#WWDC18

Better Apps Through Better Privacy

Session 718

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Privacy is about people.

Privacy Is About People

Build trust with your users

Respect users in handling their data

Apply privacy thinking to engineering decisions

“In every way, at every turn, the question we ask ourselves is not what **can** we do, but what **should** we do.”

Tim Cook, Duke University, May 13, 2018

Ask the “should” questions.

Ask Questions about Data

Why do we need this data?

Would this surprise our users?

Could we use less granular data?

How long do we need this data?

Recognize Data Assumptions

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“There’s no PII, so don’t worry about it.”

“We already protect this with encryption.”

Create Privacy Guarantees

Write high-level statements about privacy expectations

Decide in planning, verify in implementation

Examples:

- “We cannot read your messages in transit between devices.”
- “Analytics data does not identify you personally.”
- “We only retain aggregate usage data.”

Align data practices with use cases.

Handle Data with Caution

Data brings power—and danger

Gathering data adds overhead and liability

Unexpected data adds more risks and distrust

Use Proportional Data Collection

Collect only what is needed to achieve the goal

Collect consistently with user expectations

Do not collect without a clear reason

Use Privacy Techniques

Develop a toolbox

Adjust to match use case

Apply across systems

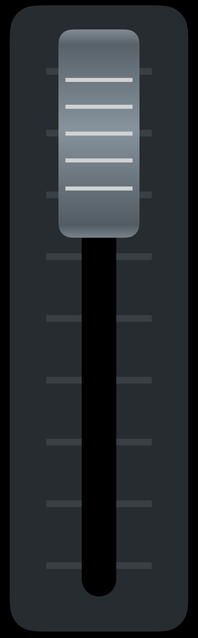
Build technical enforcements

Example: Activity Sharing

De-identified

Aggregation

Control

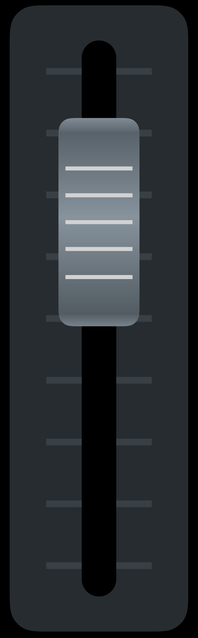


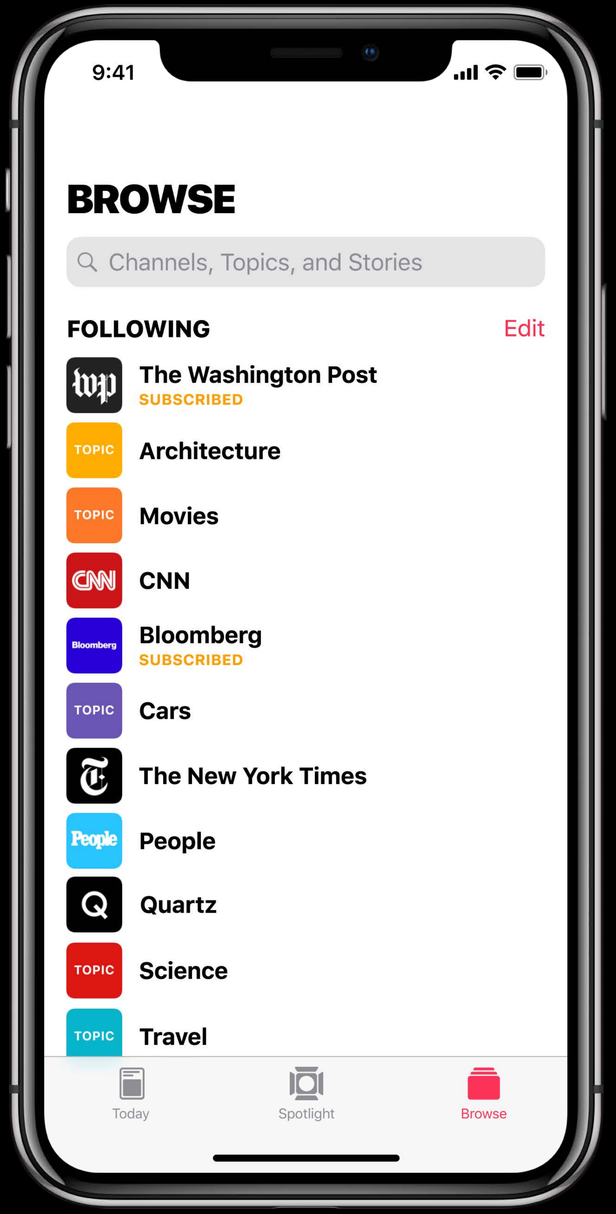
Example: News

De-identified

Aggregation

Control



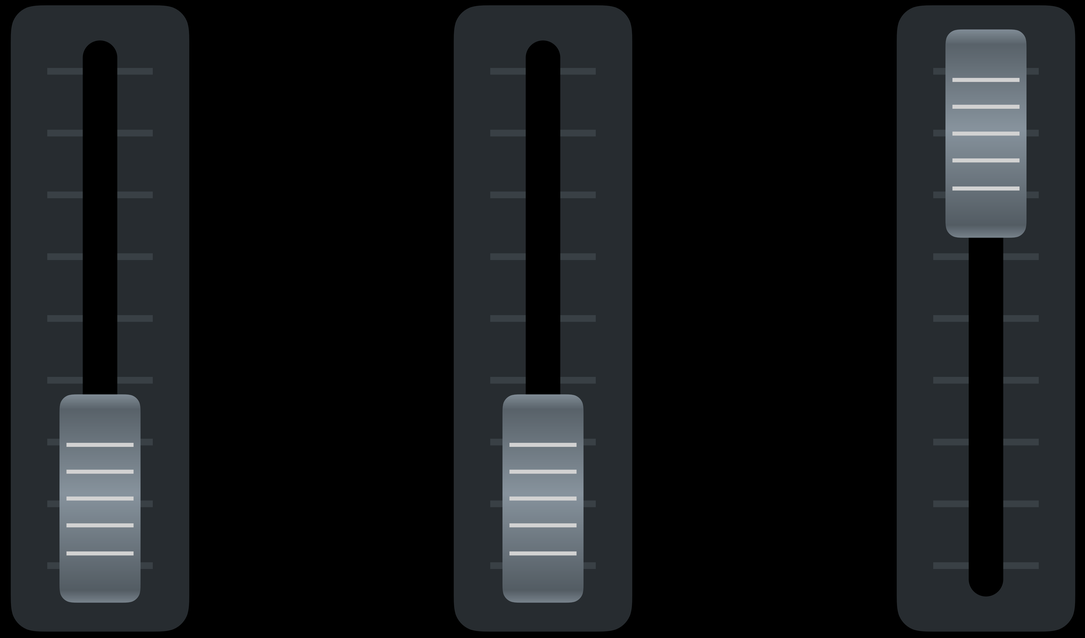


Example: Photo Memories

De-identified

Coarse

On-device



Big Ideas to Remember

Privacy is about people

Ask the “should” questions

Align data practices with use cases

Building Privacy in Your App

Accessing User Data

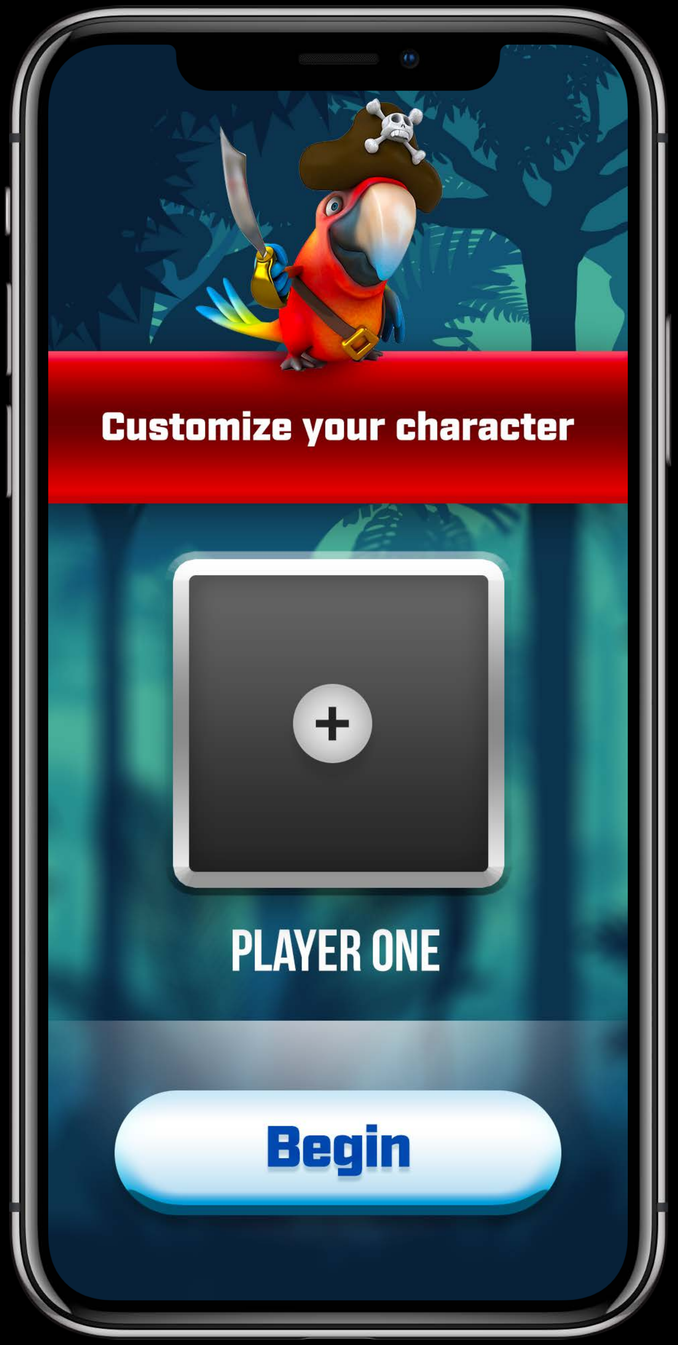
Data Stewardship

Building Privacy in Your App

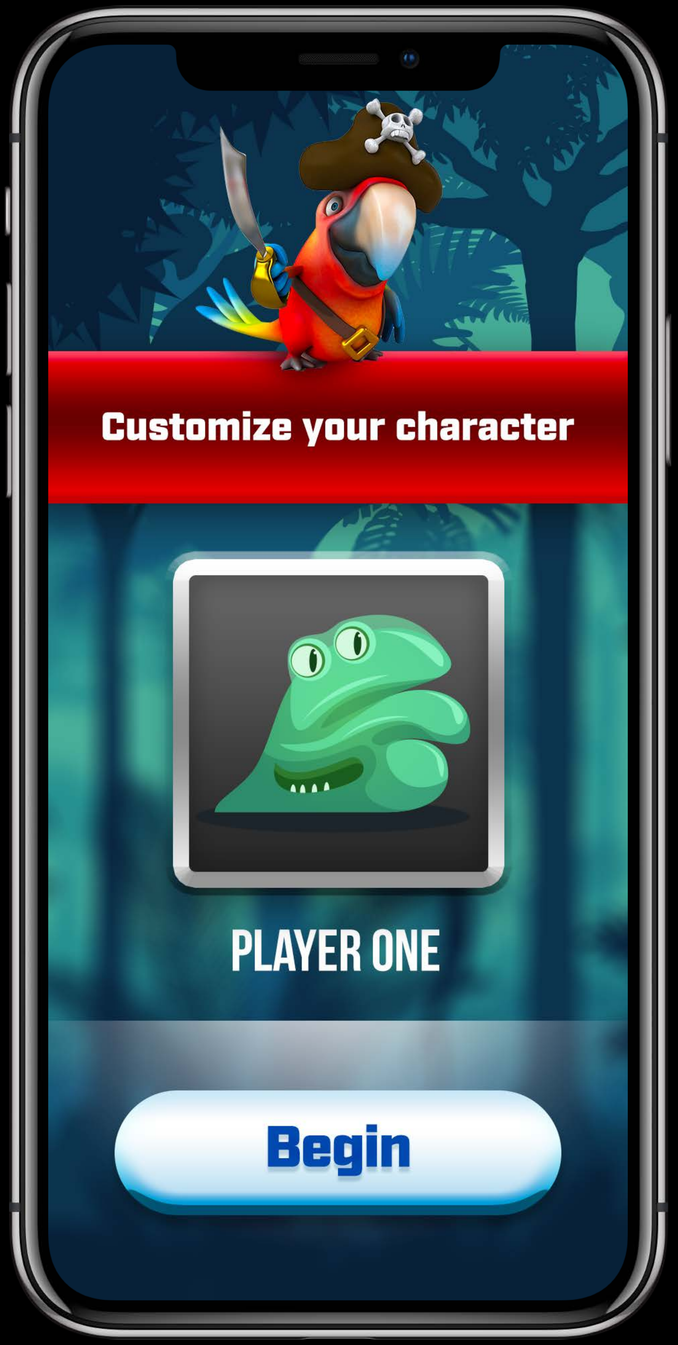
Accessing User Data

Data Stewardship

Accessing Data on iOS


Customize your character
PLAYER ONE
Begin


9:41
Photos
Game Avatars
Cancel


Customize your character
PLAYER ONE
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Use Out-of-Process Pickers

Available for Contacts, Camera, and Photos

Will not trigger a permission prompt

Default method for accessing data

Use Out-of-Process Pickers

```
let contactPicker = CNContactPickerViewController()
```

```
let cameraPicker = UIImagePickerController()
cameraPicker.sourceType = .camera
```

```
let libraryPicker = UIImagePickerController()
libraryPicker.sourceType = .photoLibrary
```

