iOS Configuration and APIs for Kiosk and Assessment Apps

Session 716

Steve Hayman, Consulting Engineer

Locking iPad to a Single App

Demo

The Four Ways to Lock an App

The Four Ways to Lock an App

Feature	Typical Scenario
Guided Access	Parents and teachers focus children on a single app

The Four Ways to Lock an App

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Guided Access	Parents and teachers focus children on a single app
Single App Mode	Consumers interact with a kiosk

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The Four Ways to Lock an App

Feature	Typical Scenario
Guided Access	Parents and teachers focus children on a single app
Single App Mode	Consumers interact with a kiosk
Autonomous Single App Mode	Patients check in with the doctor
Automatic Assessment Configuration	Students take a high-stakes test

Requirements for Locking a Device to an App

Feature	Requires Device Supervision	Release iPad from App	API Support

Requirements for Locking a Device to an App

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Guided Access	No	Passcode or device restart	Not Required

Requirements for Locking a Device to an App

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Single App Mode	Yes	MDM or Apple Configurator 2	Not Required

Requirements for Locking a Device to an App

| Feature	Requires Device Supervision	Release iPad from App	API Support
Guided Access	No	Passcode or device restart	Not Required
Single App Mode	Yes	MDM or Apple Configurator 2	Not Required
Autonomous Single App Mode	Yes and MDM	App releases itself or device restart	Yes

Requirements for Locking a Device to an App

Feature	Requires Device Supervision	Release iPad from App	API Support
Guided Access	No	Passcode or device restart	Not Required
Single App Mode	Yes	MDM or Apple Configurator 2	Not Required
Autonomous Single App Mode	Yes and MDM	App releases itself or device restart	Yes
Automatic Assessment Configuration	No	App releases itself or device restart	Yes + App entitlement required

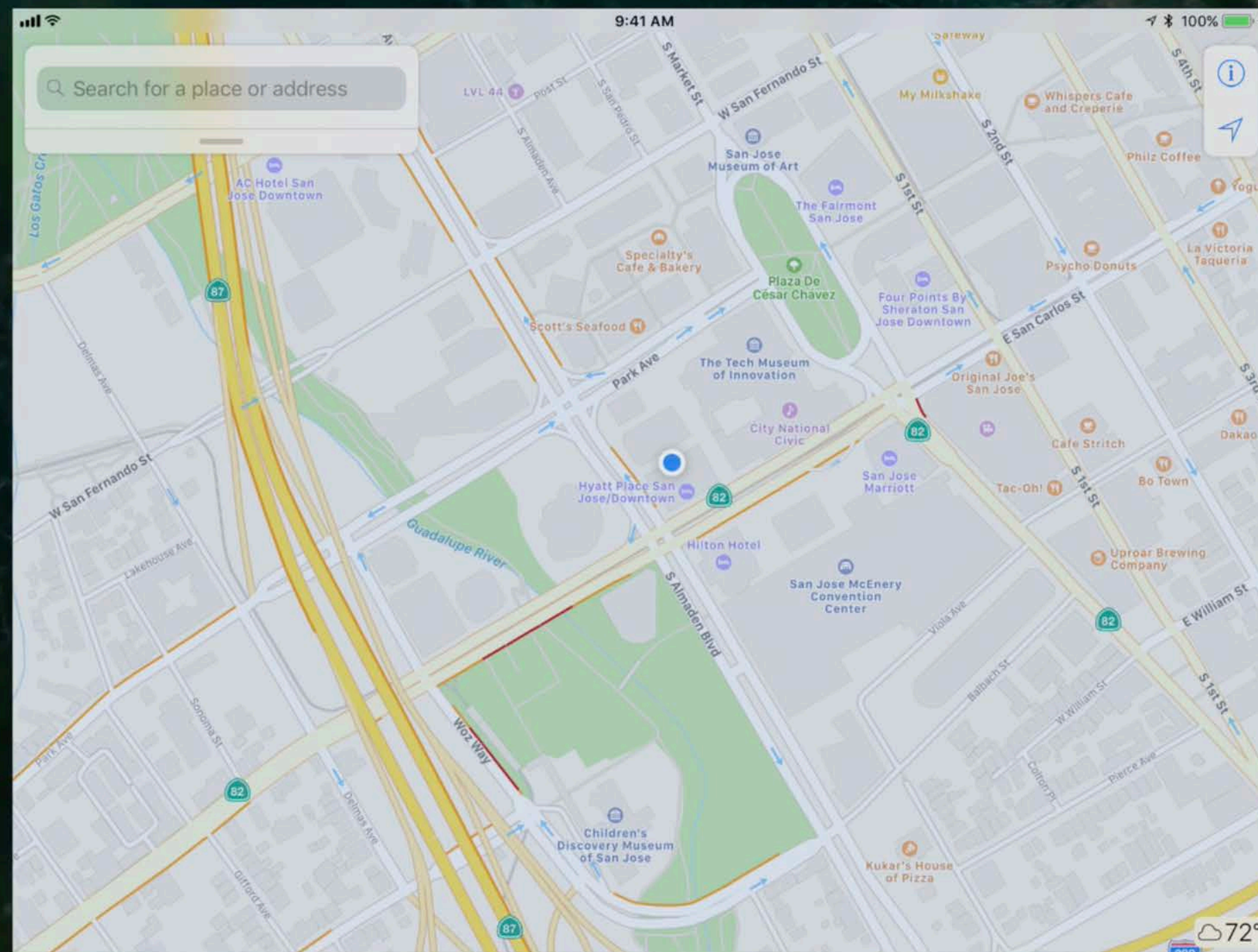# Locking iPad to a Single App

Programmatically
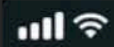
Guided Access

Guided Access
User Considerations

- ✓ Any application
- ✓ Any device
- ✓ Timer Feature
- ✓ Setup by anyone
- ✓ Restart releases app lock

Guided Access
User Considerations

- ✅ Any application
- ✅ Any device
- ✅ Timer Feature
- ✅ Setup by anyone
- ✅ Restart releases app lock

