What's New in Security

Session 706

Lucia Ballard Secure Transports Engineering Manager
Simon Cooper Trusted Execution Engineering Manager

What's New in Security?

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Network Security

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Network Security

Cryptography APIs

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Network Security

Cryptography APIs

Platform Security on macOS

What’s New in Network Security

Lucia Ballard Secure Transports Engineering Manager

Secure Communications

Secure Communications

HTTPS is the new HTTP

- Confidentiality
- Data integrity

Secure Communications

HTTPS is the new HTTP

- Confidentiality
- Data integrity

Not all HTTPS is created equal

App Transport Security

Current standards

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For NSURLSession and NSURLConnection APIs

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- TLS v1.2

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- Strong crypto—AES-128 and SHA-2

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- Forward secrecy—ECDHE

App Transport Security

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For NSURLSession and NSURLConnection APIs

- TLS v1.2
- Strong crypto—AES-128 and SHA-2
- Forward secrecy—ECDHE

Exceptions—global or for particular domains

App Transport Security Enforcement

App Transport Security Enforcement

Enforced at the end of 2016

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Reasonable justification required for most exceptions

- NSAllowsArbitraryLoads
- NSExceptionAllowsInsecureHTTPLoads
- NSExceptionMinimumTLSVersion

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Example—Communicating with a specific third-party server

App Transport Security Enforcement

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- NSExceptionMinimumTLSVersion

Example—Communicating with a specific third-party server

App Transport Security Enforcement

App Transport Security Enforcement

New exceptions to make it easier

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- Streaming media using AVFoundation

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- Streaming media using AVFoundation
- Web content using WKWebView

App Transport Security Enforcement

New exceptions to make it easier

- Streaming media using AVFoundation
- Web content using WKWebView

```
NSAppTransportSecurity : Dictionary {
   NSAllowsArbitraryLoads : Boolean
   NSAllowsArbitraryLoadsInWebContent : Boolean
}
```

Evolving Standards

Deprecation of older algorithms

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RC4 disabled by default

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SSLv3 disabled in SecureTransport

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Other algorithms showing their age

- SHA-1
- 3DES

Evolving Standards

Deprecation of older algorithms

RC4 disabled by default

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Other algorithms showing their age

- SHA-1
- 3DES

Now is the time to upgrade your servers

Certificates

Certificates

Strong TLS is not enough

Certificates

Strong TLS is not enough

Certificate ensures that you're talking to the right server

Certificates Today

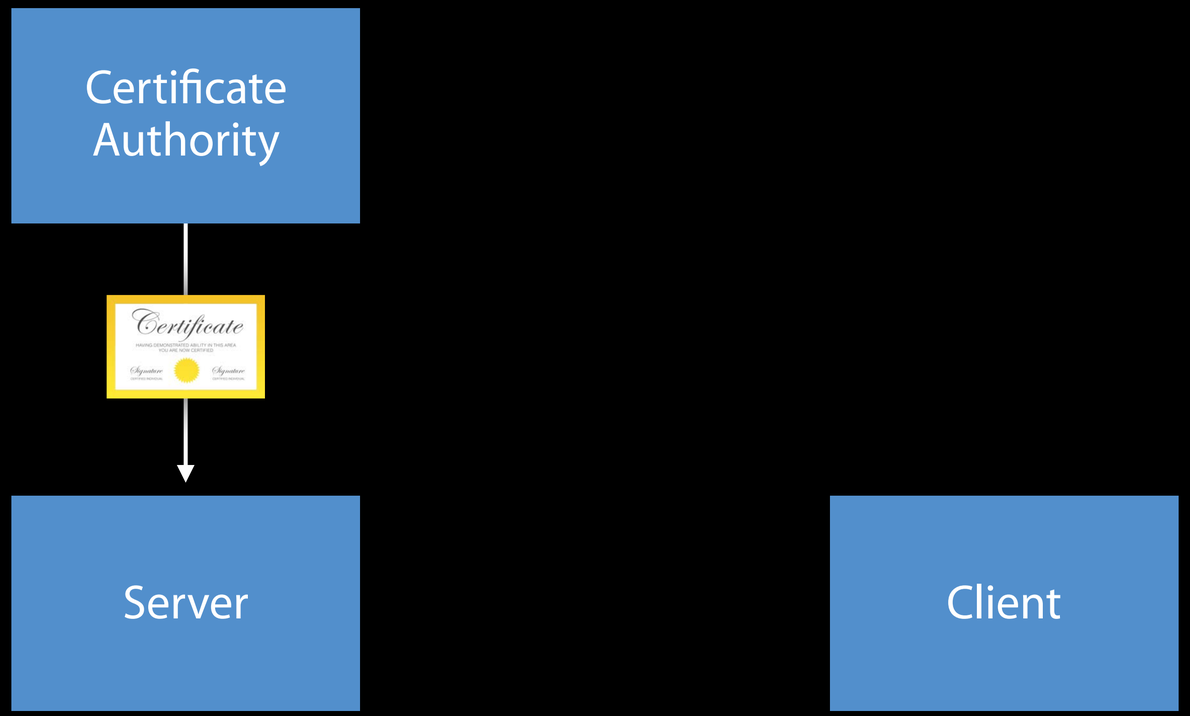
Certificates Today

Certificate Authority

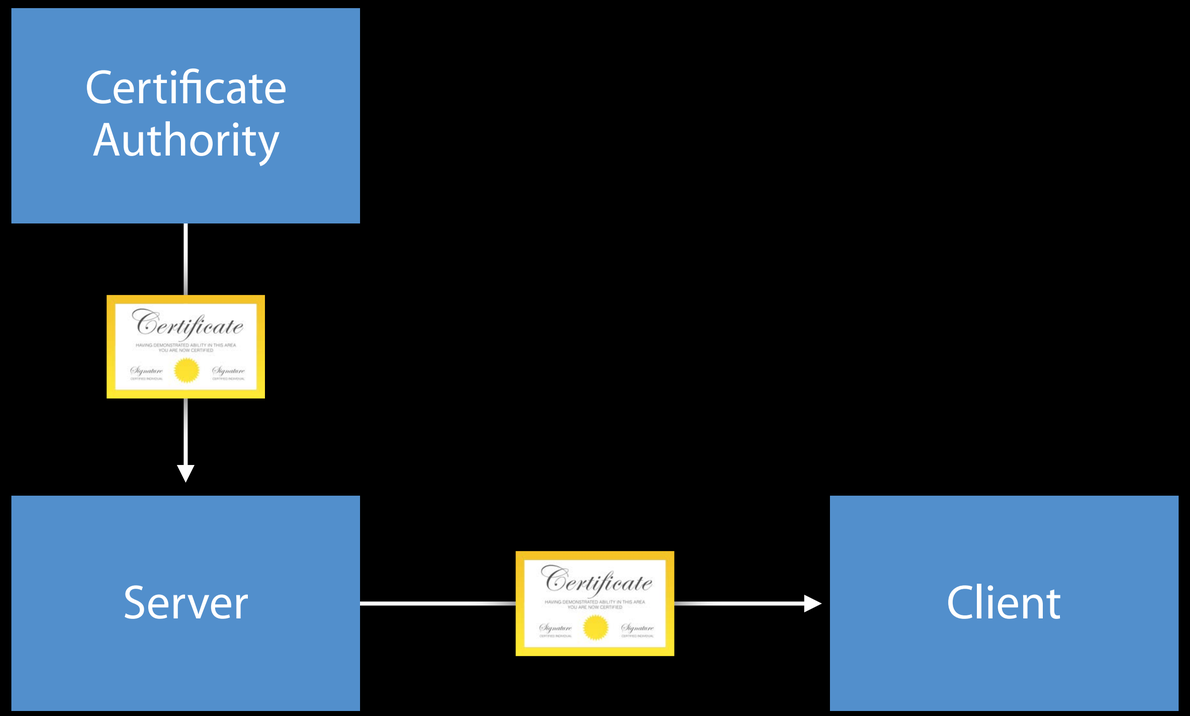
Server

Client

Certificates Today



Certificates Today



Certificates Today

What could go wrong?

Certificates Today

What could go wrong?

Certificate Authority

Server

Client

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Attacker's Server

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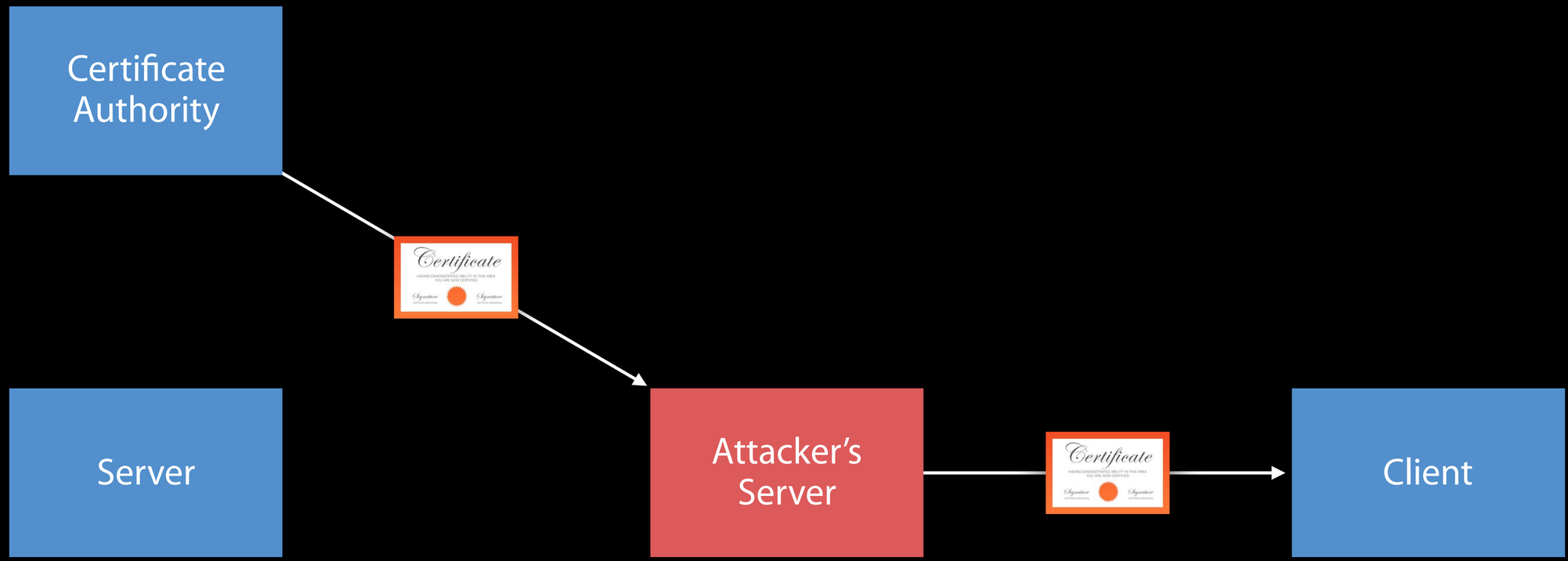
Certificates Today

What could go wrong?