Protected Resources

Bluetooth Sharing

Calendars

Camera

Contacts

Health

HomeKit

Local Authentication

Location Services

Music and Media Library

Microphone

Motion and Fitness

NFC

Photos

Reminders

SiriKit

Speech Recognition

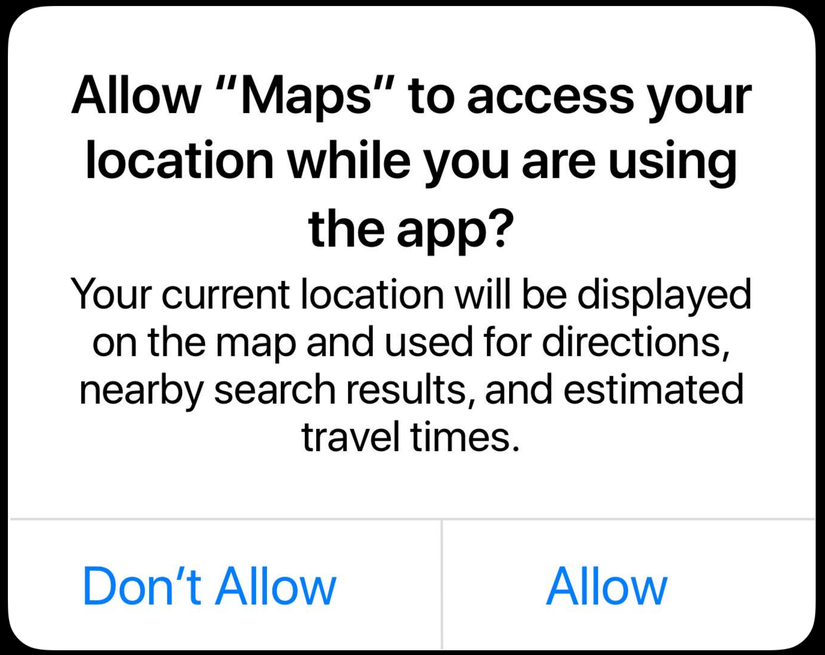
TV Provider

Requesting Access

Only what you need

Only when you need it

Only rely on the API for status

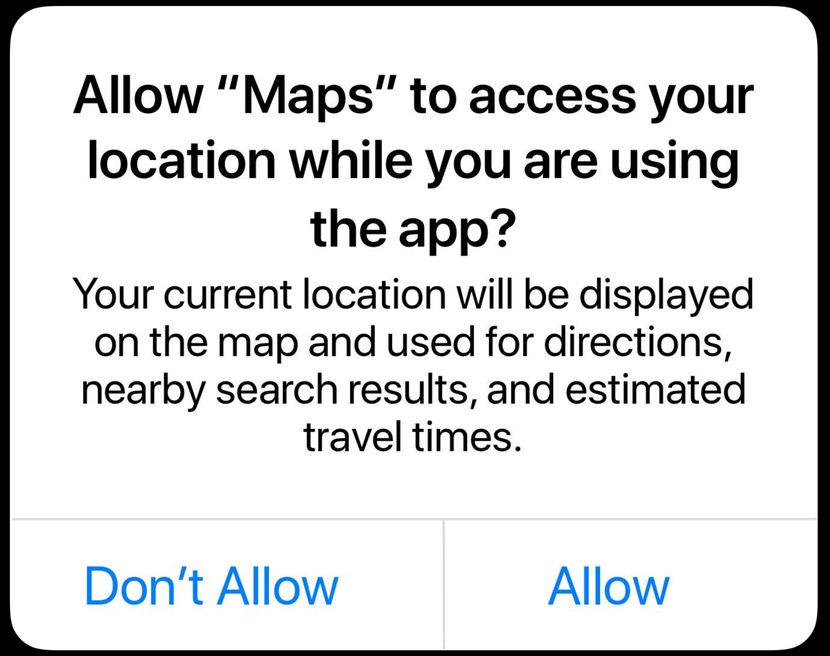


Include Purpose Strings

Required for requesting access

One method for transparency

Explains the reason for a request



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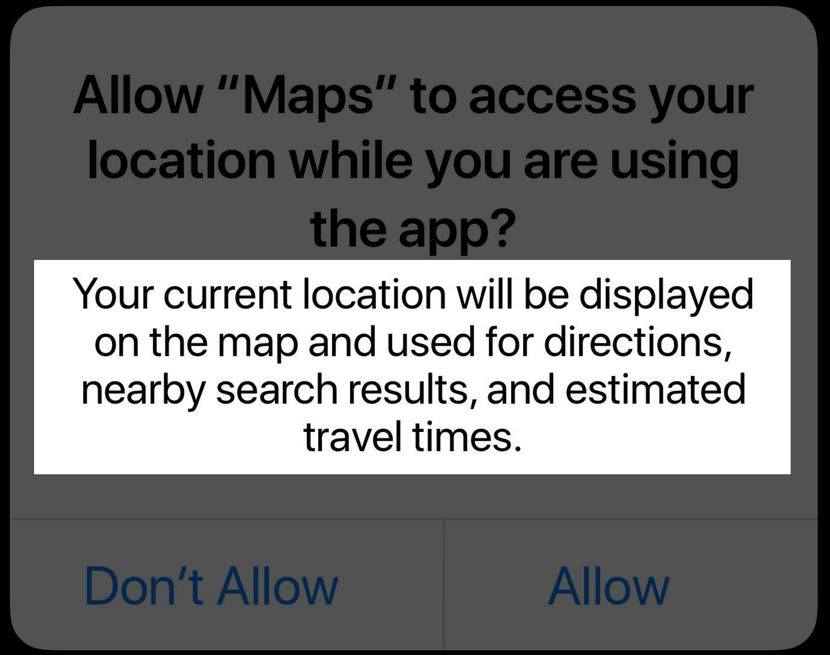


Unhelpful Purpose Strings

“”

“_“

“true“

“NSLocationAlwaysUsageDescription“

“Advertising“

“This app requires location“

“Used to provide you more relevant content“

Helpful Purpose Strings