- ⚠️ Must touch the device
- ⚠️ Lock requires a passcode

Single App Mode

A quick look at single app mode

Virtual Tour of New York

Welcome to NYC

Statue of Liberty

Ellis Island   This Month in NYC

Empire State Building

Grand Central Terminal   What's on Broadway

Brooklyn Bridge

Times Square   Tours

example.school.edu

Settings for iPad Pro 9.7
2 Payloads Configured - Updated 05/04/17 at 12:20 PM

macOS and iOS

Passcode
Not Configured

VPN
Not Configured

Fonts
Not Configured

AirPlay
Not Configured

iOS and tvOS

Global HTTP Proxy
Not Configured

App Configuration
Not Configured

iOS

Restrictions
Not Configured

Single App Mode
1 Payload configured

Content Filter
Not Configured

Domains
Not Configured

Lock To App
The app to run in Single App Mode (supervised only)

Kiosk App

Options
Settings enforced when in Single App Mode

☑ Touch
☑ Motion
☑ Volume Buttons
☑ Side Switch
☑ Sleep/Wake Button
☑ Auto-Lock
☐ VoiceOver
☐ Zoom
☐ Invert Colors
☐ AssistiveTouch
☐ Speak Selection
☐ Mono Audio

Allow the user to change these settings when in Single App Mode

☐ VoiceOver
☐ Zoom
☐ Invert Colors
☐ AssistiveTouch

Cancel　　OK

MacBook Pro

Lock To App

The app to run in Single App Mode (supervised only)

Kiosk App ⇕

Options

Settings enforced when in Single App Mode

☑ Touch

☑ Motion

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☐ Mono Audio

Single App Mode
User Considerations

✓ Can lock 1000s of iOS Devices

✓ Device stays locked after restart

✓ Can force accessibility options

Single App Mode
User Considerations

✅ Can lock 1000s of iOS Devices

✅ Device stays locked after restart

✅ Can force accessibility options

⚠️ Requires Device Supervision

⚠️ Requires MDM or Apple Configurator 2

⚠️ IT intervention to lock or unlock

⚠️ Developers can't control this

Can an App Control Exactly When App Lock Happens?

Dr. Steve Hayman's Dashboard

Upcoming Appointments

Elizabeth Abeles
Gneral Visit

Philip Allen
Followup

Lamont Andrews
New Patient

Savannah Cashman
Annual Visit

Jordon Alvarez
General Visit

Abigail Fisher
New Patient

Michelle Auger
New Patient

Andrew Boddiford
Followup

Rachel Barry
General Visit

Averi Chong
Annual Visit

Lamont Andrews

Photo Here

Sex:

Birth Date:

Chart ID:

Begin Onboarding

Payment

Co-Pay

Billing Status

Messages

834750345
Lab results available for Xavier Galloway

Philip Allen
Insurance Claim Approved

740455212
Lab results submitted for Avery Bishop

Patient Check In

First Name

Last Name

Telephone No.

Insurance

Reason for Visit

Please List Any Known Allergies

Check In

Patient Check In

First Name

Lamont

Last Name

Andrews

Telephone No.

408-555-1212

Insurance

Example

Reason for Visit

WWDC brain overload

Please List Any Known Allergies

Shellfish, peanuts, gluten, broccoli

Check In

Dr. Steve Hayman's Dashboard

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Elizabeth Abeles
Gneral Visit

Philip Allen
Followup

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New Patient

Savannah Cashman
Annual Visit

Jordon Alvarez
General Visit

Abigail Fisher
New Patient

Michelle Auger
New Patient

Andrew Boddiford
Followup

Rachel Barry
General Visit

Averi Chong
Annual Visit

Lamont Andrews

Sex: Male

Birth Date: 03/15/1977

Chart ID: KASS000335

Begin Onboarding

Payment	Co-Pay	Billing Status

Messages

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Lab results available for Xavier Galloway

Philip Allen
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Sex: Male

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Begin Onboarding

Payment

Co-Pay

Billing Status

Messages

834750345
Lab results available for Xavier Galloway

Philip Allen
Insurance Claim Approved

740455212
Lab results submitted for Avery Bishop

Have We Got a Function for You

UIAccessibilityRequestGuidedAccessSession()

```
UIAccessibilityRequestGuidedAccessSession()

UIAccessibilityIsGuidedAccessEnabled()
```

```
UIAccessibilityRequestGuidedAccessSession()

UIAccessibilityIsGuidedAccessEnabled()

UIAccessibilityGuidedAccessStatusDidChangeNotification
```

UIAccessibilityRequestGuidedAccessSession()

UIAccessibilityIsGuidedAccessEnabled()

UIAccessibilityGuidedAccessStatusDidChangeNotification

At Last, Some Code

UIAccessibilityRequestGuidedAccessSession

```
UIAccessibilityRequestGuidedAccessSession(true)
```

```
UIAccessibilityRequestGuidedAccessSession(true) {

}
```

```
UIAccessibilityRequestGuidedAccessSession(true) {
    requestSucceeded in

}
```

```
UIAccessibilityRequestGuidedAccessSession(true) {
    requestSucceeded in
    if requestSucceeded {
        // the device is now locked


    }
}
```

```
startPatientCheckin()
```

```
UIAccessibilityRequestGuidedAccessSession(true) {
    requestSucceeded in
    if requestSucceeded {
        startPatientCheckin()


    }
}
```

```
finishPatientCheckin()
```

```
UIAccessibilityRequestGuidedAccessSession(false) {
    requestSucceeded in
    if requestSucceeded {
        finishPatientCheckin()

    }
}
```

```
if UIAccessibilityIsGuidedAccessEnabled() {
        print("App Lock is On")

}
```

```swift
// Register for a notification
// whenever guided access state changes.
NotificationCenter.default.addObserver(
  forName: .UIAccessibilityGuidedAccessStatusDidChange,
   object: nil,
    queue: OperationQueue.main) { _ in

      let status = UIAccessibilityIsGuidedAccessEnabled()
      // App Lock status has changed.
      print("Notification: App Lock Status is now
            \(status ? "On" : "Off")")

}
```

