INKA ENTWORKS

appsealing

iOS SDK 1.10.0.0 for React Native

User Guide

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Prerequisite

- Xcode 13.4 or newer (macOS 12.3 or newer)
- iOS Device with iOS 10.0 or newer
- React Native 0.64 ~ 0.74 (Supports only Release build mode)

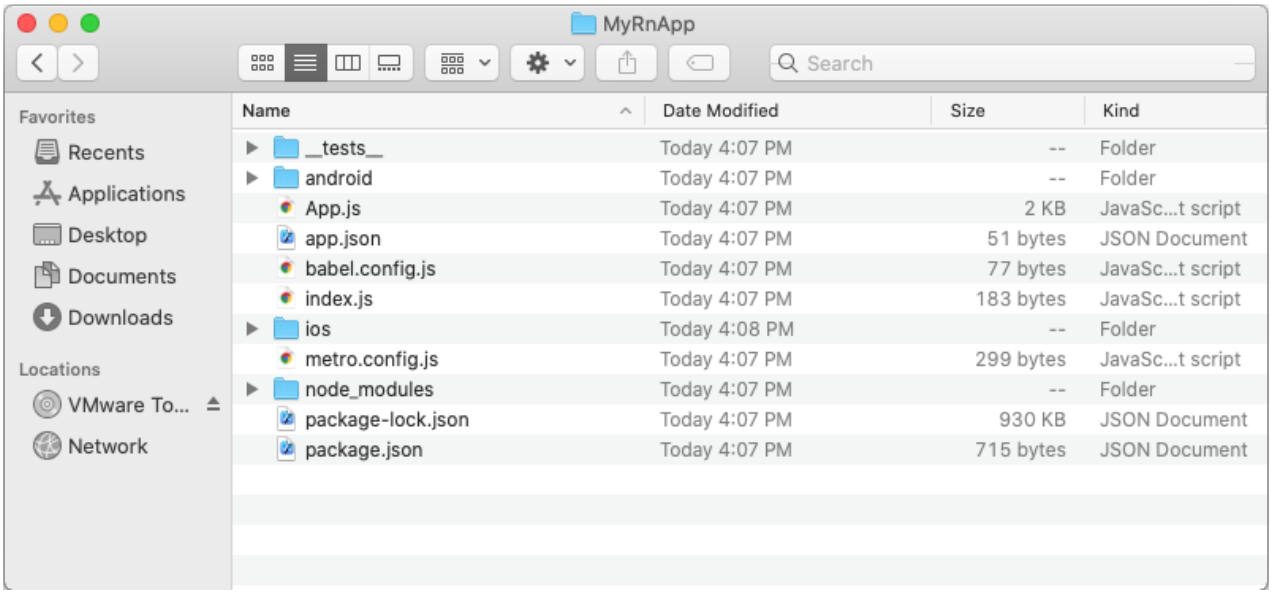
  (For React Native 0.70, only 0.70.0 version is supported)

Part 1. Apply Hermes engine to React Native project

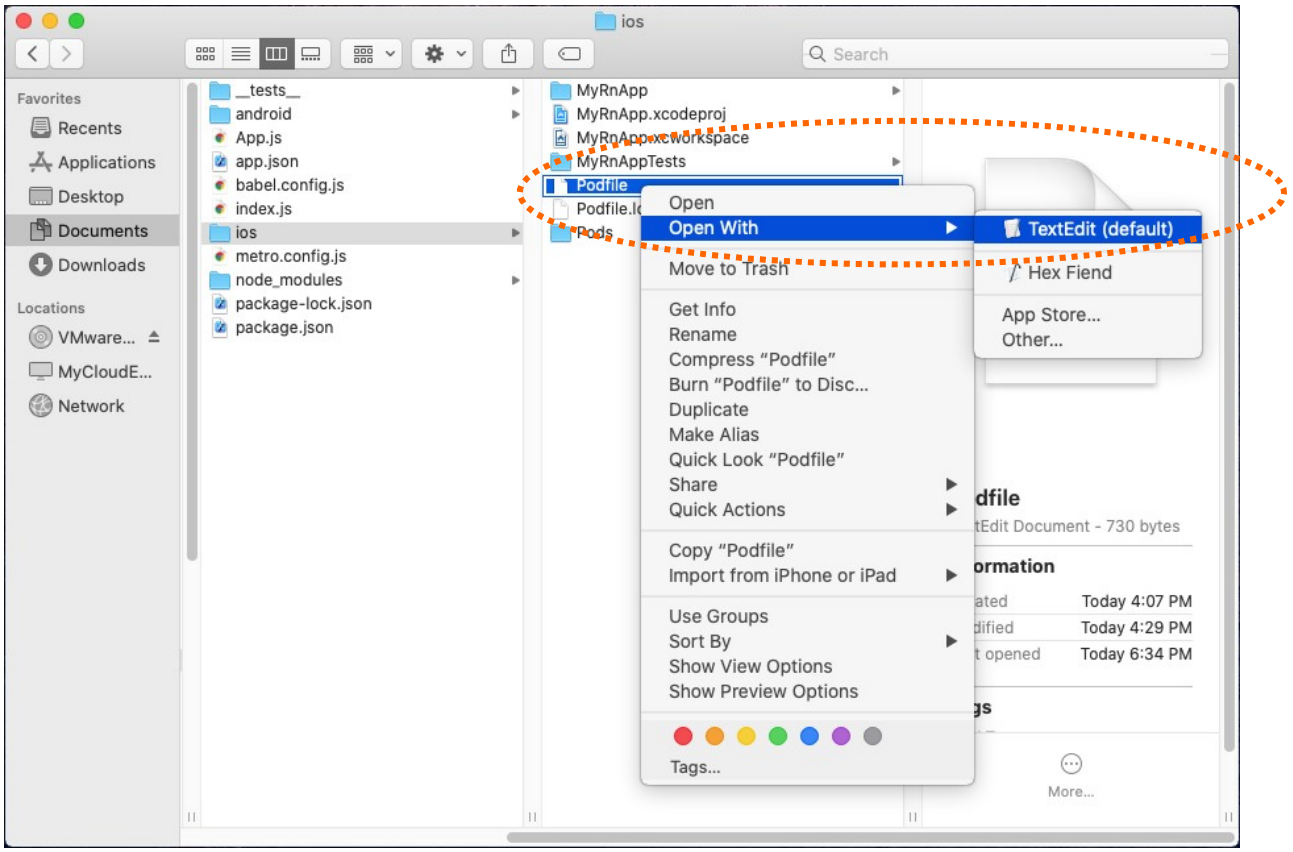
To apply AppSealing SDK to React Native app, you should configure your React Native project to use hermes javascript engine and replace hermes library with which including AppSealing security logic. (It is recommended to apply AppSealing at last step of app development)

1-1 Modify Podfile

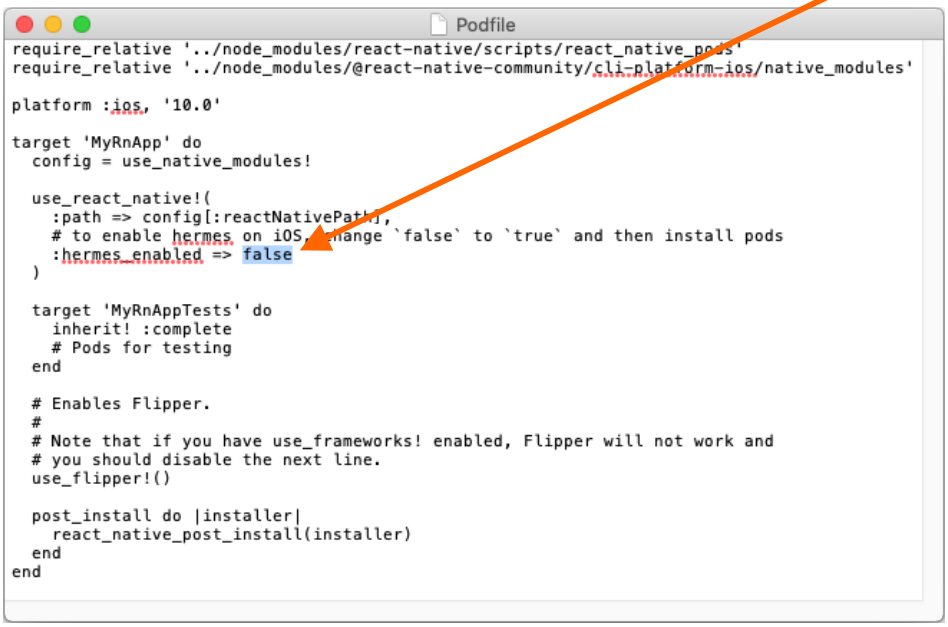
This document uses "MyRnApp" as the name of React Native project. After you created a new project you can check the project file list like below.

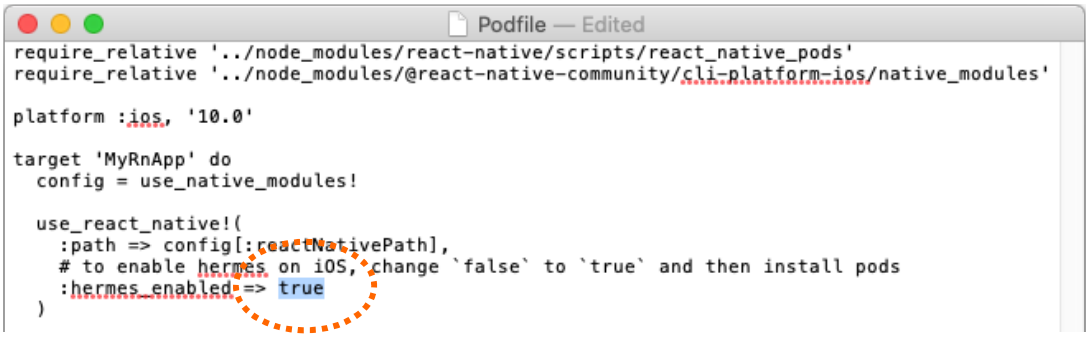


Now you should modify Podfile in ios folder to use hermes engine. Select "ios" sub-folder in your project folder and right-click on "Podfile" in it to perform "Open With"-"TextEdit (default)" menu action.

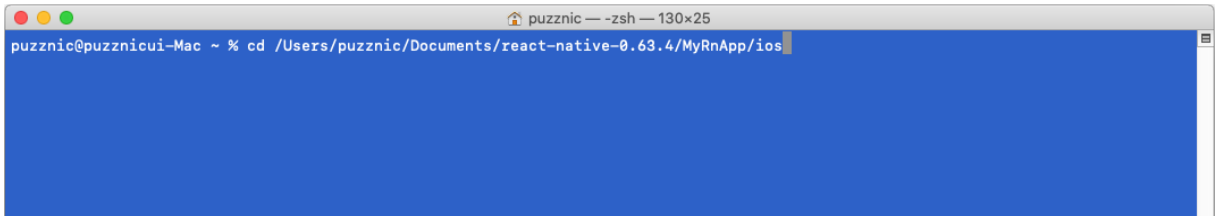


After the file opened find line ':hermes_enabled => false' and change 'false' to 'true'. (For version ≥ 0.73.x, if there is no such line, there is nothing to change)

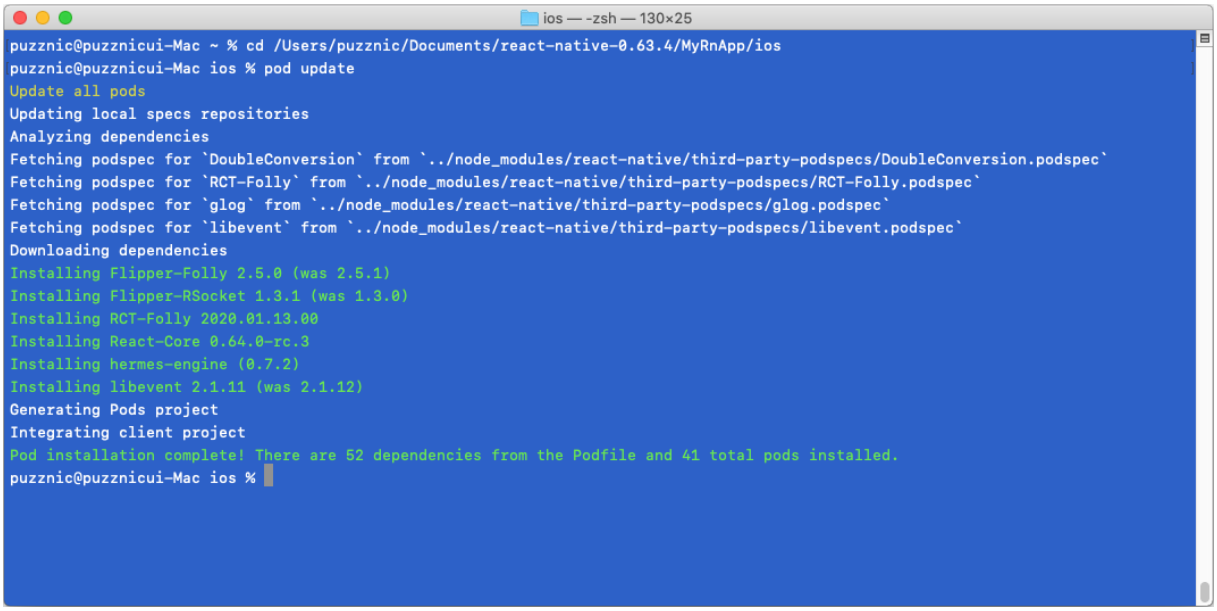




Save modification then open Terminal app and move to MyRnApp/ios folder.

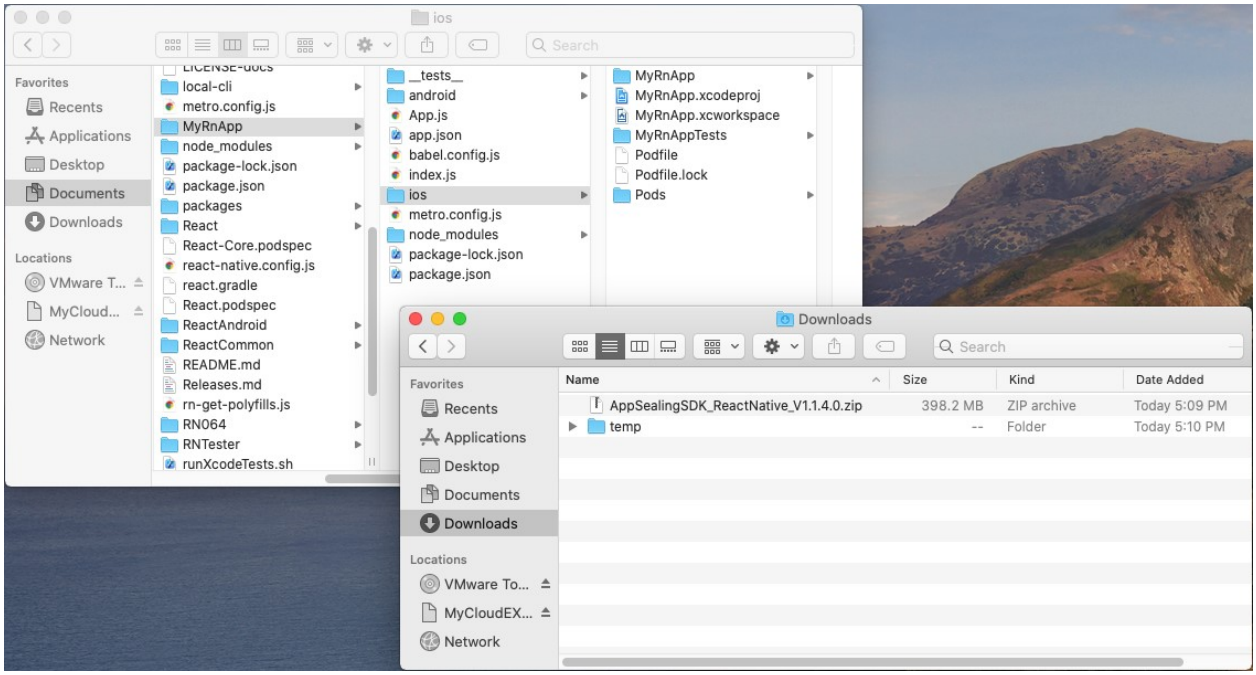


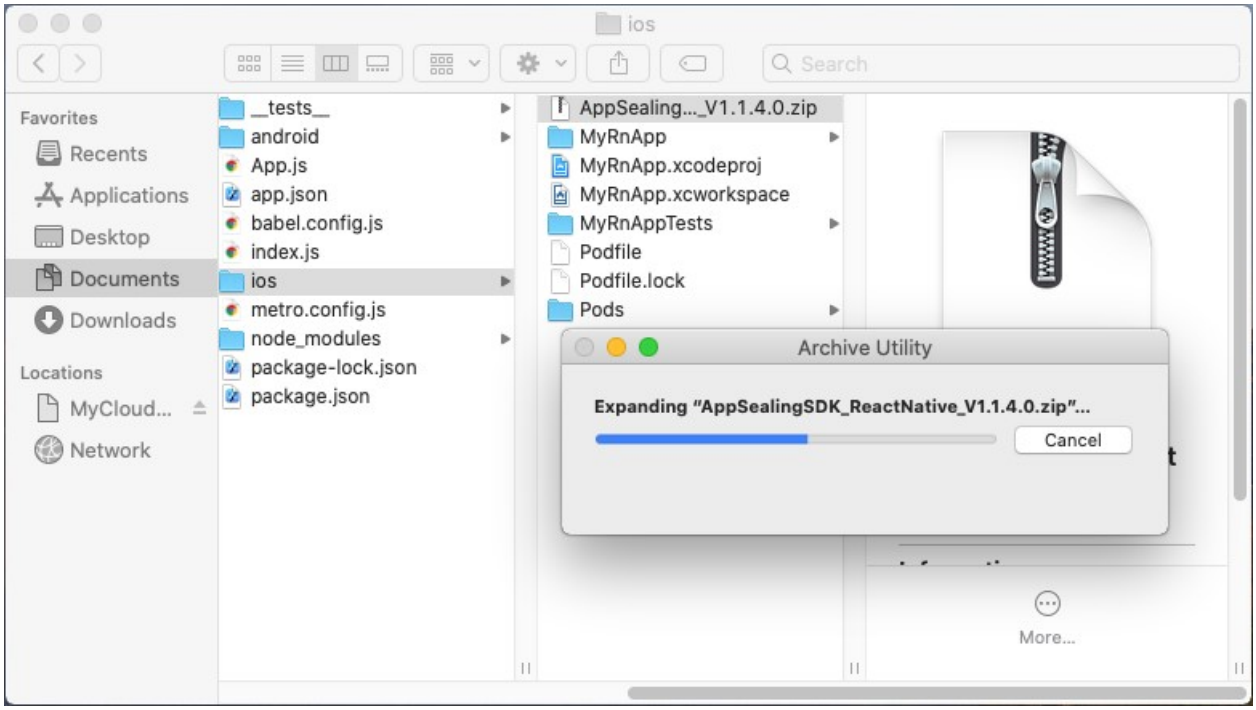
Run command "pod update" in ios folder to install required elements for using hermes engine.



1-2 **Move & Un-compress** SDK file

Move "AppSealing_SDK_ReactNative.zip" file downloaded from ADC to "ios" folder and un-compress it by double-clicking.





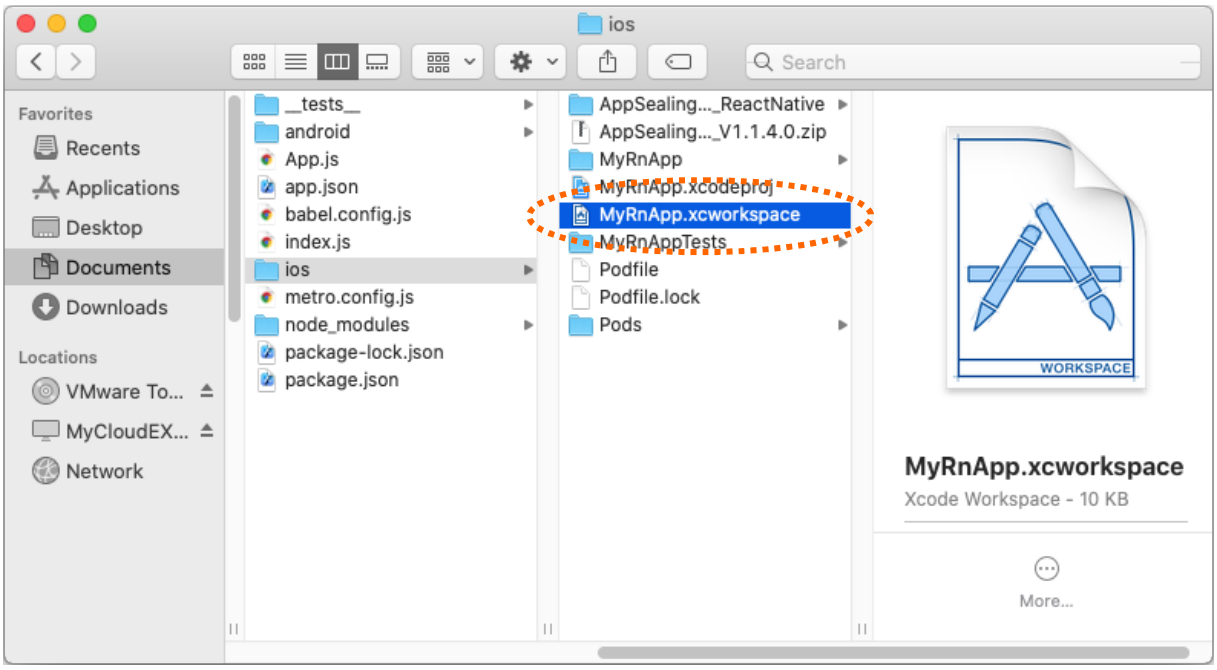
After uncompressing zip file, check whether all files are generated like below.

If any file is missing try re-download SDK or try expand zip file again.

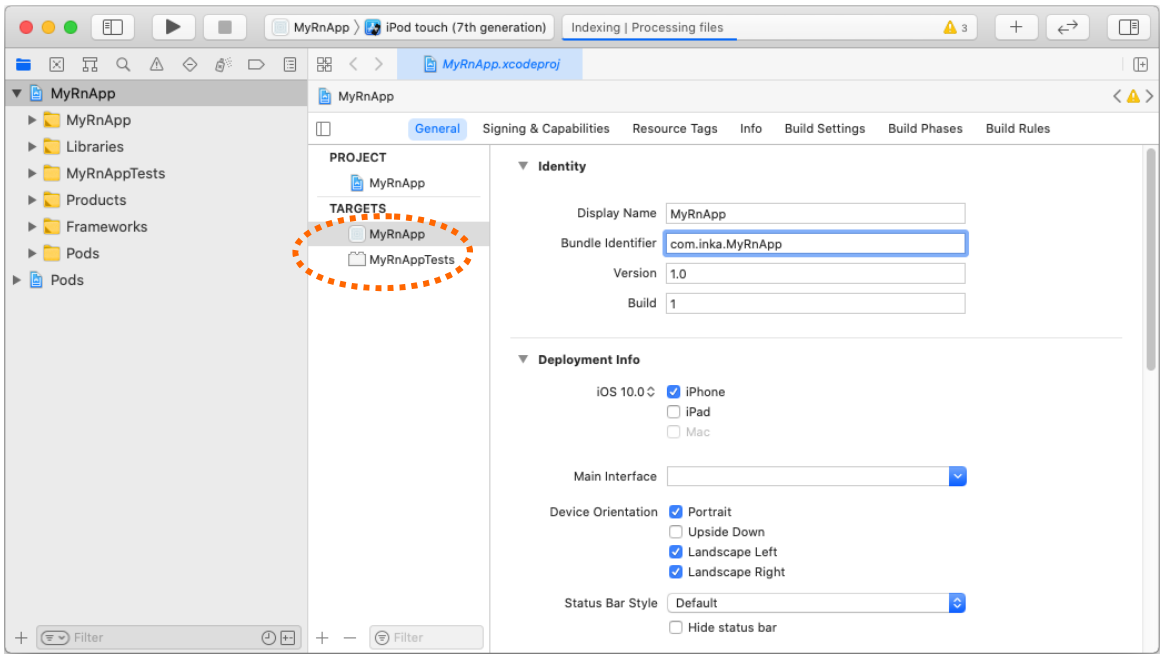
**** Warning: SDK versions that include "AdhocEnabled" in the name of the compressed file are SDKs with weakened security features, enabling app distribution through methods other than the official App Store or TestFlight (such as Ad Hoc, enterprise, MDM, and other third-party stores). Distribution outside of the App Store can make you vulnerable to attacks, so unless absolutely necessary, we recommend downloading a version that does not include AdhocEnabled.**

1-3 **Compare Bundle ID** of your project with the registered bundle ID of SDK

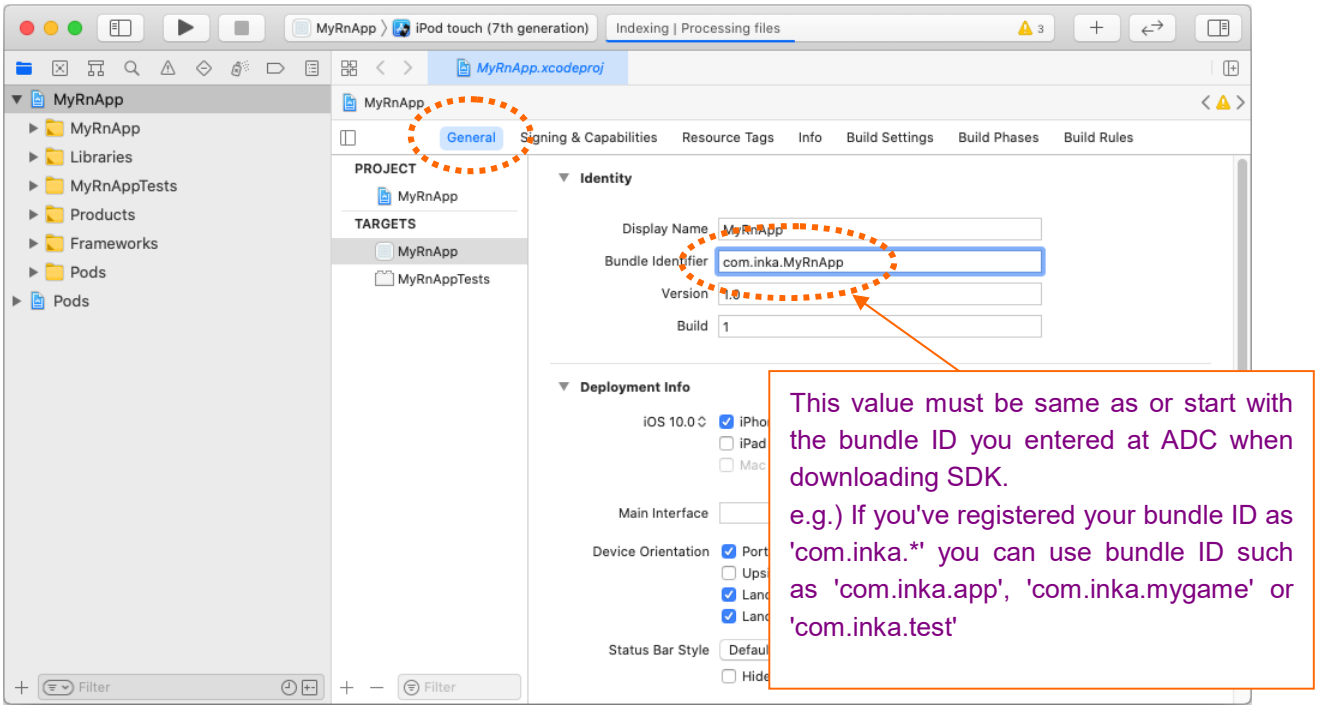
After you've uncompressed SDK zip file, you should check your bundle ID is valid. Open Xcode by double-clicking "MyRnApp.xcworkspace" file in the "ios" folder.



Select project in left panel of Xcode and select your project name(MyRnApp) at "TARGETS" list in middle panel.

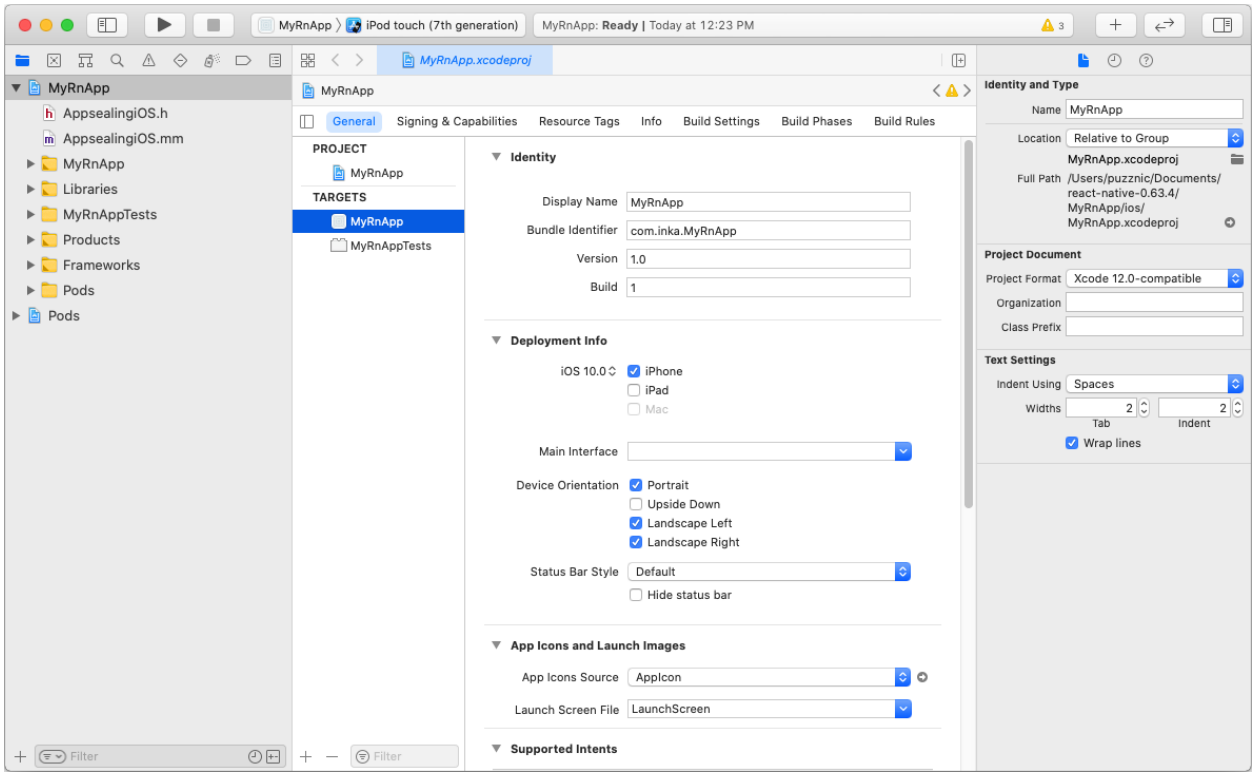


Then select "General" tab and check your bundle Id whether it is same as or starts with the value you entered when downloading SDK at ADC.

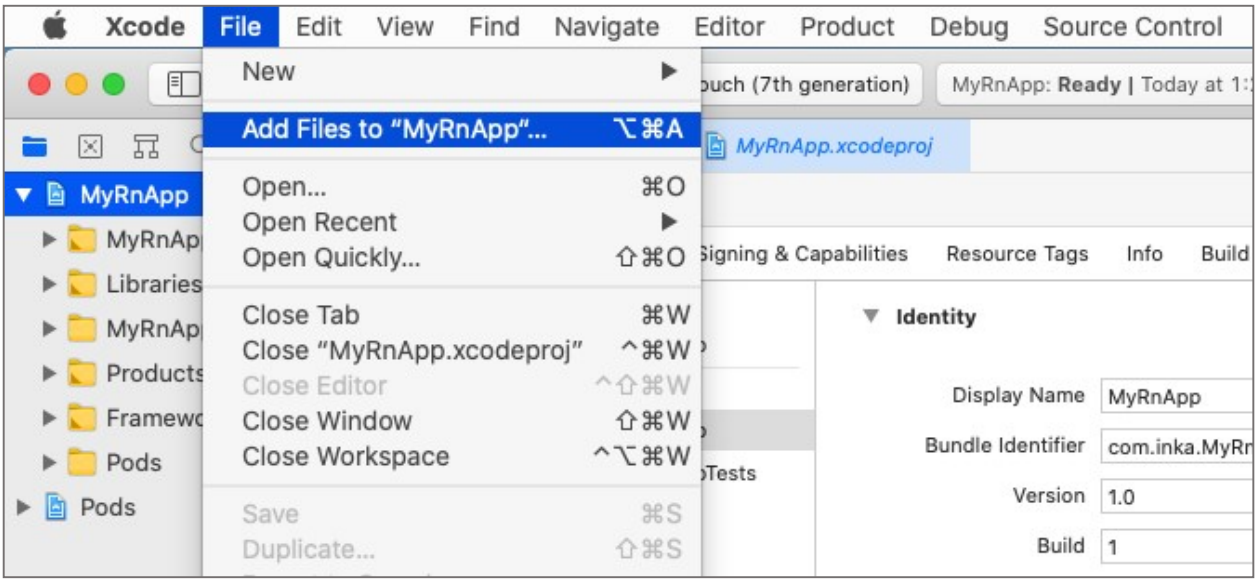


Part 2. Apply AppSealing files to your project

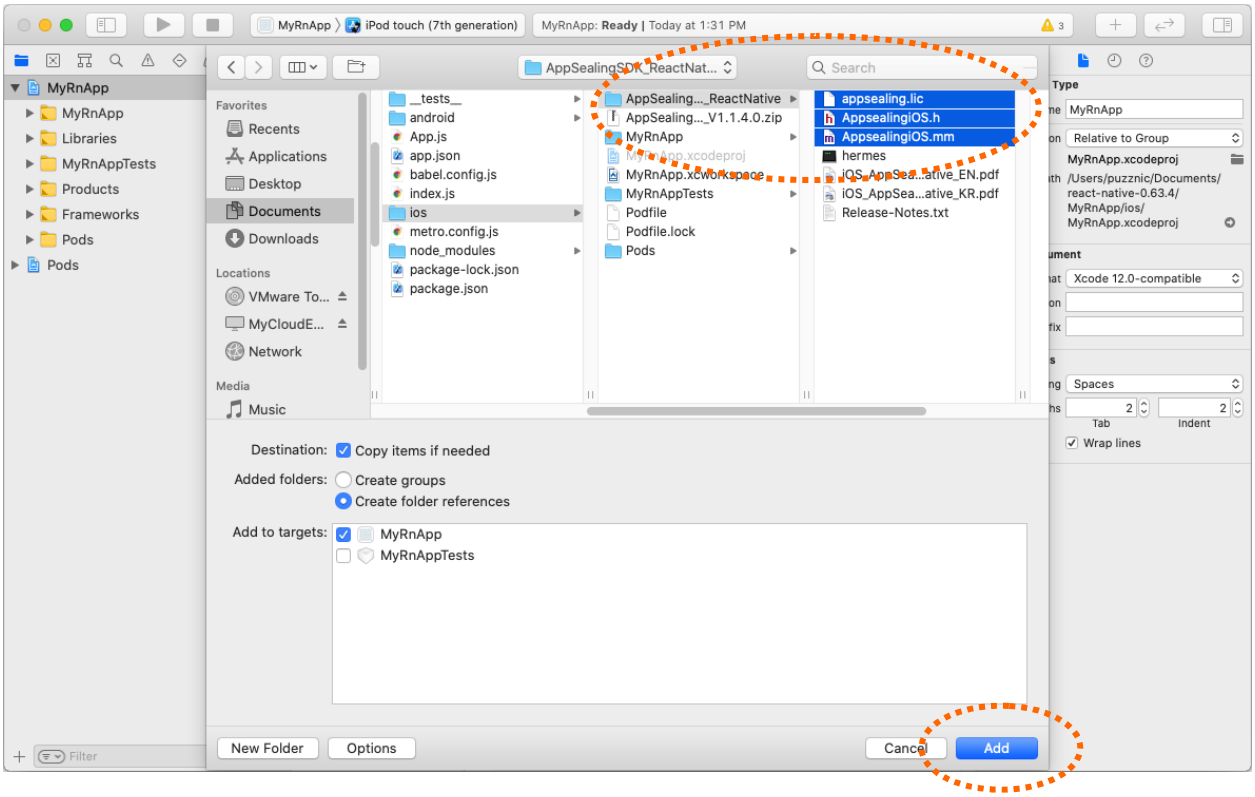
2-1 Open your **Xcode project**



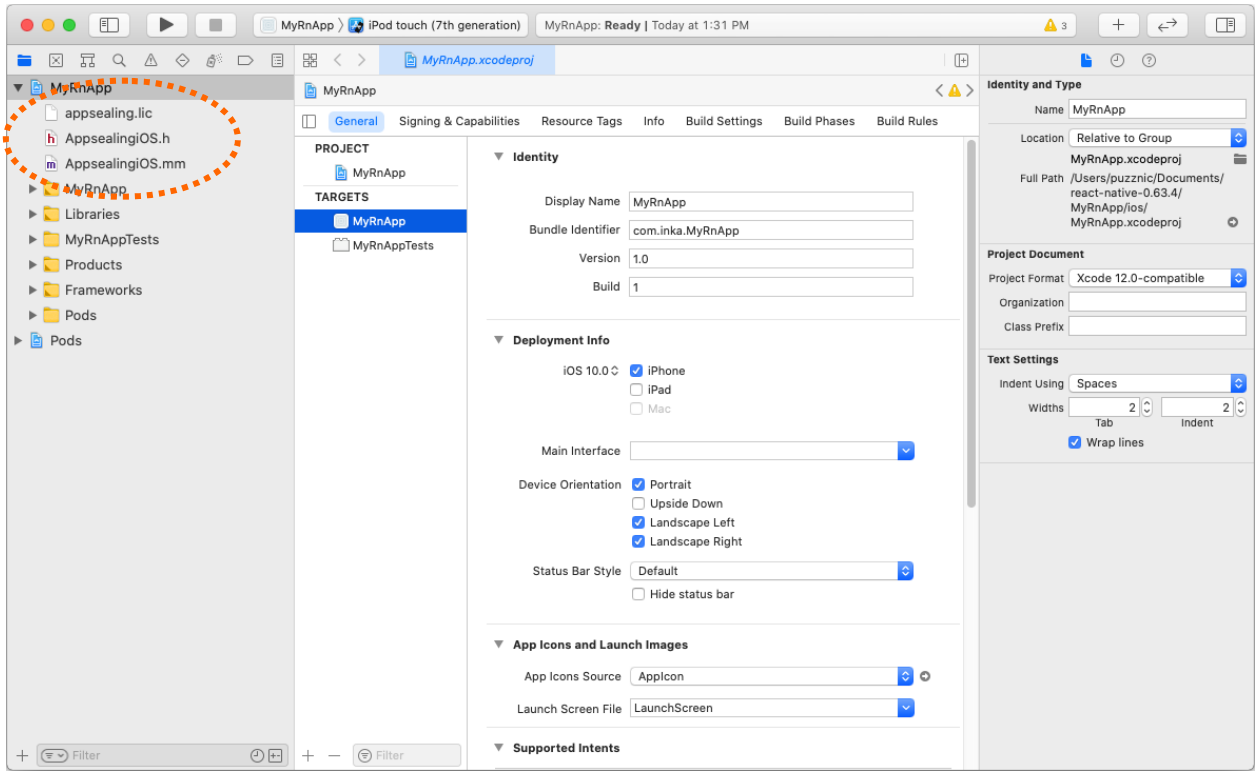
2-2 Perform **'File >> Add Files to "MyRnApp"...'** menu action



In dialog box, select "**appsealing.lic**", **"AppsealingiOS.h" and "AppsealingiOS.mm"** files in "MyRnApp/ios/AppSealingSDK_ReactNative/" folder and click "Add" button.



