



BlackBerry Dynamics SDK for iOS

Development Guide

6.0

Contents

What is the BlackBerry Dynamics SDK?	5
BlackBerry Dynamics API reference	5
Key features of the BlackBerry Dynamics SDK	5
Activation	5
Secure storage	7
Secure communication	7
Shared Services Framework	7
Data Leakage Prevention	8
User authentication	8
Administrative controls	10
Requirements and support for platform-specific features	11
Software requirements	11
Using an entitlement ID and version to uniquely identify a BlackBerry Dynamics app	13
Relationship between the entitlement ID and version and native identifiers	13
FIPS compliance	14
Link for FIPS in Objective-C or C++	14
Troubleshooting: FIPS	15
Declaring a URL type to support BlackBerry Dynamics features	16
App UI restrictions	16
Requirements and prerequisites for iOS platform features	16
Support for Touch ID	17
Support for Face ID	17
Support for WKWebView	17
Support for the Apple Universal Clipboard	18
Unsupported iOS features	18
Steps to get started with the BlackBerry Dynamics SDK	19
Install the BlackBerry Dynamics SDK for iOS	19
Create an Objective-C or Swift project with the Xcode template	20
Add the event-handler skeleton manually	20
Add the event-handler skeleton using notifications	23
Limitations and best practices when using Swift	26
Manually add the BlackBerry Dynamics SDK to your Swift project	26
Integrating optional features	28
Preventing password autofill in the app UI	28
Enforcing local compliance actions	28
Adding custom policies for your app to the UEM management console	28
Adding a custom logo and colors with the branding API	29
Integrating BlackBerry Enterprise Mobility Server services	29

Sample apps in Objective-C.....	31
Testing and troubleshooting.....	33
Implementing automated testing for BlackBerry Dynamics apps.....	33
Automated testing with the BlackBerry Dynamics sample apps.....	33
Preparing for automated testing.....	34
Components of a sample automated testing configuration.....	35
Execute tests from the command line with Xcode tools.....	36
Execute tests from the Xcode IDE.....	37
Add automated testing to your BlackBerry Dynamics iOS app.....	37
Disable compliance settings so you can debug your app.....	37
Using enterprise simulation mode.....	38
Enable enterprise simulation mode.....	38
Troubleshooting common issues.....	39
Logging and diagnostics.....	39
Configure logging for the Xcode console.....	40
Monitoring app log uploads by device users.....	40
Testing connectivity to application servers and diagnostic functions.....	41
Deploying your BlackBerry Dynamics app.....	42
Configuring library version compliance.....	42
Instructing users to trust the signing certificate.....	43
Deploying certificates to BlackBerry Dynamics apps.....	44
Using Personal Information Exchange files.....	44
Configuring support for client certificates.....	45
Certificate requirements.....	45
Using Kerberos.....	46
Legal notice.....	47

What is the BlackBerry Dynamics SDK?

The BlackBerry Dynamics SDK provides a powerful set of tools that you can use to create secure productivity apps for a BlackBerry UEM or Good Control domain. The SDK leverages the full capabilities of the secure BlackBerry Dynamics platform, so you can focus on building your apps rather than learning how to secure, deploy, and manage those apps.

The BlackBerry Dynamics SDK is available for all major development platforms. It allows you to leverage many valuable services, including secure communication, securing data in file systems and databases, inter-app data exchange, presence, push, directory lookup, single sign-on authentication, identity and access management, and more.

This guide will provide:

- Information about supported features
- Development requirements and prerequisites
- Instructions for installing, configuring, and using the SDK
- Considerations for key platform features
- Information about the sample apps provided with the SDK
- Testing and troubleshooting guidance
- Guidance for deploying your app

This guide is intended for intermediate and experienced developers with an understanding of how to create apps for the intended platform. It is not a basic tutorial.

BlackBerry Dynamics API reference

The BlackBerry Dynamics SDK API reference describes the available interfaces, classes, methods, and much more. The API reference for each SDK platform is available at <https://developers.blackberry.com/us/en/resources/api-reference.html>.

Key features of the BlackBerry Dynamics SDK

This section provides more information about key features of the BlackBerry Dynamics SDK. It does not detail the complete feature set. For more information about the full list of supported features and APIs, see the [BlackBerry Dynamics SDK API reference for your platform](#).

For more information about the requirements and prerequisites to support platform-specific features, see [Requirements and support for platform-specific features](#).

The implementation of some of the features discussed in this section will depend on how the UEM or standalone Good Control administrator has configured your organization's servers, network, and other infrastructure components. Contact the administrator to clarify whether there are components of a feature that are configured or managed using the management server.

Activation

Infrastructure and enterprise activation

After a BlackBerry Dynamics app is installed on a user's device, the user must activate the app in order to use it. The activation process registers the app with the management server and gives the app access to the full capabilities of the BlackBerry Dynamics platform. The activation process ensures that all end users are fully authorized and permitted to use the app.

Users can activate a BlackBerry Dynamics app manually using an access key provided by the administrator, by using the UEM Client, or by using the Easy Activation feature described below.

For more information about activating BlackBerry Dynamics apps, see the Activation section in the [GDAndroid class reference](#) or [GDiOS class reference](#) and [Managing BlackBerry Dynamics apps](#) in the *UEM Administration Guide*.

Easy Activation

Easy Activation simplifies the process of activating multiple BlackBerry Dynamics apps on a user's device. With Easy Activation, a device user only needs to activate the first BlackBerry Dynamics app on their device using an access key or the UEM Client; when the user installs additional BlackBerry Dynamics apps, the user can choose to delegate the activation process to the previously activated app. Any BlackBerry Dynamics app can be an activation delegate, but priority is given to the app that is configured as the [authentication delegate](#).

Easy Activation is automatically enabled for all BlackBerry Dynamics apps that are produced by BlackBerry. To enable Easy Activation for your custom BlackBerry Dynamics app, the UEM or standalone Good Control administrator must specify the app package ID (Android) or bundle ID (iOS) in the BlackBerry Dynamics app settings in the management console. Contact your organization's administrator to provide this information. For instructions for specifying the package ID or bundle ID for an app, see [Manage settings for a BlackBerry Dynamics app](#) in the *UEM Administration Guide*.

On the application side, Easy Activation is enabled by default by the BlackBerry Dynamics Runtime.

For more information, see the Easy Activation section in the [BlackBerry Dynamics Security White Paper](#).

Programmatic activation

The programmatic activation feature enables a BlackBerry Dynamics app to activate without any user interaction and without displaying activation prompts or progress screens. This can be useful when targeting your apps to a consumer audience or for developing apps for devices that have limited or no means of user input.

For more information about programmatic activation, see `programmaticActivityInit` in the [BlackBerry Dynamics SDK for Android API Reference](#) or `programmaticAuthorize` in the [BlackBerry Dynamics SDK for iOS API Reference](#).

Note the following implementation details:

- Decide whether you want users to specify a password to unlock a BlackBerry Dynamics app after the initial activation. You can use programmatic activation while still requiring users to type a password to unlock the app. This setting is configured in a BlackBerry Dynamics profile in UEM.
- To activate the app, your application server must use the [BlackBerry Web Services REST APIs](#) to retrieve the user credentials and to generate an access key. You may need to create a new UEM user account or to lookup an existing user account. See the User resource in the [BlackBerry Web Services REST API reference](#) for the available REST APIs that can be used to create a user, lookup a user, and to generate an access key.
- Pass the user credentials to the app and call `programmaticActivityInit` or `programmaticAuthorize` with the retrieved credentials, setting `ShowUserInterface` to `false`.
- For Android, receive the broadcast event `GD_STATE_ACTIVATION_ACTION` to track activation progress from `NotActivated` to `InProgress` to `Activated`. You can choose to display a progress indicator during this short period.
- For iOS, observe `GDState.BBActivationState` to track activation progress from `NotActivated` to `InProgress` to `Activated`. You can choose to display a progress indicator during this short period.
- Once activation completes, the user is prompted to set a password (unless you've configured the BlackBerry Dynamics profile to not require a password). The app should wait for the `GD_STATE_AUTHORIZED_ACTION` notification.

- You can use `configureUI` ([Android/iOS](#)) to customize the UI of the password screen (for example, with a custom logo and colors).

Secure storage

Secure file system

BlackBerry Dynamics apps store data in a secure, encrypted file system. For more information, see [BlackBerry Dynamics File I/O Package](#) in the BlackBerry Dynamics SDK for Android API reference, or [GDFileManager](#) and [GDFileHandle](#) in the BlackBerry Dynamics SDK for iOS API reference.

Core data

BlackBerry Dynamics apps can store Core Data objects in a secure, encrypted store. For more information, see [GDPersistentStoreCoordinator](#) in the API reference.

Secure SQL database

BlackBerry Dynamics apps can leverage a secure SQL database that stores and encrypts data on the user's device. The secure SQL database is based on the SQLite library.

For more information, see the BlackBerry Dynamics SQL Database page in the BlackBerry Dynamics SDK API reference ([Android/iOS](#)).

Secure communication

The BlackBerry Dynamics platform enables secure data exchange between a BlackBerry Dynamics app on an end user's device and a back-end application server on the Internet or behind the enterprise firewall. Any communication through the enterprise firewall uses the secure BlackBerry Dynamics proxy infrastructure. One app can communicate with multiple application servers.

To learn more about the programming interfaces for secure communication, see [GDSocket](#) and [GDHttpClient](#) in the BlackBerry Dynamics SDK for Android API reference, or [GDSocket](#), [GDURLLoadingSystem](#), and [NSURLSessionSupport](#) in the BlackBerry Dynamics SDK for iOS API reference.

AppKinetics

AppKinetics, or Inter-Container Communication (ICC), is a method for securely exchanging data and commands between two BlackBerry Dynamics apps on the same device. The exchange uses a consumer-provider model: one app initiates a service request that the other app receives and responds to as a service provider.

For more information about AppKinetics, see the [Inter-Container Communication Package](#) in the BlackBerry Dynamics SDK for Android API reference, or [GDService](#) and [GDServiceClient](#) in the BlackBerry Dynamics SDK for iOS API reference.

Shared Services Framework

BlackBerry Dynamics apps can communicate with each other and application servers using the Shared Services Framework, a collaboration system that is defined by two components: one that provides a service and another that consumes the service.

The provider can be a client-side service, which is a BlackBerry Dynamics app that uses the [GDService](#) APIs ([Android/iOS](#)), or a server-side service that is provided by an application server or other remote system. The service is consumed by a BlackBerry Dynamics app that communicates with the provider using AppKinetics (a proprietary BlackBerry ICC protocol) for client-side services or a protocol such as HTTPS for server-side services.

The typical steps that are required to consume a service:

1. Service discovery: The BlackBerry Dynamics app (the consumer) queries for service providers using the [GDAndroid.getServiceProvidersFor](#) API or the [GDiOS.getServiceProvidersFor](#) API. Service discovery is optional but recommended for both types of services because it respects user entitlements and permissions.

2. Provider selection: The consuming app selects the provider. This is handled by the app code.
3. Service request: The consuming app sends a service request to the provider using the GDServiceClient API ([Android/iOS](#)) for client-side services or TCP sockets or HTTP over BlackBerry Dynamics secure communication ([Android/iOS](#)) for server-side services.
4. Service response: The consuming app receives the provider response using the same interface that was used for the request (the GDServiceClient API ([Android/iOS](#)) for client-side services or BlackBerry Dynamics secure communication ([Android/iOS](#)) for server-side services).