“Your current location will be displayed on the map and used for directions, nearby search results, and estimated travel times.”

Helpful Purpose Strings

“We’ll use your location to determine what’s available to you and show you live games, events, and news from your area.”

Helpful Purpose Strings

“This app uses your location to show nearby stops and stations, and allows you to plan trips from your current location.”

Managing Access

Apps should not require access to protected resources

Build fallbacks if user declines access

Verify in case user revokes access

Stay aware of third-party SDKs

Provide ongoing transparency

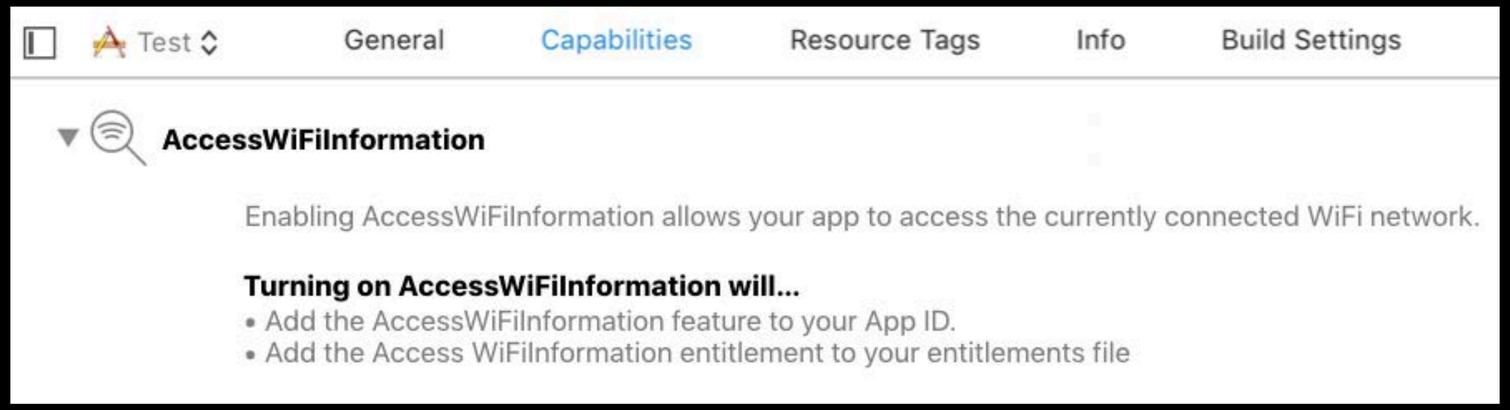
WiFi Network Information

NEW

Now requires AccessWiFiInformation capability

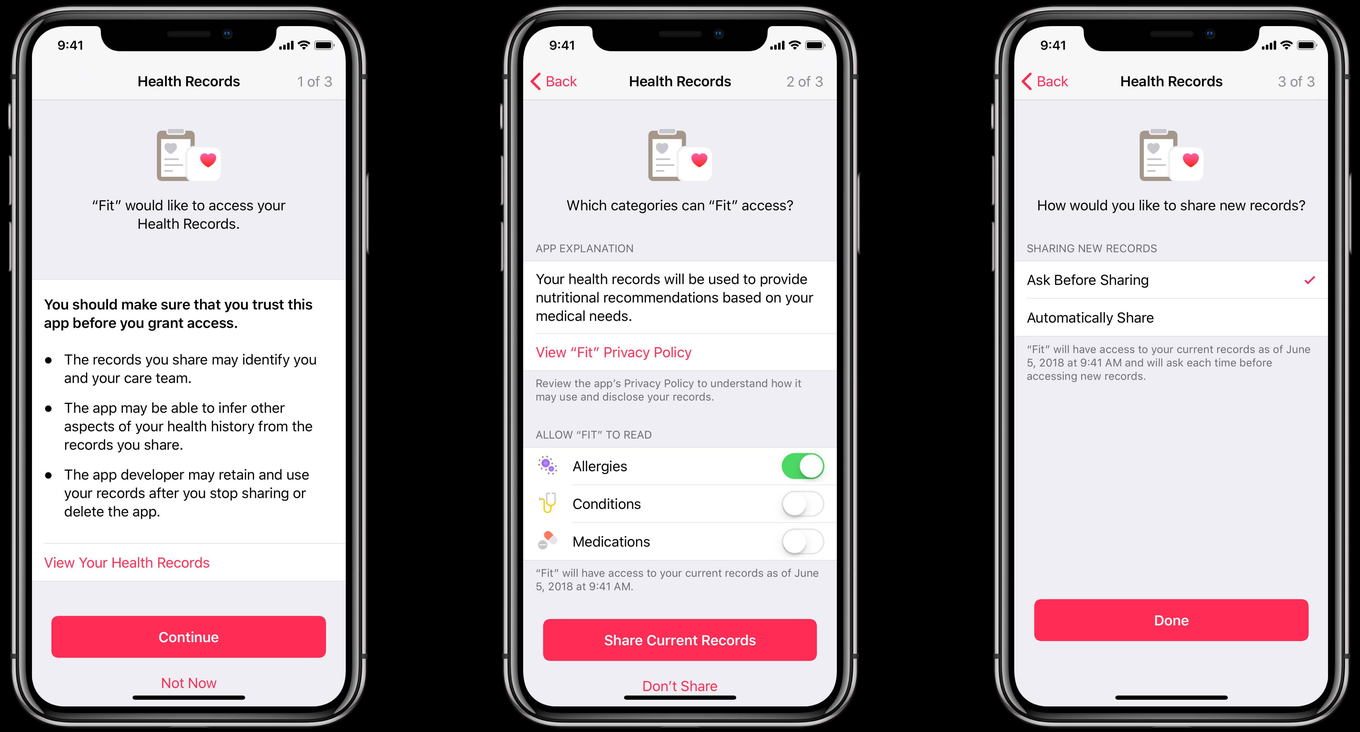
Used to check if an accessory is on the network

