

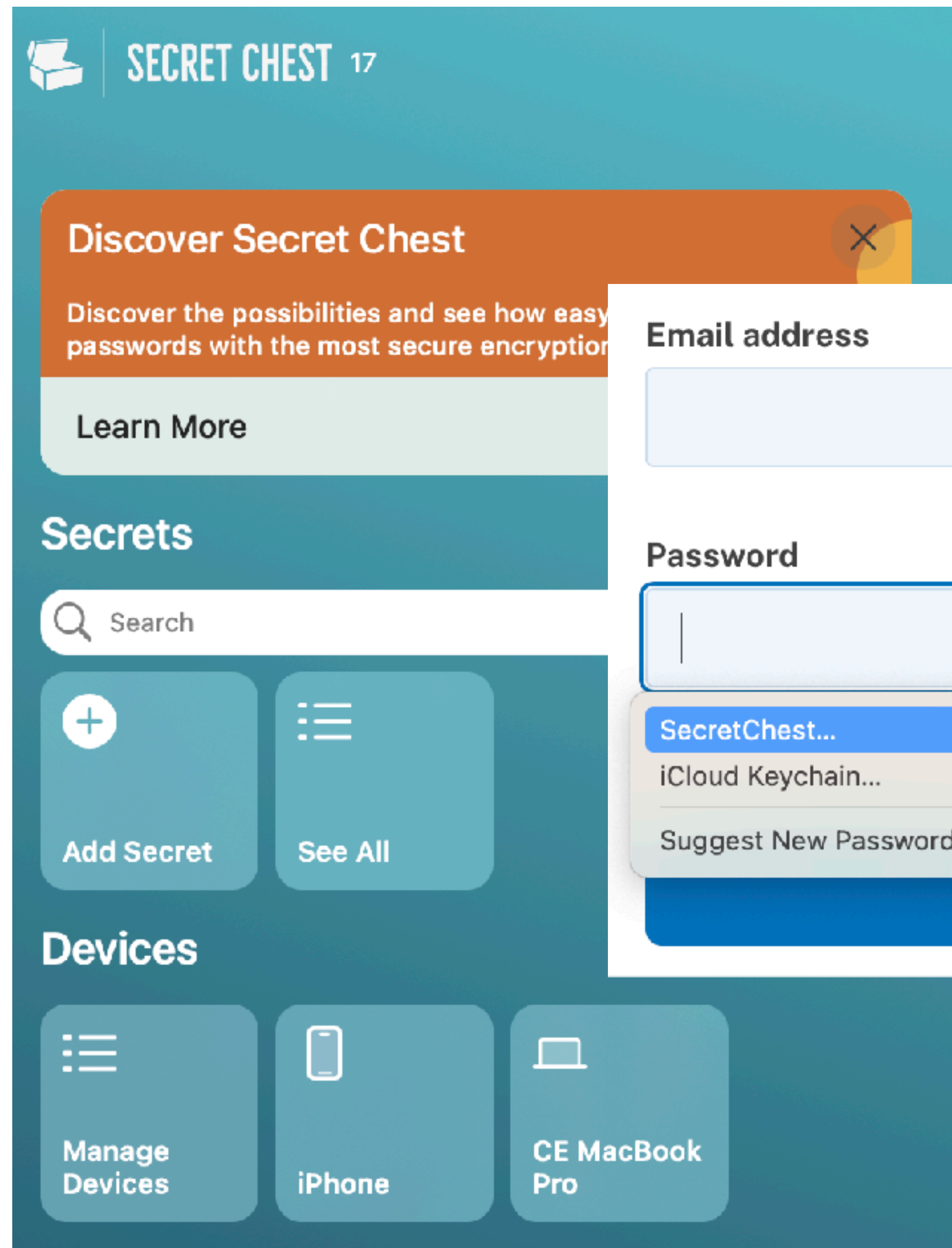
# The Past, Present, And Future of Extensions Management

Charles Edge

# System Folder

Name	Size	Kind	Label	Last Modified
▶ Apple Menu Items	—	folder	—	Sun, Apr 22, 1
Clipboard	zero K	file	—	Sun, Apr 22, 1
▶ Control Panels	—	folder	—	Sun, Apr 22, 1
▶ Extensions	—	folder	—	Sun, Apr 22, 1
Finder	500K	file	—	Sun, Apr 22, 1
▶ Fonts	—	folder	—	Mon, Aug 27, 1
▶ Preferences	—	folder	—	Sun, Apr 22, 1
Scrapbook File	32K	file	—	Thu, Apr 25, 1
▶ Startup Items	—	folder	—	Sat, Apr 14, 1
System	1,008K	suitcase	—	Sun, Apr 22, 1
System Enabler 003	16K	file	—	Mon, Aug 27, 1

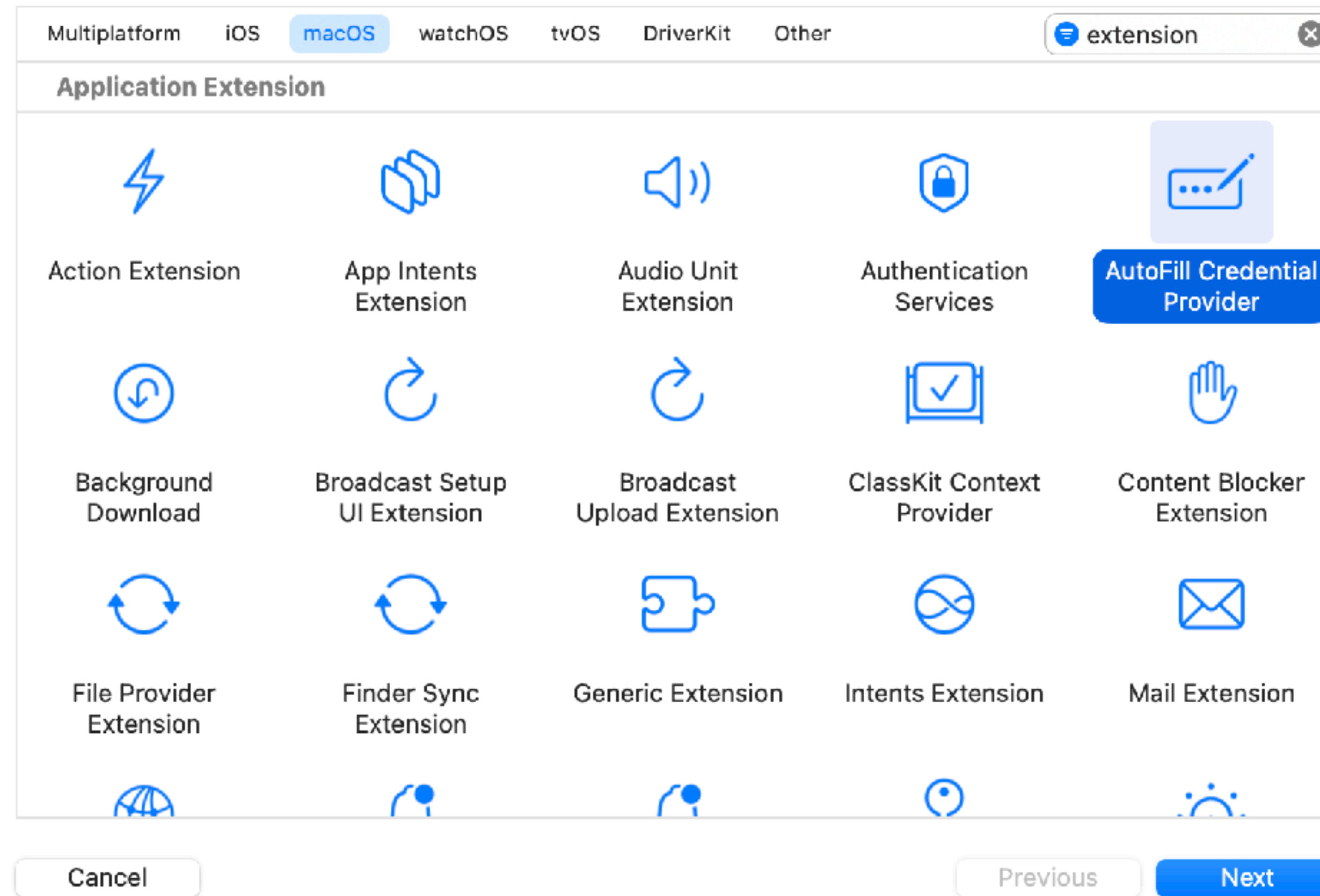
## Part II



# SecretChest.io

# File -> New Target ->

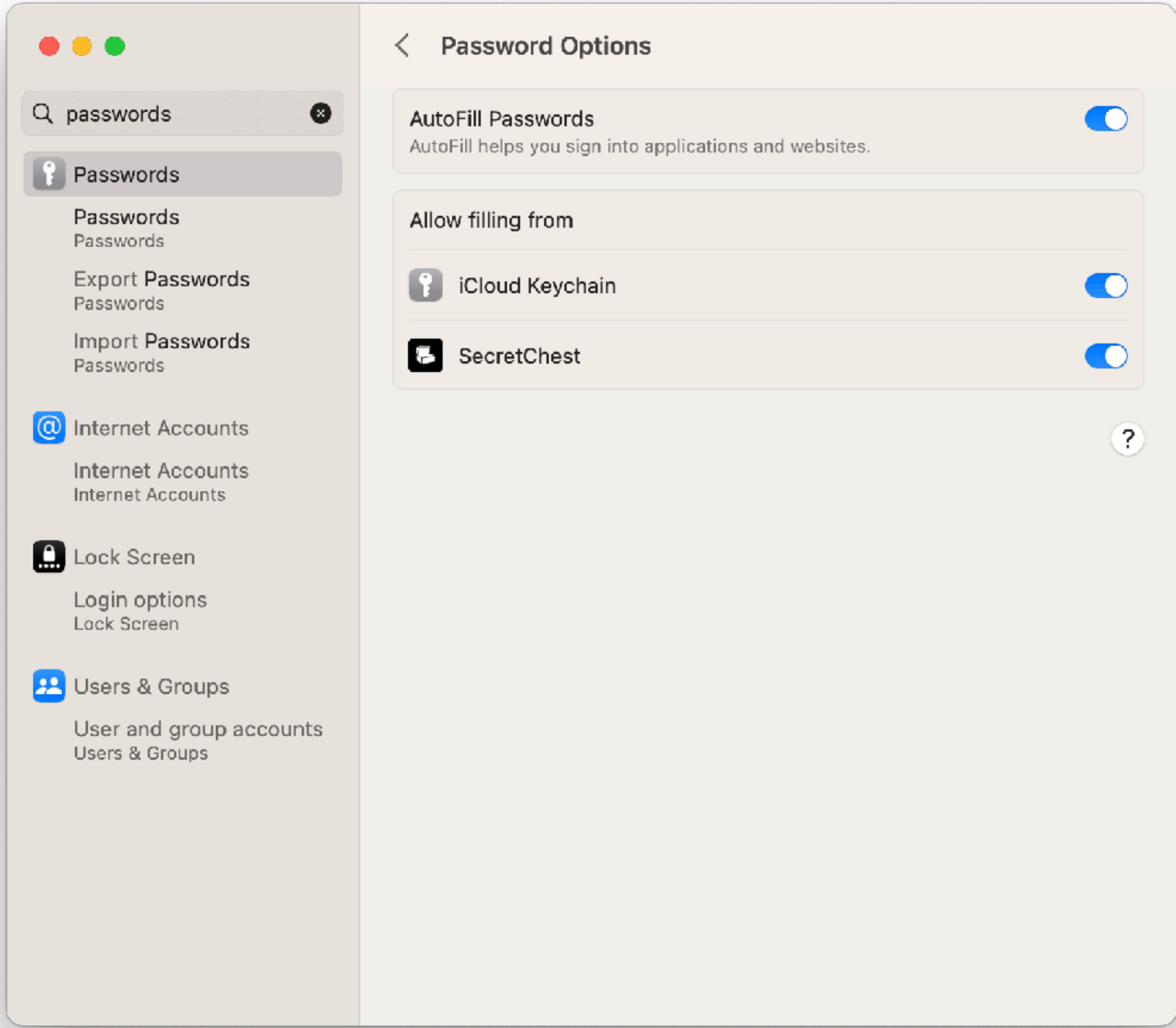
Choose a template for your new target:



# Building Extensions

The screenshot shows the Apple Developer Documentation search interface. At the top, there is a dark navigation bar with 'Documentation' on the left and 'Featured' and 'Technologies' on the right. Below this is a search bar containing the text 'App Extensions'. To the right of the search bar is a 'Show API Changes' dropdown menu. Below the search bar, there are several filter tags: 'UI', 'Graphics', 'Messaging', 'Notifications', and 'Extensions'. The search results are displayed below the filters, starting with 'Showing 23 results'. The first result is 'App Intents', with a description: 'Extend your app's custom functionality to support system-level services like Siri and the Shortcuts app.' The second result is 'Audio Toolbox', with a description: 'Record or play audio, convert formats, parse audio streams, and configure your audio session.' The third result is 'Audio Unit', with a description: 'Add sophisticated audio manipulation and processing capabilities to your app. Create audio unit extensions that generate or modify audio in a host app.' The fourth result is 'CallKit', with a description: 'Display the system-calling UI for your app's VoIP services, and coordinate your calling services with other apps and the system.' The fifth result is 'ExtensionFoundation', which is partially visible at the bottom of the list. Each result card has a blue chevron icon on the right side, indicating that it is a clickable link to more information.

[https://developer.apple.com/documentation/technologies?tags=App Extensions](https://developer.apple.com/documentation/technologies?tags=App%20Extensions)



passwords

Passwords

Passwords  
Passwords

Export Passwords  
Passwords

Import Passwords  
Passwords

Internet Accounts

Internet Accounts  
Internet Accounts

Lock Screen

Login options  
Lock Screen

Users & Groups

User and group accounts  
Users & Groups

## Password Options

AutoFill Passwords

AutoFill helps you sign into applications and websites.

### Allow filling from

iCloud Keychain

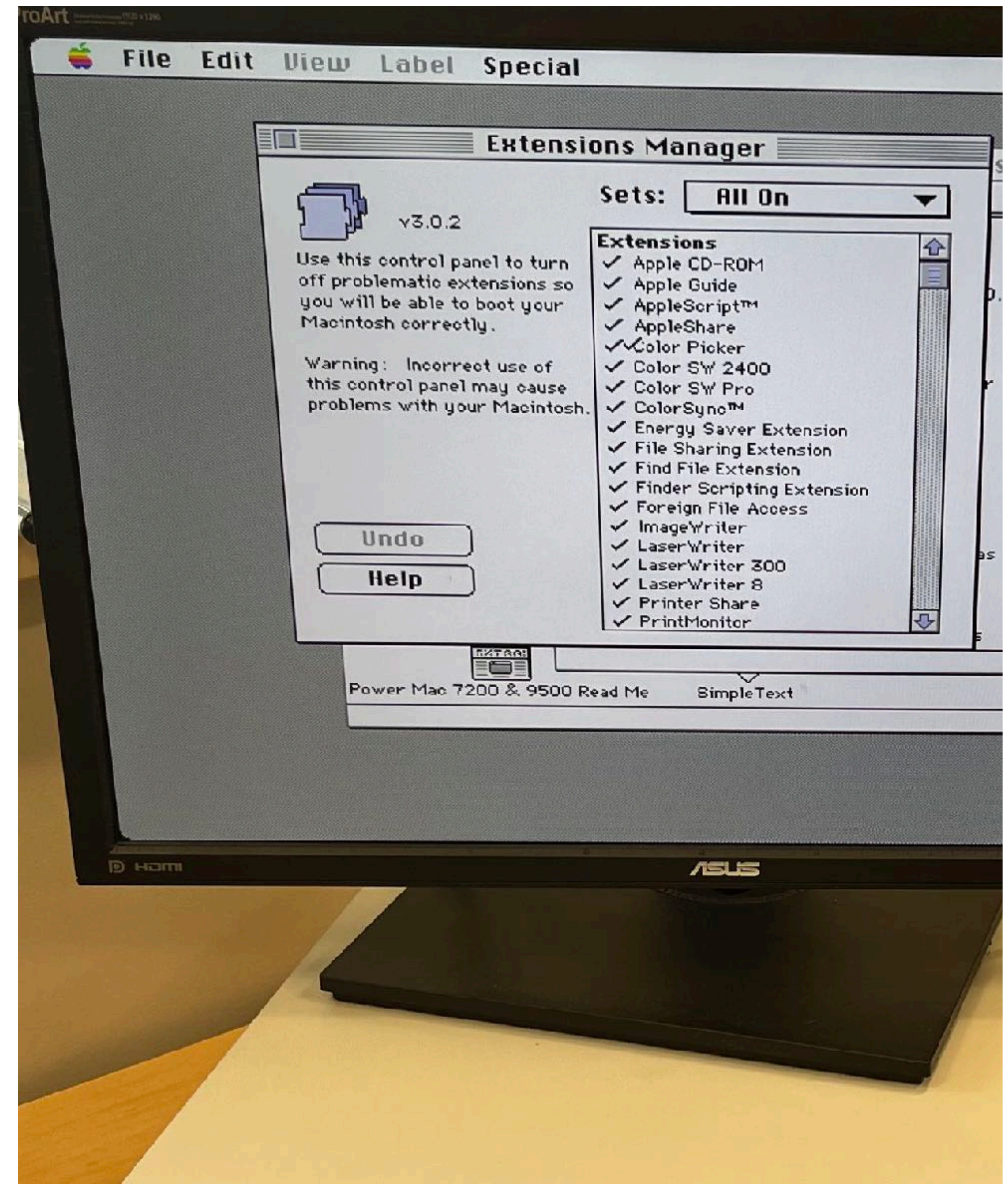
SecretChest



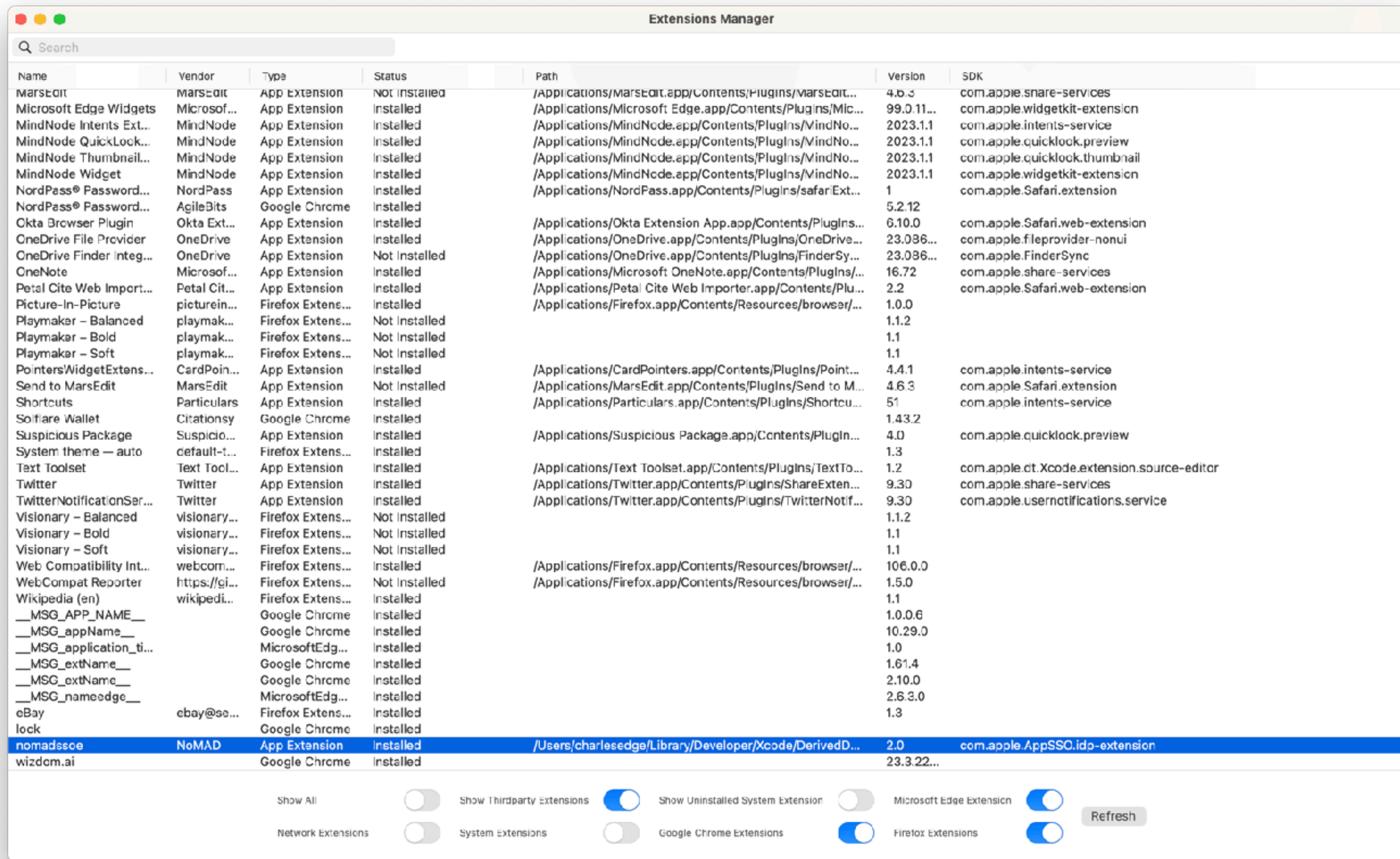
**Extensions Can Conflict**

# Extensions Manager

Circa 1991







# The Return Of Extensions Manager

<https://github.com/krypted/extensionsmanager>

# A few extra lines of code...

```
///
extension Interface_ReadableMainActorValue<(any Interface_LocalSecretChestInstance)?> {

    ///
    public func fetchPasswordForCredentialProviderExtension
        (credentialIdentity: ASPasswordCredentialIdentity,
         extensionContext: ASCredentialProviderExtensionContext)
    -> AnyProcedure<Void> {

        ///
        Name("#function") {
            self
                .getCurrentValue
                .unwrap(orElse: "The extension has no instance to use for fetching the password.")
                .flatMap { secretChestInstance in
                    secretChestInstance
                        .loggedInSecretChest
                        .waitUntilNotNil()
                        .flatMap { loggedInInstance in
                            loggedInInstance
                                .fetchInternetPassword(
                                    for: .init(credentialIdentity)
                                )
                                .flatMap { password in
                                    loggedInInstance
                                        .disableNearbyInteraction
                                        .map { _ in extensionContext.complete(with: password) }
                                }
                            }
                    }
            }
        }
    }
}
```