Certificate Transparency

Certificate Transparency

Public verifiable logs of issued certificates

Certificate Transparency

Public verifiable logs of issued certificates

Anyone can submit a certificate to a log

Certificate Transparency

Public verifiable logs of issued certificates

Anyone can submit a certificate to a log

Client checks for proof that certificate has been logged

- In the certificate itself
- In a TLS extension
- Delivered via OCSP stapling

Certificate Transparency

How it works

Certificate Transparency

How it works

Certificate Authority

Server

Client

Certificate Transparency

How it works

Certificate Authority

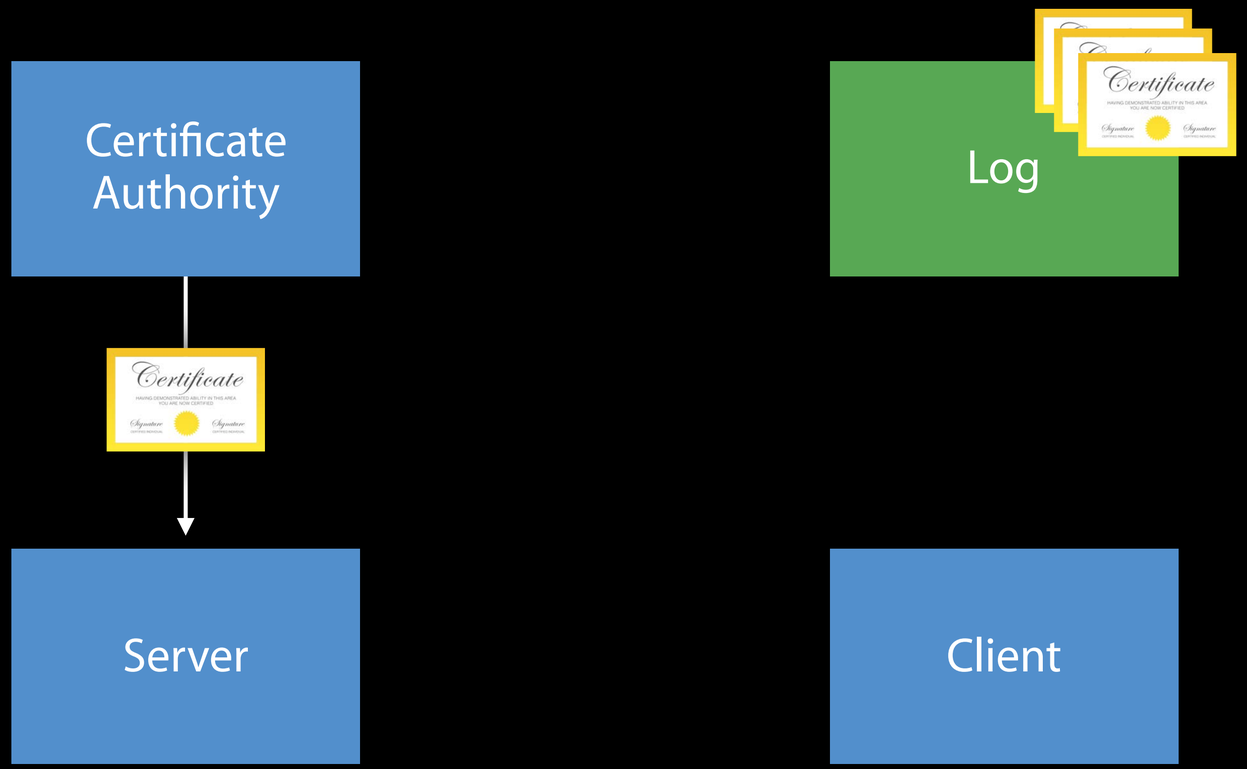
Log

Server

Client

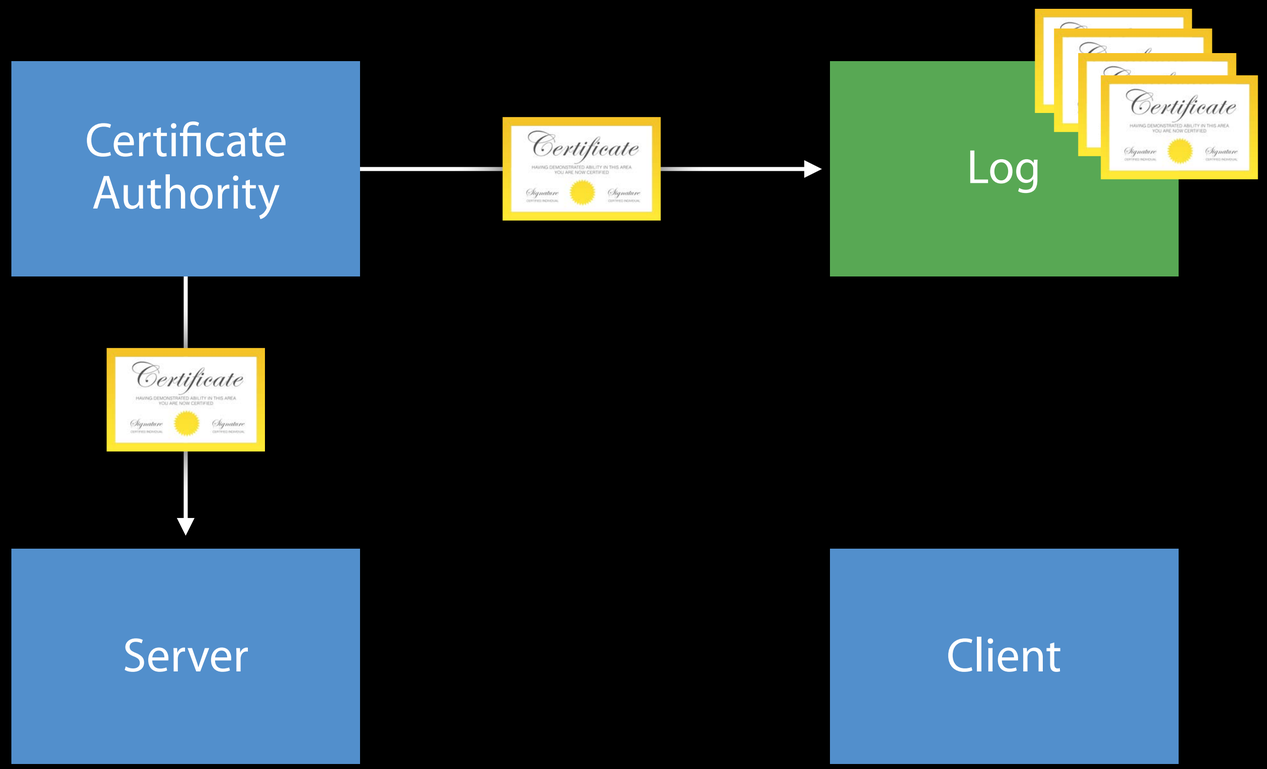
Certificate Transparency

How it works



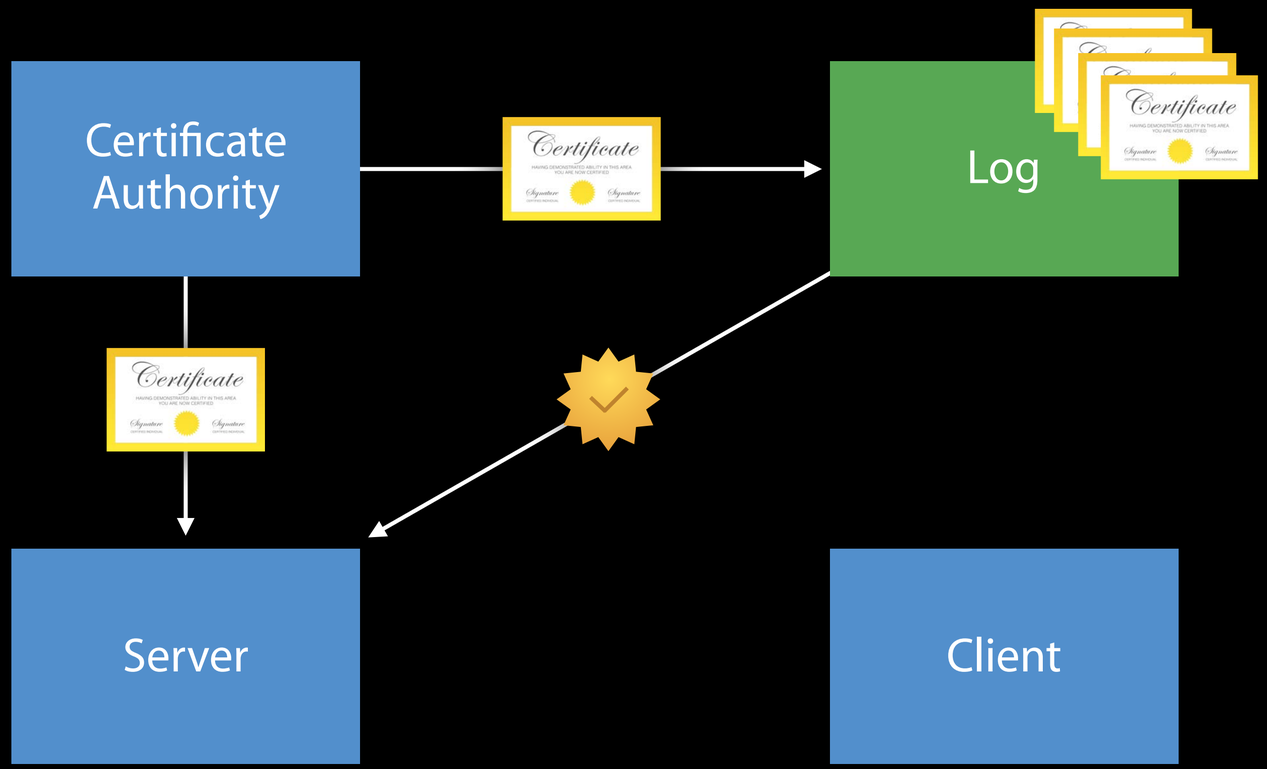
Certificate Transparency

How it works



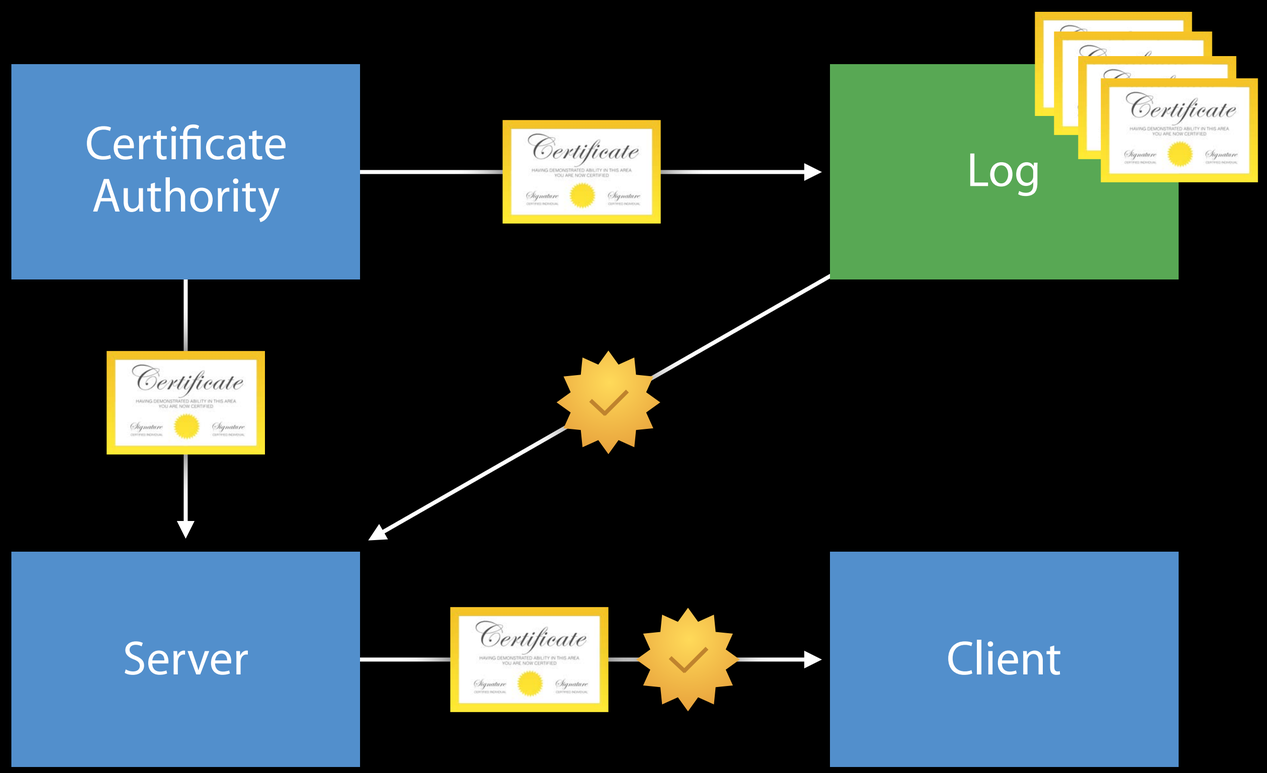
Certificate Transparency

How it works



Certificate Transparency

How it works



Certificate Transparency

Makes attacks more difficult

Certificate Authority

Server

Attacker's Server

Client

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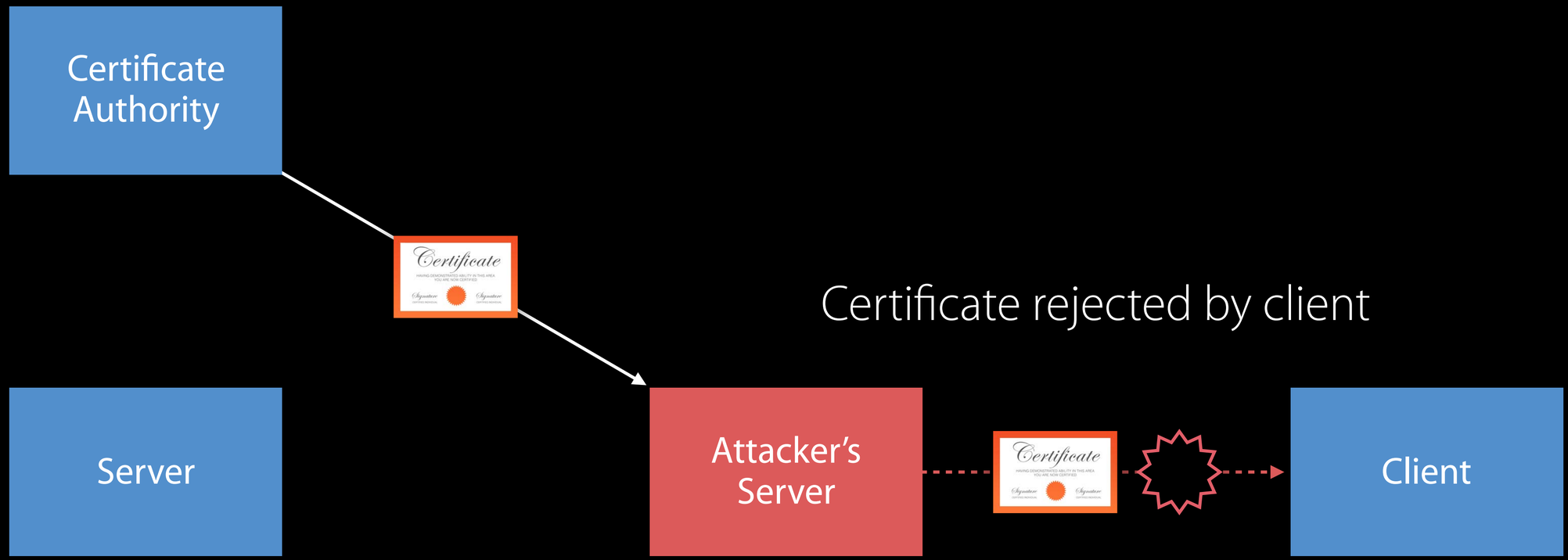

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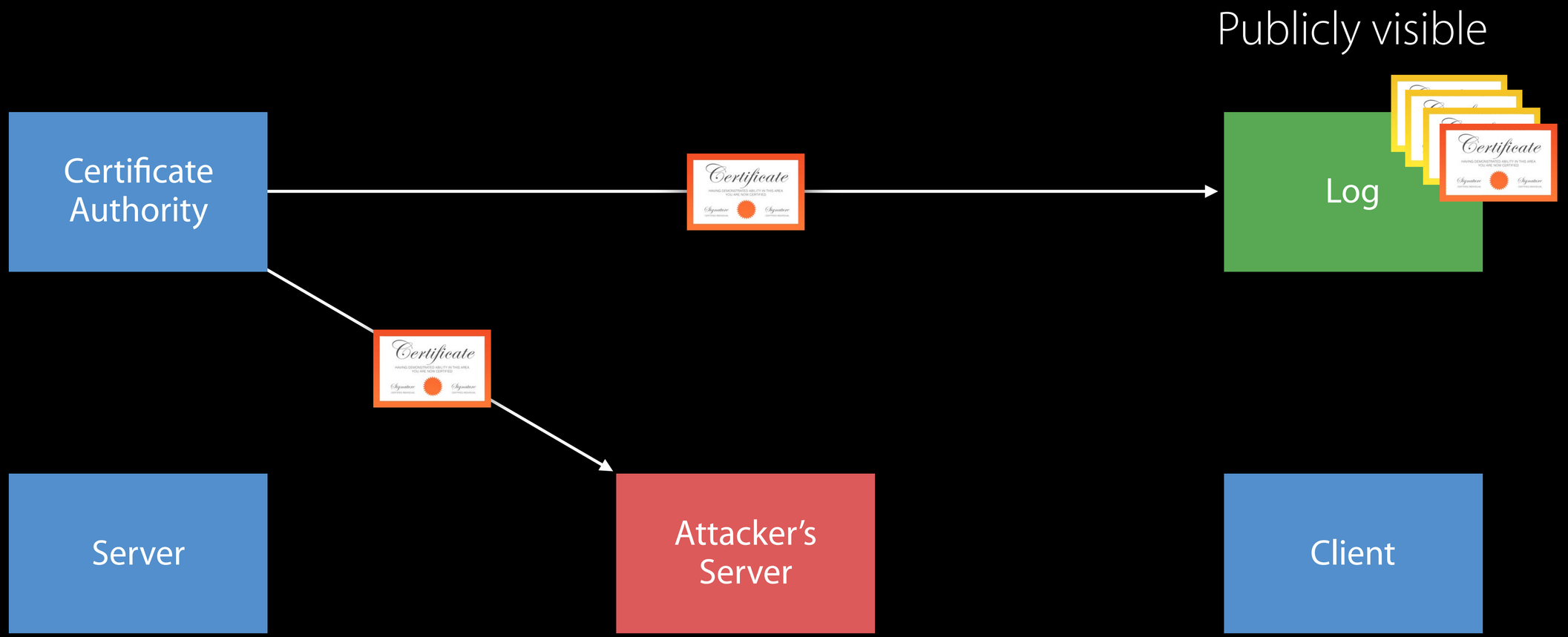

Certificate Transparency

How to try it out

Certificate Transparency

How to try it out

You can require Certificate Transparency through App Transport Security

Certificate Transparency

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You can require Certificate Transparency through App Transport Security

```
NSAppTransportSecurity {
    NSExceptionDomains {
        example.com : {
            NSRequiresCertificateTransparency : YES
        }
    }
}
```

Certificate Transparency

How to try it out

You can require Certificate Transparency through App Transport Security

```
NSAppTransportSecurity {
    NSExceptionDomains {
        example.com : {
            NSRequiresCertificateTransparency : YES
        }
    }
}
```

