Privacy and Your App

Session 703

Katie Skinner Product Security and Privacy
Jason Novak Product Security and Privacy
“This is a basic human right. We all have a right to privacy.”

Tim Cook
Our Users Are Your Users
Architect for Privacy

Updates to iOS, OS X, and watchOS

User Identifiers

Accessing User Data

Protecting User Data
Architect for Privacy

Data retention
Data transfer
Data storage
Identifiers
Transparency and control
Data Retention

Have a retention policy
Delete data when it no longer serves a user need
Collect the minimum data needed
Balance storage of data against risk
Data Minimization Techniques

Anonymize
Aggregate
Sample
De-resolve
Decay
Minimize

User Privacy in iOS and OS X
Data Transfer

Encrypt data in transit
Keep sensitive data on-device
Process sensitive data on-device
Data Storage

On device
  • Data protection
  • Keychain

Server-side
  • Encrypt at rest
  • CloudKit

CloudKit Tips and Tricks
Identifiers

Use purpose scoped identifiers

• Session, rotating, long lived
Transparency and Control

Be clear about what data is collected
- Ability to inspect data

Explain how it will be used
- Purpose strings
- Privacy Policy

Give users control
- Limit Ad Tracking
Updates
iOS
## MAC Address Randomization

<table>
<thead>
<tr>
<th></th>
<th>iOS 8</th>
<th>iOS 9</th>
</tr>
</thead>
<tbody>
<tr>
<td>Unassociated PNO Scans</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Unassociated ePNO Scans</td>
<td></td>
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## MAC Address Randomization

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<td>●</td>
</tr>
<tr>
<td>Location Scans</td>
<td></td>
<td>●</td>
</tr>
<tr>
<td>Auto Join Scans</td>
<td></td>
<td>●</td>
</tr>
</tbody>
</table>
App Detection

The apps that a user has installed are their business
App Detection

The apps that a user has installed are their business
If your app is installed isn’t another app’s business
canOpenURL

Purpose is to determine whether an app can open a given URL resource
For instance this can be used to present new user experiences if an app is installed
Use extensions or universal links
<key>LSApplicationQueriesSchemes</key>
<array>
    <string>urlscheme</string>
    <string>urlscheme2</string>
    <string>urlscheme3</string>
    <string>urlscheme4</string>
</array>
let b = UIApplication.sharedApplication().canOpenURL(url)
canOpenURL Responses

URL scheme declared in Info.plist

If a URL scheme is declared in Info.plist, `canOpenURL(urlscheme)` will return:

- YES if an app that supports that URL scheme is installed
- NO if no app supporting that URL is installed

- syslog will contain

  *canOpenURL: failed for URL: “urlscheme://“ - error: “(null)”*
canOpenURL Responses

URL scheme not declared in Info.plist

If a URL scheme is not declared in Info.plist, `canOpenURL(urlscheme)` will return:

- NO whether or not an app supporting that scheme is installed
  - syslog will contain

`canOpenURL: failed for URL: “urlscheme://“ - error: “This app is not allowed to query for scheme urlscheme”`
50

Distinct schemes for apps linked before iOS 9
Universal Links

Web links are seamless
App opens or Safari launches to your website
No need to check if another app is installed
sysctl

`sysctl()` retrieves system information for processes with appropriate privileges.

iOS apps are not permitted to see what other apps are running.
sysctl

`sysctl()` retrieves system information for processes with appropriate privileges.

iOS apps are not permitted to see what other apps are running.

In iOS 9, the sandbox now prevents a process from accessing the `kern.proc`, `kern.procargs`, and `kern.procargs2` values for other processes.
Safari Content Blocker

Block lists will apply to Safari or any apps that use SafariViewController.
Does not apply to apps using UIWebView.

Choose a template for your new target:

- iOS
  - Application
  - Framework & Library
  - Application Extension
  - Apple Watch
  - Test
  - Apple Internal
- OS X
  - Application
  - Framework & Library
  - Application Extension
OS X
In OS X Yosemite and before, cookies are shared among all applications and are kept in sync across process boundaries.