Close

NearbyInstanceInteraction ✨

2
RawNearbyInstanceManager ✨
 AdvertiserManager ✨
 BrowserManager ✨

setupTopLevelDisplay ✓

waitUntilNotNil(timeout:) ✓
 then ✓
 () ✓

1
setupSubscription ✓
 then ✓
 tryToProduceOutput(using:retryOnEachPublishFrom:timeout:) ✓

Optional<ProductionLocalSecretChestInstance> ✓
 Optional<ProductionLocalSecretChestInstance> ✓

0
startupTasks ✓

Close

```

MainActorValueModule_main_actor_value.MainActorValue<Swift.Dictionary<interface_nearby_secret_chest_interaction.NearbySecretChestI
D, interface_nearby_secret_chest_interaction.Interface_NearbySecretChest>>(fetchValue: (Function)), retentionUntilDeinit:
MainActorValueModule_main_actor_value_source.MainActorValueSource<Swift.Array<Any>>, pushNotificationSender:
production_secret_chest_push_notification_sender.ProductionSecretChestPushNotificationSender(awsSNSClient: AWSSNS.SNSClient,
userDevicesManager: production_user_devices_manager.ProductionUserDevicesManager(userDevices: (Extended Existential)))))
localInstallationParticipant: installation_participant.InstallationParticipant(deviceID: C2D3E766-093A-41C1-99A4-BD4DD1382173,
instanceType: secret_chest_instance_type.SecretChestInstanceType.mainApp, secureEnclave:
local_secure_enclave.LocalSecureEnclave(_encrypt: (Function), _decrypt: (Function)), shardStorage:
local_shard_storage.LocalShardStorage(_storeShard: (Function), _fetchShard: (Function), _deleteShard: (Function), _wipeShards:
(Function)), installationMapStorage: local_installation_map_storage.LocalInstallationMapStorage(locallyStoredInstallationMaps:
MainActorValueModule_main_actor_value_source.MainActorValueSource<Swift.Dictionary<internet_password_identity.InternetPasswordIde
ntity, installation_maps.InternetPasswordInstallationMap>>, autofillSuggestionsSetter:
local_autofill_suggestions_setter.LocalAutofillSuggestionsSetter(store: local_autofill_identity_store.LocalAutofillIdentityStore(systemStore:
<ASCredentialIdentityStore: 0x6000034561d0>))), localInstallationMapStorage:
local_installation_map_storage.LocalInstallationMapStorage(locallyStoredInstallationMaps:
MainActorValueModule_main_actor_value_source.MainActorValueSource<Swift.Dictionary<internet_password_identity.InternetPasswordIde
ntity, installation_maps.InternetPasswordInstallationMap>>, autofillSuggestionsSetter:
local_autofill_suggestions_setter.LocalAutofillSuggestionsSetter(store: local_autofill_identity_store.LocalAutofillIdentityStore(systemStore:
<ASCredentialIdentityStore: 0x6000034561d0>))), localShardStorage: local_shard_storage.LocalShardStorage(_storeShard: (Function),
_fetchShard: (Function), _deleteShard: (Function), _wipeShards: (Function)), _locallyStoredInstallationMaps:
MainActorValueModule_main_actor_value_source.MainActorValueSource<Swift.Dictionary<internet_password_identity.InternetPasswordIde

```



DASHBOARD

PROVIDER CONFIG

USER

SECRETS

SSO CONFIG

PAYMENT

LOGS

GROUPS

PINCODE

## Logs

Module Name	Updated Time	API	Status
UsersDeviceList	05/16/2023 : 12:49PM	GET /auth/users/device/list	↑ Success
UsersDeviceList	05/16/2023 : 12:49PM	GET /auth/users/device/list	↑ Success
UsersDeviceList	05/16/2023 : 12:49PM	GET /auth/users/device/list	↑ Success
UsersDeviceList	05/16/2023 : 12:49PM	GET /auth/users/device/list	↑ Success
UsersDeviceList	05/16/2023 : 12:49PM	GET /auth/users/device/list	↑ Success

« Previous **1** 2 3 4 5 ... 10 Next »

PINCODE

« Previous **1** 2 3 4 5 ... 10 Next »

**Kernel Extensions Were  
Deprecated In Favor of Kits and/or  
Purpose-Built App Extensions**

**Kernel extensions communicate  
with the kernel through XPC**



extens



Extensions

Extensions

Extensions

Password AutoFill

Extensions

Extensions

Finder

Extensions



Privacy & Security

Security settings

Privacy & Security



## Extensions

### Added extensions

Sharing, com.apple.email.extension, Finder extensions

### Actions

Markup

### Finder extensions

OneDrive

### Photos editing

Markup

### Quick Look

Not Enabled

### Sharing

Contact Suggestions, Add to Photos, AirDrop, Dropbox Transfer, Mail, Messages, Notes, Open in News, Reminders, Simulator, Copy Link, Add to

# Part II: Today

# Kernel Extensions can work



**/Library/Extensions still has cruft  
and spctl/kmutil can provide  
consent for them**

```
charlesedge@CE-MacBook-Pro ~ % cd /Library/Extensions
charlesedge@CE-MacBook-Pro Extensions % ls
HighPointIOP.kext      HighPointRR.kext      SoftRAID.kext
```

# Use MDM to approve kexts

The screenshot displays the macOS System Settings interface for 'Approved Kernel Extensions'. On the left, a sidebar lists various settings, with 'Approved Kernel Extensions' (1 payload configured) selected. The main panel shows the following configuration:

- Approved Kernel Extensions** (Close button)
- Allow users to approve kernel extensions
- Allow standard users to approve legacy kernel extensions (macOS 11 or later)
- Approved Team IDs and Kernel Extensions**
- Approved Team ID** (Expand button)
- Display Name**:
- Team ID**:
- Approved Kernel Extensions** (Optional) Approve the following bundle IDs only

DISPLAY NAME	KERNEL EXTENSION BUN...		
AKE Name	com.bundle.com	Edit	Delete

- Buttons**: + Add, Cancel, Save

<https://developer.jamf.com/developer-guide/docs/kernel-and-system-extensions>

**Modernized XPC with entitlements,  
sandboxes, notarizations, etc**

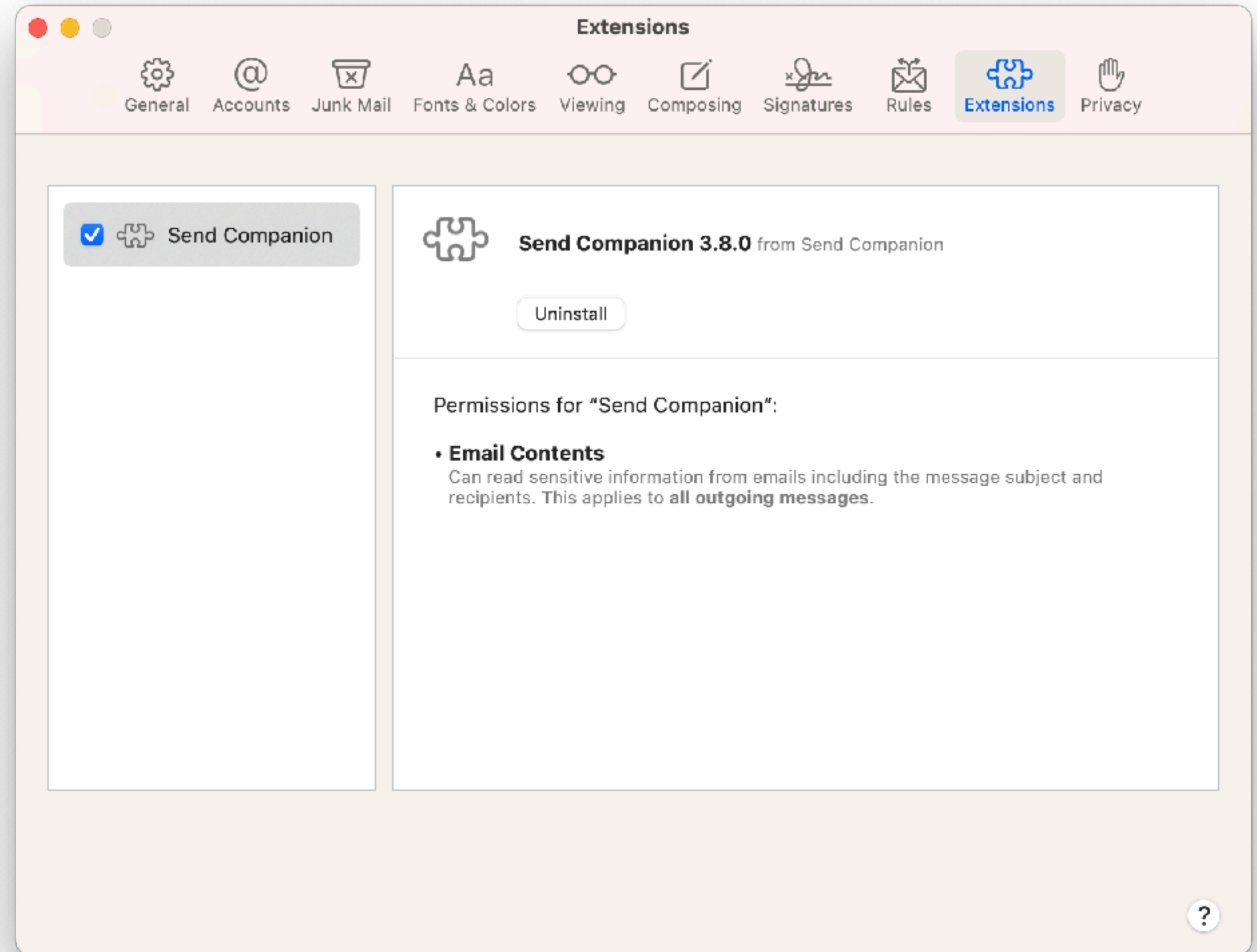
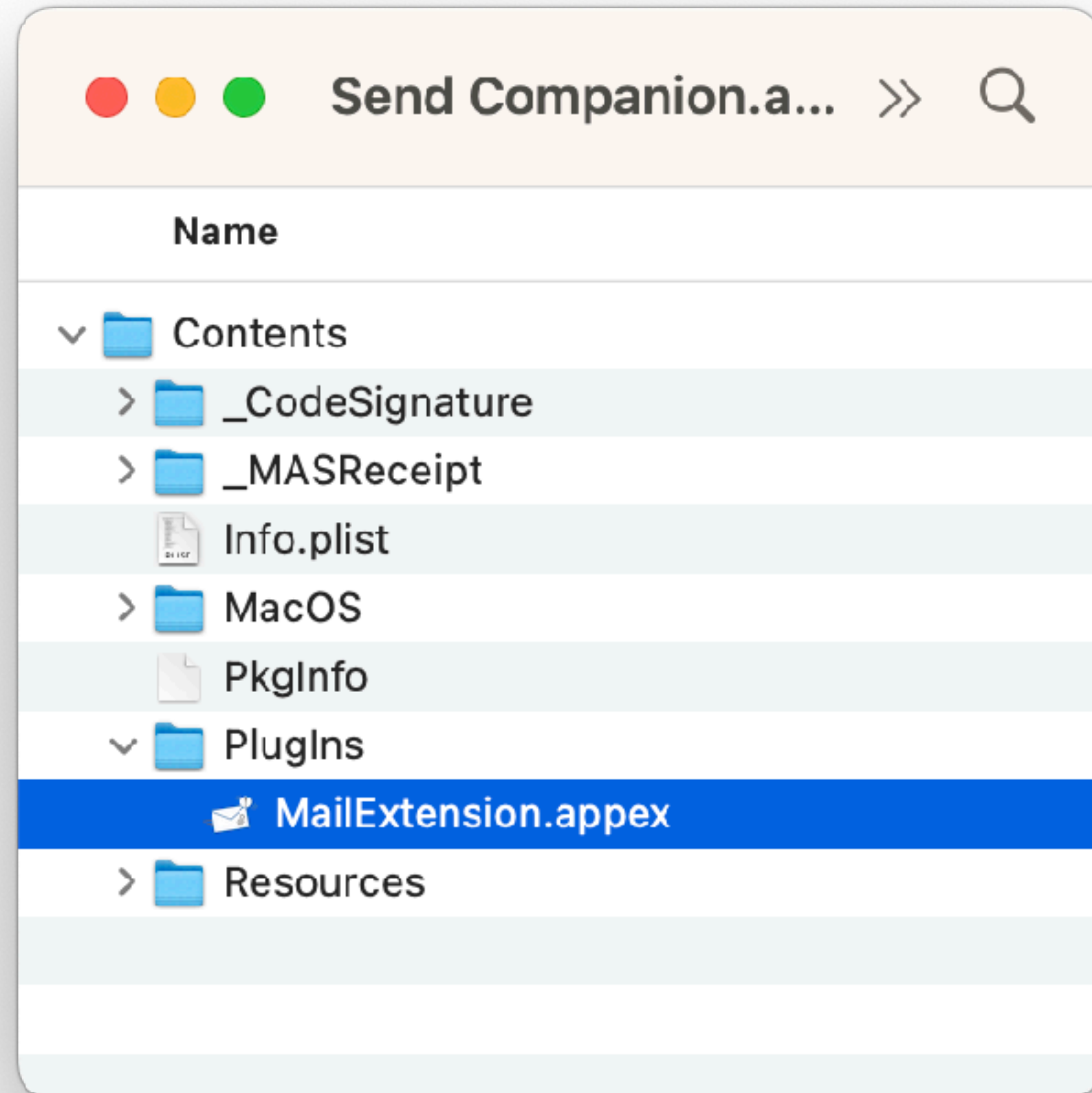
# Replacements

- Application Extensions
- Network Extensions
- System Extensions
- Browser Extensions