Proofs required from at least two logs

More information at certificate-transparency.org

Revocation

Best practices

Revocation

Best practices

Certificate Transparency does not replace revocation

Revocation

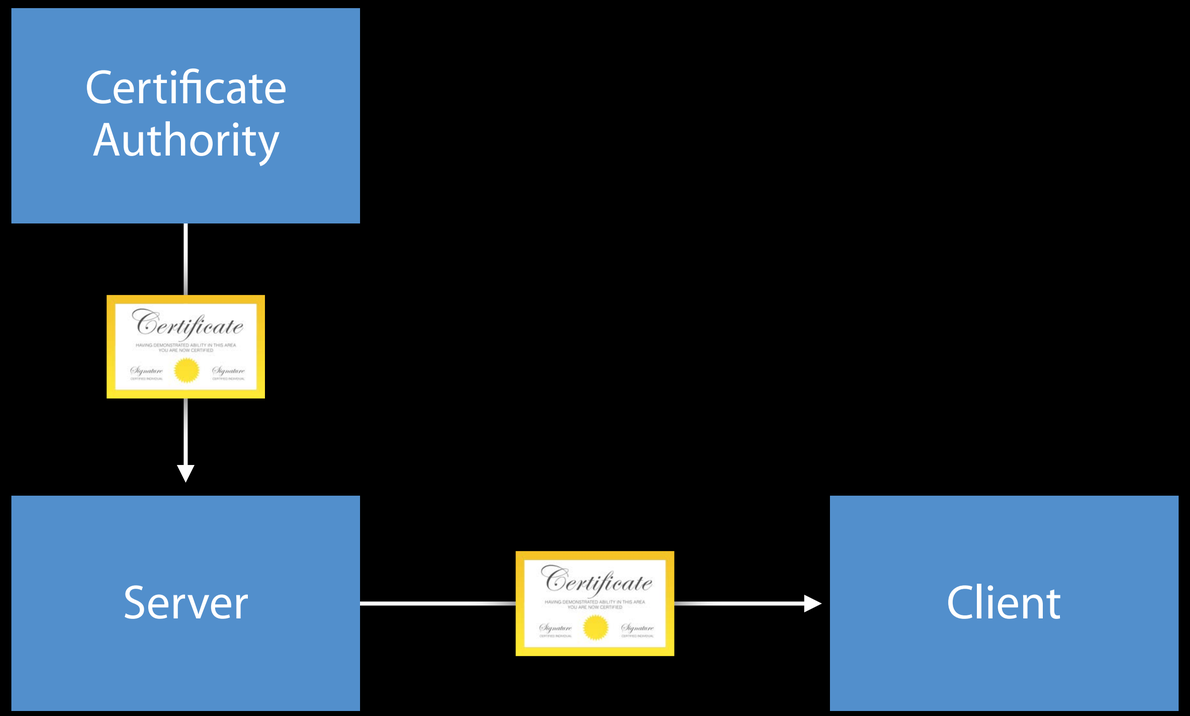
Best practices

Certificate Transparency does not replace revocation

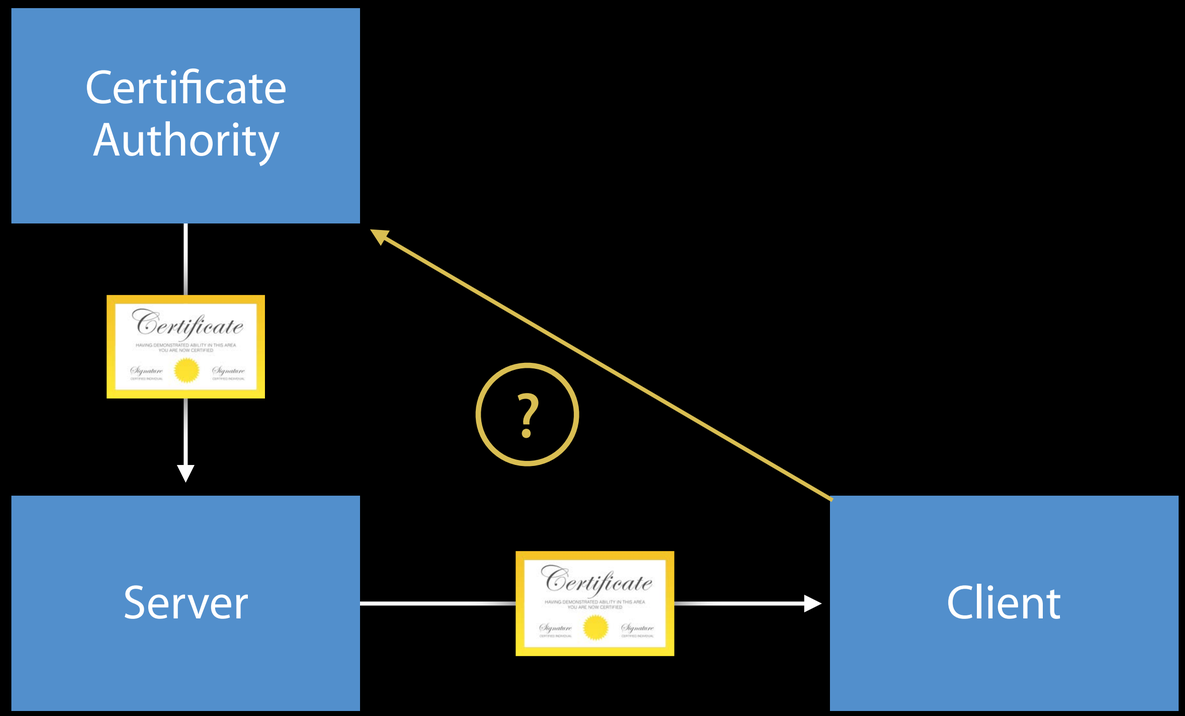
Recommended practice—OCSP stapling

- Enhancement to the Online Certificate Status Protocol (OCSP)

OCSP


Certificate Authority
Certificate
HAVING DEMONSTRATED ABILITY IN THIS AREA
YOU ARE NOW CERTIFIED
Signature
Signature
Server
Certificate
HAVING DEMONSTRATED ABILITY IN THIS AREA
YOU ARE NOW CERTIFIED
Signature
Signature
Client

OCSP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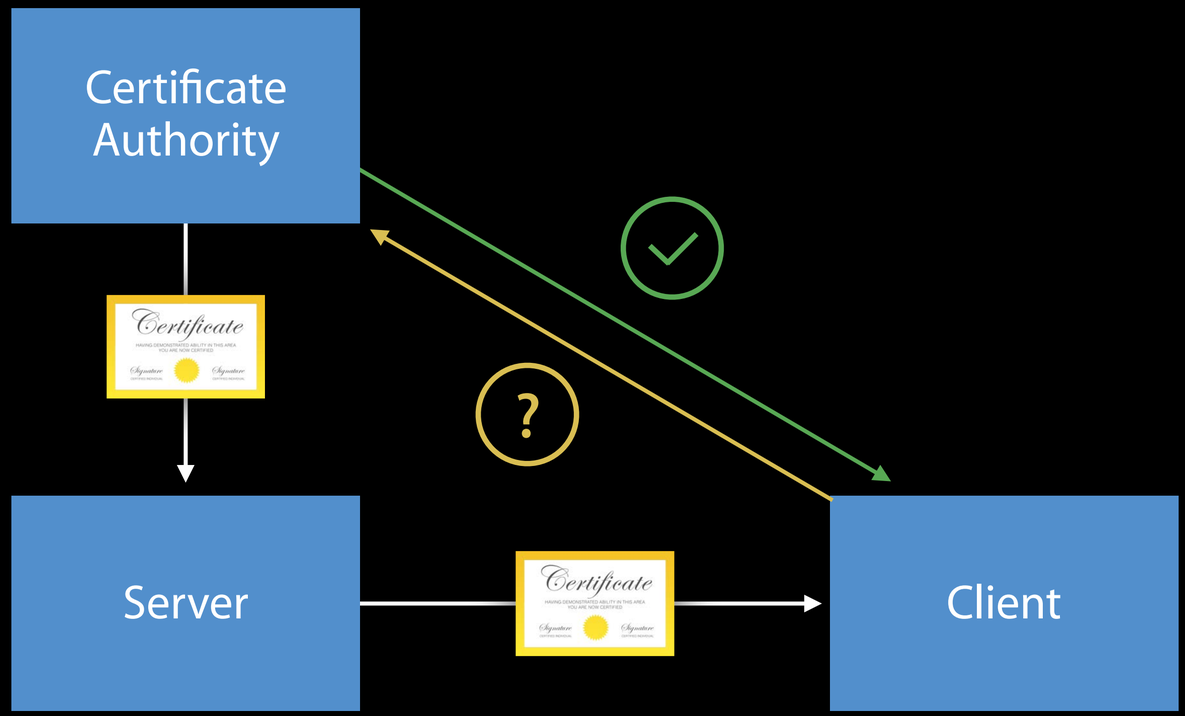
OCSP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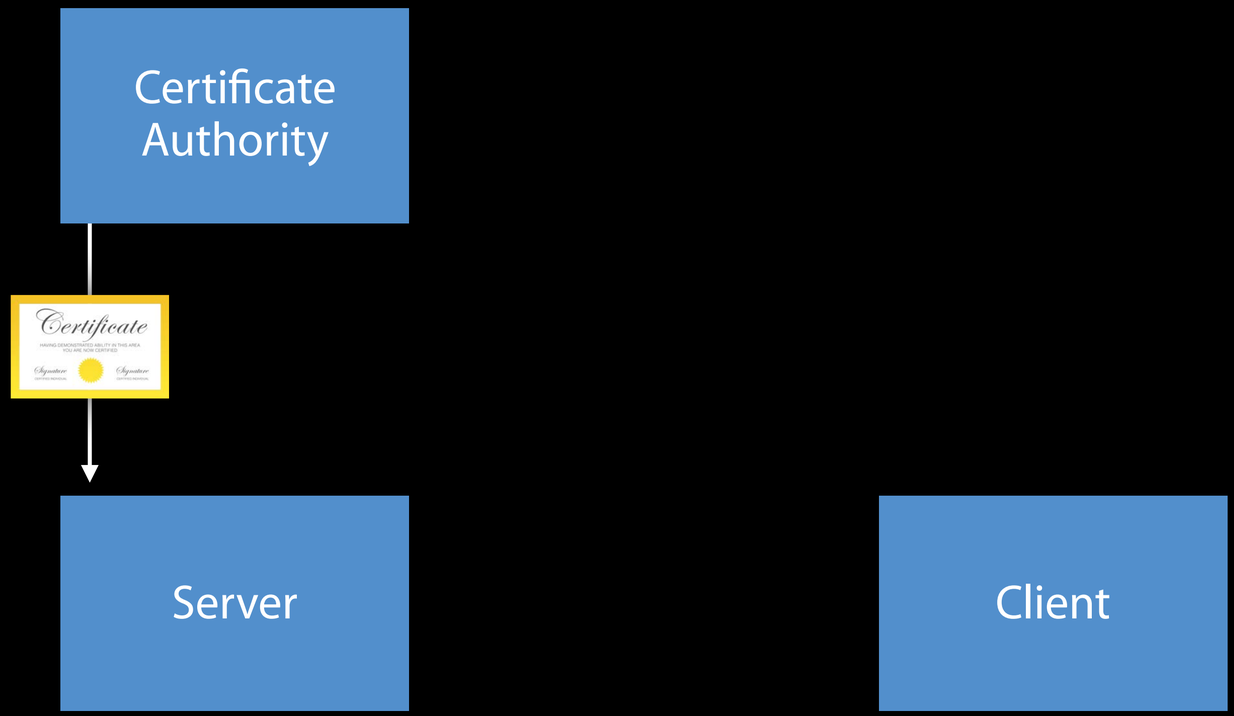
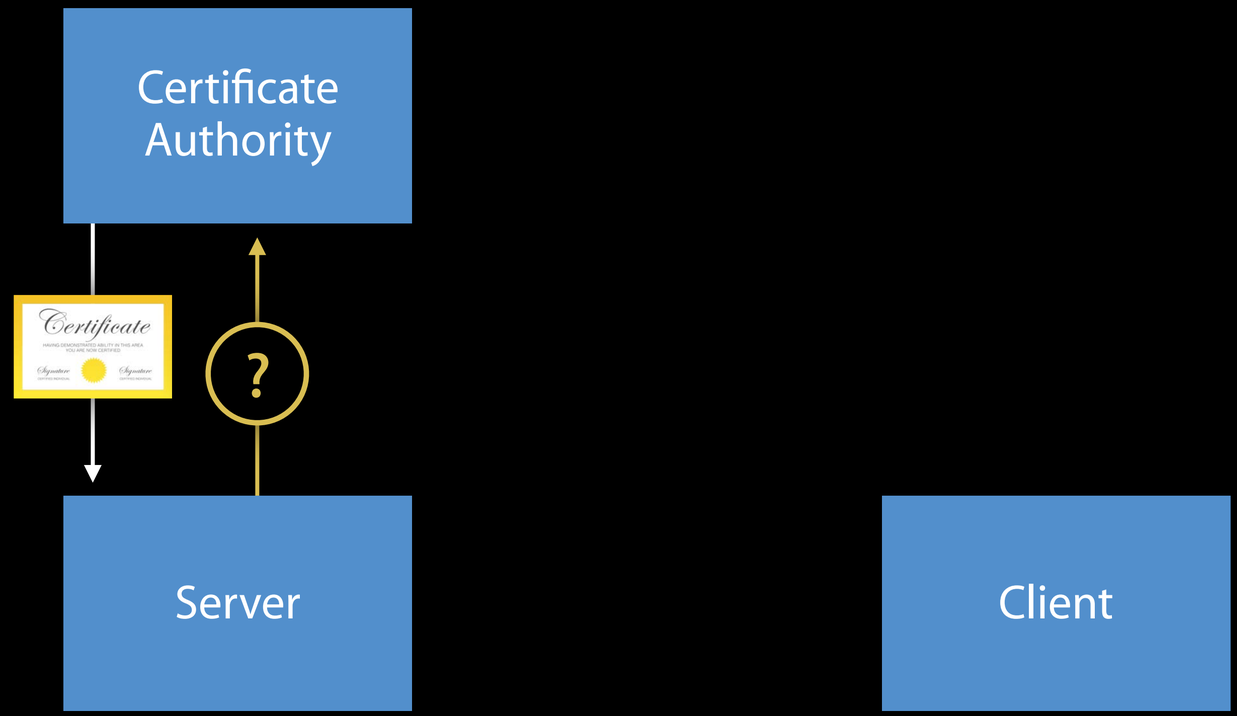
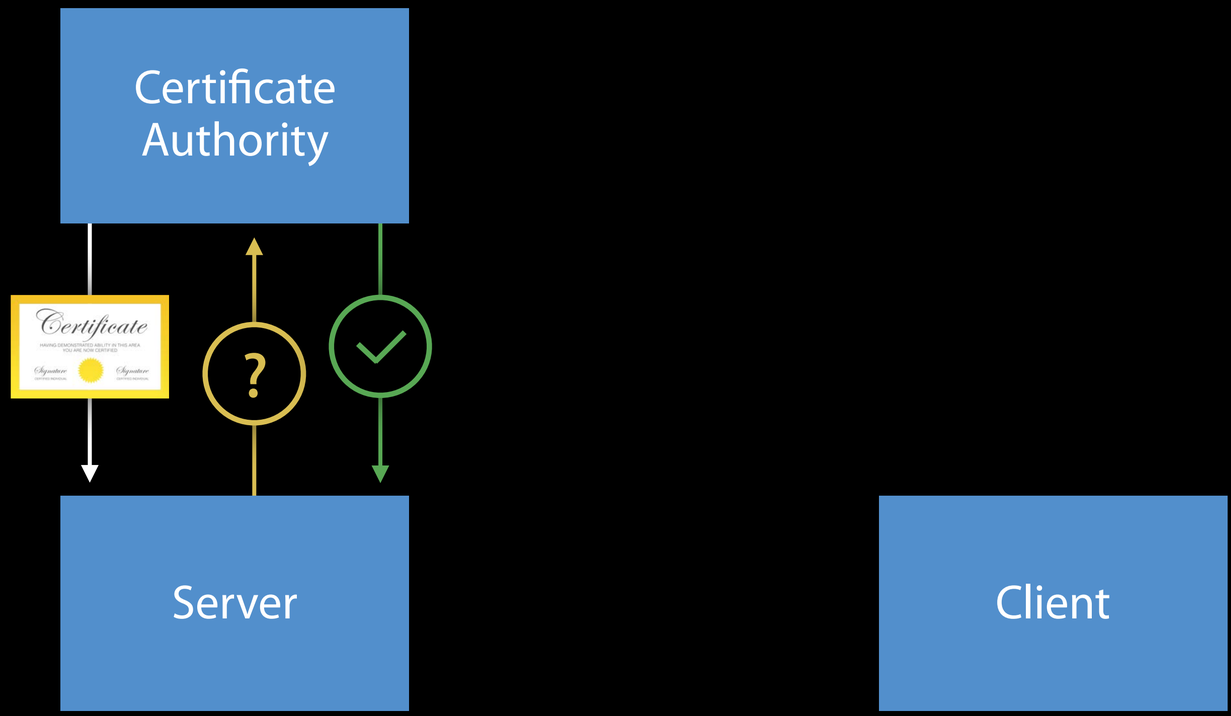
OCSP Stapling