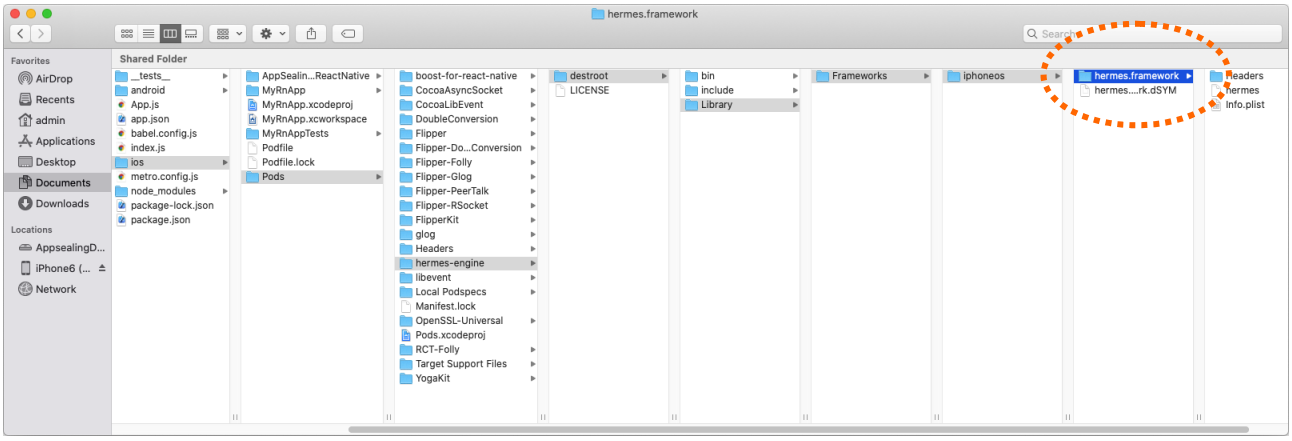
Click button to add files



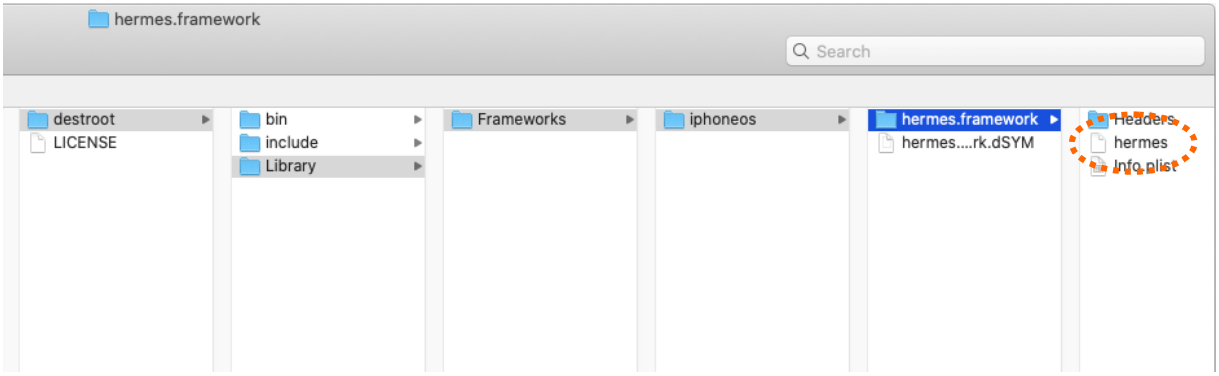
2-3 Configure hermes library

In Finder, move to following path.

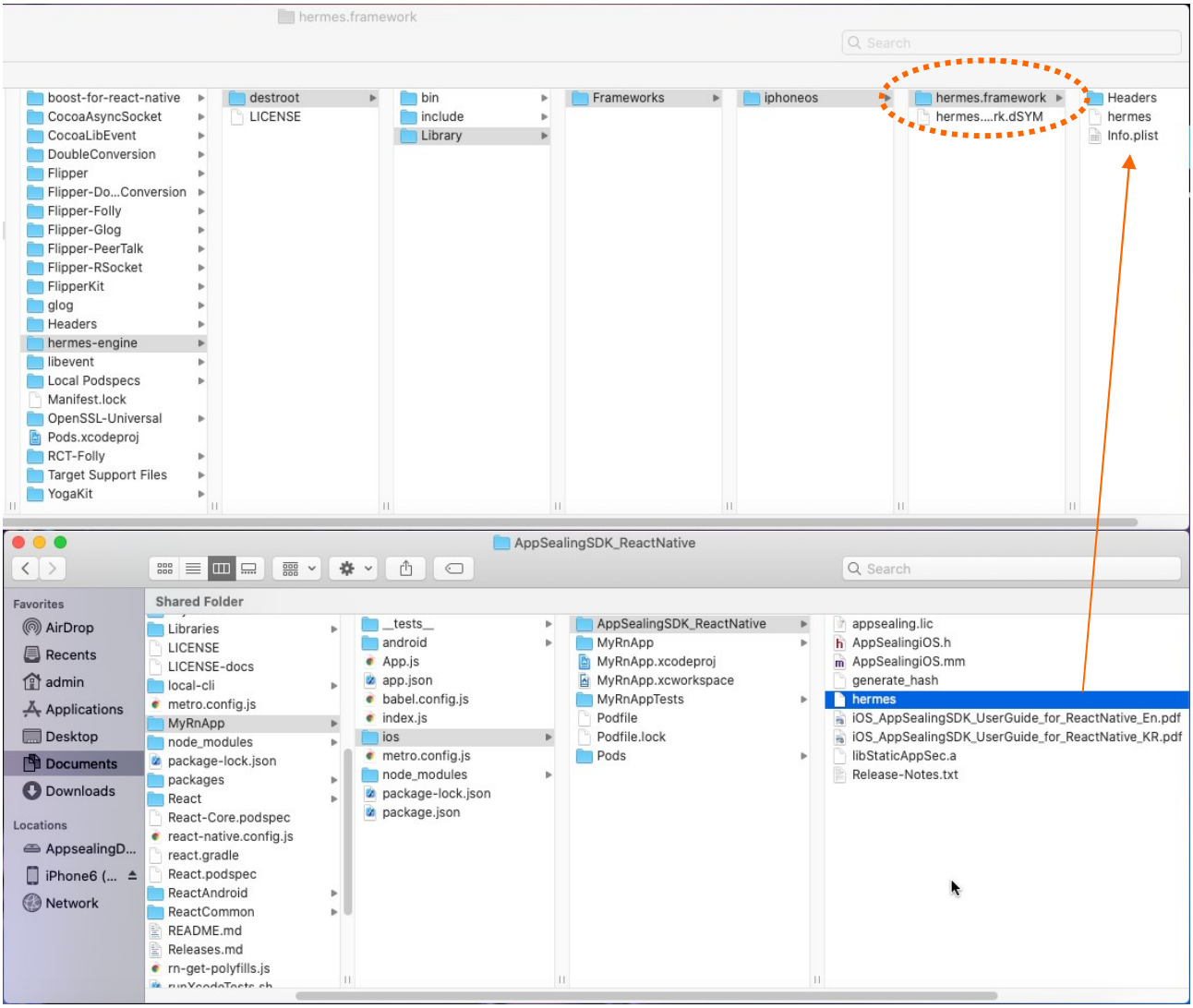
MyRnApp >> ios >> Pods >> hermes-engine >> destroot >> Library >> Frameworks >> iphoneos >> hermes.framework



Backup original "hermes" file in this folder. This file can be used when you need to debug or run "MyRnApp" without AppSealing logic.



Open Finder window then move to previous un-compressed SDK folder "MyRnApp/ios/AppSealingSDK_ReactNative" and copy/move hermes file to newly created "iphoneos-release/hermes.framework" folder. Warning dialog for duplicate file name can be shown then you just click "Replace".

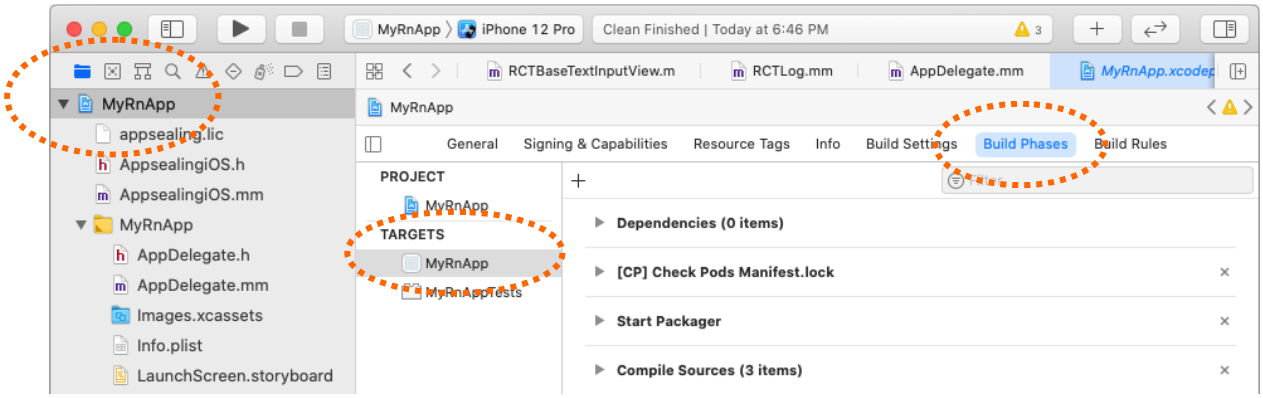


- The path of the hermes file may vary depending on the React Native version.

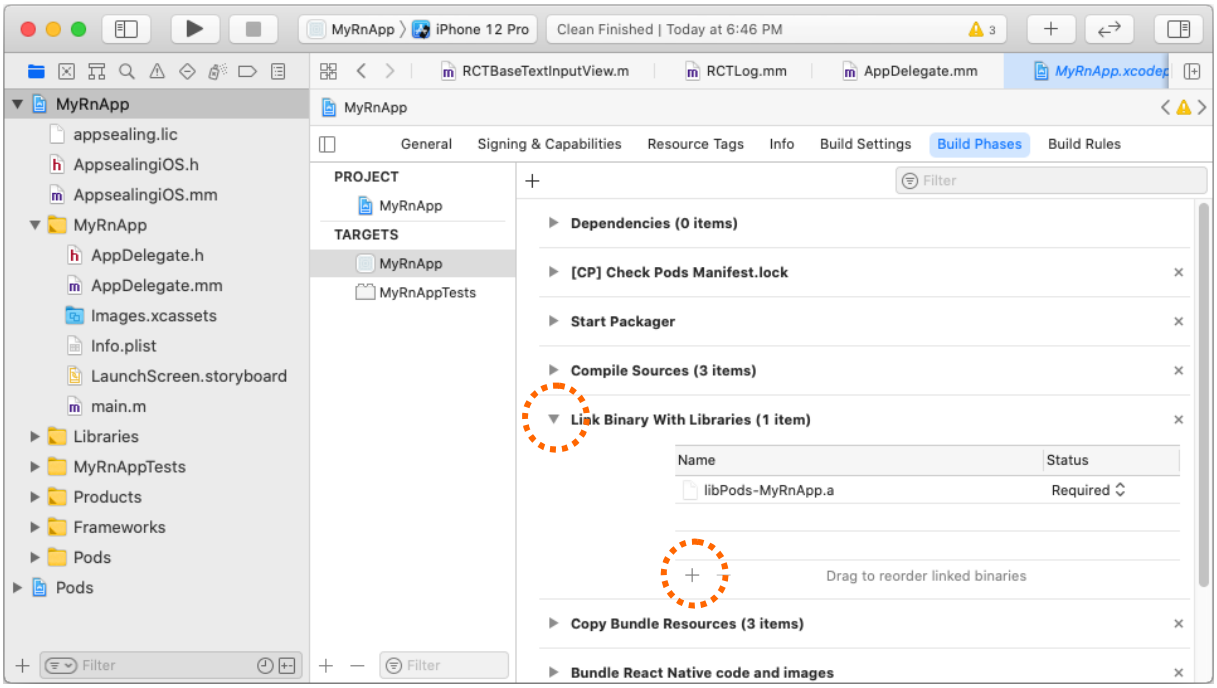
- ReactNative 0.65.1 : MyRnApp0_65/ios/Pods/hermes-engine/destroot/Library/Frameworks/universal/hermes.xcframework/ios-arm64_armv7_armv7s/hermes.framework

- ReactNative 0.66.0 : /MyRnApp0_66/ios/Pods/hermes-engine/destroot/Library/Frameworks/universal/hermes.xcframework/ios-arm64/hermes.framework

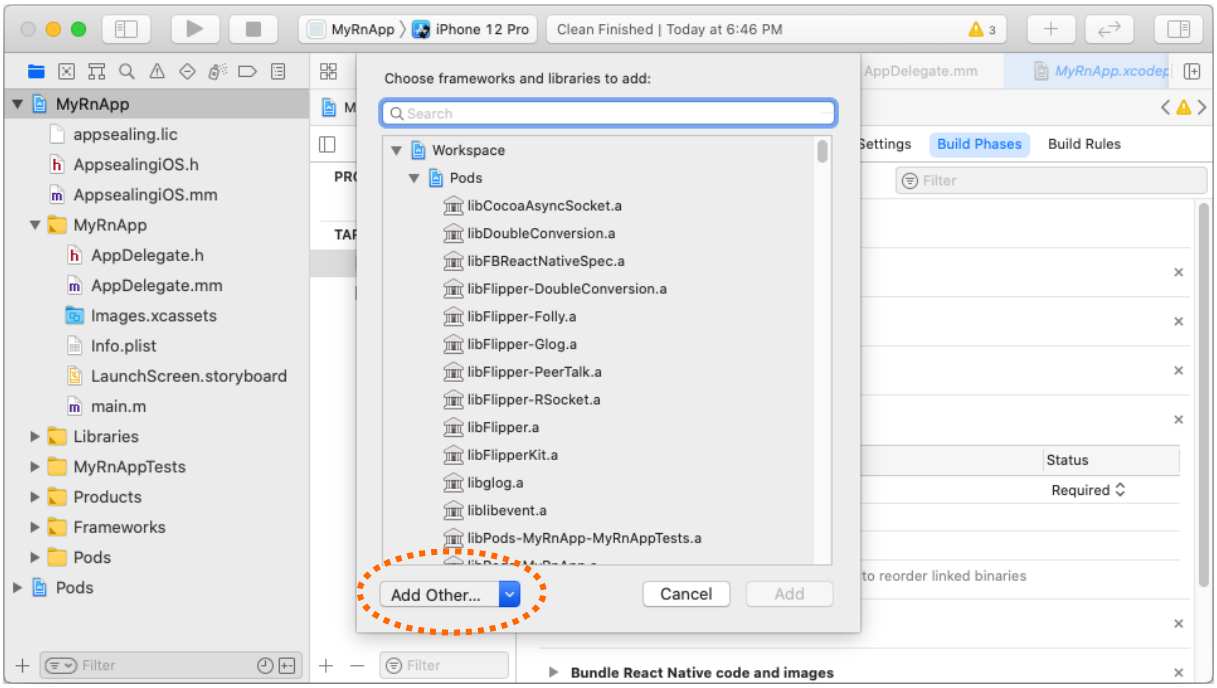
Next step is to apply static AppSealing library to your project. While project name in "TARGETS" has selected select "Build Phase" tab in right panel.



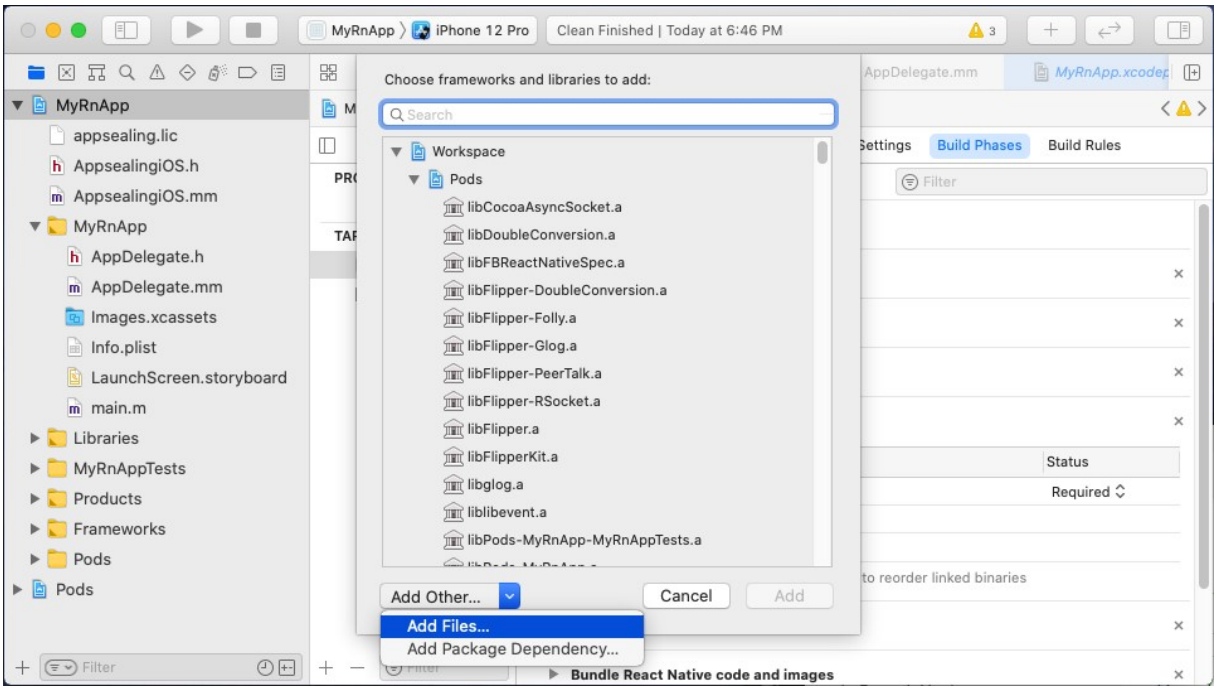
Click arrow icon left to "Link Binary With Libraries" to expand option panel and click "+" icon below.



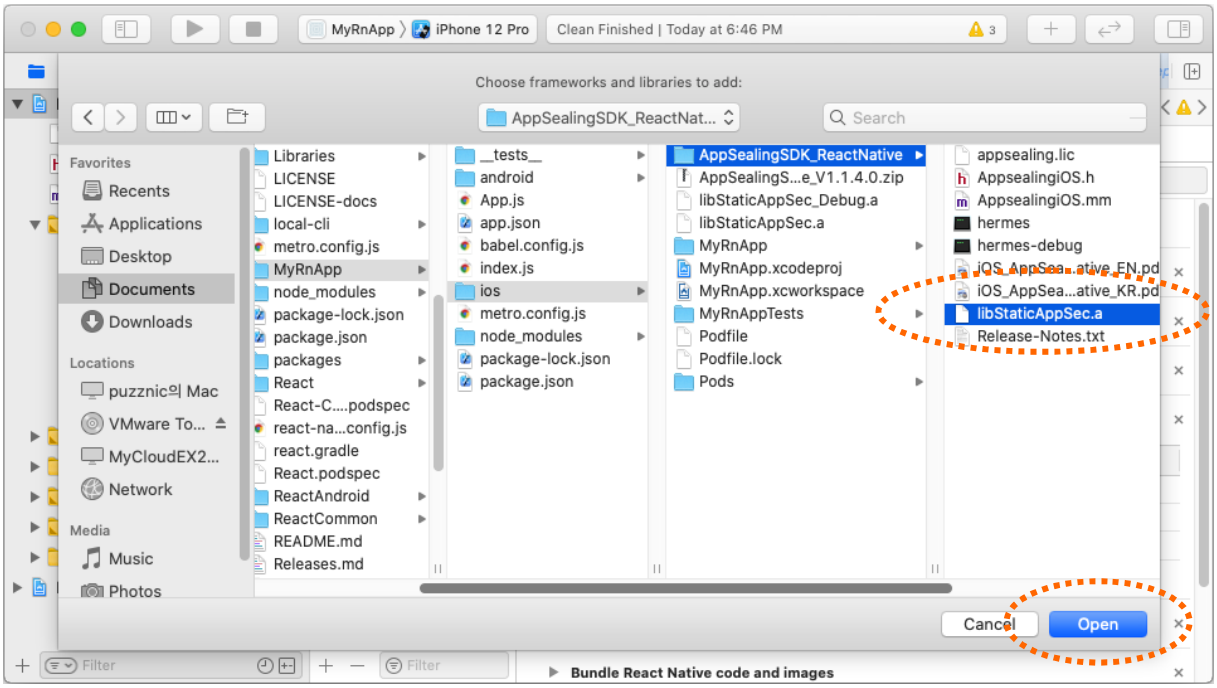
File selection window will appear then click "Add Other..." button at bottom.



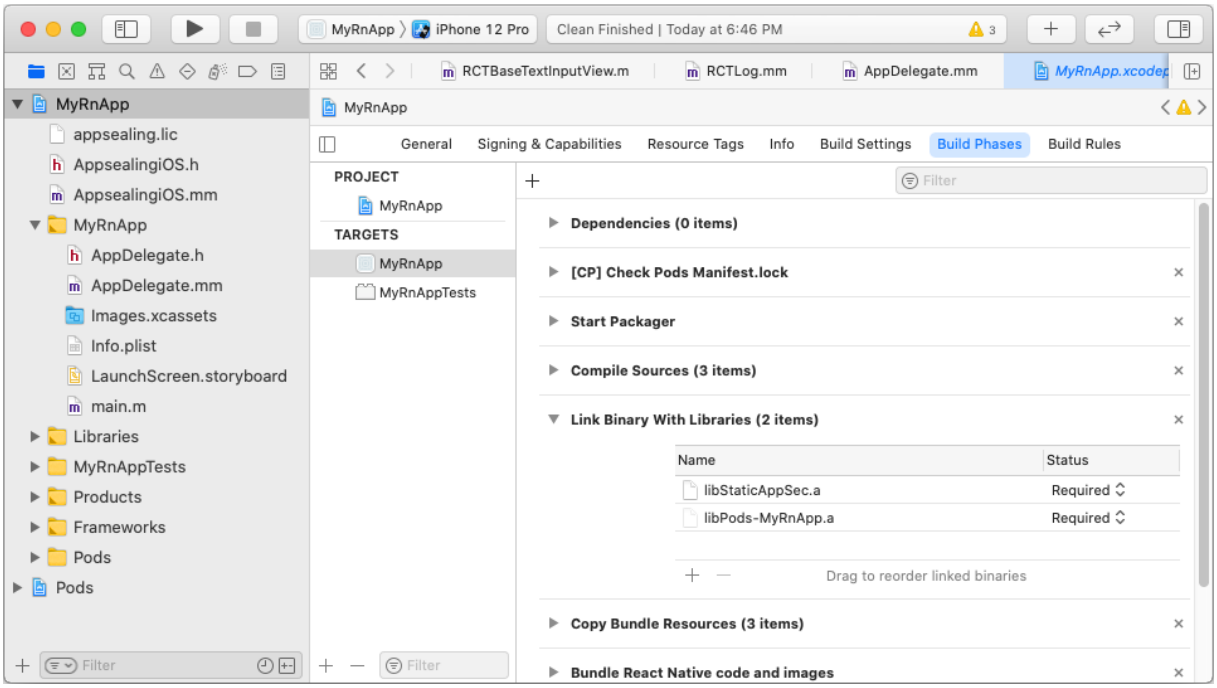
Select "Add Files..." item in drop-down list.



Choose "libStaticAppSec.a" file at "MyRnApp/ios/AppSealingSD_ReactNative" folder in file open dialog box then click "Open" button.



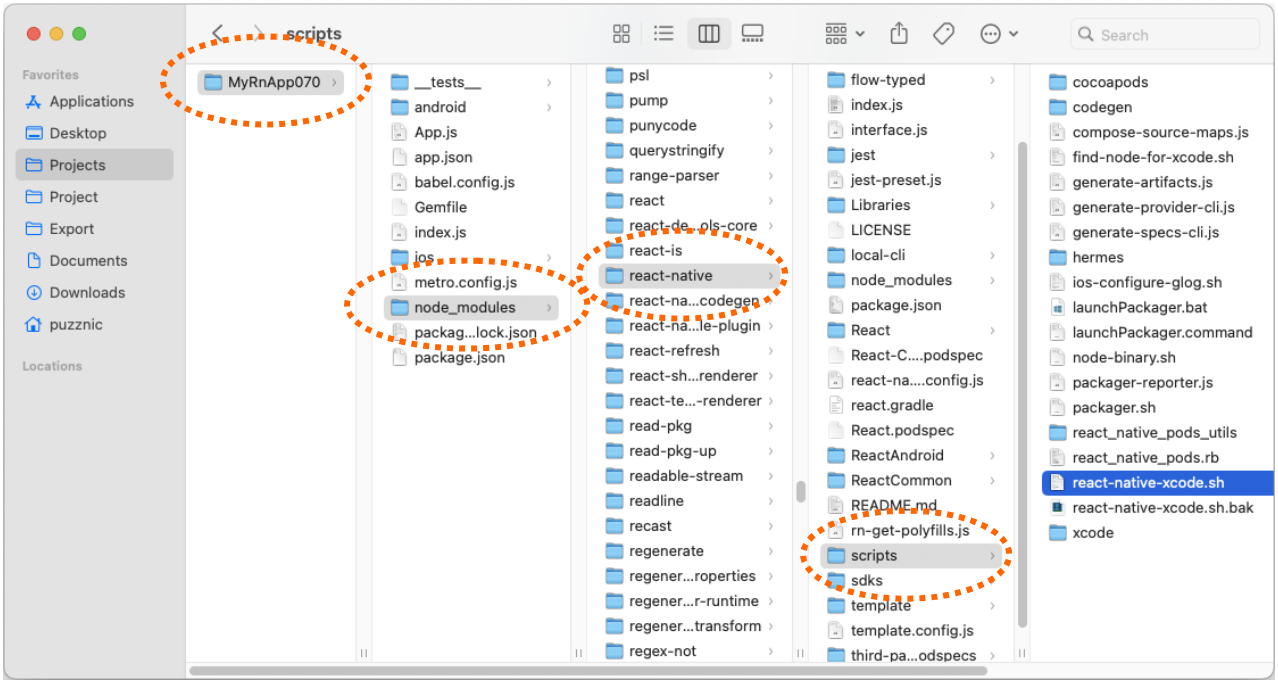
You can see the "libStaticAppSec.a" library has added like below.



2-4 Additional work required for React Native 0.70.0 or later

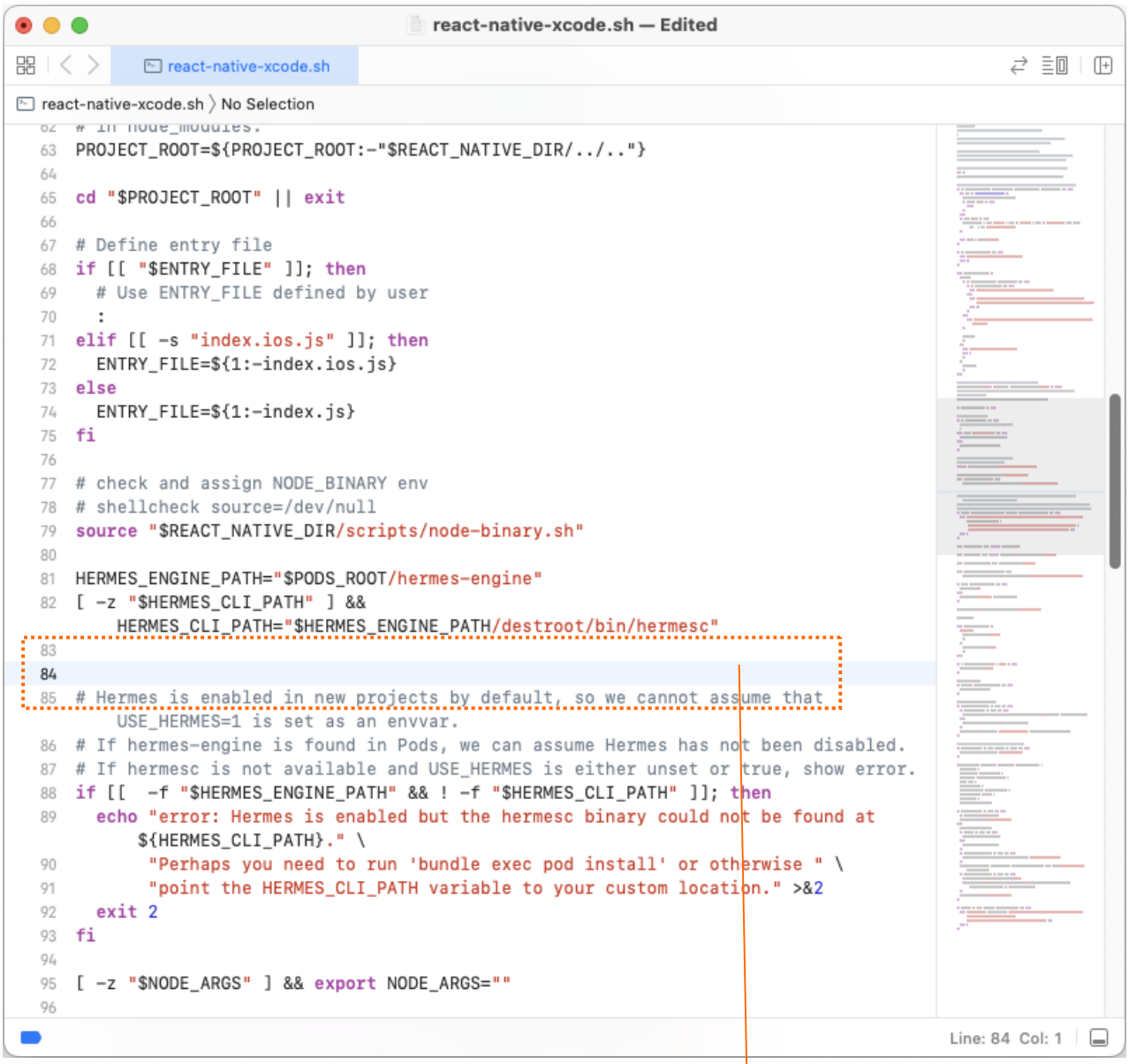
If the version of the React Native app to which the AppSealing SDK is to be applied is 0.70.0 or higher, the following additional steps must be performed. **If this process is omitted, app's javascript code is not encrypted correctly.**

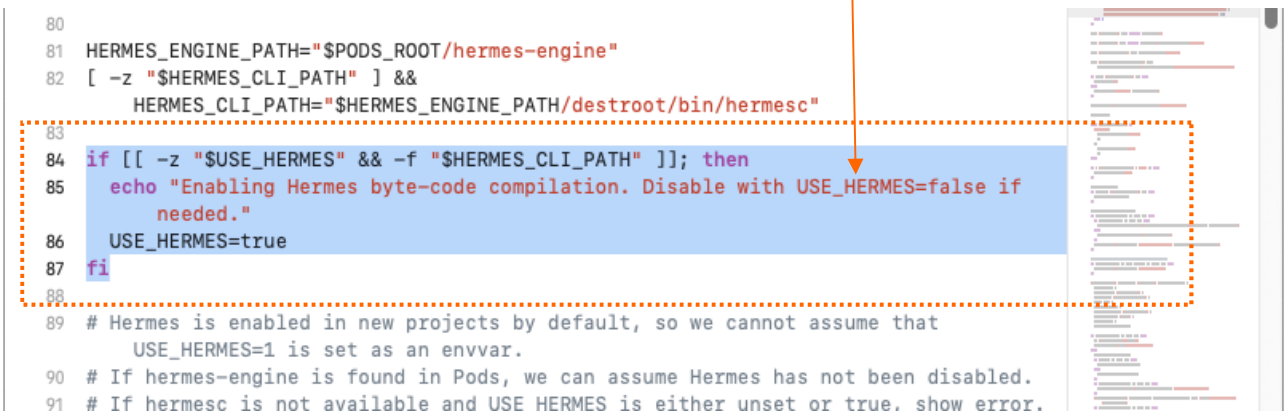
Open Finder first, and move to "node_modules/react-native/scripts" folder of your project path.



After moving to the folder, find the file named "react-native-xcode.sh" and open it with TextEditor app. When you open the file, go to line 84 of the script code and add the script below.

```
if [[ -z "$USE_HERMES" && -f "$HERMES_CLI_PATH" ]]; then
  echo "Enabling Hermes byte-code compilation. Disable with USE_HERMES=false if
needed."
  USE_HERMES=true
fi
```

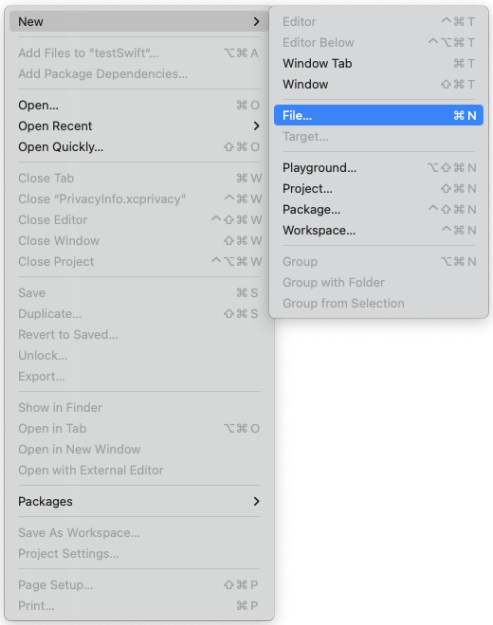





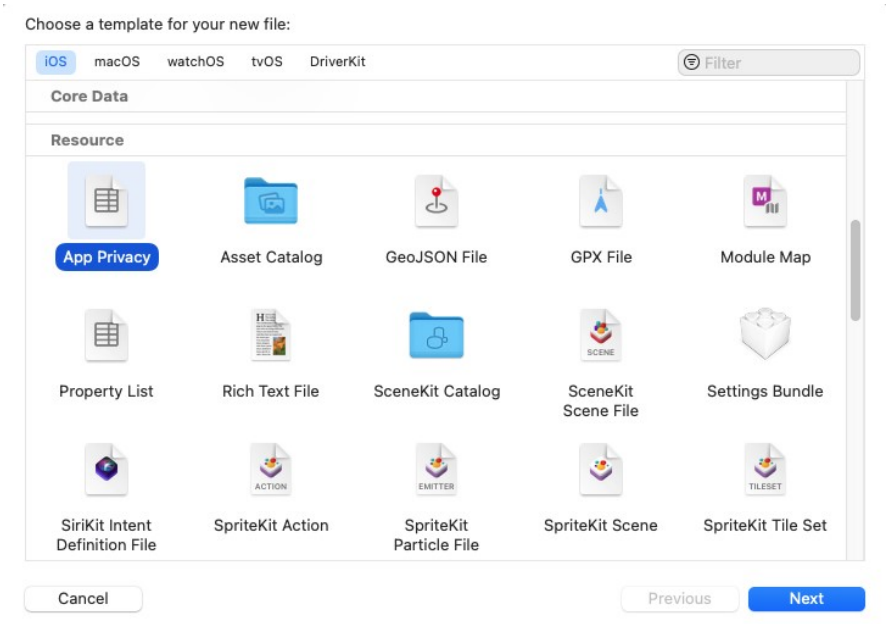
2-5 Add an item to **PrivacyInfo.xcprivacy** file (App Store upload)

Since May 2024, privacy manifest file is required for App Store upload.

If there is no "PrivacyInfo.xcprivacy" file in the project, please open .xcodeproj or .xcworkspace file of the project by Xcode, and then click "File > New > File..." in the menu.



Choose "App Privacy" in the "Resource" section to add privacy manifest file in the project:

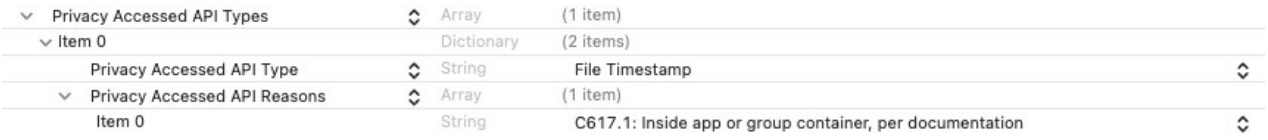


For more detailed guide for the privacy manifest file, please refer to the following link:
https://developer.apple.com/documentation/bundleresources/privacy_manifest_files#4284009

Open "PrivacyInfo.xcprivacy" file and add items so that the file includes the following structure:

- key "NSPrivacyAccessedAPITypes"
  - array
    - key "NSPrivacyAccessedAPIType": string "NSCategoryFileTimestamp"
    - key "NSPrivacyAccessedAPITypeReasons"
      - array
        - string "C617.1"

As the result, when you open "PrivacyInfo.xcprivacy" in Xcode, you can check the following structure is included:



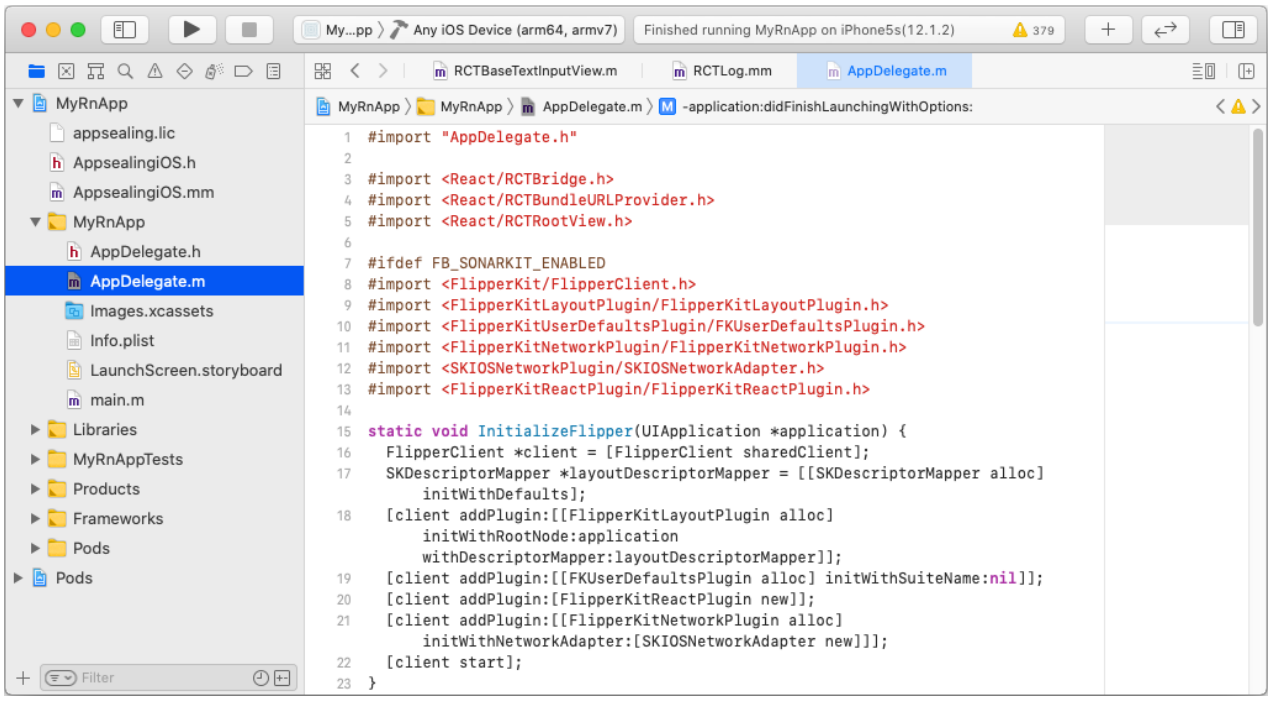
Part 3. Add simple GUI for iOS security intrusion

The AppSealing library within your App is automatically activated when right after App has launched. If AppSealing library has detected any abnormal environment (such as jailbroken-device, executable has decrypted or debugger has attached) it will close the app after 20 seconds irrespectively of user action, so the app should notify the detection result to user and show some proper message box for user can recognize there's some invalid environment in his/her device.