Client-side services can be used offline and are ideal if the service requires specific user interaction.

Server-side services can be provided by a clustered application server and are ideal if the server software already exists outside of the BlackBerry Dynamics platform.

Client-side and server-side services both require user entitlement in the UEM or standalone Good Control management console.

If you want your custom BlackBerry Dynamics app to use the Shared Services Framework, the UEM or standalone Good Control administrator must specify the app package ID (Android) or bundle ID (iOS) in the BlackBerry Dynamics app settings in the management console. Contact your organization's administrator to provide this information. For instructions for specifying the package ID or bundle ID for an app, see [Manage settings for a BlackBerry Dynamics app](#) in the *UEM Administration Guide*.

Sample apps that are included with the SDK demonstrate how to use the Shared Services Framework. For more information about how to use the Shared Services Framework, see the following resources:

- [GDAndroid.getServiceProvidersFor](#)
- [GDiOS.getServiceProvidersFor](#)
- GDService ([Android/iOS](#))
- GDServiceClient ([Android/iOS](#))
- BlackBerry Dynamics Service Definition ([Android/iOS](#))
- [Definitions and descriptions of published services](#)

Server-side services can use the Push Channel API ([Android/iOS](#)) to send notifications to BlackBerry Dynamics apps. The channel is end-to-end secure at the same level as BlackBerry Dynamics secure communication. As a result, the BlackBerry Dynamics app does not need to poll the application server, which decreases the load on both the app and the application server. Any application server that is a service provider can use the Push Channel.

Data Leakage Prevention

The BlackBerry UEM or standalone Good Control administrator can use Data Leakage Prevention (DLP) settings in BlackBerry Dynamics profiles (UEM) or security policies (Good Control) to configure data protection standards, including enabling or disabling copy and paste between BlackBerry Dynamics apps and non-BlackBerry Dynamics apps, screen captures, dictation, FIPS, and more.

Contact your organization's administrator to configure DLP standards as necessary for your custom BlackBerry Dynamics apps.

User authentication

BlackBerry UEM and standalone Good Control offer the following options to adjust the user experience for accessing BlackBerry Dynamics apps.

Fingerprint and biometric authentication

Various forms of biometric authentication are supported by the BlackBerry Dynamics SDK, including fingerprint authentication and Samsung Pass for Android, and Touch ID and Face ID for iOS. The BlackBerry UEM or standalone Good Control administrator can use a BlackBerry Dynamics profile (UEM) or a security policy (Good

Control) to enable biometric authentication. Contact your organization's administrator to enable and configure these features.

See [Requirements and support for platform-specific features](#) for more information about supporting Samsung Pass and Face ID.

For more information, see [BlackBerry Dynamics and Fingerprint Authentication](#).

Authentication delegation

The BlackBerry UEM or standalone Good Control administrator can configure up to three BlackBerry Dynamics apps on users' devices to act as an authentication delegate (a primary, secondary, and tertiary delegate). When a user opens any BlackBerry Dynamics app, the device will display the login screen of the authentication delegate app. After the user logs in successfully, all of the BlackBerry Dynamics apps on the device are unlocked. The user does not need to enter a password again until the idle timeout is reached.

If you want your custom BlackBerry Dynamics app to be an authentication delegate, the UEM or standalone Good Control administrator must specify the app package ID (Android) or bundle ID (iOS) in the BlackBerry Dynamics app settings in the management console. Contact your organization's administrator to provide this information. For instructions for specifying the package ID or bundle ID for an app, see [Manage settings for a BlackBerry Dynamics app](#) in the *UEM Administration Guide*.

The administrator configures one or more authentication delegate using a BlackBerry Dynamics profile (UEM) or a security profile (Good Control). It is a best practice to configure the most commonly used app as the authentication delegate. Contact your organization's administrator to configure one or more authentication delegates.

Note: If the administrator configures a secondary authentication delegate, the administrator must notify users that if they delete the primary authentication delegate app, the user must unlock the secondary delegate app and set the app password again so that it can be used to authenticate any additional BlackBerry Dynamics apps. The same requirement applies if a tertiary delegate is configured and the primary and secondary delegate apps are deleted.

Do not require a password

Enabled using a BlackBerry Dynamics profile (UEM) or security policy (Good Control), this setting removes the password login for BlackBerry Dynamics apps. Users cannot choose whether to use a password.

Do not enable authentication delegation and this setting in the same profile or policy set. This feature is supported in UEM 12.7 or later and Good Control 3.0.50.70 or later. If the setting is enabled and then disabled at a later date, users are prompted to create a password the next time they log in to a BlackBerry Dynamics app.

You can use the `GDAndroid.getInstance().canAuthorizeAutonomously()` or `[GDiOS sharedInstance].canAuthorizeAutonomously` method to check if this feature is enabled. See the `GDInteraction` sample app (Android) or the `SecureStore` sample app (iOS) for examples of this method.

Bypass the app unlock screen

Enabled in the UEM Client settings for a specific BlackBerry Dynamics app (UEM) or by using an app policy (Good Control), this setting allows an app to completely bypass the password login screen.

For more information and programming guidance, see the [Bypass Unlock Developer Guide](#).

Background Authorize

Background Authorize is a restricted API that allows a recently locked BlackBerry Dynamics app to use the principal [BlackBerry Dynamics APIs](#) (such as secure storage and secure communication) when the app is running in the background.

This feature can be useful in scenarios where the app has stopped unexpectedly and is started in the background in response to an APNS message (for example, a new email). If Background Authorize is enabled, the app can

download new messages and store them in the secure container. When the user brings the app to the foreground they can authorize and immediately access their new messages.

To access this restricted API, submit a request to the BlackBerry Dynamics Registrar program at BlackBerryDynamicsRegistrar@blackberry.com.

For more information about this feature, see the [Background Authorize Developer Guide](#).

Administrative controls

The BlackBerry UEM or standalone Good Control administrator can use various server settings, policies, and profiles to manage BlackBerry Dynamics apps and ensure that app usage meets the organization's security standards. Consult with your organization's administrator to ensure that your custom apps adhere to the configured settings in the management console.

For more information, see [Controlling BlackBerry Dynamics on users devices](#), [Enforcing compliance rules for devices](#), and [Managing BlackBerry Dynamics apps](#) in the *UEM Administration Guide*. If your organization uses standalone Good Control, see the [Good Control Online Help](#).

You also have the option to add new management policies and settings that are specific to your custom BlackBerry Dynamics app to the UEM management console so that they can be configured and applied to users by UEM administrators. For more information, see [Adding custom policies for your app to the UEM management console](#).

Requirements and support for platform-specific features

This section provides the software requirements for using the SDK, as well as prerequisites that are required to support platform-specific features.

Software requirements

iOS development

Item	Requirement
Compatibility with previous versions of the SDK	<p>This release of the BlackBerry Dynamics SDK for iOS is compatible with the previous two releases of the SDK:</p> <ul style="list-style-type: none">• 5.0.x• 4.2.x <p>It is recommended that you always build and test with the most recent release of the SDK to take advantage of new fixes and features.</p>
Deployment target	iOS 10 or later
iOS SDK	10.0 or later
Xcode	<p>Xcode 9 or later</p> <p>Xcode 10 does not support docset archives for reference documentation. As a result, the BlackBerry Dynamics SDK for iOS does not include a docset archive.</p>
Supported programming languages	<ul style="list-style-type: none">• Objective-C• Swift 3• Swift 4
Supported CPU architectures	<ul style="list-style-type: none">• 32-bit CPUs• 64-bit ARM (Apple A7)
Supported Internet Protocols	<ul style="list-style-type: none">• IPv4• IPv6

Item	Requirement
Frameworks and libraries	<p>The BlackBerry Dynamics Runtime static library requires the following frameworks and libraries in the Link Binary With Libraries build phase:</p> <ul style="list-style-type: none"> • AdSupport.framework • CFNetwork.framework • CoreData.framework • CoreTelephony.framework • DeviceCheck.framework • libz.tbd • LocalAuthentication.framework • MessageUI.framework • MobileCoreServices.framework • Quartzcore.framework • QuickLook.framework • Security.framework • SystemConfiguration.framework • WebKit.framework
Keychain group sharing for multiple apps	<p>Keychain group sharing allows groups of apps to share information that is stored on a device's keychain. Keychain group sharing is required when you are developing multiple inter-related apps for iOS 9 or later. The setting is part of a project's build.</p> <p>To enable keychain group sharing in an Xcode project, open the project file, navigate to the app target Capabilities tab, and turn on Keychain Sharing. You may be asked for your developer password and to choose a development team. The provisioning profiles for each app must come from the same team and must share the same App ID prefix (see row below). For the Keychain Group, specify <code>com.good.gd.data</code>.</p> <p>If the settings for keychain group sharing change, it is recommended to do a fresh reinstall of the new version of the app instead of upgrading the old version. This ensures that the new keychain settings take effect.</p>
App ID prefix	<p>An App ID prefix is a unique ID that groups a collection of apps and enables those apps to share keychain and UIPasteboard data. Apps that share keychain data must have a common App ID prefix from Apple.</p> <p>For more information, see Technical Note TN2311: Managing Multiple App ID Prefixes.</p> <p>The Apple App ID prefix is completely independent of the BlackBerry Dynamics entitlement ID.</p>

Item	Requirement
BlackBerry Dynamics Launcher Library	<p>The BlackBerry Dynamics Launcher is a user-friendly interface that allows users to easily access and switch between BlackBerry Dynamics apps, configure app settings, and take advantage of other useful features. For more information, see the BlackBerry Dynamics Launcher Framework documentation.</p> <p>The BlackBerry Dynamics SDK and the BlackBerry Dynamics Launcher Library are mutually dependent. See the BlackBerry Dynamics SDK for iOS Release Notes for the required version of the BlackBerry Dynamics Launcher Library.</p>
Restricted key prefix	<p>The key prefix "blackberry" is reserved by BlackBerry and should not be used for key values, key attributes, or key elements. For more information and examples, see the Application Policies Definition in the appendix of the API Reference.</p>

Using an entitlement ID and version to uniquely identify a BlackBerry Dynamics app

BlackBerry Dynamics apps are uniquely identified by a BlackBerry Dynamics entitlement ID (GDApplicationID) and entitlement version (GDApplicationVersion). The entitlement ID and entitlement version are used to manage end-user entitlement in the BlackBerry UEM or standalone Good Control management console. The values are also used for app publishing and service provider registration.

These values are specified in the assets/settings.json file for Android or in the Info.plist file for iOS.

You must define both the entitlement ID and the entitlement version for all of your BlackBerry Dynamics apps, regardless of whether you use the [Shared Services Framework](#). The same entitlement ID must be used to represent the app across all platforms.

