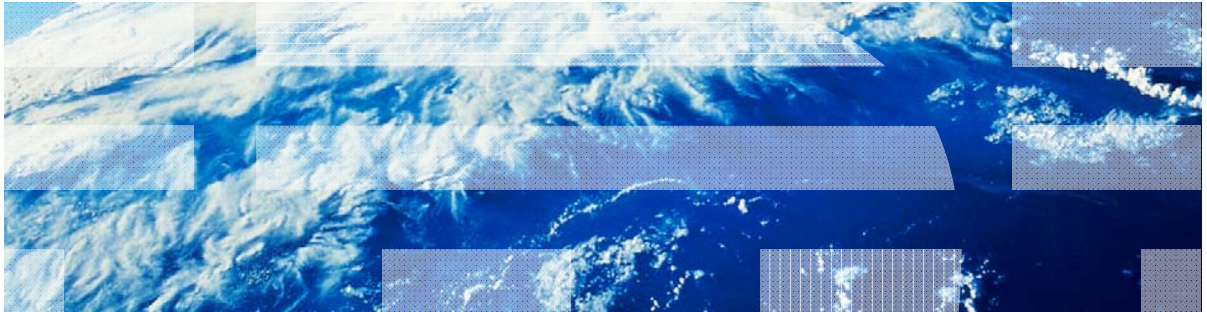*IBM Worklight V6.0.0*
Getting Started

JSONStore – The client-side JSON-based database overview

Trademarks

- IBM, the IBM logo, and ibm.com are trademarks or registered trademarks of International Business Machines Corporation, registered in many jurisdictions worldwide. Worklight is a trademark or registered trademark of Worklight, an IBM Company. Other product and service names might be trademarks of IBM or other companies. A current list of IBM trademarks is available on the Web at "Copyright and trademark information" at www.ibm.com/legal/copytrade.shtml.

- Java and all Java-based trademarks and logos are trademarks or registered trademarks of Oracle and/or its affiliates.

- Other company products or service names may be trademarks or service marks of others.

- This document may not be reproduced in whole or in part without the prior written permission of IBM.

About IBM®

- See http://www.ibm.com/ibm/us/en/

Agenda

- Overview
- JSONStore terms
  - Document
  - Collection
  - Store
  - Search fields and additional Search fields
  - Queries
- Store internals
- Error object

Introduction

- JSONStore is a JavaScript™ API for storing data inside hybrid IBM Worklight® applications.

- JSONStore is based on JavaScript Object Notation (JSON).

- This module and the following module **JSONStore – Common JSONStore usage** are for you to get started with the JSONStore feature of IBM Worklight JSONStore.

  – For more information about JSONStore, see the IBM Worklight user documentation at:

    • http://pic.dhe.ibm.com/infocenter/wrklight/v6r0m0/topic/com.ibm.worklight.help.doc/devref/c_jsonstore_overview.html

    • http://pic.dhe.ibm.com/infocenter/wrklight/v6r0m0/topic/com.ibm.worklight.help.doc/devref/c_wl_jsonstore_core_api.html for the API

Features (1 of 2)

- JSONStore is similar to technologies such as:

  - Local web or DOM storage

  - Indexed database API

  - Cordova API: Storage API or File API

  - IBM Worklight Encrypted Cache

- The table on the next slide shows how some features provided by JSONStore 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.

Agenda

- Overview
- JSONStore terms
  - Document
  - Collection
  - Store
  - Search fields and additional Search fields
  - Queries
- Store internals
- Error object

Note: Relational databases and JSONStore

- The relational database terminology is used in this module to help define and explain the terminology related to JSONStore.

- However, remember that JSONStore is not a relational database.

  - For example, the way data is structured through schemas when using a relational database differs to the JSONStore approach, where you can store any JSON content, and index what you need to search on.

Document

- A **document** is a JavaScript object with an automatically generated identifier (*_id*) and JSON data.
  - It is similar to a *record* or to a *row* in the database terminology.

- Example:

```javascript
var doc = {
    _id: 1,
    json: {
        name: 'carlos',
        age: 99
    }
};
```

Collection

- A **collection** is a named logical grouping of related documents.
  - It is similar to a *table* in the database terminology.

- Example -- **Customer Collection**

```
[
    { _id: 1, json: {name: 'carlos', age: 99} },
    { _id: 2, json: {name: 'tim', age: 100} },
]
```

Store

- The **store** is the persistent *file* on the device that holds the contents of one or more collections.
  - It is similar to a *database* in the database terminology.

Search fields and additional search fields (1 of 2)

- A **search field** is a JavaScript object with a key and a data type.
  - These keys are indexed for fast look-up times.
  - It is like column fields or attributes in the database terminology.
- **Additional search fields** are keys that are indexed, but are not part of the JSON data that is stored
  - For an example of how to use additional search fields, see the module **JSONStore – Common JSONStore usage** and the associated code sample.