Autonomous Single App Mode
(ASAM)

ASAM Requirements

Your app must call `UIAccessibilityRequestGuidedAccessSession()`

Devices must be supervised

App must be whitelisted with MDM

Settings for iPad Pro 9.7
3 Payloads Configured - Updated 05/22/17 at 1:55 PM

Certificates
Not Configured

SCEP
Not Configured

macOS and iOS

Passcode
Not Configured

VPN
Not Configured

Fonts
Not Configured

AirPlay
Not Configured

iOS and tvOS

Global HTTP Proxy
Not Configured

App Configuration
1 Payload configured

iOS

Restrictions
1 Payload configured

Single App Mode
Not Configured

Content Filter
Not Configured

Domains

Functionality | Apps | Media Content

☑ **Allow use of iTunes Store**
☑ **Allow use of News (supervised only)**
☑ **Allow use of Podcasts (supervised only)**
☑ **Allow use of Game Center (supervised only)**
　☑ **Allow multiplayer gaming**
　☑ **Allow adding Game Center friends**
☑ **Allow use of Safari**
　☑ **Enable AutoFill**
　☐ **Force fraud warning**
　☑ **Enable JavaScript**
　☐ **Block pop-ups**
　Block Cookies
　　Always Allow ⇕

Autonomous Single App Mode (supervised only)
Allow these apps to enter Single App Mode

On-boarding App

＋ ー

Restrict App Usage (supervised only)
Allow All Apps ⇕

Cancel | OK

MacBook Pro

☑ **Allow adding Game Center friends**

☑ Allow use of Safari

☑ **Enable AutoFill**

☐ **Force fraud warning**

☑ **Enable JavaScript**

☐ **Block pop-ups**

Block Cookies

| Always Allow | ⇕ |

Autonomous Single App Mode (supervised only)

Allow these apps to enter Single App Mode

On-boarding App

| + | − |

Restrict App Usage (supervised only)

| Allow All Apps | ⇕ |

```xml
<key>autonomousSingleAppModePermittedAppIDs</key>
 <array>
     <string>com.example.on-boarding</string>
```

Autonomous Single App Mode
User Considerations

- ✓ Apps can lock and unlock themselves

- ✓ Developer controls when app is locked

- ✓ Can prevent accidental exit of app

- ✓ Useful for customer on-boarding

Autonomous Single App Mode
User Considerations

✅ Apps can lock and unlock themselves

✅ Developer controls when app is locked

✅ Can prevent accidental exit of app

✅ Useful for customer on-boarding

⚠️ Requires device supervision

⚠️ Requires MDM

⚠️ IT must specifically whitelist the app

Locking iPads for Assessment

Securing iPad for an Assessment App

Guided Access?

Single App Mode?

Autonomous single
app mode with MDM?