With OS X El Capitan, cookies are local to a single process and are not shared.
watchOS
Think about privacy and security from the beginning
Think about privacy and security from the beginning
Building off of iOS infrastructure and techniques
Think about privacy and security from the beginning
Building off of iOS infrastructure and techniques
User has a single relationship across their Watch and iPhone
Privacy Settings are shared between paired devices
Keychain

Available on Watch with watchOS 2
Identifiers
Identifiers
Identifiers

Name
Identifiers

Name
Phone number
Identifiers

Name
Phone number
Randomly generated number
Identifiers

Name
Phone number
Randomly generated number
UUID
Identifiers

Name
Phone number
Randomly generated number
UUID
<table>
<thead>
<tr>
<th>Name</th>
<th>App activities</th>
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<tbody>
<tr>
<td>Phone number</td>
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<tr>
<td>Randomly generated number</td>
<td></td>
</tr>
<tr>
<td>UUID</td>
<td></td>
</tr>
</tbody>
</table>
Identifiers

Name
Phone number
Randomly generated number
UUID

App activities
Search queries
Identifiers

Name
Phone number
Randomly generated number
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App activities
Search queries
Messages
<table>
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<td>Phone number</td>
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</tr>
<tr>
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<td>Messages</td>
</tr>
<tr>
<td>UUID</td>
<td>Location</td>
</tr>
</tbody>
</table>
Identifier Usage

Do you need an identifier or just the data?

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Identifier Usage

Do you need an identifier or just the data?
What are you identifying?
• Session

7ecf67b6-50f1-493f-9306-b8773f7b8ff7
Identifier Usage

Do you need an identifier or just the data?

What are you identifying?

- Session
- User

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Identifier Usage

Do you need an identifier or just the data?

What are you identifying?

- Session
- User
- Installation on a device

7ecf67b6-50f1-493f-9306-b8773f7b8ff7
Identifier Usage

Do you need an identifier or just the data?

What are you identifying?

• Session
• User
• Installation on a device

Scoping identifiers

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<table>
<thead>
<tr>
<th>Identifier</th>
<th>Time</th>
<th>Search Query</th>
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<tbody>
<tr>
<td>123</td>
<td>2015-06-01 12:00</td>
<td>engagement ring</td>
</tr>
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<td>where to propose</td>
</tr>
<tr>
<td>123</td>
<td>2015-06-01 12:10</td>
<td>dinner reservations saturday night</td>
</tr>
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</tr>
<tr>
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<td>2015-06-01 13:42</td>
<td>how do I get to moscone center?</td>
</tr>
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<td>when is wwdc keynote?</td>
</tr>
<tr>
<td>789</td>
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## Example

### Search identifiers

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Persistent Identifiers

Permit long-term tracking of a user
Persistent Identifiers

Permit long-term tracking of a user

Aren’t transparent or in line with user expectations
Persistent Identifiers

Permit long term tracking of a user

Aren’t transparent or in line with user expectations

Users don’t have control
## Identifier APIs

<table>
<thead>
<tr>
<th>Vendor ID</th>
<th>Developer</th>
<th>Control</th>
<th>Backed Up</th>
<th>Restores Across Devices</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Uninstall all apps from same TeamID</td>
<td>Yes</td>
<td>No</td>
<td></td>
</tr>
<tr>
<td>Advertising ID</td>
<td>Device</td>
<td>“Reset Advertising ID”</td>
<td>Yes</td>
<td>No</td>
</tr>
</tbody>
</table>
## Identifier API Availability

<table>
<thead>
<tr>
<th></th>
<th>iOS</th>
<th>watchOS 1 SDK</th>
<th>watchOS 2 SDK</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Vendor ID</strong></td>
<td>BBBDD211-B69B-4FB4-9CB3-6D7A42FB5A6B</td>
<td>BBBDD211-B69B-4FB4-9CB3-6D7A42FB5A6B</td>
<td>BBBDD211-B69B-4FB4-9CB3-6D7A42FB5A6B</td>
</tr>
<tr>
<td><strong>Advertising ID</strong></td>
<td>7ED98D72-3CA8-43E9-856D-4160B7D43A59</td>
<td>7ED98D72-3CA8-43E9-856D-4160B7D43A59</td>
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Best Practices

Determine if you need an identifier at all
Best Practices

Determine if you need an identifier at all
If you need an identifier, properly scope it
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Use the OS provided identifiers
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Use the OS provided identifiers
Ensure that usage is consistent with guidelines
Best Practices

Determine if you need an identifier at all
If you need an identifier, properly scope it
Use the OS provided identifiers
Ensure that usage is consistent with guidelines
Always check the value of Limit Ad Tracking and the `advertisingIdentifier` before you use it

```swift
let identifierForAdvertising = ASIdentifierManager.sharedManager().advertisingIdentifier.UUIDString
```
Reporting
Privacy in Reporting

Report insights not data
Report aggregates
Require thresholds
Accessing User Data
Prompting Well
Consent

Allow “Maps” to access your location while you use the app?
Your location may be shown on the map and is used to provide things such as directions and nearby search results.