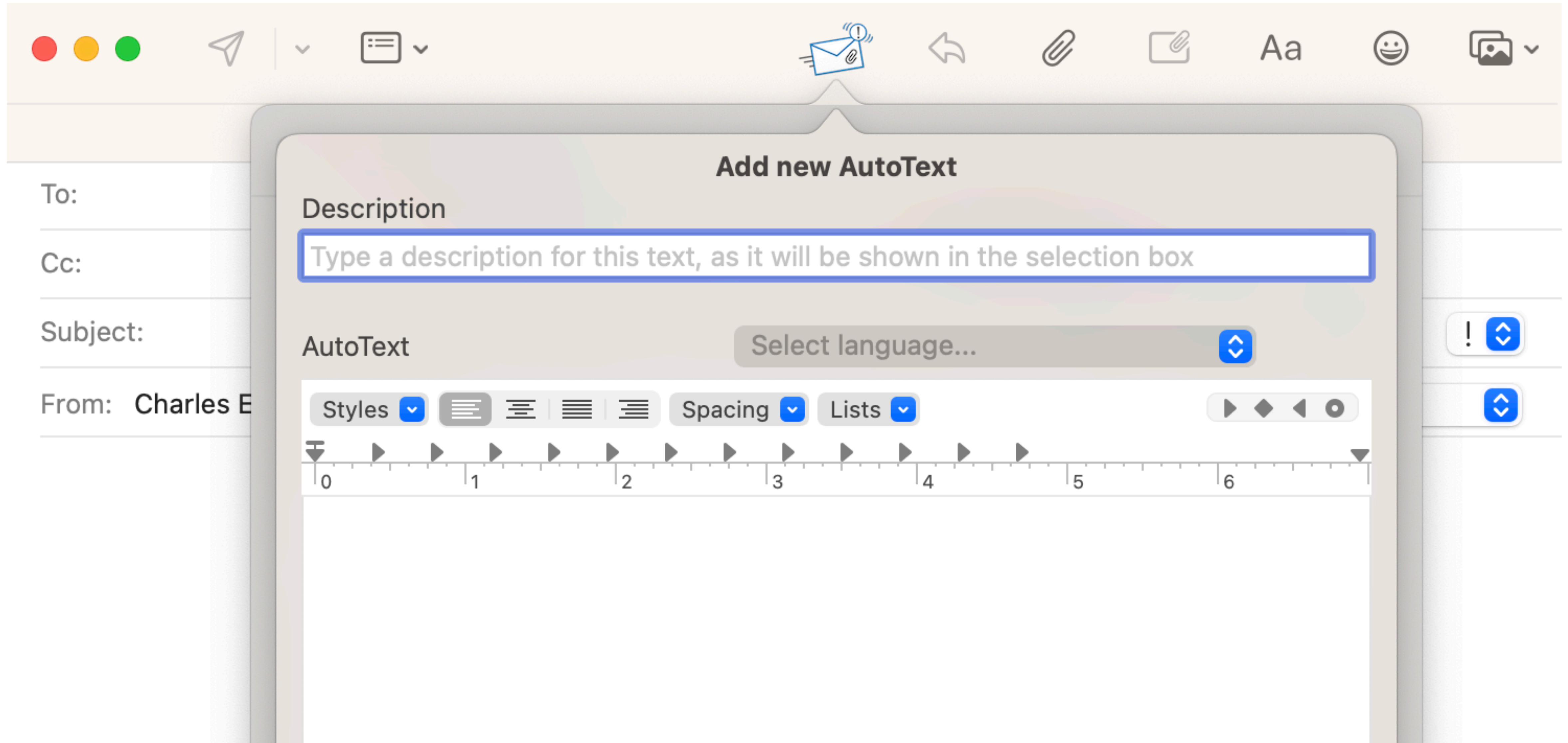
# **App Extensions**

**iOS 8/macOS 10.10 (2014)**

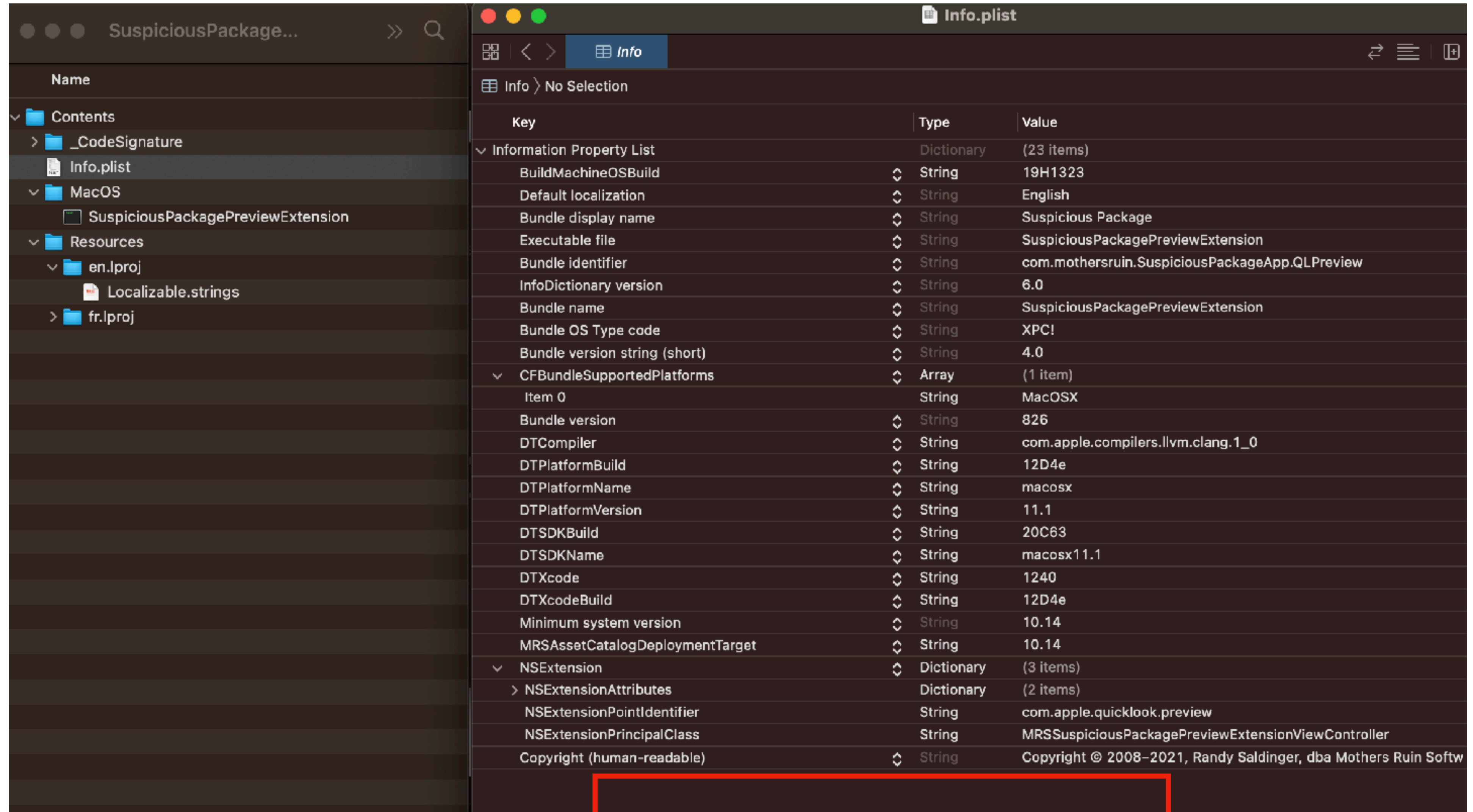
# Extensions for Mail



# Adds Screens in Mail.app



# Extensions for QuickLook



The screenshot shows a macOS file explorer window titled "SuspiciousPackage..." with a search bar and navigation icons. The left sidebar displays a file tree with the following structure:

- Contents
  - \_CodeSignature
  - Info.plist
  - MacOS
  - SuspiciousPackagePreviewExtension
  - Resources
    - en.lproj
      - Localizable.strings
    - fr.lproj

The main pane shows the "Info" tab for the selected "Info.plist" file. The content is displayed in a table with columns for Key, Type, and Value.

Key	Type	Value
Information Property List	Dictionary	(23 items)
BuildMachineOSBuild	String	19H1323
Default localization	String	English
Bundle display name	String	Suspicious Package
Executable file	String	SuspiciousPackagePreviewExtension
Bundle identifier	String	com.mothersruin.SuspiciousPackageApp.QLPreview
InfoDictionary version	String	6.0
Bundle name	String	SuspiciousPackagePreviewExtension
Bundle OS Type code	String	XPC!
Bundle version string (short)	String	4.0
CFBundleSupportedPlatforms	Array	(1 item)
Item 0	String	MacOSX
Bundle version	String	826
DTCompiler	String	com.apple.compilers.llvm.clang.1_0
DTPlatformBuild	String	12D4e
DTPlatformName	String	macosx
DTPlatformVersion	String	11.1
DTSDKBuild	String	20C63
DTSDKName	String	macosx11.1
DTXcode	String	1240
DTXcodeBuild	String	12D4e
Minimum system version	String	10.14
MRSAssetCatalogDeploymentTarget	String	10.14
NSExtension	Dictionary	(3 items)
> NSExtensionAttributes	Dictionary	(2 items)
NSExtensionPointIdentifier	String	com.apple.quicklook.preview
NSExtensionPrincipalClass	String	MRSSuspiciousPackagePreviewExtensionViewController
Copyright (human-readable)	String	Copyright © 2008–2021, Randy Saldinger, dba Mothers Ruin Softw

A red rectangular box is drawn at the bottom of the Info.plist window, highlighting the area below the table.





# node-v16.13.0.pkg

DEVELOPER ID SOFTWARE • DISTRIBUTION ARCHIVE

- Previously installed on Macintosh HD using macOS Installer — April 25, 20... [→](#)
- Installs 3,246 items — 168.5 MB on disk [→](#)
- DEVELOPER ID** Signed by "Developer ID Installer: Node.js Foundation (HX773..." [→](#)
- Notarized by Apple
- Runs 2 install scripts [→](#)
- Installs natively on Apple Silicon or Intel
- Downloaded by Safari — November 24, 2021 at 2:35 AM

Open with Suspicious Package

**One way to see extensions is to look for the entry in the info.plist**

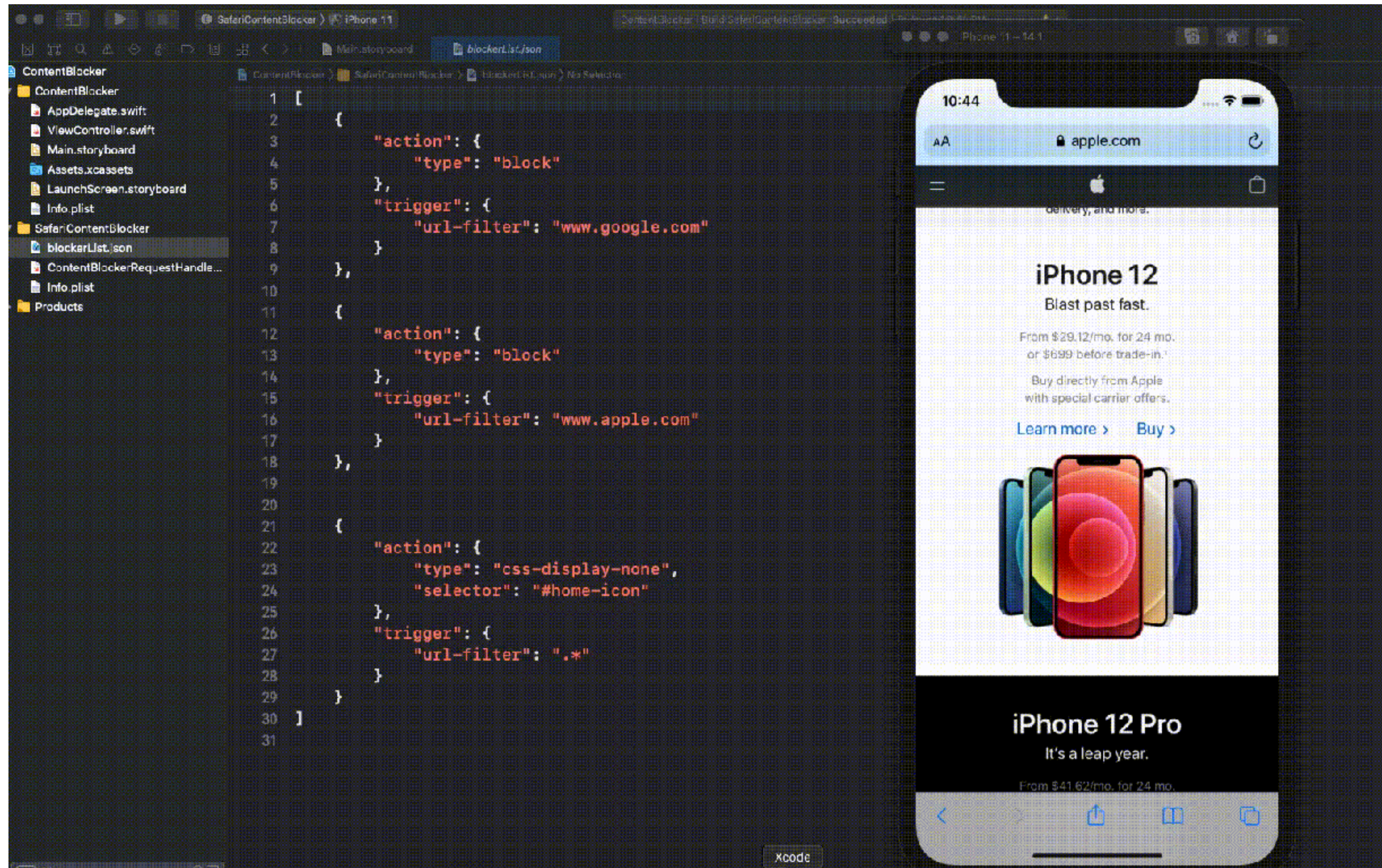
# **36 Types of App Extensions**

# Some overlap

```
<?xml version="1.0" encoding="UTF-8"?>
<!DOCTYPE plist PUBLIC "-//Apple//DTD PLIST 1.0//EN" "http://www.apple.com/DTDs/PropertyList-1.0.dtd">
<plist version="1.0">
<dict>
  <key>CFBundleDevelopmentRegion</key>
  <string>$(DEVELOPMENT_LANGUAGE)</string>
  <key>CFBundleDisplayName</key>
  <string>Restrict</string>
  <key>CFBundleExecutable</key>
  <string>$(EXECUTABLE_NAME)</string>
  <key>CFBundleIdentifier</key>
  <string>$(PRODUCT_BUNDLE_IDENTIFIER)</string>
  <key>CFBundleInfoDictionaryVersion</key>
  <string>6.0</string>
  <key>CFBundleName</key>
  <string>$(PRODUCT_NAME)</string>
  <key>CFBundlePackageType</key>
  <string>$(PRODUCT_BUNDLE_PACKAGE_TYPE)</string>
  <key>CFBundleShortVersionString</key>
  <string>1.0</string>
  <key>CFBundleVersion</key>
  <string>1</string>
  <key>NSExtension</key>
  <dict>
    <key>NSExtensionPointIdentifier</key>
    <string>com.apple.Safari.content-blocker</string>
    <key>NSExtensionPrincipalClass</key>
    <string>$(PRODUCT_MODULE_NAME).ContentBlockerRequestHandler</string>
  </dict>
</dict>
</plist>
```

<https://github.com/krypted/contentblockblock>

# Filtering at a different level









# URIBlock



krypted / URIBlockNE Public Pin Unwatch 3

[Code](#) [Issues](#) [Pull requests](#) [Actions](#) [Projects](#) [Wiki](#) [Security](#)

[main](#) [1 branch](#) [0 tags](#) [Go to file](#) [Add file](#) [Code](#)

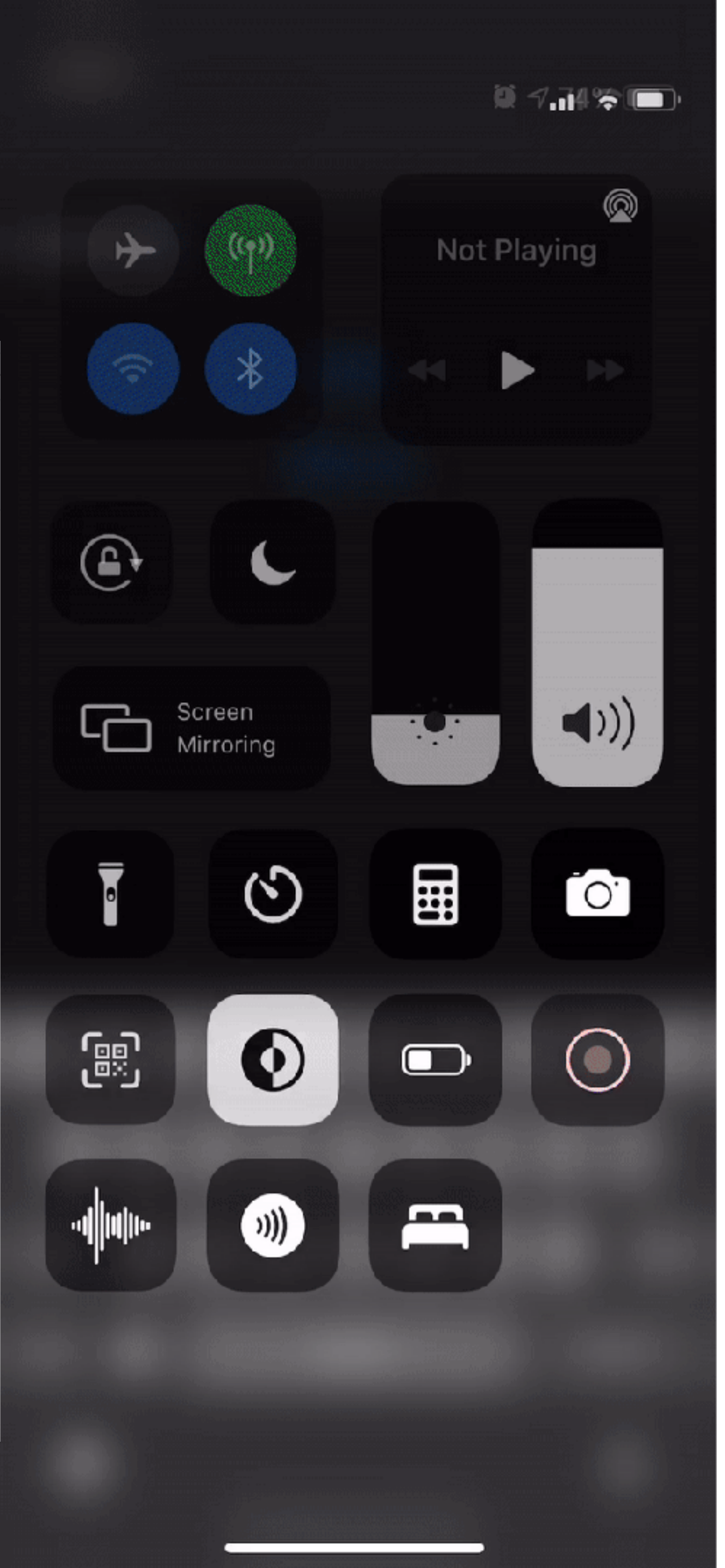
 **krypted** Update README.md fd5a74d on Oct 8, 2021 8 commits

 URIBlockNE Xcode Proj...	Add files via upload	2 years ago
 LICENSE	Initial commit	2 years ago
 README.md	Update README.md	2 years ago
 URIBlockNE Xcode Proj...	Add files via upload	2 years ago
 demovid.gif	Add files via upload	2 years ago

 [README.md](#) 

## URIBlockNE

A network extension app to block a user input URI. Meant as a network extension filter proof of concept. This is just a research effort to display one of the many capabilities of the NetworkExtension APIs from Apple.



# Network Extensions

- iOS 11 (2017)/macOS 10.15, grew to include:
  - Content filters (although there's a content blocker appex)
  - Custom socket-based protocols
  - DNS Proxies
  - Transparent proxies
  - Virtual machines
  - VPNs

**+ Wireguard = ZTNA**



# Network Extension Preferences

`/Library/Preferences/com.apple.networkextension.plist`

`com.apple.networkextension.cache.plist`

`com.apple.networkextension.control.plist`

`com.apple.networkextension.necp.plist`

`com.apple.networkextension.uuidcache.plist`

# Red Herrings

`com.apple.networkextension.control.plist`

```
CriticalDomains = (  
    "cheeserolling.apple.com",  
    "woolyjumper.sd.apple.com",  
    "basejumper.apple.com",  
    "basejumper-vip.sd.apple.com",  
    "basejumper.sd.apple.com",  
    "locksmith.apple.com",  
    "gdmf-staging-int.apple.com",  
    "pallas-uat.rno.apple.com",  
    "pr2-pallas-staging-int-prz.apple.com",  
    "livability-api.swe.apple.com"  
);
```

**In short, not much info in these**

# **System Extensions**

## **(10.15/2019)**

# SystemExtensions.framework

- Applications send an `activationRequest` or `deactivationRequest` to `sysextd` through the `SystemExtensions.framework`
- `sysextd` sends messages to `kextd`, `endpointsecurityd`, & `nesessionmanager`
- `kextd` is for drivers and IOkit
- `/usr/libexec/endpointsecurityd` is for the Endpoint Security Extension (`/System/Library/Extensions/EndpointSecurity.kext`)
- `NetworkExtension.framework` is for the Network Extension (`/usr/libexec/nesessionmanager`)

# Where's The Information?

defaults read /Library/SystemExtensions/db.plist

```
{
  bootUUID = "8FB1D036-6281-4926-8065-A1E3D6D31586";
  developerMode = 0;
  extensionPolicies = (
  );
  extensions = (
    {
      additionalLaunchdPlistEntries = {length = 825, bytes = 0x62706c69 73743030 d4010203 04050607 ... 00000000 00000281 };
      bundleVersion = {
        CFBundleShortVersionString = "5.5";
        CFBundleVersion = 6273;
      };
      categories = (
        "com.apple.system_extension.network_extension"
      );
      container = {
        bundlePath = "/Applications/Little Snitch.app";
      };
      identifier = "at.obdev.littlesnitch.networkextension";
      originPath = "/Applications/Little Snitch.app/Contents/Library/SystemExtensions/at.obdev.littlesnitch.networkextension.systemextension";
      references = (
        {
          appIdentifier = "at.obdev.littlesnitch";
          appRef = "file:///file/id=6571367.77237928/";
          teamID = MLZF7K7B5R;
        }
      );
      stagedBundleURL = {
        relative = "file:///Library/SystemExtensions/6EAF3E51-FD01-45A8-9717-88B19CDC3BE1/at.obdev.littlesnitch.networkextension.systemextension/";
      };
      stagedCdhashes = {
        191878b25be9436ebfc3e14648f4584901eab657 = {
          cpusubtype = 0;
          cputype = 16777228;
        };
        27d374587e4c0ea1103d1b80b305751568ebae2b = {
          cpusubtype = 3;
          cputype = 16777223;
        };
      };
      state = "activated_enabled";
      teamID = MLZF7K7B5R;
      uniqueID = "6EAF3E51-FD01-45A8-9717-88B19CDC3BE1";
    }
  );
  version = 1;
}
```

# **Dynamically loads**

# Grab the uniqueID

```
defaults read /Library/SystemExtensions/6EAF3E51-FD01-45A8-9717-88B19CDC3BE1/  
at.obdev.littlesnitch.networkextension.systemextension/Contents/Info.plist
```

```
{  
    BuildMachineOSBuild = 21G115;  
    CFBundleDevelopmentRegion = en;  
    CFBundleDisplayName = "Little Snitch Network Extension";  
    CFBundleExecutable = "at.obdev.littlesnitch.networkextension";  
    CFBundleIdentifier = "at.obdev.littlesnitch.networkextension";  
    CFBundleInfoDictionaryVersion = "6.0";  
    CFBundleName = "at.obdev.littlesnitch.networkextension";  
    CFBundlePackageType = SYSX;  
    CFBundleShortVersionString = "5.5";  
    CFBundleSupportedPlatforms = (  
        MacOSX  
    );  
    CFBundleVersion = 6273;  
    DTCompiler = "com.apple.compilers.llvm.clang.1_0";  
    DTPlatformBuild = 13F17a;  
    DTPlatformName = macosx;  
    DTPlatformVersion = "12.3";  
    DTSDKBuild = 21E226;  
    DTSDKName = "macosx12.3";  
    DTXcode = 1340;  
    DTXcodeBuild = 13F17a;  
    LSMinimumSystemVersion = "11.0";  
    NSHumanReadableCopyright = "Copyright \U00a9 2002-2022 Objective Development";  
    NSSystemExtensionUsageDescription = "This system extension enables Little Snitch to filter network traffic.";  
    NetworkExtension = {  
        NEMachServiceName = "MLZF7K7B5R.at.obdev.littlesnitch.networkextension";  
        NEProviderClasses = {  
            "com.apple.networkextension.filter-data" = "at_obdev_littlesnitch_networkextension.LSFilterDataProvider";  
        };  
    };  
};  
}
```



# systemextensionctl

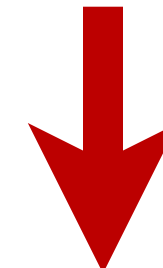
systemextensionsctl: usage:

```
systemextensionsctl developer [on|off]
```

```
systemextensionsctl list [category]
```

```
systemextensionsctl reset - reset all System Extensions state
```

```
systemextensionsctl uninstall <teamId> <bundleId>; can also accept '-' for teamID
```



sysextd(8)

System Manager's Manual

sysextd(8)

## NAME

**sysextd** - System Extension daemon

## DESCRIPTION


**sysextd** is a daemon that provides services to manage System Extensions on this machine.


There are no configuration options to **sysextd**. Users should not run **sysextd** manually.