Enable only when necessary for your use case



Health Records

NEW



Differential Privacy

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Differential

Send

Accessing Data on macOS

Protected Resources

NEW

Location Services

Contacts

Calendars

Reminders

Photos

Mail

Messages

Safari Browsing History

HTTP Cookies

Call History

iTunes Backups

Time Machine Backups

Camera

Microphone

Automation

Protected Resources

NEW

Access to resources may now trigger a prompt

Prompts apply to any third-party app process

Includes apps outside the App Store

Purpose strings will be required

Accessing Data on the Web

Storage Access API

Engage with logged-in content from embedded third parties

Including from domains classified as trackers

Storage Access API

Storage Access API

1st party cookies

news.example
video.example

Request Storage Access

```
<script>
function makeRequestWithUserGesture() {
  var promise = document.requestStorageAccess();
  promise.then(
    function () {
      // Storage access was granted.
    },
    function () {
      // Storage access was denied.
    }
  );
}
</script>
<button onclick="makeRequestWithUserGesture()">Play video</button>
```

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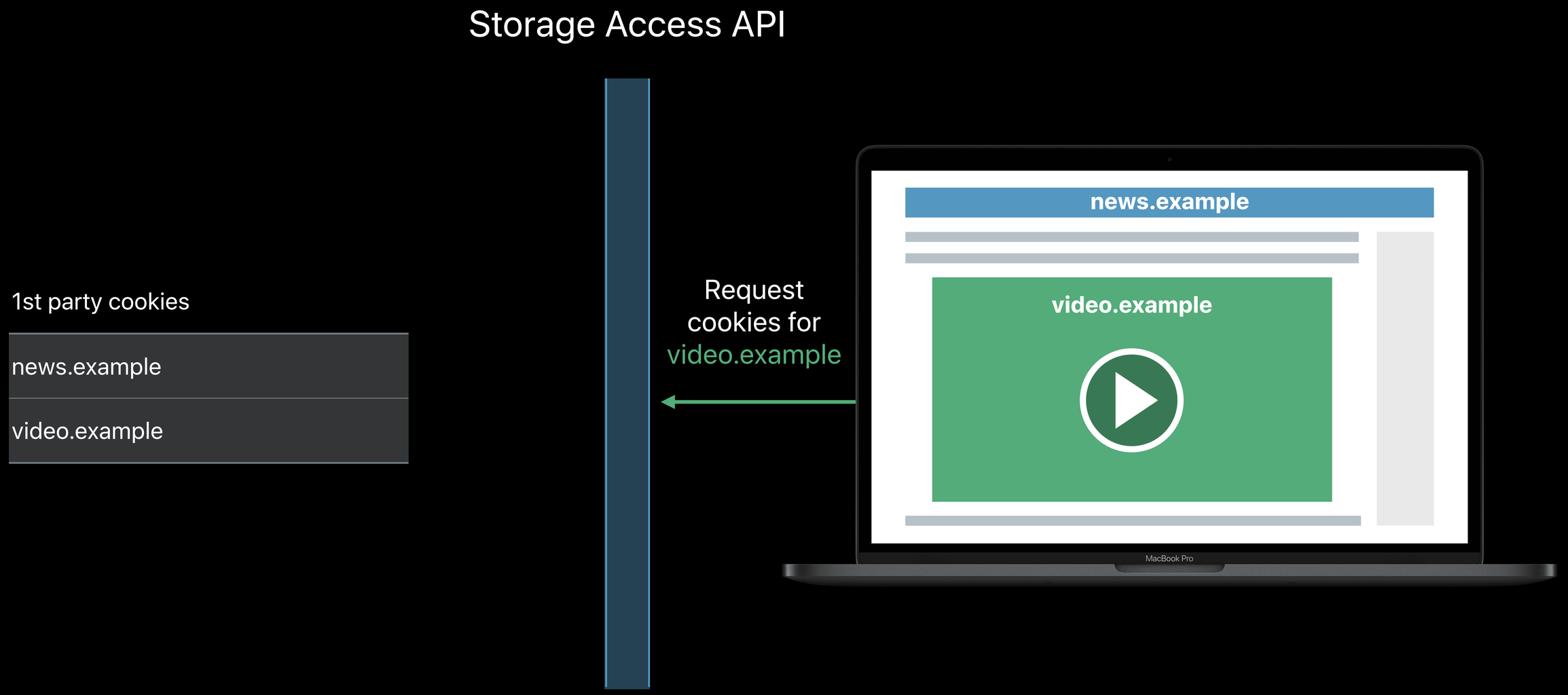
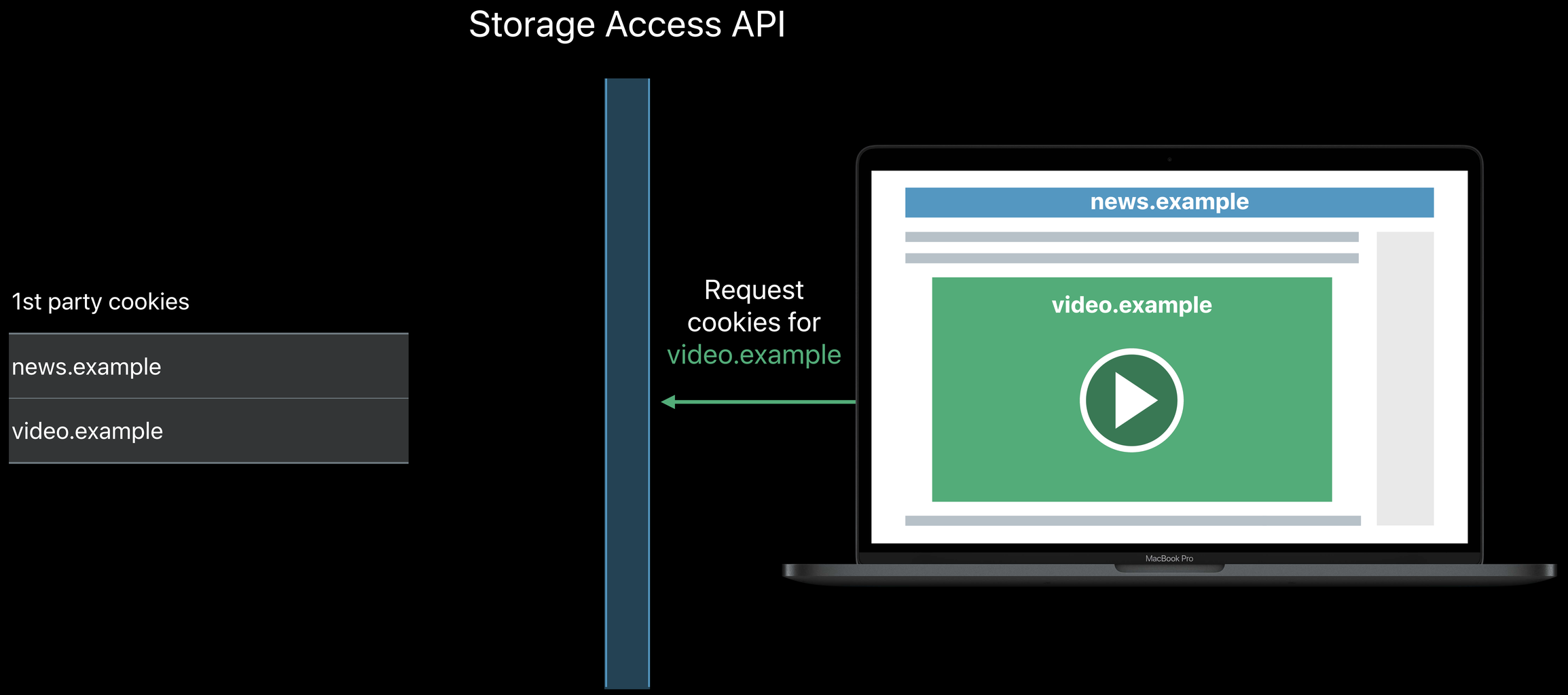
Storage Access API