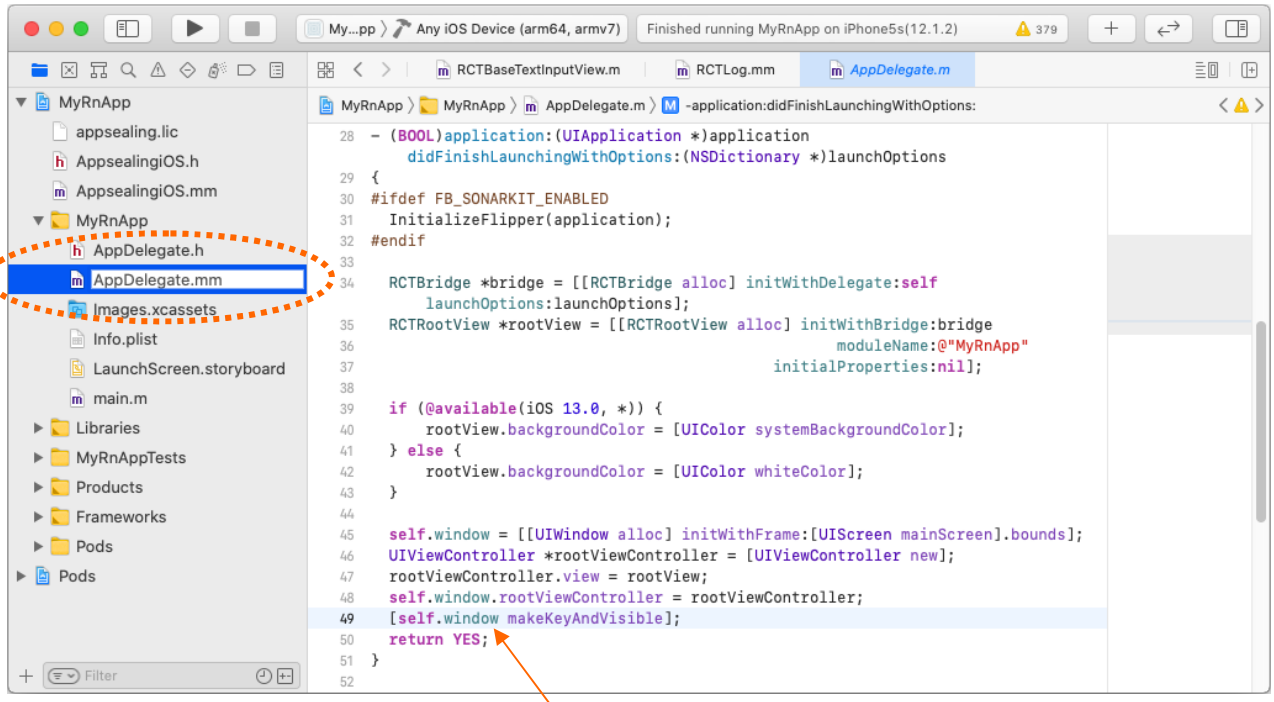
If you want to show that dialog box in your app, you can easily do that inserting small chunk of code into "AppDelegate.m" file.

3-1 Show **UIAlertController window in your app** (0.70.x or lower)

First, open MyRnApp xcode project and select "AppDelegate.m" file.



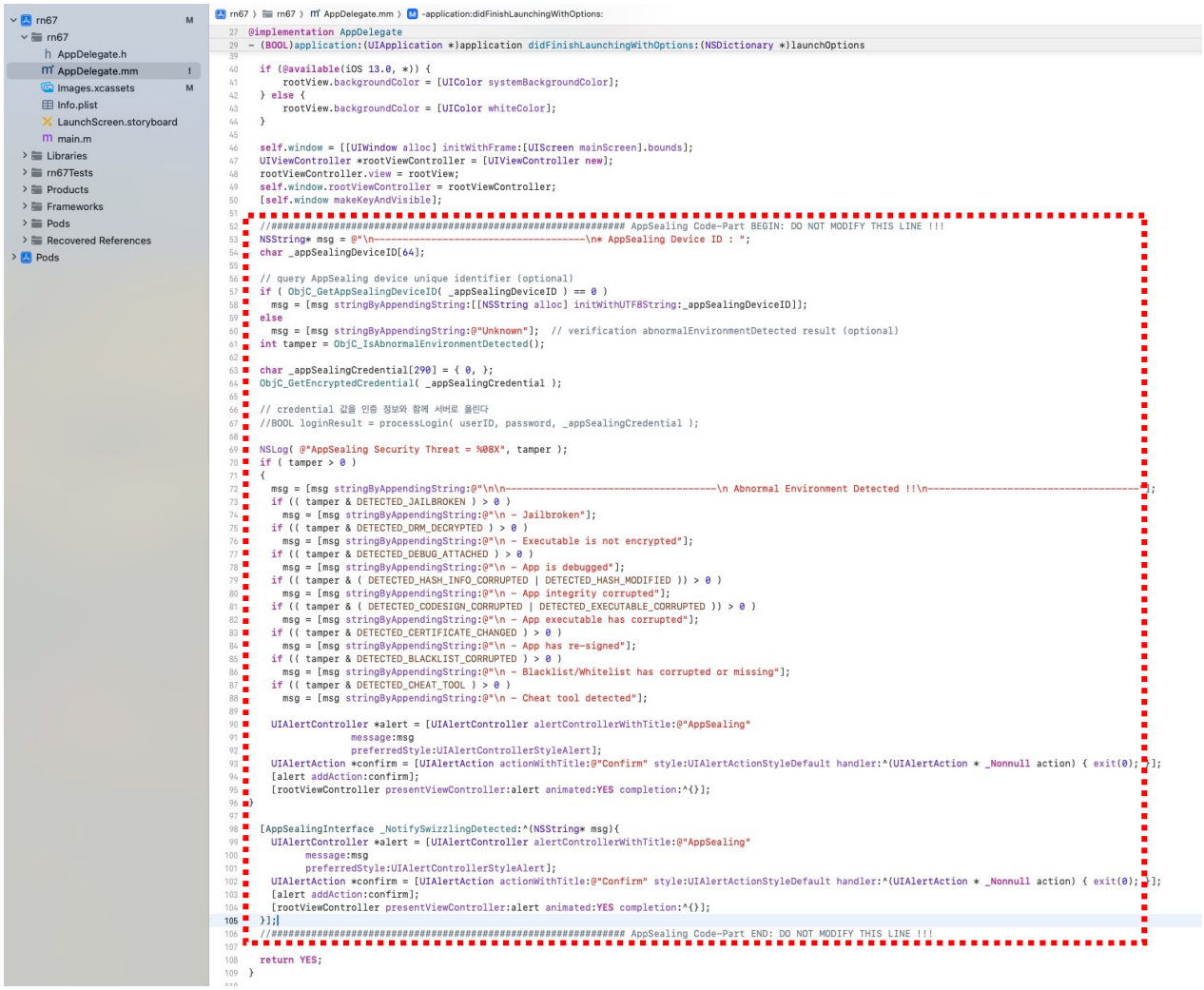
Click again selected "AppDelegate.m" item and rename it "AppDelegate.mm". After renaming move source code to 'didFinishLaunchingWithOptions' method part and paste following small code block between last two lines.



Simple UI code into 'AppDelegate.mm' for **React Native** project

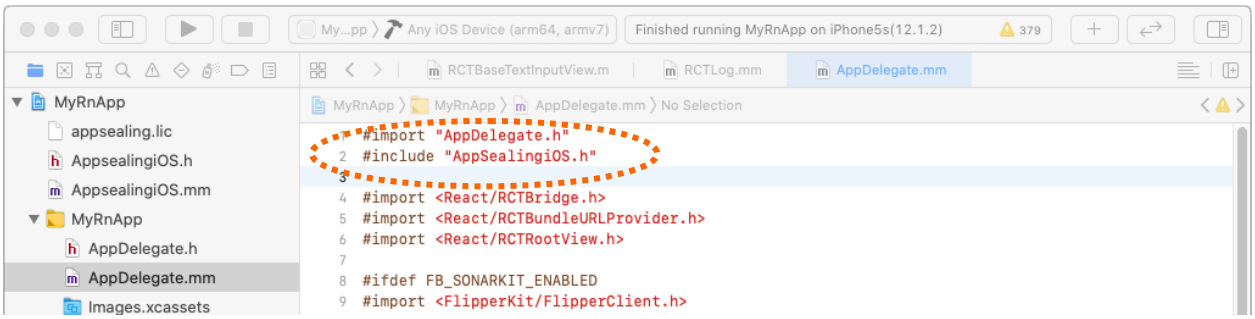
```
    //############################################################## AppSealing Code-Part BEGIN: DO NOT MODIFY THIS LINE !!!
    NSString* msg = @"\n-----------------------------------\n* AppSealing Device ID : ";
    char _appSealingDeviceID[64];

    // query AppSealing device unique identifier (optional)
    if ( ObjC_GetAppSealingDeviceID( _appSealingDeviceID ) == 0 )
        msg = [msg stringByAppendingString:[[NSString alloc] initWithUTF8String:_appSealingDeviceID]];
    else
        msg = [msg stringByAppendingString:@"Unknown"];  // verification abnormalEnvironmentDetected result (optional)
    int tamper = ObjC_IsAbnormalEnvironmentDetected();

    char _appSealingCredential[290] = { 0, };
    ObjC_GetEncryptedCredential( _appSealingCredential );

    // credential 값을 인증 정보와 함께 서버로 올린다
    //BOOL loginResult = processLogin( userID, password, _appSealingCredential );
    NSLog( @"AppSealing Security Threat = %08X", tamper );
    if ( tamper > 0 )
    {
        msg = [msg stringByAppendingString:@"\n\n-----------------------------------\n Abnormal Environment Detected !!\n-------------------------
-----------"];
        if (( tamper & DETECTED_JAILBROKEN ) > 0 )
            msg = [msg stringByAppendingString:@"\n - Jailbroken"];
        if (( tamper & DETECTED_DRM_DECRYPTED ) > 0 )
            msg = [msg stringByAppendingString:@"\n - Executable is not encrypted"];
        if (( tamper & DETECTED_DEBUG_ATTACHED ) > 0 )
            msg = [msg stringByAppendingString:@"\n - App is debugged"];
        if (( tamper & ( DETECTED_HASH_INFO_CORRUPTED | DETECTED_HASH_MODIFIED )) > 0 )
            msg = [msg stringByAppendingString:@"\n - App integrity corrupted"];
        if (( tamper & ( DETECTED_CODESIGN_CORRUPTED | DETECTED_EXECUTABLE_CORRUPTED )) > 0 )
            msg = [msg stringByAppendingString:@"\n - App executable has corrupted"];
        if (( tamper & DETECTED_CERTIFICATE_CHANGED ) > 0 )
            msg = [msg stringByAppendingString:@"\n - App has re-signed"];
        if (( tamper & DETECTED_BLACKLIST_CORRUPTED ) > 0 )
            msg = [msg stringByAppendingString:@"\n - Blacklist/Whitelist has corrupted or missing"];
        if (( tamper & DETECTED_CHEAT_TOOL ) > 0 )
            msg = [msg stringByAppendingString:@"\n - Cheat tool detected"];

        UIAlertController *alert = [UIAlertController alertControllerWithTitle:@"AppSealing" message:msg
preferredStyle:UIAlertControllerStyleAlert];
        UIAlertAction *confirm = [UIAlertAction actionWithTitle:@"Confirm" style:UIAlertActionStyleDefault handler:^(UIAlertAction * _Nonnull
action) { exit(0); }];
        [alert addAction:confirm];
        [rootViewController presentViewController:alert animated:YES completion:^{}];
    }

    [AppSealingInterface _NotifySwizzlingDetected:^(NSString* msg){
        UIAlertController *alert = [UIAlertController alertControllerWithTitle:@"AppSealing" message:msg
preferredStyle:UIAlertControllerStyleAlert];
        UIAlertAction *confirm = [UIAlertAction actionWithTitle:@"Confirm" style:UIAlertActionStyleDefault handler:^(UIAlertAction * _Nonnull
action) { exit(0); }];
        [alert addAction:confirm];
        [rootViewController presentViewController:alert animated:YES completion:^{}];
    }];
    //############################################################## AppSealing Code-Part END: DO NOT MODIFY THIS LINE !!!
```


Previous sample UI code included in "Code Samples.txt" source file of AppSealing SDK so you can copy & paste the code block. Check whether the code block has inserted in right place.



```
@implementation AppDelegate
- (BOOL)application:(UIApplication *)application didFinishLaunchingWithOptions:(NSDictionary *)launchOptions

  if (@available(iOS 13.0, *)) {
      rootView.backgroundColor = [UIColor systemBackgroundColor];
  } else {
      rootView.backgroundColor = [UIColor whiteColor];
  }

  self.window = [[UIWindow alloc] initWithFrame:[UIScreen mainScreen].bounds];
  UIViewController *rootViewController = [UIViewController new];
  rootViewController.view = rootView;
  self.window.rootViewController = rootViewController;
  [self.window makeKeyAndVisible];

  //################################################################ AppSealing Code-Part BEGIN: DO NOT MODIFY THIS LINE !!!
  NSString* msg = @"\n-----------------------------------\n* AppSealing Device ID : ";
  char _appSealingDeviceID[64];

  // query AppSealing device unique identifier (optional)
  if ( ObjC_GetAppSealingDeviceID( _appSealingDeviceID ) == 0 )
    msg = [msg stringByAppendingString:[[NSString alloc] initWithUTF8String:_appSealingDeviceID]];
  else
    msg = [msg stringByAppendingString:@"Unknown"];  // verification abnormalEnvironmentDetected result (optional)
  int tamper = ObjC_IsAbnormalEnvironmentDetected();

  char _appSealingCredential[290] = { 0, };
  ObjC_GetEncryptedCredential( _appSealingCredential );

  // credential 값을 인증 정보와 함께 서버로 올린다
  //BOOL loginResult = processLogin( userID, password, _appSealingCredential );

  NSLog( @"AppSealing Security Threat = %08X", tamper );
  if ( tamper > 0 )
  {
    msg = [msg stringByAppendingString:@"\n\n-----------------------------------\n Abnormal Environment Detected !!\n-----------------------------------"];
    if (( tamper & DETECTED_JAILBROKEN ) > 0 )
      msg = [msg stringByAppendingString:@"\n - Jailbroken"];
    if (( tamper & DETECTED_DRM_DECRYPTED ) > 0 )
      msg = [msg stringByAppendingString:@"\n - Executable is not encrypted"];
    if (( tamper & DETECTED_DEBUG_ATTACHED ) > 0 )
      msg = [msg stringByAppendingString:@"\n - App is debugged"];
    if (( tamper & ( DETECTED_HASH_INFO_CORRUPTED | DETECTED_HASH_MODIFIED )) > 0 )
      msg = [msg stringByAppendingString:@"\n - App integrity corrupted"];
    if (( tamper & ( DETECTED_CODESIGN_CORRUPTED | DETECTED_EXECUTABLE_CORRUPTED )) > 0 )
      msg = [msg stringByAppendingString:@"\n - App executable has corrupted"];
    if (( tamper & DETECTED_CERTIFICATE_CHANGED ) > 0 )
      msg = [msg stringByAppendingString:@"\n - App has re-signed"];
    if (( tamper & DETECTED_BLACKLIST_CORRUPTED ) > 0 )
      msg = [msg stringByAppendingString:@"\n - Blacklist/Whitelist has corrupted or missing"];
    if (( tamper & DETECTED_CHEAT_TOOL ) > 0 )
      msg = [msg stringByAppendingString:@"\n - Cheat tool detected"];

    UIAlertController *alert = [UIAlertController alertControllerWithTitle:@"AppSealing"
                message:msg
                preferredStyle:UIAlertControllerStyleAlert];
    UIAlertAction *confirm = [UIAlertAction actionWithTitle:@"Confirm" style:UIAlertActionStyleDefault handler:^(UIAlertAction * _Nonnull action) { exit(0); }];
    [alert addAction:confirm];
    [rootViewController presentViewController:alert animated:YES completion:^{}];
  }

  [AppSealingInterface _NotifySwizzlingDetected:^(NSString* msg){
    UIAlertController *alert = [UIAlertController alertControllerWithTitle:@"AppSealing"
          message:msg
          preferredStyle:UIAlertControllerStyleAlert];
    UIAlertAction *confirm = [UIAlertAction actionWithTitle:@"Confirm" style:UIAlertActionStyleDefault handler:^(UIAlertAction * _Nonnull action) { exit(0); }];
    [alert addAction:confirm];
    [rootViewController presentViewController:alert animated:YES completion:^{}];
  }];
  //################################################################ AppSealing Code-Part END: DO NOT MODIFY THIS LINE !!!

  return YES;
}
```

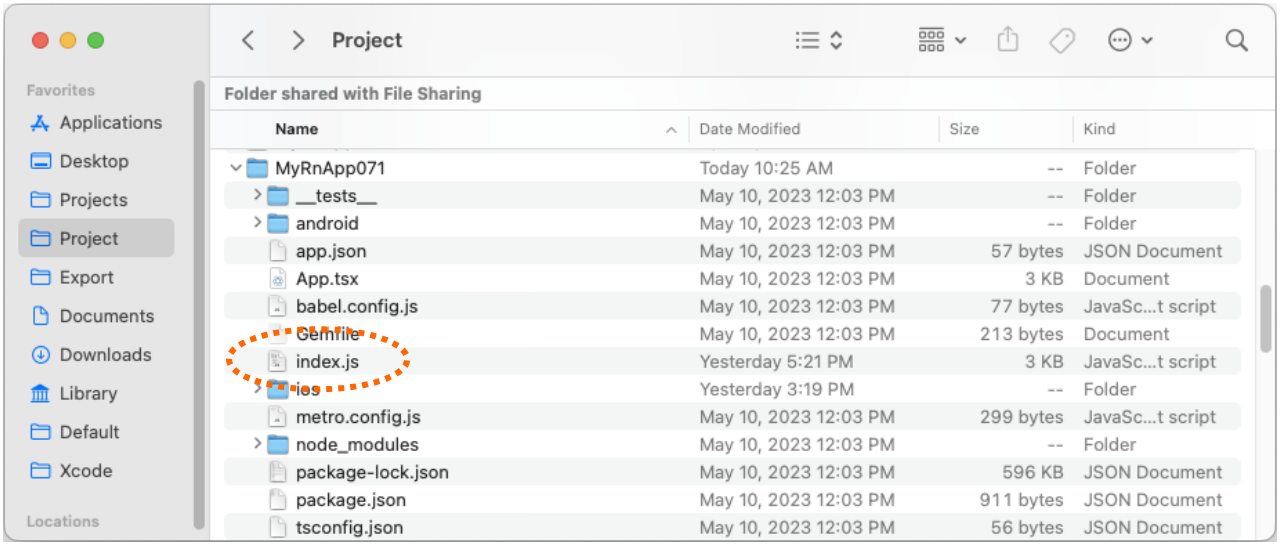
In the beginning of "AppDelegate.mm"(renamed) file, insert #include "AppsealingiOS.h" after first line.



```
#import "AppDelegate.h"
#include "AppSealingiOS.h"

#import <React/RCTBridge.h>
#import <React/RCTBundleURLProvider.h>
#import <React/RCTRootView.h>

#ifdef FB_SONARKIT_ENABLED
#import <FlipperKit/FlipperClient.h>
```


3-2 Show **Alert window** (React Native 0.71.x or higher)

If your app is using React Native 0.71.x or higher, it displays the GUI window in a different way than before. First, open Finder app and go to your project folder, then open "index.js " file with your favorite text editor.



Once the file has opened in text editor, put following code to the bottom of the "index.js" file.

Simple UI code into 'index.js' for **React Native** project

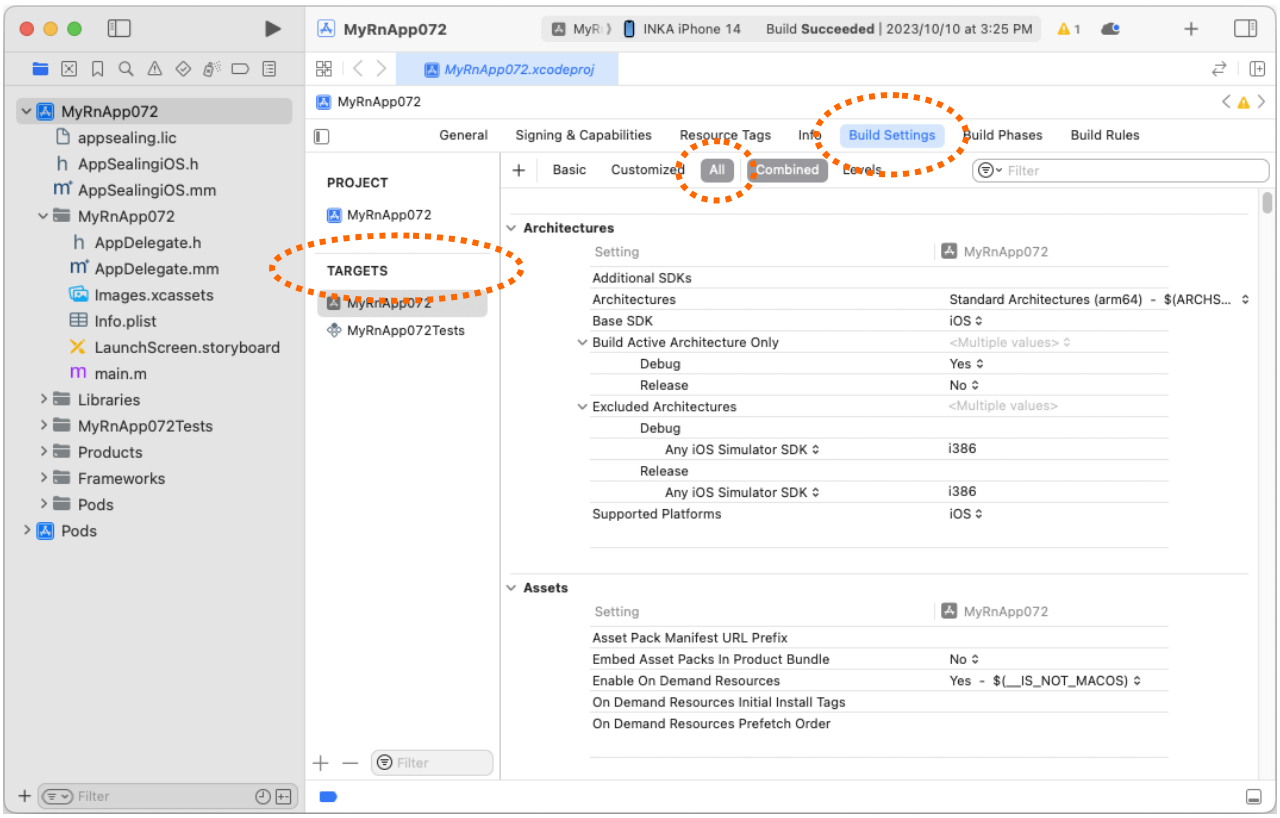
```
//############################################################ AppSealing Code-Part BEGIN: DO NOT MODIFY THIS LINE !!!
import {Alert, NativeModules} from 'react-native';

const DETECTED_JAILBROKEN           = 0x00000001;
const DETECTED_DRM_DECRYPTED        = 0x00000002;
const DETECTED_DEBUG_ATTACHED       = 0x00000004;
const DETECTED_HASH_INFO_CORRUPTED  = 0x00000008;
const DETECTED_CODESIGN_CORRUPTED   = 0x00000010;
const DETECTED_HASH_MODIFIED        = 0x00000020;
const DETECTED_EXECUTABLE_CORRUPTED = 0x00000040;
const DETECTED_CERTIFICATE_CHANGED  = 0x00000080;
const DETECTED_BLACKLIST_CORRUPTED  = 0x00000100;
const DETECTED_CHEAT_TOOL           = 0x00000200;

try
{
    const {AppSealingInterfaceBridge} = NativeModules;

    let security_threat = parseInt( AppSealingInterfaceBridge.IsAbnormalEnvironmentDetectedRN() );
    if ( security_threat > 0 )
    {
        // Show GUI
        let msg = "\n---------------------------------------"
                + "\nAbnormal Environment Detected !!"
                + "\n---------------------------------------\n";
        if (( security_threat & DETECTED_JAILBROKEN ) > 0 )
            msg += "\n - Jailbroken";
        if (( security_threat & DETECTED_DRM_DECRYPTED ) > 0 )
            msg += "\n - Executable is not encrypted";
        if (( security_threat & DETECTED_DEBUG_ATTACHED ) > 0 )
            msg += "\n - App is debugged";
        if (( security_threat & DETECTED_HASH_INFO_CORRUPTED ) > 0 || ( security_threat & DETECTED_HASH_MODIFIED ) > 0 )
            msg += "\n - App integrity has broken";
        if (( security_threat & DETECTED_CODESIGN_CORRUPTED ) > 0 || ( security_threat & DETECTED_EXECUTABLE_CORRUPTED ) > 0 )
            msg += "\n - App executable has corrupted";
        if (( security_threat & DETECTED_CERTIFICATE_CHANGED ) > 0 )
            msg += "\n - App has re-signed";
```



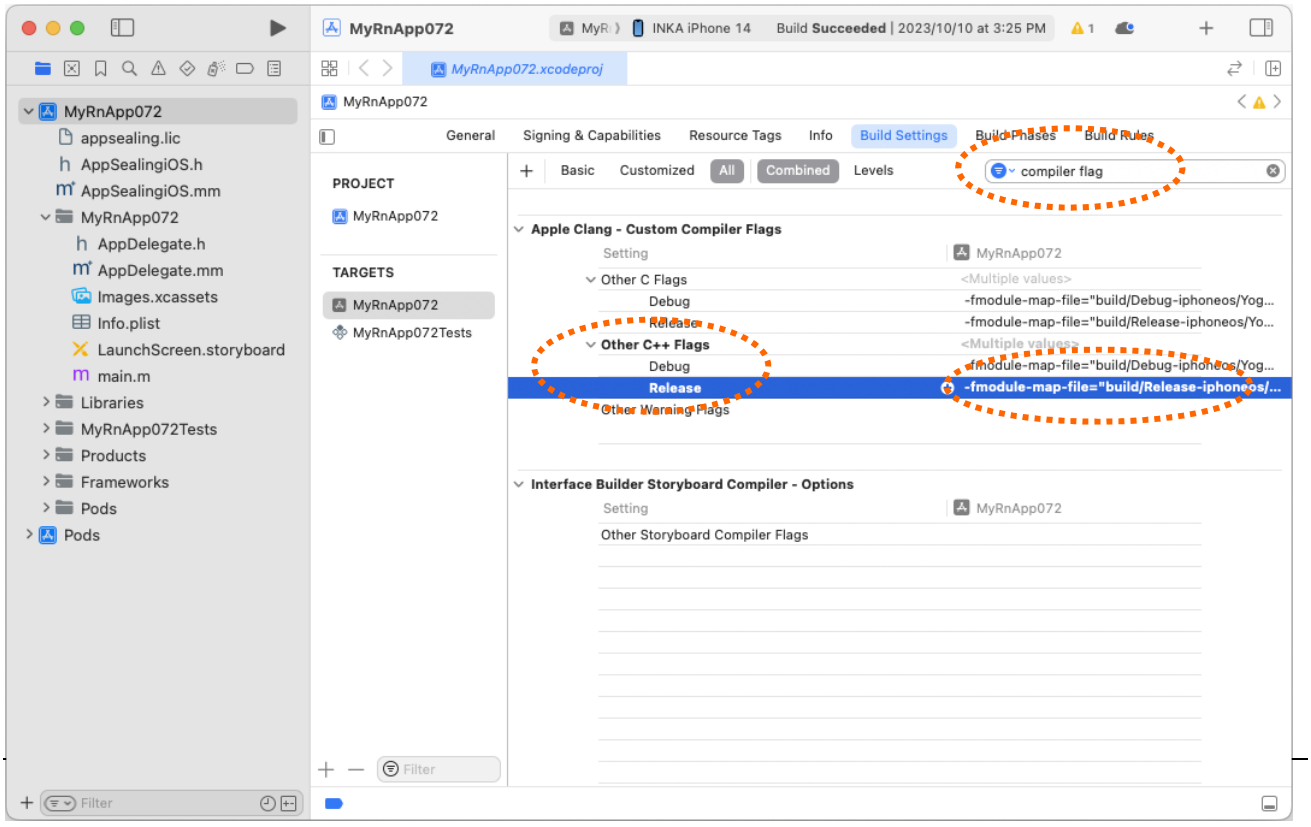
```
        if (( security_threat & DETECTED_BLACKLIST_CORRUPTED ) > 0 )
            msg += "\n - Blacklist/whitelist has corrupted";
        if (( security_threat & DETECTED_CHEAT_TOOL ) > 0 )
            msg += "\n - Cheat tool has detected";
        console.log( "AppSealing Security Threat: " + msg );
        Alert.alert( "AppSealing Security Threat", msg,
            [{ text: "Confirm", onPress: () => { AppSealingInterfaceBridge.ExitApp(); }}], { cancelable: false } );
    }
}
catch( e )
{
    console.log( "### AppSealing Security Check : " + e.ToString() );
}

AppSealingPeriodicAlerted = false;
function AppSealingPeriodicCheck() {
    if( AppSealingPeriodicAlerted ){
        return;
    }
    try
    {
        const {AppSealingInterfaceBridge} = NativeModules;

        let ret = parseInt( AppSealingInterfaceBridge.IsSwizzlingDetectedReturnRN() );

        if ( ret >= 1 && ret <= 3 )
        {
            // Show GUI
            let msg = "\n-------------------------------------"
                    + "\nAbnormal Environment Detected !!"
                    + "\n-------------------------------------\n";
            if ( ret == 1 )
                msg += "\n - Jailbroken";
            if ( ret == 2 )
                msg += "\n - Method Swizzling";
            if ( ret == 3 )
                msg += "\n - Method Hooking";

            console.log( "AppSealing Security Threat: " + msg );
            Alert.alert( "AppSealing Security Threat", msg, [{ text: "Confirm", onPress: () => { AppSealingInterfaceBridge.ExitApp(); }}],
{ cancelable: false } );

            AppSealingPeriodicAlerted = true;
        }
    }
    catch( e )
    {
        console.log( "### AppSealing Security Check : " + e.ToString() );
    }
}
setInterval(AppSealingPeriodicCheck, 2500); // 2.5ms
//################################################################## AppSealing Code-Part END: DO NOT MODIFY THIS LINE !!!
```

Previous sample UI code included in "Code Samples.txt" source file of AppSealing SDK so you can copy & paste the code block.

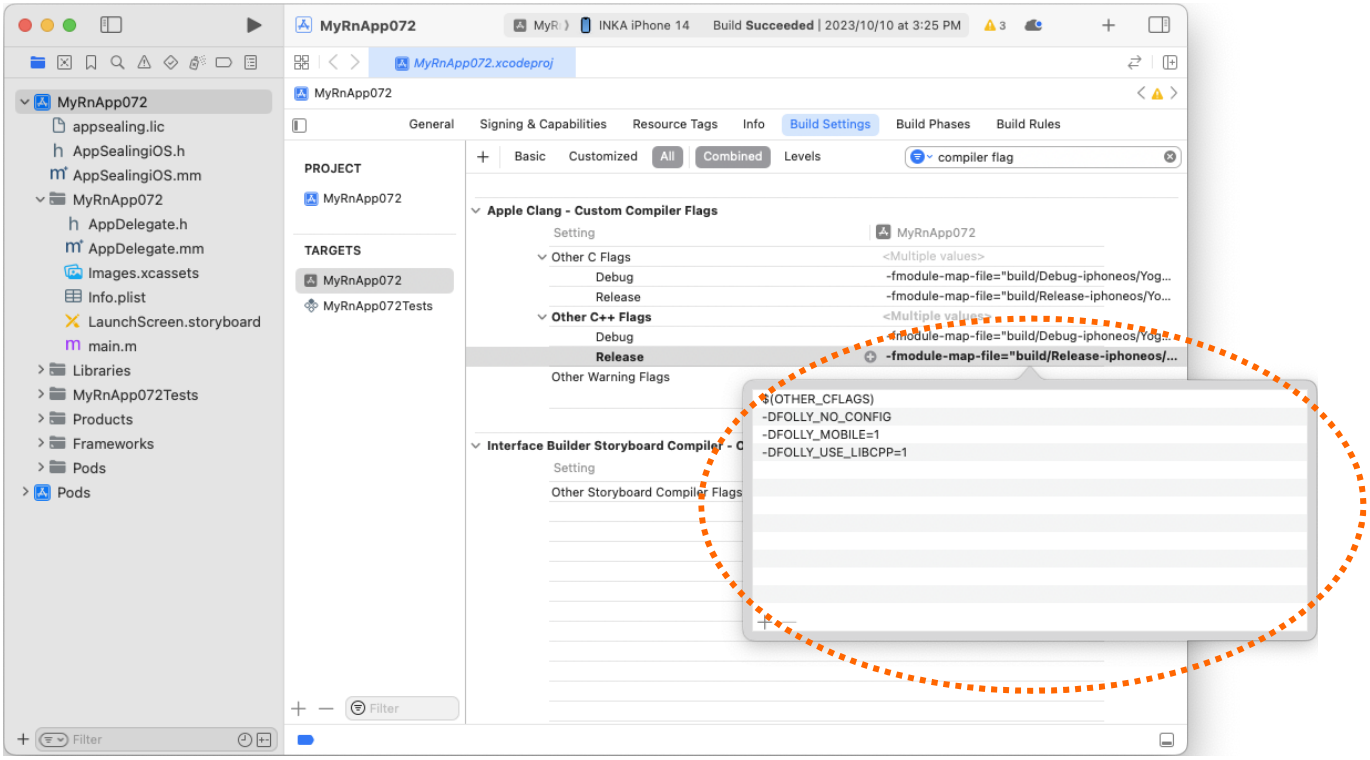
Go back to your Xcode project, select the project in “TARGETS” and select the “Build Settings” tab. Once the tab is selected, select the “All” option in the bottom left.



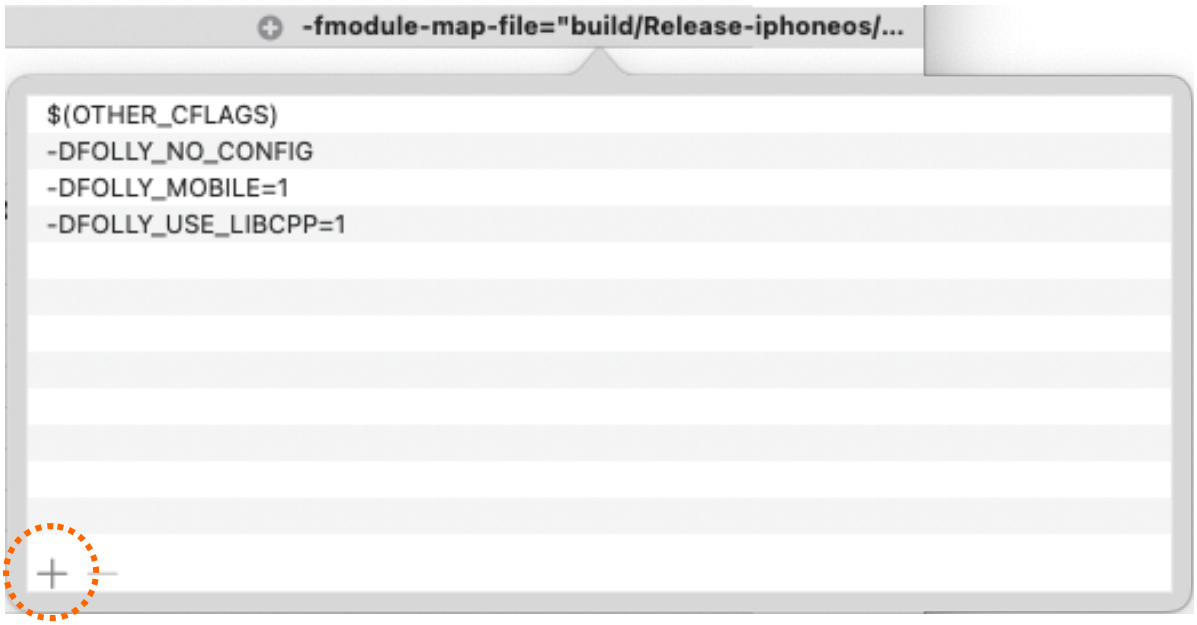
Now, enter "compiler flag" in the search box on the right, and when the search results appear at the bottom, select "Other C++ Flags" and the "Release" item below it, and double-click setting value.



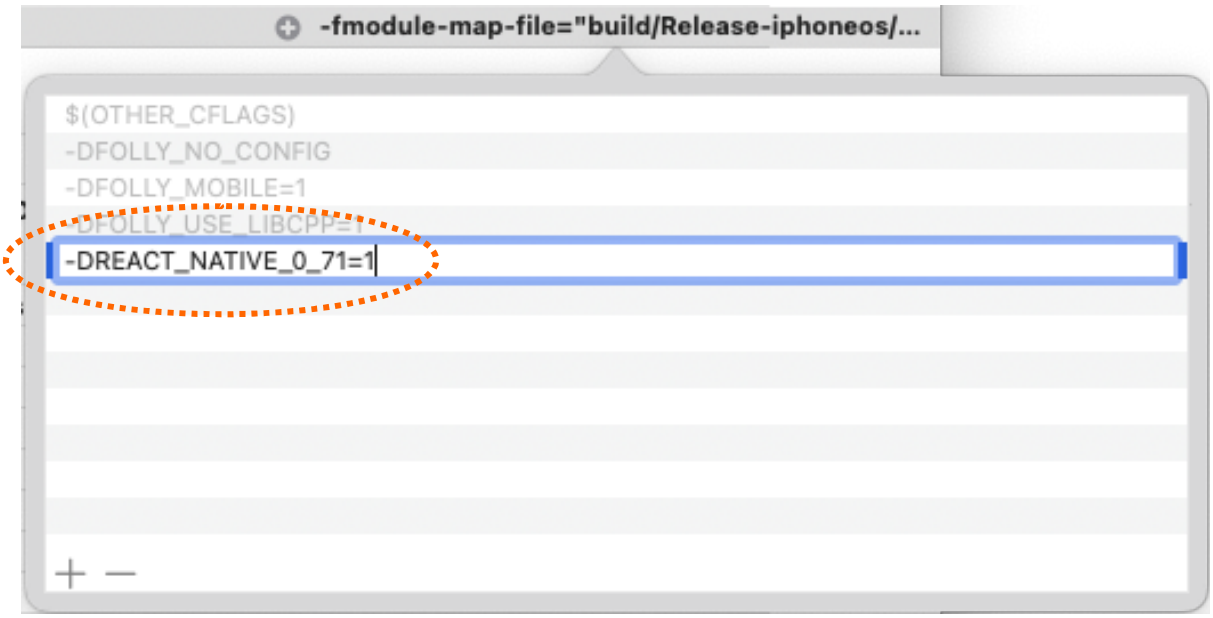
When you double-click the value, the compiler flag settings are displayed as shown below..



