JSONStore in iOS applications

Overview

IBM MobileFirst Platform Foundation's **JSONStore** is an optional client-side API providing a lightweight, document-oriented storage system. JSONStore enables persistent storage of **JSON documents**. Documents in an application are available in JSONStore even when the device that is running the application is offline. This persistent, always-available storage can be useful to give users access to documents when, for example, there is no network connection available in the device.

Key features

- Data indexing for efficient searching
- Data encryption in production environments
- Mechanism for tracking local-only changes to the stored data
- Support for multiple users

> **Note:** Some features such as data encryption are beyond the scope of this tutorial. All features are documented in detail in the IBM MobileFirst Platform Foundation user documentation website.

Prerequisite: Make sure the MobileFirst Native SDK was added to the Xcode project. Follow the Adding the MobileFirst Platform Foundation SDK to iOS applications (../../adding-the-mfpf-sdk/ios/) tutorial.

Jump to:

Adding JSONStore

1. Add the following to the existing `podfile`, located at the root of the Xcode project:

   ```
   pod 'IBMMobileFirstPlatformFoundationJSONStore'
   ```

2. From a **Command-line** window, navigate to the root of the Xcode project and run the command: `pod install` - note that this action may take a while.

Whenever you want to use JSONStore, make sure that you import the JSONStore header:
Objective-C:

```
#import <IBMMobileFirstPlatformFoundationJSONStore/IBMMobileFirstPlatformFoundationJSONStore.h>
```

Swift:

```
import IBMMobileFirstPlatformFoundationJSONStore
```

Basic Usage

Open

Use `openCollections` to open one or more JSONStore collections.

Starting or provisioning a collections means creating the persistent storage that contains the collection and documents, if it does not exists.
If the persistent storage is encrypted and a correct password is passed, the necessary security procedures to make the data accessible are run.

For optional features that you can enable at initialization time, see **Security, Multiple User Support** and **MobileFirst Adapter Integration** in the second part of this tutorial.

```
let collection:JSONStoreCollection = JSONStoreCollection(name: "people")

collection.setSearchField("name", withType: JSONStore_String)
collection.setSearchField("age", withType: JSONStore_Integer)

do {
  try JSONStore.sharedInstance().openCollections([collection], withOptions: nil)
} catch let error as NSError {
  // handle error
}
```

Get

Use `getCollectionWithName` to create an accessor to the collection. You must call `openCollections` before you call `getCollectionWithName`.

```
let collectionName:String = "people"
let collection:JSONStoreCollection = JSONStore.sharedInstance().getCollectionWithName(collectionNa
me)
```

The variable `collection` can now be used to perform operations on the `people` collection such as `add`, `find`, and `replace`.

Add

Use `addData` to store data as documents inside a collection.

```
let collectionName:String = "people"
let collection:JSONStoreCollection = JSONStore.sharedInstance().getCollectionWithName(collectionNa
me)

let data = ["name" : "yoel", "age" : 23]

do  {
  try collection.addData([data], andMarkDirty: true, withOptions: nil)
} catch let error as NSError {
  // handle error
}
```

Find

Use `findWithQueryParts` to locate a document inside a collection by using a query. Use `findAllWithOptions` to retrieve all the documents inside a collection. Use `findWithIds` to search by the document unique identifier.

```
let collectionName:String = "people"
let collection:JSONStoreCollection = JSONStore.sharedInstance().getCollectionWithName(collectionNa
me)

let options:JSONStoreQueryOptions = JSONStoreQueryOptions()
// returns a maximum of 10 documents, default: returns every document
options.limit = 10

let query:JSONStoreQueryPart = JSONStoreQueryPart()
query.searchField("name", like: "yoel")

do  {
  let results:NSArray = try collection.findWithQueryParts([query], andOptions: options)
} catch let error as NSError {
  // handle error
}
```

Replace

Use `replaceDocuments` to modify documents inside a collection. The field that you use to perform the replacement is `_id,` the document unique identifier.

```
let collectionName:String = "people"
let collection:JSONStoreCollection = JSONStore.sharedInstance().getCollectionWithName(collectionNa
me)

var document:Dictionary<String,AnyObject> = Dictionary()
document["name"] = "chevy"
document["age"] = 23

var replacement:Dictionary<String, AnyObject> = Dictionary()
replacement["_id"] = 1
replacement["json"] = document

do {
  try collection.replaceDocuments([replacement], andMarkDirty: true)
} catch let error as NSError {
  // handle error
}
```

This examples assumes that the document `{_id: 1, json: {name: 'yoel', age: 23} }` is in the collection.