Storage Access API



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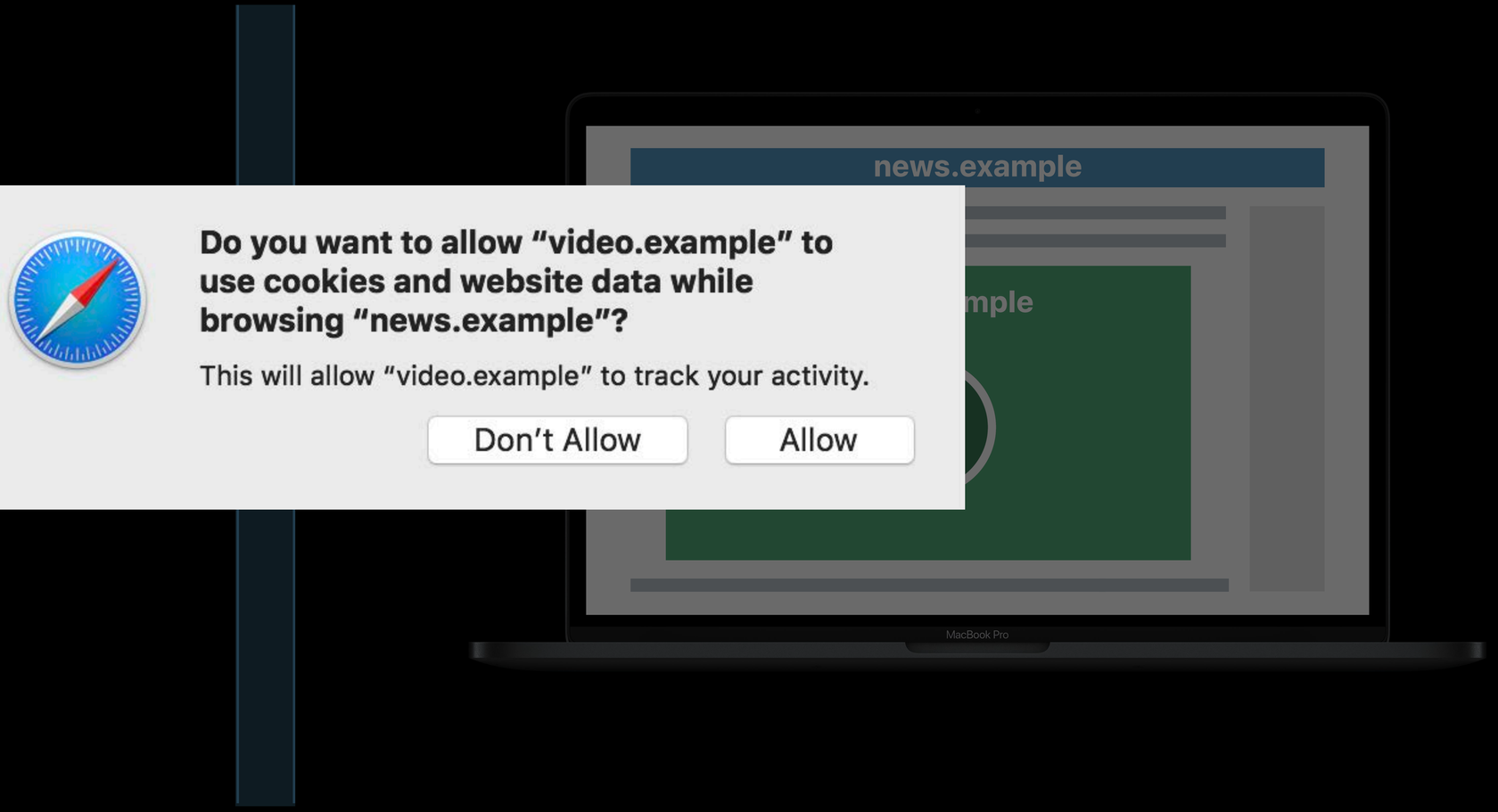

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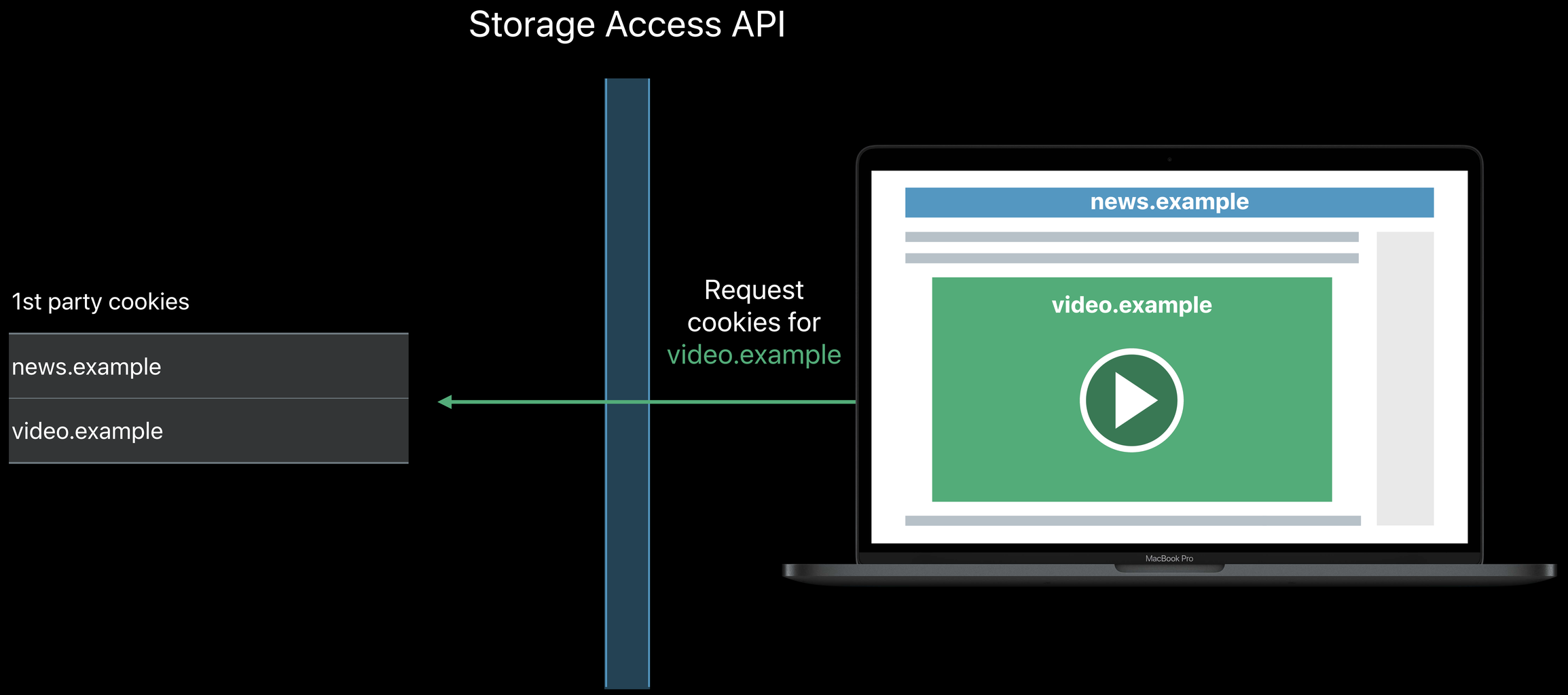
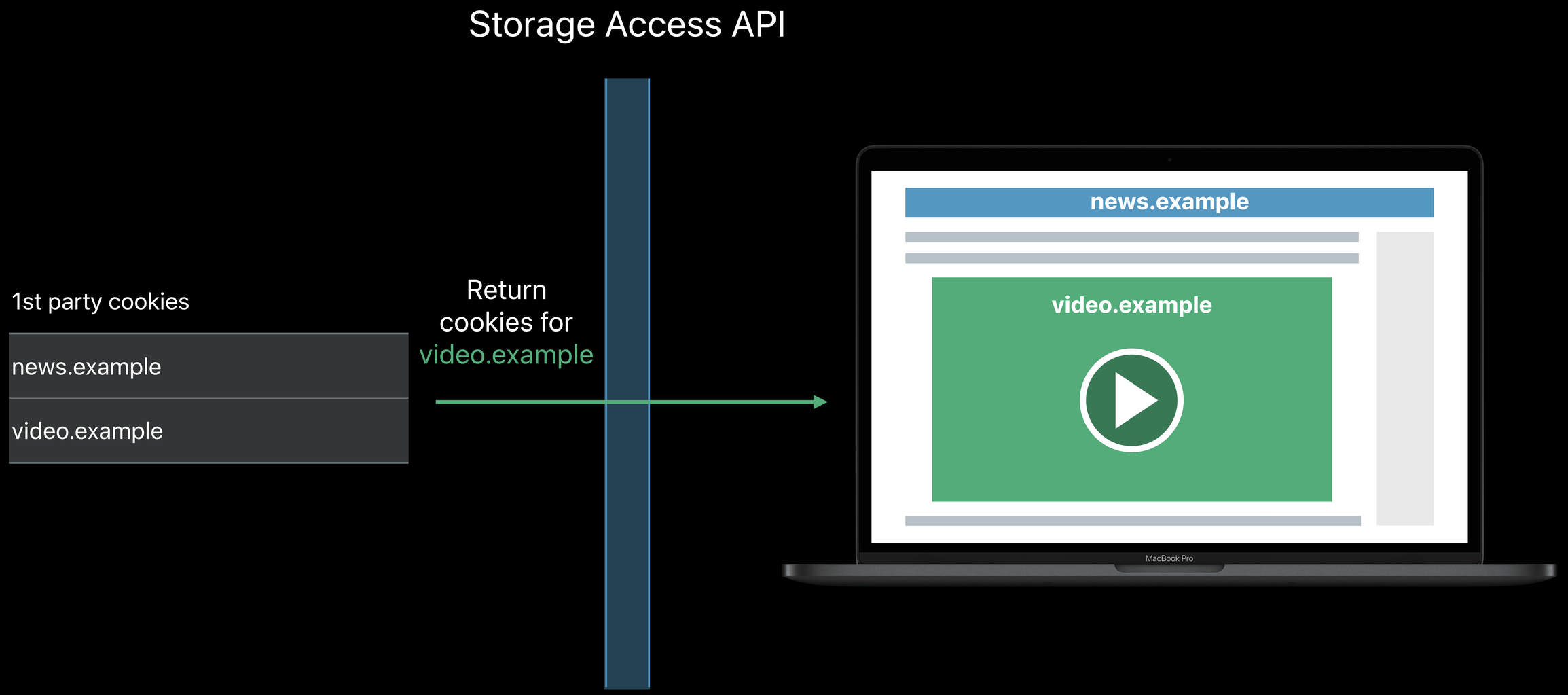