Now click on the "+" button at the bottom of the window and enter the value "-DREACT_NATIVE_0_71=1". (You must enter it without the double quotes).

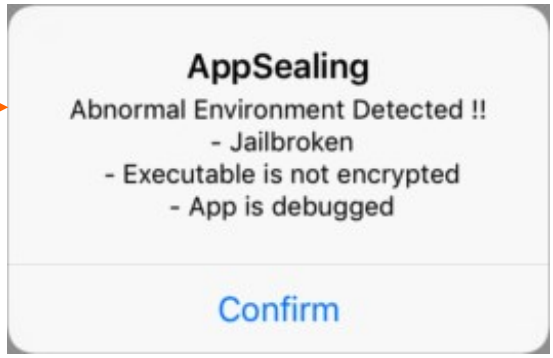


When the window contents change as shown below, click anywhere on the screen to close the window.



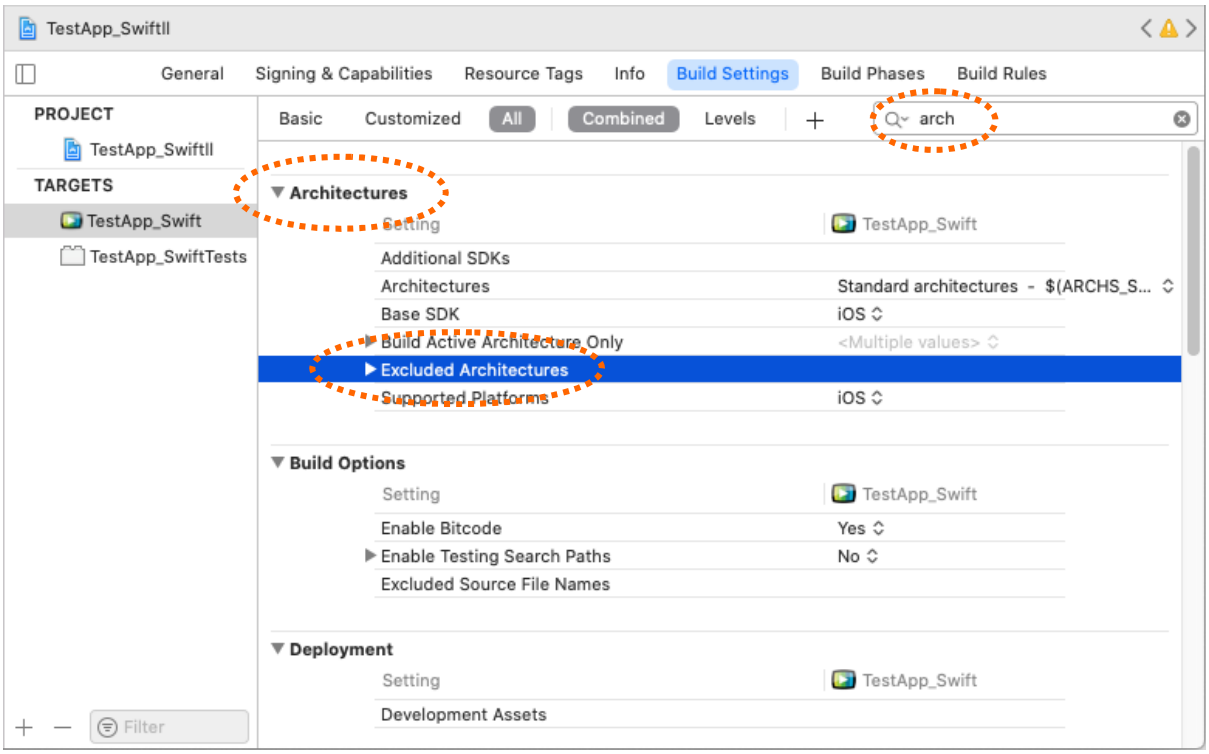
Your app will show simple alert box like below when you run your app on abnormal device such as jailbroken or debug your app using Xcode or gdb. In such situation irrespective of user action the app will exit after 20 seconds automatically.

When security intrusion has detected in iOS device, simple alert view will appear and app will close after 20 seconds or when user touches "Confirm" button.



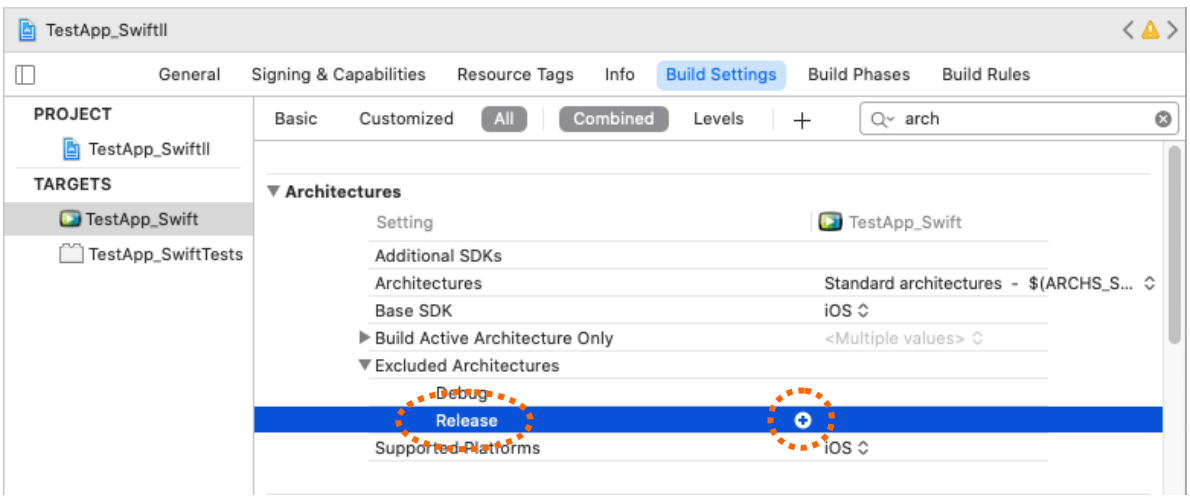
Part 4. Modify "Build Settings" of your project

Search “arch” keyword at Build Settings panel.

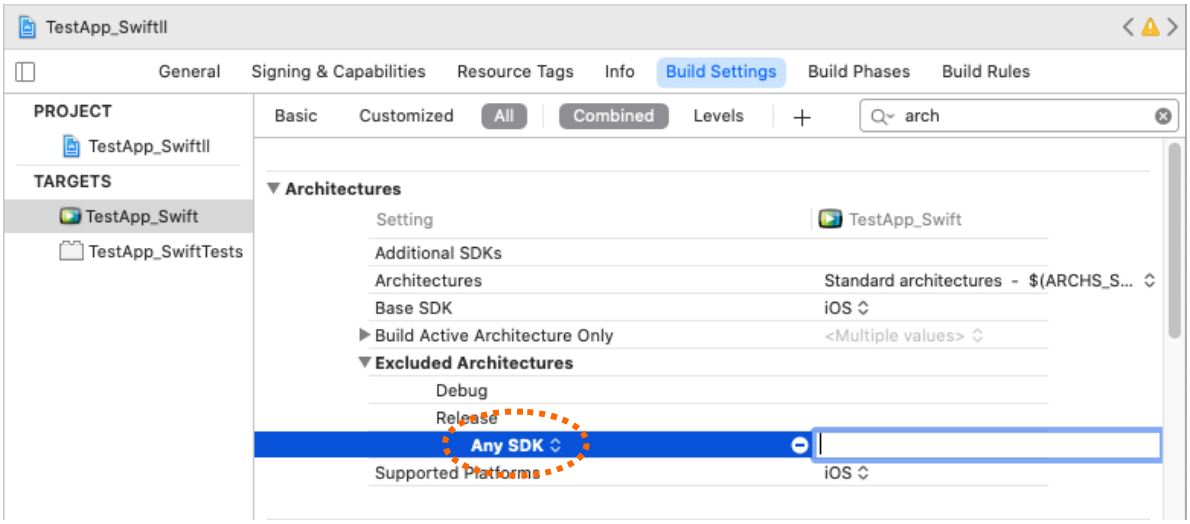


Follow next steps after **"Architectures"** field has shown.

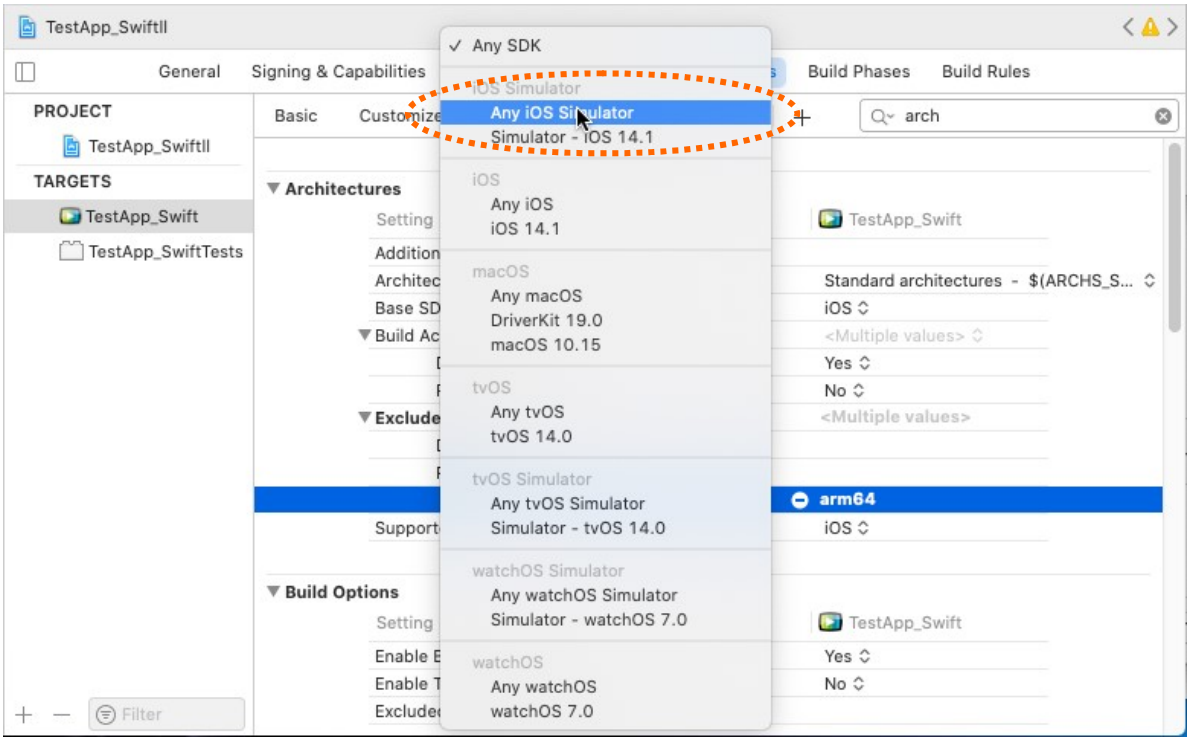
1) Expand "Excluded Architectures" by clicking the left-side triangle icon.



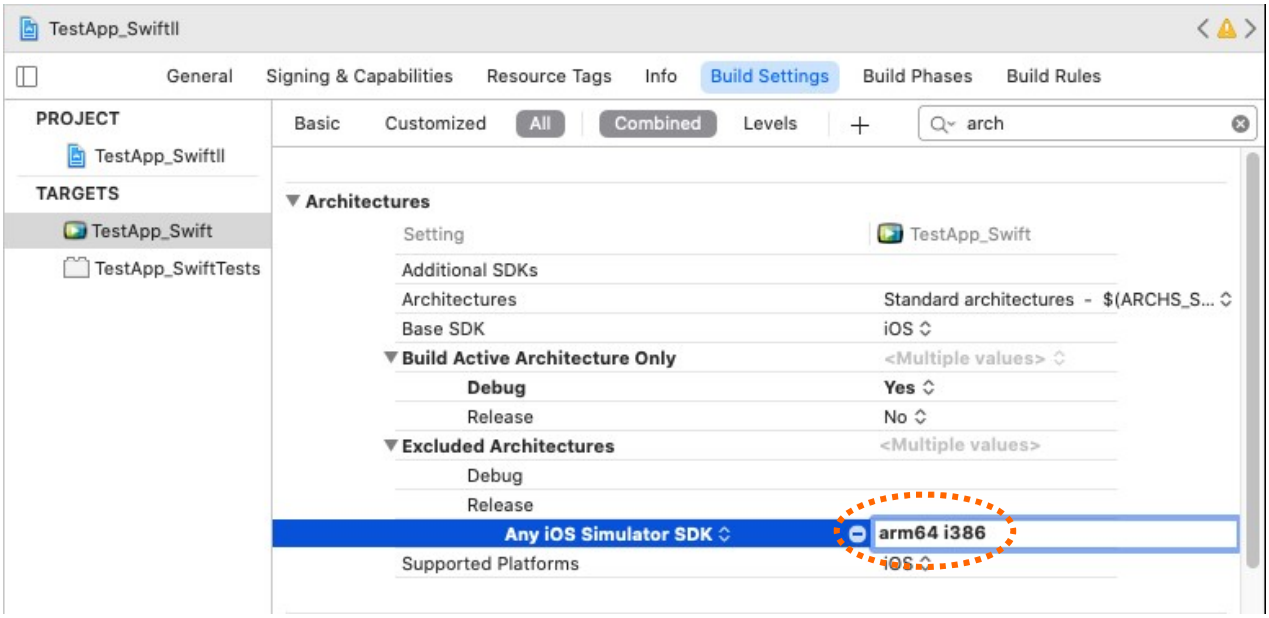
2) Select "Release" item and click right-side “**+**” icon.



3) After "Any SDK" item has created click it to show popup menu.



4) Select "Any iOS Simulator" item in popup menus.



5) Enter value for "Any iOS Simulator SDK" as "arm64 i386". (Space between arm64 and i386)

Now AppSealing security features have been adopted to your project. Go on 'Build', 'Run', 'Archive' as usual.

Part 5. App Build & post process

5-1 Reminds about Xcode build mode

* AppSealing SDK for React Native works only in Release build mode.

Due to instability in Debug build mode of React Native app, AppSealing security features will be applied only to Release build mode and following functions will be activated. For using Debug build mode in development process, remove AppSealing features and proceed.

- Jailbreak detection
- Anti-debugging
- Anti-hooking
- Not encrypted executable file detection
- App-Integrity corruption detection
- Re-signing detection

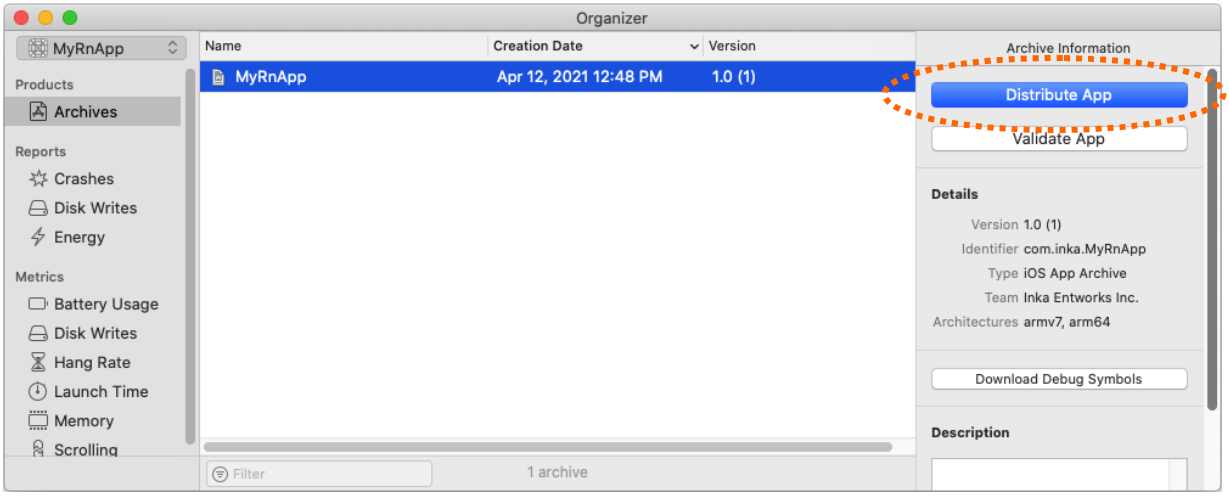
You will build the app as Release mode when distributing to the App Store. If you test AppSealing with Release mode, your app should be distributed to App Store or 'TestFlight'. If not, the executable file will be detected as not encrypted, so the app will be closed.

5-2 Generate App integrity & certificate verification snapshot

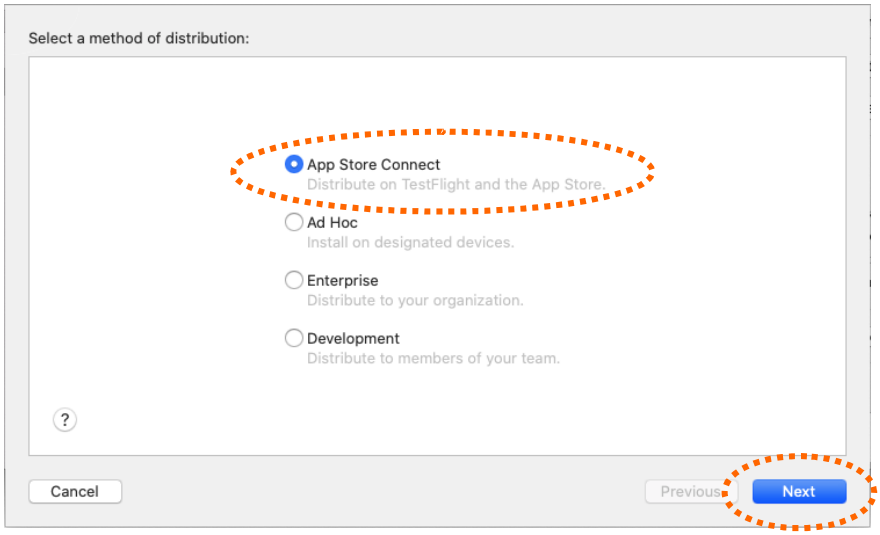
There is additional process to verify app integrity & certificate when you test your app or distribute app through app store. If you skip this step the app running on device will be terminated after few seconds for broken app integrity.

You should process this step when you distribute your app through TestFlight or App Store, and when you use Ad Hoc distribution with AdhocEnabled SDK.

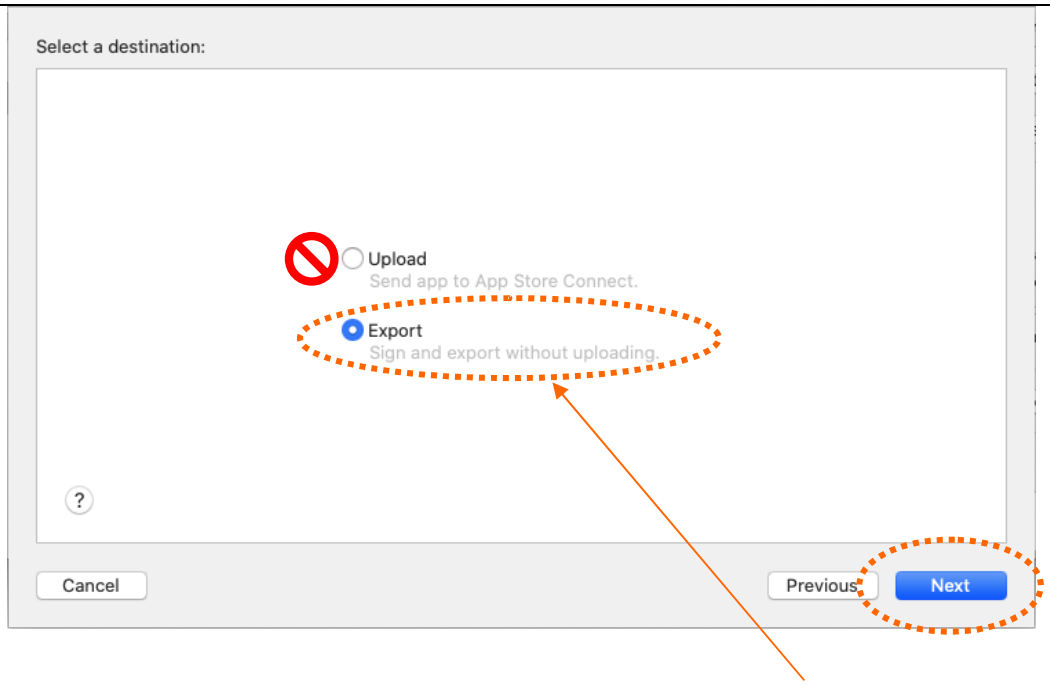
Let's see the upload process to App Store or TestFlight step by step. Below is Organizer window after Archive from Xcode.



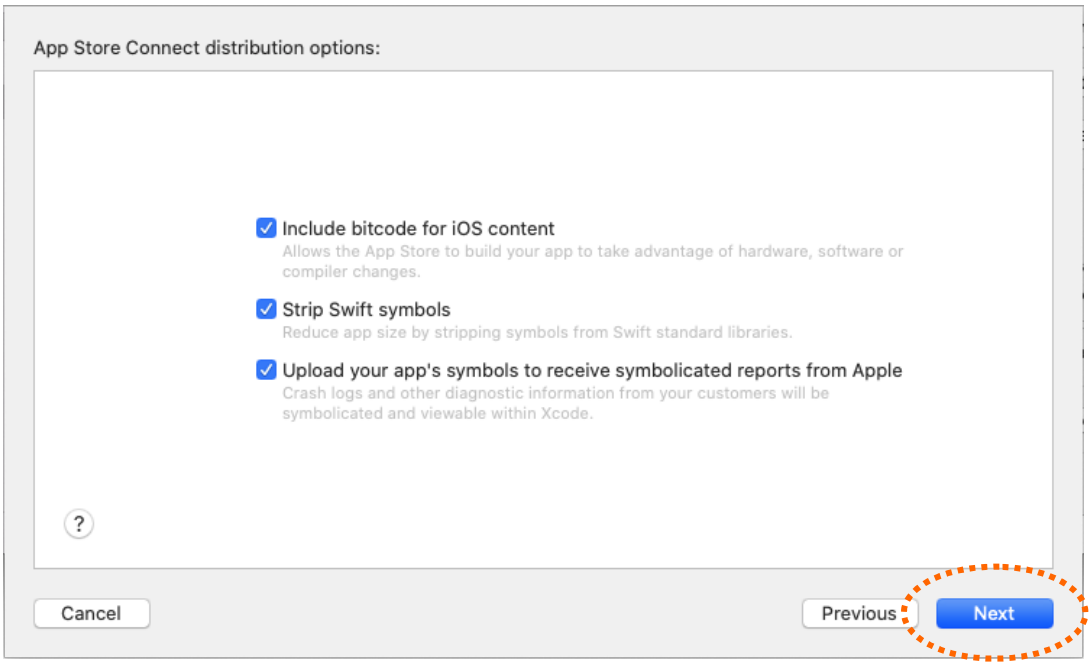
Click "Distribute App" button to generate IPA for uploading to App Store.



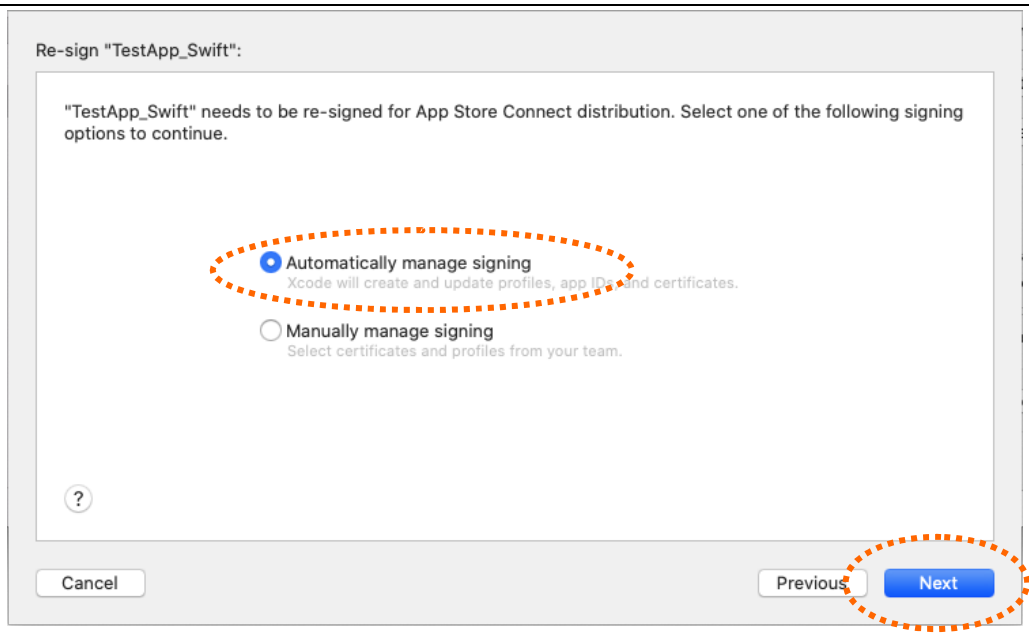
Click "Next" button with "App Store Connect" is selected. (If you are using AdhocEnabled SDK, "Ad Hoc" is also an available option.)



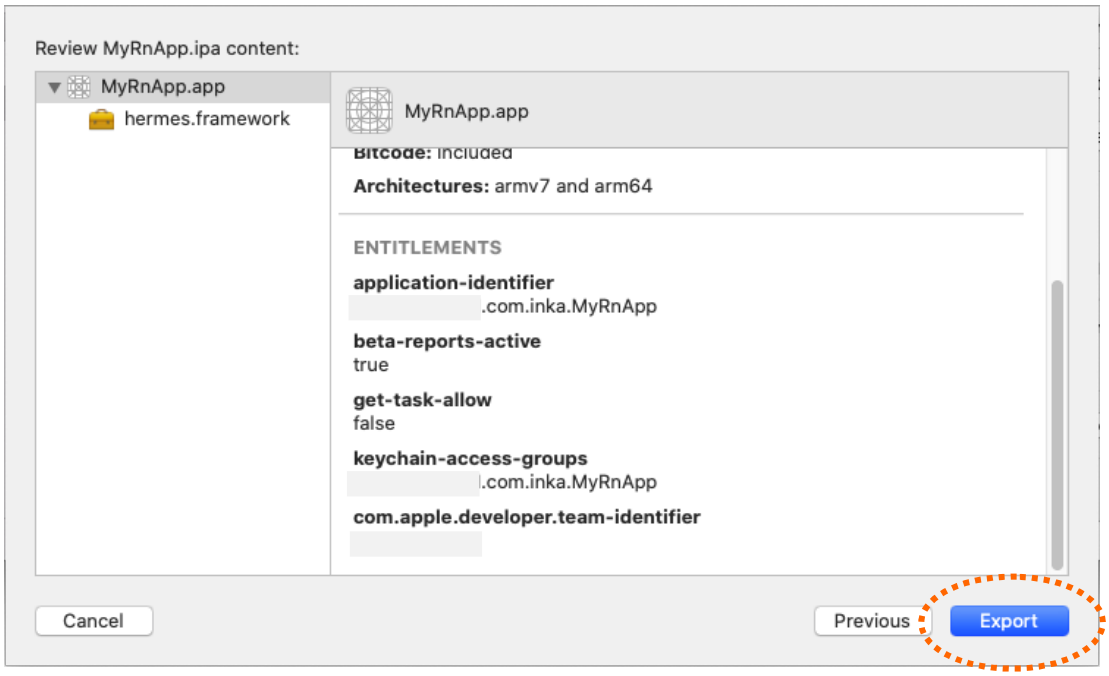
You usually selected "Upload" almost but you **must select "Export" to apply AppSealing**. This is because taking snapshot for app integrity and certificate is needed and your **app will not run normally on device without this process**. Click "Next" button with "Export" is selected.



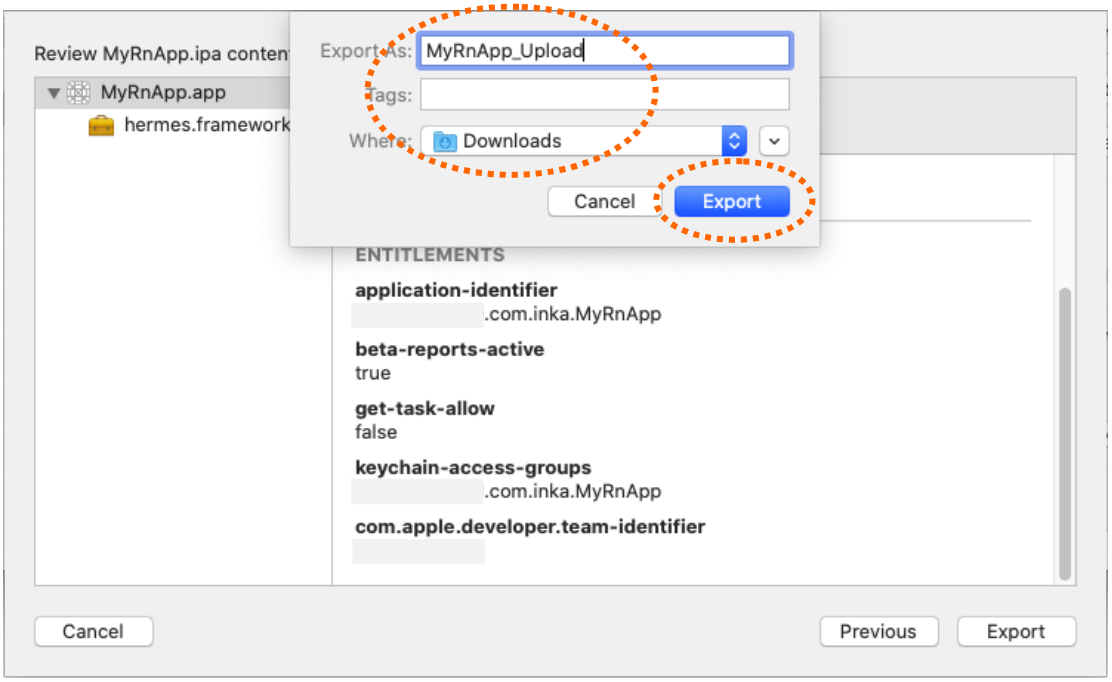
Click "Next" button with all options keep default.



With default options retained, click "Next" button. Then you can see the window from which you can export as an IPA.

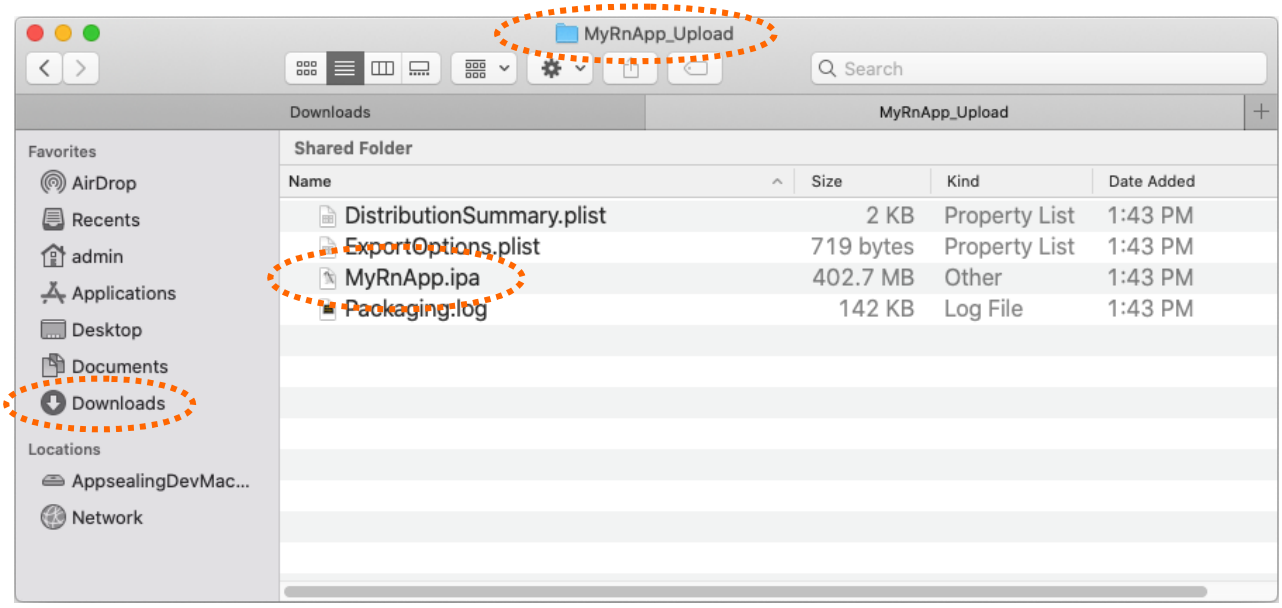


Verify the brief contents and click "Export" button.



When destination dialog appear select store location and click "Export" button. This document used folder named "~/Downloads/MyRnApp_Upload"

After you've clicked "Export" button IPA file will be created at the designated folder. You can see the generated IPA file at finder like below. Now, you should keep in mind the location of IPA or remain finder widow opened.



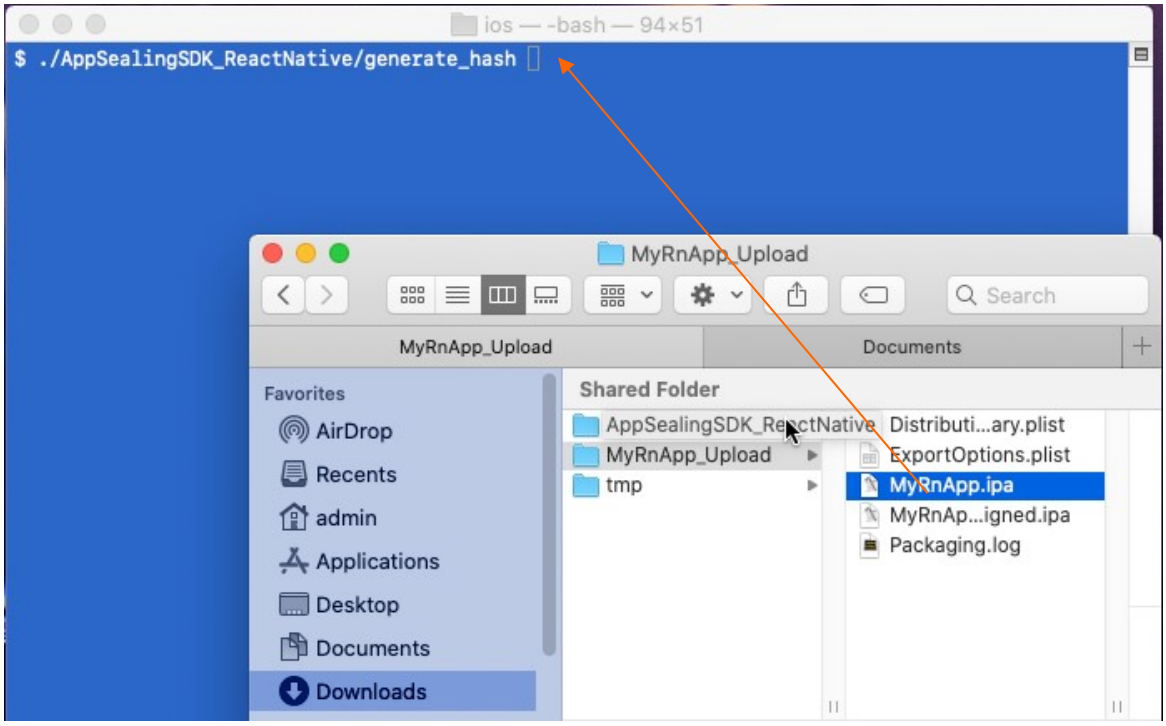
Run add permission command like below.

```
$ chmod +x MyRnApp/ios/AppSealingSDK_ReactNative/generate_hash
```

Now you should process next step with exported IPA. Launch terminal app and move to ios folder of MyRnApp project. You can check current folder using pwd command in terminal window.

Now you run 'generate_hash' script like below. This script has only one parameter which is path to the exported IPA file in previous step. You can type the IPA path manually or drag & drop the IPA file from the opened Finder window in previous step.

```
$ ./AppSealingSDK_ReactNative/generate_hash ~/Downloads/MyRnApp_Upload/MyRnAppt.ipa
```



After you execute the script you will see the progress like below and snapshot for app integrity and certificate will be added to the IPA file. The javascript bytecode included in app will be encrypted also.

This process has to be applied to distribution step as "Ad Hoc", "Enterprise", "Development" identically.

5-3 Controlling anti-swizzling / anti-hooking features

Method swizzling is a technique used primarily in Objective-C to swap the functionality of an existing method of a class with the functionality of a new method, so that when the original method is called, the code of the new method is actually executed. This allows for flexible modification or extension of the behavior of existing code.

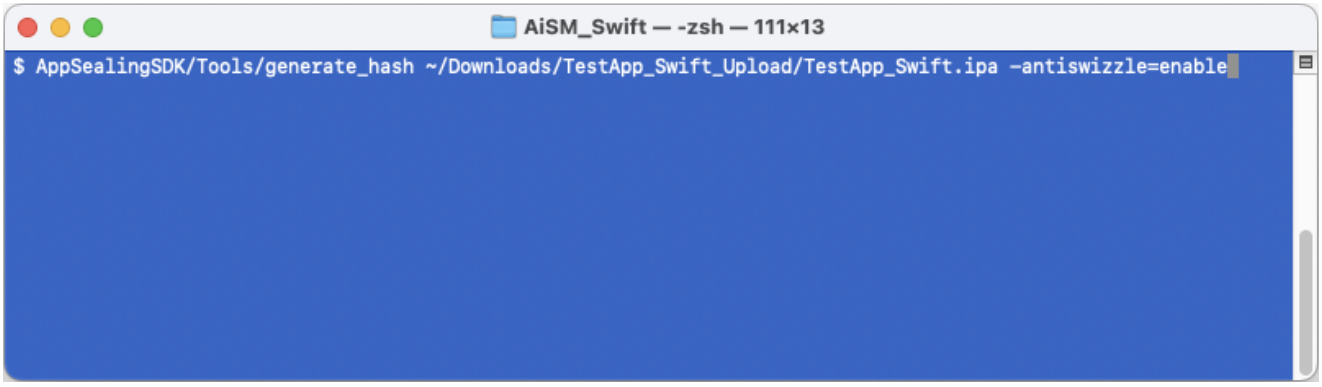
Method swizzling is a useful technique, but it also allows attackers to replace existing methods with their own malicious code. For example, they can modify methods that process user input to steal data or perform unwanted actions.

You can also swizzle the system's logging methods so that important events are not logged, thereby preventing malicious behavior from being detected.

The AppSealing SDK adds the ability to detect this method swizzling behavior, but since method swizzling is not always used as a means of attack, you can specify whether or not you want to detect it.