For more information about setting and checking the entitlement ID and version, the proper format to use for these values, and other requirements and considerations:

- See the [GDAndroid Class reference](#) in the BlackBerry Dynamics SDK for Android API Reference, especially these sections:
 - Identification
 - Indirect Authorization Initiation
 - void authorize (GDAppEventListener eventListener) throws GDInitializationError
- See the [GDiOS Class reference](#) in the BlackBerry Dynamics SDK for iOS API Reference, especially these sections:
 - Identification
 - Authorization
 - - (void) authorize: (id< GDiOSDelegate > _Nonnull) delegate

Relationship between the entitlement ID and version and native identifiers

The entitlement ID (GDApplicationID) and entitlement version (GDApplicationVersion) of a BlackBerry Dynamics app are different from the native identifiers that are required by the app OS platform. The native identifiers for Android are the packageName and packageVersion values in the AndroidManifest.xml file. The

native identifiers for iOS are the CFBundleIdentifier and CFBundleVersion in the Info.plist file. The values of the entitlement ID and entitlement version and the platform native identifiers can be the same, but do not have to be.

To take advantage of BlackBerry Dynamics features such as [Easy Activation](#), [authentication delegation](#), [certificate sharing](#), the [Shared Services Framework](#), and more, the UEM or standalone Good Control administrator must specify the entitlement ID and version and the native identifier (package name or bundle ID) for a custom BlackBerry Dynamics app in the management console. For more information, see [Add an internal BlackBerry Dynamics app entitlement](#) and [Manage settings for a BlackBerry Dynamics app](#) in the *UEM Administration Guide*, or the [Good Control Help](#).

The native identifiers for your custom BlackBerry Dynamics app should be unique, especially with respect to apps that are available through public app stores. Duplicate native identifiers can prevent the proper installation or upgrade of an app.

You must change the native app version if you want to distribute a new version of the app. You only need to change the entitlement version if the app starts to provide a new shared service or shared service version, or if the app stops providing a shared service or shared service version.

FIPS compliance

It is a best practice to make your BlackBerry Dynamics apps compliant with U.S. Federal Information Processing Standards (FIPS) 140-2. The BlackBerry Dynamics SDK distribution contains FIPS canisters and tools.

The BlackBerry UEM or standalone Good Control administrator enables FIPS compliance using a BlackBerry Dynamics profile (UEM) or security policy (Good Control). If enabled, BlackBerry Dynamics apps must start in FIPS-compliant mode. The SDK determines whether a service is running in FIPS mode when the app communicates with the server to receive policies.

FIPS compliance enforces the following constraints:

- The use of MD4 and MD5 are prohibited. As a result, access to NTLM-protected or NTLM2-protected web pages and files is blocked.
- In secure socket key exchanges with ephemeral keys, with servers that are not configured to use Diffie-Hellman keys of sufficient length, BlackBerry Dynamics retries with static RSA cipher suites.

Note:

- When you enable FIPS compliance, user certificates must use encryption that meets FIPS standards. If a user tries to import a certificate with encryption that is not compliant, the user receives an error message indicating that the certificate is not allowed and cannot be imported.
- For iOS, when you build for testing with the x86 64-bit simulator, FIPS mode is not enforced. As a result, you might see a difference in behavior with the simulator compared to actual operation. BlackBerry recommends that you always test your app on actual iOS hardware and not rely exclusively on the simulation.

Link for FIPS in Objective-C or C++

Before you begin:

- If you are not using a default xcconfig file, create one named **default.xcconfig** and configure your build options to use it.
 - In your project build settings, verify that the debug and other build configurations point to **default.xcconfig**.
1. Add the following lines to the **default.xcconfig** file to ensure that the FIPS canister linking script `gd_fipsId` is called as part of the build process:

```
FIPS_PACKAGE=$( CURRENT_ARCH ) . sdk
```

```
LDPLUSPLUS=$(HOME)/Library/Application Support/BlackBerry/Good.platform/
iOS/FIPS_module/$FIPS_PACKAGE/bin/gd_fipsld
LD=$(HOME)/Library/Application Support/BlackBerry/Good.platform/iOS/
FIPS_module/$FIPS_PACKAGE/bin/gd_fipsld
```

2. Set the deployment target to the required version (see [Software requirements](#)).
3. In the **Other Linker Flags** field in the target build settings, verify that the **all_load linker** flag is not selected. Alternatively, you can use the **ObjC** linker flag.

After you finish: If your project or app includes at least one Swift language source file, see [Link for FIPS in Swift](#).

Link for FIPS in Swift

If your project or app includes at least one Swift language source file, complete the steps below.

Before you begin:

- [Link for FIPS in Objective-C or C++](#). If you are not including source code in Objective-C, you must replace the contents of the **default.xcconfig** file, not add to it.
 - If you are not using a default xcconfig file, create one named **default.xcconfig** and configure your build options to use it.
 - In your project build settings, verify that the debug and other build configurations point to **default.xcconfig**.
1. Add the following lines to the **default.xcconfig** file:

```
#
```

```
FIPS_PACKAGE=$(CURRENT_ARCH).sdk
LDPLUSPLUS=$(HOME)/Library/Application Support/BlackBerry/Good.platform/
iOS/FIPS_module/$FIPS_PACKAGE/bin/gd_fipsld
LD=$(HOME)/Library/Application Support/BlackBerry/Good.platform/iOS/
FIPS_module/$FIPS_PACKAGE/bin/gd_fipsld
```

2. Set the deployment target to the required version (see [Software requirements](#)).
3. In the project, navigate to **Target > > Build Settings > Linking > Other Linker Flags** and add the following:

```
-B ${LDUTILDIR}
```

Troubleshooting: FIPS

Issue	Possible Solution
The app crashes	Crashes might occur if the FIPS canister has not been linked to the app correctly. Check for the following line in the log output: "Crypto::initialise: FIPS_mode_set failed: fingerprint does not match" Verify that you followed the steps in Link for FIPS in Objective-C or C++ and, if necessary, Link for FIPS in Swift and that no errors are reported.
"invalid arch name '-arch armv7s'" linker error when building from Xcode	For development or testing purposes, set Build Active Architecture Only to Yes . For production release, set Build Active Architecture Only to No .

Declaring a URL type to support BlackBerry Dynamics features

A BlackBerry Dynamics app for iOS devices must declare a URL type so that it can be discovered by other apps on the same device. This enables [AppKinetics](#), which is required for many BlackBerry Dynamics features. The URL type and schemes are declared in the app's Info.plist file.

The URL type must be the same as the app's native bundle ID. Within the URL type declaration, the following URL schemes must be declared. For example, if the native bundle ID of the app is `com.example.gd.myapp` and its entitlement version (`GDAApplicationVersion`) is `1.0.0.0`, then the declared URL type is `com.example.gd.myapp` and the schema declarations are as follows:

Format	Description	Example
<code>com.good.gd.discovery</code>	Always required	Exactly as shown
<code>com.good.gd.discovery.enterprise</code>	Always required	Exactly as shown
<code><bundle_ID>. sc3</code>	Always required	<code>com.example.gd.myapp.sc3</code>
<code><bundle_ID>. sc2</code>	Enables an app to use authentication delegation and is required for all BlackBerry Dynamics apps	<code>com.example.gd.myapp.sc2</code>
<code><bundle_ID>. sc2.<GDAApplicationVersion></code>	Required only if your app provides a discoverable service	<code>com.example.gd.myapp.sc2. 1.0.0.0</code>

App UI restrictions

The BlackBerry Dynamics Runtime monitors the app UI to enforce the configuration of enterprise profiles or policies from BlackBerry UEM or standalone Good Control. For example, a BlackBerry Dynamics profile may require the user to enter a password when the app transitions from the background to the foreground, or it may lock the app UI after a certain period of inactivity.

Note that SDK version 6.0 and later supports the use of multiple UIWindow objects. No coding is required to use this feature. The AppKinetics sample app demonstrates support for multiple UIWindow objects.

For a complete explanation of the restrictions and requirements that the app UI must follow, see [Application User Interface Restrictions](#) in the API Reference.

Requirements and prerequisites for iOS platform features

This section provides specific requirements or considerations to support features of the iOS platform in your BlackBerry Dynamics apps.

Support for Touch ID

Touch ID is a fingerprint recognition system for some iOS devices.

Touch ID can be allowed for user authentication in BlackBerry Dynamics apps in addition to standard password authentication. For more information about Touch ID, see [BlackBerry Dynamics and Fingerprint Authentication](#) in the BlackBerry Developers for Enterprise Apps portal.

Support for Face ID

The BlackBerry Dynamics SDK for iOS version 4.0 and later supports Face ID. An administrator can enable or disable the feature in a BlackBerry Dynamics profile in UEM or in a security policy in Good Control.

For apps built for iOS 11 or later, each app must add the `NSFaceIDUsageDescription` key to the `Info.plist` file. For more details about Face ID, see the [Build-Time Configuration](#) appendix in the API Reference.

Support for WKWebView

The BlackBerry Dynamics SDK for iOS version 4.2 and later supports secure [WKWebView](#) for displaying interactive web content. The SDK supports WKWebView for devices running iOS 11.0 or later.

Note the following support details:

- The SDK supports multiple WKWebView instances. The instances must be created programmatically.
- The SDK supports loading WKWebView from UIStoryboard. To avoid any possible data leaks, you must load UIStoryboard with the WKWebView component after the initialization of the SDK.
- The supported versions of iOS require JavaScript injection by the BlackBerry Dynamics Runtime.
- The JavaScript [Fetch API](#) is not supported for iOS 11.2 and earlier.
- The JavaScript [Fetch API](#) is supported for iOS 11.3 and later, with the following known issue that will be addressed in a future release:
 - Requests with the raw file or blob binary object body content types do not work.

The SDK's implementation of secure WKWebView currently supports:

- Loading HTTP and HTTPS data
- Redirection
- Basic, Digest, NTLM, Kerberos, and ClientCertificate authentication
- Cookies
- Video and audio playback
- Asynchronous XHR requests
- HTML5 non-persistent local storage
- Sending the following types of body data using [XMLHttpRequest](#): ArrayBuffer, Blob, FormData, URLSearchParams, USVString

The SDK's implementation of secure WKWebView does not currently support:

- Secure WKWebView creation from UIStoryboard, including WKWebView controls that are added with the Xcode Interface Builder tool
- The JavaScript `sendBeacon` API
- The following Data Leakage Prevention (DLP) settings from BlackBerry UEM or standalone Good Control for long-press or 3D touch actions:
 - Do not allow copying data from BlackBerry Dynamics apps into non BlackBerry Dynamics apps
 - Do not allow copying data from non BlackBerry Dynamics apps into BlackBerry Dynamics apps
- HTML5 persistent local storage
- HTML attributes for a link tag (for example, `preconnect`)

- WebSockets
- HTTP/2

Support for the Apple Universal Clipboard

The SDK supports secure cut, copy, and paste operations using the Apple Universal Clipboard. Users can copy and move data between BlackBerry Dynamics apps and devices that follow Apple Continuity system requirements. The apps and devices must be activated for the same user account on the same instance of BlackBerry UEM or standalone Good Control.

For more information about the Apple Universal Clipboard, see support.apple.com to read [Set up Universal Clipboard](#).

Unsupported iOS features

The following features are not supported by the BlackBerry Dynamics SDK:

Feature	Details
BitCode	<p>BitCode is an intermediate, architecture-independent binary object format that allows developers to submit a "machine neutral" app to Apple for a final, architecture-dependent build. The intermediate nature of BitCode is not compatible with the cryptographic requirements of the BlackBerry Dynamics SDK, which relies on the delivery of libraries or other modules that are cryptographically signed at build-time. The signatures of the libraries and modules are validated at runtime to ensure integrity.</p> <p>If you enable BitCode and try to build an app, a build error will indicate that the SDK does not support BitCode.</p>
App Extensions	The BlackBerry Dynamics SDK does not support app extensions such as Sirikit.