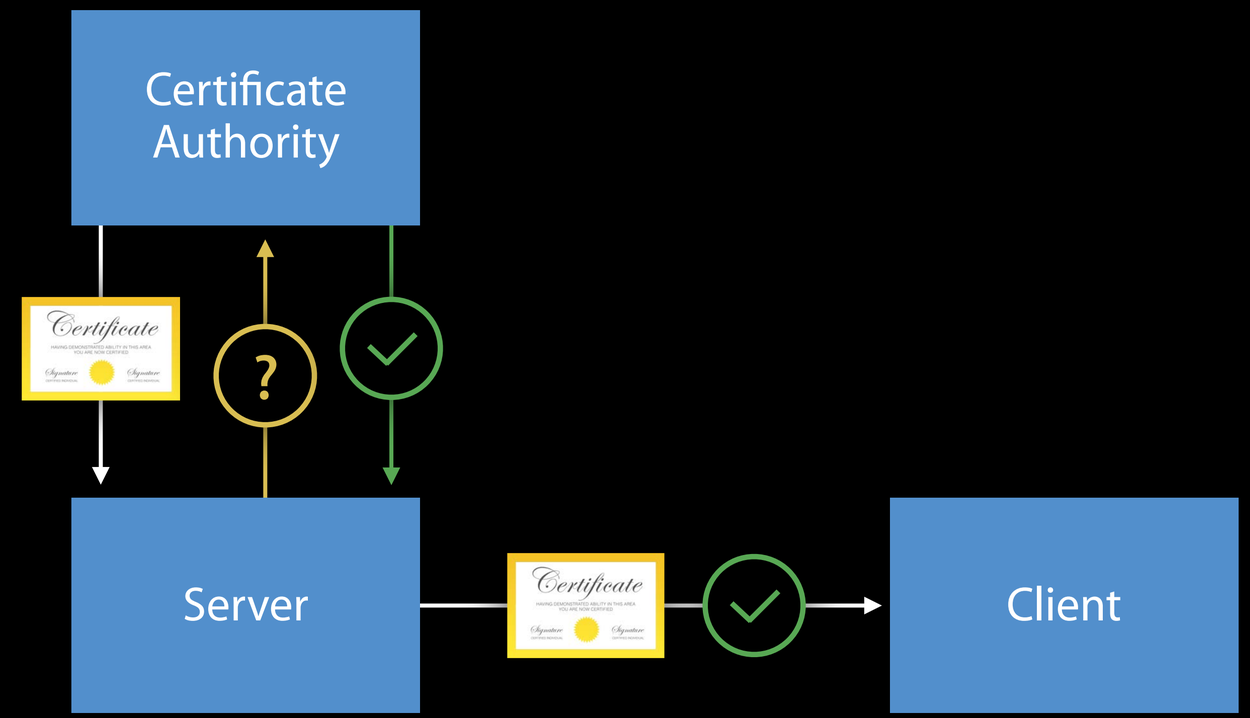
OCSP Stapling



OCSP Stapling



OCSP Stapling



Benefits of OCSP Stapling

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Reliable, quick revocation information

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Protects your users' privacy

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Deliver certificate transparency proofs as well

Benefits of OCSP Stapling

Reliable, quick revocation information

Protects your users' privacy

Deliver certificate transparency proofs as well

Widely supported and backwards-compatible

- Now fully supported on all Apple platforms

Summary

Network security

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Network security

Move forward to secure algorithms and ciphers—TLS v1.2, forward secrecy, and SHA-2 certificates

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Move forward to secure algorithms and ciphers—TLS v1.2, forward secrecy, and SHA-2 certificates

Add your certificates to certificate transparency logs

Summary

Network security

Move forward to secure algorithms and ciphers—TLS v1.2, forward secrecy, and SHA-2 certificates

Add your certificates to certificate transparency logs

Enable OCSP stapling

Cryptographic Improvements

SecKey and smart cards

SecKey Improvements

SecKey Improvements

API for asymmetric keys

- Unification of macOS and iOS APIs
- Support for common operations

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API for asymmetric keys

- Unification of macOS and iOS APIs
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Replacement for deprecated CDSA calls

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API for asymmetric keys

- Unification of macOS and iOS APIs
- Support for common operations

Replacement for deprecated CDSA calls

Replacement for asymmetric SecTransforms

CryptoTokenKit

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System support for cryptographic devices

- Smart cards, USB cryptographic tokens

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Out-of-the-box integration with system services

- Token content accessible through keychain
- Token cryptographic operations available using SecKey API

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More information in Security Labs

What’s New in Platform Security

Simon Cooper Trusted Execution Engineering Manager

What's New in Security

What's New in Security

How Software is Delivered

What's New in Security

How Software is Delivered

Developer ID

What's New in Security

How Software is Delivered

Developer ID

Gatekeeper

What's New in Security

How Software is Delivered

Developer ID

Gatekeeper

Software Packaging

How Software is Delivered

Software Delivery for iOS

iOS

Software Delivery for iOS

App Store

Software Delivery for iOS

App Store

Xcode

Software Delivery for iOS

App Store

Xcode

Enterprise programs

Software Delivery for macOS

macOS

Software Delivery for macOS

Mac App Store

macOS

Software Delivery for macOS

Mac App Store

Developer ID

Software Delivery for macOS

Mac App Store

Developer ID

Xcode

Developer ID

What is Developer ID?

What is Developer ID?

Deliver apps outside of the App Store

What is Developer ID?

Deliver apps outside of the App Store

Usually downloaded

What is Developer ID?

Deliver apps outside of the App Store

Usually downloaded

Developer ID Signing Identity

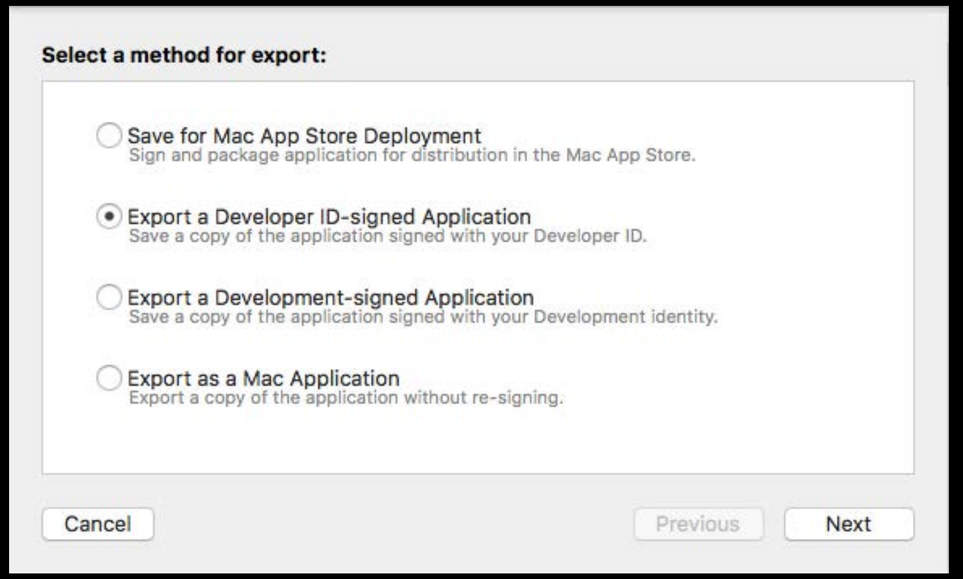
What is Developer ID?

Deliver apps outside of the App Store

Usually downloaded

Developer ID Signing Identity

Developer ID Signed Apps treated specially



iCloud for Developer ID

NEW

iCloud for Developer ID

NEW

Developer ID can now use iCloud features

- iCloud Drive
- iCloud Keychain
- Push Notifications
- VPN

iCloud for Developer ID

iCloud for Developer ID

Deliver iCloud-enabled Apps outside
of the App Store

iCloud for Developer ID

Deliver iCloud-enabled Apps outside of the App Store

Developer ID apps can now share data with iCloud iOS apps

iCloud for Developer ID

Deliver iCloud-enabled Apps outside of the App Store

Developer ID apps can now share data with iCloud iOS apps

Deploy back to macOS 10.9

iCloud for Developer ID

iCloud for Developer ID

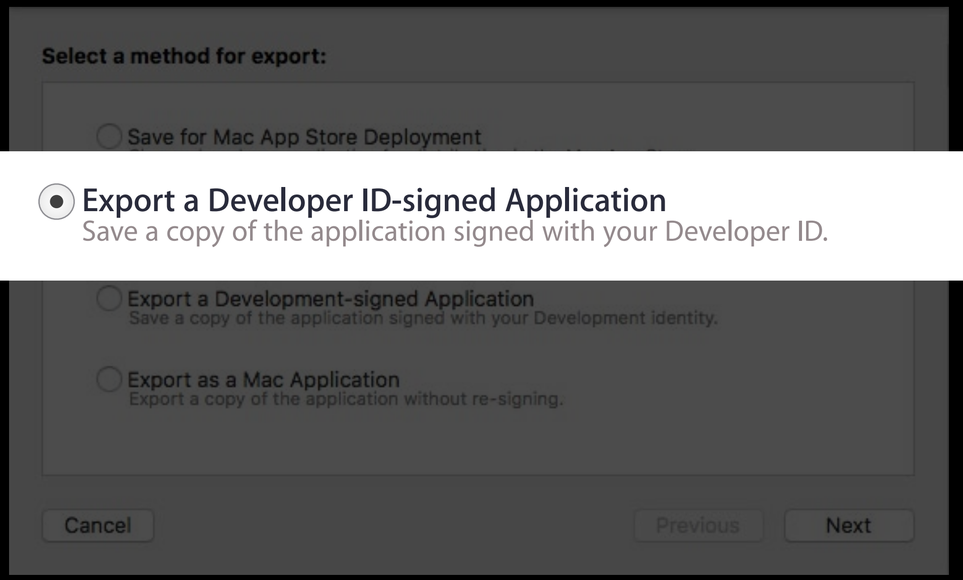
iCloud Development testing today

iCloud for Developer ID

iCloud Development testing today

iCloud Deployment

- Testing in upcoming seeds
- Distribution using GM tools



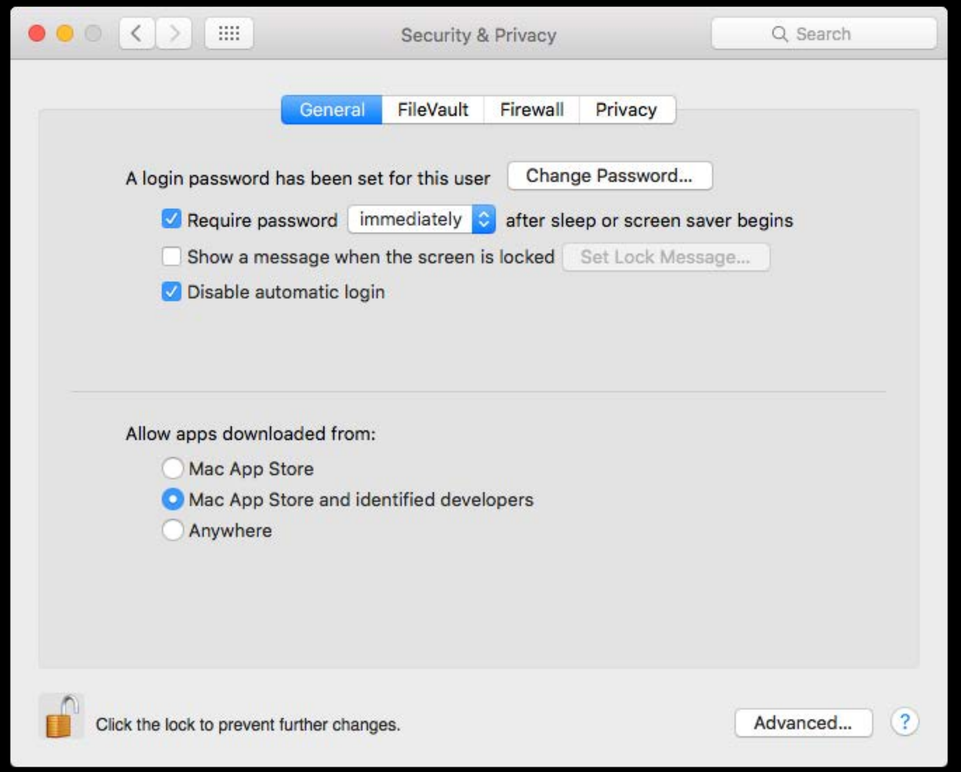
Gatekeeper

What is Gatekeeper?

What is Gatekeeper?