Remove

Use `removeWithIds` to delete a document from a collection. Documents are not erased from the collection until you call `markDocumentClean`. For more information, see the **MobileFirst Adapter Integration** section later in this tutorial.

```
let collectionName:String = "people"
let collection:JSONStoreCollection = JSONStore.sharedInstance().getCollectionWithName(collectionNa
me)

do {
  try collection.removeWithIds([1], andMarkDirty: true)
} catch let error as NSError {
  // handle error
}
```

Remove Collection

Use `removeCollection` to delete all the documents that are stored inside a collection. This operation is similar to dropping a table in database terms.

```
let collectionName:String = "people"
let collection:JSONStoreCollection = JSONStore.sharedInstance().getCollectionWithName(collectionNa
me)

do {
  try collection.removeCollection()
} catch let error as NSError {
  // handle error
}
```

Destroy

Use `destroyData` to remove the following data:

- All documents
- All collections
- All Stores - See **Multiple User Support** later in this tutorial
- All JSONStore metadata and security artifacts - See **Security** later in this tutorial

```
do {
  try JSONStore.sharedInstance().destroyData()
} catch let error as NSError {
  // handle error
}
```

Advanced Usage

Security

You can secure all the collections in a store by passing a `JSONStoreOpenOptions` object with a password to the `openCollections` function. If no password is passed, the documents of all the collections in the store are not encrypted.

Some security metadata is stored in the keychain (iOS).
The store is encrypted with a 256-bit Advanced Encryption Standard (AES) key. All keys are strengthened with Password-Based Key Derivation Function 2 (PBKDF2).

Use `closeAllCollections` to lock access to all the collections until you call `openCollections` again. If you think of `openCollections` as a login function you can think of `closeAllCollections` as the corresponding logout function.

Use `changeCurrentPassword` to change the password.

```
let collection:JSONStoreCollection = JSONStoreCollection(name: "people")
collection.setSearchField("name", withType: JSONStore_String)
collection.setSearchField("age", withType: JSONStore_Integer)

let options:JSONStoreOpenOptions = JSONStoreOpenOptions()
options.password = "123"

do {
  try JSONStore.sharedInstance().openCollections([collection], withOptions: options)
} catch let error as NSError {
  // handle error
}
```

Multiple User Support

You can create multiple stores that contain different collections in a single MobileFirst application. The `openCollections` function can take an options object with a username. If no username is given, the default username is "jsonstore".

```
let collection:JSONStoreCollection = JSONStoreCollection(name: "people")
collection.setSearchField("name", withType: JSONStore_String)
collection.setSearchField("age", withType: JSONStore_Integer)

let options:JSONStoreOpenOptions = JSONStoreOpenOptions()
options.username = "yoel"

do {
  try JSONStore.sharedInstance().openCollections([collection], withOptions: options)
} catch let error as NSError {
  // handle error
}
```

MobileFirst Adapter Integration

This section assumes that you are familiar with MobileFirst adapters. MobileFirst Adapter Integration is optional and provides ways to send data from a collection to an adapter and get data from an adapter into a collection.

You can achieve these goals by using functions such as `WLResourceRequest`.

Adapter Implementation

Create a MobileFirst adapter and name it "**People**". Define it's procedures `addPerson`, `getPeople`, `pushPeople`, `removePerson`, and `replacePerson`.

```
function getPeople() {
    var data = { peopleList : [{name: 'chevy', age: 23}, {name: 'yoel', age: 23}] };
    WL.Logger.debug('Adapter: people, procedure: getPeople called.');
    WL.Logger.debug('Sending data: ' + JSON.stringify(data));
    return data;
}
function pushPeople(data) {
    WL.Logger.debug('Adapter: people, procedure: pushPeople called.');
    WL.Logger.debug('Got data from JSONStore to ADD: ' + data);
    return;
}
function addPerson(data) {
    WL.Logger.debug('Adapter: people, procedure: addPerson called.');
    WL.Logger.debug('Got data from JSONStore to ADD: ' + data);
    return;
}
function removePerson(data) {
    WL.Logger.debug('Adapter: people, procedure: removePerson called.');
    WL.Logger.debug('Got data from JSONStore to REMOVE: ' + data);
    return;
}
function replacePerson(data) {
    WL.Logger.debug('Adapter: people, procedure: replacePerson called.');
    WL.Logger.debug('Got data from JSONStore to REPLACE: ' + data);
    return;
}
```