Steps to get started with the BlackBerry Dynamics SDK

Step	Action
1	Download and install the BlackBerry Dynamics SDK.
2	<p>Create an Objective-C or Swift project with the Xcode template.</p> <p>If you don't want to use the project template, add the BlackBerry Dynamics SDK event-handler skeleton manually or by using notifications.</p> <p>If you are using Swift, review the limitations and best practices. If you are using an existing project, manually add the SDK to your Swift project.</p>
3	<p>Consult the BlackBerry Dynamics SDK API reference for instructions for implementing the desired features of the BlackBerry Dynamics platform.</p> <p>See the sample apps included in the SDK package for examples of how to implement key features.</p> <p>For additional guidance and code examples, see the Getting started workflow for BlackBerry developers.</p>
4	<p>See the following sections if you want to use any of these optional features:</p> <ul style="list-style-type: none">• Preventing password autofill in the app UI• Adding a custom logo and colors with the branding API• Integrating BlackBerry Enterprise Mobility Server services
5	<p>Test and debug your app.</p> <p>The SDK allows you to test in enterprise simulation mode and supports automated testing.</p>
6	<p>Review configuration recommendations and then deploy your app.</p>
7	<p>Optionally, deploy certificates to the BlackBerry Dynamics apps on users' devices.</p>

Install the BlackBerry Dynamics SDK for iOS

Before you begin:

- Visit [BlackBerry Developer Downloads](#) to download the SDK package. When you click the link, you are prompted to log in to the Developer site with your BlackBerry Online Account. If you don't already have an account, you can register and create one.
- The task below installs the SDK to the default location. To install the SDK to a specific location, untar the **.tar** package into the desired directory and run the following commands for the current working directory:
 - `cd Good.platform/iOS`

- `sudo ./install.sh`

Adjust the paths in the project **.xcconfig** file to point to the FIPS_module folder in the main artifacts directory.

1. In the macOS GUI (not a shell), uncompress the SDK package.
2. Double-click the *sdk_version.pkg*.
3. Follow the prompts to install the standard or advanced package.

If you use the advanced installation, you must install the core SDK. It is recommended that you include the code samples in the installation.

The SDK artifacts are installed in the following default locations:

- The main artifacts are installed in `~/Library/Application Support/BlackBerry/Good.platform/iOS`.
- A softlink to the GD.framework directory from the path above is created in `/Library/Frameworks`.
- The GD.framework directory is copied to the installed Xcode folder so that it is available for all iOS platforms.
- The Xcode template is in `~/Library/Developer/Xcode/Templates`.

Create an Objective-C or Swift project with the Xcode template

You can use the Xcode project template supplied with the BlackBerry Dynamics SDK to create a BlackBerry Dynamics app. The template includes a single view controller, a storyboard (or nib) file, and the necessary frameworks and directives.

Before you begin: [Install the BlackBerry Dynamics SDK for iOS](#).

1. Start Xcode and select **New > Project**.
2. Follow the prompts to create the skeleton application.

All of the necessary frameworks and artifacts are included in your stub.

Add the event-handler skeleton manually

Note that this task is only required if you choose not to use the [Xcode template](#), which includes this code by default.

The application-delegate object `UIApplicationDelegate` manages the iOS app life cycle using events. You can decide how to implement the life cycle of events; the steps below provide an example that is based loosely on the Apple Breadcrumbs sample app (with differences in declarations and other key areas). Several of the [sample apps](#) included in the SDK also demonstrate the event handling lifecycle.

1. Specify the entitlement ID (`GDAApplicationID`) and entitlement version (`GDAApplicationVersion`) in the **Info.plist** file. See [Using an entitlement ID and version to uniquely identify a BlackBerry Dynamics app](#).
2. Import `GDiOS.h` and implement a skeleton `GDiOSDelegate` protocol. The example here relies on a boolean variable named `started`. An alternative approach is to declare the variable in your project's **.m** file.

```
// AppDelegate.h
#import <UIKit/UIKit.h>
#import <GD/GDiOS.h>

@interface AppDelegate : UIResponder <UIApplicationDelegate, GDiOSDelegate>
{
    BOOL started;
}
```

```

@property (strong, nonatomic) UIWindow *window;
@property (strong, nonatomic) GDiOS *good;

- (void)onAuthorized:(GDAppEvent *)anEvent;
- (void)onNotAuthorized:(GDAppEvent *)anEvent;

@end

```

3. Build the app and verify that there are no warnings or errors.
4. Use GDAppEvent to process events. Move the application launch code from didFinishLaunchingWithOptions to the GDAppEvent handler method.

```

// AppDelegate.m
- (BOOL)application:(UIApplication *)application
didFinishLaunchingWithOptions:(NSDictionary *)launchOptions {
    // Override point for customization after application launch.
    self.good = [GDiOS sharedInstance];
    _good.delegate = self;
    started = NO;
    //Show the BlackBerry Authentication UI.
    [_good authorize];

    return YES;
}

#pragma mark BlackBerry Dynamics Delegate Method
- (void)handleEvent:(GDAppEvent *)anEvent
{
    /* Called from _good when events occur, such as system startup. */
    switch (anEvent.type)
    {
        case GDAppEventAuthorized:
        {
            [self onAuthorized:anEvent];
            break;
        }
        case GDAppEventNotAuthorized:
        {
            [self onNotAuthorized:anEvent];
            break;
        }
        case GDAppEventRemoteSettingsUpdate:
        {
            // handle app config changes
            break;
        }
        case GDAppEventPolicyUpdate:
        {
            // handle app policy changes
            break;
        }
        case GDAppEventServicesUpdate:
        {
            // handle services changes
            break;
        }
        case GDAppEventEntitlementsUpdate:
        {
            // handle entitlements changes
            break ;
        }
    }
}

```

```

    }
    default:
        NSLog(@"Unhandled Event");
        break;
    }
}

```

5. Special-case the `onNotAuthorized` events. Verify that the app can handle authorization errors or functionality like remote wipe, a lockout, or blocking events. Implement these events in the `onNotAuthorized` function.

```

- (void)onNotAuthorized:(GDAppEvent *)anEvent
{
    /* Handle the BlackBerry Libraries not authorized event. */
    switch (anEvent.code) {
        case GDErrorActivationFailed:
        case GDErrorProvisioningFailed:
        case GDErrorPushConnectionTimeout:
        case GDErrorSecurityError:
        case GDErrorAppDenied:
        case GDErrorBlocked:
        case GDErrorWiped:
        case GDErrorRemoteLockout:
        case GDErrorPasswordChangeRequired: {
            // A condition has occurred denying authorization, an
            application may wish to log these events
            NSLog(@"onNotAuthorized %@", anEvent.message);
            break;
        }
        case GDErrorIdleLockout: {
            // idle lockout is benign & informational
            break;
        }
        default:
            NSAssert(false, @"Unhandled not authorized event");
            break;
    }
}

```

6. On authorization, start the app. Initialize and start the UI with the `onAuthorized` function. The `GDErrorNone` event is returned by the BlackBerry Dynamics Runtime whenever a container is opened and no error occurs.

```

- (void)onAuthorized:(GDAppEvent *)anEvent
{
    /* Handle the BlackBerry Libraries authorized event. */
    switch (anEvent.code) {
        case GDErrorNone: {
            // started was declared in first step.
            if (!started) {
                // launch application UI here
                started = YES;
            }
            break;
        }
        default:
            NSAssert(false, @"Authorized startup with an error");
            break;
    }
}

```

7. [Link for FIPS in Objective-C or C++](#).

8. Add **GDAAssets.bundle** to the **Copy Bundle Resources** build phase in Xcode. Verify that the copy of the bundle that is distributed with the framework has been added to the project.

Add the event-handler skeleton using notifications

Note that this task is only required if you choose not to use the [Xcode template](#), which includes this code by default.

The application-delegate object `UIApplicationDelegate` manages the iOS app life cycle using events. You can decide how to implement the life cycle of events; the steps below provide an example that is based loosely on the Apple Breadcrumbs sample app (with differences in declarations and other key areas). Several of the [sample apps](#) included in the SDK also demonstrate the event handling lifecycle.

1. Specify the entitlement ID (`GDAApplicationID`) and entitlement version (`GDAApplicationVersion`) in the **Info.plist** file. See [Using an entitlement ID and version to uniquely identify a BlackBerry Dynamics app](#).
2. Add the `BlackBerryDynamics` dictionary with key `'CheckEventReceiver'` and its Boolean value set to `NO`.

```
<plist version="1.0">
  <dict>
    ...
    <key>BlackBerryDynamics</key>
    <dict>
      <key>CheckEventReceiver</key>
      <false/>
    </dict>
    ...
  </dict>
</plist>
```

3. Import `GDiOS.h` and `GDState.h`. This example relies on a boolean variable named `'hasAuthorized'`. An alternative approach is to declare the variable in your project's `.m` file.

```
// AppDelegate.h
#import <UIKit/UIKit.h>
#import <GD/GDiOS.h>
#import <GD/GDState.h>

@interface AppDelegate : UIResponder <UIApplicationDelegate> {
    BOOL hasAuthorized;
}

@property (strong, nonatomic) UIWindow *window;

- (void)handleStateChange:(GDState *)state;
- (void)onAuthorized;
- (void)onNotAuthorized:(GDAppResultCode)code;

@end
```

4. Build the app and verify that there are no warnings or errors.
5. Make your `AppDelegate` an observer for state changing notifications.

```
// AppDelegate.m
```

```

- (BOOL)application:(UIApplication *)application
didFinishLaunchingWithOptions:(NSDictionary *)launchOptions {
    // Override point for customization after application launch.
    [self addStateObserverUsingNotificationCenter];
    hasAuthorized = NO;
    [[GDiOS sharedInstance] authorize];

    return YES;
}

#pragma mark - BlackBerry Dynamics observer for state changes (Notification
Center)

- (void)addStateObserverUsingNotificationCenter
{
    // register to receive notification center notifications for GD state
changes
    [[NSNotificationCenter defaultCenter] addObserver:self
selector:@selector(receiveStateChangeNotification:)
name:GDStateChangeNotification object:nil];
}

- (void) receiveStateChangeNotification:(NSNotification *) notification
{
    if ([[notification name] isEqualToString:GDStateChangeNotification]) {
        NSDictionary* userInfo = [notification userInfo];
        NSString *propertyName = [userInfo
objectForKey:GDStateChangeKeyProperty];
        GDState* state = [userInfo objectForKey:GDStateChangeKeyCopy];

        // For the purposes of this example, we want to log a different
message so that it is known
        // these calls are coming from Notification Center
        if ([propertyName isEqualToString:GDKeyIsAuthorized]) {
            NSLog(@"receiveStateChangeNotification - isAuthorized: %@",
state.isAuthorized ? @"true" : @"false");
            [self handleStateChange:state];

        } else if ([propertyName isEqualToString:GDKeyReasonNotAuthorized])
{
            NSLog(@"receiveStateChangeNotification - reasonNotAuthorized:
%d", (long) state.reasonNotAuthorized);

        } else if ([propertyName isEqualToString:GDKeyUserInterfaceState])
{
            NSLog(@"receiveStateChangeNotification - userInterfaceState:
%d", (long) state.userInterfaceState);

        } else if ([propertyName isEqualToString:GDKeyCurrentScreen]) {
            NSLog(@"receiveStateChangeNotification - currentScreen: %ld",
(long) state.currentScreen);
        }
    }
}