Controls what software is allowed to run on your Mac

- Mac App Store
- Mac App Store and identified developers
- Anywhere

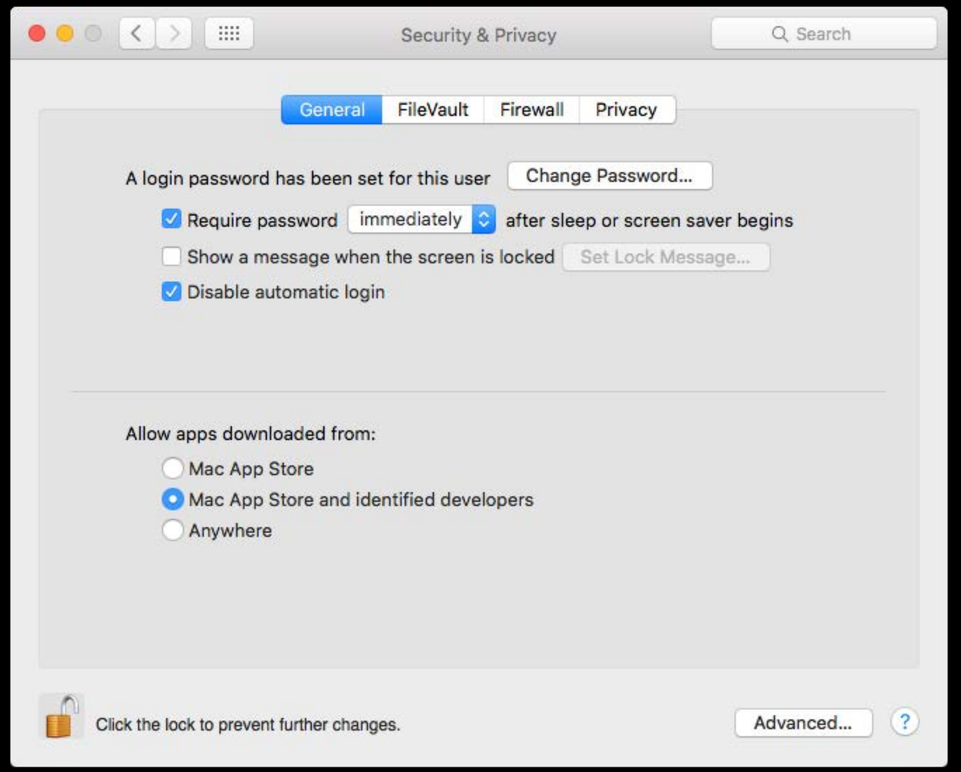


What is Gatekeeper?

Controls what software is allowed to run on your Mac

- Mac App Store
- Mac App Store and identified developers
- Anywhere

Prompts user before first run

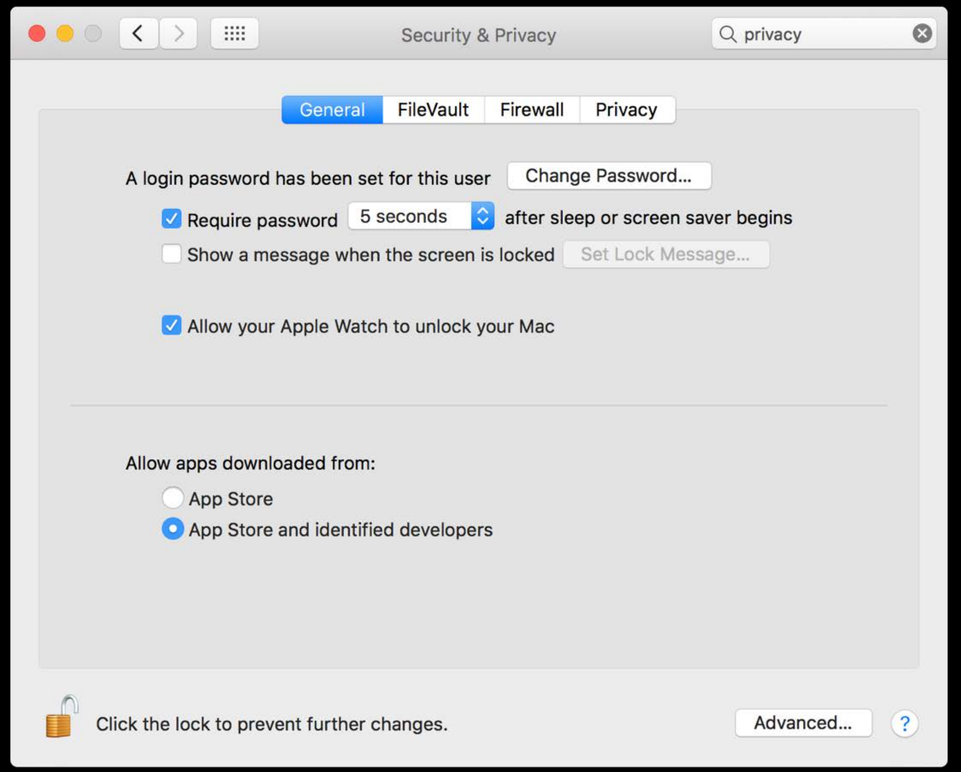


Changes to Gatekeeper

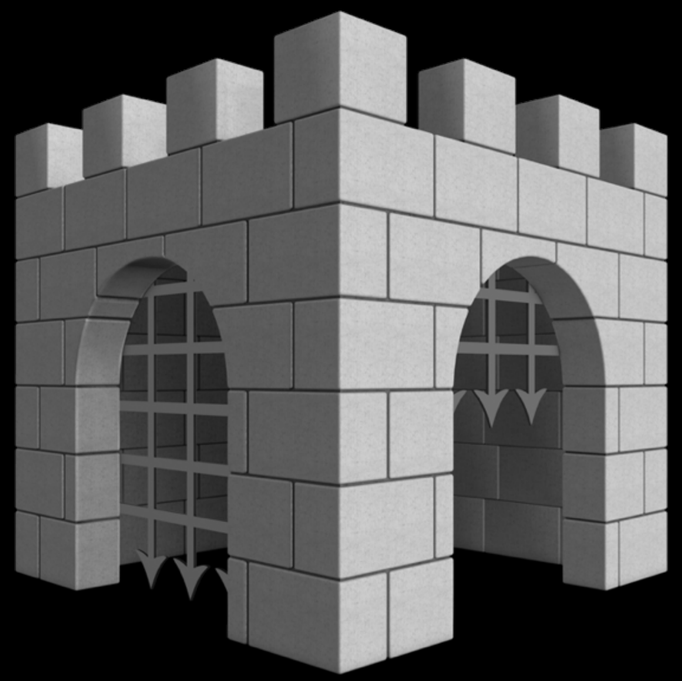
Changes to Gatekeeper

Changing the default options

- Mac App Store
- Mac App Store and identified Developers
- Can still open anyway



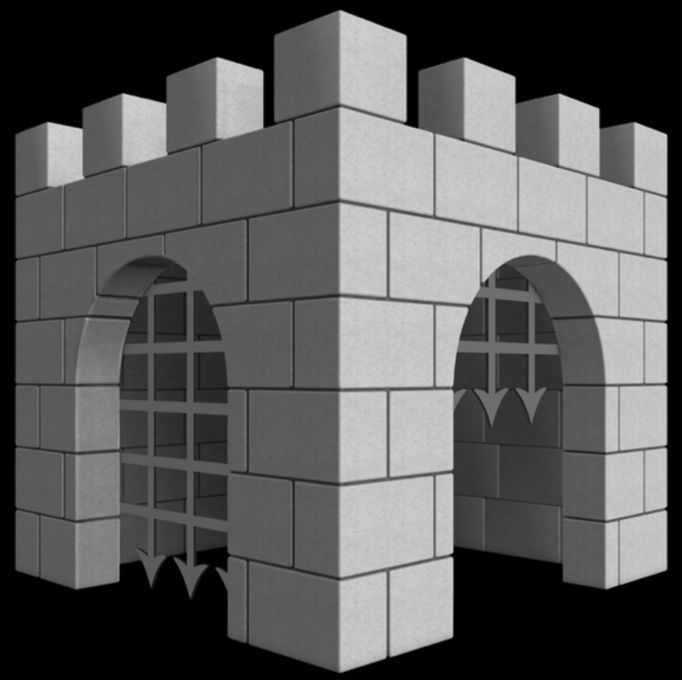
Changes to Gatekeeper



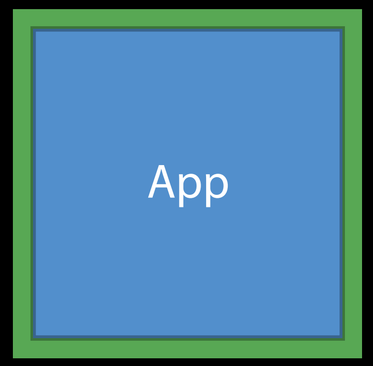
Changes to Gatekeeper

Repackaging problem

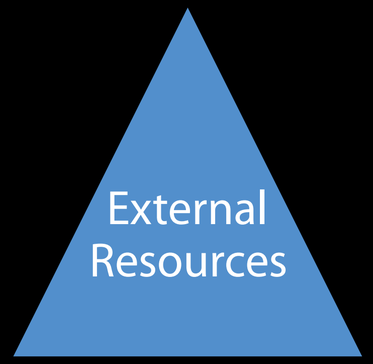
Gatekeeper enhancement



Repackaging Problem



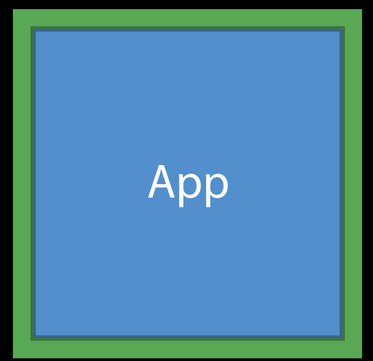
Correctly Signed App



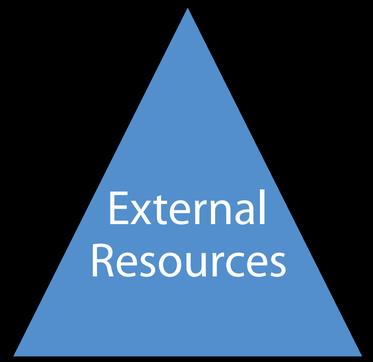
Code or Code equivalent

Libraries, plugins, HTML,
Lua, Python, etc.

Repackaging Problem



Correctly Signed App



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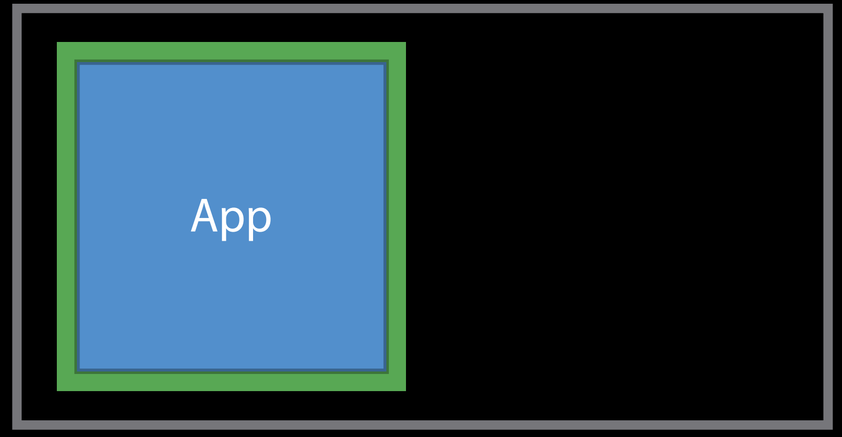
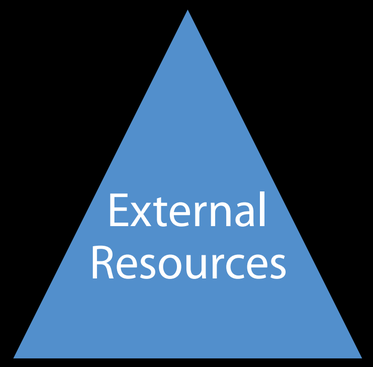
Repackaging Problem

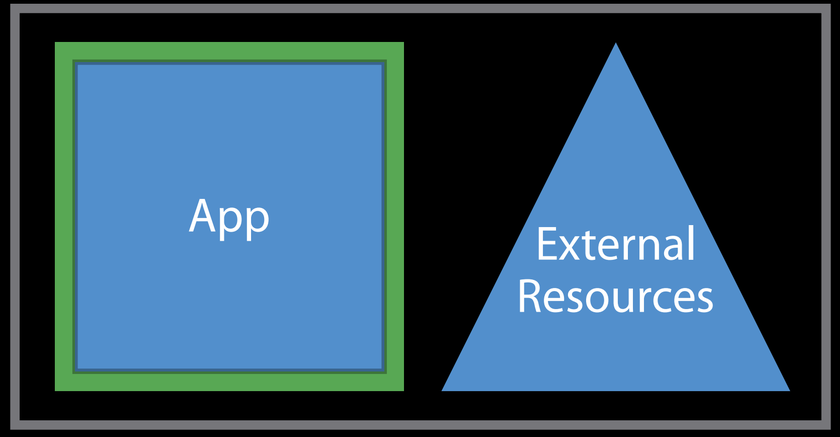




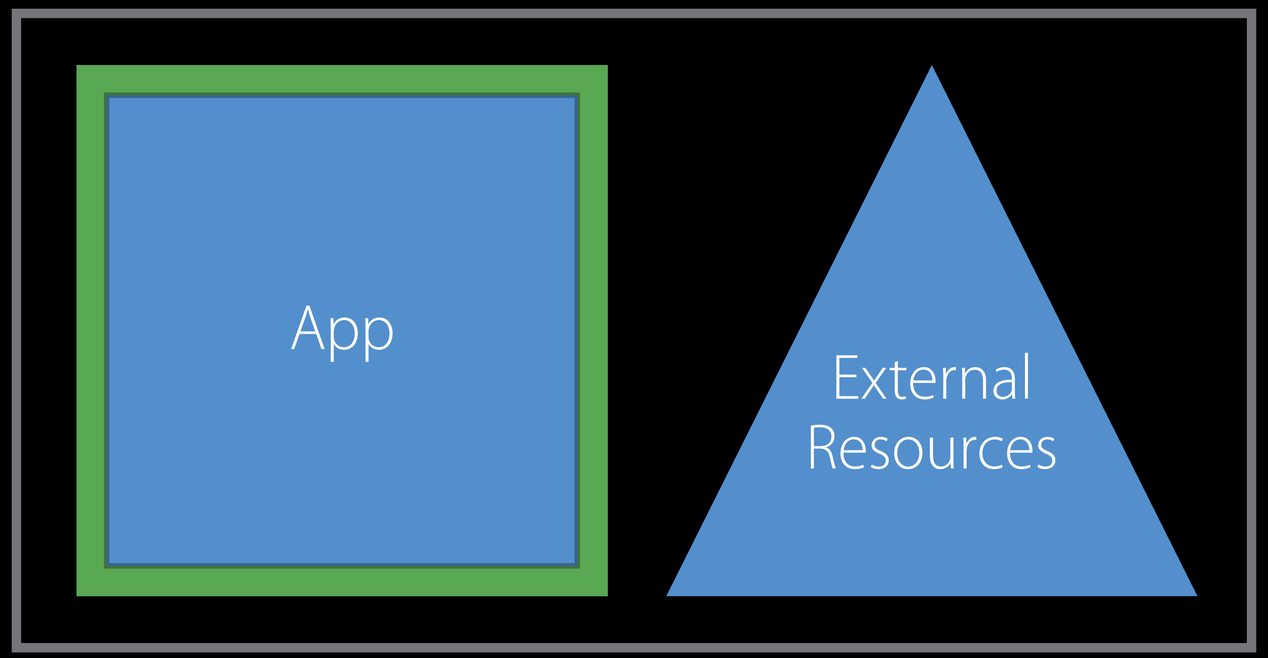
Code or Code equivalent

Libraries, plugins, HTML, Lua, Python, etc.