Securing iPad for an Assessment App

Automatic Assessment Configuration

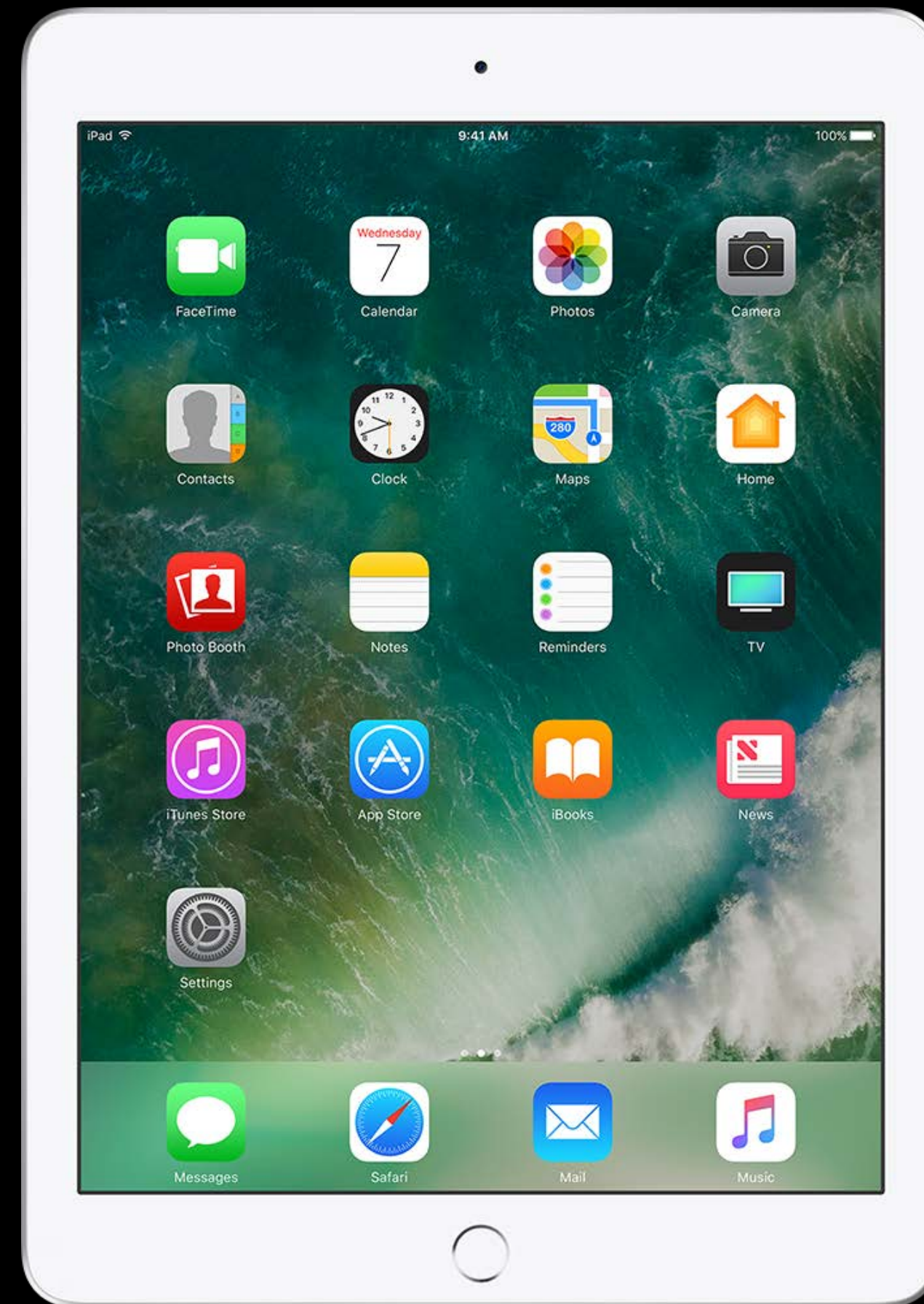# Assessment Challenges

Secure Test Environment

Locks into single dedicated testing app