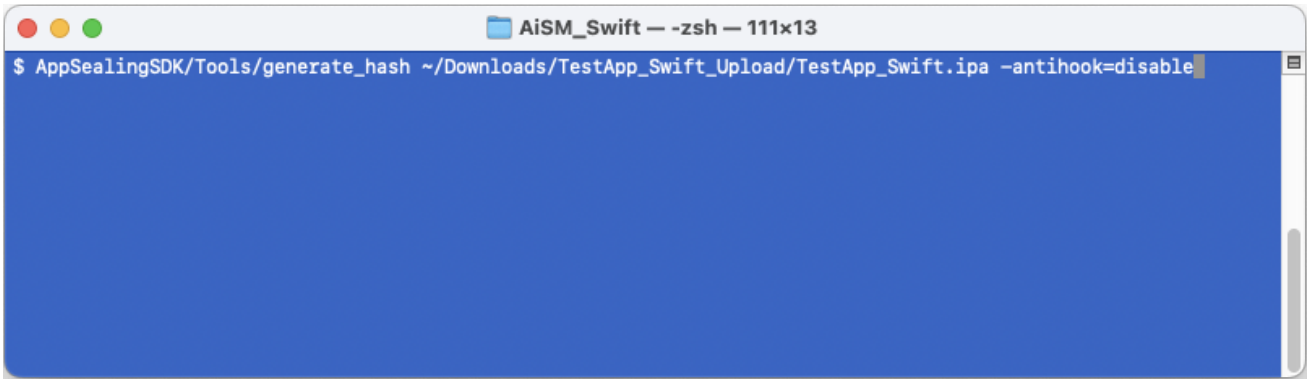
By default, the SDK is distributed with method swizzling detection disabled to prevent malfunctions, but you can enable it when running the generate_hash script. If you receive a security warning during the app testing phase that method swizzling has been detected, you should not enable method swizzling detection, as it may be that another library included in your app is intentionally using method swizzling.

To enable method swizzling detection within script phase, run generate_hash script with the "**antiswizzle=enable**" parameter, as follows:

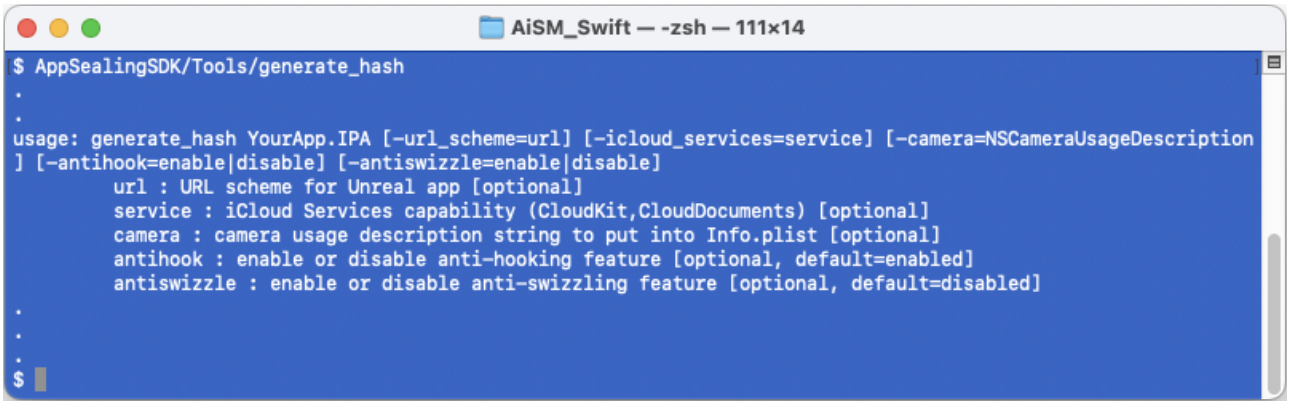


Method hooking is an attack method used with method swizzling. Method hooking is similar to method swizzling, but the difference is that it directly manipulates and controls the execution flow of the method rather than swapping methods. Method swizzling can be used in apps or specific libraries as needed, but method hooking is not used in normal apps and libraries, so the AppSealing SDK has method hooking detection enabled by default, but this feature can be disabled if needed.

To disable method hooking detection, run the generate_hash script with the "**antihook=disable**" parameter as follows:

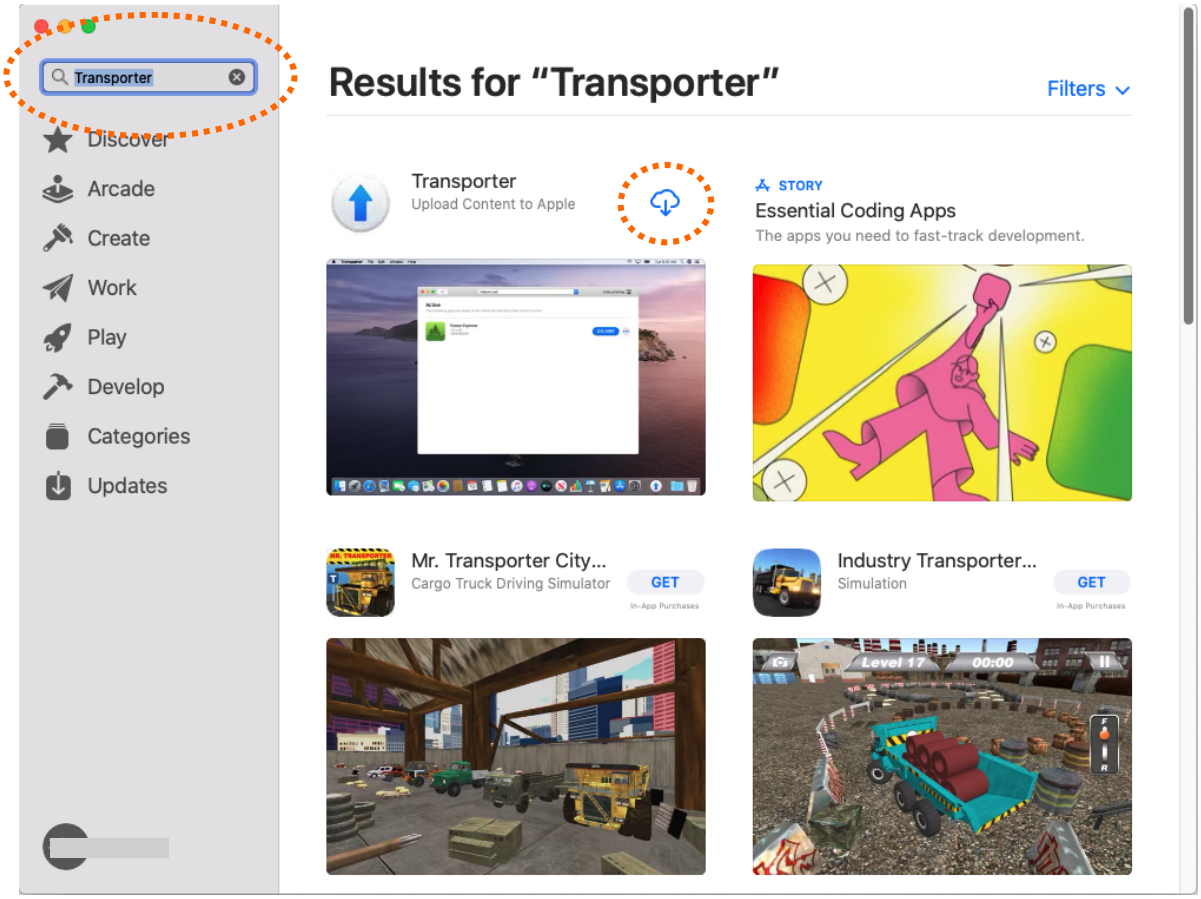


If you want to check all parameters of the generate_hash script, you can run the script without the IPA path name and check all available parameters as shown in the screen below.

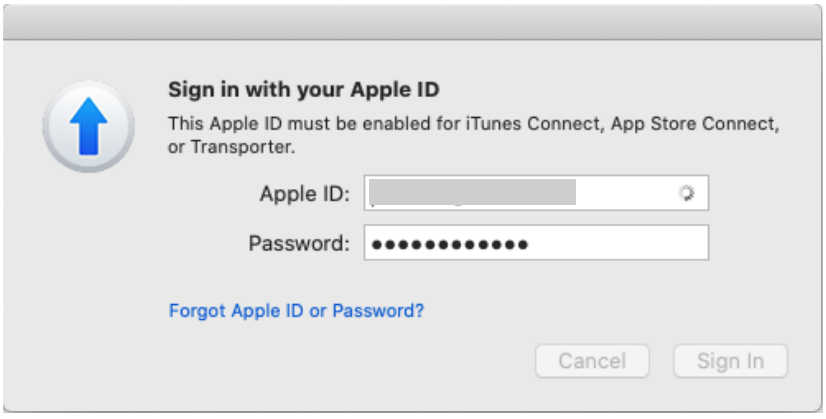


5-4 Upload re-signed IPA to App Store Connect

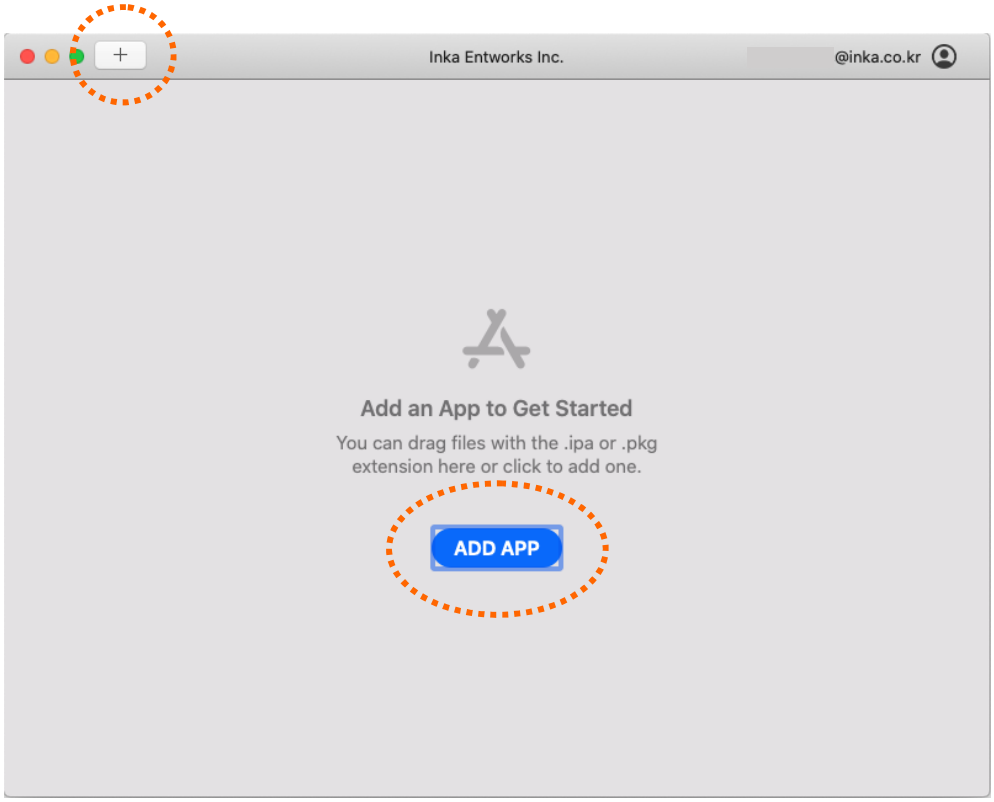
Now you can upload re-signed IPA to App Store Connect. (Of course, if you use Ad Hoc distribution by AdhocEnabled SDK, this step is not required.) This document uses Transporter app (MAC) for convenient uploading. If the Transporter app has not installed in your MAC you can open Mac AppStore, search "Transporter" and install.

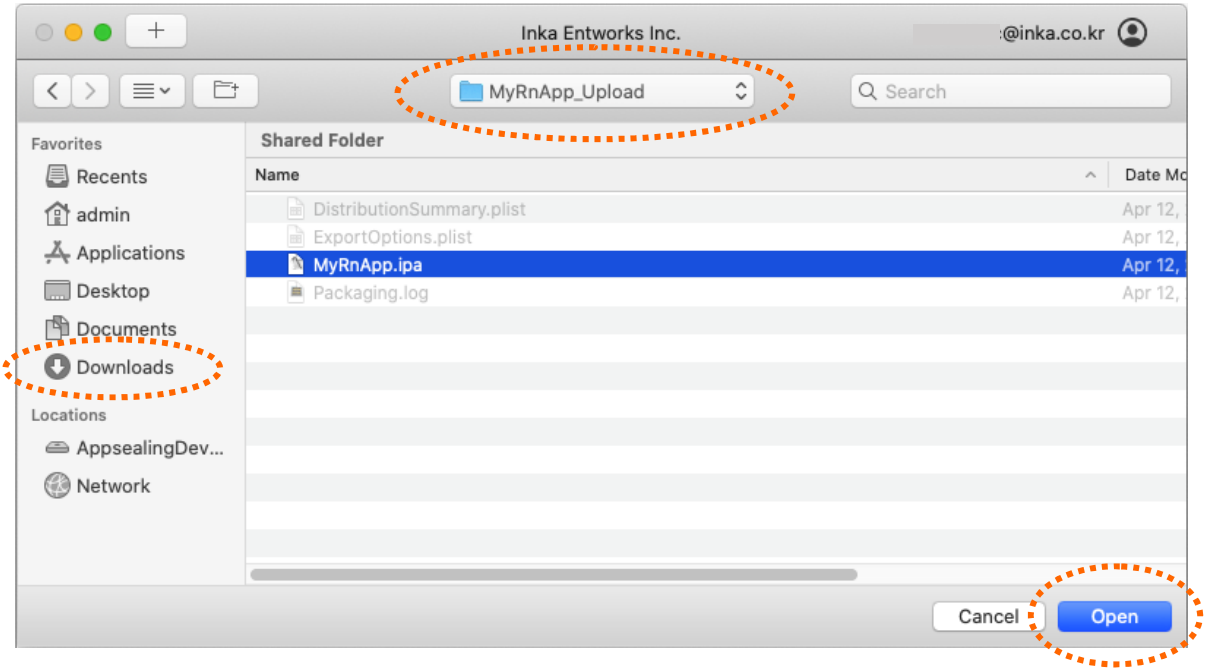


Launch Transporter after installation you are requested for Apple ID like below. Enter your Apple ID and password. (This step is required only once for the first time)

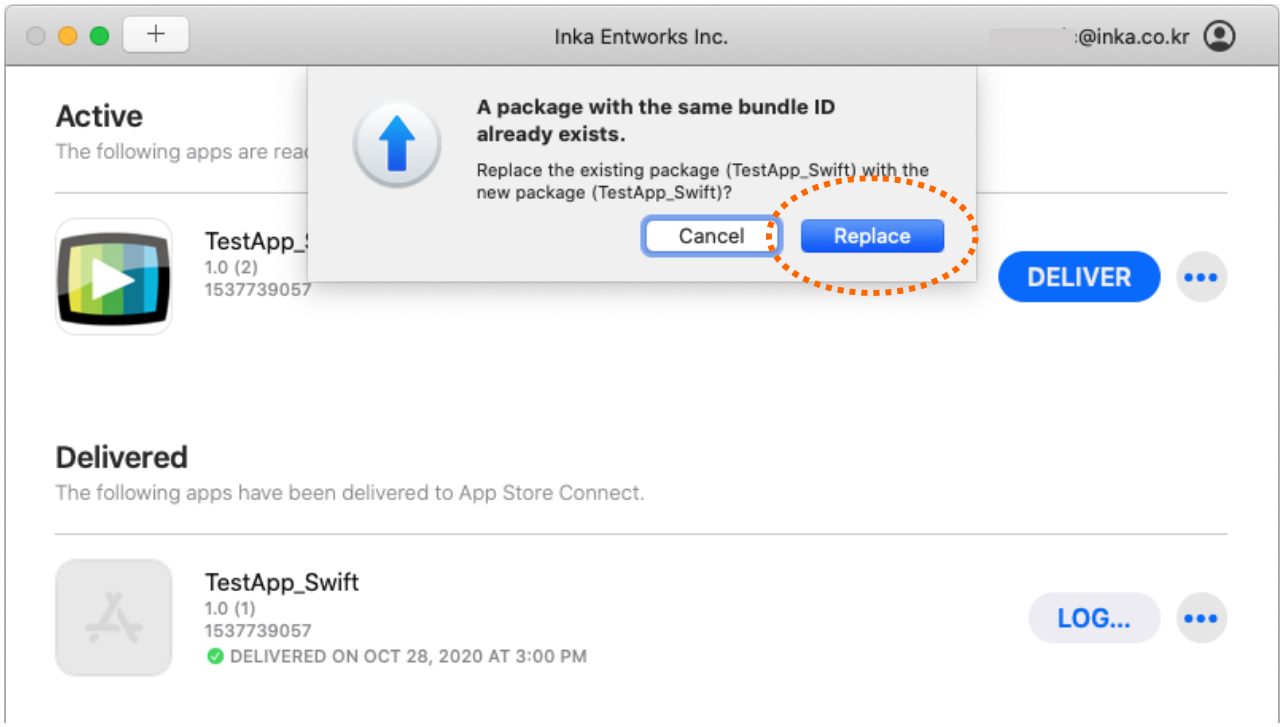


After you login with your ID and password you can see the Transporter window like below. Click the "+" button upper-left or "ADD APP" button in the middle to select IPA to be uploaded and select the re-signed IPA in previous step.

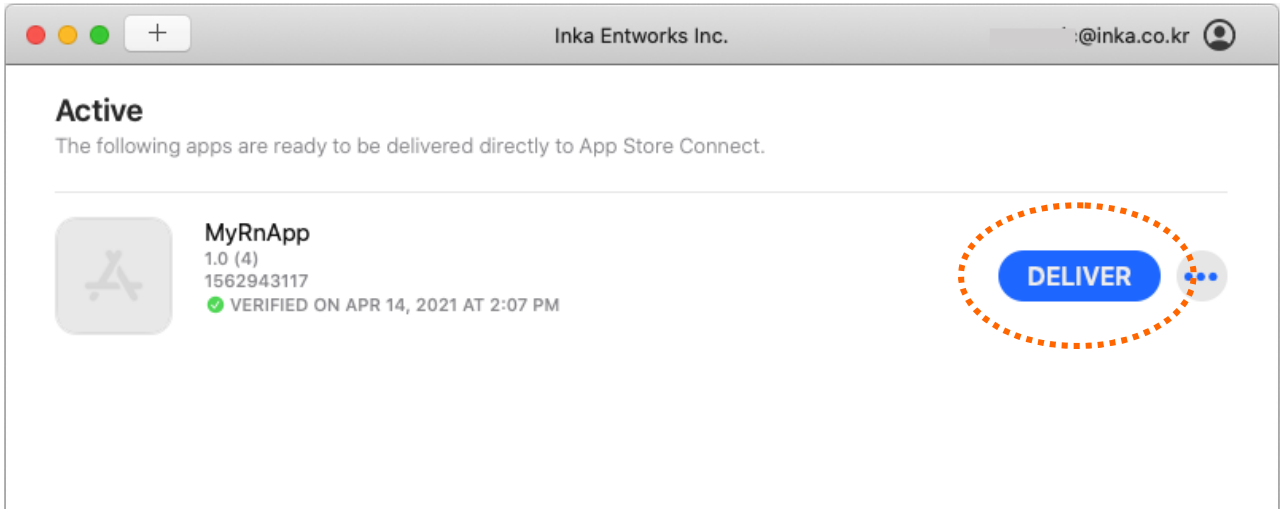


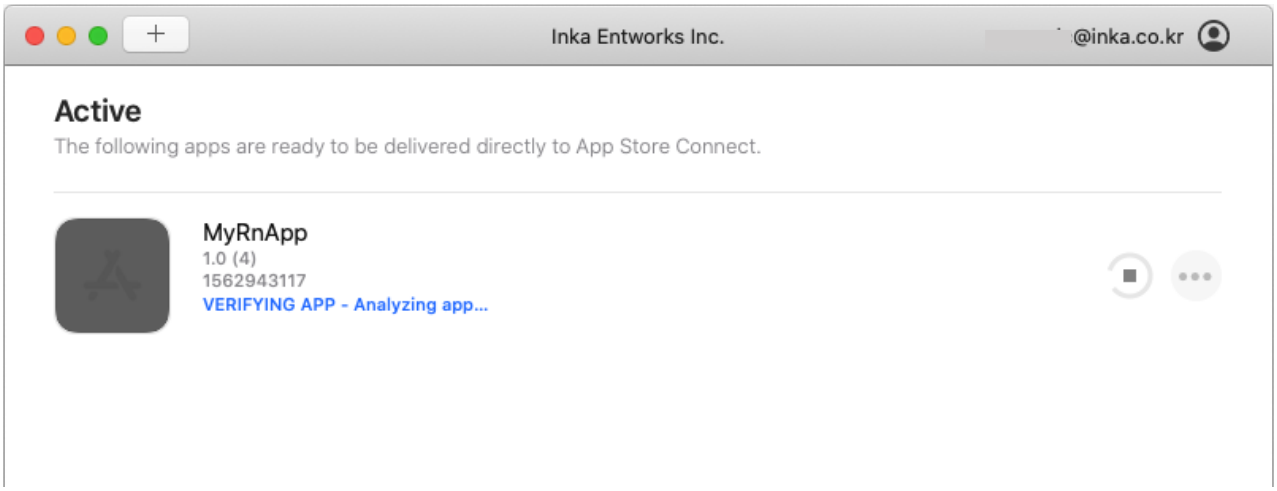


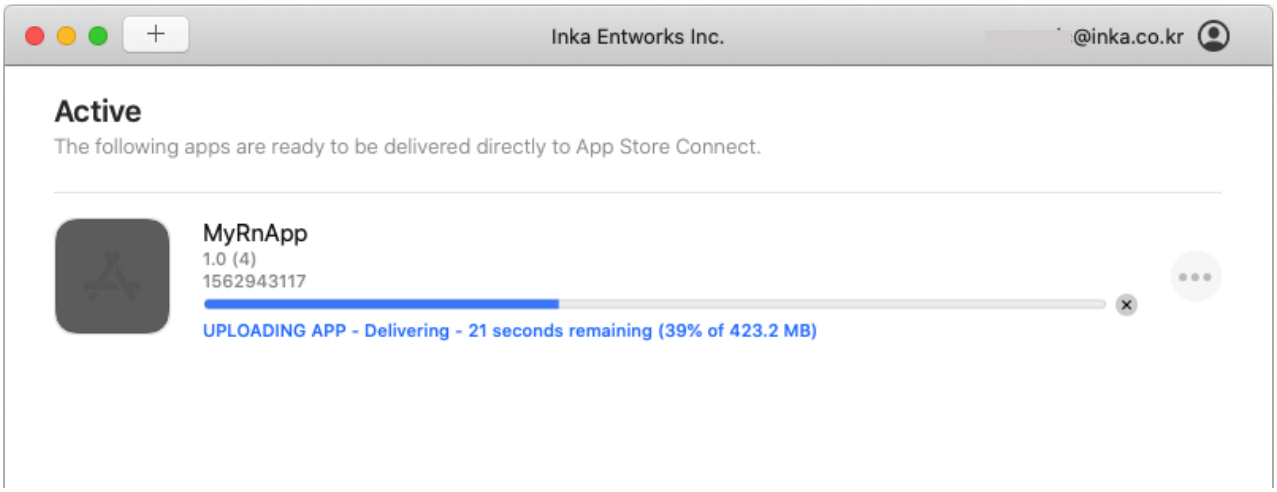
When you update your app by adding IPA file with new version or higher build number a warning dialog can appear like below because of same bundle ID. In this case just click "Replace" button to upload new IPA.

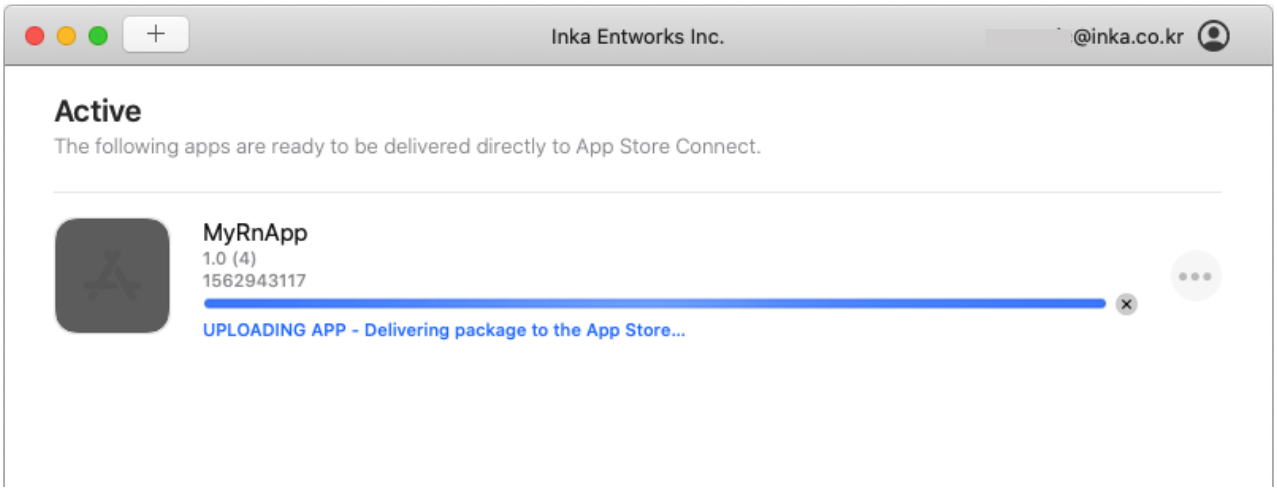


After IPA file has added, click "DELIVER" button then verifying and uploading to App Store Connect process will be in progress.

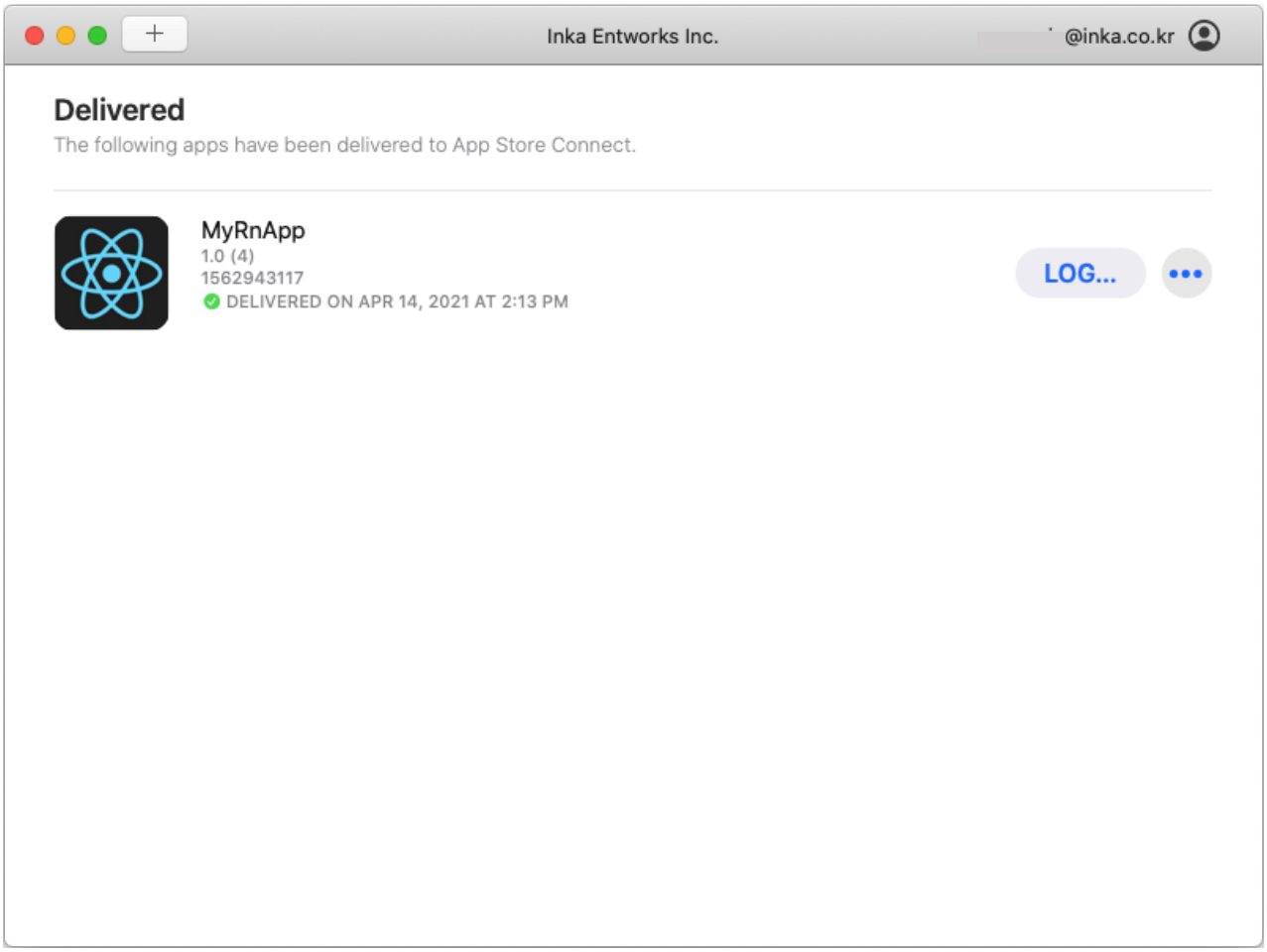








If you encounter below window the upload process has finished and you can submit your build for App Store review or TestFlight distribution.



Part 6. Acquire AppSealing device unique identifier

AppSealing SDK generates and manages unique identifier for each device. Customer who use the AppSealing SDK can use the interface of AppSealing to verify the device unique identifier, if necessary. And can be used for the business using the hacking data service provided by AppSealing.

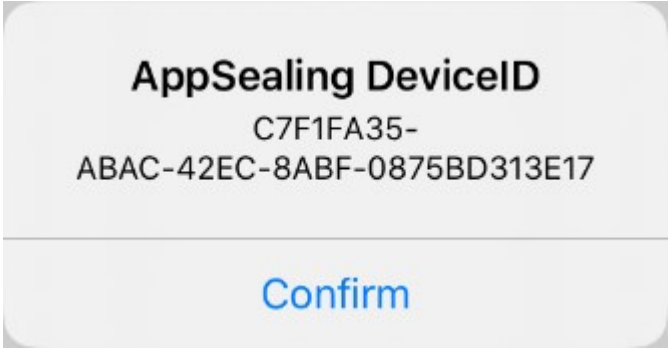
6-1 Show acquire device unique identifier

Insert following code block right before last "return YES;" line of the method "didFinishLaunchingWithOptions" in the previously opened AppDelegate.mm file, and insert #include "AppsealingiOS.h" at top of the file then you can verify the unique device ID AppSealing uses

Simple UI code into 'AppDelegate.mm' for **React Native** project

```
NSString* msg = @"\n-----------------------------------\n* AppSealing Device ID : ";
char _appSealingDeviceID[64];

if ( ObjC_GetAppSealingDeviceID( _appSealingDeviceID ) == 0 )
{
    UIAlertController *alert = [UIAlertController alertControllerWithTitle:@"AppSealing DeviceID"
                        message:[[NSString alloc] initWithUTF8String:_appSealingDeviceID]
                        preferredStyle:UIAlertControllerStyleAlert];
    UIAlertAction *confirm = [UIAlertAction actionWithTitle:@"Confirm"
                        style:UIAlertActionStyleDefault
                        handler:^(UIAlertAction * _Nonnull action) { }];
    [alert addAction:confirm];
    [self presentViewController:alert animated:YES completion:nil];
}
```

Your app will show simple alert box like below when you run your app.



Part 7. Enhanced jailbreak-detection using app server

7-1 Overview and Necessity of Enhanced Jailbreak Detection Method

One of the main functions within AppSealing SDK is detecting the environment of the jailbroken device and forcibly closes the app. However, there is a possibility that these detection functions will be bypassed by more sophisticated attack methods. This is because, due to the characteristics of the iOS operating system, the code of the loaded dynamic library (dylib) is executed first when the app is launched. An attacker may distribute the code to patch a specific area of the executable file in such a dynamic library.
If this code patch occurs before AppSealing's detection logic is executed, the code that terminates the app has been removed, so even if a jailbreak is detected, the app will remain running.
Of course, not everyone can perform this type of attack easily, but since this type of attack has been confirmed by a group of hackers with specialized hacking knowledge, AppSealing provides an additional jailbreak detection method to overcome such an attack situation.

Since the characteristic of this attack method is to change the code of the running app in advance, no matter how strong detection logic is added to the AppSealing library itself, the situation in which the code is patched by the dynamic library is unavoidable. Therefore, the newly provided jailbreak detection function does not detect in the app, but in a way that rejects all services and actions, such as log-in in or accepting API calls, in the case of a terminal suspected of being jailbroken in the server linked to the app.
The basic method is to obtain server credentials from the app through the AppSealing interface, add them to the existing authentication parameters, and send them to the server.
This method cannot be applied for a client-only app that does not work with the server.

The following sections describe, with example code, how to obtain and validate server credentials.

7-2 iOS App Code

Additional process of your app needs verify the server credentials is to call a function in the AppSealing SDK to get the server credential string and send it to the server along with the existing authentication parameters.
Most apps that work with the server will go through a user authentication or login process, and in this process, the account information entered by the user will be transmitted to the server. You can add the server credential string to the parameters you send to the server.

The server credential string is obtained in the following way:

Simple UI code into 'ViewController.swift' for **Swift** project

```swift
func userLogin( userID: String, password: String ) -> Bool
{
    let inst: AppSealingInterface = AppSealingInterface();
    let appSealingCredential = String.init( cString: inst._GetEncryptedCredential() );
     // credential 값을 인증 정보와 함께 서버로 올린다
    let loginResult = processLogin( user: userID, pwd: password, credential: appSealingCredential );
    ...
    ...
}
```

Simple UI code into 'ViewController.mm' for **Objective-C** project

```objc
- (BOOL)userLogin:(NSString*)userID withPassword:(NSString*)password
{
    char _appSealingCredential[290] = { 0, };
    ObjC_GetEncryptedCredential( _appSealingCredential );
     // credential 값을 인증 정보와 함께 서버로 올린다
    BOOL loginResult = processLogin( userID, password, _appSealingCredential );
    ...
    ...
}
```

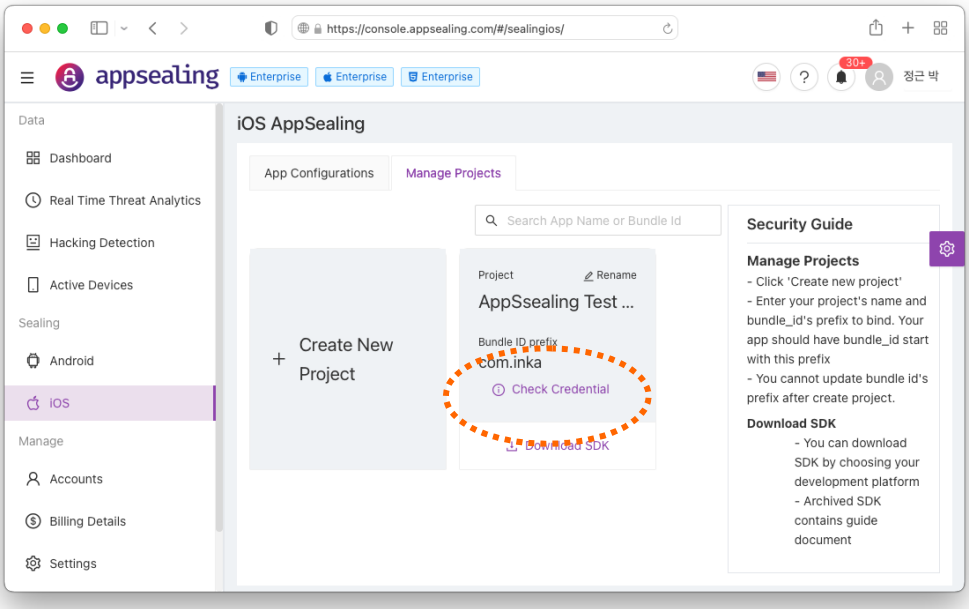
If your server fails to validate credential, you should also force the login to fail and the app to not proceed further. However, since code such as checking the login result and closing the app is likely to be tampered by an attacker, the best practice is configuring your server to deny service or response for any requests from that client after the server fails credential validation.
This will be discussed again in the next section.

7-3 Verification at app server

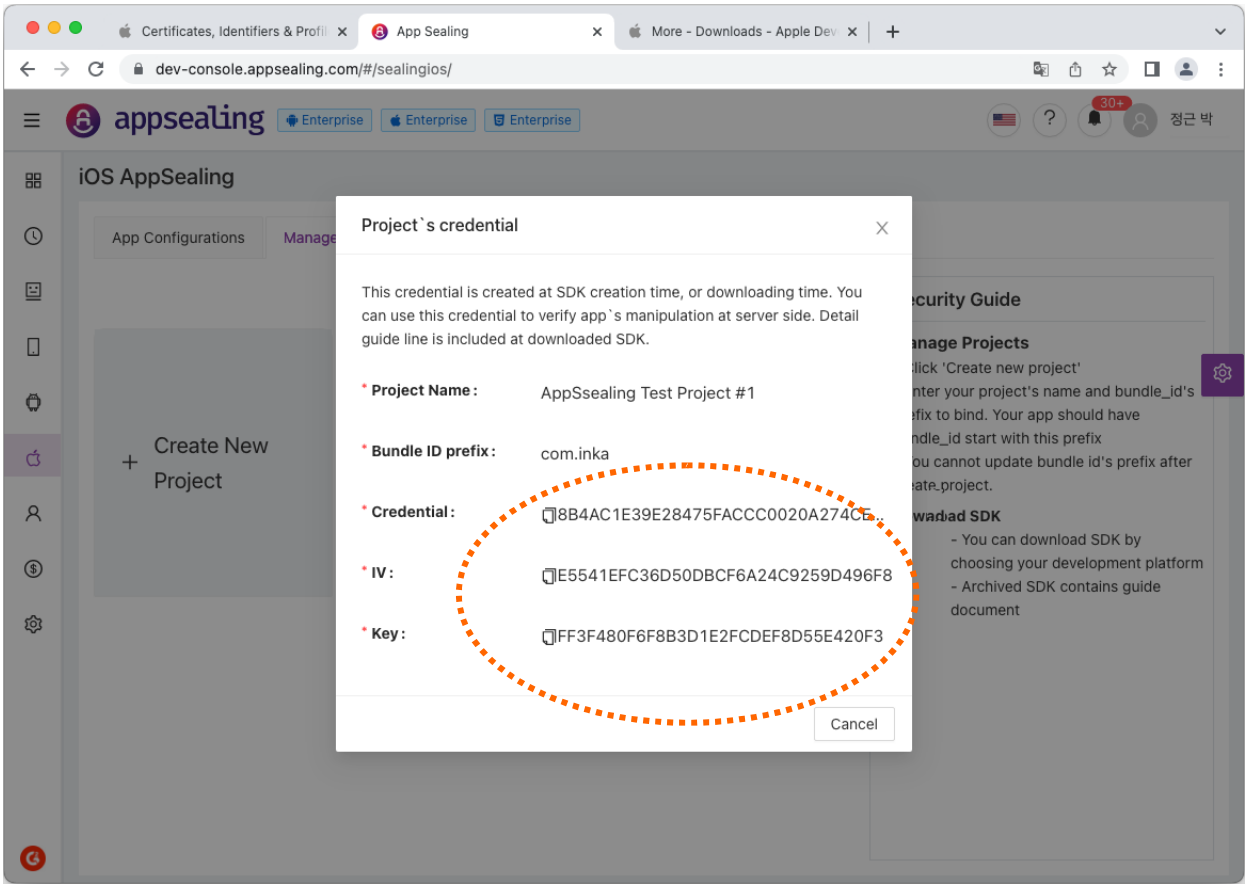
The credential data (hex string) returned from the interface call to the AppSealing module is only valid when the security logic inside AppSealing is normally performed and no dangerous situation is detected in the device.
If code patch attack is made through the dynamic library or the security logic is bypassed by other methods, valid credential data will not be generated, so the server should verify this value and blocks the attack situation of the device.
The app server must check whether the credential value sent by the client (app) is correct, and if it is not correct, it must deny authentication (login) and then deny any services (API call) requested by that client.