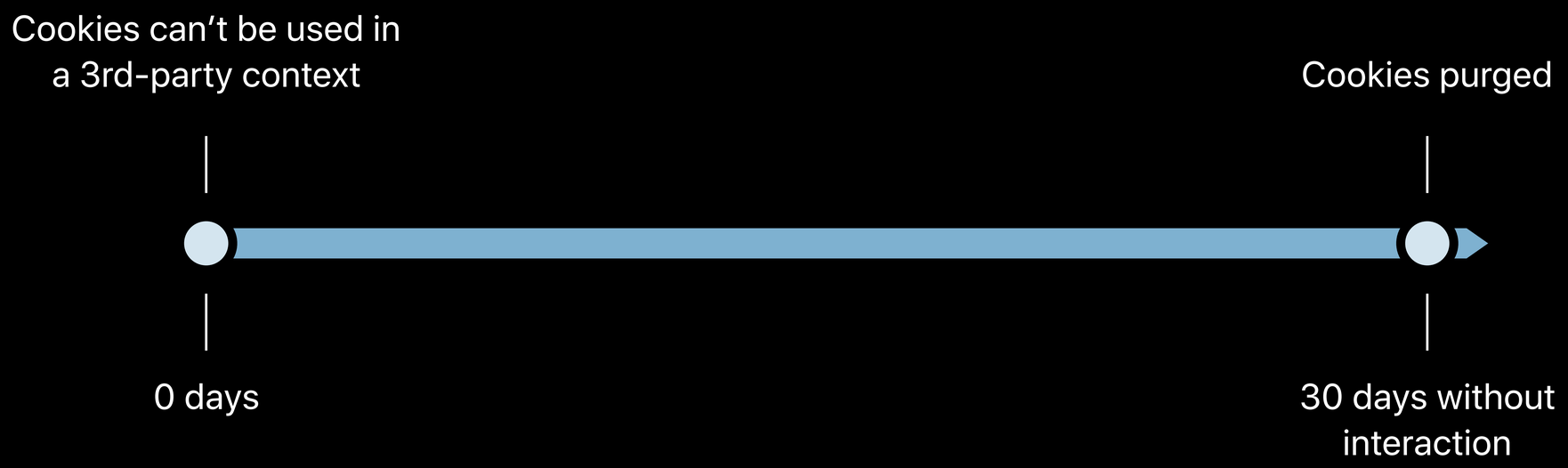
Storage Access API



Intelligent Tracking Prevention 2.0

NEW

Cookies from domains classified as trackers partitioned immediately



Storage Access API

1st Party Context

3rd Party Context

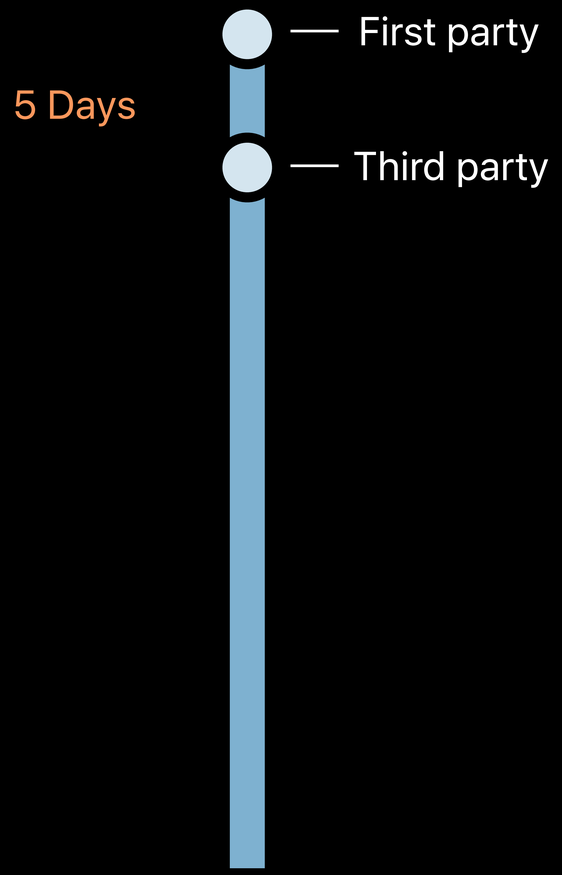
Storage Access API

Days since interaction: 0

— First party

Storage Access API

Days since interaction: 5



Storage Access API

Days since interaction: **10**

Storage Access API

Days since interaction: **25**

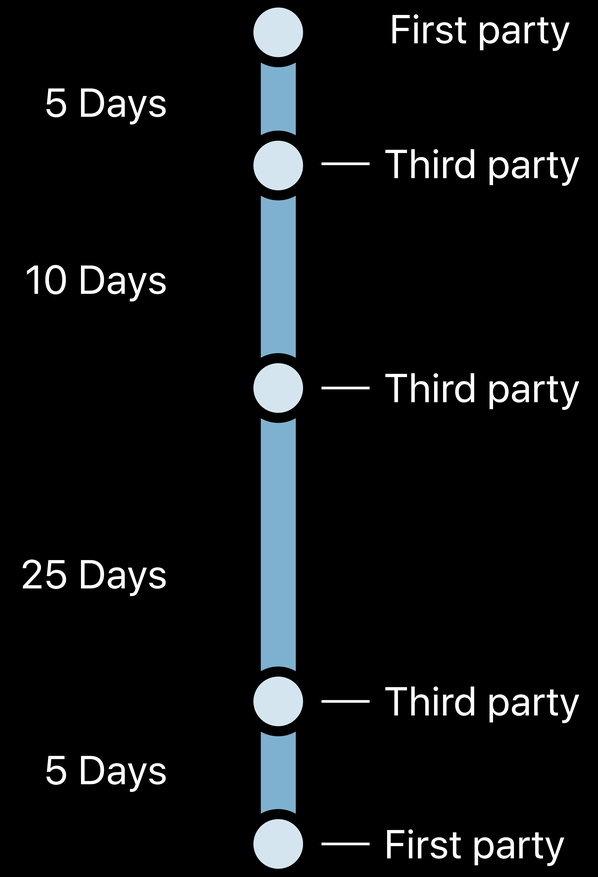
Storage Access API

Days since interaction: **5**

Storage Access API

45 Days

Days since interaction: **5**



Building Privacy in Your App

Accessing User Data

Data Stewardship

Data Stewardship

Deletion

Device Tracking

Third-Party Partners

Machine Learning

Deletion

Clean Up Deleted Data

Recognize data flows going outside your app

Ensure consistency across systems

Update data shared with Operating System

- Siri Shortcuts
- Notifications
- Passwords

Siri Shortcuts

INInteraction

```
delete(with:completion:)

deleteAll(completion:)
```

Notifications

UNUserNotificationCenter

```
removeDeliveredNotifications(withIdentifiers:)

removeAllDeliveredNotifications()
```

Passwords

ASCredentialIdentityStore

```
removeCredentialIdentities(with:completion:)

removeAllCredentialIdentities(_:)
```

Device Tracking

You Might Want to Know...

Did this device already consume a free trial?

Has this device paid for content but not linked that purchase to an account?

Was this device previously used by an abusive user?

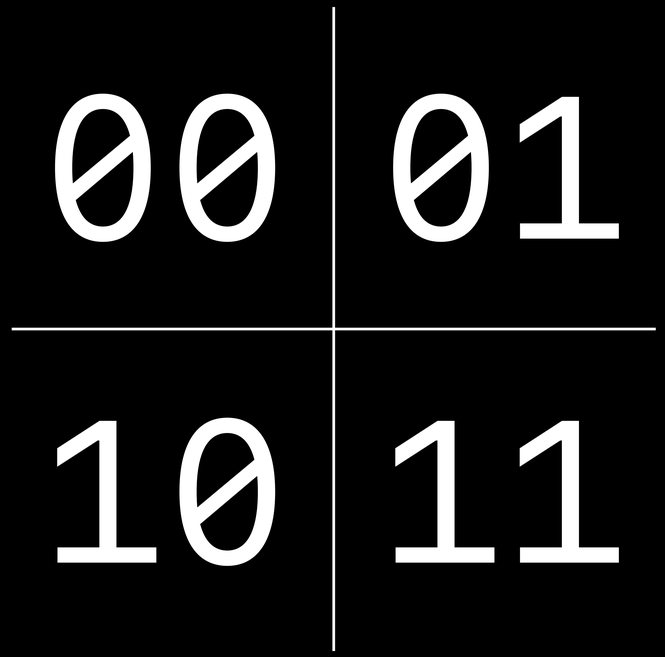
Was this device previously used for fraudulent activities?

DeviceCheck

Set two bits of data per device

Stored by Apple with timestamp

Persist across reset or erase install



DeviceCheck

Do not rely on unsupported device tracking methods

- Continuing to remove entropy (unique device attributes)
- Continuing to remove functionality being abused to uniquely identify users

Third-Party Partners

Third-Party Code

You’re responsible for all code in your app

Understand data access or transfers

Be complete when giving transparency

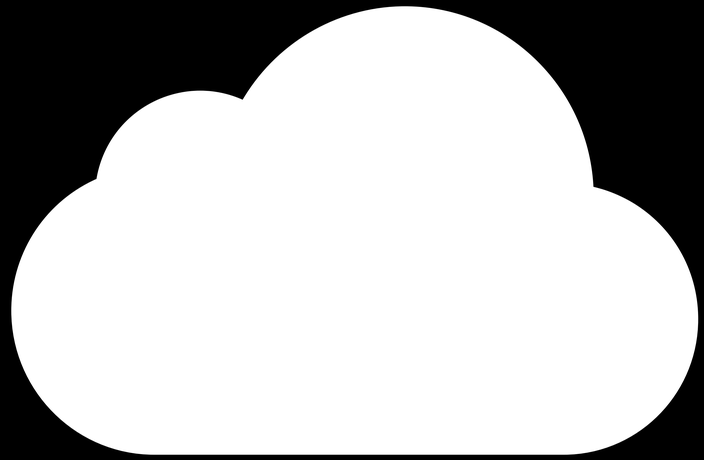
Avoid unnecessary requests for resources