```

6. Use GDState to handle the state of the BlackBerry Dynamics Runtime.

```

// AppDelegate.m

#pragma mark - Good Dynamics handler methods for state changes

```



```

- (void)handleStateChange:(GDState *)state
{
    if (state.isAuthorized) {
        NSLog(@"gdState: authorized");
        [self onAuthorized];
    } else {
        GDAppResultCode errorCode = [state reasonNotAuthorized];
        NSLog(@"gdState: not authorized, error:%ld", (long) errorCode);
        [self onNotAuthorized:errorCode];
    }
}

- (void)onAuthorized
{
    if (!hasAuthorized) {
        // launch application UI here
        hasAuthorized = YES;
    }
}

- (void)onNotAuthorized:(GDAppResultCode)code
{
    /* Handle the Good Libraries not authorized event. */

    switch (code)
    {
        case GDErrorActivationFailed:
        case GDErrorProvisioningFailed:
        case GDErrorPushConnectionTimeout:
        case GDErrorSecurityError:
        case GDErrorAppDenied:
        case GDErrorAppVersionNotEntitled:
        case GDErrorBlocked:
        case GDErrorWiped:
        case GDErrorRemoteLockout:
        case GDErrorPasswordChangeRequired:
        {
            // an condition has occurred denying authorization, an
            application may wish to log these events
            NSLog(@"gdState: not authorized, error:%ld", (long) code);
            break;
        }
        case GDErrorIdleLockout:
        {
            // idle lockout is benign & informational
            break;
        }
        default:
            NSAssert(false, @"Unhandled not authorized event");
            break;
    }
}

```

7. [Link for FIPS in Objective-C or C++.](#)

8. Add **GDAssets.bundle** to the **Copy Bundle Resources** build phase in Xcode. Verify that the copy of the bundle that is distributed with the framework has been added to the project.

Limitations and best practices when using Swift

The BlackBerry Dynamics SDK for iOS is compatible with the Swift programming language. For supported versions, see the [Software requirements](#).

Note the following limitations and best practices:

Item	Description
Xcode template	<p>The easiest way to use Swift with the BlackBerry Dynamics SDK is to create a new Xcode project with the Single View template that includes all necessary frameworks and compile-time directives. For more information about creating the template, see Create an Objective-C or Swift project with the Xcode template.</p> <p>You can include your Swift source files into the project and build with Xcode.</p>
Sample apps	<p>The BlackBerry Dynamics SDK includes the following sample apps in Swift. The sample apps are stored in <code>~/Library/Application Support/BlackBerry/Good.platform/iOS/Examples/</code>. The Swift 3 versions are located in the "swift" folder, and the Swift 4 versions are located in the "swift4" folder. iPhone X is the default device for the Swift 4.0 sample applications.</p> <ul style="list-style-type: none">• RSSReaderSwift: This sample demonstrates how to use the BlackBerry Dynamics Secure Communication APIs for basic networking. It shows how to use <code>GET</code> with the <code>GDHttpRequest</code> API (with and without authentication) and the <code>GDNSURLSession</code> API. For session management, only <code>GDNSURLSession.sharedSession</code> is supported.• ServicesServerSwift and ServicesClientSwift: This sample provides a complete client/server app that demonstrates how to implement a service with the Shared Services Framework. The service enables secure communication between two apps. The ServicesServerSwift app provides the service and works in conjunction with the ServicesClientSwift app, which calls the service. The samples also demonstrate how the file transfer service is used with the ServicesServeSwift app.

Manually add the BlackBerry Dynamics SDK to your Swift project

Follow the steps below if you have an existing project. For new projects, see [Create an Objective-C or Swift project with the Xcode template](#).

Before you begin: [Install the BlackBerry Dynamics SDK for iOS](#)

1. In the **Link binary with binaries** section or **Build** section of your Xcode project, add **GD.framework**.
2. Add the required frameworks and libraries to the project (see [Software requirements](#)).
3. In your code, import the BlackBerry Dynamics Runtime module:

```
import GD.Runtime
```

4. Modify the **AppDelegate** class to implement the **GDiOSDelegate** protocol to implement a `handleEvent(anEvent:)` method:

```
class AppDelegate: UIResponder, UIApplicationDelegate, GDiOSDelegate {  
    [...]  
    func handle(_ anEvent:GDAppEvent) {
```

```
        [...]  
    }  
}
```

5. Add a variable to your **AppDelegate**:

```
var good: GDiOS?
```

6. Add the following code to the `didFinishLaunchingWithOptions` function:

```
self.good = GDiOS.sharedInstance() // Get BlackBerry Dynamics shared instance  
self.good!.delegate = self // Set delegate  
self.good!.authorize() // Authorize
```

7. In the **Info.plist** file, add the entitlement ID (**GDAApplicationID**) and entitlement version (**GDAApplicationVersion**). For more information, see [Using an entitlement ID and version to uniquely identify a BlackBerry Dynamics app](#).
8. Define URL types with the same ID as the bundle ID and URL schemes with the required schemes described in [Declaring a URL type to support BlackBerry Dynamics features](#).
9. Enable FIPS linking. See [Link for FIPS in Objective-C or C++](#) and [Link for FIPS in Swift](#).
10. Add **GDAAssets.bundle** to the **Copy Bundle Resources** build phase in Xcode. Verify that the copy of the bundle that is distributed with the framework has been added to the project.
11. Build your project.

Integrating optional features

This section provides more information about integrating optional features into your custom BlackBerry Dynamics apps.

Preventing password autofill in the app UI

Password autofill is an iOS feature that automatically provides suggestions for a user's password or other privacy data in an app. This feature does not satisfy the security standards of the BlackBerry Dynamics platform and can lead to the exposure of sensitive data.

The BlackBerry Dynamics SDK disables the password autofill feature for all screens in BlackBerry Dynamics apps, but it does not block the feature in the app UI. BlackBerry provides an open source sample on GitHub that demonstrates how to prevent the password autofill feature in the UI. For more information, see [AutoFill blocking solution for Password AutoFill in UITextField](#).

This method is independent of and does not rely on the BlackBerry Dynamics SDK. Note that this solution applies only to UITextField.

Enforcing local compliance actions

The BlackBerry Dynamics SDK includes the following APIs that you can use to block or unblock a user's access to the UI of a BlackBerry Dynamics app locally:

- [GDiOS.executeBlock](#)
- [GDiOS.executeUnblock](#)

You can use these APIs to temporarily prevent access to an app under certain conditions. For example, if the user accesses a public Wi-Fi network that is not trusted, you can use [GDiOS.executeBlock](#) to prevent access to the app until the user is on a trusted Wi-Fi network. While the app UI is blocked, the app's network activity and container storage access is not affected.

You can use [GDiOS.executeBlock](#) to display a message to the user that explains why access to the app has been blocked and how the user can restore compliance and unblock the UI.

The RemoteDB sample app has been updated to demonstrate the use of these APIs.

Note: It is possible to circumvent a UI block if the user is able to restore a backup that was created before the block occurred. Take this condition into account when you develop and test your app.

Adding custom policies for your app to the UEM management console

You can add new management policies and settings that are specific to your custom BlackBerry Dynamics app to the BlackBerry UEM management console so that they can be configured and applied to users by UEM administrators. The new management policies that you define are in addition to the full suite of BlackBerry Dynamics and device management policies already offered by UEM.

You can add a custom policy for a BlackBerry Dynamics app by creating and uploading an application policy definition file to the management console. For implementation details and more information about the file format and elements, see the Application Policies Definition appendix in the API Reference ([Android/iOS](#)) and the [BlackBerry Dynamics App Policies Technical Brief](#).

For instructions for uploading the file to the management console, see [Manage settings for a BlackBerry Dynamics app](#) in the *UEM Administration Guide*.

Adding a custom logo and colors with the branding API

You can use the branding API to add a custom logo and colors to the app UI. For more information, see [\(void\) configureUIWithLogo](#) in the API Reference.

Integrating BlackBerry Enterprise Mobility Server services

This section covers the general approach for programming with the BlackBerry Dynamics SDK and the [BlackBerry Enterprise Mobility Server](#) services. The approach consists of two parts:

- Programming an app to interact with the desired BEMS services
- Entitling users to the necessary applications

BEMS services conform to the [Shared Services Framework](#). A service consists of two applications: A program that provides the service, and an app that consumes the service. BEMS is the service provider that must be configured for use in BlackBerry UEM or in standalone Good Control. You create the app that consumes this service.

BEMS services APIs

The BEMS services are described in the [BEMS API Reference Guides](#).

Programming your service consumer app

You must define a unique BlackBerry Dynamics app ID for your application (for complete details, see [Using an entitlement ID and version to uniquely identify a BlackBerry Dynamics app](#)). The BlackBerry Dynamics SDK has functions to discover services, and each BEMS service has specific programming interfaces.

To discover the BEMS services, use `GDSERVICEType`. This API and other APIs for shared services are described in other sections of this guide and in the [BlackBerry Dynamics API reference](#).

After your consumer app discovers the service, the way the app communicates with the service depends on the service definition.

Note: Most BEMS services run over SSL (HTTPS) on port 8443. Be sure your consumer application connects to the correct server and port.

Discovering the BlackBerry Enterprise Mobility Server services

Described here is a general approach to using the BlackBerry Dynamics SDK and Server-based Services Framework to programmatically discover the Docs services offered by your BEMS installation.

Item	Description
Service identifier	First you need to know the service identifier and version. For more information about the available services, see Mobile Services .

Item	Description
Service discovery	Next, code a service discovery query in your application program. The API for that is <code>GDSERVICE_TYPE</code> in the <code>GDAndroid</code> , <code>GDiOS</code> , and <code>GDMac</code> classes.
Server cluster	<p>The result of the service discovery query is an array of <code>GDSERVICE_PROVIDER</code> objects. Each object corresponds to a BlackBerry Dynamics entitlement ID that is registered as a provider of the service. Your best result is that the array has one element.</p> <p>If the array is empty, it means that the current end user isn't entitled to any App ID that provides the service. In that case, your app shouldn't use the service.</p> <p>If the array has more than one element, it means that the end user is entitled to more than one GD App ID that provides the service (likely a configuration error by the enterprise). Your app would have to pick one of the GD App IDs, or try all of them, or prompt the user to select.</p> <p>In the <code>GDSERVICE_PROVIDER</code> object, there is a <code>serverCluster</code> attribute. It contains an array of <code>GDAAPP_SERVER</code> objects, each of which tells you the address and port number of a server, and the priority of that instance within the cluster.</p>
Server selection	<p>If the <code>serverCluster</code> array has only one element, then server selection is trivial. Use the server address and port number of the first element.</p> <p>If the <code>serverCluster</code> array is empty, that indicates an enterprise configuration error.</p> <p>If the <code>serverCluster</code> array has more than one element, then you must implement a server selection algorithm. A sample algorithm is given on the <code>GDAndroid</code>, <code>GDiOS</code>, and <code>GDMac</code> pages in the BlackBerry Dynamics API reference, in the <code>getApplicationConfig</code> section. The algorithm is the same for the BlackBerry Dynamics SDK for Android and for the BlackBerry Dynamics SDK for iOS. The recommended selection algorithm is as follows.</p> <p>For each priority value in the list, starting with the highest:</p> <ul style="list-style-type: none"> • Select a server that has that priority, at random. • Attempt to connect to the server. • If the connection succeeds, use that server. • If the connection fails, try another server at the same priority, at random. • If there are no more untried servers at that priority, try the servers at the next lower priority.