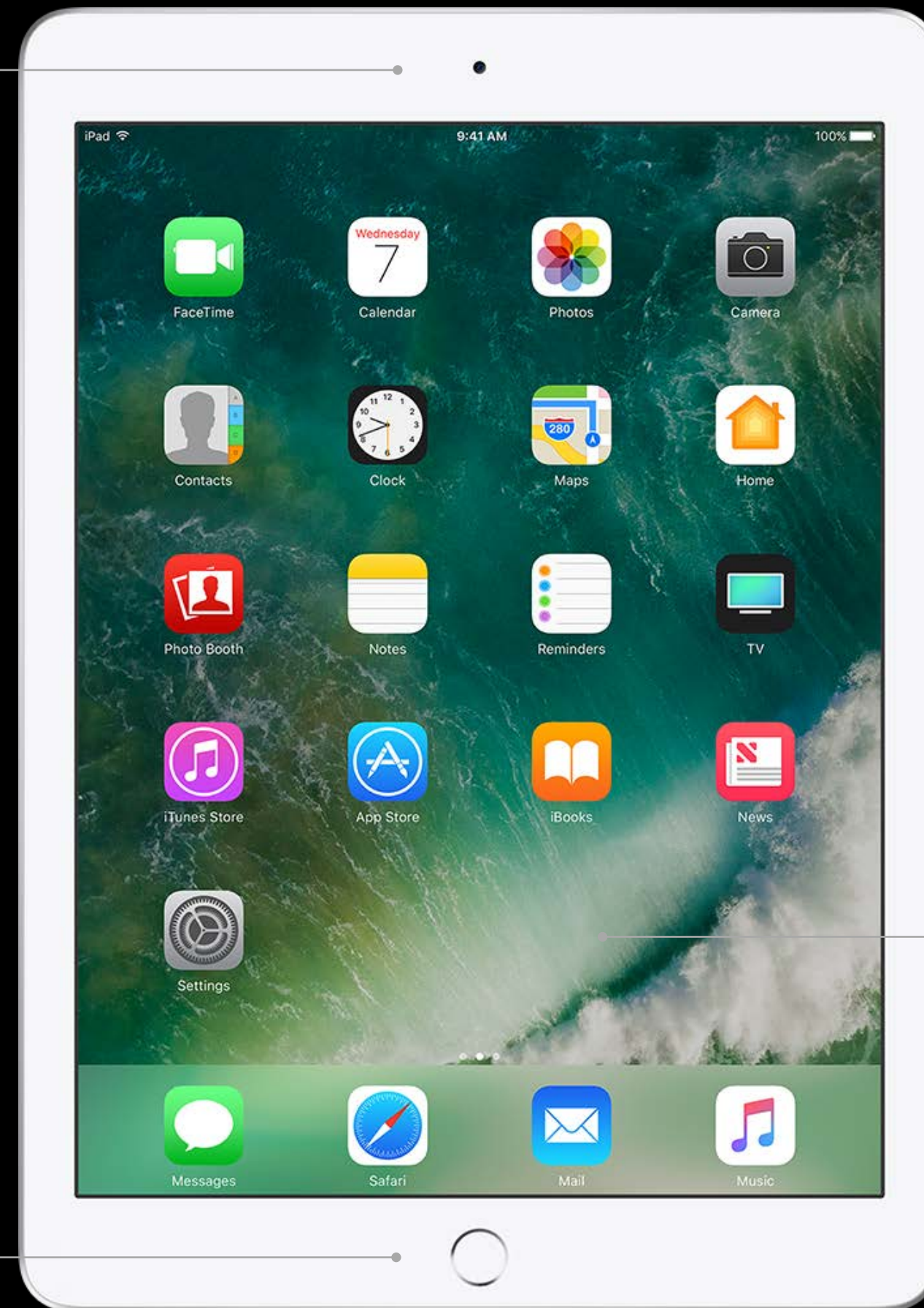Prevents access to outside resources

Prevents sharing of content
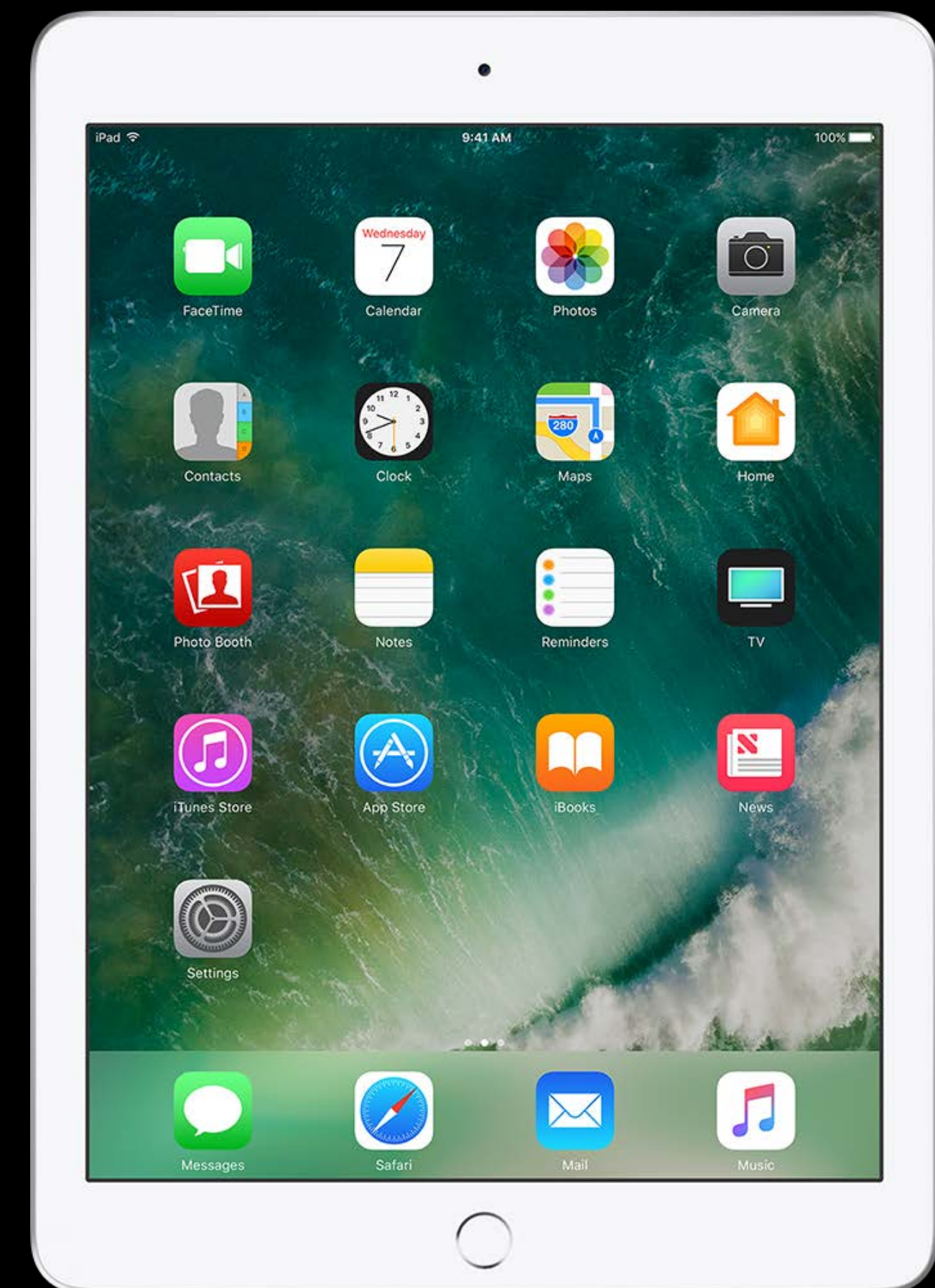
Securing iPad for Assessments