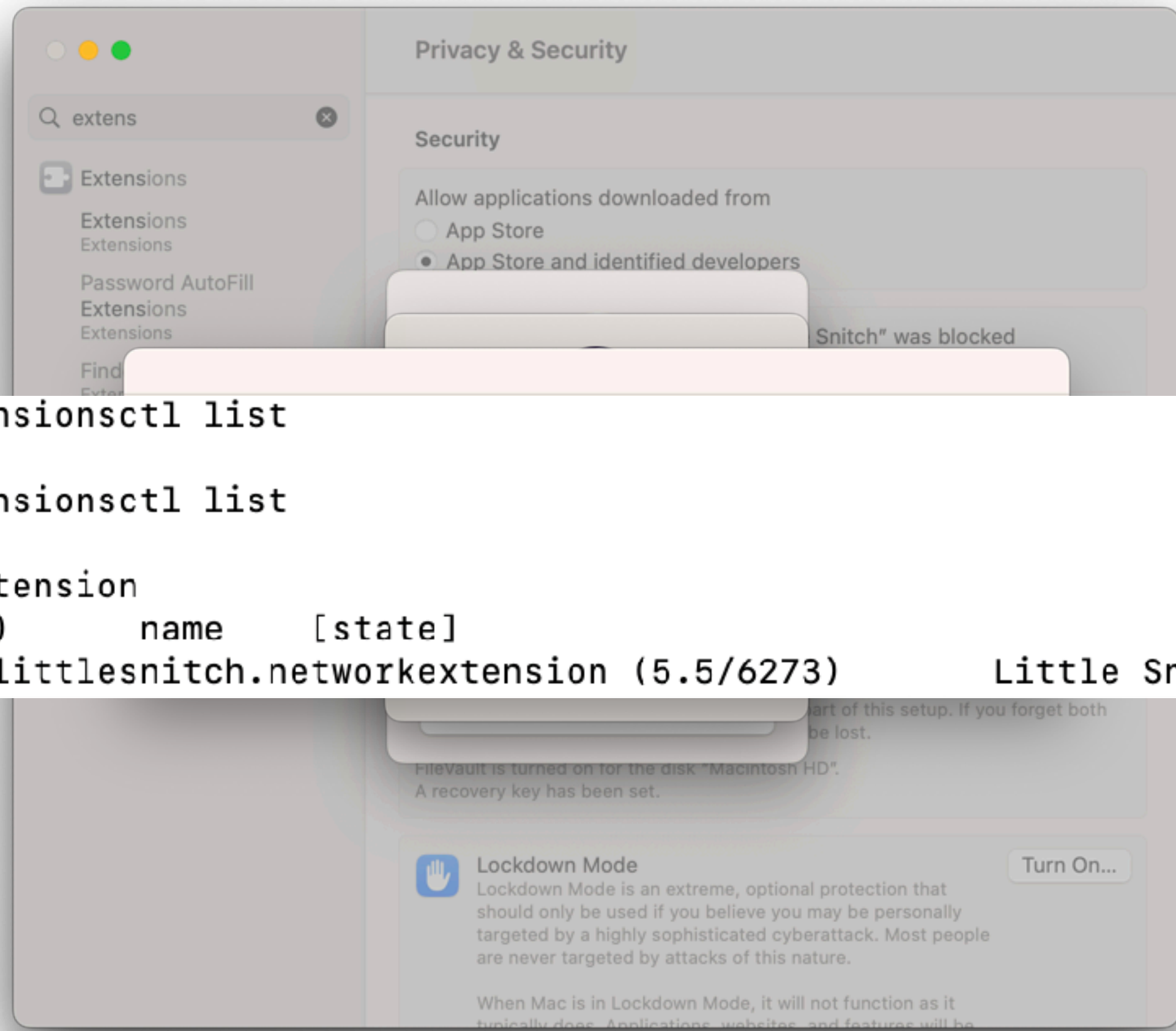
Darwin

February 7, 2019

Darwin

 **"Little Snitch Agent" Notifications**  
Notifications may include alerts, sounds, and icon badges.

 **Background Items Added**  
"Little Snitch" added items that can run in the background. You can manage this in Login Items Settings.



```
[charlesedge@CE-MacBook-Pro ~ % systemextensionsctl list
0 extension(s)
[charlesedge@CE-MacBook-Pro ~ % systemextensionsctl list
1 extension(s)
--- com.apple.system_extension.network_extension
enabled active teamID bundleID (version) name [state]
* * MLZF7K7B5R at.obdev.littlesnitch.networkextension (5.5/6273) Little Snitch Network Extension [activated enabled]
```

**The information in `/Library/`  
`SystemExtensions/<uniqueID>` is copied  
there from the relative path in the app bundle**

- > \_CodeSignature
- CodeResources
- Components
  - Little Snitch Agent
  - Little Snitch Network Monitor
  - Little Snitch Software Update
  - littlesnitch
- embedded.provisionprofile
- Info.plist
- Library
  - SystemExtensions
    - at.obdev.littlesnitch.endpointsecurity.systemextension
    - at.obdev.littlesnitch.networkextension.systemextension
- MacOS
- PkgInfo
- Resources

```

<?xml version="1.0" encoding="UTF-8"?>
<!DOCTYPE plist PUBLIC "-//Apple//DTD PLIST 1.0//EN"
"http://www.apple.com/DTDs/PropertyList-1.0.dtd">
<plist version="1.0">
<dict>
  <key>com.apple.application-identifier</key>
  <string>MLZF7K7B5R.at.obdev.littlesnitch</string>
  <key>com.apple.developer.networking.networkextension</
key>
  <array>
    <string>content-filter-provider-systemextension</
string>
  </array>
  <key>com.apple.developer.system-extension.install</key>
  <true/>
  <key>com.apple.developer.team-identifier</key>
  <string>MLZF7K7B5R</string>
  <key>com.apple.security.application-groups</key>
  <array>
    <string>MLZF7K7B5R.at.obdev.littlesnitch</string>
  </array>
  <key>com.apple.security.automation.apple-events</key>
  <true/>
</dict>
</plist>

```

Downloads Folder	<input type="checkbox"/> Read	<input type="checkbox"/> Read and write
Movies Folder	<input type="checkbox"/> Read	<input type="checkbox"/> Read and write
Music Folder	<input type="checkbox"/> Read	<input type="checkbox"/> Read and write
Pictures Folder	<input type="checkbox"/> Read	<input type="checkbox"/> Read and write
User Selected File	<input type="checkbox"/> Read	<input type="checkbox"/> Read and write
App Group	1	
Scripting Target		
Keychain		
Temporary Exception		

<https://apps.apple.com/us/app/sandkorn/id1377973524?mt=12>

# Parsed codesign Output

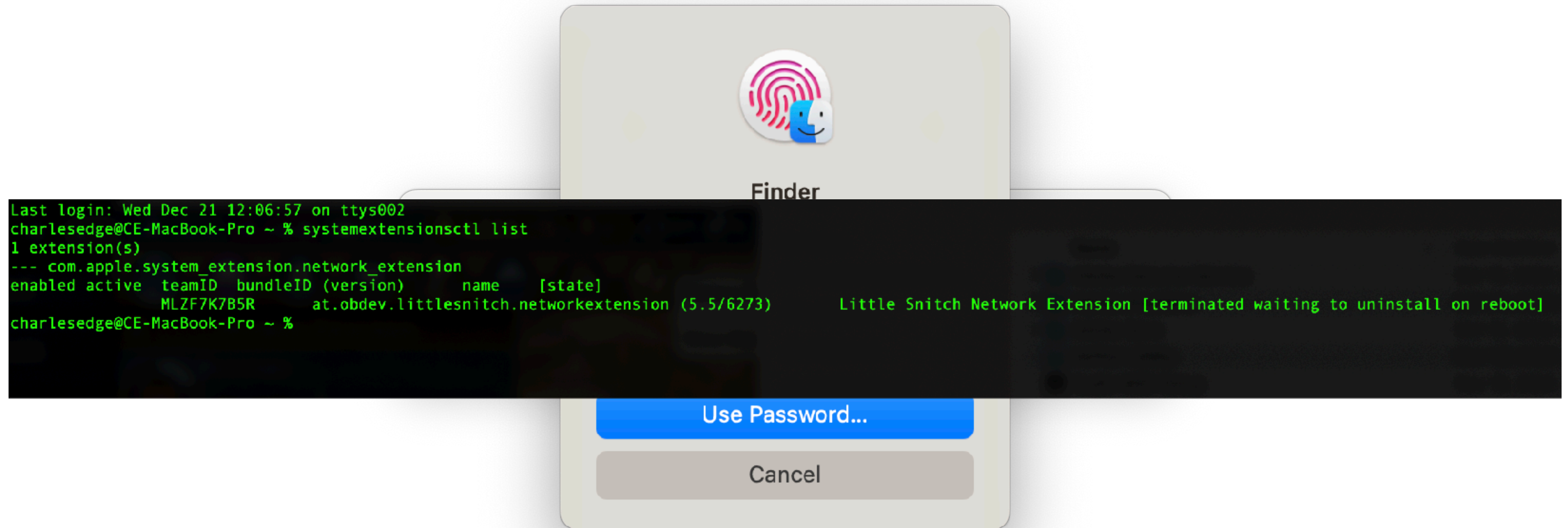
```
charlesedge@CE-MacBook-Pro ~ % codesign -d --entitlements :- /  
Applications/Little\ Snitch.app
```

```
Executable=/Applications/Little Snitch.app/Contents/MacOS/Little  
Snitch
```

```
Warning: Specifying ':' in the path is deprecated and will not work  
in a future release
```

```
<?xml version="1.0" encoding="UTF-8"?><!DOCTYPE plist PUBLIC "-//  
Apple//DTD PLIST 1.0//EN" "https://www.apple.com/DTDs/  
PropertyList-1.0.dtd"><plist  
version="1.0"><dict><key>com.apple.application-identifier</  
key><string>MLZF7K7B5R.at.obdev.littlesnitch</  
string><key>com.apple.developer.networking.networkextension</  
key><array><string>content-filter-provider-systemextension</  
string></array><key>com.apple.developer.system-extension.install</  
key><true/><key>com.apple.developer.team-identifier</  
key><string>MLZF7K7B5R</string><key>com.apple.security.application-  
groups</key><array><string>MLZF7K7B5R.at.obdev.littlesnitch</  
string></array><key>com.apple.security.automation.apple-events</  
key><true/></dict></plist>
```

# To remove, delete the app



**A modern centralized control  
mechanism**

[Table of Contents](#) 

# Use MDM to block Extensions

From the Apple Platform Deployment guide

## Extensions MDM payload settings for Apple devices

Use the Extensions [payload](#) to control which extensions can be used on a Mac computer enrolled in a mobile device management (MDM) solution.


The Extensions payload supports the following. For more information, see [Payload information](#).

- *Supported payload identifier:* com.apple.NSExtension
- *Supported operating systems and channels:* macOS device, macOS user.
- *Supported enrollment types:* Device Enrollment, Automated Device Enrollment.
- *Duplicates allowed:* True—more than one Extensions payload can be delivered to a user or device.

You can use the settings in the table below with the Extensions payload.

Setting	Description	Required
Allowed extensions	Add the bundle identifier for each extension allowed to run on the Mac. Any extensions not listed are unable to run.	No
Disallow all extension	Users can't use any extension points for their Mac.	No



kandji 

- DEVICES
- BLUEPRINTS
- LIBRARY
- USERS
- ACTIVITY
- ALERTS
- ADD DEVICES
- INTEGRATIONS
- SETTINGS
- HELP
- FEATURE REQUEST
- Charles Edge

### Team ID

Team Identifier

9PTGMPNXZ2

 Required.

Name (optional)

Symantec Endpoint Protection

System extensions

Allow specific system extensions

Choose whether all system extensions signed by the team identifier are allowed, or if specific extensions or extension types are allowed.

Allowed system extension

Name (optional)

com.symantec.mes.systemextension

Symantec System Extension 

 Required.

 Add More



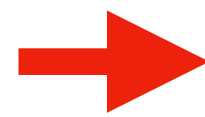
Cancel

Save

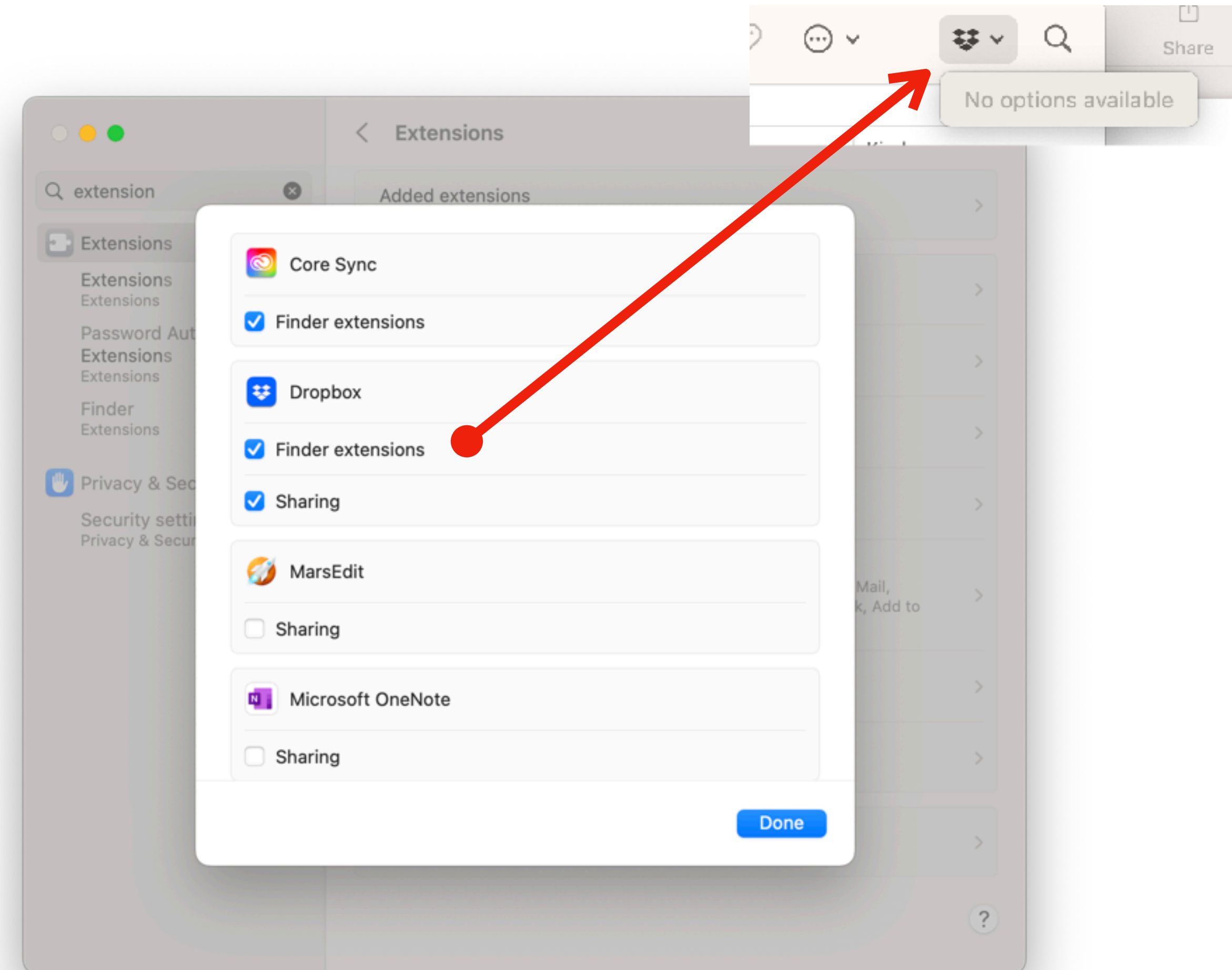
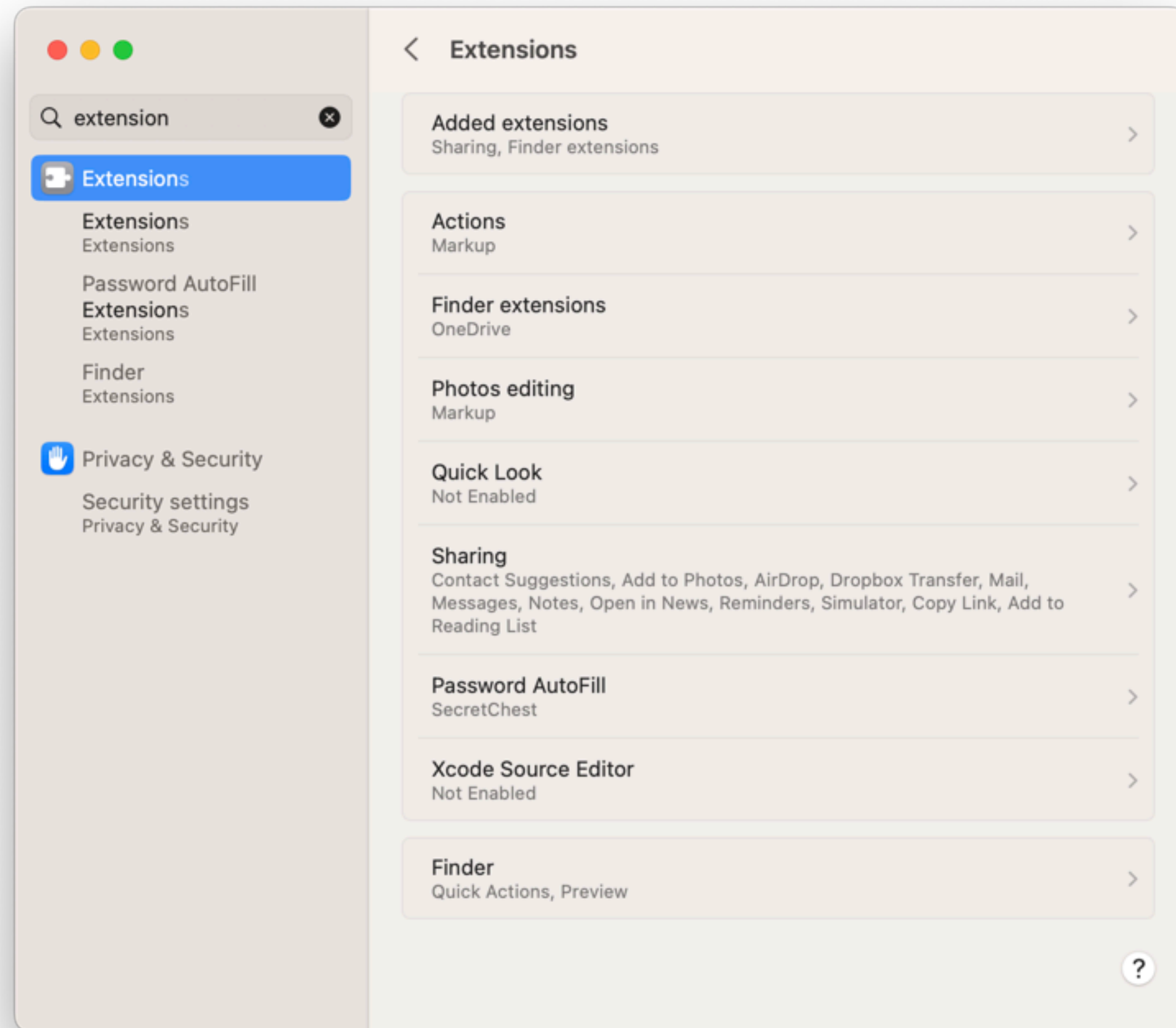
# Codesign

```
codesign -dv --verbose=4 /Applications/Little\ Snitch.app 2>&1
```