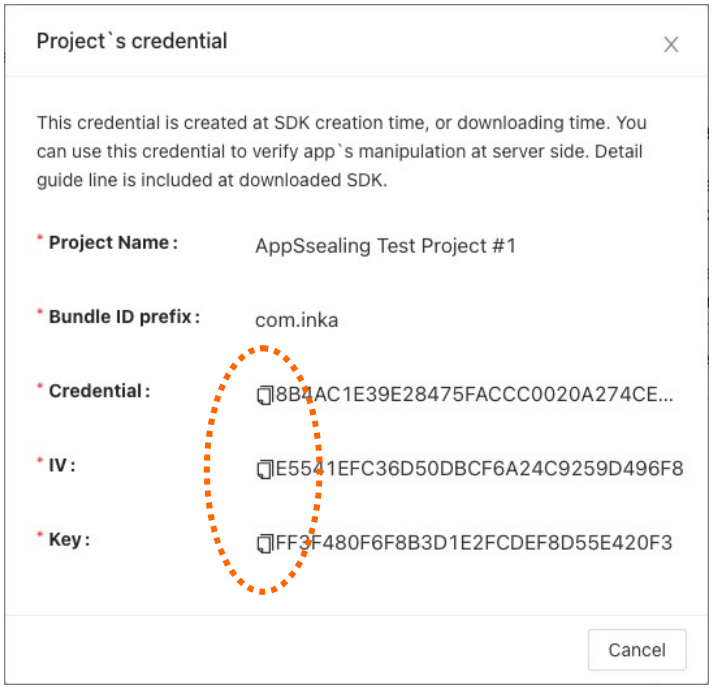
[Preparation]

To verify credential data on the server, you need an AES Key and IV to decrypt the data sent from the client, and the original credential data to compare and verify.
All of these values can be acquired through the "Check Credential" button of the project in the ADC. Just copy the Hex string shown here and paste it into the example code and use it. First, connect to ADC as shown in the screen below and click the "Check Credential" button in the project box.
If you click the button, the following window is displayed, where you can check the Credential value and IV and key to be used for decryption. You can use the copy button to the left of the string to copy this value as it is, paste it into the server-side verification code and use it.



If you click the button, the following window is displayed, where you can check the Credential value and IV and AES key to be used for decryption. You can use the copy button to the left of the string to copy this value as it is, paste it into the server-side verification code and use it.

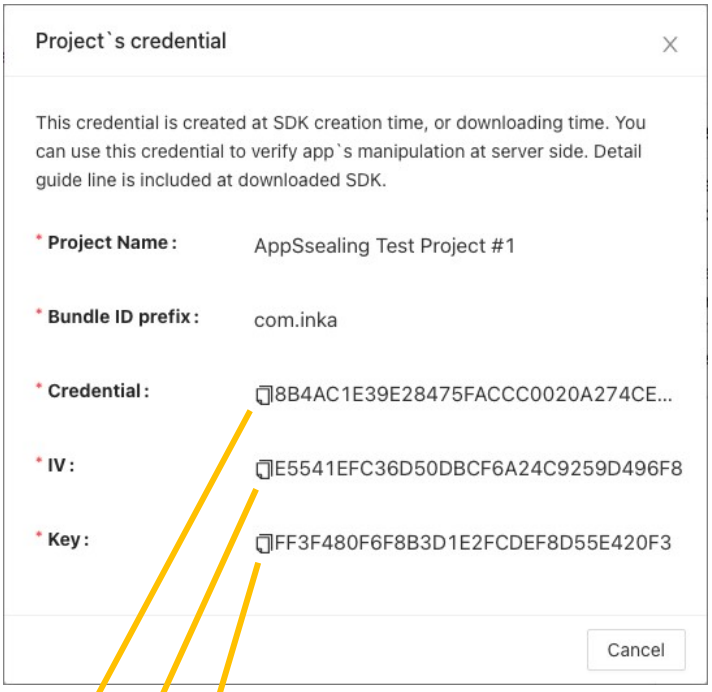




[In case your server code is using Node.js/Javascript]

Add following code to your existing code and use it for credential data validation. Authenticity can be determined by passing the credential value sent as a parameter in the login or authentication function of the existing server code to the verfityAppSealingCredential function provided in the code below. (The code below is also included in the SDK as a file named appsealing_credential.js).

**** Note: In the code below, ORG_CREDENTIAL, AES_IV, and AES_KEY must be replaced with values obtained through the "Check Credential" function of the corresponding project in the ADC.** If you just take the example code and use it intactly, credential value will not be verified properly.




```
var crypto = require('crypto');

function verifyAppSealingCredential( credential )
{
    // Need to Change : Get From ADC (via 'Check Credential') ----------------------------------------
    const ORG_CREDENTIAL =
"572E0E1459453F2078D6576FF71ECD0DBCA0484430C7FA7FE45B788A37DE3A04204F5A55FEA83AC9AFBA2C688594F75A3828B23972DB34858EC4F6CC3202533E44121
E5F2614B227E18B6419A83810F7511D5E51FCACD5175A1CC550F83CB874A7378ACDAFE78EB2E329CD5D3C384061C4669674F1EE6B1B59FB7D91835DB7EE";

    const AES_IV  = "055772B7434A4174749A   09B1413472";
    const AES_KEY = "71CA94A64A4DEBF5566495AB03F6798F";
    //-----------------------------------------------------------------------------------------------
```

```
    // convert credential from hex string to byte array
    let decrypted_UTC = 0, decrpyted_buffer, aes_key2;

    // decrypt UTC
  try
    {
      const decipher = crypto.createDecipheriv( 'aes-128-ctr', Buffer.from( AES_KEY, 'hex' ), Buffer.from( AES_IV, 'hex' ));
      decrpyted_buffer = Buffer.concat( [decipher.update( credential.substr( 0, 32 ), 'hex' ), decipher.final()] );
              decrypted_UTC = decrpyted_buffer.slice( 0, 8 ).readUInt32LE();
  }
    catch( error )
    {
      throw error;
  }

    // verfity UTC with current time (+/-) 10sec
    const current_UTC = parseInt( Date.now() / 1000 ); // get current UTC in seconds
    if ( Math.abs( current_UTC - decrypted_UTC ) > 10 )
    {
              console.log( "Invalid UTC value has sent, deny login & all services for this client... " + Math.abs( current_UTC -
decrypted_UTC ) );
              return false;
    }
    console.log( "** UTC verified : " + decrypted_UTC + " (current = " + current_UTC + ", diff = " + Math.abs( current_UTC -
decrypted_UTC ) + ")" );

    // get AES KEY2
    aes_key2 = Buffer.concat( [new Uint8Array( decrpyted_buffer.slice( 0, 8 )), new
Uint8Array( Buffer.from( ORG_CREDENTIAL.substring( 52, 52 + 16 ), 'hex' ))] );
    for( let i = 0; i < 16; i++ )
              aes_key2[i] ^= Buffer.from( AES_IV.substring( i * 2, i * 2 + 2 ), 'hex' ).readUInt8();

    // decrypt credential
    let decrypted_credential = [];
  try
    {
      const decipher = crypto.createDecipheriv( 'aes-128-ctr', aes_key2, Buffer.from( AES_IV, 'hex' ));
      decrypted_credential = Buffer.concat( [decipher.update( credential.substr( 32, 256 ), 'hex' ), decipher.final()] );
  }
    catch( error )
    {
      throw error;
  }

    // verfity credential with CREDENTIAL(ADC)
    // return if fail
    if ( ORG_CREDENTIAL.toLowerCase() != decrypted_credential.toString( 'hex' ).toLowerCase() )
    {
              console.log( "Invalid credential value has sent, deny login & all services for this client..." );
              return false;
    }

    console.log( "** Credential verified : PASS" );
    return true;
}
```


[In case your server code is using Java]

Add following code to your existing code and use it for credential data validation. Authenticity can be determined by passing the credential value sent as a parameter in the login or authentication function of the existing server code to the verfityAppSealingCredential function provided in the code below. (The code below is also included in the SDK as a file named appsealing_credential.java).

**** Note: In the code below, ORG_CREDENTIAL, AES_IV, and AES_KEY must be replaced with values obtained through the "Check Credential" function of the corresponding project in the ADC.** If you just take the example code and use it intactly, credential value will not be verified properly.

```
import java.nio.ByteBuffer;
import java.nio.ByteOrder;
import java.util.Arrays;

import javax.crypto.Cipher;
import javax.crypto.spec.IvParameterSpec;
import javax.crypto.spec.SecretKeySpec;
import javax.xml.bind.DatatypeConverter;

public class AppSealingCredential
{
    private static boolean verifyAppSealingCredential( final String credential )
    {
        // Need to Change : Get From ADC (via 'Check Credential') ----------------------------------------
        final String ORG_CREDENTIAL =
"572E0E1459453F2078D6576FF71ECD0DBCA0484430C7FA7FE45B788A37DE3A04204F5A55FEA83AC9AFBA2C688594F75A3828B23972DB34858EC4F6CC
3202533E44121E5F2614B227E18B6419A83810F7511D5E51FCACD5175A1CC550F83CB874A7378ACDAFE78EB2E329CD5D3C384061C4669674F1EE6B1B5
9FB7D91835DB7EE";

        final String AES_IV  = "055772B7434A4174749AFE09B1413472";
        final String AES_KEY = "71CA94A64A4DEBF5566495AB03F6798F";
        //--------------------------------------------------------------------------------------------

        long decrypted_UTC = 0;
        byte[] decryptedUTC = new byte[8];

        // decrypt UTC
        try
        {
            SecretKeySpec key = new SecretKeySpec( DatatypeConverter.parseHexBinary( AES_KEY ), "AES" );
            IvParameterSpec ivSpec = new IvParameterSpec( DatatypeConverter.parseHexBinary( AES_IV ));

            Cipher cipher = Cipher.getInstance( "AES/CTR/NoPadding" );
            cipher.init( Cipher.DECRYPT_MODE, key, ivSpec );

            byte[] encryptedUTC = DatatypeConverter.parseHexBinary( credential.substring( 0, 32 ));
            System.arraycopy( cipher.doFinal( encryptedUTC ), 0, decryptedUTC, 0, 8 );
            System.out.println( DatatypeConverter.printHexBinary( decryptedUTC ));
```



```
            decrypted_UTC = ByteBuffer.wrap( decryptedUTC ).order( ByteOrder.LITTLE_ENDIAN ).getInt() & 0xFFFFFFFFL;
        }
        catch( Exception e )
        {
            System.out.println( "[Error] " + e.getLocalizedMessage() );
        }

        // verfity UTC with current time (+/-) 10sec
        long current_UTC = System.currentTimeMillis() / 1000; // get current UTC in seconds

        if ( Math.abs( current_UTC - decrypted_UTC ) > 10 )
        {
            System.out.println( "Invalid UTC value has sent, deny login & all services for this client..." );
            return false;
        }
        System.out.println( "** UTC verified : " + decrypted_UTC + " (current = " + current_UTC + ", diff = " +
Math.abs( current_UTC - decrypted_UTC ) + ")" );

        // get AES KEY2
        byte[] aes_key2 = Arrays.copyOf( decryptedUTC, 16 );
        byte[] xor = DatatypeConverter.parseHexBinary( ORG_CREDENTIAL.substring( 52, 52 + 16 ));
        System.arraycopy( xor, 0, aes_key2, decryptedUTC.length, xor.length );

        for( int i = 0; i < 16; i++ )
            aes_key2[i] ^= ( byte )DatatypeConverter.parseHexBinary( AES_IV.substring( i * 2, i * 2 + 2 ))[0];
        System.out.println( DatatypeConverter.printHexBinary( aes_key2 ));

        // decrypt credential
        byte[] decrypted_credential = null;
        try
        {
            SecretKeySpec key = new SecretKeySpec( aes_key2, "AES" );
            IvParameterSpec ivSpec = new IvParameterSpec( DatatypeConverter.parseHexBinary( AES_IV ));

            Cipher cipher = Cipher.getInstance( "AES/CTR/NoPadding" );
            cipher.init( Cipher.DECRYPT_MODE, key, ivSpec );

            System.out.println( "########### " + credential.substring( 32, 32 + 256 ) );
            byte[] encrypted_credential = DatatypeConverter.parseHexBinary( credential.substring( 32, 32 + 256 ));
            decrypted_credential = cipher.doFinal( encrypted_credential );
        }
        catch( Exception e )
        {
            System.out.println( "[Error] " + e.getLocalizedMessage() );
        }

        // verfity credential with CREDENTIAL(ADC)
        // return if fail
        if ( !ORG_CREDENTIAL.equalsIgnoreCase( DatatypeConverter.printHexBinary( decrypted_credential )))
        {
            System.out.println( "Invalid credential value has sent, deny login & all services for this client..." );
            return false;
        }

        System.out.println( "** Credential verified : PASS" );
        return true;
    }
}
```


[In case your server code is using ASP.NET / C#]

Add following code to your existing code and use it for credential data validation. Authenticity can be determined by passing the credential value sent as a parameter in the login or authentication function of the existing server code to the verfityAppSealingCredential function provided in the code below. (The code below is also included in the SDK as a file named appsealing_credential.cs, because C# does not support AES CTR mode, you must include the AesCtrTransform function for CTR processing as shown in the code below.)

**** Note: In the code below, ORG_CREDENTIAL, AES_IV, and AES_KEY must be replaced with values obtained through the "Check Credential" function of the corresponding project in the ADC.** If you just take the example code and use it intactly, credential value will not be verified properly.

```
using System;
using System.Collections.Generic;
using System.IO;
using System.Linq;
using System.Security.Cryptography;
using System.Text;
using System.Threading.Tasks;

namespace AppSealingSDK
{
    class AppSealingCredential
    {
        public static void AesCtrTransform( byte[] key, byte[] salt, Stream inputStream, Stream outputStream )
        {
            SymmetricAlgorithm aes = new AesManaged { Mode = CipherMode.ECB, Padding = PaddingMode.None };

            int blockSize = aes.BlockSize / 8;
            if ( salt.Length != blockSize )
                throw new ArgumentException( "Salt size must be same as block size " + $"(actual: {salt.Length}, expected:
{blockSize})" );

            byte[] counter = ( byte[] )salt.Clone();

            Queue<byte> xorMask = new Queue<byte>();
            var zeroIv = new byte[blockSize];
            ICryptoTransform counterEncryptor = aes.CreateEncryptor( key, zeroIv );

            int b;
            while(( b = inputStream.ReadByte()) != -1 )
            {
                if ( xorMask.Count == 0 )
                {
                    var counterModeBlock = new byte[blockSize];
```



```
                counterEncryptor.TransformBlock( counter, 0, counter.Length, counterModeBlock, 0 );

                for( var i2 = counter.Length - 1; i2 >= 0; i2-- )
                {
                    if ( ++counter[i2] != 0 )
                        break;
                }
                foreach( var b2 in counterModeBlock )
                    xorMask.Enqueue( b2 );
            }
            var mask = xorMask.Dequeue();
            outputStream.WriteByte(( byte )((( byte )b ) ^ mask ));
        }
    }
    public static byte[] StringToByteArray( String hex )
    {
        return Enumerable.Range( 0, hex.Length / 2 ).Select( x => Convert.ToByte( hex.Substring( x * 2, 2 ),
16 )).ToArray();
    }
    public static bool VerifyAppSealingCredential( String credential )
    {
        // Need to Change : Get From ADC (via 'Check Credential') ----------------------------------------
        const String ORG_CREDENTIAL =
"572E0E1459453F2078D6576FF71ECD0DBCA0484430C7FA7FE45B788A37DE3A04204F5A55FEA83AC9AFBA2C688594F75A3828B23972DB34858EC4F6CC
3202533E44121E5F2614B227E18B6419A83810F7511D5E51FCACD5175A1CC550F83CB874A7378ACDAFE78EB2E329CD5D3C384061C4669674F1EE6B1B5
9FB7D91835DB7EE";

        const String AES_IV  = "055772B7434A4174749AFE09B1413472";
        const String AES_KEY = "71CA94A64A4DEBF5566495AB03F6798F";
        //-----------------------------------------------------------------------------------------------

        long decrypted_UTC = 0;
        byte[] decrypted_buffer = new byte[8];

        // decrypt UTC
        try
        {
            byte[] encrypted_UTC = StringToByteArray( credential.Substring( 0, 32 ));
            byte[] result = new byte[16];
            AesCtrTransform( StringToByteArray( AES_KEY ), StringToByteArray( AES_IV ), new
MemoryStream( encrypted_UTC ), new MemoryStream( result ));
            Array.Copy( result, 0, decrypted_buffer, 0, 8 );
            decrypted_UTC = BitConverter.ToInt64( decrypted_buffer, 0 );
            System.Console.WriteLine( "** UTC = " + decrypted_UTC );
        }
        catch(Exception e )
        {
            System.Console.WriteLine( "[Error] " + e.Message );
        }

        // verfity UTC with current time (+/-) 10sec
        long current_UTC = DateTimeOffset.Now.ToUnixTimeMilliseconds() / 1000;// get current UTC in seconds
        if ( Math.Abs( current_UTC - decrypted_UTC ) > 10 )
        {
            System.Console.WriteLine( "Invalid UTC value has sent, deny login & all services for this client..." );
            return false;
        }
        System.Console.WriteLine( "** UTC verified : " + decrypted_UTC + " (current = " + current_UTC + ", diff = " +
Math.Abs(current_UTC - decrypted_UTC ) + ")" );
```



```
            // get AES KEY2
            byte[] aes_key2 = new byte[16];
            Array.Copy( decrypted_buffer, 0, aes_key2, 0, 8 );
            byte[] xor = StringToByteArray( ORG_CREDENTIAL.Substring( 52, 16 ));
            Array.Copy( xor, 0, aes_key2, decrypted_buffer.Length, xor.Length );

            for(int i = 0; i< 16; i++ )
                aes_key2[i] ^= ( byte )StringToByteArray( AES_IV.Substring( i* 2, 2 ))[0];

            // decrypt credential
            byte[] decrypted_credential = null;
            try
            {
                byte[] encrypted_credential = StringToByteArray( credential.Substring( 32, 256 ));
                decrypted_credential = new byte[encrypted_credential.Length];
                AesCtrTransform( aes_key2, StringToByteArray( AES_IV ), new MemoryStream( encrypted_credential ), new
MemoryStream( decrypted_credential ));
            }
            catch(Exception e )
            {
                System.Console.WriteLine( "[Error] " + e.Message );
            }

            // verfity credential with CREDENTIAL(ADC)
            // return if fail
            if ( !ORG_CREDENTIAL.Equals( BitConverter.ToString( decrypted_credential ).Replace( "-", "" ),
StringComparison.InvariantCultureIgnoreCase ))
            {
                System.Console.WriteLine( "Invalid credential value has sent, deny login & all services for this
client..." );
                return false;
            }

            System.Console.WriteLine( "** Credential verified : PASS" );
            return true;
        }
}
```


[In case your server code is using python]

Add following code to your existing code and use it for credential data validation. Authenticity can be determined by passing the credential value sent as a parameter in the login or authentication function of the existing server code to the verfityAppSealingCredential function provided in the code below. (The code below is also included in the SDK as a file named appsealing_credential.py)

**** Note: In the code below, ORG_CREDENTIAL, AES_IV, and AES_KEY must be replaced with values obtained through the "Check Credential" function of the corresponding project in the ADC.** If you just take the example code and use it intactly, credential value will not be verified properly.

```
from Crypto.Cipher import AES
from Crypto.Util import Counter
import time

#============================================================
def verifyAppSealingCredential( credential ):

    # Need to Change : Get From ADC (via 'Check Credential') ------------------------------------------
    ORG_CREDENTIAL =
"572E0E1459453F2078D6576FF71ECD0DBCA0484430C7FA7FE45B788A37DE3A04204F5A55FEA83AC9AFBA2C688594F75A3828B23972DB34858EC4F6CC
3202533E44121E5F2614B227E18B6419A83810F7511D5E51FCACD5175A1CC550F83CB874A7378ACDAFE78EB2E329CD5D3C384061C4669674F1EE6B1B5
9FB7D91835DB7EE"
    AES_IV  = "055772B7434A4174749AFE09B1413472"
    AES_KEY = "71CA94A64A4DEBF5566495AB03F6798F"
    #-------------------------------------------------------------------------------------------------

          # decrypt UTC
    try:
        counter = Counter.new( 128, initial_value = int.from_bytes( bytes.fromhex( AES_IV ), "big" ))
        cipher = AES.new( bytes.fromhex( AES_KEY ), AES.MODE_CTR, counter = counter )
        descrypted_buffer = cipher.decrypt( bytes.fromhex( credential[:32] ))

        decrypted_UTC = int.from_bytes( descrypted_buffer[:8], "little" )
    except Exception as e:
        print( '[Error] ', e )
        return 0;

    # verfity UTC with current time (+/-) 10sec
    current_UTC = round( time.time() * 1000 );     # get current UTC in seconds

    if abs( current_UTC - decrypted_UTC ) > 10:
        print( "Invalid UTC value has sent, deny login & all services for this client..." )
        #return 0

    print( "** UTC verified : ", decrypted_UTC, " (current = ", current_UTC, ", diff = ", abs( current_UTC -
decrypted_UTC ), ")" )
```



```
# get AES KEY2
aes_key2 = bytearray( 16 )
aes_key2[0:8] = descrypted_buffer[0:8]
aes_key2[8:8] = bytes.fromhex( ORG_CREDENTIAL[52:68] )
print( aes_key2[:16].hex() )

for i in range( 0, 16 ):
    aes_key2[i] ^= bytes.fromhex( AES_IV[i * 2:i * 2 + 2] )[0]
print( aes_key2[:16].hex() )

# decrypt credential
try:
    counter2 = Counter.new( 128, initial_value = int.from_bytes( bytes.fromhex( AES_IV ), "big" ))
    cipher2 = AES.new( aes_key2[:16], AES.MODE_CTR, counter = counter2 )
    print( credential[32:288] )
    decrypted_credential = cipher2.decrypt( bytes.fromhex( credential[32:288] ))
except Exception as e:
    print( '[Error] ', e )
    return 0;

# verfity credential with CREDENTIAL(ADC)
# return if fail
if ORG_CREDENTIAL.casefold() != decrypted_credential.hex().casefold():
    print( "Invalid credential value has sent, deny login & all services for this client..." )
    return 0

print( "** Credential verified : PASS" )
return 1
```


[In case your server code is using ruby script]

Add following code to your existing code and use it for credential data validation. Authenticity can be determined by passing the credential value sent as a parameter in the login or authentication function of the existing server code to the verfityAppSealingCredential function provided in the code below. (The code below is also included in the SDK as a file named appsealing_credential.rb)

**** Note: In the code below, ORG_CREDENTIAL, AES_IV, and AES_KEY must be replaced with values obtained through the "Check Credential" function of the corresponding project in the ADC.** If you just take the example code and use it intactly, credential value will not be verified properly.

```
require 'securerandom'
require 'net/https'
require 'json'

# Need to Change : Get From ADC (via 'Check Credential') ------------------------------------------
ORG_CREDENTIAL =
"572E0E1459453F2078D6576FF71ECD0DBCA0484430C7FA7FE45B788A37DE3A04204F5A55FEA83AC9AFBA2C688594F75A3828B23972DB34858EC4F6CC
3202533E44121E5F2614B227E18B6419A83810F7511D5E51FCACD5175A1CC550F83CB874A7378ACDAFE78EB2E329CD5D3C384061C4669674F1EE6B1B5
9FB7D91835DB7EE"
AES_IV  = "055772B7434A4174749AFE09B1413472"
AES_KEY = "71CA94A64A4DEBF5566495AB03F6798F"
#-------------------------------------------------------------------------------------------------

def verifyAppSealingCredential( credential )

    # decrypt UTC
    begin
        aes = OpenSSL::Cipher::AES.new( "128-CTR" )
        aes.decrypt
        aes.key = [AES_KEY].pack( 'H*' )
        aes.iv = [AES_IV].pack( 'H*' )
        decrypted_buffer = aes.update( [credential[0..31]].pack( 'H*' )) + aes.final

        decrypted_UTC = decrypted_buffer.slice( 0, 8 ).unpack( 'V' ).first
    rescue => e
        puts '[Error] ' + e.to_s
        return 0
           end

    # verfity UTC with current time (+/-) 10sec
    current_UTC = Time.now.strftime( '%s%L' ).to_i;          # get current UTC in seconds

    if ( current_UTC - decrypted_UTC ).abs > 10
        puts "Invalid UTC value has sent, deny login & all services for this client..."
        return 0
    end
```



```
    puts "** UTC verified : " + decrypted_UTC.to_s + " (current = " + current_UTC.to_s + ", diff = " + ( current_UTC - decrypted_UTC ).abs.to_s + ")"

    # get AES KEY2
    aes_key2 = decrypted_buffer.bytes.slice( 0, 8 ) + [ORG_CREDENTIAL[52..67]].pack( 'H*' ).bytes
    for i in 0..15 do
        aes_key2[i] ^= [AES_IV[i * 2..i * 2 + 1]].pack( 'H*' ).bytes[0]
    end

    # decrypt credential
    begin
        aes = OpenSSL::Cipher::AES.new( "128-CTR" )
        aes.decrypt
        aes.key = aes_key2.pack( 'C*' )
        aes.iv = [AES_IV].pack( 'H*' )
        decrypted_credential = aes.update( [credential[32..287]].pack( 'H*' )) + aes.final
    rescue => e
        puts '[Error] ' + e.to_s
        return 0
           end

    # verfity credential with CREDENTIAL(ADC)
    # return if fail
    if ORG_CREDENTIAL.casecmp( decrypted_credential.unpack( 'H*' ).first ) != 0
        print( "Invalid credential value has sent, deny login & all services for this client..." )
        return 0
    end

    print( "** Credential verified : PASS" )
    return 1

end
```


[In case your server code is using C++]

Add following code to your existing code and use it for credential data validation. Authenticity can be determined by passing the credential value sent as a parameter in the login or authentication function of the existing server code to the verfityAppSealingCredential function provided in the code below. (The code below is also included in the SDK as a file named appsealing_credential.cpp with aes.hpp/aes.cpp)

**** Note: In the code below, ORG_CREDENTIAL, AES_IV, and AES_KEY must be replaced with values obtained through the "Check Credential" function of the corresponding project in the ADC.** If you just take the example code and use it intactly, credential value will not be verified properly.

```
#include <iostream>
#include <vector>
#include <time.h>
#include "aes.cpp"

typedef std::vector<unsigned char> bytes;
bytes HexToBytes( const std::string& hex )
{
    std::vector<unsigned char> bytes;
    for( unsigned int i = 0; i < hex.length(); i += 2 )
    {
        std::string byteString = hex.substr( i, 2 );
        unsigned char byte = ( unsigned char )strtol( byteString.c_str(), NULL, 16 );
        bytes.push_back( byte );
    }
    return bytes;
}

static bool verifyAppSealingCredential( const char* credential )
{
    // Need to Change : Get From ADC (via 'Check Credential') ------------------------------------------
    const char* ORG_CREDENTIAL =
"572E0E1459453F2078D6576FF71ECD0DBCA0484430C7FA7FE45B788A37DE3A04204F5A55FEA83AC9AFBA2C688594F75A3828B23972DB34858EC4F6CC
3202533E44121E5F2614B227E18B6419A83810F7511D5E51FCACD5175A1CC550F83CB874A7378ACDAFE78EB2E329CD5D3C384061C4669674F1EE6B1B5
9FB7D91835DB7EE";
    const char* AES_IV  = "055772B7434A4174749AFE09B1413472";
    const char* AES_KEY = "71CA94A64A4DEBF5566495AB03F6798F";
    //-------------------------------------------------------------------------------------------------

    unsigned char decrypted_buffer[16], decrypted_credential[128];

    // decrypt UTC
    struct AES_ctx ctx;
    try
    {
```



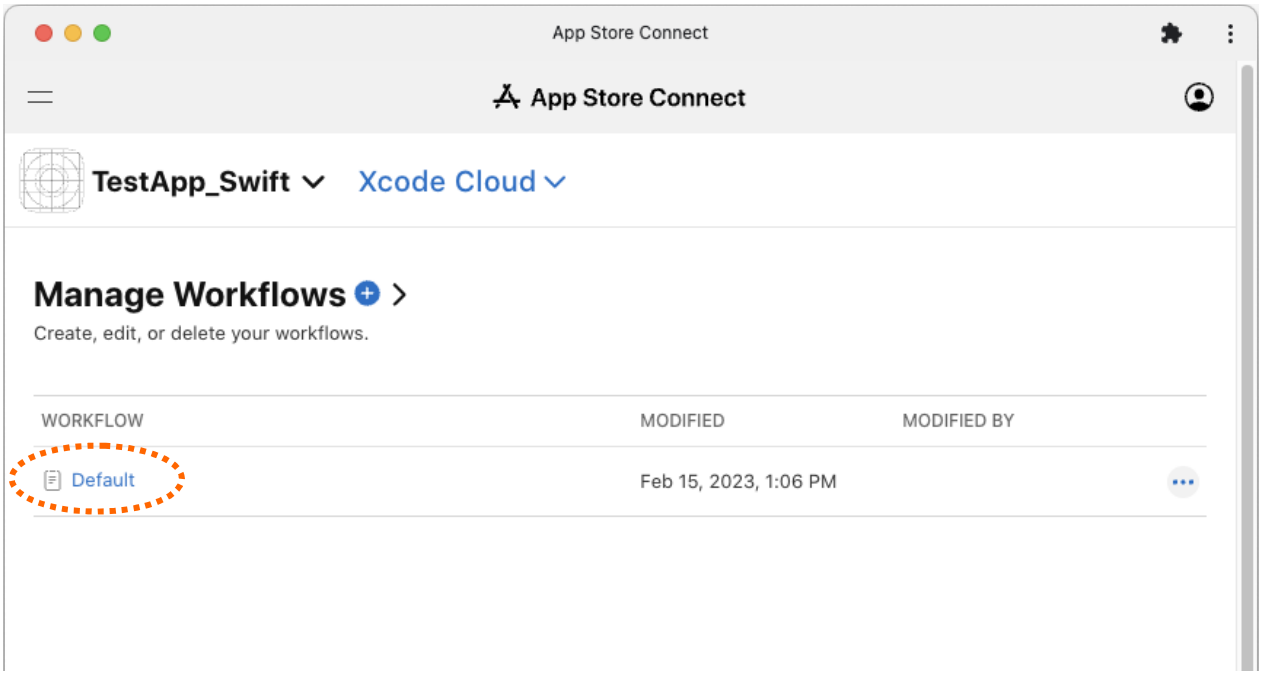
```
        memcpy( decrypted_buffer, HexToBytes( std::string( credential ).substr( 0, 32 )).data(), 16 );

        AES_init_ctx_iv( &ctx, HexToBytes( AES_KEY ).data(), HexToBytes( AES_IV ).data() );
        AES_CTR_xcrypt_buffer( &ctx, decrypted_buffer, 16 );

        long decrypted_UTC = *(( long* )decrypted_buffer );

        std::cout << "** UTC = " << decrypted_UTC << "\n";

        // verfity UTC with current time (+/-) 10sec
        time_t current_UTC = time( 0 );
        current_UTC = 1664439768;//REMOVE
        if ( abs( current_UTC - decrypted_UTC ) > 10 )
        {
            std::cout << "Invalid UTC value has sent, deny login & all services for this client...\n";
            return false;
        }
        std::cout << "** UTC verified : " << decrypted_UTC << " (current = " << current_UTC << ", diff = " <<
abs(current_UTC - decrypted_UTC ) << ")\n";

        // get AES KEY2
        unsigned char aes_key2[16];
        memcpy( aes_key2, decrypted_buffer, 8 );
        bytes XOR = HexToBytes( std::string( ORG_CREDENTIAL ).substr( 52, 16 ));
        memcpy( aes_key2 + 8, XOR.data(), XOR.size() );

        for( int i = 0; i < 16; i++ )
            aes_key2[i] ^= HexToBytes( std::string( AES_IV ).substr( i * 2, 2 )).data()[0];

        // decrypt credential
        memcpy( decrypted_credential, HexToBytes( std::string( credential ).substr( 32, 256 )).data(), 128 );

        AES_init_ctx_iv( &ctx, aes_key2, HexToBytes( AES_IV ).data() );
        AES_CTR_xcrypt_buffer( &ctx, decrypted_credential, 128 );
    }
    catch( const std::out_of_range& e )
    {
        std::cout << "pos exceeds string size\n";
    }

    // verfity credential with CREDENTIAL(ADC)
    // return if fail
    if ( memcmp( HexToBytes( ORG_CREDENTIAL ).data(), decrypted_credential, 128 ) != 0 )
    {
        std::cout << "Invalid credential value has sent, deny login & all services for this client...";
        return false;
    }
    std::cout << "** Credential verified : PASS";
}
```


Part 8. Resign and upload from Xcode Cloud

AppSealing SDK can be applied to projects using Xcode Cloud. After adding the necessary files for the SDK and pushing them to the Git repository, the app is archived and exported as an IPA in the way Xcode Cloud works, and then the IPA with security-related features added is uploaded to App Store Connect by performing a re-signing script. will do.
However, in this process, some actions must be performed differently from the original Xcode Cloud operation, so additional settings and preparations are required. Follow the steps outlined below to prepare the process.

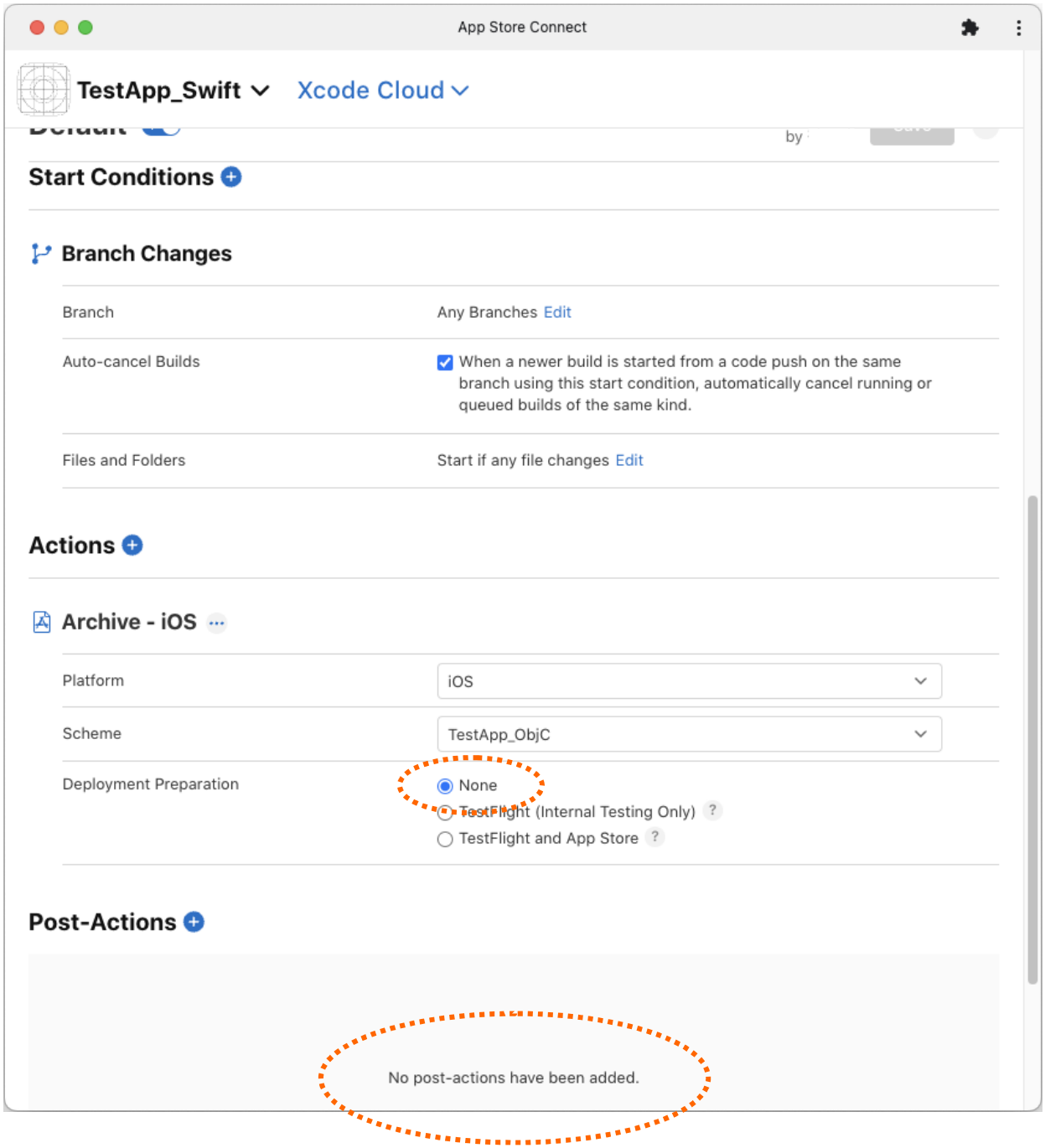
8-1 Configure Xcode Cloud

Integration of Xcode Cloud and project Git repository is assumed to be completed as described in the Xcode Cloud documentation. First you need to change the workflow settings in Xcode Cloud. The project name used in this document is "TestApp_Swift" and the workflow name is "Default". Connect to "App Store Connect" and go to the "Xcode Cloud" page of the project.



Click on the workflow name to go to the settings screen.

When the setting screen is displayed, leave other items as they are, scroll the page to the bottom, select "None" as the value of "Actions - Deployment Preparation" and leave "Post-Actions" blank so that no action is entered.

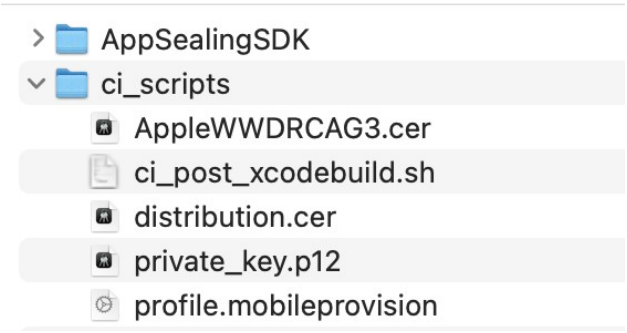


If you do not select "None" as the value of the "Deployment Preparation" item, the app will not run normally because the built IPA is uploaded to App Store Connect without going through the re-signing process. The same goes for Post-Actions, so these two must be left blank or set to "None"

8-2 ci_scripts preparation process

To re-sign the built IPA with security settings file in the Xcode Cloud environment, a custom script file, a signing certificate & private key, and a provisioning profile for distribution are additionally required to upload the modified IPA to App Store Connect.
All of these files should be included in the ci_scripts folder of your project path. In addition to the ci_scripts configuration items provided by the AppSealing SDK, the following items are additionally required and added by yourself.