Repackaging Problem



Repackaging Problem



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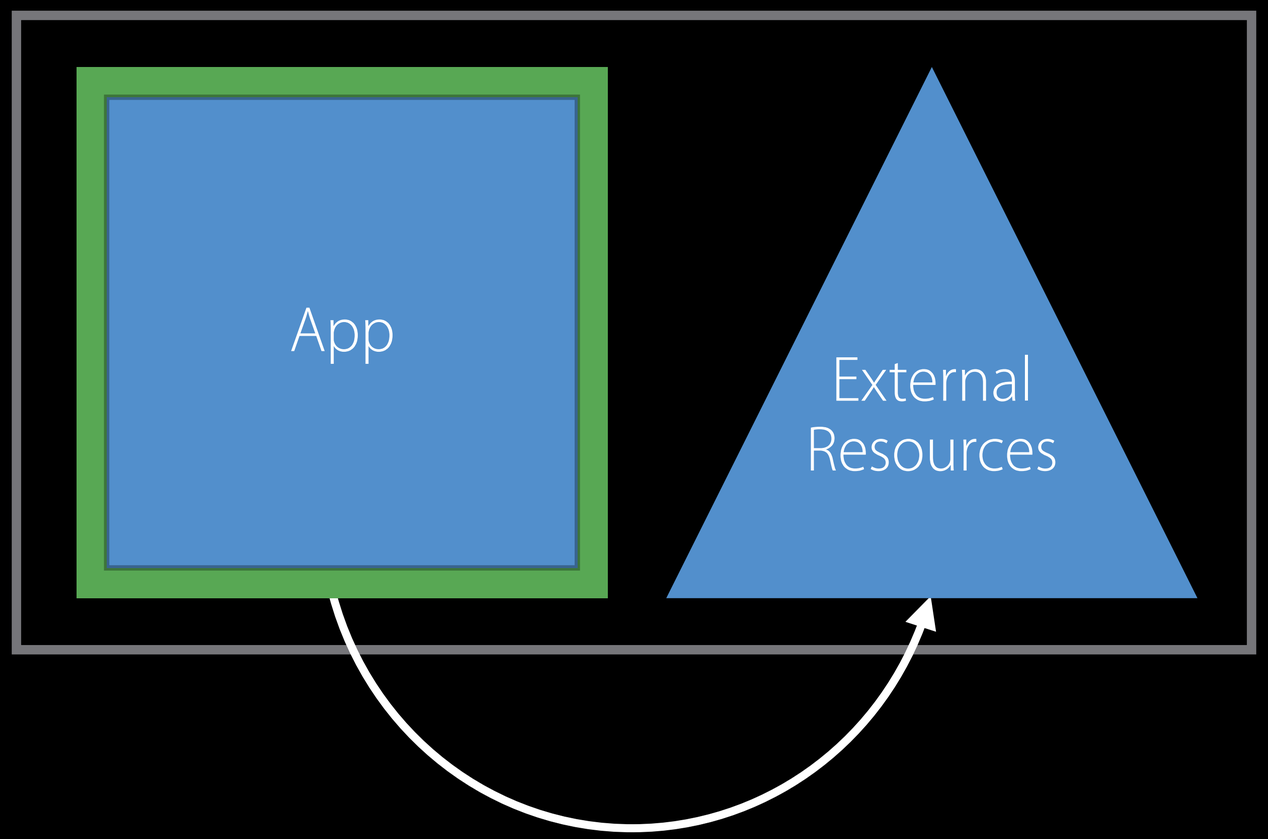

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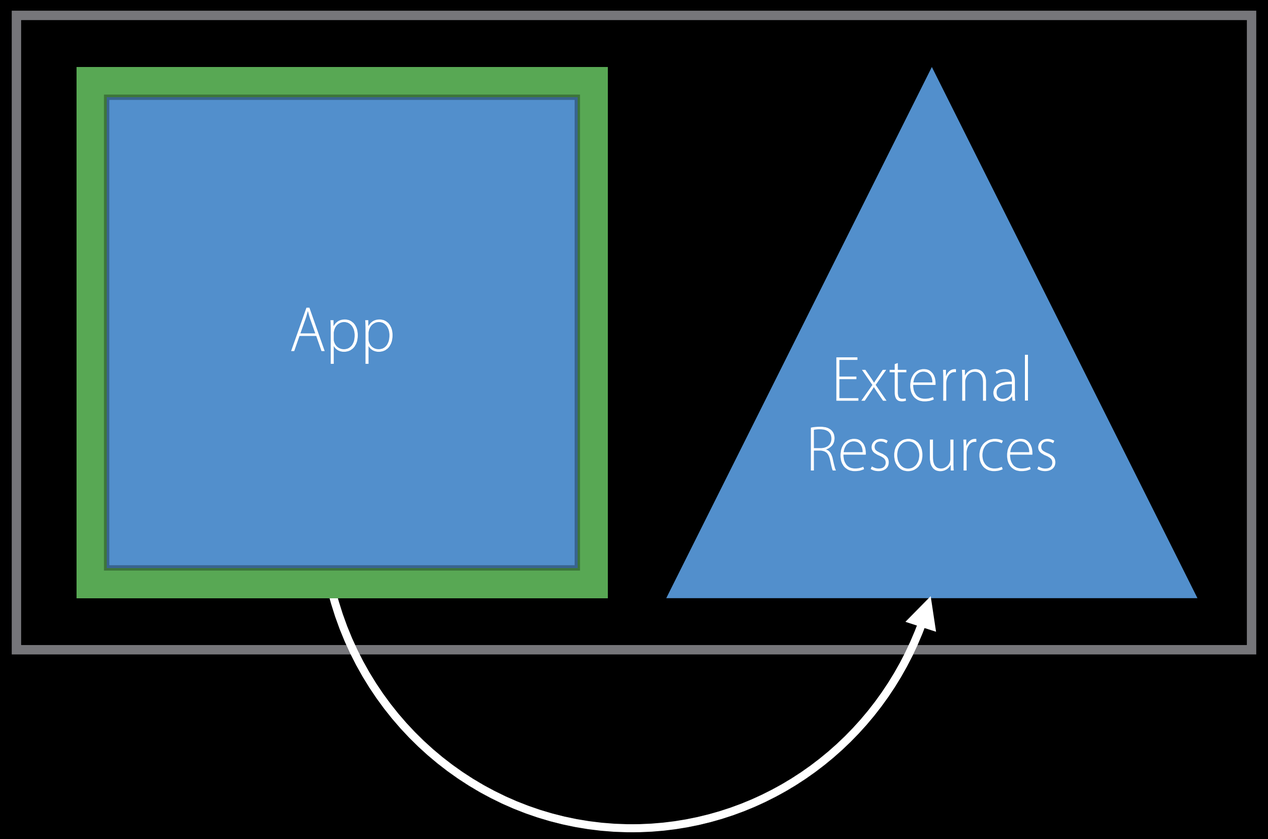

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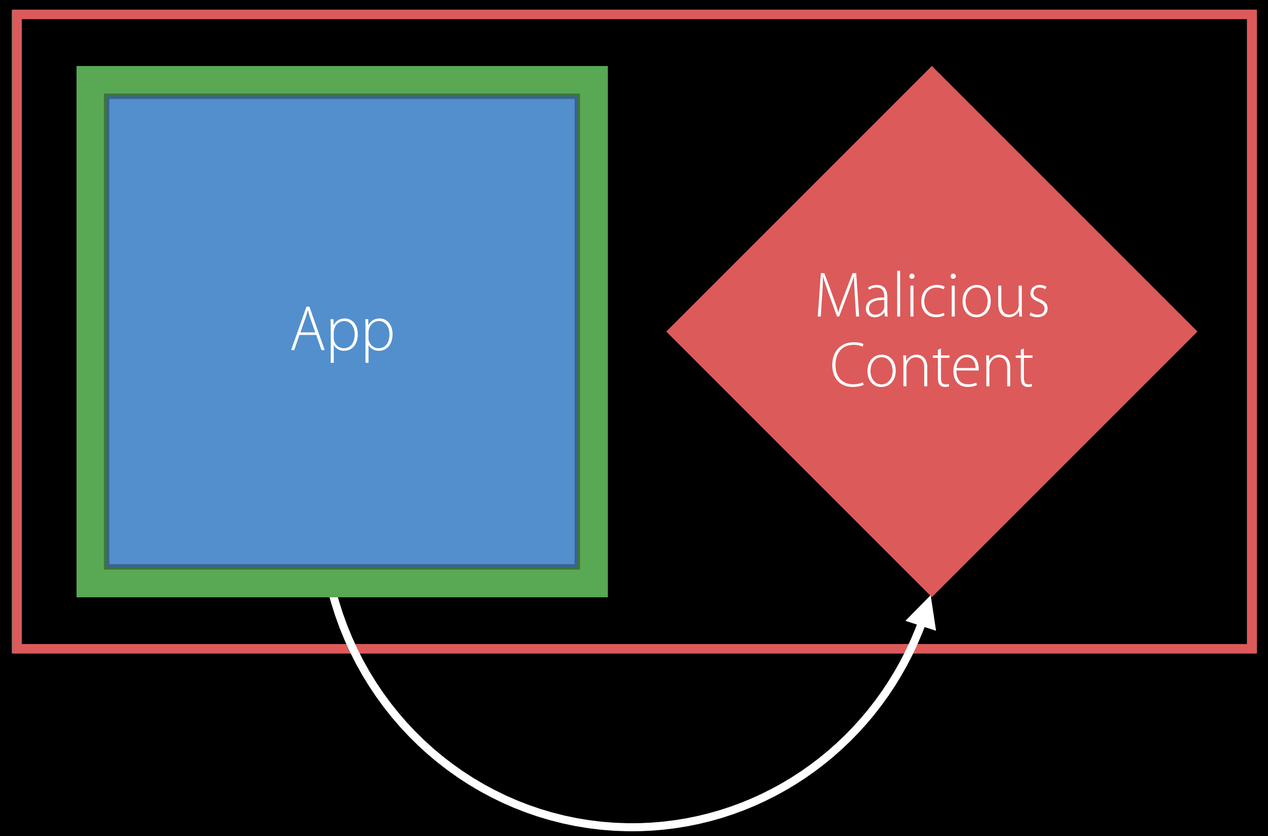