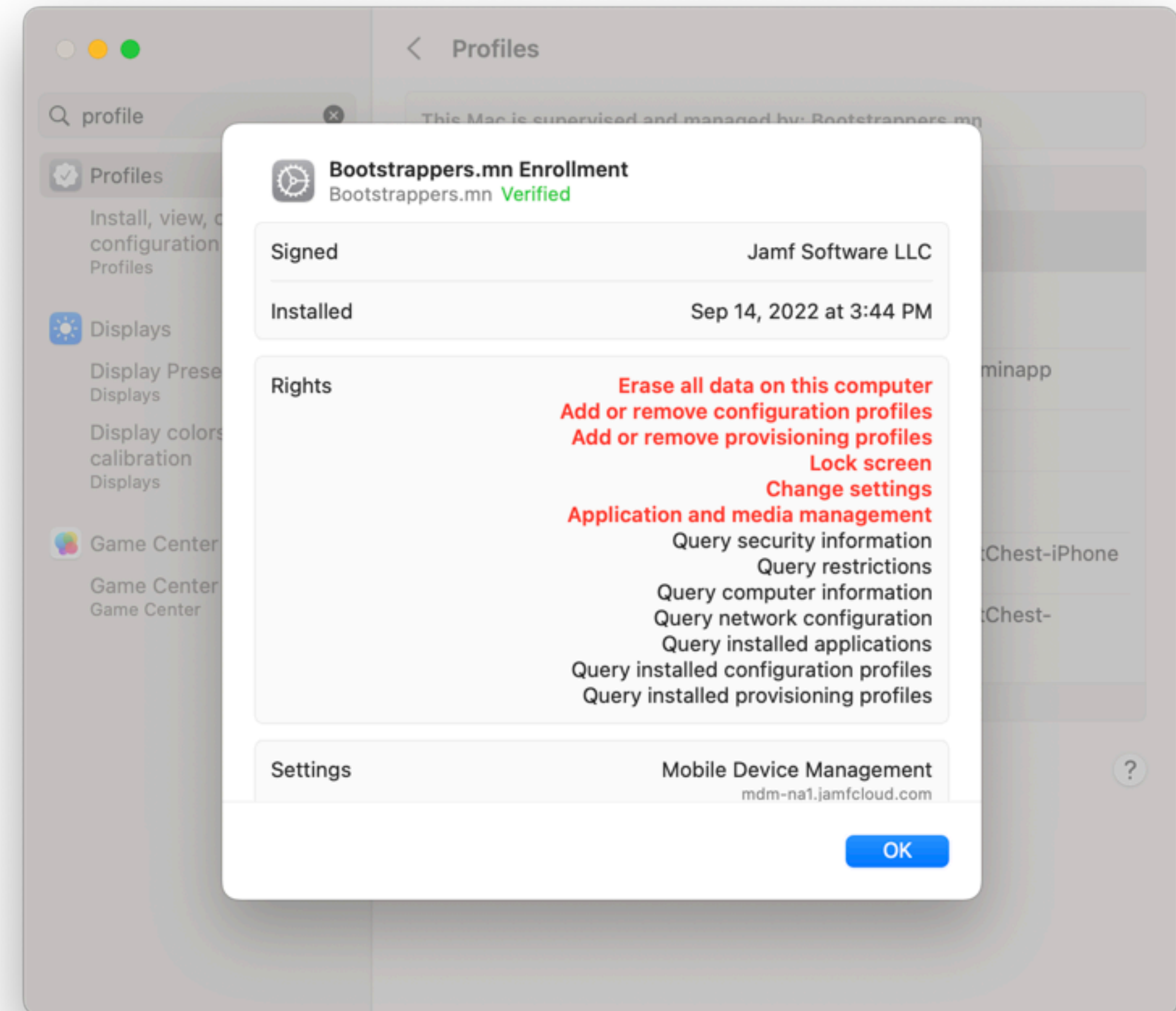
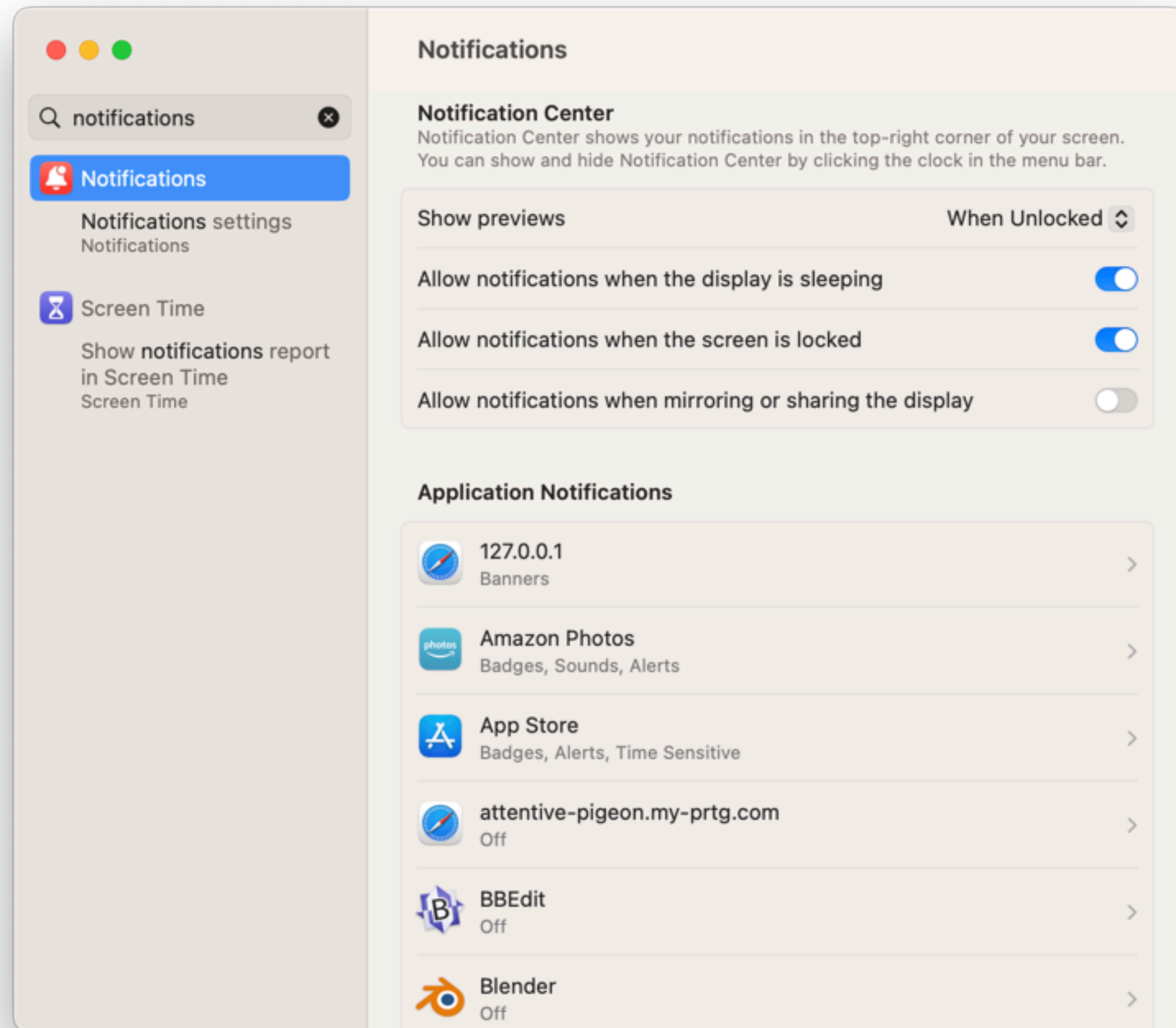
```
Executable=/Applications/Little Snitch.app/Contents/MacOS/Little Snitch
Identifier=at.obdev.littlesnitch
Format=app bundle with Mach-O universal (x86_64 arm64)
CodeDirectory v=20500 size=43585 flags=0x12b00(hard,kill,restrict,library-validation,runtime) hashes=1351+7 location=embedded
VersionPlatform=1
VersionMin=720896
VersionSDK=787200
Hash type=sha256 size=32
CandidateCDHash sha256=b9f084cff4b14e7ccc26ec20bb1690e0a890a544
CandidateCDHashFull sha256=b9f084cff4b14e7ccc26ec20bb1690e0a890a544eb7aeeacd2df16635caaae80
Hash choices=sha256
CMSDigest=b9f084cff4b14e7ccc26ec20bb1690e0a890a544eb7aeeacd2df16635caaae80
CMSDigestType=2
Executable Segment base=0
Executable Segment limit=3883008
Executable Segment flags=0x1
Page size=4096
Launch Constraints:
  None
CDHash=b9f084cff4b14e7ccc26ec20bb1690e0a890a544
Signature size=9007
Authority=Developer ID Application: Objective Development Software GmbH (MLZF7K7B5R)
Authority=Developer ID Certification Authority
Authority=Apple Root CA
Timestamp=Oct 12, 2022 at 5:39:20 AM
Info.plist entries=31
TeamIdentifier=MLZF7K7B5R
Runtime Version=12.3.0
Sealed Resources version=2 rules=13 files=496
Internal requirements count=1 size=184
```



# Extensions Pane returned in 10.10



# Some Extensions Are Apple's



# Looks simple, but...

Developer

[< All Identifiers](#)

## Certificates, Identifiers & Profiles

[< All Identifiers](#)

### Register a new identifier

- App IDs**  
Register an App ID to enable your app, app extensions, or App Clip to access available services and identify your app in a provisioning profile. You can enable app services when you create an App ID or modify these settings later.
- Services IDs**  
For each website that uses Sign in with Apple, register a services identifier (Services ID), configure your domain and return URL, and create an associated private key.
- Pass Type IDs**  
Register a pass type identifier (Pass Type ID) for each kind of pass you create (i.e. gift cards). Registering your Pass Type IDs lets you generate Apple-issued certificates which are used to digitally sign and send updates to your passes, and allow your passes to be recognized by Wallet.
- Order Type IDs**  
Register an order type identifier (Order Type ID) to support signing and distributing order bundles with Wallet and Apple Pay. Registering your order type ID lets you generate certificates to digitally sign and send updates to your orders in Wallet.
- Website Push IDs**  
Register a Website Push Identifier (Website Push ID). Registering your Website Push IDs lets you generate Apple-issued certificates which are used to digitally sign and send push notifications from your website to macOS.
- iCloud Containers**  
Registering your iCloud Container lets you use the iCloud Storage APIs to enable your apps to store data and documents in iCloud, keeping your apps up to date automatically.

### Register an App ID

[Back](#)

Platform  
iOS, macOS, tvOS, watchOS

Description

You cannot use special characters such as @, &, \*, ', ", -, .








App ID Prefix  
7Q66G8D9F9 (Team ID)

Bundle ID  Explicit  Wildcard

We recommend using a reverse-domain name style string (i.e., com.domainname.appname). It cannot contain an asterisk (\*).

#### Capabilities

#### App Services

ENABLED	NAME	NOTES
<input type="checkbox"/>	 Access WiFi Information ⓘ	
<input type="checkbox"/>	 App Attest ⓘ	
<input type="checkbox"/>	 App Groups ⓘ	
<input type="checkbox"/>	 Apple Pay Payment Processing ⓘ	
<input type="checkbox"/>	 Associated Domains ⓘ	
<input type="checkbox"/>	 AutoFill Credential Provider ⓘ	
<input type="checkbox"/>	 ClassKit ⓘ	

# Some have lengthy configurations

<https://krypted.com/swift/configure-amazon-sns-for-mac-and-ios-apns-development/>

# Installation process (from Apple)

- During the activation process, the system verifies:
- Your extension is installed in the Contents/Library/SystemExtensions folder of your app.
- Your app is installed in an appropriate Applications directory of the system.
- The code signature of your extension.
- The entitlements in the code signature match the entitlements granted to your development team.
- The identifier in your activation request matches the one in your system extension bundle.
- The identifier isn't already in use by another system extension.

[https://developer.apple.com/documentation/systemextensions/installing\\_system\\_extensions\\_and\\_drivers](https://developer.apple.com/documentation/systemextensions/installing_system_extensions_and_drivers)

**Extensions can have an entitlement  
that allows for redistribution**



## Replies

---



There is, alas, no supported way to do this. I researched this a while back as part of a DTS incident (s. 600,057,819). The system has a 'responsibility' mechanism that it uses to track the relationships between processes (you can see the results of this in Activity Monitor) but the API for this is not public (r. 14,860,959).

Share and Enjoy

—

Quinn "The Eskimo!"

Apple Developer Relations, Developer Technical Support, Core OS/Hardware

```
let myEmail = "eskimo" + "1" + "@apple.com"
```

# What's Different

- They don't access the kernel directly (userland)
- They load/register when an app that has the extension is open
- Unregister on first reboot after deleting an app (by default)
- Registration of app extensions is handled by PluginKit,
- PluginKit also performs housecleaning when the app is moved or deleted
- pkd is the PluginKit daemon

# Telemetry

# Example Command

```
pluginkit -mAvvv | grep /Applications
```

```
com.ideasoncanvas.mindnode.macos.thumbnails(2022.4.2)  
    Path = /Applications/MindNode.app/Contents/PlugIns/MindNode Thumbnail Extension.appex  
    UUID = 9DD5E3BF-6C8C-443D-A0BB-FDE07B43A5C8  
    Timestamp = 2022-12-04 14:42:18 +0000  
    SDK = com.apple.quicklook.thumbnail  
Parent Bundle = /Applications/MindNode.app  
Display Name = MindNode Thumbnail Extension  
Short Name = MindNode Thumbnail Extension  
Parent Name = MindNode  
Platform = macOS
```

# Widgets

```
Extensions — -zsh — 136x53
charlesedge@CE-MacBook-Pro Extensions % pluginkit -mAvvv | grep Widget
com.apple.Notes.WidgetExtension(4.10)
    Path = /System/Applications/Notes.app/Contents/PlugIns/com.apple.Notes.WidgetExtension.appex
com.apple.Home.HomeWidgetSingleAccessoryIntent(6.0)
    Path = /System/Applications/Home.app/Contents/PlugIns/HomeWidgetSingleAccessoryIntent.appex
    Display Name = HomeWidgetSingleAccessoryIntent
    Short Name = HomeWidgetSingleAccessoryIntent
    Path = /System/Applications/Weather.app/Contents/PlugIns/WeatherWidget.appex
    Display Name = WeatherWidget
    Short Name = WeatherWidget
com.apple.findmy.FindMyWidgetIntentsItems(1)
    Path = /System/Applications/FindMy.app/Contents/PlugIns/FindMyWidgetIntentsItems.appex
    Display Name = FindMyWidgetIntentsItems
    Short Name = FindMyWidgetIntentsItems
com.apple.WorkflowUI.WidgetConfigurationExtension(6.0)
    Path = /System/iOSSupport/System/Library/PrivateFrameworks/WorkflowUI.framework/PlugIns/WidgetConfigurationExtension
    .appex
    Display Name = WidgetConfigurationExtension
    Short Name = WidgetConfigurationExtension
com.apple.tips.Widget(9.0)
    Path = /System/Library/CoreServices/Tips.app/Contents/PlugIns/TipsAppWidget-macOSExtension.appex
com.microsoft.Outlook.CalendarWidget(16.73.1)
    Path = /Applications/Microsoft Outlook.app/Contents/PlugIns/CalendarWidgetExtension.appex
    Display Name = CalendarWidgetExtension
    Short Name = CalendarWidgetExtension
    Path = /Applications/MindNode.app/Contents/PlugIns/MindNode Widget Extension.appex
    Display Name = MindNode Widget
    Short Name = MindNode Widget
com.apple.findmy.FindMyWidgetPeople(1)
    Path = /System/Applications/FindMy.app/Contents/PlugIns/FindMyWidgetPeople.appex
    Display Name = FindMyWidgetPeople
    Short Name = FindMyWidgetPeople
developer.apple.wwdc-Release.Developer-Widget(10.4.1)
    Path = /Applications/Developer.app/Contents/PlugIns/Developer Widget.appex
    Path = /Applications/Microsoft Edge.app/Contents/PlugIns/MicrosoftEdgeWidgets.appex
    Display Name = Microsoft Edge Widgets
    Short Name = Microsoft Edge Widgets
com.apple.ScreenTimeWidgetApplication.ScreenTimeWidgetIntentsExtension(3.0)
    Path = /System/Library/CoreServices/Screen Time.app/Contents/PlugIns/ScreenTimeWidgetIntentsExtension.appex
com.apple.CalendarWidget.IntentsExtension(1.0)
    Path = /System/Library/PrivateFrameworks/CalendarWidget.framework/PlugIns/IntentsExtension.appex
com.apple.Home.HomeWidget(6.0)
    Path = /System/Applications/Home.app/Contents/PlugIns/HomeWidget.appex
    Display Name = HomeWidget
    Short Name = HomeWidget
com.apple.findmy.FindMyWidgetItems(1)
    Path = /System/Applications/FindMy.app/Contents/PlugIns/FindMyWidgetItems.appex
    Display Name = FindMyWidgetItems
    Short Name = FindMyWidgetItems
com.apple.findmy.FindMyWidgetIntentsPeople(1)
    Path = /System/Applications/FindMy.app/Contents/PlugIns/FindMyWidgetIntentsPeople.appex
    Display Name = FindMyWidgetIntentsPeople
    Short Name = FindMyWidgetIntentsPeople
```