Search fields and additional search fields (2 of 2)

- These fields define the key whose values (in a given JSON collection) will be indexed, and therefore used to search faster.

- These fields can be of the following data types: `string`, `boolean`, `number` and `integer`.

  – These types determine how indexable fields are stored.

  – For example: defining {age: 'number'} indexes 1 as 1.0, while defining{age: 'integer'} indexes 1 as 1.

- Examples:

```
var searchField = {name: 'string', age: 'integer'};

var additionalSearchField = {key: 'string'};
```

Queries

- Queries are JavaScript objects that use search fields or additional search fields to look for documents.

- The following example presumes that **name** and **age** are search fields, of types **string** and **integer** respectively.

- Examples:

  – Find documents with **name** that matches **carlos**:

```
var query1 = {name: 'carlos'};
```

  – Find documents with **name** that matches carlos **and** age that matches 99:

```
var query2 = {name: 'carlos', age: 99};
```

Agenda

- Overview

- JSONStore terms

  - Document

  - Collection

  - Store

  - Search fields and additional Search fields

  - Queries

- Store internals

- Error object

Store Internals (1 of 2)

- The following slides give a simplified version of how data is stored.

- In the following example, the key elements are:

  - **_id** is the unique identifier (example: *AUTO INCREMENT PRIMARY KEY*).

  - **json** contains an exact representation of the stored JSON object.

  - **name** and **age** are search fields.

  - **key** is an additional search field.

  - **people** is the collection name.

Store Internals (2 of 2)

- Example: the **people** table

_id	key	name	age	json
1	c	carlons	99	{name: 'carlos', age: 99}
2	t	tim	100	{name: 'tim', age: 100}

- When you search the **people** table with one or a combination of the following queries, the retrieved document is `{_id: 1, json: {name: 'carlos', age: 99} }`:

  - `{_id : 1}`
  - `{name: 'carlos'}`
  - `{age: 99}`
  - `{key: 'c'}`

Agenda

- Overview
- JSONStore terms
  - Document
  - Collection
  - Store
  - Search fields and additional Search fields
  - Queries
- Store internals
- Error object

Error object

- The Error object is a JavaScript object that is returned when a JSONStore operation (such as **find** or **add**) fails.
- The Error object provides information about the cause of the failure.
- **Example**

```
var errorObject = {
  src: 'find', //operation that failed
  err: -50, //error code
  msg: 'PERSISTENT_STORE_FAILURE', //error message
  col: 'people', //collection name
  usr: 'jsonstore', //username
  doc: {_id: 1, {name: 'carlos', age: 99}}, //document that the failure
  relates to
  res: {...} //response from the server
}
```

- Not all the key-value pairs are part of all Error objects.
  - For example, the response from the server is available only when operations that use the network fail, such as **push**.

For more information

- For more information about the JSONStore API documentation, including JSONStore errors, see the IBM Worklight user documentation .

  – Search for: **Class WL.JSONStore**

Notices

- Permission for the use of these publications is granted subject to these terms and conditions.

- This information was developed for products and services offered in the U.S.A.

- IBM may not offer the products, services, or features discussed in this document in other countries. Consult your local IBM representative for information on the products and services currently available in your area. Any reference to an IBM product, program, or service is not intended to state or imply that only that IBM product, program, or service may be used. Any functionally equivalent product, program, or service that does not infringe any IBM intellectual property right may be used instead. However, it is the user's responsibility to evaluate and verify the operation of any non-IBM product, program, or service.

- IBM may have patents or pending patent applications covering subject matter described in this document. The furnishing of this document does not grant you any license to these patents. You can send license inquiries, in writing, to:

  – IBM Director of Licensing
  IBM Corporation
  North Castle Drive
  Armonk, NY 10504-1785
  U.S.A.

- For license inquiries regarding double-byte character set (DBCS) information, contact the IBM Intellectual Property Department in your country or send inquiries, in writing, to:

  – Intellectual Property Licensing
  Legal and Intellectual Property Law
  IBM Japan Ltd.
  1623-14, Shimotsuruma, Yamato-shi
  Kanagawa 242-8502 Japan

- **The following paragraph does not apply to the United Kingdom or any other country where such provisions are inconsistent with local law:** INTERNATIONAL BUSINESS MACHINES CORPORATION PROVIDES THIS PUBLICATION "AS IS" WITHOUT WARRANTY OF ANY KIND, EITHER EXPRESS OR IMPLIED, INCLUDING, BUT NOT LIMITED TO, THE IMPLIED WARRANTIES OF NON-INFRINGEMENT, MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE. Some states do not allow disclaimer of express or implied warranties in certain transactions, therefore, this statement may not apply to you.

- This information could include technical inaccuracies or typographical errors. Changes are periodically made to the information herein; these changes will be incorporated in new editions of the publication. IBM may make improvements and/or changes in the product(s) and/or the program(s) described in this publication at any time without notice.