Repackaging Problem

Repackaging Problem

Not affected

- From the Mac App Store
- In a signed Apple Installer package

Repackaging Problem

Repackaging Problem

Affected

- ZIP
- Disk Images (DMGs)
- ISO Images
- Other archive formats

Repackaging Problem

Affected

- ZIP
- Disk Images (DMGs)
- ISO Images
- Other archive formats

Maybe affected

- 3rd-party installers

Repackaging Problem

Repackaging Problem

Need your help

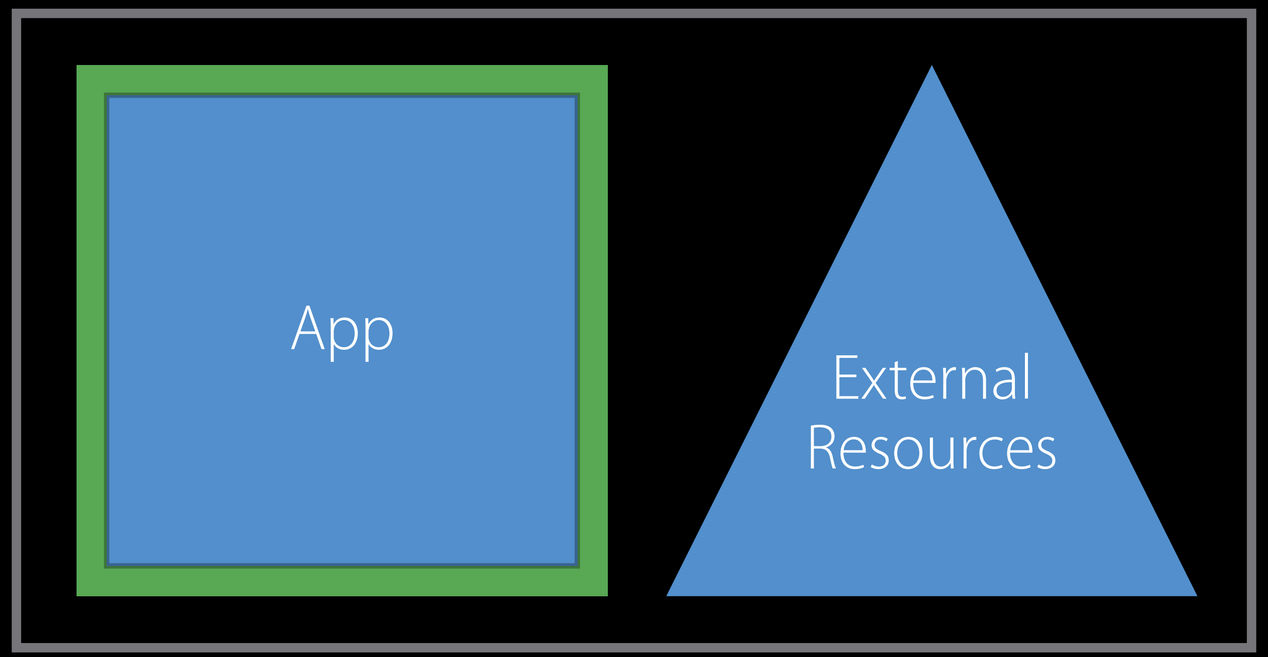
Repackaging Problem

Need your help

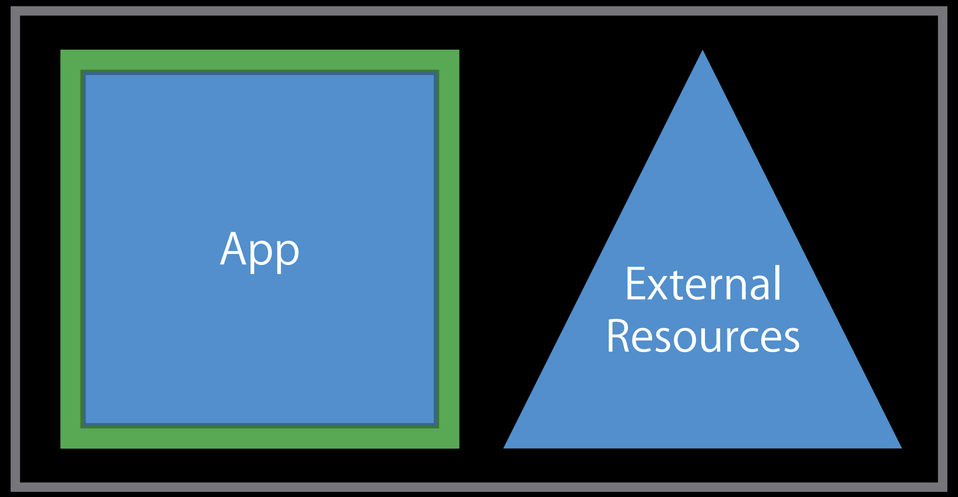
We need to protect customers

Containers

ZIP, DMG, ISO

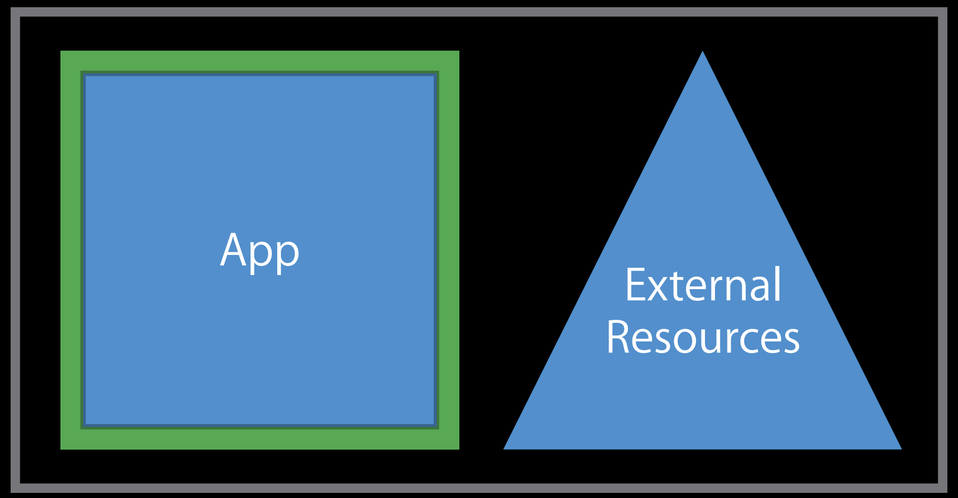


Signing Disk Images



Signing Disk Images

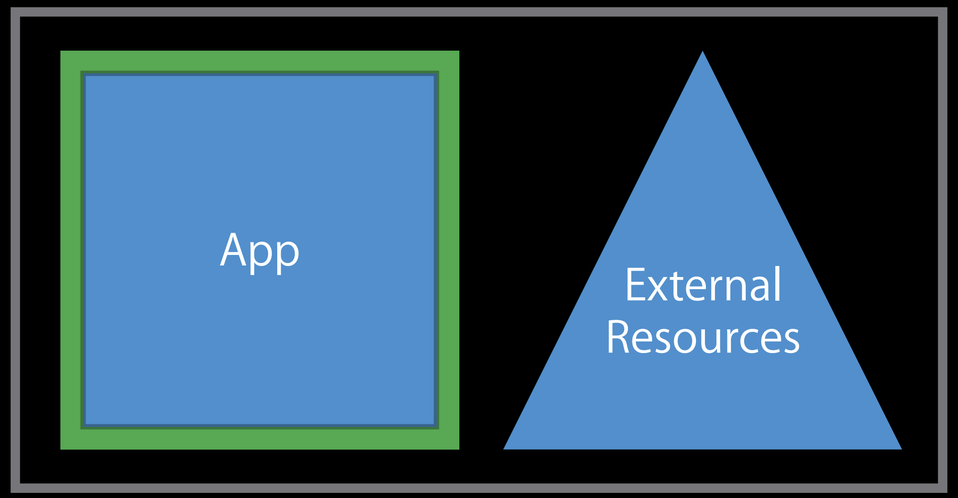
Using macOS 10.11.5 or later



Signing Disk Images

Using macOS 10.11.5 or later

Use the "codesign" tool

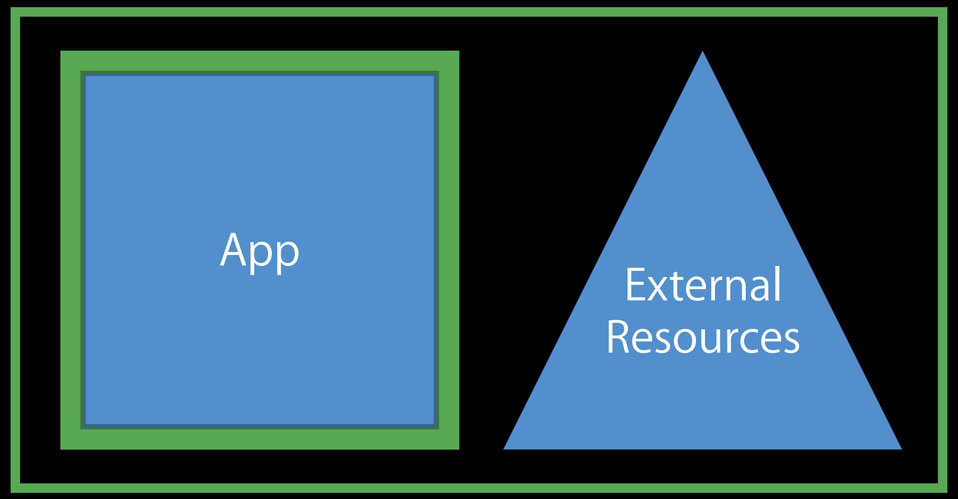


Signing Disk Images

Using macOS 10.11.5 or later

Use the "codesign" tool

Signatures are embedded



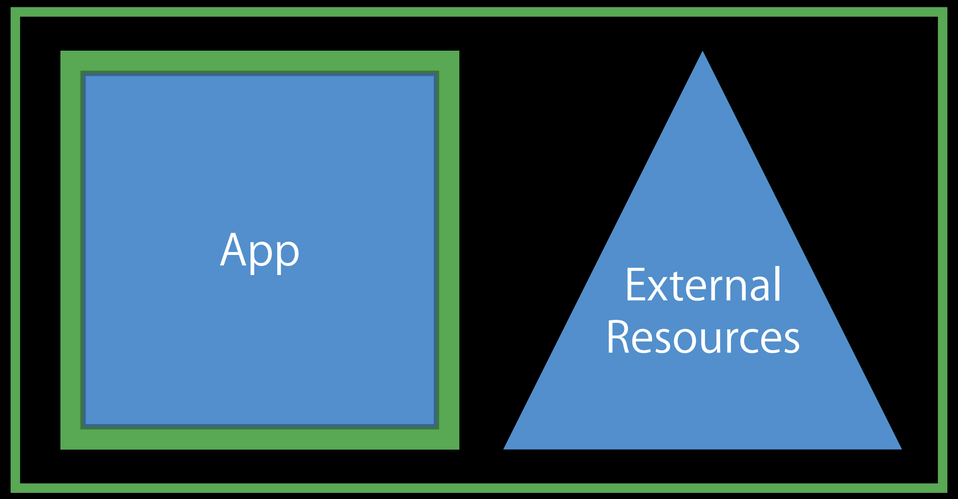
Signing Disk Images

Using macOS 10.11.5 or later

Use the "codesign" tool

Signatures are embedded

Backwards-compatible with older OS releases



Signing Disk Images

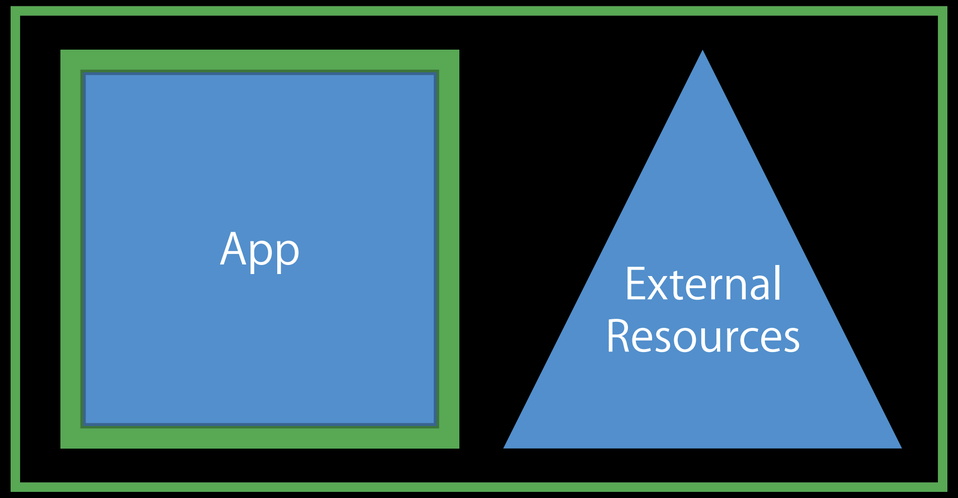
Using macOS 10.11.5 or later

Use the "codesign" tool

Signatures are embedded

Backwards-compatible with older OS releases

For assistance, come to the Security Labs

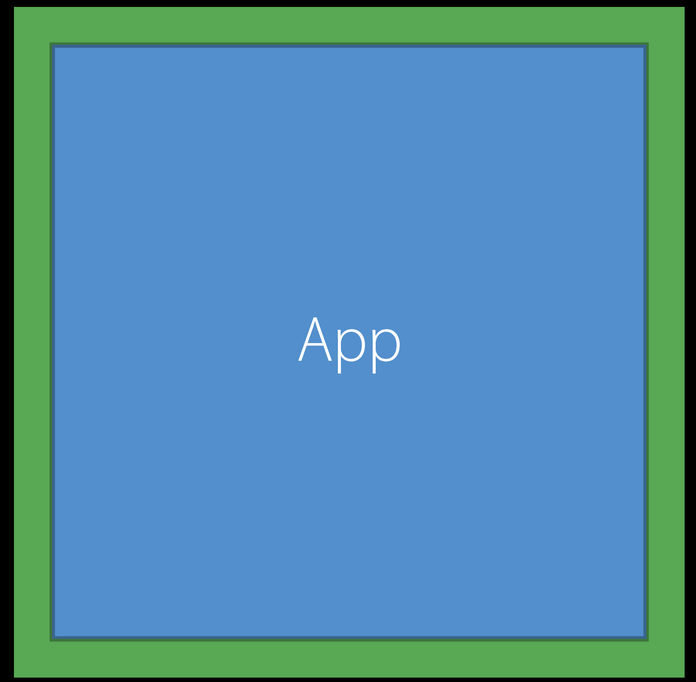


Packaging Advice

Do these

Avoid the problem

- Put resources inside App Bundle

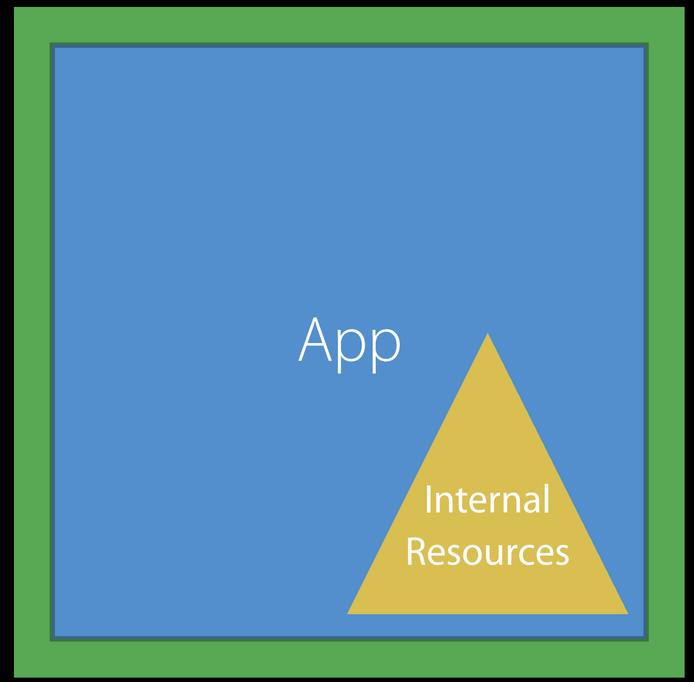


Packaging Advice

Do these

Avoid the problem

- Put resources inside App Bundle



Packaging Advice

Do these

Packaging Advice

Do these

Distributing an App Bundle?

- Deliver via the Mac App Store
- Sign the App
  - Package in a Zip Archive
  - Verify signature before release
- Signed Apple Installer package

Packaging Advice

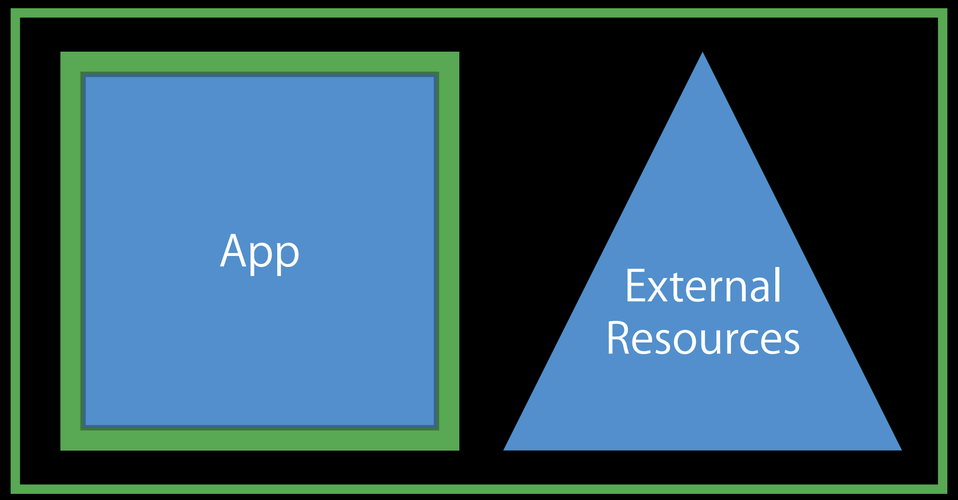
Do these

Packaging Advice

Do these

For a container with Apps and resources

- Signed Disk Image
  - Sign any content in the container
  - Sign the disk image
- Verify signatures before release



Packaging Advice

Packaging Advice

Do These

Adding personalization or licensing information

- Use extended attribute on bundle root—see TN2206
- Sign a personalized Disk Image

Packaging Advice

Do These

Adding personalization or licensing information

- Use extended attribute on bundle root—see TN2206
- Sign a personalized Disk Image