# List Safari Extensions

```
pluginkit -mAvvv -p com.apple.Safari.web-extension
```

```
okta.ExtensionLauncher.Extension.WebExtension(6.10.0)  
Path = /Applications/Okta Extension App.app/Contents/  
  PlugIns/WebExtension.appex  
UUID = D1DC6638-0DF5-4DCE-89F3-080BE3970BF8  
Timestamp = 2022-12-04 14:41:58 +0000  
SDK = com.apple.Safari.web-extension  
Parent Bundle = /Applications/Okta Extension App.app  
Display Name = Okta Browser Plugin  
Short Name = Okta Browser Plugin  
Parent Name = Okta Extension App  
Platform = macOS
```

# List active Password Managers

```
pluginkit -mAvvv -p com.apple.authentication-services-credential-provider-ui
```

Or

```
Defaults read com.apple.preferences.extensions.CredentialProvider
```

```
{  
    displayOrder = (  
        "com.krypted.SecretChe  
        "io.secrechest.Secret  
        "io.secrechest.Secret  
        "com.krypted.MacOSCrede  
    );  
    userHasOrdered = 1;  
}
```

## Or Share Sheet Extensions

```
defaults read com.apple.preferences.extensions.ShareMenu
```

**And the SSO extension(s)?**



# com.apple.AppSSO.idp-extension

```
pluginkit -mAvvv -p com.apple.AppSSO.idp-extension
```

```
com.okta.mobile.auth-service-extension(3.9.0)
```

```
Path = /Applications/Okta Verify.app/Contents/PlugIns/AuthServiceExtension.appex
```

```
UUID = 266FAADD-8E24-491E-AB07-286D53FBD8AB
```

```
Timestamp = 2022-11-29 00:27:29 +0000
```

```
SDK = com.apple.AppSSO.idp-extension
```

```
Parent Bundle = /Applications/Okta Verify.app
```

```
Display Name = Okta Verify
```

```
Short Name = Okta Verify
```

```
Parent Name = Okta Verify
```

```
Platform = macOS
```

```
com.apple.AppSSOKerberos.KerberosExtension(1.0)
```

```
Path = /System/Library/PrivateFrameworks/AppSSOKerberos.framework/PlugIns/KerberosExtension.appex
```

```
UUID = A2D64D7E-093C-4E8D-98EE-AE4D933B7984
```

```
Timestamp = 2022-10-21 13:29:19 +0000
```

```
SDK = com.apple.AppSSO.idp-extension
```

```
Display Name = Kerberos
```

```
Short Name = Kerberos
```

```
Platform = macOS
```

# Classic extensions created control panels

- New extensions framework in Ventura
- The old paths were also delimited by a “:”
- Now, let’s open Software Update with a script:
  - open x-apple.systempreferences:com.apple.Software-Update-Settings.extension
- Or profiles:
  - open x-apple.systempreferences:com.apple.Profiles-Settings.extension

# Too Much Telemetry?

```
sudo eslogger access authentication | grep snitch
{"schema_version":1,"mach_time":176471027170875,"event_type":55,"thread":
{"thread_id":31023786},"version":6,"seq_num":26,"event":{"access":{"mode":4,"target":
{"path":"\\System\\Library\\PrivateFrameworks\\SidecarCore.framework","stat":
{"st_blocks":0,"st_blksize":4096,"st_rdev":0,"st_dev":16777233,"st_uid":0,"st_gid":0,"
st_ino":1152921500312289578,"st_birthtimespec":"2022-11-18T10:07:25.000000000Z","st_fl
ags":524288,"st_nlink":6,"st_mtimespec":"2022-11-18T10:07:25.000000000Z","st_ctimespec
":"2022-11-18T10:07:25.000000000Z","st_size":192,"st_gen":0,"st_mode":16877,"st_atimes
pec":"2022-11-18T10:07:25.000000000Z"},"path_truncated":false}}},"time":"2022-12-19T17
:19:32.404547610Z","action":{"result":{"result":
{"flags":2147483647},"result_type":1}},"process":
{"signing_id":"at.obdev.littlesnitch","parent_audit_token":
{"asid":100014,"pidversion":515,"ruid":0,"euid":0,"rgid":0,"auid":4294967295,"egid":0,
"pid":1},"codesigning_flags":570505985,"executable":{"path":"\\Applications\\Little
Snitch.app\\Contents\\MacOS\\Little Snitch","stat":
{"st_blocks":21800,"st_blksize":4096,"st_rdev":0,"st_dev":16777233,"st_uid":0,"st_gid"
:0,"st_ino":77238194,"st_birthtimespec":"2022-10-12T10:39:20.000000000Z","st_flags":0,
"st_nlink":1,"st_mtimespec":"2022-10-12T10:39:20.000000000Z","st_ctimespec":"2022-12-1
4T16:31:24.296302379Z","st_size":11160720,"st_gen":0,"st_mode":33261,"st_atimespec":"2
022-12-19T17:18:18.998193966Z"},"path_truncated":false},"ppid":1,"tty":null,"start_tim
e":"2022-12-19T17:18:18.814566Z","is_platform_binary":false,"group_id":83782,"audit_to
ken":
{"asid":100017,"pidversion":14446238,"ruid":501,"euid":501,"rgid":20,"auid":501,"egid"
:20,"pid":83782},"is_es_client":false,"responsible_audit_token":
{"asid":100017,"pidversion":14446238,"ruid":501,"euid":501,"rgid":20,"auid":501,"egid"
:20,"pid":83782},"session_id":1,"original_ppid":1,"cdhash":"6821C50878680E847ACA712012
F6D175D71B0687","team_id":"MLZF7K7B5R"},"action_type":1,"global_seq_num":26}
```

# Plenty of Prebuilt Extensions

Extension Point	Description	iOS/iPadOS	macOS	tvOS	watchOS
<a href="#">Virtual Conference</a>	Integrate your video conferencing service directly into events on user's calendars.	●	●		
<a href="#">Widget</a>	Show relevant, glanceable content from your app on the iOS Home screen or macOS Notification Center.	●	●		
<a href="#">Xcode Source Editor</a>	Provide custom editing features directly inside Xcode's source editor.		●		
<a href="#">Quick Look Preview</a>	Provide previews of documents your app owns so they can be viewed in any app.	●	●		
<a href="#">Safari Services</a>	Extend the web-browsing experience in Safari by leveraging web technologies and native code.		●		
<a href="#">Share</a>	Let users post to your social-network service from any app.	●	●		
<a href="#">Smart Card Token</a>	Grant access to user accounts and the keychain using a hardware-based token.		●		
<a href="#">Spotlight Import</a>	Make content in your app searchable in Spotlight, Safari, Siri, and more.	●	●		
<a href="#">Sticker Pack</a>	Add custom stickers to Messages.	●			
<a href="#">Thumbnail</a>	Display thumbnails of your custom document types in all apps.	●	●		
<a href="#">TV Top Shelf</a>	Help users discover your app by providing Top Shelf content and a description of your tvOS app.			●	
<a href="#">Unwanted Communication</a>	Block incoming phone calls using your app's custom unsolicited caller database.	●			

<https://developer.apple.com/app-extensions/>

# Example: CredentialProvider

```
12  ///
13  class CredentialProviderViewController: ASCredentialProviderViewController {
14
15      ///Load Apple credentialProviderExtension and sustantiate variables
16      var credentialProviderExtension: CredentialProviderExtension? = nil
17      var app: AppHolder? = nil
18      var error: String? = nil
19
20      ///
21      required convenience init? (coder: NSCoder) {
22          self.init()
23      }
24
25      /// when the init runs, load the nibName - but init with the device type, the groupId, but using nil initially
26      init () {
27          super.init(nibName: nil, bundle: nil)
28
29          Task {
30              await MainActor.run {
31                  self.credentialProviderExtension =
32                      .init(
33                          deviceType: .mac,
34                          appGroupIdentifier: groupId,
35                          keychainAccessGroup: keychainAccessGroup,
36                          contextFetcher: { [weak self] in self?.extensionContext }
37                      )
38                  setupView()
39              }
40          }
41      }
42
43      ///
44      func setupView () {
45          let ui: NSView
46          if let credentialProviderExtension = credentialProviderExtension {
47              ui = NSHostingView(rootView: credentialProviderExtension.standardDisplay())
48          } else {
49              ui = NSHostingView(rootView: Color.purple)
```

# Example 2: Just a .js

main ▾ Word-Replacer-Safari-Extension / word-replacer-master / Extension / script.js / <> Jump to ▾

 **krypted** Add files via upload Latest commit bc7a203 on Ma

1 contributor

17 lines (14 sloc) | 522 Bytes Raw Blame

```
1 document.addEventListener("DOMContentLoaded", function(event) {
2     safari.self.addEventListener("message", handleMessage);
3     safari.extension.dispatchMessage("WR_LOADED");
4 });
5
6 function handleMessage(e) {
7     if (e.name == "WR_REPLACE") {
8         const originalWord = e.message['WR_ORIGINAL'];
9         const newWord = e.message['WR_NEW'];
10
11         if (originalWord.length === 0) {
12             return;
13         }
14
15         document.body.innerHTML = document.body.innerHTML.replace(originalWord, newWord);
16     }
17 }
```

<https://github.com/krypted/Word-Replacer-Safari-Extension>

# Example 3: eslogger

```
nm /usr/bin/eslogger | grep _es_
```

```
U _es_delete_client
```

```
U _es_exec_arg
```

```
U _es_exec_arg_count
```

```
U _es_exec_env
```

```
U _es_exec_env_count
```

```
U _es_exec_fd
```

```
U _es_exec_fd_count
```

```
U _es_mute_process
```

```
U _es_new_client
```

```
U _es_release_message
```

```
U _es_retain_message
```

```
U _es_subscribe
```

# Crash reports in Console

The screenshot shows the macOS Console application. On the left sidebar, the 'Reports' section is expanded to 'Crash Reports', and the 'Spin Reports' button is highlighted with a red box. The main pane displays a list of crash reports with columns for Process Name, Date, and Kind. The selected report is for 'extensionkitservice' on '12/14/22, 8:25 PM' by 'User'. Below the list, a 'Translated Report (Full Report Below)' is shown for the same process. The report details include:

- Incident Identifier: 68A05393-6C82-4FCF-8836-2F6801649F3E
- CrashReporter Key: 60AA3509-0F3D-2BC7-CFDB-008D8C5CBED2
- Hardware Model: MacBookPro18,3
- Process: extensionkitservice [55702]
- Path: /System/Library/Frameworks/ExtensionFoundation.framework/Versions/A/XPCServices/extensionkitservice.xpc/Contents/MacOS/extensionkitservice
- Identifier: com.apple.extensionkitservice
- Version: 97 (97)
- Code Type: X86-64 (Native)
- Role: Unspecified
- Parent Process: zsh [55333]
- Coalition: com.apple.Terminal [642]
- Responsible Process: Terminal [711]

Additional report details:

- Date/Time: 2022-12-14 20:25:44.5354 -0600
- Launch Time: 2022-12-14 20:25:44.5126 -0600
- OS Version: macOS 13.1 (22C5059b)
- Release Type: User
- Report Version: 104

Exception information:

- Exception Type: EXC\_CRASH (SIGKILL (Code Signature Invalid))
- Exception Codes: 0x0000000000000000, 0x0000000000000000
- Termination Reason: CODESIGNING 4 Launch Constraint Violation

Other details:

- Highlighted by Thread: 0
- Backtrace not available
- No thread state (register information) available
- Binary Images: Binary images description not available
- Error Formulating Crash Report: \_dyld\_process\_info\_create failed with 30, dyld\_process\_snapshot\_get\_shared\_cache failed, Failed to create CSSymbolicatorRef - corpse still valid, thread\_get\_state(PAGEIN) returned 0x10000003: (ipc/send) invalid destination port, thread\_get\_state(EXCEPTION) returned 0x10000003: (ipc/send) invalid destination port, thread\_get\_state(FLAVOR) returned 0x10000003: (ipc/send) invalid destination port

The report ends with 'EOF' and a 'Full Report' link.



# Other Types of Extensions

# Browser Extensions

- Introduced for Internet Explorer in 1999
- Plug-ins (compiled binaries) are deprecated in favor of uncompiled extensions, thus telemetry without studying symbols
- Most are javascripts (e.g. a listener, parser, processor) that render information to a browser window with an html/css file and manifest.json
- Since 2015 the W3C has tried to align APIs given wide-ranging capabilities
- Most sync between computers
- An example: <https://github.com/krypted/webauthn-inspector>

# View Passkeys



The image shows a browser window displaying the webauthn.io website. The page features a registration form with the email address "krypted@me.com" entered. A modal alert box is open, displaying a JSON Web Authentication (WebAuthn) challenge response. The response includes a public key, user information, a challenge, and public key creation parameters.

```
webauthn.io says
{"0":{"publicKey":{"rp":{"name":"webauthn.io","id":"webauthn.io"},"user":{"id":{"0":97,"1":51,"2":74,"3":53,"4":99,"5":72,"6":82,"7":108,"8":90,"9":69,"10":66,"11":116,"12":90,"13":93,"14":53,"15":106,"16":98,"17":50,"18":48},"name":"krypted@me.com","displayName":"krypted@me.com"},"challenge":{},"pubKeyCredParams":[{"type":"public-key","alg":-7}],"type":"public-key","ala":-257,"timeout":60000,"excludeCredentials":{}}
```

WebAuthn  
A demo of the WebAuthn

krypted@me.com

Register

Advanced Settings

What is WebAuthn?

Welcome to webauthn.io! This site is designed by [Duo Labs](#) to test the new W3C Specification Web Authentication. WebAuthn is supported

# Chrome Extensions

- Introduced in 2010 for the Chrome Web Store (apps can install them too)
- Chrome Extensions are stored in `/Users/<username>/Library/Application\ Support/Google/Chrome/Default/Extensions`
- Can be packed in a crx or unpacked
  - `find ~/Library/Application\ Support/Google/Chrome/Default/Extensions -type f -name "manifest.json" -print0 | xargs -I {} -0 grep "name":' "{}" | uniq`
- APIs: [https://github.com/krypted/extensionsmanager/blob/main/Chrome Extensions/apilistasarray](https://github.com/krypted/extensionsmanager/blob/main/Chrome%20Extensions/apilistasarray)
- Permissions (similar to entitlements) in the manifest.json
  - `"permissions": [ "activeTab", "alarms", "scripting", "storage" ],`

# Firefox Extensions

- Introduced in 2004, initially used the XUL and XPCOM approach but now conforms to standard API definitions
- Extension List at `/Users//Library/Application\ Support/Firefox/Profiles/*/extensions.json`
- APIs: [https://github.com/krypted/extensionsmanager/blob/main/Firefox Extensions/apisaslist](https://github.com/krypted/extensionsmanager/blob/main/Firefox%20Extensions/apisaslist)
- Find a list of extensions:
  - `cat /Users/*/Library/Application\ Support/Firefox/Profiles/*/extensions.json | sed 's/"name"/\n"name"/g' | grep "name" | awk -F',' '{print $2}'`

# Microsoft Edge Extensions

- Chromium-based browser
- Extensions can be installed from the Chrome Web Store or manually
- APIs: [https://github.com/krypted/extensionsmanager/blob/main/Microsoft Edge/apisasarray](https://github.com/krypted/extensionsmanager/blob/main/Microsoft%20Edge/apisasarray)
- To see a list of extensions:
  - `find ~/Library/Application\ Support/Microsoft\ Edge/Default/Extensions -type f -name "manifest.json" -print0 | xargs -I {} -0 grep "name:" "{}" | uniq`

# Changing Attack Surfaces

- Safari extensions began to conform to the Chrome API in 2020 for the Mac and introduced for iOS in 2021
- Apps can install extensions (although not Safari) and use deep links in apps
- Extension-based malware is more portable
- Over time more entitlements are given to browsers
- Can hide data in encoded blobs
- Each extension has its own permissions: lowest common denominator of permissions

Extensions - Web Extension x +

Chrome | chrome://extensions/?id=okaacfiejbdlfnigdnoiclnophelcan

Extensions Search extensions Developer mode

Load unpacked Pack extension Update

Size  
< 1 MB

ID  
okaacfiejbdlfnigdnoiclnophelcan

Inspect views  
• [background page](#)

Permissions  
• Read your browsing history

Site access  
Allow this extension to read and change all your data on all websites you visit: ?

Allow in Incognito  
Warning: Google Chrome cannot prevent extensions from recording your browsing activity. If you want to use this extension in Incognito mode, unselect this option.

Allow access to file URLs

Collect errors

Source  
Unpacked extension  
Loaded from: [~/Downloads/webauthn-9](#)

Remove extension

chrome web store

Home > Extensions > LINER: ChatGPT Google Assistant & Highlighter

LINER: ChatGPT Google Assistant & Highlighter Checking...

getliner.com Featured

5.0

Overview

Related

Try LINER - one and only tool you need to build y... Watch later Share

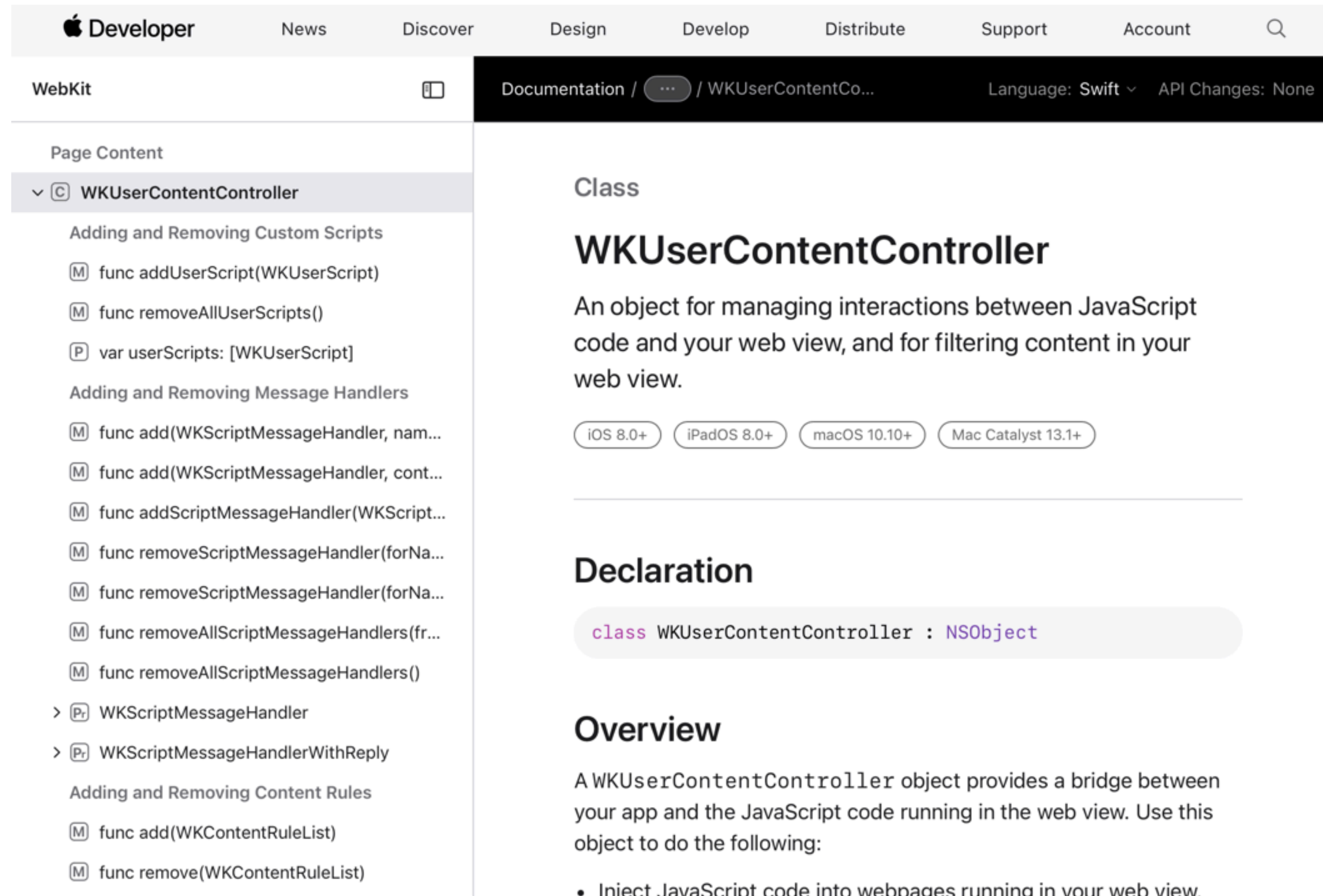
Get Answer Directly with LINER AI Powered by ChatGPT

It can:  
Read and change all your data on all websites  
Modify data you copy and paste

Cancel Add extension



# navigator.credentials.get



The screenshot shows the Apple Developer website documentation for the `WKUserController` class. The page is titled "WKUserController" and is part of the "WebKit" framework. The left sidebar shows a tree view with "WKUserController" expanded, listing various methods and properties. The main content area shows the class name, a description, platform availability (iOS 8.0+, iPadOS 8.0+, macOS 10.10+, Mac Catalyst 13.1+), the class declaration, and an overview section.