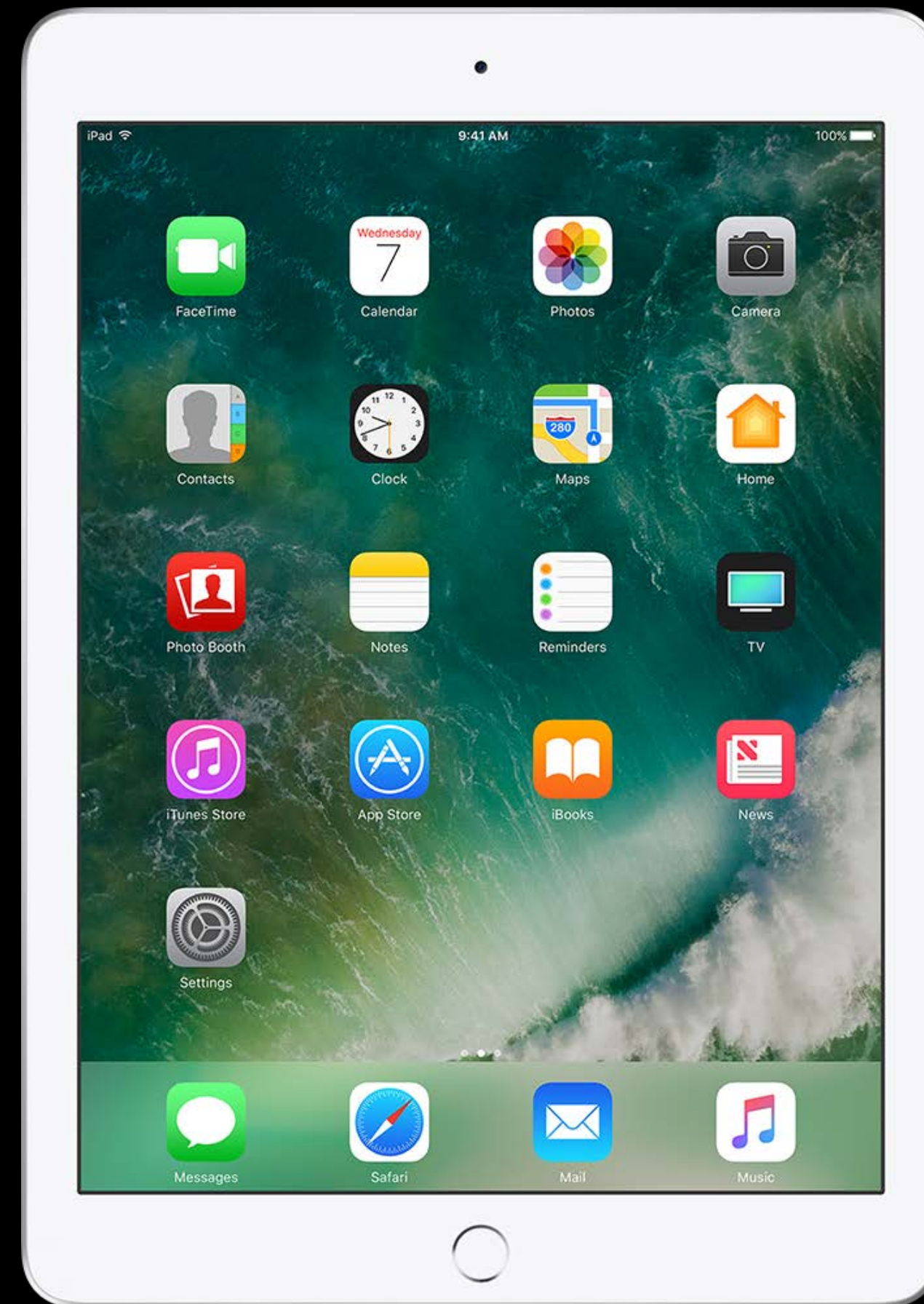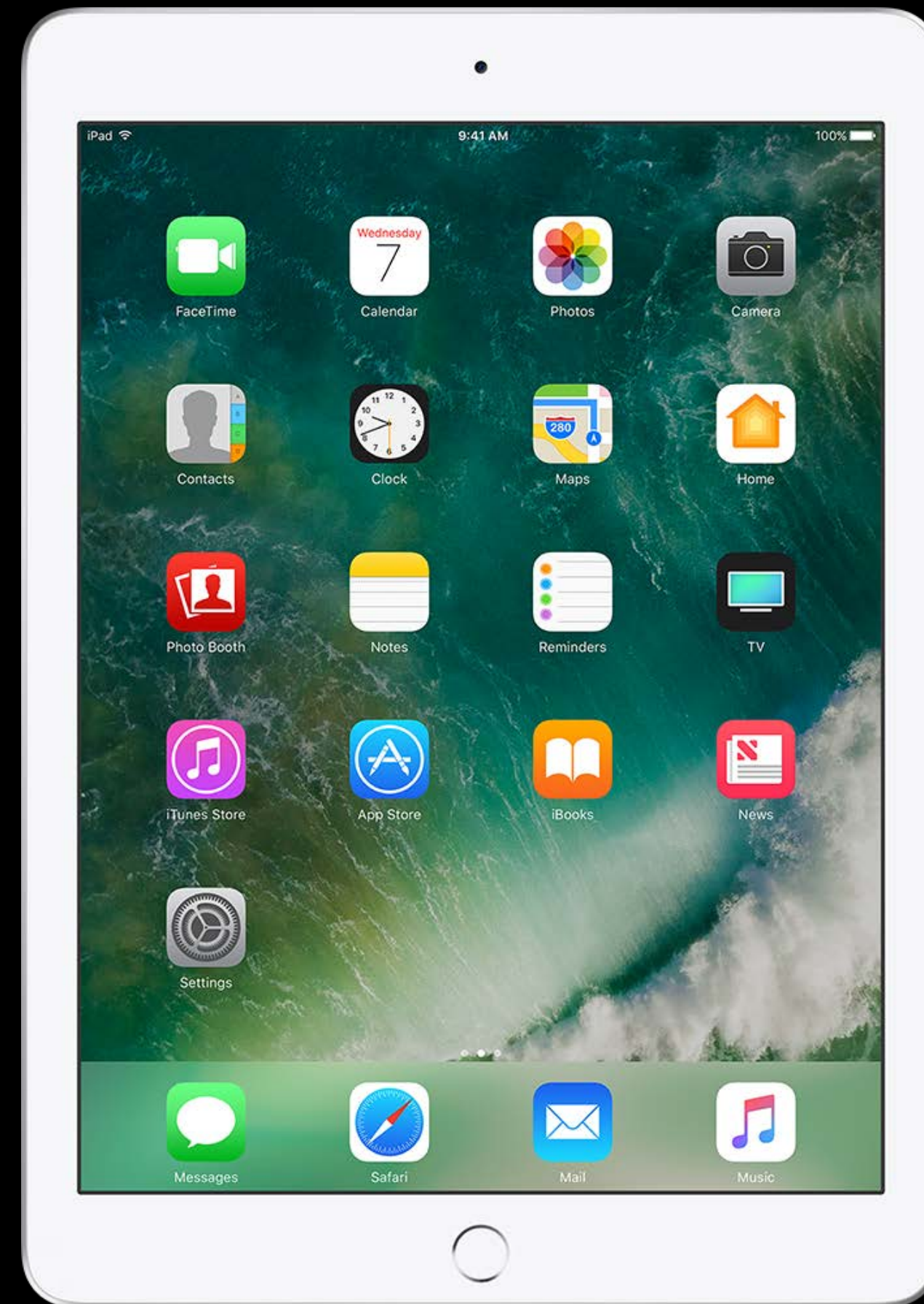# Securing iPad for Assessments

Camera

App and Lookup Functions

Home Button

Securing iPad for Assessments

Securing iPad for Assessments

Autocorrect/Spellcheck

Predictive Keyboard

Dictionary / Definition Lookup

Keyboard Shortcuts

Sharing

Universal Clipboard

Dictation

Siri

Automatic Assessment Configuration

Automatic Assessment Configuration

Ideal for assessment apps

Automatic Assessment Configuration

Ideal for assessment apps

Lock the device, like Autonomous Single App Mode
- `UIAccessibilityRequestGuidedAccessSession()`

Automatic Assessment Configuration
Ideal for assessment apps

Lock the device, like Autonomous Single App Mode
- `UIAccessibilityRequestGuidedAccessSession()`

Automatically disabled
- Auto correct
- Spell Check
- Define
- Predictive Keyboard
- Keyboard shortcuts
- Sharing

- Universal Clipboard
- Background apps
- Dictation
- Siri
- Classroom Observation

Automatic Assessment Configuration
Requirements

Entitlement com.apple.developer.edu-assessment-mode

• Managed or unmanaged iOS devices

• No need for app whitelisting

Once It's Locked, How Does It Unlock?

If the user allows locking

- iOS is locked to this app, until one of these happens
  - The app unlocks via `UIAccessibilityRequestGuidedAccessSession(false)`
  - The user restarts the device
  - Eight hours have elapsed

Enable App Lock	Disable App Lock

Try typing here. Test auto correct and lookup.

(Disabled) Notification: App Lock Status is now Off

App Lock is Disabled

Enable App Lock	Disable App Lock

Try typing here. Test auto correct and lookup.