Do Not Do This

Modify your app after signing

Deliver an app with a broken signature

Use an ISO image

NEW

Gatekeeper Enhancement

Protecting customers

Gatekeeper Path Randomization

NEW

Gatekeeper Path Randomization

NEW

Supplements existing Gatekeeper protections

Gatekeeper Path Randomization

NEW

Supplements existing Gatekeeper protections

No change for Mac App Store apps

Gatekeeper Path Randomization

NEW

Supplements existing Gatekeeper protections

No change for Mac App Store apps

No change for previously run apps

Gatekeeper Path Randomization

NEW

Supplements existing Gatekeeper protections

No change for Mac App Store apps

No change for previously run apps

Applies to newly downloaded apps

Gatekeeper Path Randomization

NEW

Supplements existing Gatekeeper protections

No change for Mac App Store apps

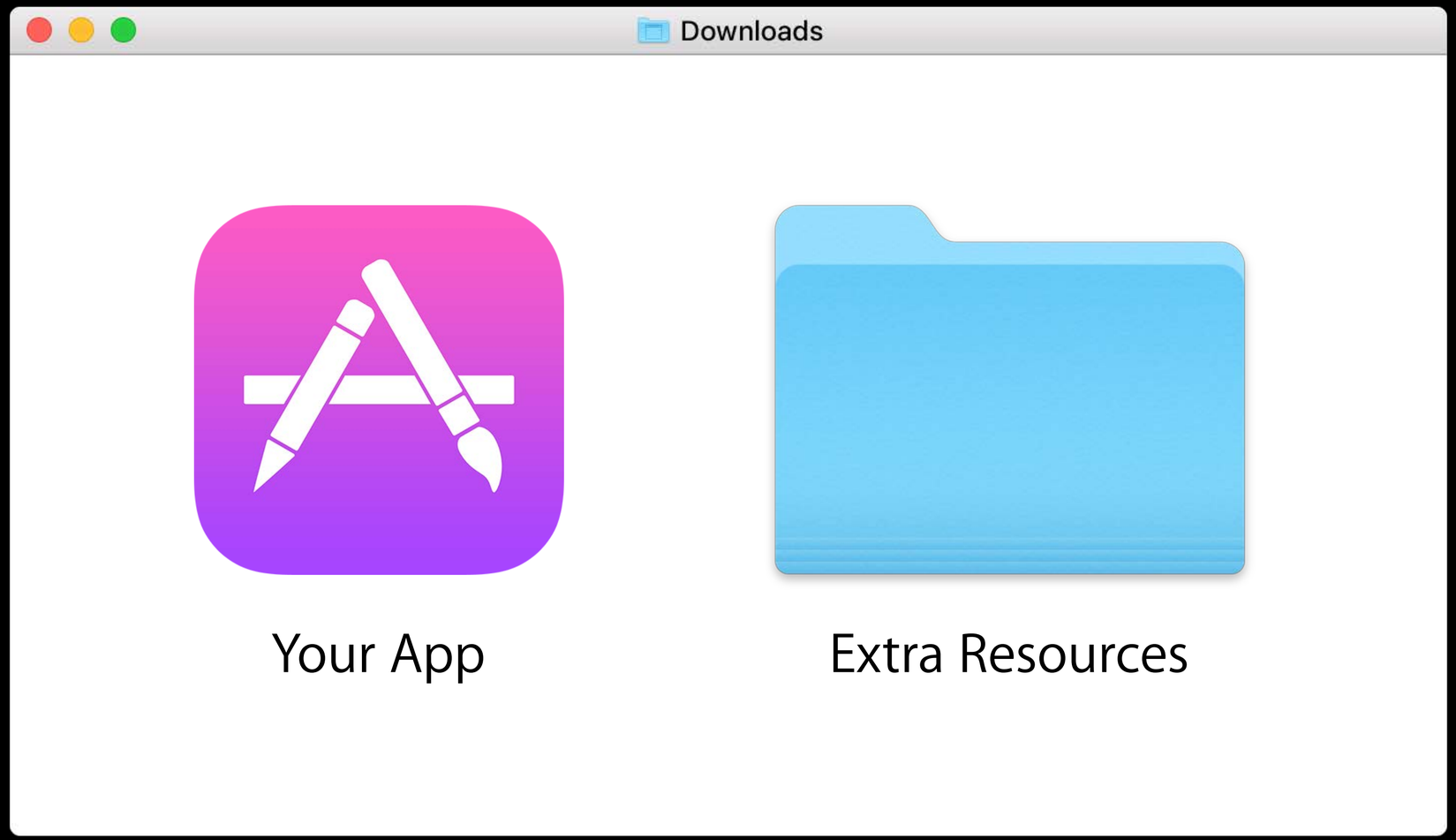
No change for previously run apps

Applies to newly downloaded apps

Applies to apps on unsigned Disk Images

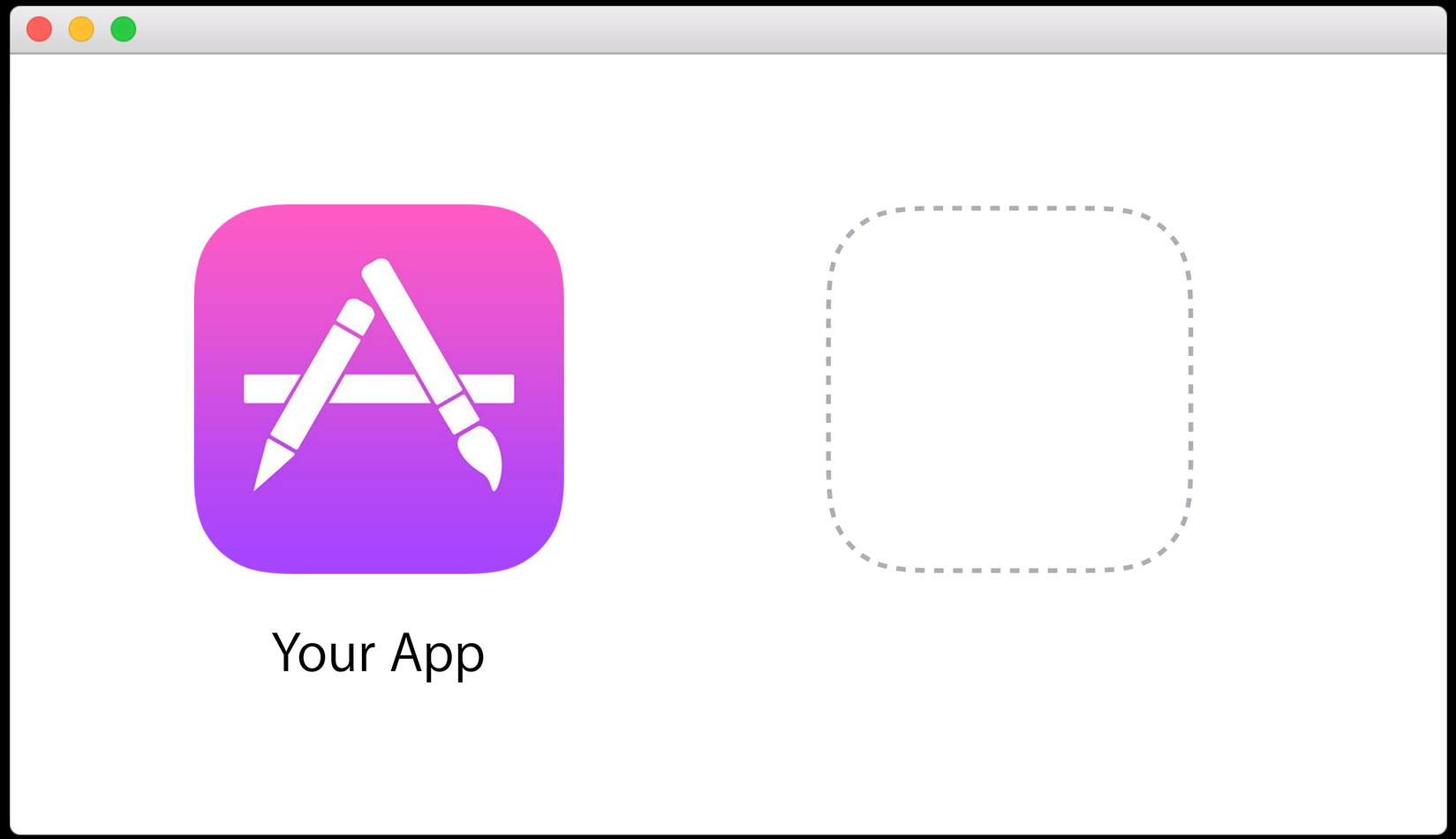
Gatekeeper Path Randomization

In a folder or Disk Image



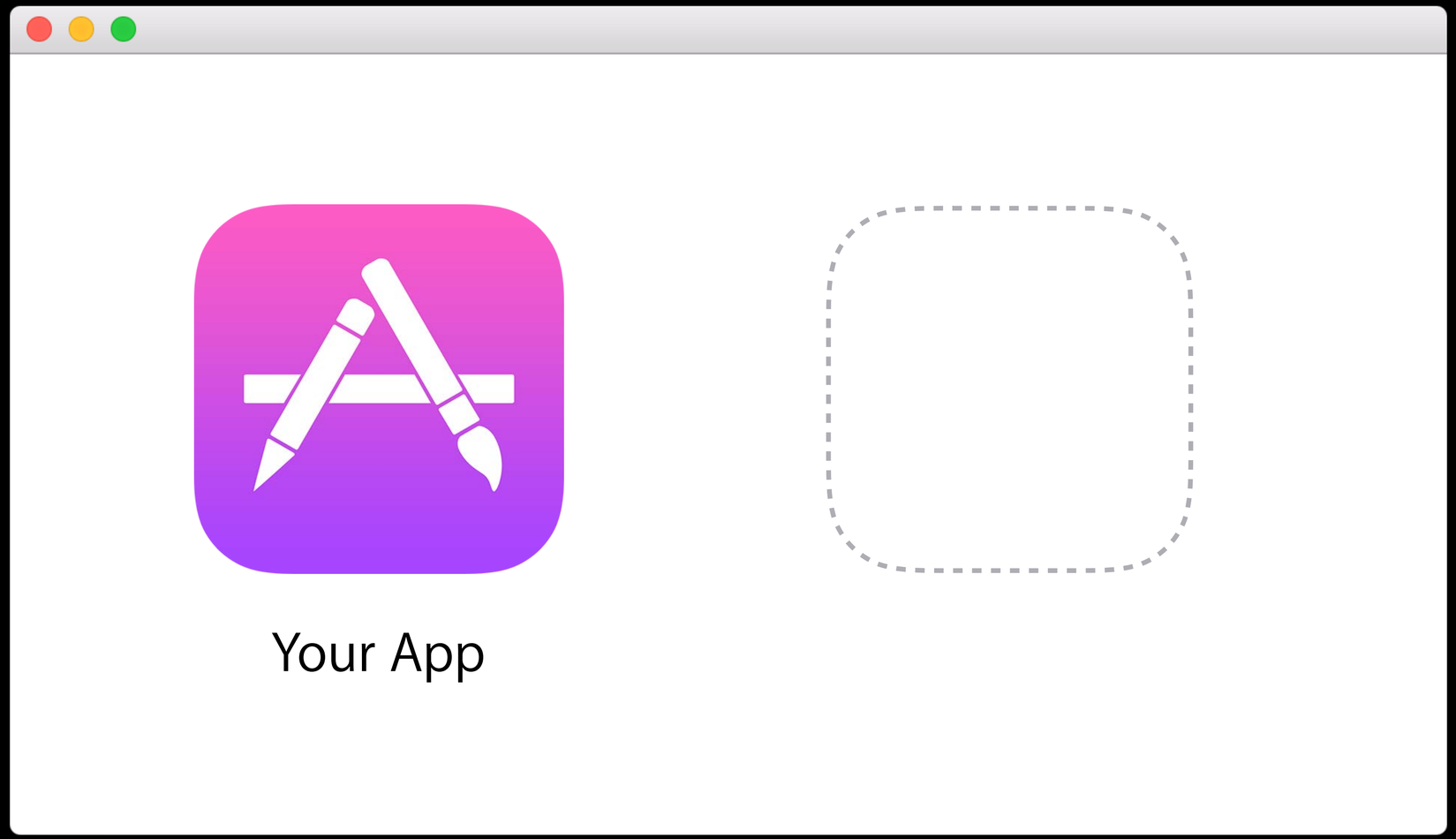
Gatekeeper Path Randomization

When app is running



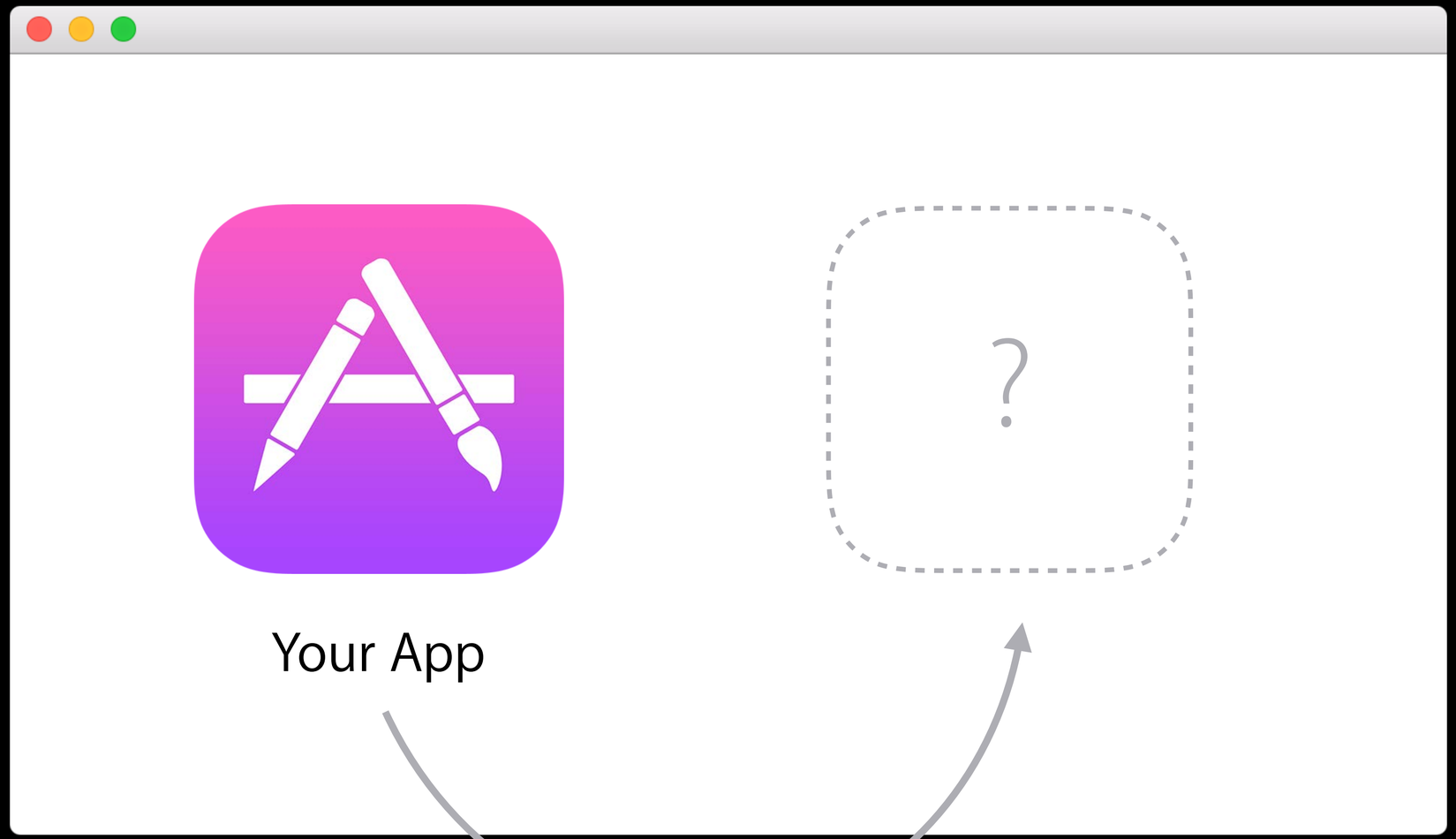
Gatekeeper Path Randomization

When app is running



Gatekeeper Path Randomization

When app is running



Gatekeeper Path Randomization

Does not apply

Gatekeeper Path Randomization

Does not apply

User moves just the app bundle

- Must only move a single app bundle

Gatekeeper Path Randomization

Does not apply

User moves just the app bundle

- Must only move a single app bundle

Signed Disk Images

Gatekeeper Path Randomization

Does not apply

User moves just the app bundle

- Must only move a single app bundle

Signed Disk Images

Signed Apple installer package

Gatekeeper Path Randomization

Does not apply

User moves just the app bundle

- Must only move a single app bundle

Signed Disk Images

Signed Apple installer package

Apps from the Mac App Store

Summary

Sign what you deliver

Check the signatures are valid

More Information

https://developer.apple.com/wwdc16/706

Labs

Security & Privacy Lab 1	Frameworks Lab C	Wednesday 9:00AM
Security & Privacy Lab 2	Frameworks Lab B	Thursday 9:00AM

WWDC16