Apple Developer News Discover Design Develop Distribute Support Account

WebKit Documentation / WKUserController... Language: Swift API Changes: None

Page Content

- WKUserController
  - Adding and Removing Custom Scripts
    - func addUserScript(WKUserScript)
    - func removeAllUserScripts()
    - var userScripts: [WKUserScript]
  - Adding and Removing Message Handlers
    - func add(WKScriptMessageHandler, nam...)
    - func add(WKScriptMessageHandler, cont...)
    - func addScriptMessageHandler(WKScript...)
    - func removeScriptMessageHandler(forNa...)
    - func removeScriptMessageHandler(forNa...)
    - func removeAllScriptMessageHandlers(fr...)
    - func removeAllScriptMessageHandlers()
  - WKScriptMessageHandler
  - WKScriptMessageHandlerWithReply
  - Adding and Removing Content Rules
    - func add(WKContentRuleList)
    - func remove(WKContentRuleList)

Class

## WKUserController

An object for managing interactions between JavaScript code and your web view, and for filtering content in your web view.

iOS 8.0+ iPadOS 8.0+ macOS 10.10+ Mac Catalyst 13.1+

Declaration

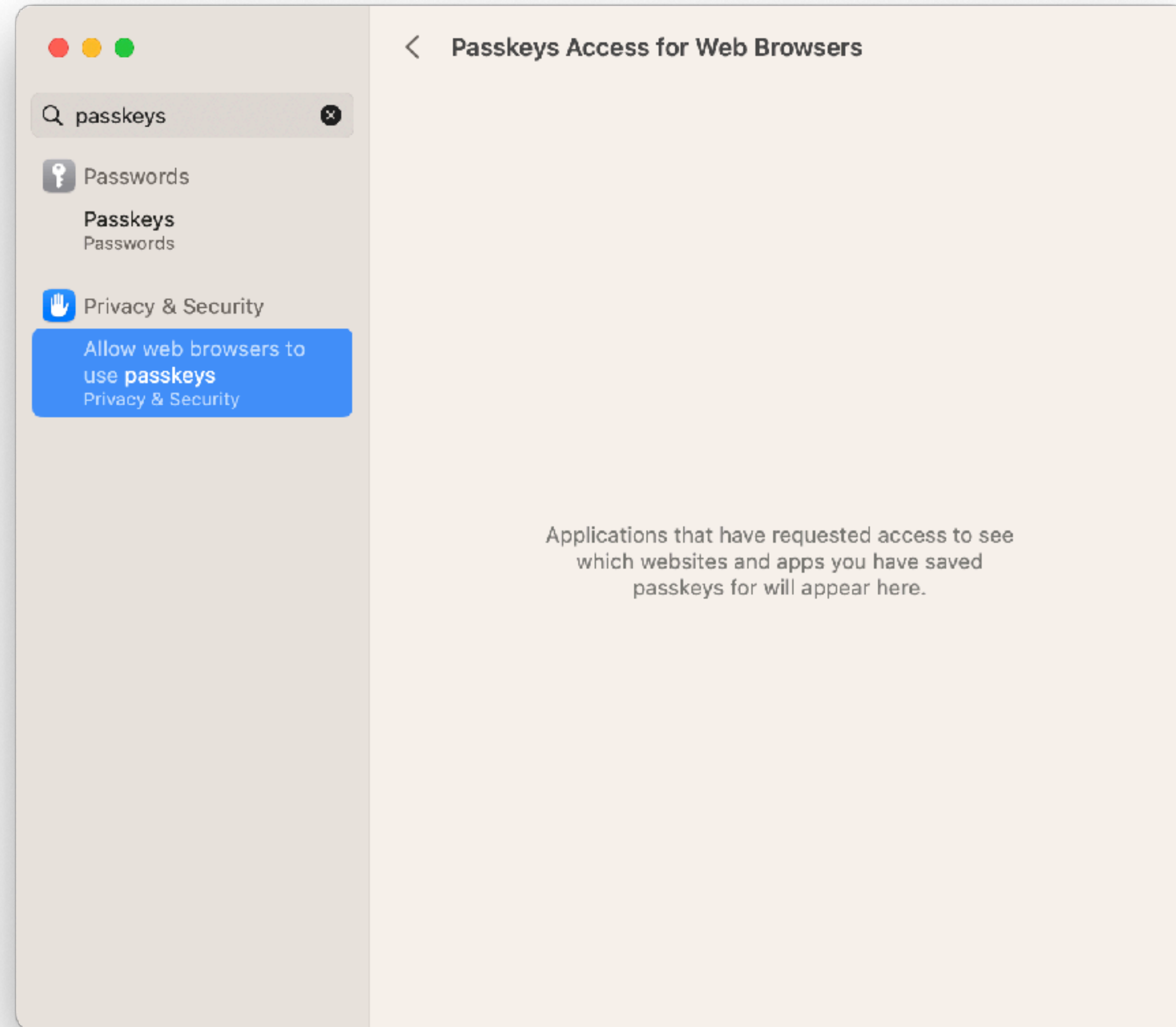
```
class WKUserController : NSObject
```

Overview

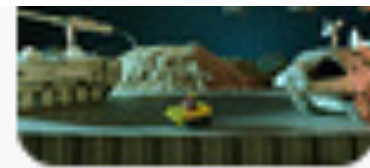
A `WKUserController` object provides a bridge between your app and the JavaScript code running in the web view. Use this object to do the following:

- Inject JavaScript code into webpages running in your web view.

# Passkey entitlements?



# Extensions Manager Day 0



Why hasn't Jamf added a System Extension section for Computer Inventory in Jamf Pro?

# Get a list of some extensions

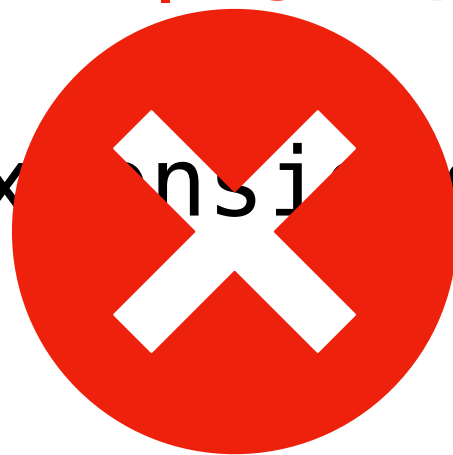
```
pluginkit -mAvvv -p com.apple.authentication-services-credential-provider-ui \  
| grep Path | grep -o '/.*'
```

```
pluginkit -mAvvv -p com.apple.Safari.web-extension | grep Path | grep -o '/.*'
```


```
defaults read /Library/SystemExtensions/db.plist | grep originPath | \  
cut -d '"' -f2
```

```
pluginkit -mAvvv -p com.apple.AppSSO.idp-extension | grep -v /System | \  
grep Path | grep -o '/.*'
```

```
Systemextensionsctl list
```





# Make it a script/EA

 [krypted / extensionslist](#) Public Pin Unwatch 1 Fork 0

[Code](#) [Issues](#) [Pull requests](#) [Actions](#) [Projects](#) [Wiki](#) [Security](#) [Insights](#) [Settings](#)

[main](#) [extensionslist / extensionslist.sh](#)

 **krypted** Add files via upload Latest commit 33e71d4 36

 1 contributor

4 lines (4 sloc) | 367 Bytes Raw

```
1 pluginkit -mAvvv -p com.apple.authentication-services-credential-provider-ui | grep Path | grep -o './.*'  
2 pluginkit -mAvvv -p com.apple.Safari.web-extension | grep Path | grep -o './.*'  
3 pluginkit -mAvvv -p com.apple.AppSSO.idp-extension | grep -v /System | grep Path | grep -o './.*'  
4 defaults read /Library/SystemExtensions/db.plist | grep originPath | cut -d '"' -f2
```

**Only problem: tools only show  
what are loaded**

# Let's find all the .appex bundles

```
charlesedge@CE-MacBook-Pro ~ % extensionsman -all
truong.tuan.TextPlus.Line(1.6.0)
com.microsoft.OneDrive.FinderSync(22.238.1114)
com.apple.preferences.sharing.SharingPrefsExtension(1.1)
com.apple.diagnostics.osx.getmobilityinfo(1.0)
com.apple.siri.parsec.CoreParsec.SearchPoirotExtension(1.0)
com.apple.CloudDocsDaemon.StorageManagement(1.0)
com.apple.iCal.FaceTimeExtension(1)
com.apple.inputmethod.VietnameseIM(1.4)
com.apple.TV.TVStorageExtension(1.3.2)
com.apple.news.tag(8.2)
com.apple.InternetAccountsSettings.extension(1.0)
com.apple.STMExtension.Applications(1.0)
com.apple.CryptoTokenKit.pivtoken(1.0)
okta.ExtensionLauncher.Extension.WebExtension(6.10.0)
com.apple.WorkflowUI.CatalystContentExtension(1.0)
com.apple.Photos.PhotosReliveWidget(1.0)
com.apple.share.System.setaccountpicture(845)
com.apple.iCal.CalendarNotificationContentExtentionOSX(1.0)
com.apple.AuthKitUI.AKAppSSOExtension(1.0)
com.apple.TV.TVCacheExtension(1.3.2)
me.erambert.bettertweetdecksafari.extension(4.9.0)
com.apple.ClassKitSettings.extension(1.0)
com.apple.family.FAFollowupExtension(1.0)
com.apple.Photos.PhotosSiriExtension(8.0)
com.apple.stocks.detailintents(1.0)
com.apple.diagnostics.osx.filevault(1.0)
com.apple.messages.ShareExtension(1.0)
com.apple.findmy.FindMyWidgetItems(1)
com.apple.iBooksX.DiskSpaceEfficiency(1)
com.apple.inputmethod.TYIM(104)
com.apple.FaceTime.IntentExtension(1.0)
```

**Let's take it further...**

**-n, -s, and -all**



# -raw option, because...

## **-m --match**

Requests **pluginkit** to scan all registered plug-ins for those matching the given search criteria (see DISCOVERY MATCHING below).

All matching plug-ins are returned, one per line. Each line may begin with any one of the following tags indicating the user election state:

- + indicates that the user has elected to use the plug-in

- indicates that the user has elected to ignore the plug-in

- ! indicates that the user has elected to use the plug-in for debugger use

- = indicates that the plug-in is superseded by another plug-in

- ? unknown user election state

# Initial Ideas for a GUI

ExtensionsManager						
Name	Vendor	Type	Status	Path	Version	SDK
NewsToday2	Apple	App Extension	Installed	/System/Applications/News.app/Contents/PlugIns/NewsToday2.appex	8.2	com.apple.wid getkit- extension
Little Snitch	Little Snitch	System Extension	Not Installed	/Applications/Little Snitch.app/Contents/Little Snitch Extension	9.4	System Extension
Little Snitch	Little Snitch	Network Extension	Not Installed	/Applications/Little Snitch.app/Contents/Little Snitch Network Extension.networkextension/systemextension	9.4	Network Extension
Malwarebytes	Little Snitch	Endpoint Security Framework	Installed	/Applications/Malwarebytes.app/Extensions/esf.systemextension	11.2	Endpoint Security Framework
HomeWidget	Apple	App Extension	Installed	/System/Applications/Home.app/Contents/PlugIns/HomeWidget.appex	6.0	com.apple.wid getkit- extension

Show All  Hide Apple Extensions

Network Extensions  System Extensions  Show Uninstalled System Extensions

**One more problem...**

**Can call ESF without an  
extension - maybe not for long**

# Libraries and symbols

```
sudo ~/mn.sh -r /Applications/Malwarebytes.app _es_new_client
```

```
File: /Library/Application Support/Malwarebytes/MBAM/Engine.bundle/Contents/PlugIns/  
RTProtectionDaemon.app/Contents/MacOS/RTProtectionDaemon  
2577:          U _es_new_client
```

```
sudo ~/mn.sh -r / _es_new_client
```

```
File: /Library/Application Support/Malwarebytes/MBAM/Engine.bundle/Contents/  
PlugIns/RTProtectionDaemon.app/Contents/MacOS/RTProtectionDaemon  
2577:          U _es_new_client
```

Name	Vendor	Type	Status	Path	Version	SDK
MarsEdit	MarsEdit	App Extension	Not Installed	/Applications/MarsEdit.app/Contents/Plugins/MarsEdit...	4.6.3	com.apple.share-services
Microsoft Edge Widgets	Microsof...	App Extension	Installed	/Applications/Microsoft Edge.app/Contents/Plugins/Mic...	99.0.11...	com.apple.widgetkit-extension
MindNode Intents Ext...	MindNode	App Extension	Installed	/Applications/MindNode.app/Contents/Plugins/MindNo...	2023.1.1	com.apple.intents-service
MindNode QuickLock...	MindNode	App Extension	Installed	/Applications/MindNode.app/Contents/Plugins/MindNo...	2023.1.1	com.apple.quicklock.preview
MindNode Thumbnail...	MindNode	App Extension	Installed	/Applications/MindNode.app/Contents/Plugins/MindNo...	2023.1.1	com.apple.quicklock.thumbnail
MindNode Widget	MindNode	App Extension	Installed	/Applications/MindNode.app/Contents/Plugins/MindNo...	2023.1.1	com.apple.widgetkit-extension
NordPass® Password...	NordPass	App Extension	Installed	/Applications/NordPass.app/Contents/Plugins/safari/Ext...	1	com.apple.Safari.extension
NordPass® Password...	AgileBits	Google Chrome	Installed		5.2.12	
Okta Browser Plugin	Okta Ext...	App Extension	Installed	/Applications/Okta Extension App.app/Contents/Plugins...	6.10.0	com.apple.Safari.web-extension
OneDrive File Provider	OneDrive	App Extension	Installed	/Applications/OneDrive.app/Contents/Plugins/OneDrive...	23.036...	com.apple.fileprovider-nonui
OneDrive Finder Integ...	OneDrive	App Extension	Not Installed	/Applications/OneDrive.app/Contents/Plugins/FinderSy...	23.036...	com.apple.FinderSync
OneNote	Microsof...	App Extension	Installed	/Applications/Microsoft OneNote.app/Contents/Plugins/...	16.72	com.apple.share-services
Petal Cite Web Import...	Petal Cit...	App Extension	Installed	/Applications/Petal Cite Web Importer.app/Contents/Plu...	2.2	com.apple.Safari.web-extension
Picture-In-Picture	picturein...	Firefox Extens...	Installed	/Applications/Firefox.app/Contents/Resources/browser/...	1.0.0	
Playmaker - Balanced	playmak...	Firefox Extens...	Not Installed		1.1.2	
Playmaker - Bold	playmak...	Firefox Extens...	Not Installed		1.1	
Playmaker - Soft	playmak...	Firefox Extens...	Not Installed		1.1	
Pointers/WidgetExtens...	CardPoin...	App Extension	Installed	/Applications/CardPointers.app/Contents/Plugins/Point...	4.4.1	com.apple.intents-service
Send to MarsEdit	MarsEdit	App Extension	Not Installed	/Applications/MarsEdit.app/Contents/Plugins/Send to M...	4.6.3	com.apple.Safari.extension
Shortcuts	Particulars	App Extension	Installed	/Applications/Particulars.app/Contents/Plugins/Shortcu...	51	com.apple.intents-service
Sofiare Wallet	Citationsy	Google Chrome	Installed		1.43.2	
Suspicious Package	Suspicio...	App Extension	Installed	/Applications/Suspicious Package.app/Contents/Plugin...	4.0	com.apple.quicklock.preview
System theme - auto	default-t...	Firefox Extens...	Installed		1.3	
Text Toolset	Text Tool...	App Extension	Installed	/Applications/Text Toolset.app/Contents/Plugins/TextTo...	1.2	com.apple.dt.Xcode.extension.source-editor
Twitter	Twitter	App Extension	Installed	/Applications/Twitter.app/Contents/Plugins/ShareExten...	9.30	com.apple.share-services
TwitterNotificationSer...	Twitter	App Extension	Installed	/Applications/Twitter.app/Contents/Plugins/TwitterNotif...	9.30	com.apple.usernotifications.service
Visionary - Balanced	visionary...	Firefox Extens...	Not Installed		1.1.2	
Visionary - Bold	visionary...	Firefox Extens...	Not Installed		1.1	
Visionary - Soft	visionary...	Firefox Extens...	Not Installed		1.1	
Web Compatibility Int...	webcom...	Firefox Extens...	Installed	/Applications/Firefox.app/Contents/Resources/browser/...	106.0.0	
WebCompat Reporter	https://gi...	Firefox Extens...	Not Installed	/Applications/Firefox.app/Contents/Resources/browser/...	1.5.0	
Wikipedia (en)	wikipedi...	Firefox Extens...	Installed		1.1	
__MSG_APP_NAME__		Google Chrome	Installed		1.0.0.6	
__MSG_appName__		Google Chrome	Installed		10.29.0	
__MSG_application_ti...		MicrosoftEdg...	Installed		1.0	
__MSG_extName__		Google Chrome	Installed		1.61.4	
__MSG_extName__		Google Chrome	Installed		2.10.0	
__MSG_nameedge__		MicrosoftEdg...	Installed		2.6.3.0	
eBay	ebay@se...	Firefox Extens...	Installed		1.3	
lock		Google Chrome	Installed			
nomadscoe	NoMAD	App Extension	Installed	/Users/charlesedge/Library/Developer/Xcode/DerivedD...	2.0	com.apple.AppSSC.idp-extension
wizdm.ai		Google Chrome	Installed		23.3.22...	

