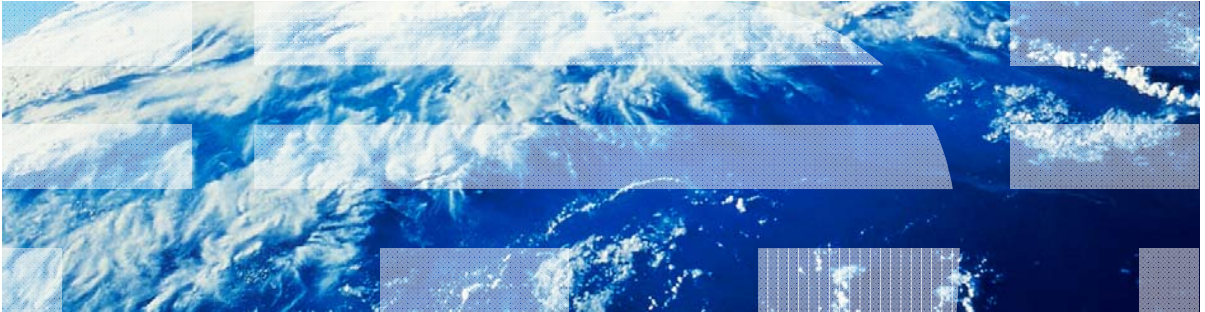


IBM Worklight V6.0.0 Getting Started

Storing sensitive data in Encrypted Cache



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Agenda

- What is encrypted cache?
- Features
- Supported browsers and devices
- Create and Open
- Read, Write, and Remove
- Close and Destroy
- Change encryption key
- Exercise

What is encrypted cache?

- Encrypted cache is a mechanism for storing sensitive data on the client side
- Encrypted cache is implemented by using HTML5 web storage technology, which allows data to be saved locally and retrieved on subsequent application use or relaunch
- Data is encrypted with a combination of user-provided key and server-retrieved randomly generated token, which makes it more secure
- Data is stored in key-value pairs
- Encrypted cache is like a security deposit box – it remains open until you close it, so remember to close the cache when you finish working with it

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Features (1 of 2)

- Encrypted cache is similar to technologies such as:
 - Local web or DOM storage
 - Indexed database API
 - Cordova API: Storage API or File API
 - JSONStore
- The table on the next slide shows how some features provided by encrypted cache compare with other technologies.

Features (2 of 2)

| | JSONStore | Encrypted Cache | Local Storage | Indexed DB | Cordova Storage | Cordova File |
|-------------------------|-----------------|-------------------|-------------------|----------------|------------------|-----------------|
| Android Support | Yes | Yes | Yes | Yes | Yes | Yes |
| iOS Support | Yes | Yes | Yes | Yes | Yes | Yes |
| Web | Dev. Only (3) | Yes | Yes | Yes | - | - |
| Data Encryption (1) | Yes | Yes | - | - | - | - |
| Maximum Storage | Available space | ~ 5 MB | ~ 5 MB | > 5 MB | Available space | Available space |
| Reliable Storage (2) | Yes | - | - | - | Yes | Yes |
| Adapter Integration (1) | Yes | - | - | - | - | - |
| Multi User Support (1) | Yes | - | - | - | - | - |
| Indexing | Yes | - | - | Yes | Yes | - |
| Type of Storage | JSON Documents | Key – value pairs | Key – value pairs | JSON Documents | Relational (SQL) | Strings |

- > (1): These features are further described in the module **JSONStore – Common JSONStore usage**.
- > (2): *Reliable Storage* means that your data is not deleted unless the application is removed from the device or one of the methods that removes data is called.
- > (3): *Dev. Only* means that it is designed only for development. There are no security features and a ~5 MB storage space limit.



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Supported browsers and devices

- Encrypted cache is implemented using HTML5 web storage technology
- Mobile devices HTML5 web storage support chart

| Show all versions | iOS Safari | Opera Mini | Opera Mobile | Android Browser | |
|-----------------------------------|------------|------------|--------------|-----------------|-----|
| 3 versions back | 3.2 | | | | |
| 2 versions back | 4.0-4.1 | | 10.0 | 2.1 | |
| Previous version | 4.2-4.3 | | 11.0 | 2.2 | |
| Current | 5.0 | 5.0-6.0 | 11.1 | 2.3 | 3.0 |
| Near future | | | | 4.0 | |
| Farther future | | | | | |

 = Supported  = Not supported

- For additional information, see <http://caniuse.com>

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Creating and opening encrypted cache

- To create or open previously created encrypted cache, use the following API:
 - **WL.EncryptedCache.open(credentials, createlfNone, onComplete, onError);**
 - credentials – string value representing user-provided password
 - createlfNone – Boolean value specifying whether new encrypted cache should be created if none is found
 - onComplete – a callback function to be invoked when cache opening/creating is complete
 - onError - a callback function to be invoked when cache is not successfully opened/created.

```
WL.EncryptedCache.open(key, true, onOpenComplete, onOpenError);  
function onOpenComplete(status){  
    alert("Encrypted cache succesfully opened");  
}
```

- Note: The application must be able to connect to Worklight® Server to create a new encrypted cache.