- Cerfiticate for App Store distribution : distribution.cer
- Private key for distribution certificate : private_key.p12 (password: '' [empty])
- Provisioning profile for App Store distribution : profile.mobileprovision
- Apple ID & App-Specific password (to be written in script)



The ci_scripts configuration of the AppSealing SDK includes the Apple root certificate "AppleWWDRCAG3.cer" certificate file and "ci_post_xcodebuild.sh" ruby script file. These files should not be renamed either.

The three previously mentioned files (distribution.cer, private_key.p12, profile.mobile provision) are added to these basic files, resulting in a total five files as shown in the picture above.

Certificate for App Store distribution

The ci_scripts folder must contain the distribution certificate. This certificate must be a CER format file downloaded from the Apple Developer site, and the file name must be fixed to "distribution.cer". If you add a certificate other than the one for App Store distribution or the file name is different, re-signing will not work properly.

Private key for distribution certificate

The private key file corresponding to the distribution certificate included earlier must also be included in the ci_scripts folder. The private key file can be exported from the Mac Keychain app, with the format set to PKCS#12 (extension .p12) and the password for the private key file must be set to an empty string. The name of the private key file must also be fixed to "private_key.p12".

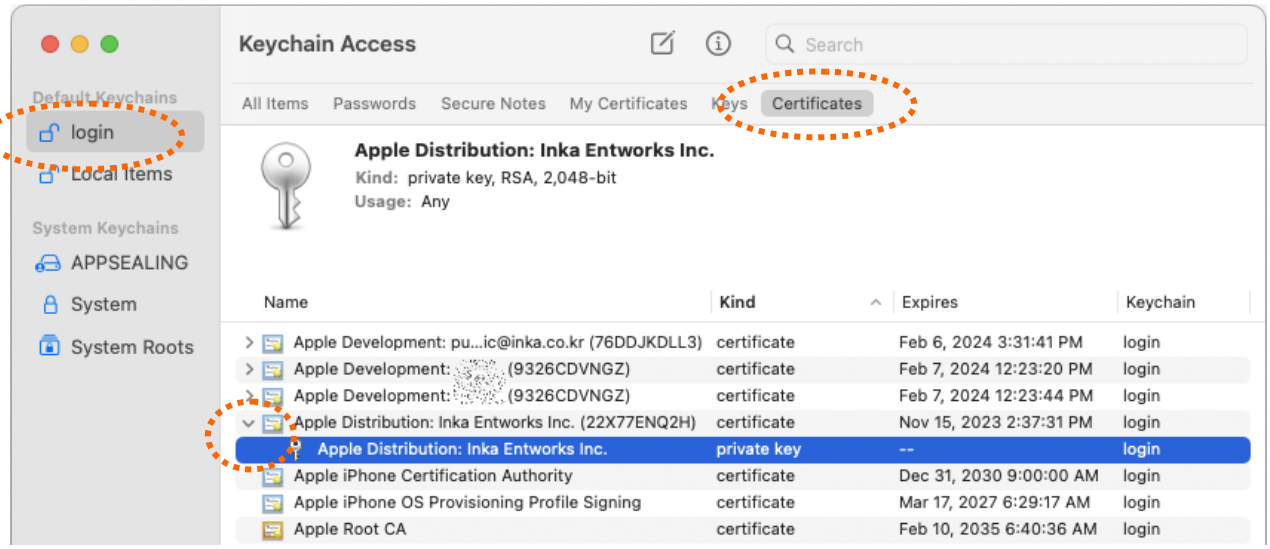
If the file name does not match or a non-empty value is set in the password, re-signing will not proceed properly. If you want to set a password in the private key file, proceed with additional steps in the script modification section below.

Below is a step-by-step explanation of the private key file creation process. If you have already created a private key file, skip these instructions.

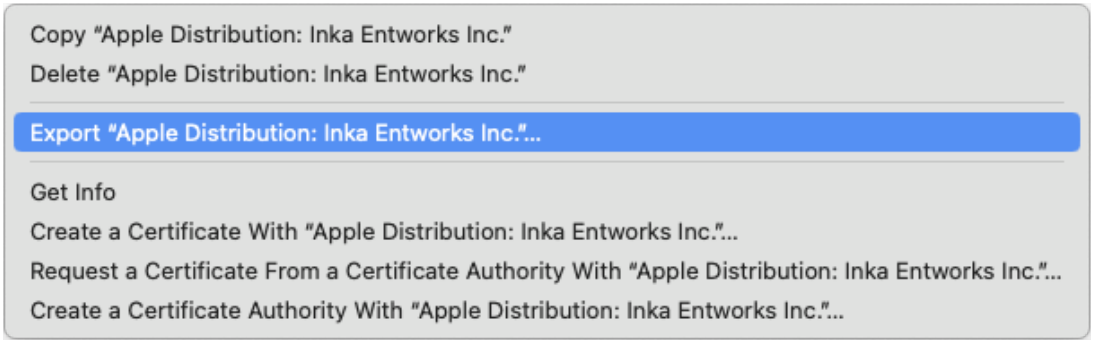
STEP Private key file creation process in Mac Keychain app

If you go to "Etc." in Mac's launchpad, the "Keychain Access" app will appear. Run this app and when the screen below appears, select the "login" item from the left tab.

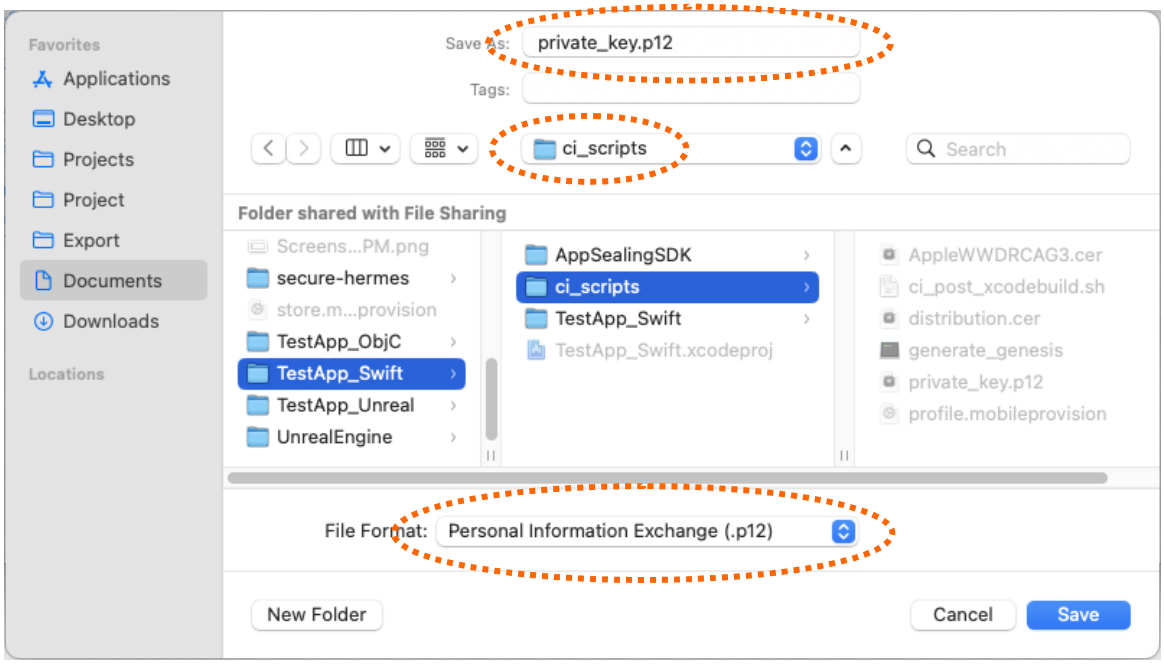
Select "Certificates" from the top tab menu in the right pane.
Click the right-angle bracket (>) to the left of the distribution certificate registered in the keychain to display the private key of the certificate.



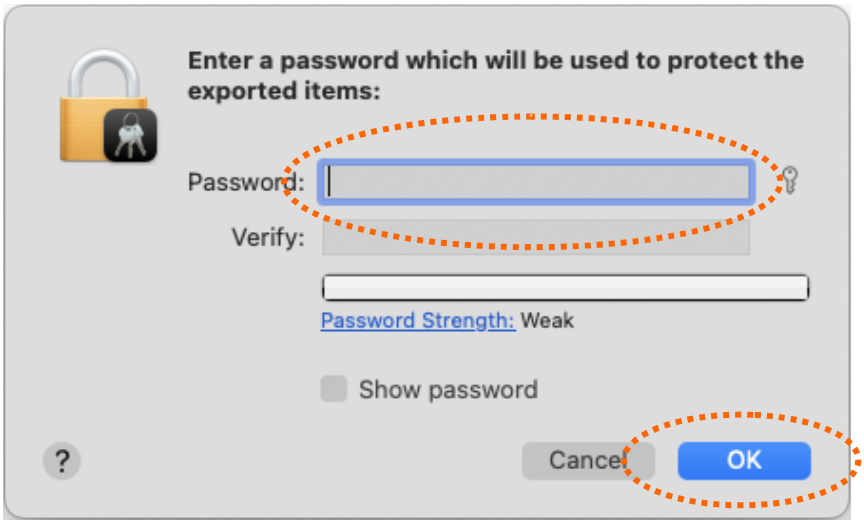
After selecting the private key, right-click the mouse and when the context menu appears, select "Export... " item.



Select the "ci_scripts" folder of the project as the save location, the file name as "private_key.p12", and the file format as "Personal Information Exchange."



When the password input window appears, leave the password blank and save it.



If you specify a password, you must edit the ci_post_xcodebuild.sh file.
Open the file with an editor and go to line 445. You can see that the password for the private key file is left blank in this line of commands.

```
441    system( 'security create-keychain -p 0000 ' + APPSEALING_KEYCHAIN )
442    system( 'security list-keychains -d user -s login.keychain ' + APPSEALING_KEYCHAIN )
443    system( 'security import ./AppleWWDRCAG3.cer -k ' + APPSEALING_KEYCHAIN + ' -t cert -A -P ""' )
444    system( 'security import ./distribution.cer -k ' + APPSEALING_KEYCHAIN + ' -t cert -A -P ""' )
445    system( 'security import ./private_key.p12 -k ' + APPSEALING_KEYCHAIN + ' -t priv -A -P ""' )
446    system( 'security default-keychain -d user -s ' + APPSEALING_KEYCHAIN )
447    system( 'security unlock-keychain -p 0000 ' + APPSEALING_KEYCHAIN )
448    system( 'security set-keychain-settings ' + APPSEALING_KEYCHAIN )
449    system( 'security set-key-partition-list -S apple-tool:,apple:,codesign: -s -k 0000 ' + APPSEALING_KEYCHAIN + ' > /dev/null' )
```

Write down the password you specified and save the file in this location. If you saved your password as the string "your_password", you must modify it as follows.

```
441    system( 'security create-keychain -p 0000 ' + APPSEALING_KEYCHAIN )
442    system( 'security list-keychains -d user -s login.keychain ' + APPSEALING_KEYCHAIN )
443    system( 'security import ./AppleWWDRCAG3.cer -k ' + APPSEALING_KEYCHAIN + ' -t cert -A -P ""' )
444    system( 'security import ./distribution.cer -k ' + APPSEALING_KEYCHAIN + ' -t cert -A -P ""' )
445    system( 'security import ./private_key.p12 -k ' + APPSEALING_KEYCHAIN + ' -t priv -A -P "your_password"' )
446    system( 'security default-keychain -d user -s ' + APPSEALING_KEYCHAIN )
447    system( 'security unlock-keychain -p 0000 ' + APPSEALING_KEYCHAIN )
448    system( 'security set-keychain-settings ' + APPSEALING_KEYCHAIN )
449    system( 'security set-key-partition-list -S apple-tool:,apple:,codesign: -s -k 0000 ' + APPSEALING_KEYCHAIN + ' > /dev/null' )
```

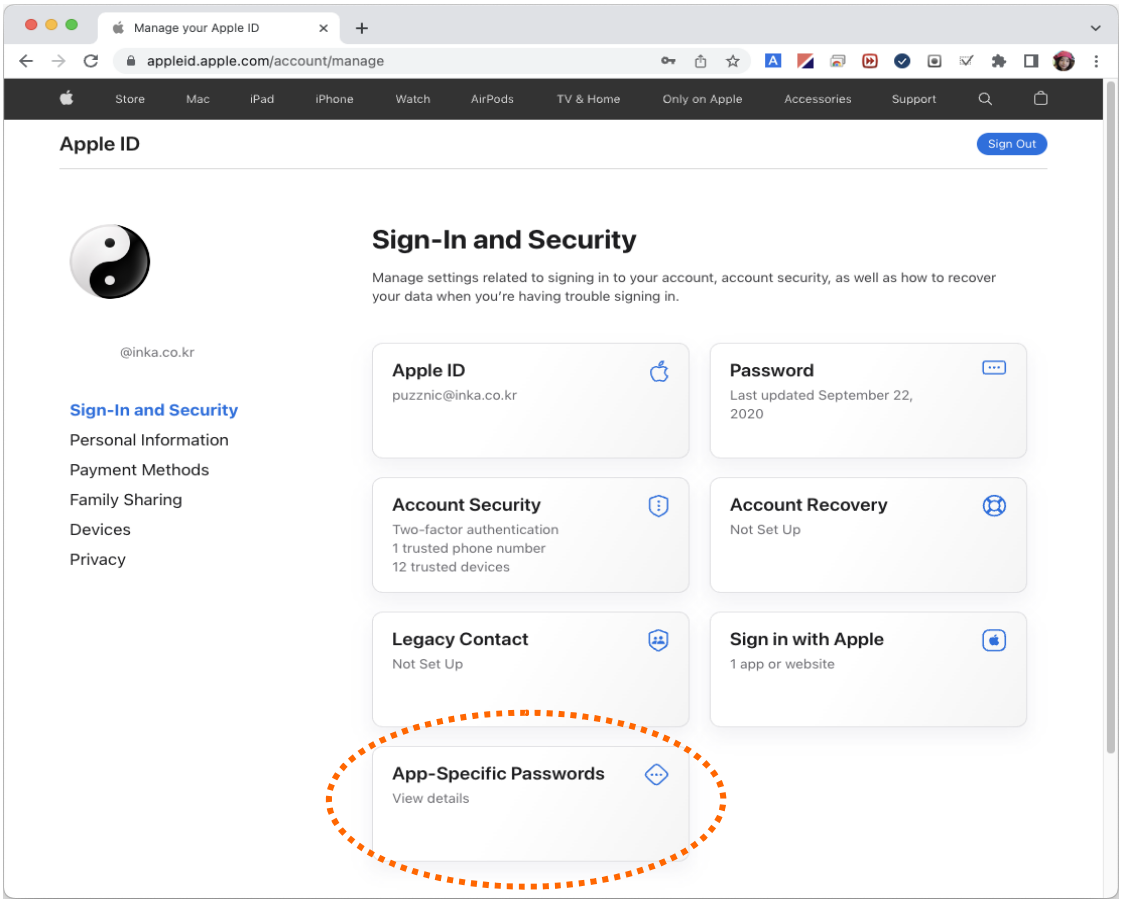

Provisioning profiles for App Store distribution

The ci_scripts folder must contain a provisioning profile for App store deployment. This file should contain the profile downloaded from the Apple Developer site with the name "profile.mobileprovision". If the file name does not match or the profile is not correct, re-signing may fail or the app may not install/run properly.

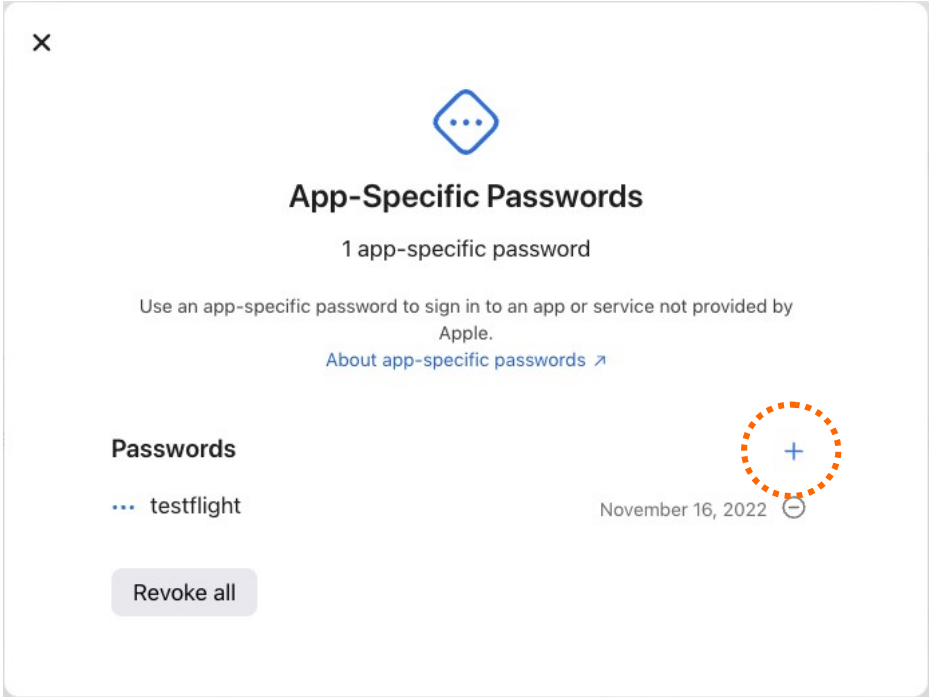
Custom scripts for post-build processing

The ci_scripts folder contains the ci_post_xcodebuild.sh script file by default. The content of the script includes a process for uploading the re-signed IPA to App Store Connect. To perform this operation, the app developer's Apple account and app password are required. (Not password for Apple account ID!)

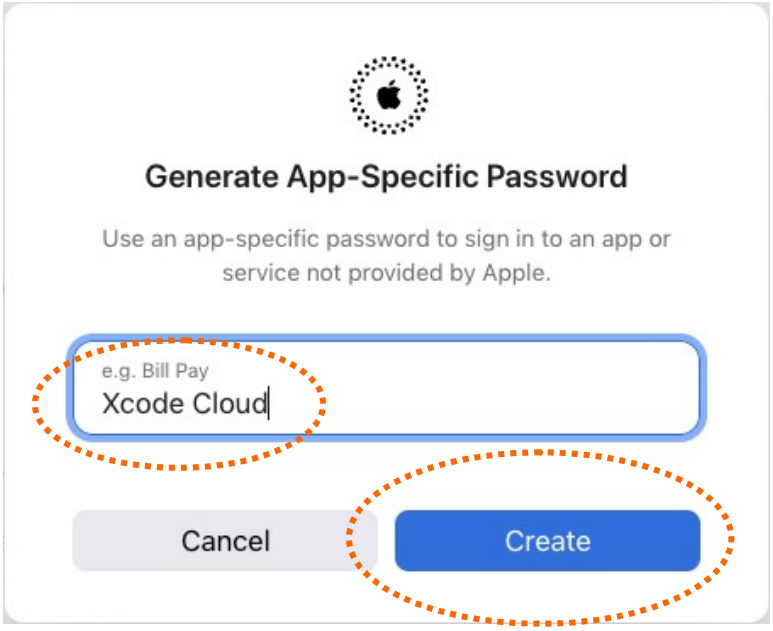
If you do not have an app password, you can create one on below Apple's page.
https://appleid.apple.com/account/manage



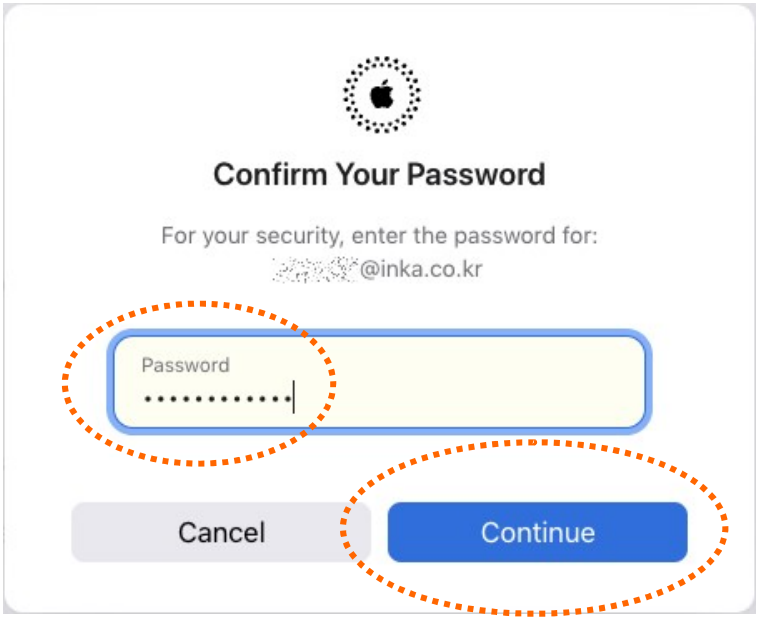
When you select the "App-Specific Passwords" item of the "Sign-In and Security" page, the "App-Specific Passwords" window will appear as shown below. Here, click the + button to start creating a new app password.



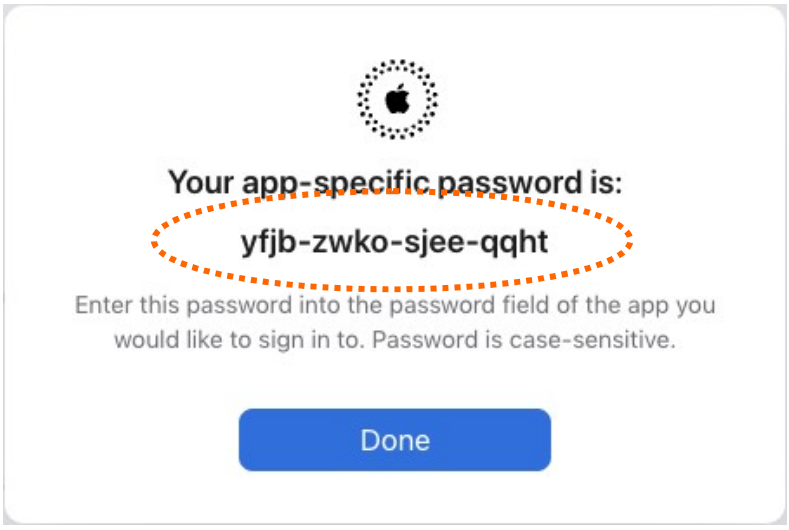
When you click the + button, a window will appear where you can enter the name of the app password. Please enter a name that is easy to recognize and suit the purpose. Here we arbitrarily entered the name "Xcode Cloud". Now click on the "Create" button.



Now, when a window asking you to enter your Apple account password appears, enter the account password of your Apple ID and click the "Continue" button.



You will now see your newly created 16-digit app password as shown in the window below. Passwords created in this way cannot be verified later and can only be discarded, so they must be well recorded.



Now, write your Apple account and app password in lines 20 to 21 at the top of the ci_post_xcodebuild.sh file and save the file.

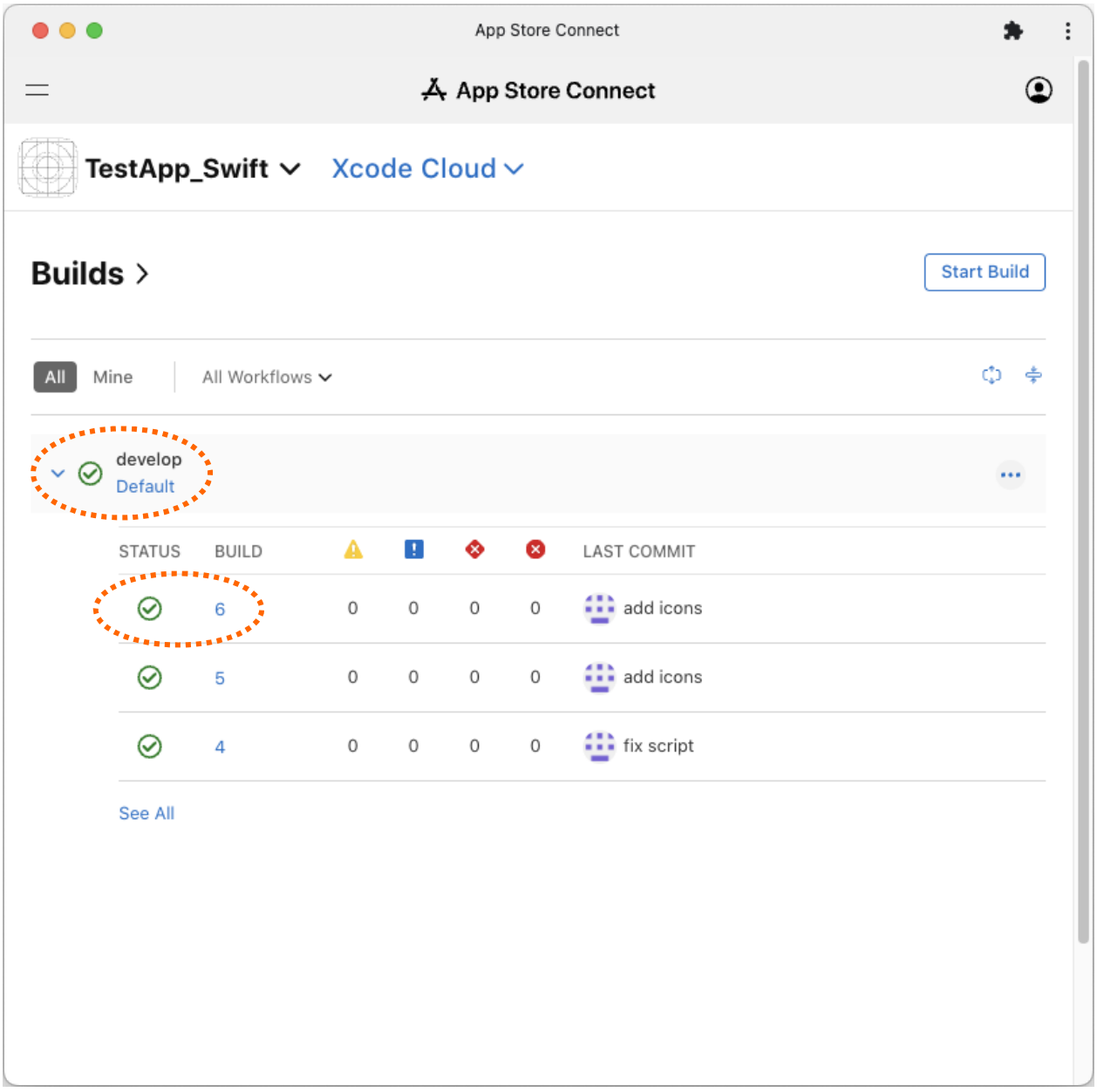
```
1  #!/usr/bin/env ruby
2
3  =begin
4  ================================================================================
5  |  AppSealing iOS SDK Hash Generator V1.2.2                                    |
6  |                                                                              |
7  |  * presented by Inka Entworks                                                |
8  ================================================================================
9  =end
10
11 require 'pathname'
12 require 'tmpdir'
13 require 'securerandom'
14 require 'net/https'
15 require 'json'
16 require 'io/console'
17 require 'open-uri'
18
19 #-------------------------------------------------------------------------------------------------------------
20 APPLE_ID = "support@inka.co.kr"                  # replace with your apple developer ID
21 APPLE_APP_PASSWORD = "aaaa-bbbb-cccc-dddd"      # replace with your apple application password (https://applei
22                                                  # NOT ACCOUNT PASSWORD !
23 #-------------------------------------------------------------------------------------------------------------
24
```

If the Apple account is "myappleid@company.com" and the issued app password is "yfjb-zwko-sjee-qqht", lines 20 to 21 of the script file should be changed as follows.

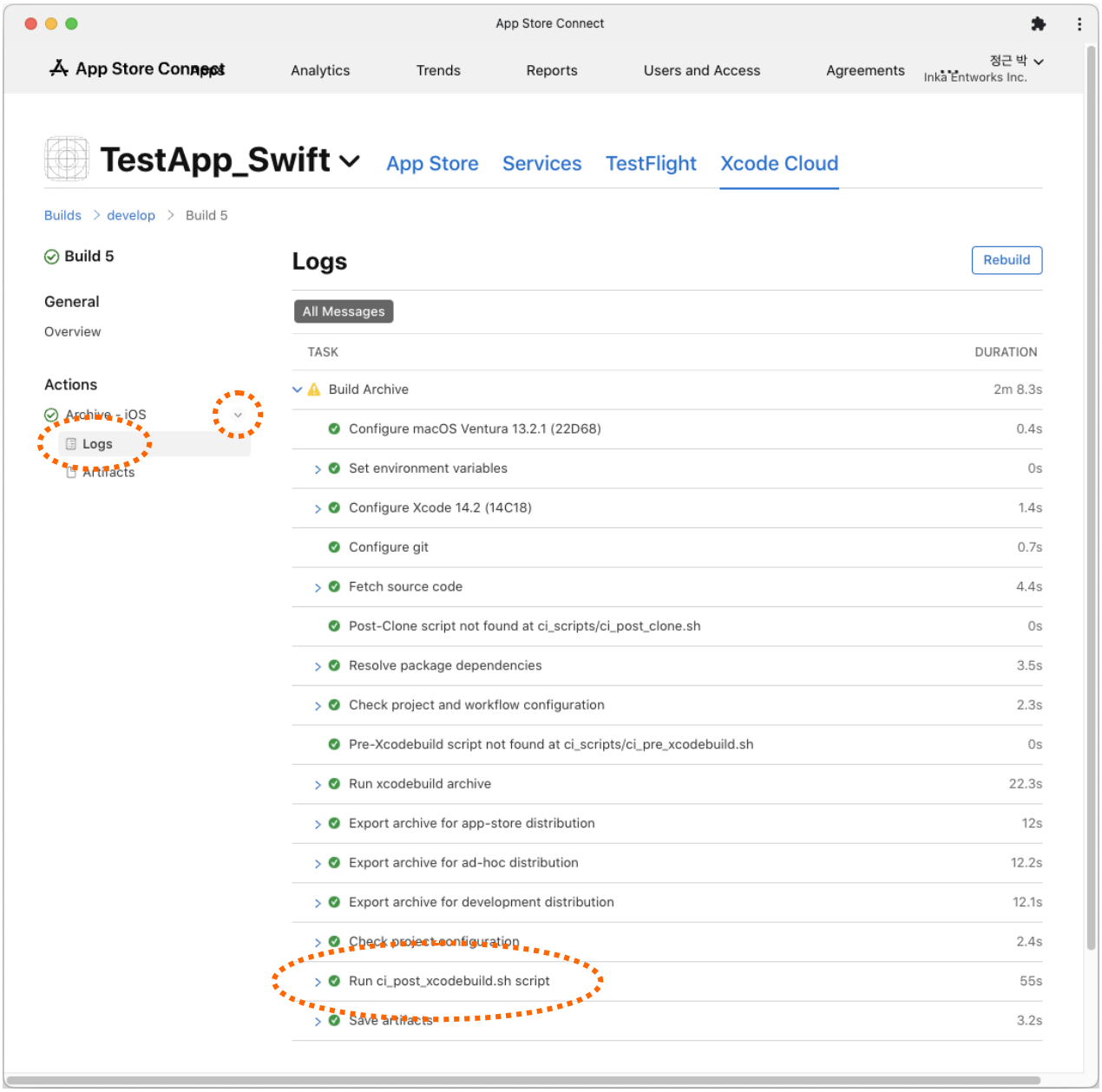
```
13 #-------------------------------------------------------------------------------------------------------------
14 APPLE_ID = "myappleid@company.com"          # replace with your apple developer ID
15 APPLE_APP_PASSWORD = "yfjb-zwko-sjee-qqht" # replace with your apple application password
16                                            # NOT ACCOUNT PASSWORD !
17 #-------------------------------------------------------------------------------------------------------------
```


8-3 Check the build and upload process

Once you have completed setting up the Xcode Cloud environment and preparing the files required for the ci_scripts folder, push the files added to ci_scripts to the git repository. Now connect to App Store Connect and confirm that the build of the target branch (in this document, develop) has been completed.

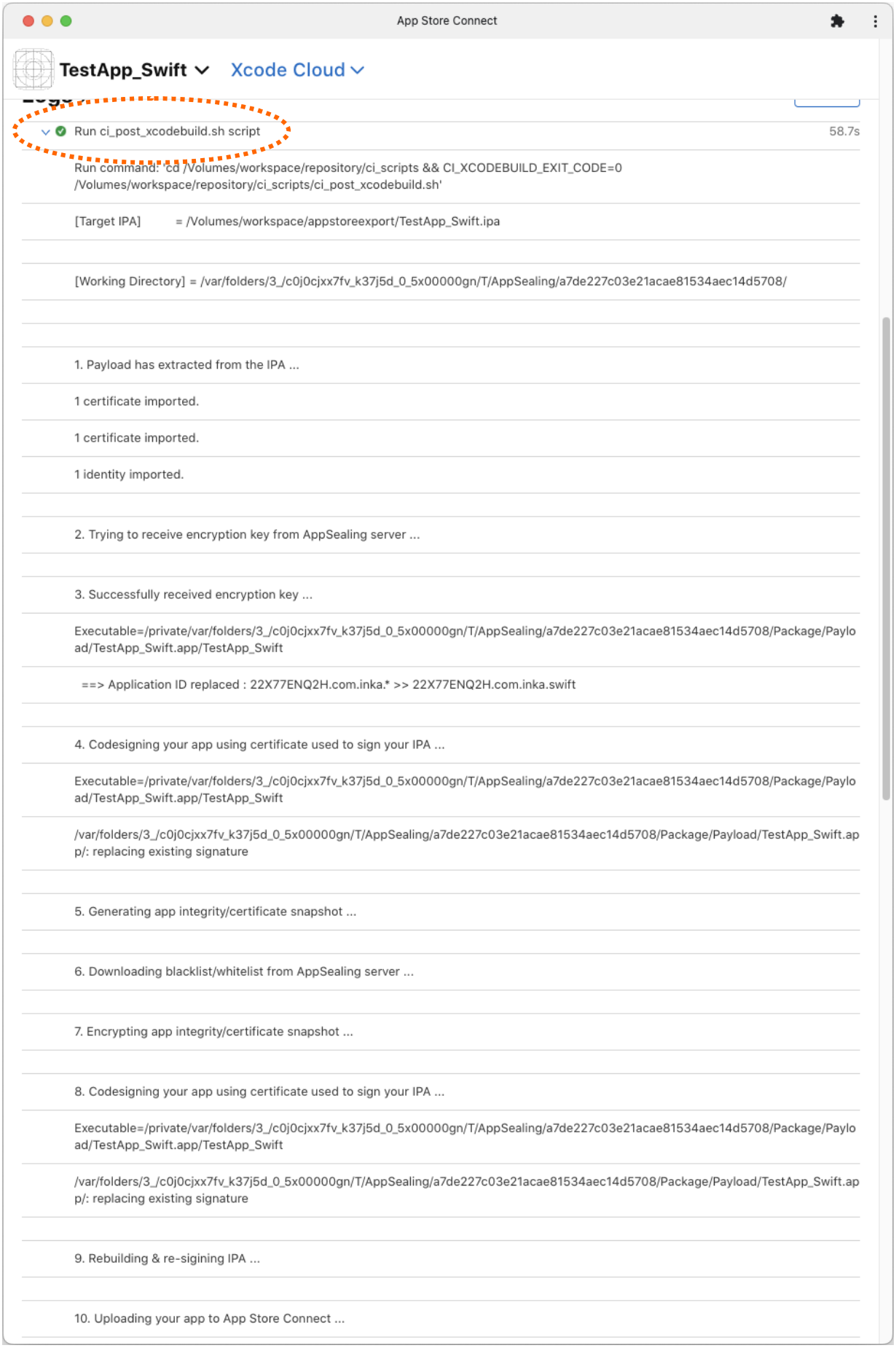


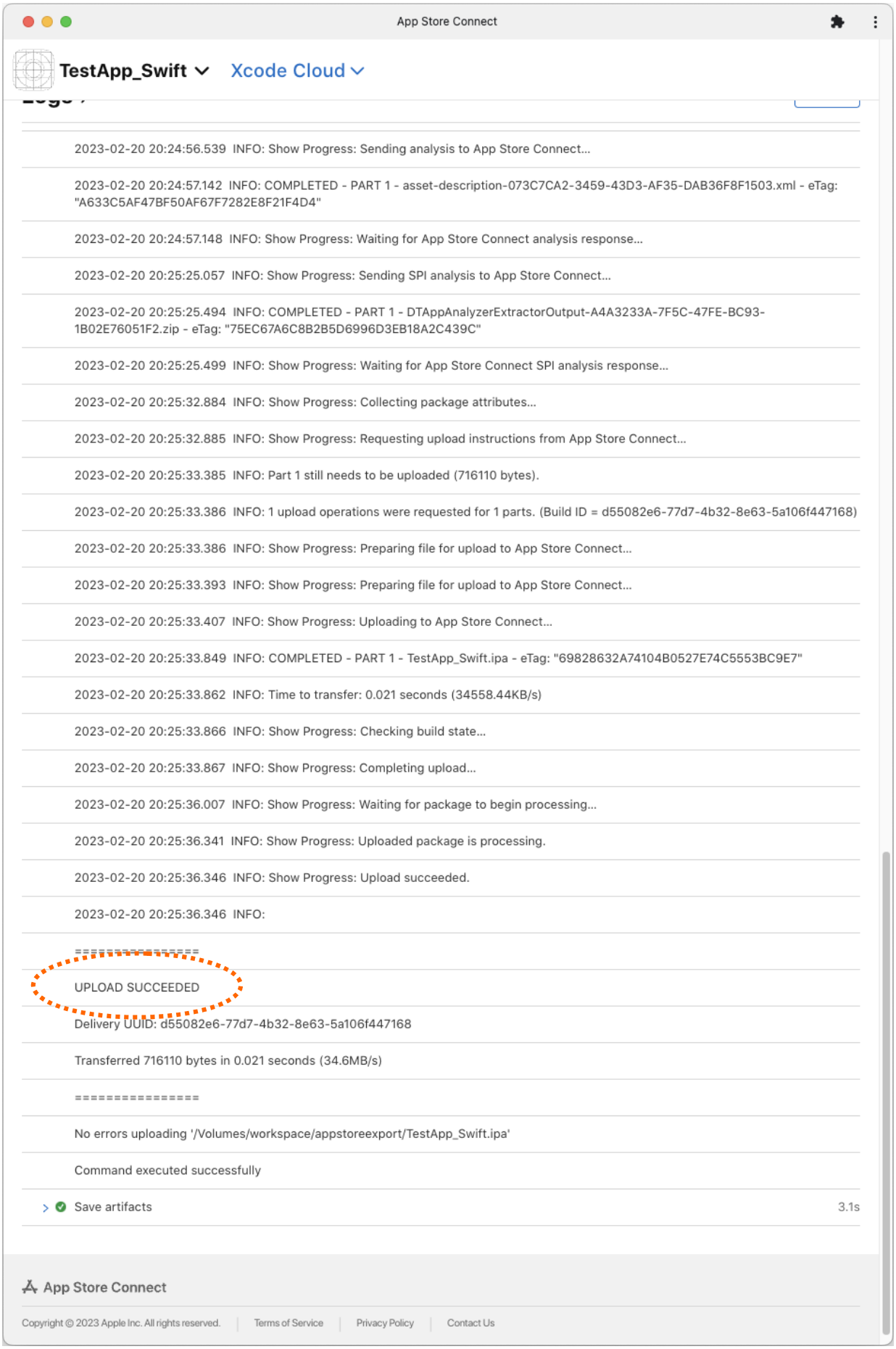
Click the build number to go to the build overview screen. Click the arrow to the right of the "Archive – iOS" item under "Actions" on the left to expand the menu and check the log.