Don’t Allow  Allow

“Messages” would like to use your current location.
Your location may be shown on the map.

Don’t Allow  Allow
Prompting Well

Consent

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Prompting Well
Transparency

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Don’t Allow  Allow
Prompting Well

TRANSPARENCY

Allow “Maps” to access your location while you use the app?

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Prompting Well

Transparency

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Don’t Allow  Allow
Prompting on watchOS
Prompting on watchOS
Prompting on watchOS

Maps would like to access your location. You can confirm or deny this on your iPhone.
Prompting on watchOS

Maps would like to access your location. You can confirm or deny this on your iPhone.
Prompting on watchOS

Maps would like to access your location. You can confirm or deny this on your iPhone.

Dismiss
Settings on watchOS and iOS
Settings on watchOS and iOS
Settings on watchOS and iOS
Settings on watchOS and iOS
Settings on watchOS and iOS
Settings on watchOS and iOS
Settings on watchOS and iOS
Settings on watchOS and iOS
Protecting User Data
New Technologies
App Transport Security

Secure—TLSv1.2 with forward secrecy—connections by default

- **NSURLErrorAppTransportSecurityRequiresSecureConnection** error on insecure connections
App Transport Security

Secure—TLSv1.2 with forward secrecy—connections by default

- **NSURLErrorAppTransportSecurityRequiresSecureConnection** error on insecure connections

Specify specific domains to load content over insecurely in your app’s Info.plist

Networking with NSURLSession

Pacific Heights    Thursday 9:00 AM
App Transport Security

<key>NSAppTransportSecurity</key>
<dict>
    <key>NSExceptionDomains</key>
    <dict>
        <key>testdomain.com</key>
        <dict>
            <key>NSIncludesSubdomains</key>
            <false/>
            <key>NSTemporaryExceptionAllowInsecureHTTPLoads</key>
            <false/>
            <key>NSTemporaryExceptionRequiresForwardSecrecy</key>
            <true/>
            <key>NSTemporaryExceptionMinimumTLSVersion</key>
            <string>TLTv1.2</string>
            <key>NSTemporaryThirdPartyExceptionAllowInsecureHTTPLoads</key>
            <false/>
        </dict>
    </dict>
</dict>
<key>NSTemporaryExceptionRequiresForwardSecrecy</key>  <true/>
<key>NSTemporaryExceptionMinimumTLSVersion</key>  <string>TL Sv1.2</string>
<key>NSTemporaryThirdPartyExceptionAllowInsecureHTTPLoads</key>  <false/>
<key>NSTemporaryThirdPartyExceptionRequiresForwardSecrecy</key>  <true/>
<key>NSTemporaryThirdPartyExceptionMinimumTLSVersion</key>  <string>TL Sv1.2</string>
<key>NSRequiresCertificateTransparency</key>  <false/>
</dict>
Rewards Cards

Encrypt personally identifying data

```
"nfc" : {
    "message" : "4444678966661234",
"encryptionPublicKey" : "MDkwEwYHKoZIzj0CAQYIKoZIzj0DAQcDgACigjc
+QYC17m3i9u08uKc8mLpaS1UJOEaCFvMedkXsuA="
},
```

Wallet—The Home for Apple Pay and More  Mission  Tuesday 10:00AM
Rewards Cards

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Wallet—The Home for Apple Pay and More

Mission  Tuesday 10:00AM
Deep App Search

NSUserActivity
- All apps

CoreSpotlight
- Apps that persist user data

Introducing App Search
Indexing
NSUserActivity

Extension of iOS 8 Handoff APIs
Views that can be searched for by the user in Search to resume an activity
NSUserActivity API

Enable Capabilities

var eligibleForHandoff: Bool
var eligibleForSearch: Bool
var eligibleForPublicIndexing: Bool

Manage Data

@NSCopying var expirationDate: NSDate
NSUserActivity API

Enable Capabilities

```swift
var eligibleForHandoff: Bool
var eligibleForSearch: Bool
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@NSCopying var expirationDate: NSDate
```
NSUserActivity and Public Indexing