Creating and opening encrypted cache

- A callback function can receive one of the following statuses:
 - **WL.EncryptedCache.OK** – Encrypted cache was successfully opened or created
 - **WL.EncryptedCache.ERROR_CREDENTIALS_MISMATCH** – an attempt was made to open existing encrypted cache using wrong credentials
 - **WL.EncryptedCache.ERROR_SECURE_RANDOM_GENERATOR_UNAVAILABLE** – unable to generate random token due to Worklight® Server unavailability
 - **WL.EncryptedCache.ERROR_NO_EOC** – could not open encrypted cache because it was not previously created
 - **WL.EncryptedCache.ERROR_LOCAL_STORAGE_NOT_SUPPORTED** – device does not support HTML5 local storage
 - **WL.EncryptedCache.ERROR_KEY_CREATION_IN_PROGRESS** – an open() or changeCredentials() request is already running

Creating and opening encrypted cache

```
WL.EncryptedCache.open(key, true, onOpenComplete, onOpenError);  
function onOpenComplete(status){  
    alert("Encrypted cache succesfully opened");  
}  
function onOpenError(status){  
    busyIndicator.hide();  
    switch(status){  
        case WL.EncryptedCache.ERROR_KEY_CREATION_IN_PROGRESS:  
            alert("ERROR: KEY CREATION IN PROGRESS");  
            break;  
        case WL.EncryptedCache.ERROR_LOCAL_STORAGE_NOT_SUPPORTED:  
            alert("ERROR: LOCAL STORAGE NOT SUPPORTED");  
            break;  
        case WL.EncryptedCache.ERROR_NO_EOC:  
            alert("ERROR: NO EOC");  
            break;  
        case WL.EncryptedCache.ERROR_COULD_NOT_GENERATE_KEY:  
            alert("ERROR: COULD NOT GENERATE KEY");  
            break;  
        case WL.EncryptedCache.ERROR_CREDENTIALS_MISMATCH:  
            alert("ERROR: CREDENTIALS MISMATCH");  
            break;  
    }  
}
```

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Reading, writing, and removing data with encrypted cache

- When the encrypted cache is open, you can perform operations on it such as reading, writing, and removing data
- To store data in encrypted cache, use the following API:
 - `WL.EncryptedCache.write(credentials, value, onSuccess, onFailure);`

```
WL.EncryptedCache.write(key, value, onWriteSuccess, onWriteFailure);  
function onWriteSuccess(status){  
    alert("Successfully encrypted into cache.");  
}  
function onWriteFailure(status){  
    if (status == WL.EncryptedCache.ERROR_EOC_CLOSED)  
        alert("Encrypted cache closed, write failed. error code= "+ status);  
}
```

Reading, writing, and removing data with encrypted cache

- To read data from the encrypted cache, use the following API:
 - WL.EncryptedCache.read(credentials, onSuccess, onFailure);

```
WL.EncryptedCache.read(key, onDecryptReadSuccess, onDecryptReadFailure);  
function onDecryptReadSuccess(value){  
    alert("Read success. Retrieved value :: " + key + " = " + value);  
}  
function onDecryptReadFailure(status){  
    alert("Encrypted cache closed, reading failed");  
}
```

- To remove data from the encrypted cache, use the following API:
 - WL.EncryptedCache.remove(key, onSuccess, onFailure);

```
WL.EncryptedCache.remove(key, onRemoveSuccess, onRemoveFailure);  
function onRemoveSuccess(status){  
    alert("Successfully removed from cache.");  
}  
function onRemoveFailure(status){  
    alert("Encrypted cache closed, remove failed");  
}
```


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Closing and destroying encrypted cache

- To avoid possible undesired access to encrypted cache, close it
- After encrypted cache is closed, access to its data is not possible without the encryption key that was used to create it
- To close the encrypted cache, use the following API:
 - `WL.EncryptedCache.close(onComplete, onFailure);`

```
function closeCacheClicked(){
    WL.EncryptedCache.close(onCloseCompleteHandler, onCloseFailureHandler);
}
function onCloseCompleteHandler(status){
    alert("Encrypted cache closed successfully");
}
function onCloseFailureHandler(status){
    alert("Could not close Encrypted cache");
}
```