(Disabled) Notification: App Lock Status is now Off

Confirm App Self-Lock

ASAMple wants to start Single App Mode. You will be unable to use other apps on iPad until ASAMple ends Single App Mode. Do you want to allow this?

No	Yes

Your iPad is now locked to ASAMple.
Your iPad will be unlocked when ASAMple ends Single App Mode, or after 8 hours.

Enable App Lock	Disable App Lock

Try typing here. Test auto correct and lookup.

(Enabled) Enable App Lock request - Succeeded
(Enabled) Notification: App Lock Status is now On
(Disabled) Notification: App Lock Status is now Off

App Lock is Enabled

Enable App Lock	Disable App Lock

Try typing here. Test auto correct and lookup.

(Enabled) Enable App Lock request - Succeeded
(Enabled) Notification: App Lock Status is now On
(Disabled) Notification: App Lock Status is now Off

Enable App Lock   Disable App Lock

Try typing here. Test auto correct and lookup.

(Disabled) Disable App Lock request - Succeeded
(Disabled) Notification: App Lock Status is now Off
(Enabled) Enable App Lock request - Succeeded
(Enabled) Notification: App Lock Status is now On
(Disabled) Notification: App Lock Status is now Off

Automatic Assessment Configuration

User Considerations

✓ Apps can lock and unlock themselves

✓ Inappropriate features automatically disabled

✓ Developer controls when app is locked

✓ No device supervision is required

✓ No MDM requirement

Automatic Assessment Configuration
User Considerations

✅ Apps can lock and unlock themselves

✅ Inappropriate features automatically disabled

✅ Developer controls when app is locked

✅ No device supervision is required

✅ No MDM requirement

⚠️ Requires special app entitlement

⚠️ Entitlement only useful for assessment developers

Implementing AAC

Implementing Automatic Assessment Configuration

Apply for the com.apple.developer.edu-assessment-mode entitlement

• It is granted only to assessment developers

Create a provisioning profile with this entitlement

Build your app with this profile

Requesting Code-level Support

Submit a [Technical Support Incident (TSI)](#) if you cannot fix a bug in your app, have trouble implementing an Apple technology, or have other questions about your code. Your incident will be assigned to an Apple support engineer who can help troubleshoot your code or provide workarounds to fast-track your development.

Name   John Appleseed

Email   jappleseed@apple.com

Organization   Select team ⌄

Platform   Select platform ⌄

Do you need additional entitlements?

To include extended entitlements in this provisioning profile, select an option in the menu below. If you want to use only standard entitlements in this profile without adding extended entitlements, select default.

Entitlements: EDU Assessment Mode (Dev) ⇕

Extended Entitlements	
com.apple.developer.edu-assessment-mode	true

Cancel | Back | Continue

MacBook Pro

Do you need additional entitlements?

To include extended entitlements in this provisioning profile, select an option in the menu below. If you want to use only standard entitlements in this profile without adding extended entitlements, select default.

Entitlements: EDU Assessment Mode (Dev) ⇕

Extended Entitlements	
com.apple.developer.edu-assessment-mode	true

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Entitlements: EDU Assessment Mode (Dev) ⬍

Extended Entitlements	
com.apple.developer.edu-assessment-mode	true

Certificates

- All
- Pending
- Development
- Production
- APNs Auth Key

Identifiers

- App IDs
- Pass Type IDs
- Website Push IDs
- iCloud Containers
- App Groups

Devices

- All
- Apple TV
- Apple Watch
- iPad
- iPhone
- iPod Touch

Provisioning Profiles

- All
- Development
- Distribution

77 profiles total.

Name	Type	Status
ASAMple – Development	iOS Development	● Active
ASAMple – Distribution	iOS UniversalDistribution	● Active

MacBook Pro

77 profiles total.

Name	Type	Status
ASAMple – Development	iOS Development	● Active
ASAMple – Distribution	iOS UniversalDistribution	● Active

ASAMple

General   Capabilities   Resource Tags   Info   Build Settings   Build Phases   Build Rules

PROJECT
ASAMple

TARGETS
ASAMple

▼ Identity

Display Name   ASAMple
Bundle Identifier   com.example.WWDC17.ASAMple
Version   1.0
Build   1

▼ Signing

☐ Automatically manage signing
Xcode will create and update profiles, app IDs, and certificates.

▼ Signing (Debug)

Provisioning Profile   WWDC17 ASAMple
Team   Apple Inc. - Enterprise SE
Signing Certificate   iPhone Developer: John Appleseed

▼ Signing (Release)

Provisioning Profile   WWDC17 ASAMple
Team   Apple Inc. - Enterprise SE
Signing Certificate   iPhone Developer: John Appleseed

▼ Deployment Info

Deployment Target   9.3
Devices   Universal
Main Interface   Main
Device Orientation ☑ Portrait
                    ☐ Upside Down
                    ☑ Landscape Left

WWDC17 ASAMple
Created May 25, 2017 (Expires in 11 months)

App ID: com.example.WWDC17.ASAMple
Matches bundle ID "com.example.WWDC17.ASAMple"

Certificates: 26 Included
Includes newest signing certificate "iPhone Developer: Steve Hayman (BR9V3LJTAJ)".

Capabilities: 3 Included
Includes Game Center, In-App Purchase, and Keychain Sharing.

Entitlements: 5 Included
Includes get-task-allow, com.apple.developer.edu-assessment-mode,

MacBook Pro

ASAMple

General Capabilities Resource Tags Info Build Settings Build Phases Build Rules

PROJECT
  ASAMple
TARGETS
  ASAMple

▼ Identity

Display Name ASAMple
Bundle Identifier com.example.WWDC17.ASAMple
Version 1.0
Build 1

▼ Signing

☐ Automatically manage signing
Xcode will create and update profiles, app IDs, and certificates.