Show All   
 Show Thirdparty Extensions   
 Show Uninstalled System Extension   
 Microsoft Edge Extension   
 Network Extensions   
 System Extensions   
 Google Chrome Extensions   
 Firefox Extensions   

<https://github.com/krypted/extensionsmanager>

**Added browser extensions for  
these sessions**

# The Future of Extensions



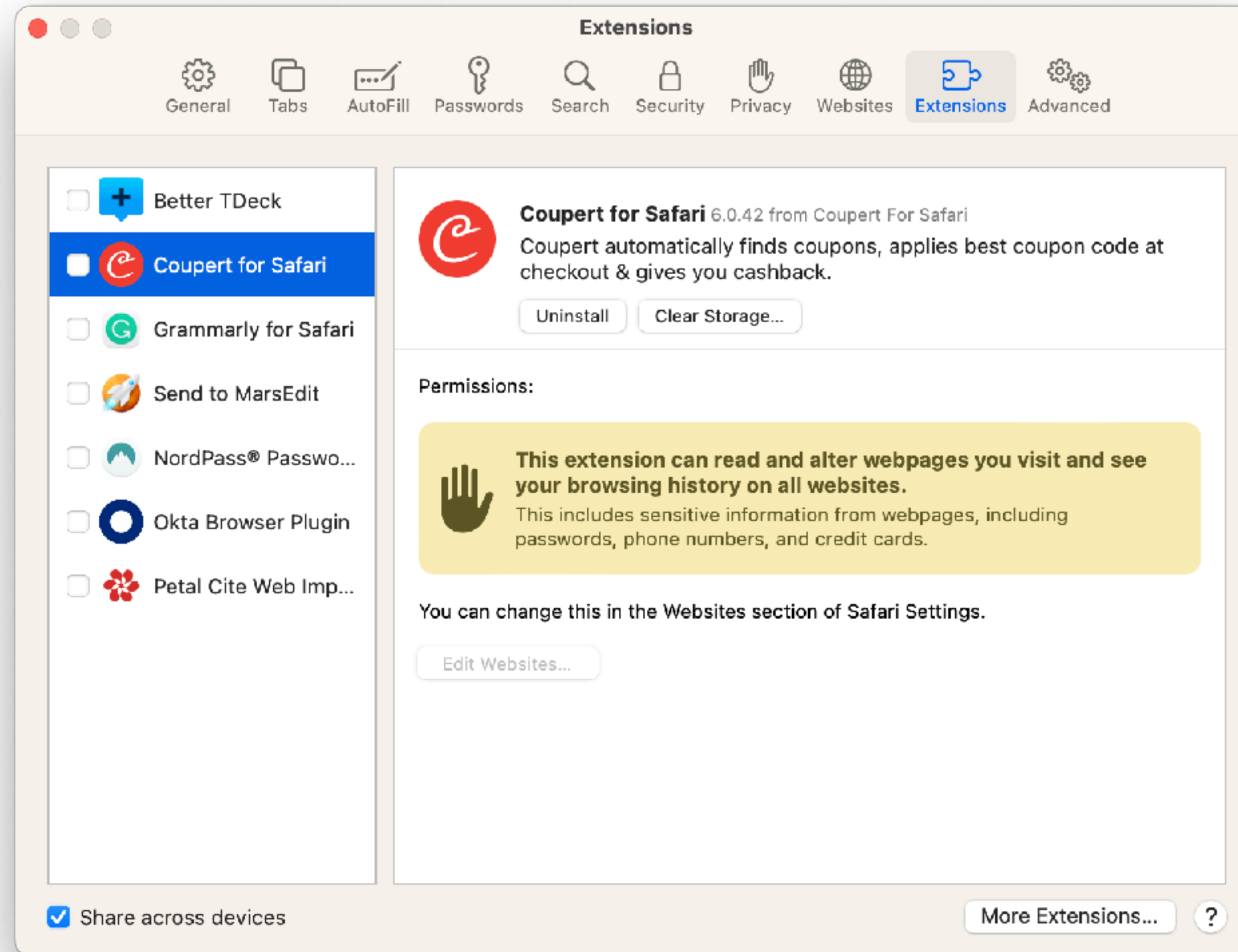
**“appex used to be pretty benign,  
but aren’t really anymore.”**

**-Joel Rennich**

# Telemetry and Privacy

**More Granular Controls for  
some extensions (e.g. Safari)**

# More granularity like Chrome

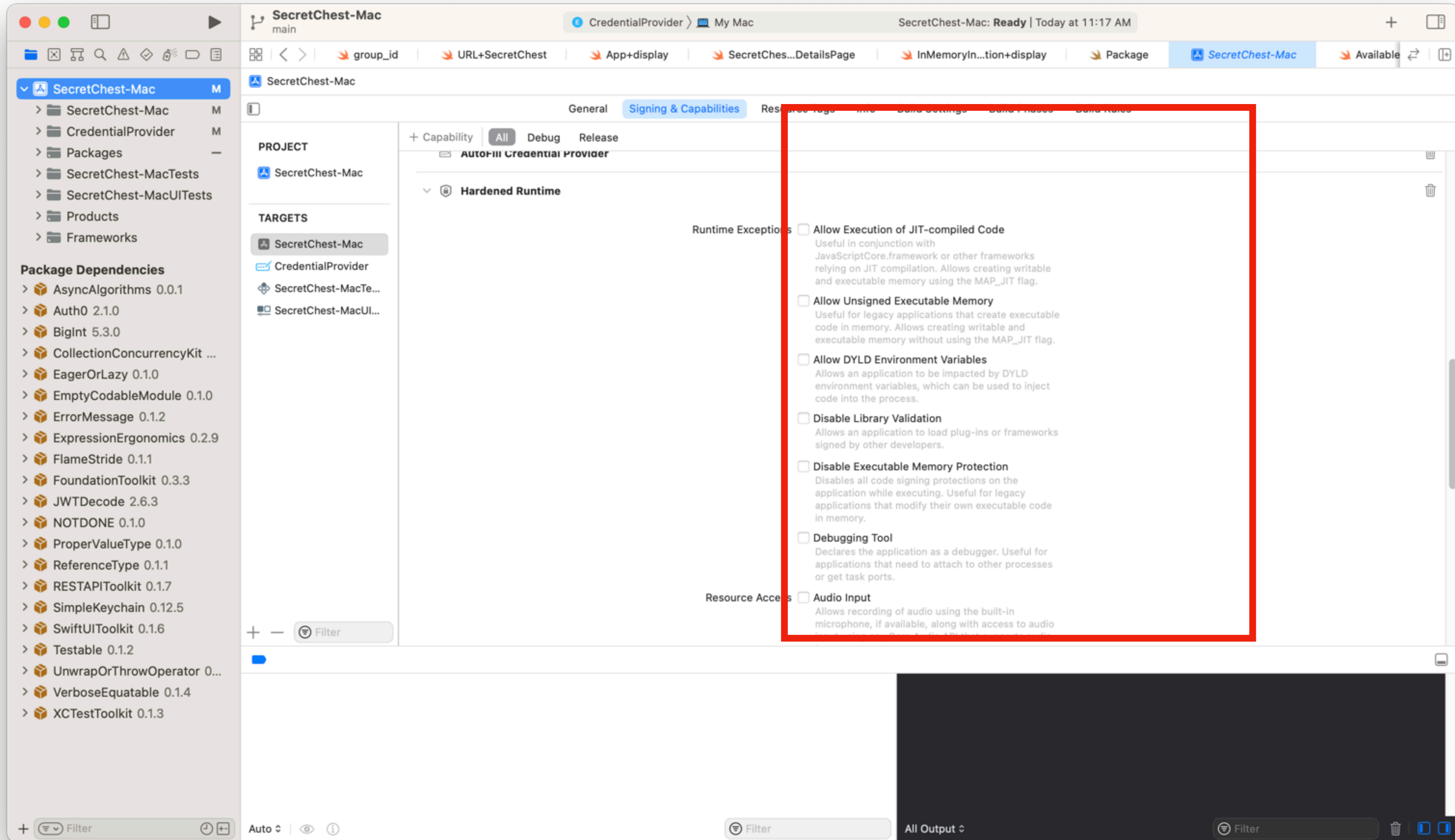


# frameworks/dylibs

```
charlesedge@CE-MacBook-Pro ~ % otool -L /usr/libexec/mdmclient
```

```
/usr/libexec/mdmclient:
```

```
  /usr/lib/libmis.dylib (compatibility version 1.0.0, current version 1.0.0)
  /usr/lib/libMobileGestalt.dylib (compatibility version 1.0.0, current version 1.0.0)
  /System/Library/PrivateFrameworks/MobileActivationMacOS.framework/Versions/A/MobileActivationMacOS (
  /System/Library/PrivateFrameworks/AppleIDSSOAuthentication.framework/Versions/A/AppleIDSSOAuthentica
  /System/Library/PrivateFrameworks/RecoveryOS.framework/Versions/A/RecoveryOS (compatibility version
  /System/Library/PrivateFrameworks/AppleMediaServices.framework/Versions/A/AppleMediaServices (compat
  /System/Library/PrivateFrameworks/DMCUtilities.framework/Versions/A/DMCUtilities (compatibility vers
  /System/Library/PrivateFrameworks/DMCEnrollmentLibrary.framework/Versions/A/DMCEnrollmentLibrary (co
  /System/Library/PrivateFrameworks/SystemPolicy.framework/Versions/A/SystemPolicy (compatibility vers
  /System/Library/PrivateFrameworks/MobileInstallation.framework/Versions/A/MobileInstallation (compat
  /usr/lib/libbootpolicy.dylib (compatibility version 1.0.0, current version 199.40.4)
  /usr/lib/libDiagnosticMessagesClient.dylib (compatibility version 1.0.0, current version 113.0.0)
  /System/Library/Frameworks/UserNotifications.framework/Versions/A/UserNotifications (compatibility v
  /System/Library/Frameworks/LocalAuthentication.framework/Versions/A/LocalAuthentication (compatibili
  /System/Library/PrivateFrameworks/AppStoreDaemon.framework/Versions/A/AppStoreDaemon (compatibility
  /System/Library/Frameworks/DiskArbitration.framework/Versions/A/DiskArbitration (compatibility versi
  /System/Library/PrivateFrameworks/DiskManagement.framework/Versions/A/DiskManagement (compatibility
  /System/Library/PrivateFrameworks/AppStoreFoundation.framework/Versions/A/AppStoreFoundation (compat
  /System/Library/PrivateFrameworks/RemoteServiceDiscovery.framework/Versions/A/RemoteServiceDiscovery
  /System/Library/PrivateFrameworks/OSUpdate.framework/Versions/A/OSUpdate (compatibility version 1.0.
  /System/Library/PrivateFrameworks/CoreAnalytics.framework/Versions/A/CoreAnalytics (compatibility ve
  /System/Library/PrivateFrameworks/FindMyDevice.framework/Versions/A/FindMyDevice (compatibility vers
  /usr/lib/libIASUnifiedProgress.dylib (compatibility version 1.0.0, current version 1.0.0)
  /usr/lib/libCoreStorage.dylib (compatibility version 1.0.0, current version 1.0.0)
  /usr/lib/libcsfde.dylib (compatibility version 1.0.0, current version 1.0.0)
  /System/Library/PrivateFrameworks/EFILogin.framework/Versions/A/EFILogin (compatibility version 1.0.
  /System/Library/Frameworks/Accounts.framework/Versions/A/Accounts (compatibility version 1.0.0, curr
  /System/Library/Frameworks/AVFoundation.framework/Versions/A/AVFoundation (compatibility version 1.0
  /System/Library/PrivateFrameworks/AuthKit.framework/Versions/A/AuthKit (compatibility version 1.0.0,
  /System/Library/Frameworks/SecurityInterface.framework/Versions/A/SecurityInterface (compatibility v
  /System/Library/PrivateFrameworks/ApplePushService.framework/Versions/A/ApplePushService (compatibil
  /System/Library/Frameworks/CoreWLAN.framework/Versions/A/CoreWLAN (compatibility version 1.0.0, curr
  /System/Library/PrivateFrameworks/login.framework/Versions/A/login (compatibility version 1.0.0, cur
  /System/Library/PrivateFrameworks/UserManagement.framework/Versions/A/UserManagement (compatibility
```



# Device Supervision and MDM

**One-click, multiple  
entitlements**



# Refreshed Apple Tools

The screenshot shows the macOS System Information window for a MacBook Pro. The left sidebar is expanded to 'Software' > 'Extensions'. The main pane displays a table of installed extensions, with 'afpfs' selected. Below the table, the details for 'afpfs' are shown, including its version (11.4), last modified date (11/18/22, 4:07 AM), and location (/System/Library/Extensions/afpfs.kext). The 'Validity Errors' section indicates a validation failure: 'Kext has a CFBundleExecutable property but the executable can't be found.' The 'Signed by' field is 'Not Signed'.

Extension Name	Version	Last Modified	Notarized	Loaded	Obtained from
RemoteVirtualInterface	1.0	5/8/22, 3:14 PM	Yes	No	Apple
SCSIDeviceSpecifics	547	11/18/22, 4:07 AM	Yes	No	Apple
SonyXDCAMDriver	547	11/18/22, 4:07 AM	Yes	No	Apple
System	22.2.0	11/18/22, 4:07 AM	Yes	No	Apple
USBStorageDeviceSpecifics	547	11/18/22, 4:07 AM	Yes	No	Apple
HighPointIOP	4.4.5	11/18/22, 4:07 AM	Yes	No	Identified Developer
HighPointRR	4.22.1	11/18/22, 4:07 AM	Yes	No	Identified Developer
Sof.RAID	6.3.1	11/18/22, 4:07 AM	Yes	No	Identified Developer
acfs	589	11/18/22, 4:07 AM	Unknown	No	Not Signed
actsetl	589	11/18/22, 4:07 AM	Unknown	No	Not Signed
ACPI_SMC_PlatformPlugin	1.0.0	11/18/22, 4:07 AM	Unknown	No	Not Signed
<b>afpfs</b>	<b>11.4</b>	<b>11/18/22, 4:07 AM</b>	<b>Unknown</b>	<b>No</b>	<b>Not Signed</b>
AFTK_Kext	1.0	11/18/22, 4:07 AM	Unknown	No	Not Signed
AGDCBacklightControl	7.1.18	11/18/22, 4:07 AM	Unknown	No	Not Signed
AGDCPluginDisplayMetrics	7.1.18	11/18/22, 4:07 AM	Unknown	No	Not Signed
AGXFWareKextG13GRTBuddy	227.2.45	11/18/22, 4:07 AM	Unknown	No	Not Signed
AGXFWareKextG13XRTBuddy	227.2.45	11/18/22, 4:07 AM	Unknown	No	Not Signed
AGXFWareKextG14GRTBuddy	227.2.45	11/18/22, 4:07 AM	Unknown	No	Not Signed
AGXFWareKextG14PRTBuddy	227.2.45	11/18/22, 4:07 AM	Unknown	No	Not Signed
AGXFWareKextRTBuddy64	227.2.45	11/18/22, 4:07 AM	Unknown	No	Not Signed
AGXG13G	227.2.45	11/18/22, 4:07 AM	Unknown	No	Not Signed
AGXG13X	227.2.45	11/18/22, 4:07 AM	Unknown	No	Not Signed
AGXG14G	227.2.45	11/18/22, 4:07 AM	Unknown	No	Not Signed
AirPortBromNIC	14.0	11/18/22, 4:07 AM	Unknown	No	Not Signed
AI F	5.0	11/18/22, 4:07 AM	Unknown	No	Not Signed
AMD500Controller	4.9.51	11/18/22, 4:07 AM	Unknown	No	Not Signed
AMD1000Controller	4.9.51	11/18/22, 4:07 AM	Unknown	No	Not Signed
AMDFramebuffer	4.9.51	11/18/22, 4:07 AM	Unknown	No	Not Signed
AMDRadeonServiceManager	4.9.51	11/18/22, 4:07 AM	Unknown	No	Not Signed

**afpfs:**

Version: 11.4  
Last Modified: 11/18/22, 4:07 AM  
Bundle ID: com.apple.filesystems.afpfs  
Notarized: Unknown  
Loaded: No  
Obtained from: Not Signed  
Location: /System/Library/Extensions/afpfs.kext  
Kext Version: 11.4  
Loadable: No  
Validity Errors:  
Validation Failures:  
Kext has a CFBundleExecutable property but the executable can't be found. afpfs  
Signature Validation Errors: Not Signed  
Dependencies: Incomplete  
Signed by: Not Signed

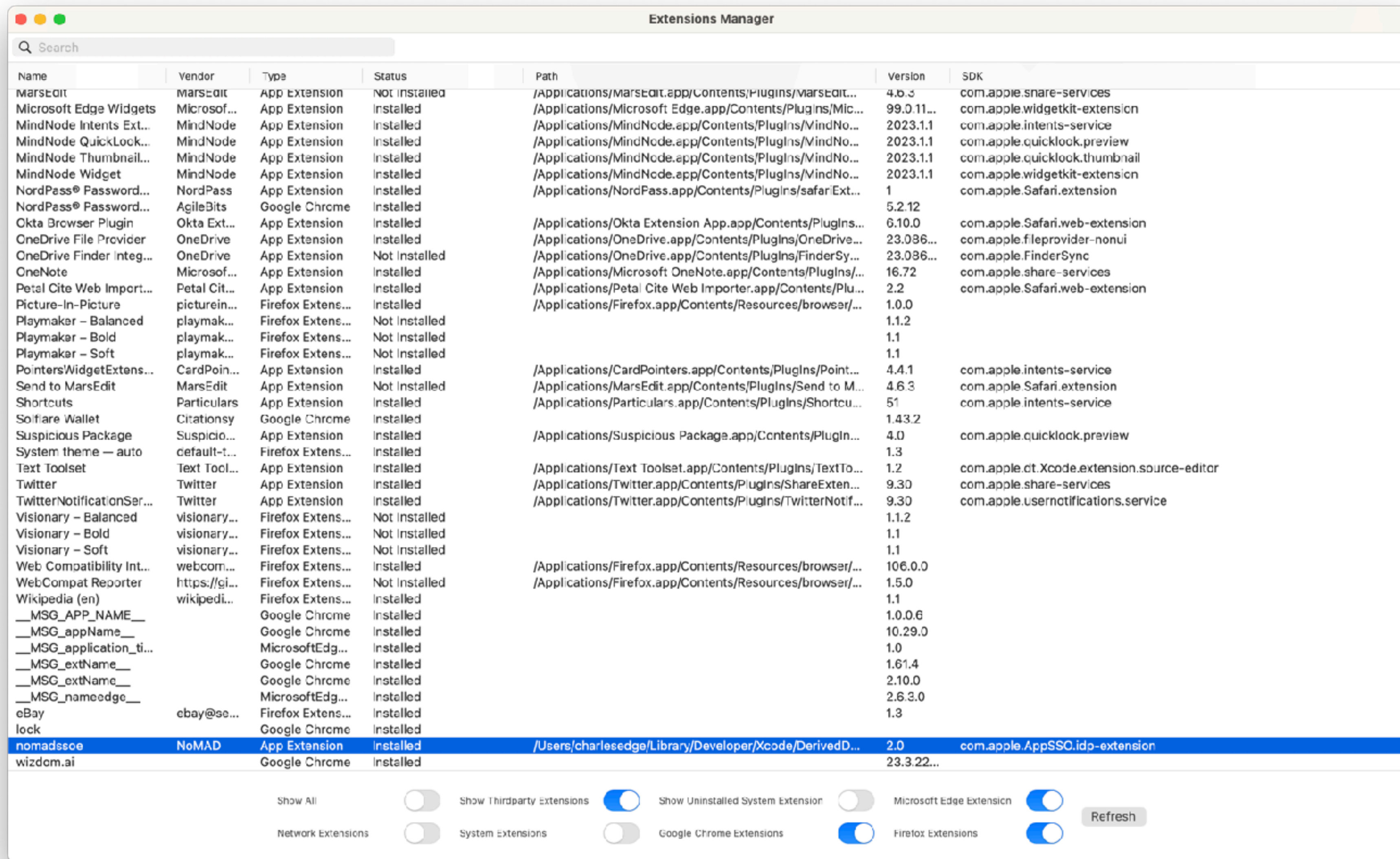
CE MacBook Pro > Software > Extensions > afpfs

# **New Third Party Options**

**Hacking things together - but with  
privacy and protections in mind**

**Sure, people gave permission  
to it, buuuuut...**

**Reminders or a Security Wizard**



# Extensions Manager

<https://github.com/krypted/extensionsmanager>

**Thank You!**