Load data from MobileFirst Adapter

To load data from a MobileFirst Adapter use `WLResourceRequest`.

```
// Start - LoadFromAdapter
class LoadFromAdapter: NSObject, WLDelegate {
  func onSuccess(response: WLResponse!) {
    let responsePayload:NSDictionary = response.getResponseJson()
    let people:NSArray = responsePayload.objectForKey("peopleList") as! NSArray
    // handle success
  }

  func onFailure(response: WLFailResponse!) {
    // handle failure
  }
}
// End - LoadFromAdapter

let pull = WLResourceRequest(URL: NSURL(string: "/adapters/People/getPeople"), method: "GET")

let loadDelegate:LoadFromAdapter = LoadFromAdapter()
pull.sendWithDelegate(loadDelegate)
```

Get Push Required (Dirty Documents)

Calling `allDirty` returns and array of so called "dirty documents", which are documents that have local modifications that do not exist on the back-end system.

```
let collectionName:String = "people"
let collection:JSONStoreCollection = JSONStore.sharedInstance().getCollectionWithName(collectionNa
me)

do {
  let dirtyDocs:NSArray = try collection.allDirty()
} catch let error as NSError {
  // handle error
}
```

To prevent JSONStore from marking the documents as "dirty", pass the option `andMarkDirty:false` to `add`, `replace`, and `remove`.

Push changes

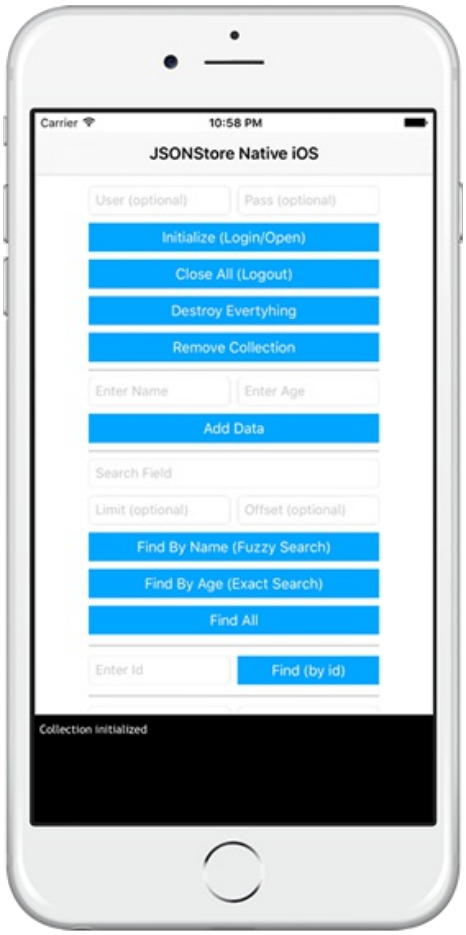
To push changes to a MobileFirst adapter, call the `allDirty` to get a list of documents with modifications and then use `WLResourceRequest`. After the data is sent and a successful response is received make sure you call `markDocumentsClean`.

```
// Start - PushToAdapter
class PushToAdapter: NSObject, WLDelegate {
  func onSuccess(response: WLResponse!) {
    // handle success
  }

  func onFailure(response: WLFailResponse!) {
    // handle failure
  }
}
// End - PushToAdapter

let collectionName:String = "people"
let collection:JSONStoreCollection = JSONStore.sharedInstance().getCollectionWithName(collectionNa
me)

do {
  let dirtyDocs:NSArray = try collection.allDirty()
  let pushData:NSData = NSKeyedArchiver.archivedDataWithRootObject(dirtyDocs)

  let push = WLResourceRequest(URL: NSURL(string: "/adapters/People/pushPeople"), method: "POST
")

  let pushDelegate:PushToAdapter = PushToAdapter()
  push.sendWithData(pushData, delegate: pushDelegate)

} catch let error as NSError {
  // handle error
}
```

Sample application

The JSONStoreSwift project contains a native iOS Swift application that utilizes the JSONStore API set.
Included is a JavaScript adapter Maven project.

Click to download (https://github.com/MobileFirst-Platform-Developer-Center/JSONStoreSwift/tree/release80) the Native iOS project.
Click to download (https://github.com/MobileFirst-Platform-Developer-Center/JSONStoreAdapter/tree/release80) the adapter Maven project.



Sample usage

1. From the command line, navigate to the project's root folder.
2. Ensure the sample is registered in the MobileFirst Server by running the command: `mfpdev app register`.
3. The sample uses the `JSONStoreAdapter` contained in the Adapters Maven project. Use either Maven or MobileFirst Developer CLI to build and deploy the adapter (../../adapters/creating-adapters/).
4. Import the project to Xcode, and run the sample by clicking the **Run** button.