- Any references in this information to non-IBM Web sites are provided for convenience only and do not in any manner serve as an endorsement of those Web sites. The materials at those Web sites are not part of the materials for this IBM product and use of those Web sites is at your own risk.

- IBM may use or distribute any of the information you supply in any way it believes appropriate without incurring any obligation to you.

- Licensees of this program who wish to have information about it for the purpose of enabling: (i) the exchange of information between independently created programs and other programs (including this one) and (ii) the mutual use of the information which has been exchanged, should contact:

  – IBM Corporation
  Dept F6, Bldg 1
  294 Route 100
  Somers NY 10589-3216
  USA

- Such information may be available, subject to appropriate terms and conditions, including in some cases, payment of a fee.

- The licensed program described in this document and all licensed material available for it are provided by IBM under terms of the IBM Customer Agreement, IBM International Program License Agreement or any equivalent agreement between us.

- Information concerning non-IBM products was obtained from the suppliers of those products, their published announcements or other publicly available sources. IBM has not tested those products and cannot confirm the accuracy of performance, compatibility or any other claims related to non-IBM products. Questions on the capabilities of non-IBM products should be addressed to the suppliers of those products.

COPYRIGHT LICENSE:

- This information contains sample application programs in source language, which illustrate programming techniques on various operating platforms. You may copy, modify, and distribute these sample programs in any form without payment to IBM, for the purposes of developing, using, marketing or distributing application programs conforming to the application programming interface for the operating platform for which the sample programs are written. These examples have not been thoroughly tested under all conditions. IBM, therefore, cannot guarantee or imply reliability, serviceability, or function of these programs.

- Each copy or any portion of these sample programs or any derivative work, must include a copyright notice as follows:

  – © (your company name) (year). Portions of this code are derived from IBM Corp. Sample Programs. © Copyright IBM Corp. _enter the year or years_. All rights reserved.

Privacy Policy Considerations

- IBM Software products, including software as a service solutions, ("Software Offerings") may use cookies or other technologies to collect product usage information, to help improve the end user experience, to tailor interactions with the end user or for other purposes. In many cases no personally identifiable information is collected by the Software Offerings. Some of our Software Offerings can enable you to collect personally identifiable information. If this Software Offering uses cookies to collect personally identifiable information, specific information about this offering's use of cookies is set forth below.

- Depending upon the configurations deployed, this Software Offering may use session cookies that collect session information (generated by the application server). These cookies contain no personally identifiable information and are required for session management. Additionally, persistent cookies may be randomly generated to recognize and manage anonymous users. These cookies also contain no personally identifiable information and are required.

- If the configurations deployed for this Software Offering provide you as customer the ability to collect personally identifiable information from end users via cookies and other technologies, you should seek your own legal advice about any laws applicable to such data collection, including any requirements for notice and consent. For more information about the use of various technologies, including cookies, for these purposes, see IBM's Privacy Policy at http://www.ibm.com/privacy and IBM's Online Privacy Statement at http://www.ibm.com/privacy/details the sections entitled "Cookies, Web Beacons and Other Technologies" and the "IBM Software Products and Software-as-a-Service Privacy Statement" at http://www.ibm.com/software/info/product-privacy.

Support and comments

- For the entire IBM Worklight documentation set, training material and online forums where you can post questions, see the IBM website at:
  - http://www.ibm.com/mobile-docs
- **Support**
  - Software Subscription and Support (also referred to as Software Maintenance) is included with licenses purchased through Passport Advantage and Passport Advantage Express. For additional information about the International Passport Advantage Agreement and the IBM International Passport Advantage Express Agreement, visit the Passport Advantage website at:
    - http://www.ibm.com/software/passportadvantage
  - If you have a Software Subscription and Support in effect, IBM provides you assistance for your routine, short duration installation and usage (how-to) questions, and code-related questions. For additional details, consult your IBM Software Support Handbook at:
    - http://www.ibm.com/support/handbook
- **Comments**
  - We appreciate your comments about this publication. Please comment on specific errors or omissions, accuracy, organization, subject matter, or completeness of this document. The comments you send should pertain to only the information in this manual or product and the way in which the information is presented.
  - For technical questions and information about products and prices, please contact your IBM branch office, your IBM business partner, or your authorized remarketer.
  - When you send comments to IBM, you grant IBM a nonexclusive right to use or distribute your comments in any way it believes appropriate without incurring any obligation to you. IBM or any other organizations will only use the personal information that you supply to contact you about the issues that you state.
  - Thank you for your support.
  - Submit your comments in the IBM Worklight Developer Edition support community at:
    - https://www.ibm.com/developerworks/mobile/worklight/connect.html
  - If you would like a response from IBM, please provide the following information:
    - Name
    - Address
    - Company or Organization
    - Phone No.
    - Email address

IBM

Thank You