Privacy
NSUserActivity and Public Indexing

Privacy

Activities are private by default
Designate “public” if searchable activity fields are solely public
Provisions to prevent user specific activities from being indexed
NSUserActivity and Public Indexing

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Activities are private by default
Designate “public” if searchable activity fields are solely public
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NSUserActivity and Public Indexing

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Activities are private by default
Designate “public” if searchable activity fields are solely public
Provisions to prevent user specific activities from being indexed
CoreSpotlight

Encryption

Protect your data in Spotlight:

• Set a default with your entitlements
• Set a specific data class for certain items:
  
  - `init(name: String, protectionClass: String) { ... }
  
  `NSFileProtectionNone`,
  `NSFileProtectionComplete`,
  `NSFileProtectionCompleteUnlessOpen`, or
  `NSFileProtectionCompleteUntilFirstUserAuthentication`
Search

Data management best practices

Store relevant user data
Search

Data management best practices

Store relevant user data

Update data after the user updates the original

• func `indexSearchableItems(items: [CSSearchableItem], completionHandler: ((NSError?) -> Void)?)`
Search

Data management best practices

Store relevant user data

Update data after the user updates the original

• func `indexSearchableItems(items: [CSSearchableItem], completionHandler: ((NSError?) -> Void)?)`

Delete the data in the index after the user deletes the original

• func `deleteSearchableItemsWithIdentifiers(identifiers: [String], completionHandler: ((NSError?) -> Void)?)`
Search

Data management best practices

Store relevant user data

Update data after the user updates the original

• func `indexSearchableItems(items: [CSSearchableItem], completionHandler: ((NSError?) -> Void)?)`

Delete the data in the index after the user deletes the original

• func `deleteSearchableItemsWithIdentifiers(identifiers: [String], completionHandler: ((NSError?) -> Void)?)`
• func `deleteSearchableItemsWithDomainIdentifiers(domainIdentifiers: [String], completionHandler: ((NSError?) -> Void)?)`
Search

Data management best practices

Store relevant user data

Update data after the user updates the original

- `func indexSearchableItems(items: [CSSearchableItem], completionHandler: ((NSError?) -> Void)?)`

Delete the data in the index after the user deletes the original

- `func deleteSearchableItemsWithIdentifiers(identifiers: [String], completionHandler: ((NSError?) -> Void)?)`
- `func deleteSearchableItemsWithDomainIdentifiers(domainIdentifiers: [String], completionHandler: ((NSError?) -> Void)?)`
- `func deleteAllSearchableItemsWithCompletionHandler(completionHandler: ((NSError?) -> Void)?)`
Existing Technologies
Leverage Existing Technologies

Touch ID
Apple Pay
Privacy Policy transparency
Data Protection
Privacy Policy
Privacy Policy

iTunes Connect

WWDC Version 3.0.4

Name
WWDC

Description
Make the most of the Apple Worldwide Developers Conference with the WWDC app. Even if you can’t join us in San Francisco, you can still follow along each day — session videos are just a tap away. And because the WWDC app experience now extends to Apple Watch, conference information is available right from your wrist.

- Stream or download videos from current and previous WWDC sessions.
- Start watching on one iOS device, and pick up where you left off on another.
- Browse times, locations, and descriptions for sessions, labs, and special events.
- Mark schedule items as favorites.
- Keep up with the latest news, get important notifications, and see daily photos.
- View accessible maps to find your way around Moscone West.
- Provide feedback on content and speakers for each session.
- Add your pass to Passbook for faster check-in at WWDC.

The WWDC app makes use of geofencing at the conference, which can decrease battery life. You can opt-out of using this feature by editing your location privacy in Privacy > Location Services in Settings.

What’s New in This Version
This update addresses minor issues related to sign in, calendars, and timezone support.

Keywords
WWDC, WWDC 2015, Worldwide Developers Conference, Apple Developer, iOS, OS X

Support URL
https://developer.apple.com/contact/

Marketing URL
https://developer.apple.com/wwdc/

Privacy Policy URL
http://www.apple.com/privacy/
Privacy Policy
iTunes Connect

WWDC Version 3.0.4

Name
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Support URL
https://developer.apple.com/contact/

Marketing URL
https://developer.apple.com/wwdc/

Privacy Policy URL
http://www.apple.com

A URL that links to your organization’s privacy policy. Privacy policies are required for apps that are Made for Kids or offer auto-renewable in-App Purchases or free subscriptions. They are also required for apps with account registration, apps that access a user’s existing account, or any otherwise required by law. Privacy policies are recommended for apps that collect user- or device-related data.
Privacy Policy