Sample apps in Objective-C

Visit [Dynamics SDK Samples](#) to view and download the following sample apps. In the SDK package, the samples are stored in `~/Library/ApplicationSupport/BlackBerry/Good.platform/iOS/Examples/objective-c`.

Note: It is recommended to make a copy of the source code in another location before making any changes. Reinstalling or upgrading will overwrite or even remove the sample apps in the default location.

Sample app	Description
AppBasedCertImport	Demonstrates how to create an app that can import a user's PKI credentials using the BlackBerry Dynamics Certificate Credential Import API. For more information, see Certificate Credential Import and Creating user credential profiles for app-based certificates in the <i>UEM Administration Guide</i> .
AppKinetics	Demonstrates how to search for, create, and subscribe to client services (AppKinetics). The sample demonstrates these concepts by implementing a consumer and a provider for the Transfer File service. It is intended as a starting point for developers making use of BlackBerry Dynamics AppKinetics services. This app also demonstrates how to support multiple UIWindow objects.
AppKinetics save/edit client and server	Demonstrates how to write a client and a server that use the BlackBerry Dynamics Inter Container Communications API (also known as AppKinetics).
Bypass Unlock	Demonstrates how part of the application user interface can remain accessible after the BlackBerry Dynamics idle time out has expired. Bypass Unlock can be allowed or disallowed by enterprise policy. This is implemented using the GD Application Policies feature (GD Application Policies are sometimes known as BlackBerry Dynamics Application-Specific Policies). The ViewController that bypasses the unlock screen can be opened by pressing the volume controls if the application is in the foreground, or by using the auxiliary 'notifier' application (from the sub-project) if the application is in background.
Core Data	Demonstrates how to use BlackBerry Dynamics with a Core Data Incremental Data Store backed by an encrypted SQLite database. The sample shows how Core Data can be used to securely store a sample set of 20,000 fictional employee details and their office locations.
Greetings client and greetings server	Provides a client/server example of how to use the BlackBerry Dynamics Services API to communicate securely between two applications.

Sample app	Description
Remote DB	<p>Demonstrates how to use BlackBerry Dynamics Remote Settings and DB APIs. The sample allows you to configure remote settings in the management console, and upon receipt, it stores them in the secure DB. Any changes to the settings are automatically synchronized and stored.</p> <p>This app also demonstrates the use of the GDiOS.executeBlock and GDiOS.executeUnblock APIs that can be used to locally block or unblock a user's access to the UI of a BlackBerry Dynamics app.</p>
RSS Reader	<p>Demonstrates how to use the BlackBerry Dynamics Secure Communications APIs to access resources behind the enterprise firewall.</p> <p>Note: If cellular access is enabled for a feed, the name of the feed is green in the app. If cellular access is not enabled for a feed, the name of the feed is black in the app.</p>
Server-based Services	<p>Provides a starting point for developers making use of BlackBerry Dynamics Server based Services. It retrieves the details of the google.timezone.service using getServiceProvidersFor. The sample prompts the user to supply a latitude and longitude and retrieves the corresponding results from Google.</p> <p>Before running this sample, make sure serviceId is created and associated with some existing app along with its endpoint details in the management console. Also, a user who is running this sample must have permission in the management console to run it.</p> <p>The Google timezone service is a publicly available service:</p> <ul style="list-style-type: none"> • URL: https://maps.googleapis.com/maps/api/timezone/json?location=37,122&timestamp=85187&language=en&sensor=true • BlackBerry Service ID: com.blackberry.example.gdservice.time-zone • Latest Version: 1.0.0.0

Testing and troubleshooting

This section provides guidance for testing and troubleshooting issues with your BlackBerry Dynamics apps.

Implementing automated testing for BlackBerry Dynamics apps

The BlackBerry Dynamics SDK includes the BlackBerry Dynamics Automated Test Support Library (ATSL) to support automated testing for your BlackBerry Dynamics apps. The library is delivered as a dynamic framework.

The library includes helper functions for testing common user interactions in BlackBerry Dynamics apps, such as activation and authorization. The configuration and structure of the library is compatible with the tools offered by Apple for user interface testing. It makes use of the following components:

- XCTest framework
- Accessibility identifiers

For more information about these components and iOS user interface testing, see [Apple Documentation Archive: User Interface Testing](#).

You can use the BlackBerry Dynamics library and the native library components mentioned above to automate the building, execution, and reporting of your application tests.

Since the BlackBerry Dynamics ATSL is delivered as a framework, you cannot make your own changes to it. If you want to review the implementation and customize it, you can see the source in GitHub at <https://github.com/blackberry/BlackBerry-Dynamics-iOS-Samples/tree/master/AutomatedTestSupportLibrary>.

The BlackBerry Dynamics ATSL framework is located alongside the BlackBerry Dynamics framework in the Frameworks sub-directory in the SDK home directory. If you use the graphical installer to install the BlackBerry Dynamics SDK, the library is located under the BlackBerry Dynamics home directory at `~/Library/Application Support/BlackBerry/Good.platform/iOS/Frameworks/`.

Automated testing with the BlackBerry Dynamics sample apps

The sample apps included in the BlackBerry Dynamics SDK have been integrated with the BlackBerry Dynamics Automated Test Support Library (ATSL). Most Objective-C sample apps include test code that executes automated tests for provisioning and activation, and also demonstrate how to use the library to interact with generic UI components that are not related to BlackBerry Dynamics.

You can use the integration of the ATSL in any of the sample apps as a guide for integrating the library with your own BlackBerry Dynamics apps. Note the following details about ATSL integration:

Item	Description
Build target for testing	<p>Each app has an <code><AppName>UITests</code> build target that can be used by the XCTest framework.</p> <p>For more information about how to configure and run user interface tests and view results, see Apple Documentation Archive: Running Tests and Viewing Results.</p>
Code for XCUITest tests	<p>The test code is located in the sub-directory <code><AppName>UITests</code>.</p> <p>The code is based on the XCTest framework. Most of the classes relate to user interface testing as <code>XCUIApplication</code>.</p>

Item	Description
Use of ATSL for interaction with BlackBerry Dynamics screens	<p>The test code uses helper functions in the ATSL. For example, the code calls the <code>loginOrProvisionBBDDApp</code> method of the <code>BBDAutomatedTestSupport</code> class, which executes the entire activation process.</p> <p>You can validate ATSL helper function operations using <code>XCTAssert</code> macros. For example, this assertion will fail if activation fails:</p> <pre>XCTAssertTrue([ats loginOrProvisionBBDDApp], @"Activation Failed!");</pre>
Use of ATSL for general interactions	<p>The test code also uses helper functions in the ATSL for general interactions, such as checking that an item exists in the user interface and then interacting with that item. The ATSL functions handle this by using <code>XCTestCase</code> and <code>XCUIElement</code> classes.</p> <p>These functions are defined in the category <code>XCTestCase+Expectations</code> and the group <code>Event_Helpers</code>.</p>

Preparing for automated testing

As part of your automated testing you must activate a new installation of your BlackBerry Dynamics app or log in to an already activated app. This requires a user identifier (typically an email address), an access key, and a password. The ATSL can read activation or login credentials from a file in JSON format in the application resource bundle.

The file does not have any naming restrictions and must contain a single object with the following fields:

- `GD_TEST_PROVISION_EMAIL`: String that specifies the user's email address
- `GD_TEST_PROVISION_ACCESS_KEY`: String that specifies the access key
- `GD_TEST_PROVISION_PASSWORD`: String that specifies the user's password after provisioning or during login
- `GD_TEST_UNLOCK_KEY`: Specifies the unlock key, if necessary (optional)

For example:

```
{
  "GD_TEST_PROVISION_EMAIL": "user@acme.com",
  "GD_TEST_PROVISION_ACCESS_KEY": "012345678901234",
  "GD_TEST_PROVISION_PASSWORD": "abcd"
}
```

There are different options to prepare the file:

- Manually generate an access key for a user in the UEM or standalone Good Control management console, then manually edit the file.
- Manually generate and store a number of access keys in advance, then automatically edit the file and consume a key from the store.
- Automatically generate an access key, and optionally a user, with the [BlackBerry Web Services](#) APIs, then automatically edit the file.

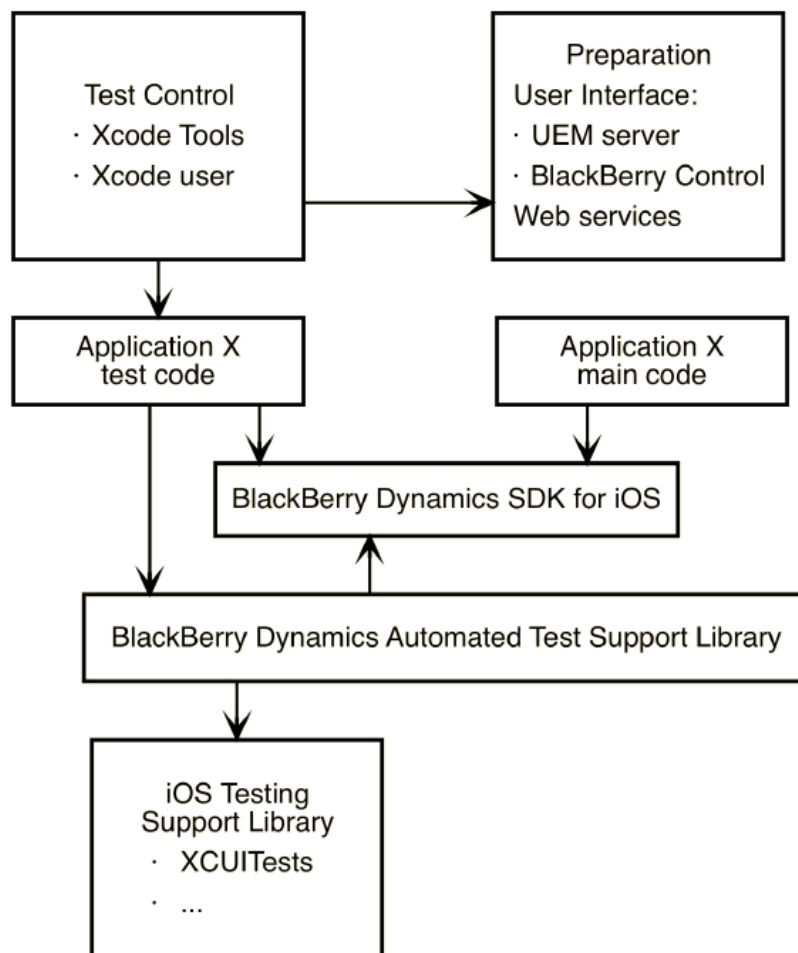
Use the option that best suits your needs, based on your access to the management console and administrator level permissions, your familiarity with the [BlackBerry Web Services](#) APIs, and your preference for using a new activation for every test or running subsequent tests on the same app as an upgrade.