▼ Signing (Debug)

Provisioning Profile WWDC17 ASAMple
Team Apple Inc. - Enterprise SE
Signing Certificate iPhone Developer: John Appleseed

▼ Signing (Release)

Provisioning Profile WWDC17 ASAMple
Team Apple Inc. - Enterprise SE
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▼ Deployment Info

Deployment Target 9.3
Devices Universal
Main Interface Main
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WWDC17 ASAMple
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⊘ App ID: com.example.WWDC17.ASAMple
Matches bundle ID "com.example.WWDC17.ASAMple"

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Includes Game Center, In-App Purchase, and Keychain Sharing.

⊘ Entitlements: 5 Included
Includes get-task-allow, com.apple.developer.edu-assessment-mode,

MacBook Pro

Bundle Identifier | com.example.WWDC17.ASAMple

Version | 1.0

Build | 1

WWDC17 ASAMple
Created May 25, 2017 (Expires in 11 months)

ning

☐ Automatically manage signing
Xcode will create and update profiles, app IDs, and certificates.

⊘ App ID: com.example.WWDC17.ASAMple
Matches bundle ID "com.example.WWDC17.ASAMple"

ning (Debug)

Provisioning Profile | WWDC17 ASAMple

Team Apple Inc. - Enterprise SE

Signing Certificate iPhone Developer: John Appleseed

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ning (Release)

Provisioning Profile | WWDC17 ASAMple

Team Apple Inc. - Enterprise SE

Signing Certificate iPhone Developer: John Appleseed

Entitlements: 5 Included
Includes get-task-allow, com.apple.developer.edu-assessment-mode,

⊘

loyment Info

Deployment Target | 9.3

When to Call These Functions

Call `UIAccessibilityRequestGuidedAccessSession(true)` when ready to enter the secure part of your test

Call `UIAccessibilityRequestGuidedAccessSession(false)` when ready to relinquish the lock

• Check the result to see if it worked!

Demo

AAC Additional Considerations

When Can an App Lock Request Fail?

```
UIAccessibilityRequestGuidedAccessSession(true) { didSucceed in
```

When Can an App Lock Request Fail?

```
UIAccessibilityRequestGuidedAccessSession(true) { didSucceed in
```

For Autonomous Single App Mode

• The device isn't supervised

• Your app's Bundle Identifier hasn't been white-listed via MDM

When Can an App Lock Request Fail?

```
UIAccessibilityRequestGuidedAccessSession(true) { didSucceed in
```

For Autonomous Single App Mode

• The device isn't supervised

• Your app's Bundle Identifier hasn't been white-listed via MDM

For Automatic Assessment Configuration

• Your app doesn't have the com.apple.developer.edu-assessment-mode entitlement

When Can an App Lock Request Fail?

```
UIAccessibilityRequestGuidedAccessSession(true) { didSucceed in
```

For Autonomous Single App Mode

• The device isn't supervised

• Your app's Bundle Identifier hasn't been white-listed via MDM

For Automatic Assessment Configuration

• Your app doesn't have the com.apple.developer.edu-assessment-mode entitlement

Or—

• It's already locked

Ensuring Automatic Assessment Configuration Setup

Ensuring Automatic Assessment Configuration Setup

AAC restrictions are only there if your app successfully requested App Lock

Ensuring Automatic Assessment Configuration Setup

AAC restrictions are only there if your app successfully requested App Lock

Before enabling App Lock, check if it's already on
• If it's already on, do not proceed with the test

```swift
// On startup.  Check at least 2 seconds after app launch.

DispatchQueue.main.asyncAfter(deadline: .now() + 2.0) {
    if UIAccessibilityIsGuidedAccessEnabled() {
        // Guided Access or SAM is enabled.
        // Test should not proceed
        // until this is fixed.
        print("Test should not proceed.")
    }
}
```

```swift
// Start the test, provided we aren't already locked

guard UIAccessibilityIsGuidedAccessEnabled() == false else {
    print("Unable to start test. Device already locked.")
    return
}


// Attempt to lock, and proceed if it worked.
UIAccessibilityRequestGuidedAccessSession(true)  { didSucceed in
    if didSucceed {
        // successfully locked
        beginStandardizedTest()
    } else {
        print("Unable to lock.")
    }
}
```

Clearing the Pasteboard on Entry and Exit

```
UIPasteboard.general.items = []
```

Disabling Third Party Keyboards

iOS Allows third-party keyboards via App Extensions

They are not blocked by Automatic Assessment Configuration

Submit

What is the capital of Canada?

q w e r t y u i o p ⌫

a s d f g h j k l return

⇧ z x c v b n m ! ? ⇧

.?123 🌐   .?123 ⌨

Submit

What is the capital of Canada?

Submit

What is the capital of Canada?

🔍 capital of canada ⊗

Ottawa

Canada / Capital

SHARE ⬈

Ottawa, Ontario, Canada

Capital of Canada

Ottawa is Canada's capit...

SHARE

ABC 🔍 🖼 GIF ⌫

```swift
// App Delegate

func application(_ application: UIApplication,
    shouldAllowExtensionPointIdentifier extensionPointIdentifier:
      UIApplicationExtensionPointIdentifier) -> Bool {

    // Disallow custom keyboard extensions
    if extensionPointIdentifier == .keyboard {
        return false
    }


    // Currently, the keyboard extension is the only one that can
    // be disallowed, but we will disallow all other types too
    return false

}
```

ASAM vs. AAC

ASAM (Device Supervision + MDM)   AAC (Any Device + App Entitlement)

ASAM (Device Supervision + MDM)		AAC (Any Device + App Entitlement)	
App Locked	✓	App Locked	✓

ASAM (Device Supervision + MDM)		AAC (Any Device + App Entitlement)	
App Locked	✓	App Locked	✓
		Autocorrect and Spellcheck	✗
	✗	Predictive Keyboard	✗
	✗	Definition and Lookup	✗
	✗	Sharing and Universal Clipboard	✗
	✗	Siri and Dictation	✗
	✗	Classroom Observation	✗
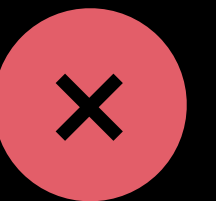
The Four Ways to Lock an App

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Automatic Assessment Configuration	Taking a test	Yes + Special Entitlement	Any device

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