Third-Party Vendors

Data flow to 3rd parties from your servers

Know your partners' data practices

Be transparent about all use cases



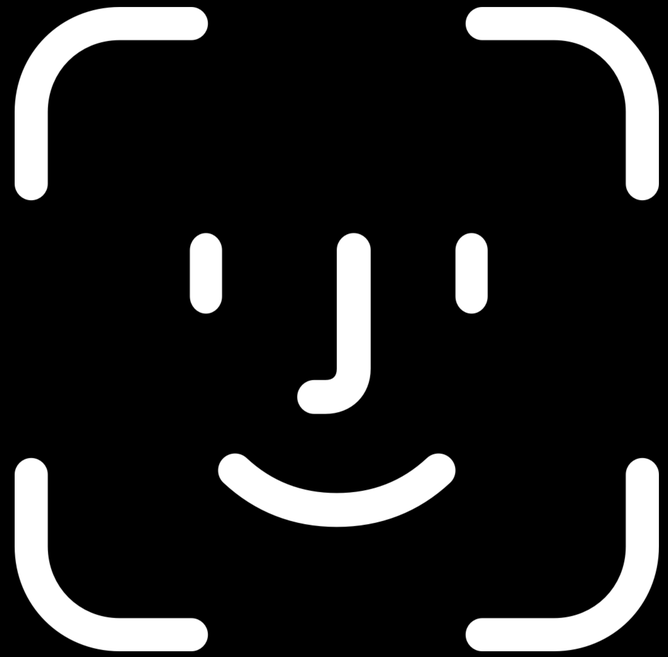
Machine Learning

Face ID

Built with privacy-friendly machine learning

Easy to add Face ID authentication to your app

Use the LocalAuthentication framework



ARKit 2

Uses machine learning to model the environment

Create, persist, and share map of environment

Collect this map only if needed for your feature

Use MultipeerConnectivity API for
end-to-end encryption

Create ML + Core ML

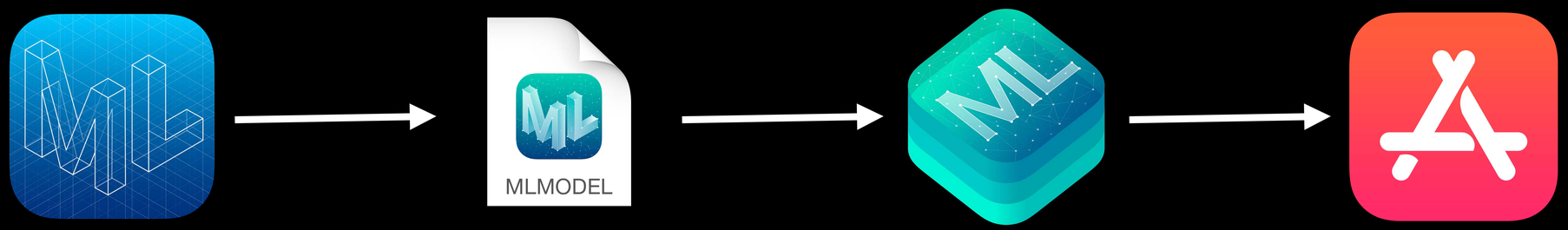
Create ML + Core ML 2.0

Easier than ever to add on-device machine learning to your app

Train models on your Mac

Evaluate models on your user’s device

Avoid collecting sensitive user data



Privacy Questions for ML

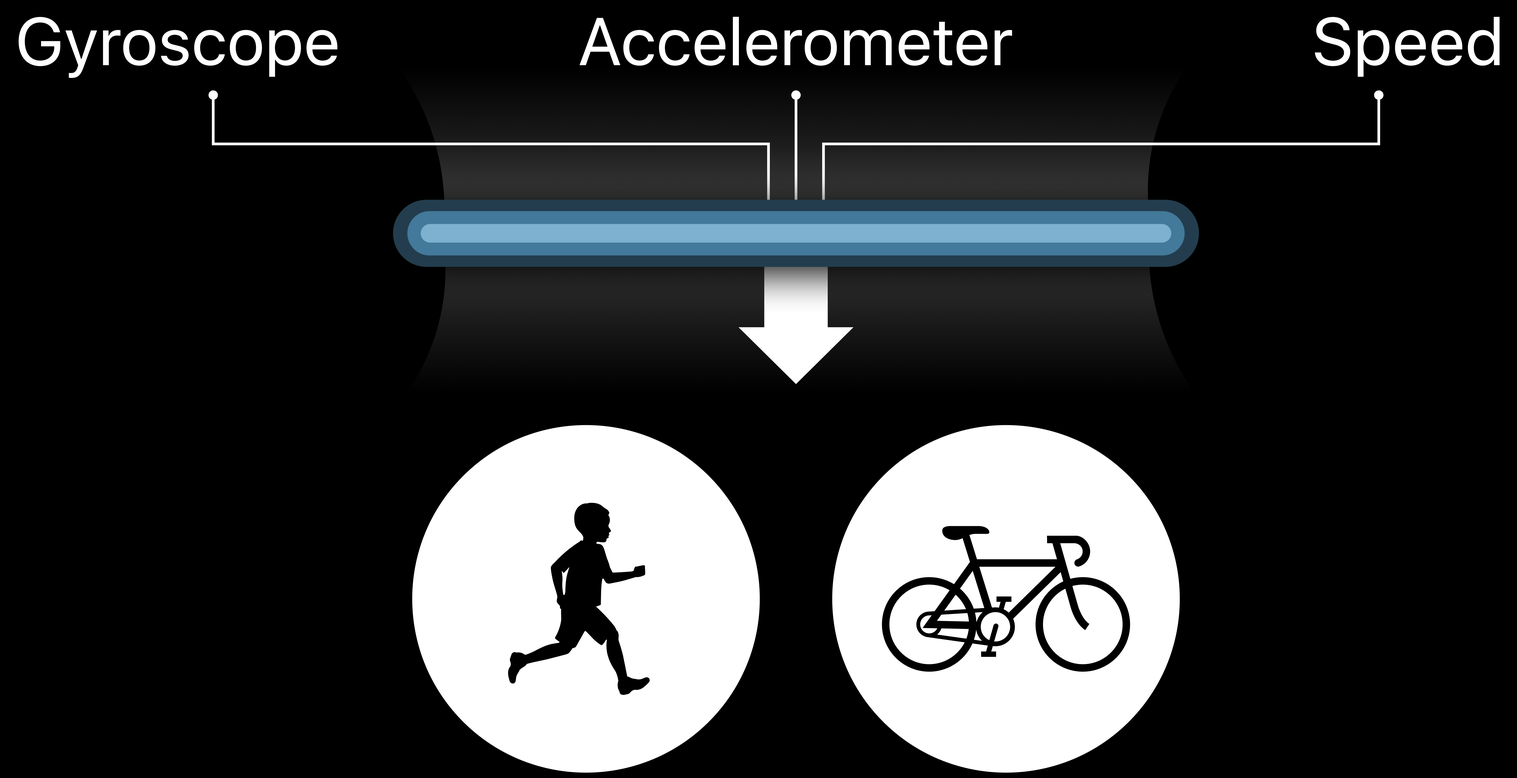
Does my model reveal training data?

Training

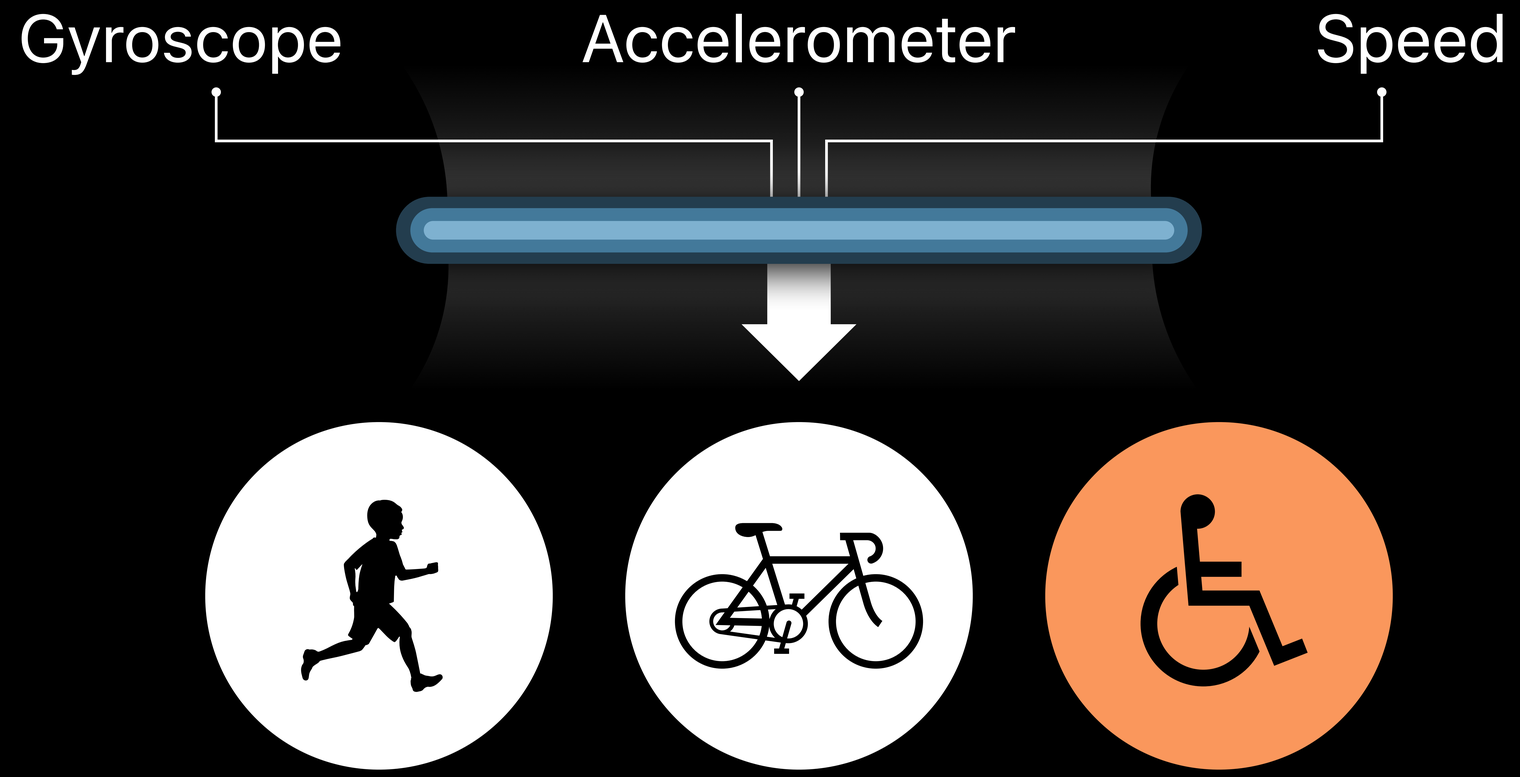
Inversion

Fredrikson et al., Model Inversion Attacks that Exploit Confidence Information and Basic Countermeasures, ACM CCS 2015

Can I infer more about my users than they expected?



Can I infer more about my users than they expected?



Mitigations

Ensure you train on the right data

Keep model complexity proportional to goal

Privacy is about people.

Great features and privacy

Great features and privacy

Summary

Privacy is about people

Ask the “should” questions

Align data practices with use cases

More Information

https://developer.apple.com/wwdc18/718

Understanding ARKit Tracking and Detection	Hall 1	Thursday 5:00PM
Privacy Lab	Technology Lab 1	Thursday 5:00PM
Privacy Lab	Technology Lab 2	Friday 2:00PM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