors like battery overheating/drainage or conflicts with other (default) apps

# Simulators: Advantages and Disadvantages

- ▶ Advantages
  - ▶ Fast
  - ▶ No set up needed (or minimum involvement)
  - ▶ Can be used to study the behavior of an app
  - ▶ Help you find unexpected behavior, but it can also give you false positives
- ▶ Disadvantages
  - ▶ Can only simulate the software part
  - ▶ Apps may might need a modified code to run on simulators
  - ▶ Simulation results may be difficult to analyze, due to incomplete data

# Real Devices?

## ▶ Advantages

- ▶ Provide real environment
- ▶ Use all hardware like GPS, network, Bluetooth and many others in real time
- ▶ Perform faster than emulators and simulators
- ▶ Allow to use sensors like orientation, gyroscope and others
- ▶ Can catch battery drain, excessive usage of CPU, GPU and RAM

## ▶ Disadvantages

- ▶ Testing on multiple models is not only frustrating and time consuming but also expensive
- ▶ The resources spent on the maintenance of the real devices
- ▶ The devices may not be released yet

# Summary

# How to get an application for testing on a device/simulator?

- ▶ TestFlight
- ▶ Build from Xcode to connected device/simulator
- ▶ Drag&Drop to simulator



# How to check logs?

- ▶ Xcode
- ▶ Console Application
- ▶ Terminal
- ▶ Device
  - Settings - Privacy - Analytics and Improvements - Analytics Data

# Bonus: Human Interface Guidelines

- ▶ The HIG contains guidance and best practices that can help you design a great experience for any Apple platform.
- ▶ Offers in-depth information and UI resources for all of Apple's platforms, including specific technology areas
- ▶ <https://developer.apple.com/design/human-interface-guidelines/guidelines/overview/>