App Store
Privacy Policy
App Store
Data Protection
Data Protection

Uses encryption hardware to protect user data on iOS and watchOS
Per-file encryption
Multiple levels of protection
## Data Protection

<table>
<thead>
<tr>
<th>Data Protection Class</th>
<th>Key Availability</th>
</tr>
</thead>
<tbody>
<tr>
<td>NSFilerProtectionComplete</td>
<td>Read/Write Keys Available Only While Device Is Unlocked</td>
</tr>
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<td>Read When Device is Unlocked Write When Device is Locked</td>
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<td>Read and Write After First Unlock of Device</td>
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<td>NSFilerProtectionNone</td>
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## Data Protection

<table>
<thead>
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<th>Data Protection Class</th>
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NSFileProtectionNone
No Protection
No Protection
No Protection
No Protection
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NSFileProtectionCompleteUntilFirstUserAuthentication
Protected Until First User Authentication
Protected Until First User Authentication
Protected Until First User Authentication
Protected Until First User Authentication
Protected Until First User Authentication
NSFileProtectionCompleteUnlessOpen
Protected Unless Open
Protected Unless Open

Reading

Writing
Protected Unless Open

Reading

Writing
Protected Unless Open

Reading

Writing
Protected Unless Open

Reading

Writing
NSFileProtectionComplete
Complete Protection
Complete Protection
Complete Protection
Complete Protection
Complete Protection
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Data Protection

- Change Passcode
  - Require Passcode: Immediately
  - Voice Dial: On
    - Music Voice Control is enabled.
    - Allow access when locked:
      - Today: On
      - Notifications View: On
      - Reply with Message: Off
      - Wallet: On
        - Get cards or passes ready from the lock screen by double-clicking the home button.
  - Erase Data:
    - Erase all data on this iPhone after 10 failed passcode attempts.
    - Data protection is enabled.
Data Protection

Settings Touch ID & Passcode
Change Passcode

Require Passcode

Voice Dial
Music Voice Control is always enabled.

ALLOW ACCESS WHEN LOCKED:

Today

Notifications View

Reply with Message

Wallet
Get cards or passes ready from the lock screen by double-clicking the home button.

Erase Data

Erase all data on this iPhone after 10 failed passcode attempts.

Data protection is enabled.
Summary

Test to understand impact
Prompt with purpose
Minimize data and keep it up to date
Leverage the platform’s infrastructure
User privacy is our shared responsibility
More Information

Sample Code
PrivacyPrompts

Technical Support
Apple Developer Forums
http://developer.apple.com/forums

Developer Technical Support
http://developer.apple.com/support/technical

General Inquiries
Paul Danbold, Core OS Evangelist
danbold@apple.com
# Related Sessions

<table>
<thead>
<tr>
<th>Session</th>
<th>Location</th>
<th>Date</th>
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<tbody>
<tr>
<td>Wallet—The Home for Apple Pay and More</td>
<td>Mission</td>
<td>Tuesday 10:00AM</td>
</tr>
<tr>
<td>Security and Your Apps</td>
<td>Mission</td>
<td>Tuesday 4:30PM</td>
</tr>
<tr>
<td>WatchKit In-Depth, Part 1</td>
<td>Pacific Heights</td>
<td>Wednesday 9:00AM</td>
</tr>
<tr>
<td>Introducing App Search</td>
<td>Mission</td>
<td>Wednesday 11:00AM</td>
</tr>
<tr>
<td>Networking with NSURLSession</td>
<td>Pacific Heights</td>
<td>Thursday 9:00AM</td>
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<tr>
<td>Seamless Linking to Your App</td>
<td>Nob Hill</td>
<td>Thursday 3:30PM</td>
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<tr>
<td>App Extension Best Practices</td>
<td>Presidio</td>
<td>Thursday 4:30PM</td>
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<tr>
<td>CloudKit Tips and Tricks</td>
<td>Pacific Heights</td>
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## Related Labs

<table>
<thead>
<tr>
<th>Security and Privacy Lab</th>
<th>Frameworks Lab C</th>
<th>Wednesday 9:00AM</th>
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<tbody>
<tr>
<td>Security and Privacy Lab</td>
<td>Frameworks Lab B</td>
<td>Thursday 9:00AM</td>
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