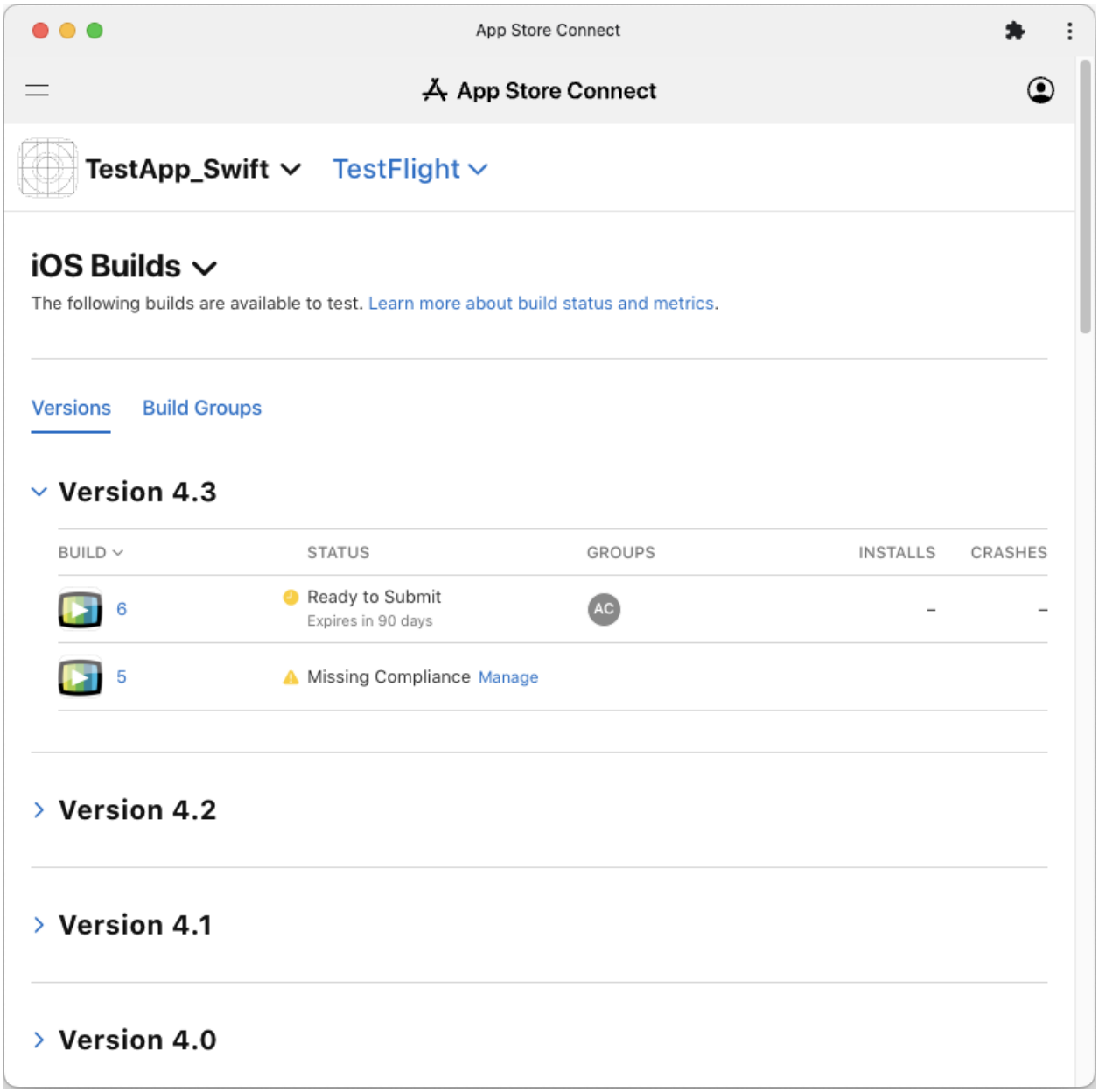
As shown in the screen above, all tasks under "Build Archive" should be performed normally. In particular, no further operations should be performed after "Run ci_post_xcodebuild.sh script" and "Save artifacts". If there is a progress log for another task, you must refer to section 7-1 to modify the workflow settings and then proceed with the build again.

Now click on the left angle sign (>) of the "Run ci_post_xcodebuild.sh script" item to expand the script log. You can check the log where the ci_post_xcodebuild.sh script was executed for the exported IPA. Scroll to the bottom of the log to see that the IPA was successfully uploaded.





Now if we go to TestFlight, we can see that the version we just built (6) is registered.



Part 9. Apply to Fastlane project

9-1 Configure project's Fastfile

AppSealing SDK can also be used in projects that have applied Fastlane. Typically, the reason for using the Fastlane tool in an Xcode project is to automate the app build and packaging process, and also to automate the subsequent distribution process. If you apply AppSealing SDK to an Xcode project, there are additional steps that need to be performed after building the app, but if Fastlane is applied, you can maintain the existing automation process by adding the AppSealing application process to the Fastfile script.
This chapter explains how to modify your scripts to maintain Fastlane's automated build and distribution process.

Here is the Fastfile code for a project named "TestApp_Swfit" with Fastlane enabled (excluding comments). It includes the steps to build, sign, and upload the app to Testflight. The script for uploading to the Apple Store has the same structure, so this guide will only explain Testflight case.

Default Fastfile of project

```
default_platform(:ios)

platform :ios do
  desc "Push a new beta build to TestFlight"
  lane :beta do
    increment_build_number(xcodeproj: "TestApp_Swift.xcodeproj")
    build_app(scheme: "TestApp_Swift")
    upload_to_testflight
  end
end
```

In general, you will build and deploy by running the "fastlane beta" command without making any major modifications to this file. If you apply the AppSealing SDK here, additional work is required between the build and distribution, so you need to modify the fastfile script as follows. In the original script, the project name and file name are directly entered as string values, but the script to be modified is designed to extract

the necessary values from the project folder instead of directly specifying the values so that it can be applied to all other projects. Therefore, even if the project name is not "TestApp_Swift", you can apply the same Fastfile script to all projects.

Open Fastfile with a text editor and replace all codes with the code below. However, you must replace the FASTLANE_USER, FASTLANE_APPLE_APPLICATION_SPECIFIC_ PASSWORD, and PROFILE values in the code below with the values you actually use. FASTLANE_USER should be your Apple account, and FASTLANE_APPLE_APPLICATION_SPECIFIC_ PASSWORD should be your app-specific password. For information on how to issue an app-specific password, please refer to page 72.

The PROFILE value should be the name of the provisioning profile you use in the distribution step.

Fastfile when using AppSealing SDK

```
default_platform(:ios)

before_all do
  ENV["FASTLANE_USER"] = "#YOUR_APPLE_ID#"
  ENV["FASTLANE_APPLE_APPLICATION_SPECIFIC_PASSWORD"] = "#YOUR_APP_SPECIFIC_PASSWORD#"
  ENV['PROFILE'] = "#YOUR_DISTRIBUTION_PROVISIONING_PROFILE_NAME#"
end

platform :ios do
  desc "Push a new beta build to TestFlight"
  lane :beta do
    # Get project root path
    project_root = File.expand_path("..", __dir__)

    # Dynamically retrieve Xcode project or workspace files
    xcode_file_path = Dir.glob(File.join(project_root, "*.xcworkspace")).first ||
Dir.glob(File.join(project_root, "*.xcodeproj")).first
    if xcode_file_path.nil?
      UI.user_error!("[AppSealing] No Xcode project or workspace found in the project
root directory: #{project_root}")
    end

    # Automatically extract project name and scheme
    project_name = File.basename(xcode_file_path, File.extname(xcode_file_path))

    # Auto-search scheme
    scheme_name = ""
    Dir.chdir(File.dirname(xcode_file_path)) do
      scheme_name = sh("xcodebuild -list -#{xcode_file_path.end_with?('.xcworkspace') ?
```



```
'workspace' : 'project'} #{File.basename(xcode_file_path)} | grep 'Schemes:' -A 1 |
tail -n 1").strip
    end

    if scheme_name.empty?
      UI.user_error!("[AppSealing] Failed to retrieve scheme name from Xcode project or
workspace.")
    end

    # Dynamically extract bundle ID
    bundle_id = ""
    Dir.chdir(File.dirname(xcode_file_path)) do
      bundle_id_command = "xcodebuild -showBuildSettings -scheme #{scheme_name} | grep
'PRODUCT_BUNDLE_IDENTIFIER' | awk -F ' = ' '{print $2}'"
      bundle_id_output = sh(bundle_id_command).lines.map(&:strip).reject { |line|
line.include?("WARNING") || line.empty? }
      bundle_id = bundle_id_output.last.strip
    end

    if bundle_id.empty?
      UI.user_error!("[AppSealing] Failed to retrieve Bundle ID from Xcode project.")
    end

    # Dynamically extract Team ID
    team_id = ""
    Dir.chdir(File.dirname(xcode_file_path)) do
      team_id_command = "xcodebuild -showBuildSettings -scheme #{scheme_name} | grep
'DEVELOPMENT_TEAM' | awk -F ' = ' '{print $2}'"
      team_id_output = sh(team_id_command).lines.map(&:strip).reject { |line|
line.include?("WARNING") || line.empty? }
      team_id = team_id_output.last.strip
    end

    if team_id.empty?
      UI.user_error!("[AppSealing] Failed to retrieve Team ID from Xcode project.")
    end

    UI.message "[AppSealing] Project Name: #{project_name}"
    UI.message "[AppSealing] Scheme Name: #{scheme_name}"
    UI.message "[AppSealing] Bundle ID: #{bundle_id}"
    UI.message "[AppSealing] Team ID: #{team_id}"

    # Build and generate IPA file
    archive_path = File.join(project_root, "build", "#{project_name}.xcarchive")
    ipa_output_path = File.join(project_root, "build")

    # Separate handling of workspace and project options when calling build_ios_app
    build_options = {
      scheme: scheme_name,
      export_method: "app-store",
      clean: true,
```



```
      output_directory: ipa_output_path,
      output_name: "#{project_name}.ipa",
      export_options: {
        provisioningProfiles: {
          bundle_id => ENV["PROFILE"]
        }
      }
    }

    if xcode_file_path.end_with?(".xcworkspace")
      build_options[:workspace] = xcode_file_path
      build_options[:project] = nil
    else
      build_options[:project] = xcode_file_path
      build_options[:workspace] = nil
    end

    build_ios_app(build_options)

    # Set .ipa file path
    ipa_path = File.join(ipa_output_path, "#{project_name}.ipa")

    unless File.exist?(ipa_path)
      UI.user_error!("[AppSealing] IPA file not found at path: #{ipa_path}")
    end

    UI.message "[AppSealing] IPA Path: #{ipa_path}"

    # Dynamically find and execute the generate_hash script path
    generate_hash_script = Dir.glob(File.join(project_root, "**/generate_hash")).first
|| File.join(project_root, "AppSealingSDK", "Tools", "generate_hash")

    unless File.exist?(generate_hash_script)
      UI.user_error!("[AppSealing] generate_hash script not found at path:
#{generate_hash_script}")
    end

    unless File.executable?(generate_hash_script)
      sh("chmod +x '#{generate_hash_script}'")
    end

    sh("#{generate_hash_script} #{File.absolute_path(ipa_path)}")

     # Upload your IPA file to TestFlight
     begin
       upload_to_testflight(
         ipa: ipa_path,
         skip_waiting_for_build_processing: true, # Skip build processing wait time
       )
       UI.success("[AppSealing] Upload to TestFlight completed successfully!")
```



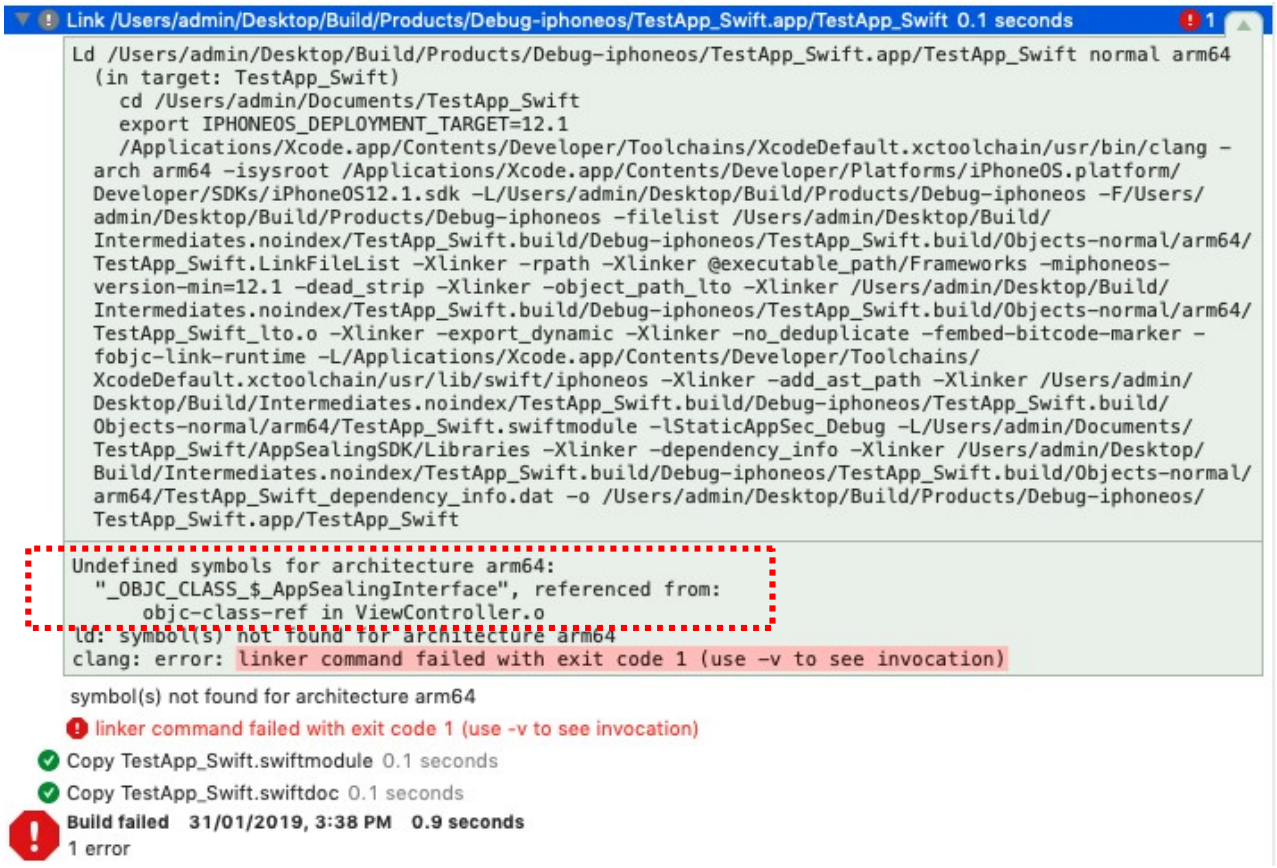
```
    rescue => e
      UI.error("[AppSealing] Upload to TestFlight failed with error: #{e.message}")
      raise e

    ensure
      # Delete build directory
      if Dir.exist?(ipa_output_path)
        UI.message("[AppSealing] Deleting build directory: #{ipa_output_path}")
        FileUtils.rm_rf(ipa_output_path)
        UI.message("[AppSealing] Build directory deleted.")
      else
        UI.message("[AppSealing] Build directory not found or already deleted.")
      end
    end
  end
end
```

The above code is also included in the CodeSamples.txt file included in the SDK, so you can copy and use it from there.

If you modify the code and run the “fastlane beta” command as before, it will build the app, export it as an IPA, automatically run the generate_hash script, and upload the AppSealing-enabled IPA to testflight.

Part 10. Troubleshooting

10-1 Xcode Build error (1) **Undefined symbols for architecture arm64: "_OBJC_CLASS_$_AppSealingInterface"**



This link error can occur in two cases. The first is when you create a project in macOS 11.x environment and try to rebuild after updating macOS to 12.x, and the second is when the necessary files are not included in the project.

1) How to fix link error caused by macOS update (0.66 only)

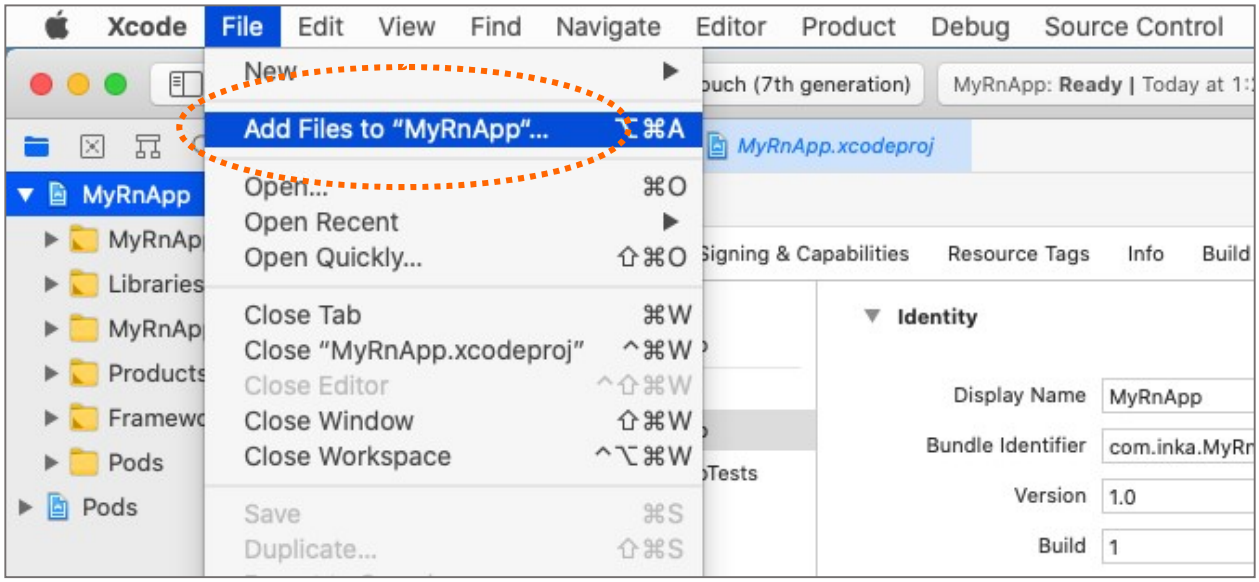
If you have created a React Native 0.66 project in macOS 11.x environment, and updated macOS to 12.x / Xcode to 13.3 or higher, when you try to build the existing project, the above link error occurs.
In this case, the problem is solved by creating a new React Native 0.66 project in the new macOS environment and moving the code from the existing project to build.

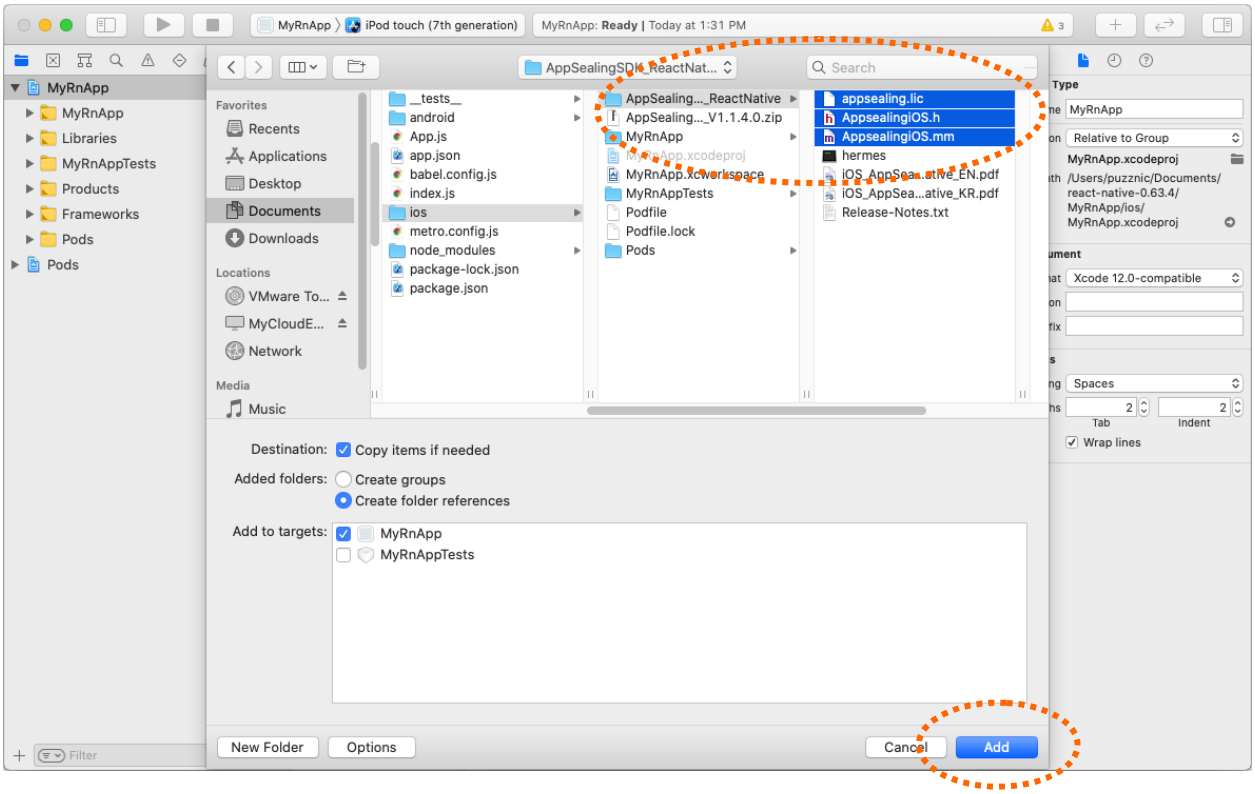
This link error do not occur if you are using macOS 11.x as it is or if it is a React Native 0.64, 0.65 version project.
It will be improved to solve problems without transferring project code in the future.

2) How to resolve link errors that occur because the file is not included

This case occurs when the "AppsealingiOS.mm" is not included in your project. Check project tree whether the file has added or not.

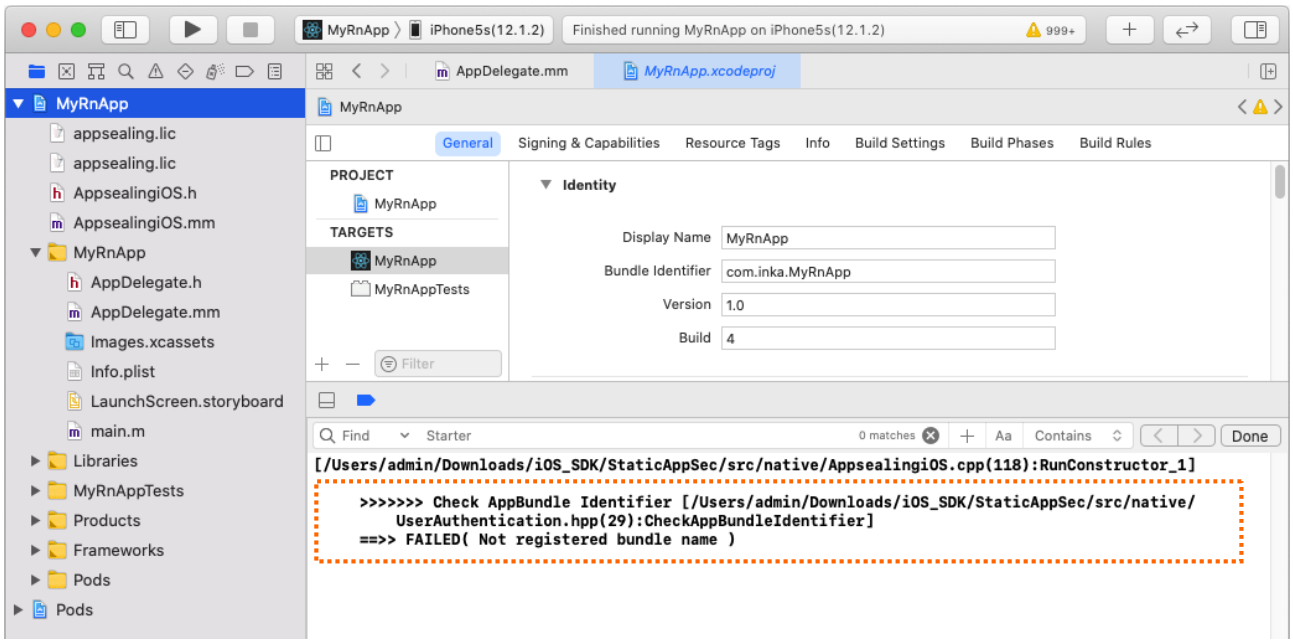
If the "AppsealingiOS.mm" file is not included in your project, perform "File > Add Files to "RnMyApp" ... " menu action to include required files into your project.



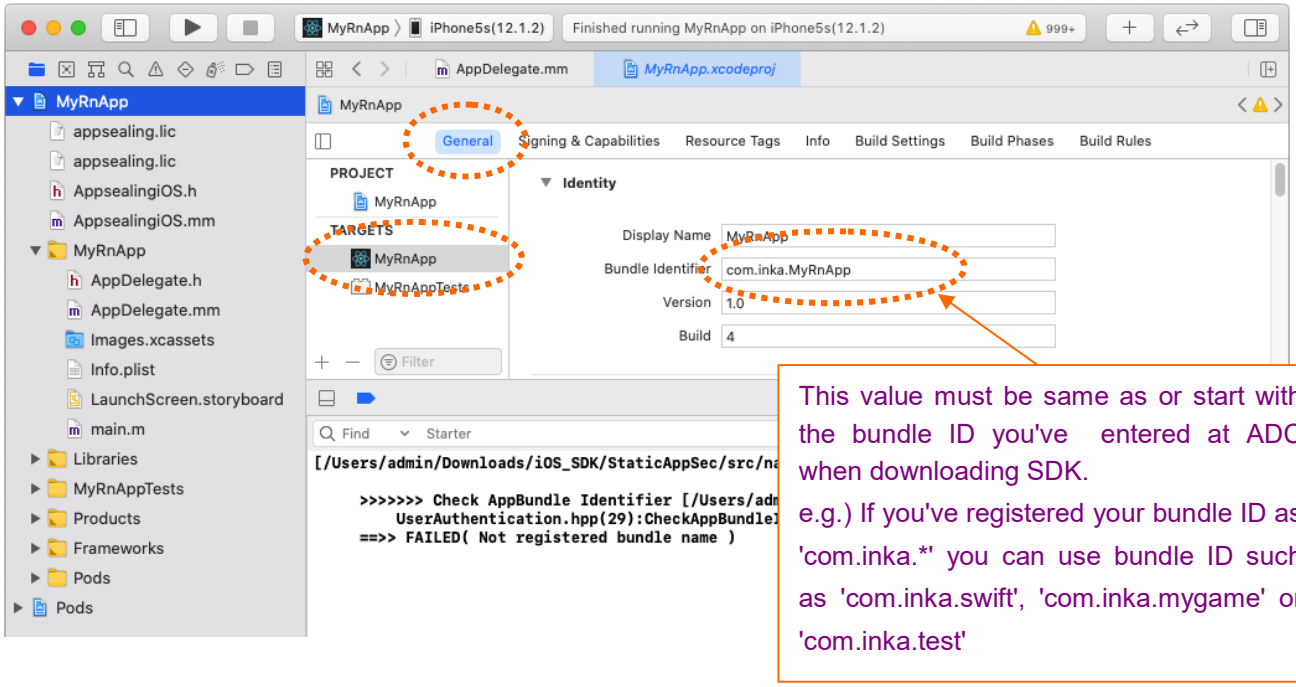


10-2 Execution error (I) **App terminated immediately after launch**

If your app has terminated right after launching in device, you should check the execution log message whether your bundle ID is valid.

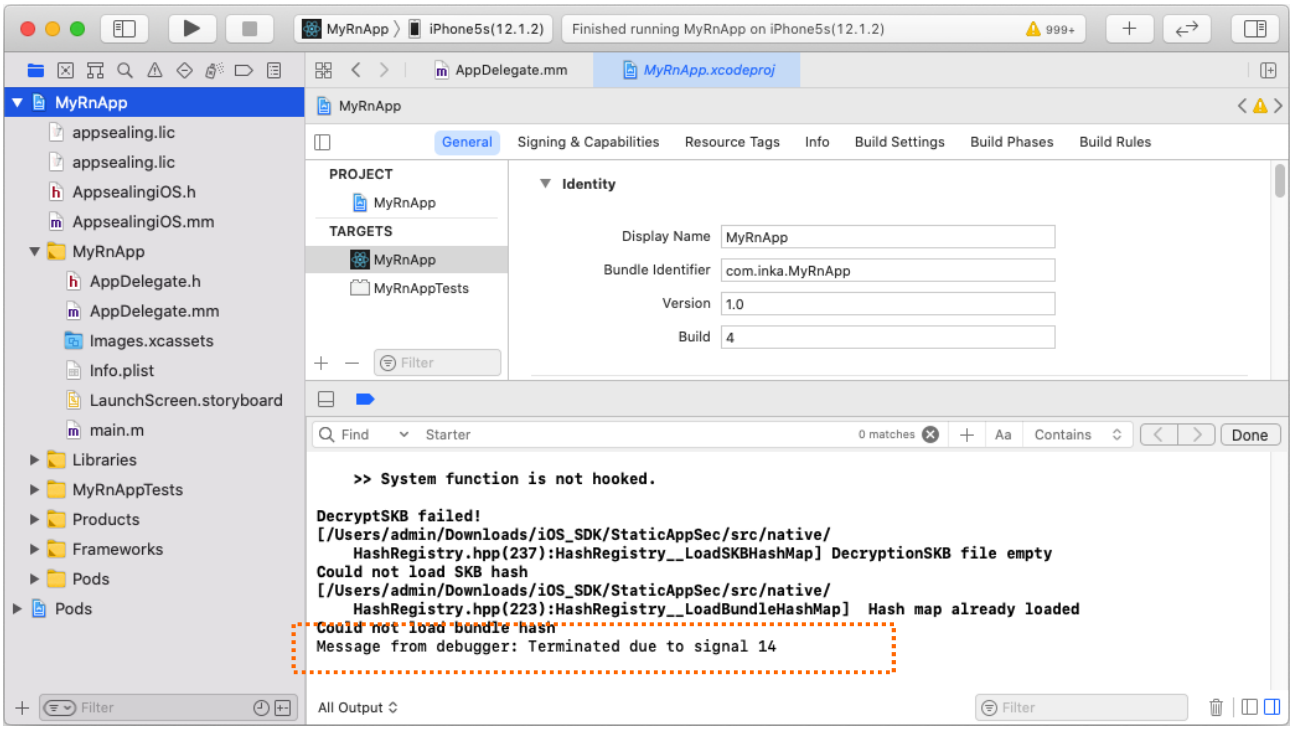


If the log message contains string like " ==>> FAILED(Not registered bundle name)" then it tells the bundle Id you used is not registered properly at AppSealing Developer Center (ADC) while downloading AppSealing SDK file. Check your bundle Id if it is same as the value you entered when downloading SDK at ADC.



10-3 Execution error (II) **App terminated suddenly while running**

If your app has terminated suddenly while running about after 20 seconds from launching you should check the execution log message whether you have run your app with Release configuration.

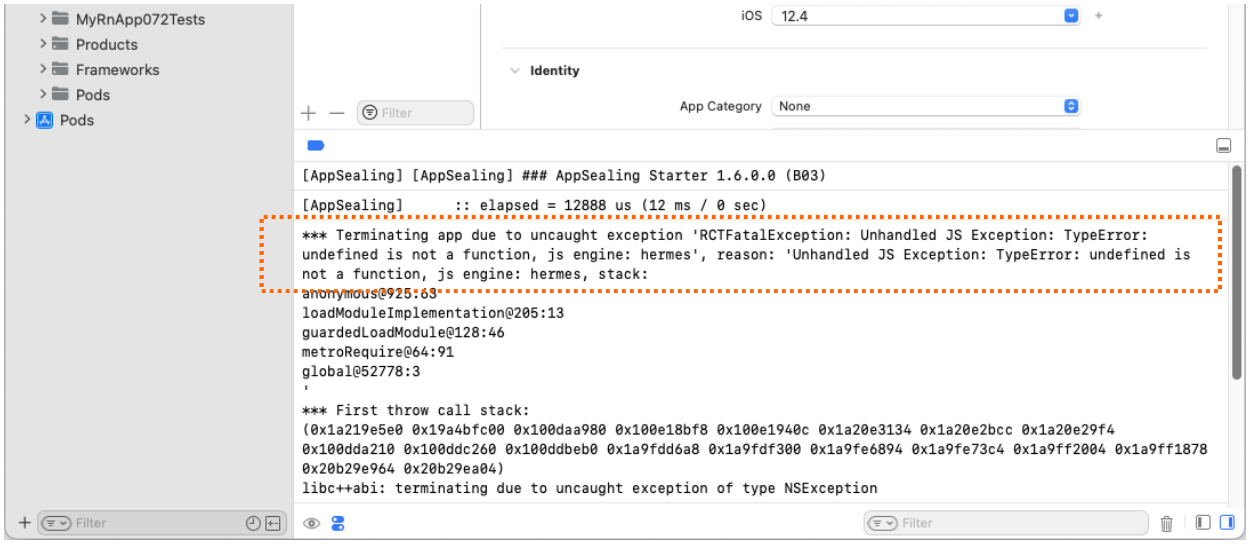


If the log message contains string like "Message from debugger: Terminated due to signal 14" then it tells that you have built & run your app in Release configuration and so AppSealing detection logic has activated. AppSealing logic in Release configuration checks some security intrusion such as jailbreak, debugger attachment, execution file encryption flag and if there is some problem it will close the app after 20 seconds irrespectively of user action or other circumstances.

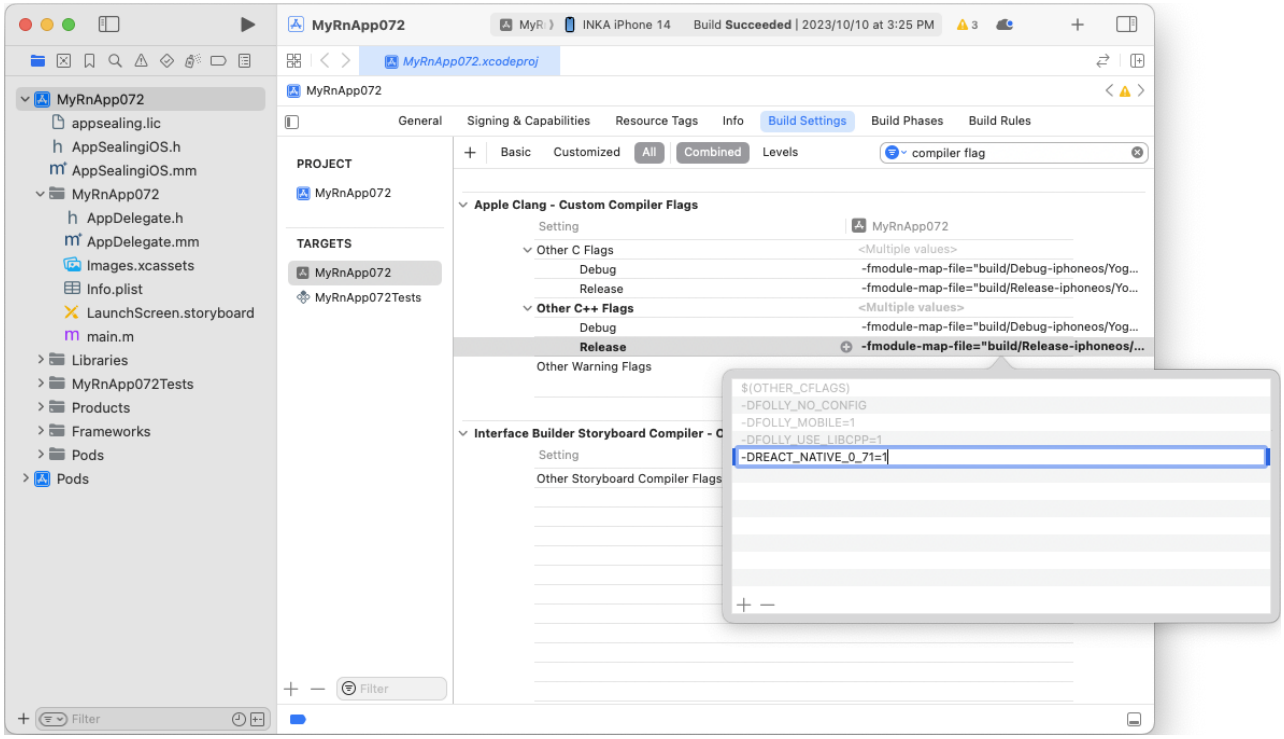
Only in Release configuration the AppSealing logic will be activated and will terminate your app, so you should run your app with Debug configuration until you distribute the app to AppStore or TestFlight because the built executable file doesn't have encrypted with FairPlay DRM before it is installed from AppStore to device. AppSealing logic will detect that executable file has decrypted abnormally and it will terminate the app after 20 seconds while running your app in device at Xcode.

10-4 Execution error (III) **App terminated immediately after launch**

If the app terminates immediately after execution, check the execution log and if it contains the sentence "Unhandled JS Exception: TypeError: undefined is not a function", recheck whether the C++ compilation flag is properly set in the build settings. (Refer to 3-2)

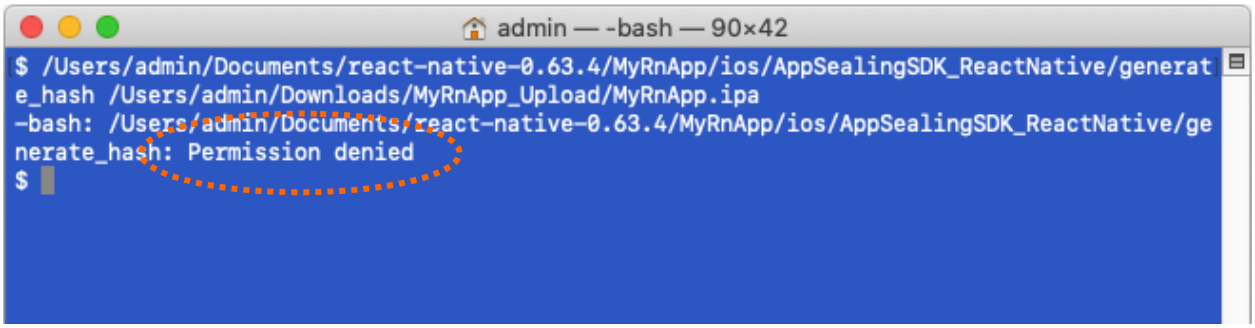


Make sure the value "-DREACT_NATIVE_0_71=1" is set in Build Settings – Apple Clang Custom Compiler Flags – Other C++ Flags – Release Settings.



10-5 Cannot execute "generate_hash" : Permission denied

It may happens that script execution in step 3-5 "Generate App integrity and certificate snapshot" fails by "Permission denied" error message like below.



In this situation run add permission command like below and try again.

```
$ chmod +x /MyRnApp/ios/AppSealingSDK_ReactNative/generate_hash
```