Please note the following:

- In the JSON file, the access key and unlock key have to be 15 characters and cannot have dashes.
- Automated testing works in Enterprise Simulation mode, but will have the same restrictions (for example, the app cannot connect to any back-end servers).
- There is currently an iOS known issue where automated tests can fail because the keyboard disappears occasionally in the simulator.
- In Xcode 8.3 and later, the XCTest framework executes tests in a random order, as a best practice. Tests should be self-contained and independent.
- Every BlackBerry Dynamics app needs a one-time initialization to complete activation. To ensure that this is executed first, define a dedicated test method that executes BlackBerry Dynamics activation and have that activation test executed in isolation.
- The source code is provided in Objective-C. If any of the app or test code is written in Swift, you must configure the code according to Apple standards for mixing Swift and Objective-C.

Components of a sample automated testing configuration

The following diagram illustrates the different components in a sample automated testing configuration:



Execute tests from the command line with Xcode tools

Follow these instructions to build the application and test code, run the tests on a connected iOS device or simulator, and record the results. You can run the command from a continuous integration system such as Jenkins.

Run the following command:

```
xcodebuild test -project "${XCODE_PROJ_PATH}" -scheme "${APP_SCHEME}" \
-sdk "${SDK_TYPE}" -configuration "${BUILD_TYPE}" \
CLANG_ALLOW_NON_MODULAR_INCLUDES_IN_FRAMEWORK_MODULES=YES \
DEVELOPMENT_TEAM="${TEAM_ID}" CODE_SIGN_IDENTITY="${CODE_SIGN}" \
FRAMEWORK_SEARCH_PATHS="${FRAMEWORKS_PATH}" \
HEADER_SEARCH_PATHS="${HEADERS_PATH}" \
-destination "${DESTINATION}" \
-only-testing:${APP_TARGET}/${CLASS}/${TESTCASE}
```

Define the following variables:

Variable	Value
XCODE_PROJ_PATH	The path to your project.
APP_SCHEME	The name of your app scheme.
SDK_TYPE	iphoneros or iphonesimulator.
BUILD_TYPE	Release or Debug.
TEAM_ID	The unique identifier of the team used for signing, as provided by an Apple developer program.
CODE_SIGN	iPhone Distribution or iPhone Developer.
FRAMEWORKS_PATH	The path to the folder containing the GD.framework package. The typical value is <Dynamics_SDK_home_folder>/Frameworks.
HEADERS_PATH	The path to the ATSL headers. This does not need to be specified if the ATSL is copied within the project folder.
DESTINATION	<p>A string that describes the device that will be used to run the tests.</p> <p>For a physical device, it would be <code>platform=iOS,name=\${DEVICE_NAME}</code>, where <code>DEVICE_NAME</code> is the name of the device as returned by <code>instruments -s devices</code>.</p> <p>For a simulator, it would be <code>platform=iOS Simulator,name=\${SIMULATOR_NAME},OS=\${IOS_VERSION}</code>, where <code>IOS_VERSION</code> is the version (for example, 10.3) and <code>SIMULATOR_NAME</code> is the name of the hardware simulator as returned by <code>instruments -s devices</code>.</p>
APP_TARGET	The target for user interface tests.
CLASS	The test class to be executed. This value is optional. If it is omitted, all test classes in the target are executed.

Variable	Value
TESTCASE	The method within the test class to be run. This value is optional. If it is omitted, all test methods in the class are run.

Test results are printed on standard output in the OUnit format, and can be saved by a continuous integration system. You might need to convert the format to JUnit or another format that is suitable for your continuous integration system.

Execute tests from the Xcode IDE

The tests that you can run from the command line ([Execute tests from the command line with Xcode tools](#)) can also be run from within the Xcode IDE. This can be useful for investigating test failures with breakpoints or for running tests as you write the code.

The tests in the BlackBerry Dynamics sample applications for iOS can be run from within the IDE in the same way as any other tests that use the XCTest framework. Test results will be available in the Result view.

For more information, see [Apple Documentation Archive: Running Tests and Viewing Results](#).

Add automated testing to your BlackBerry Dynamics iOS app

The following steps assume that the target app is already configured to use the BlackBerry Dynamics SDK.

1. If necessary, create a target in the project to run user interface tests. The target must have the type "iOS UI Testing Bundle".
2. Add the BlackBerry Dynamics ATSL to the target for UI tests. On the **Build Phases** tab, do the following:
 - a) Add **BlackBerryDynamicsAutomatedTestSupportLibrary.framework** to the **Link Binary With Libraries** section.
 - b) Create a new **Copy Files** phase. Set **Destination** to **Frameworks** and add **BlackBerryDynamicsAutomatedTestSupportLibrary.framework** to the list.
3. If the test code is written in Swift, you must add the umbrella header to the bridging header, as required by Apple. Add **"#import <BlackBerryDynamicsAutomatedTestSupportLibrary/AutomatedTestSupportLibrary.h>"** to the bridging header.
4. Add or write code for your app tests. Use the helper functions in the ATSL in your test code.

You can use the code for the app tests in any of the sample apps as a starting point. The first app test, `testProvision`, executes BlackBerry Dynamics activation and unlock as an automated test.

Disable compliance settings so you can debug your app

Compliance profiles in BlackBerry UEM and compliance policies in standalone Good Control provide the ability to detect when a device OS is jailbroken and to initiate an enforcement action. This feature extends to deployed BlackBerry Dynamics apps, compiled with SDK version 5.0 or later, where an active debugging tool is detected. If the detect jailbroken compliance setting is enabled, the BlackBerry Dynamics Runtime stops a BlackBerry Dynamics app if it detects an active debugging tool.

If you want to debug one of your BlackBerry Dynamics apps in an environment where a compliance profile or policy is applied, the compliance setting to detect jailbroken devices must be disabled. Alternatively, you can use a non-debug build of your app to test it with the compliance setting enabled.

The setting to detect jailbroken devices is disabled by default in UEM compliance profiles and enabled by default in standalone Good Control compliance policies.

Using enterprise simulation mode

During the development and testing of your BlackBerry Dynamics app, you can run the app in enterprise simulation mode to verify its execution and functionality. This mode runs the app on an emulator (for example, the emulator that is supplied with the SDK). The user authentication process is simulated, so there is no direct communication with your organization's UEM or Good Control server. As a result, a valid activation key is not required to activate the app.

Enterprise simulation mode is intended for development environments only. Note that even though there is no communication with the management server, communication with the BlackBerry Dynamics NOC still occurs during the initial activation of the app. The BlackBerry Dynamics NOC must be accessible from your testing environment.

You will notice the following differences when you run the app in enterprise simulation mode:

- A [Simulated] label appears in the BlackBerry Dynamics Runtime user interface.
- Any email address and activation key (PIN) is accepted for enterprise activation.
- The provisioning and policy setup flow is only simulated in the UI.
- A hard-coded set of profiles and policies from the management server is applied. Authentication delegation is not supported.

You should also note the following:

- If you run an app that was built for enterprise simulation mode on an actual device and not on an emulator, the app will be wiped.
- If you try to change to simulation mode when the app is already installed on a device, the app will be wiped.
- Lost password recovery is not available.
- Inter-container Communication (ICC) cannot be used; as a result, the Shared Services Framework cannot be used.
- The Secure Storage, Secure Communication, and Push Channel APIs ([Android/iOS](#)) are all available in enterprise simulation mode. The communication APIs will not be able to connect to your organization's application servers through the BlackBerry Dynamics proxy infrastructure. You can make connections to your organization's application servers if, for example, the AVD is running on a computer on your organization's LAN or VPN.

Enable enterprise simulation mode

1. In the Xcode project navigator, in the **Supporting Files** folder, open the associated **.plist** file.
The prefix of the file includes the project name. For example, if the project name is FirstProject, the .plist file is named FirstProject-Info.plist. The file consists of a number of key-value pairs, including type.
2. Add a new row with the following values:
 - Key: **GDLibraryMode**
 - Type: **String (default)**
 - Value: **GDEnterpriseSimulation**

After you finish: To return to the default mode, delete the new row from the .plist file.

Troubleshooting common issues

Problem	Possible solution
Linking problems (for example, undefined symbols)	To verify that you included the necessary frameworks and libraries, check the appendix of the BlackBerry Dynamics SDK for iOS API Reference .
Access and password screens are poorly rendered	Verify that <code>GDAAssets.bundle</code> has been added to the Copy Bundle Resources build phase and that the copy of the bundle distributed with the framework has been added to the project.
App crashes	<ul style="list-style-type: none">• A crash in the early stages of the app lifecycle is most likely caused by a configuration issue. Review the errors printed in the logs for details.• Initialize the BlackBerry Dynamics libraries before calling any other BlackBerry Dynamics API.
Provisioning error	The email address or access key (PIN) has been incorrectly entered, or an old access key has been used. Double-check the credentials and, if necessary, send a new access key from the BlackBerry UEM management console.
Blank screen with keyboard when the app is launched	The BlackBerry Dynamics user interface is not correctly integrated with the app. Verify that <code>awakeFromNib</code> is implemented without warnings.
Blank screen after the password is entered	The app was authorized but failed to continue because the <code>GDAAppEventAuthorized</code> event passed to <code>handleEvent</code> was not handled correctly.
A device command from BlackBerry UEM, such as wipe or lock, did not go into effect immediately	The app was unauthorized but failed to stop running because the <code>GDAAppEventNotAuthorized</code> event passed to <code>handleEvent</code> was not handled correctly.

Logging and diagnostics

The processing activity of the BlackBerry Dynamics Runtime is logged by the runtime itself. The activity log is written to the BlackBerry Dynamics secure container on the device after deployment. You can configure how your BlackBerry Dynamics apps generate console log information. For more information about console logs controlled by developers and container logs controlled by UEM or Good Control administrators, see the BlackBerry Dynamics Runtime activity log appendix in the API reference ([Android/iOS](#)).

If your app uses SDK version 5.0 or later, and the UEM or Good Control administrator has turned off “Enable detailed logging for BlackBerry Dynamics apps” in the BlackBerry Dynamics profile (UEM) or security policy (Good Control), the app does not generate console log information. This provides additional protection against attacks by malicious users. This change has no impact on how container logs are generated.

The “Enable detailed logging for BlackBerry Dynamics apps” setting is off by default.

For BlackBerry Dynamics apps running SDK version 5.0 or later, console logs are generated only if this setting is turned on or if the app is running in enterprise simulation mode.

Configure logging for the Xcode console

The messages that are printed to the Xcode console can be configured in the build targets of the app project. Different targets can have different activity logging configurations. You can configure the logging to be detailed or selective. Changes to the console logging configuration take effect the next time the target is built and run, and do not affect the container log.