Closing and destroying encrypted cache

- Encrypted cache can be wiped from the local storage
- After encrypted cache is destroyed there is no way to return the data that was stored in it
- Destroy encrypted cache only if you are sure that data stored in it will never be required again, or as a last measure if the encryption key is lost
- To destroy an encrypted cache, use the following API:
 - WL.EncryptedCache.destroy(onComplete, onError);

```
function destroyCacheClicked(){
    WL.EncryptedCache.destroy(onDestroyCompleteHandler, onDestroyErrorHandler);
}
function onDestroyCompleteHandler(status){
    alert("Encrypted cache destroyed");
}
function onDestroyErrorHandler(status){
    alert("Error destroying Encrypted cache");
}
```

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- Close and Destroy
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- Exercise

Change encryption key

- While encrypted cache is in the open state, it is possible to change the encryption key
- To do so, use the following API:
 - **WL.EncryptedCache.changeCredentials(credentials, onComplete, onError)**
 - **credentials** – new user password to be used.
 - **onComplete** – a callback function to be invoked when complete.
 - **onError** – a callback function to be invoked in case of an error.
- Callback receives a status object with same structure as WL.EncryptedCache.open()

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Exercise

- Create an application that performs the following functions:
 - Creates an encrypted cache with a user-provided encryption key
 - Stores some key-value pair data in it
 - Closes the encrypted cache
 - Tries to access encrypted data while cache is in closed mode
 - Tries to open encrypted cache with an invalid encryption key
 - Opens encrypted cache with the correct encryption key
 - Retrieves previously stored data from encrypted cache
 - Closes encrypted cache
 - Destroys encrypted cache

Exercise

- The sample for this training module can be found in the Getting Started page of the IBM Worklight documentation website at <http://www.ibm.com/mobile-docs>

The image displays three sequential screenshots of the 'Encrypted Cache' application interface, illustrating the process of encrypting and then attempting to decrypt data.

Left Screenshot: The application title is 'Encrypted Cache'. It features an 'Encryption key:' field with an empty input box. Below this are three buttons: 'Open cache', 'Close cache', and 'Destroy cache'. The 'Data to encrypt:' section includes a 'Key:' field with an empty input box and a 'Value:' field with an empty input box. At the bottom of this section are three buttons: 'Encrypt key/value', 'Decrypt key', and 'Remove key'.

Middle Screenshot: The application title is 'Encrypted Cache'. The 'Encryption key:' field now contains the value '123'. The 'Data to encrypt:' section has 'Key:' set to 'cityName' and 'Value:' set to 'New York'. A system dialog box is overlaid on the screen, titled 'The page at 192.168.1.34:8080 says:', with the message 'Successfully encrypted into cache.' and an 'OK' button.

Right Screenshot: The application title is 'Encrypted Cache'. The 'Encryption key:' field contains '123'. The 'Data to encrypt:' section has 'Key:' set to 'cityName' and 'Value:' set to 'New York'. A system dialog box is overlaid on the screen, titled 'The page at 192.168.1.34:8080 says:', with the message 'Encrypted cache closed, reading failed' and a checkbox labeled 'Prevent this page from creating additional dialogs.' (which is unchecked). An 'OK' button is at the bottom right of the dialog.

Check yourself questions

- Connectivity to Worklight Server is required only in order to:
 - Create a new encrypted cache
 - Open an existing encrypted cache
 - Read and write values to encrypted cache
 - Destroy encrypted cache
- Which of the following APIs is synchronous and does not require callbacks to be set up?
 - WL.EncryptedCache.open
 - WL.EncryptedCache.read
 - WL.EncryptedCache.destroy
 - All encrypted cache APIs are asynchronous and require setting up callbacks for success and failure
- Which of the following sentences correctly describes the encrypted cache?
 - Encrypted cache is stored in the device native storage. Its size is limited by the free space on a device, therefore large amounts of data can be stored.
 - HTML5 WebStorage is used for storing encrypted cache; therefore the amount of data stored in it is limited to several megabytes
 - Encrypted cache is stored on Worklight Server. Its size is limited by the free space in the Worklight Server database, therefore large amounts of data can be stored
 - Encrypted cache is stored in virtual memory. Its size is limited by the device RAM and it is erased each time the user quits the application.

Check yourself questions

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