1. Open the app's **Info.plist** file.
2. Perform one of the following tasks:

Task	Steps
Configure detailed logging	<ol style="list-style-type: none">a. Add a new row with the following values:<ul style="list-style-type: none">• Key: GDConsoleLogger• Type: String• Value: GDFilterNoneb. In Xcode 9.3 or later, to view the detailed logs, open the console app (Window > Devices and Simulators, or from OSX, Applications > Utilities > Console.app) and enable the following settings in the Action menu:<ul style="list-style-type: none">• Include Info Messages• Include Debug Messages
Configure selective logging	<ol style="list-style-type: none">a. Add a new row with the following values:<ul style="list-style-type: none">• Key: GDConsoleLogger• Type: Arrayb. For each category that you want to omit from the console log, add a row under the logger row as an item in the logger's array. For each item, set the Type to String and the value to the desired logging level: GDFilterDetailed, GDFilterInfo, GDFilterWarnings, or GDFilterErrors.

Monitoring app log uploads by device users

You can use the `GLogManager` class ([Android/iOS](#)) to monitor app log file uploads that are initiated by your organization's device users. This class does not manage or display information about log uploads that are initiated by the UEM or standalone Good Control administrator, or by management console profiles or policies.

`GLogManager` provides the following information:

- Upload size
- Amount of data uploaded
- Events that indicate the following states:
 - Upload completed
 - Upload abandoned or canceled
 - Upload suspended
 - Upload resumed after suspension
- Actions for managing a log upload (cancel, suspend, resume)

When detailed logging is disabled by the management server profiles or policies, calling any API in the GDLogManager class has no effect. It is a best practice to check this setting using the `getApplicationConfig` API ([Android/iOS](#)). If detailed logging is enabled, present the log upload progress UI or any other related UI.

The following sample apps that are included in the BlackBerry Dynamics SDK for iOS demonstrate how to use GDLogManager:

- Objective-C samples: RSSReader, BypassUnlock, GreetingsClient, and GreetingsServer
- All Swift samples

Testing connectivity to application servers and diagnostic functions

You can use the [GDDiagnostic](#) class to test connectivity to application servers and other diagnostic functions.

The GreetingsClient sample app that is provided with the SDK demonstrates how to use the GDDiagnostic class.

Deploying your BlackBerry Dynamics app

Before you deploy your BlackBerry Dynamics app to your organization's production environment, you should test the app and the deployment process in a BlackBerry UEM or standalone Good Control environment that is reserved for development testing and evaluation. Coordinate with your organization's administrator to get access to a dedicated test environment.

BlackBerry Dynamics apps are fully supported for BlackBerry UEM and for standalone Good Control. BlackBerry UEM is the recommended enterprise management solution to implement and use going forward, because it provides advanced app and user management features, advanced connectivity and networking options, expanded compliance and integrity checking, and the most recent BlackBerry Web Services REST APIs that your apps can leverage.

See the following resources for more information about distributing and managing your app in a BlackBerry UEM environment:

Task	Resource
Add your app to BlackBerry UEM and distribute it to users	See the following topics in the <i>BlackBerry UEM Administration Guide</i> : <ul style="list-style-type: none">• Apps• Add an internal BlackBerry Dynamics app entitlement• Managing BlackBerry Dynamics apps
Configure BlackBerry Dynamics profiles that impact app functionality	See the following topics in the <i>BlackBerry UEM Administration Guide</i> : <ul style="list-style-type: none">• Controlling BlackBerry Dynamics on users devices• BlackBerry Dynamics profile settings• BlackBerry Dynamics connectivity profile settings• Assigning profiles
Collect activity and compliance violation information for BlackBerry Dynamics apps	See the following topic in the <i>BlackBerry UEM Administration Guide</i> : <ul style="list-style-type: none">• Activity and compliance violation reports for BlackBerry Dynamics apps

For more information about testing and distributing BlackBerry Dynamics apps using standalone Good Control, see [Developer Bootstrap: Good Control Essentials](#) and the [Good Control documentation](#).

Configuring library version compliance

In a compliance profile or compliance policy, an administrator can enable the BlackBerry Dynamics library version verification compliance rule to specify an enforcement action if a BlackBerry Dynamics app is using a version of the BlackBerry Dynamics library that is not permitted. The available enforcement actions are "Do not allow BlackBerry Dynamics apps to run" and "Delete BlackBerry Dynamics app data."

In UEM, by default the BlackBerry Dynamics library version verification compliance rule is not selected and all versions are permitted. An administrator can enable this option and select specific versions to disallow.

In standalone Good Control 5.0, the following options are available:

- Allow all BlackBerry Dynamics library versions: Apps that use any version of the SDK library are allowed. If this option is enabled, the administrator cannot select specific versions to allow or disallow. By default, this option is disabled.
- Allow unlisted BlackBerry Dynamics library versions: Apps that use versions of the SDK library that are newer than the latest version listed in the compliance rule are allowed. The administrator can still allow or disallow specific versions of the library from the version list. By default, this option is enabled.

Consult with the UEM or Good Control administrator to ensure that the compliance rule is configured appropriately.

Instructing users to trust the signing certificate

When a user opens a custom BlackBerry Dynamics app that has been deployed and installed on their device, the user is prompted to trust the organization that signed the app. An administrator should instruct users to complete this step. If a user does not trust the signing organization, the device will display a warning each time the user opens the app.

Deploying certificates to BlackBerry Dynamics apps

You can use any of the following options to deploy certificates to BlackBerry Dynamics apps. Each method requires configuration in the BlackBerry UEM or standalone Good Control management console. Coordinate with your organization's administrator to select and configure the desired option.

Option	For more information
Personal Information Exchange files	See Using Personal Information Exchange files in this section.
CA certificate profile	See Sending CA certificates to devices and apps in the <i>UEM Administration Guide</i> .
User credential profile	See Sending client certificates to devices and apps using user credential profiles in the <i>UEM Administration Guide</i> .
SCEP profile	See Sending client certificates to devices and apps using SCEP in the <i>UEM Administration Guide</i> .
Shared certificate profile	See Sending the same client certificate to multiple devices in the <i>UEM Administration Guide</i> .

After certificates are distributed to a user's device, those certificates are shared and used by all of the BlackBerry Dynamics apps on the device. No additional programming is required by the app developer to support client certificates.

The management server and BlackBerry Dynamics apps also support the use of Kerberos for service authentication. For more information, see [Using Kerberos](#) in this section.

The SDK also provides a Crypto C language programming interface that allows an app to retrieve public key certificates that are stored in the BlackBerry Dynamics credentials store and use those certificates for signing and verification of messages and documents such as PDFs. Note that BlackBerry Infrastructure certificates cannot be retrieved from the store and that the private key will remain inaccessible. For more information, see the Crypto C Programming Interface appendix ([Android/iOS](#)) in the API reference.

Using Personal Information Exchange files

An organization can deploy corporate services that require two-way SSL/TLS authentication for users. A user is issued a password-protected Personal Information Exchange file (PKCS12 format, .p12 or .pfx) containing an SSL/TLS client certificate and a private key. This file can be provided to BlackBerry Dynamics apps to grant access to secure corporate services.

The BlackBerry Dynamics SDK supports the use of Personal Information Exchange files to authenticate BlackBerry Dynamics apps and to access secure services. All of the required operations to support client certificates are carried out by the BlackBerry Dynamics Runtime, with no additional programming required. The app can use client certificates if:

- The app uses the BlackBerry Dynamics Secure Communication Networking APIs.
- The device user's UEM or standalone Good Control account is [configured to support certificates](#).
- The certificates satisfy the [certificate requirements](#).

After a user activates a BlackBerry Dynamics app, the app receives the Personal Information Exchange files. For each file, the user is prompted to provide the issued password so that the files and identification material can be installed. When this process is complete, the app can access the server resources that require two-way SSL/TLS authentication.

If more than one Personal Information Exchange file is required per user, the BlackBerry Dynamics Runtime selects the appropriate certificate using the following criteria:

1. Only client certificates that are suitable for SSL/TLS client authentication are eligible to send to the server. Certificates must have no Key Usage or Extended Key Usage, or Key Usage that contains "Digital Signature" or "Key Agreement", or Extended Key Usage that contains "TLS Web Client Authentication". Key Usages and Extended Key Usages must not contradict allowances for SSL/TLS client authentication.
2. If the server advertises the client certificate authority in the SSL/TLS handshake, only client certificates that have been issued by that authority are considered.
3. Expired certificates and certificates that are not yet valid cannot be selected.
4. If more than one certificate satisfies the above criteria, the BlackBerry Dynamics Runtime selects the most recently issued certificate.

Configuring support for client certificates

Certificate support is configured in the BlackBerry UEM or standalone Good Control management console by the administrator. Contact your organization's administrator to configure certificate support for BlackBerry Dynamics apps.

For more information about configuring certificate support in BlackBerry UEM, see the following:

- [Manage settings for a BlackBerry Dynamics app](#) in the *UEM Administration Guide*
- [Sending certificates to devices using profiles](#) in the *UEM Administration Guide*
- [Connect BlackBerry UEM to a BlackBerry Dynamics PKI Connector](#) in the *UEM Administration Guide*

For more information about configuring certificate support in standalone Good Control, see the [Good Control and Good Proxy Admin Help](#).

Certificate requirements

- Client certificates must be in PKCS12 format, with the Certificate Authority (CA), public key, and private key in the same file.
- The PKCS12 file must have a .p12 or .pfx extension
- The PKCS12 file must be password-protected
- The source of the certificate can be your own internal CA, a well-known public CA, or an online tool such as OpenSSL or the Java keytool. You can use the following keytool example to generate a certificate, substituting your own values as required:

```
keytool -genkeypair -alias good123 -keystore good123.pfx -storepass good123 -  
validity 365 -keyalg RSA -keysize 2048 -storetype pkcs12
```

- If the organization's security policy uses FIPS standards, Personal Information Exchange files must be encrypted with FIPS-strength ciphers. If Personal Information Exchange files use a weak cipher, which is common for third-party applications when exporting identity material, you can use a tool like OpenSSL to re-encrypt the files with a FIPS-strength cipher. See the following example:

```
openssl pkcs12 -in weak.p12 -nodes -out decrypted.pem  
    <enter password>  
openssl pkcs12 -export -in decrypted.pem -keypbe AES-128-CBC -certpbe  
AES-128-CBC -out strong.p12  
    <enter password>
```

```
rm decrypted.pem
```

Using Kerberos

BlackBerry Dynamics apps support both Kerberos PKINIT with PKI certificates and Kerberos Constrained Delegation. Kerberos PKINIT and Kerberos Constrained Delegation are distinct implementations of Kerberos. You can support one or the other for BlackBerry Dynamics apps, but not both.

With Kerberos PKINIT, authentication occurs directly between the BlackBerry Dynamics app and the Windows Key Distribution Center (KDC). User authentication is based on certificates that are issued by Microsoft Active Directory Certificate Services. No additional programming is required by the app developer to use Kerberos PKINIT.

With Kerberos Constrained Delegation, authentication is based on a trust relationship between the management server (BlackBerry UEM or standalone Good Control) and a KDC. The management server communicates with the service on behalf of the app.

Note: The BlackBerry Dynamics GDHTTPRequest method does not support Kerberos Constrained Delegation (KCD). If you plan to develop iOS apps for use with KCD, you can use the NSURLSystem provided by Apple instead.

For more information about how to configure the desired Kerberos implementation in UEM, including requirements and prerequisites, see [Configuring Kerberos for BlackBerry Dynamics apps](#) in the *UEM Administration Guide*.

For more information about configuring the desired Kerberos implementation in Good Control, see the [Good Control and Good Proxy Admin Help](#) and [Kerberos Constrained Delegation with Good Control](#).

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