Developing Modern Applications with Db2

simplify coding

```
{
  "store"   : "json",
  "call"    : "RESTful",
  "code"    : "OData",
  "exploit" : "relational",
  "get"     : "results"
}
```

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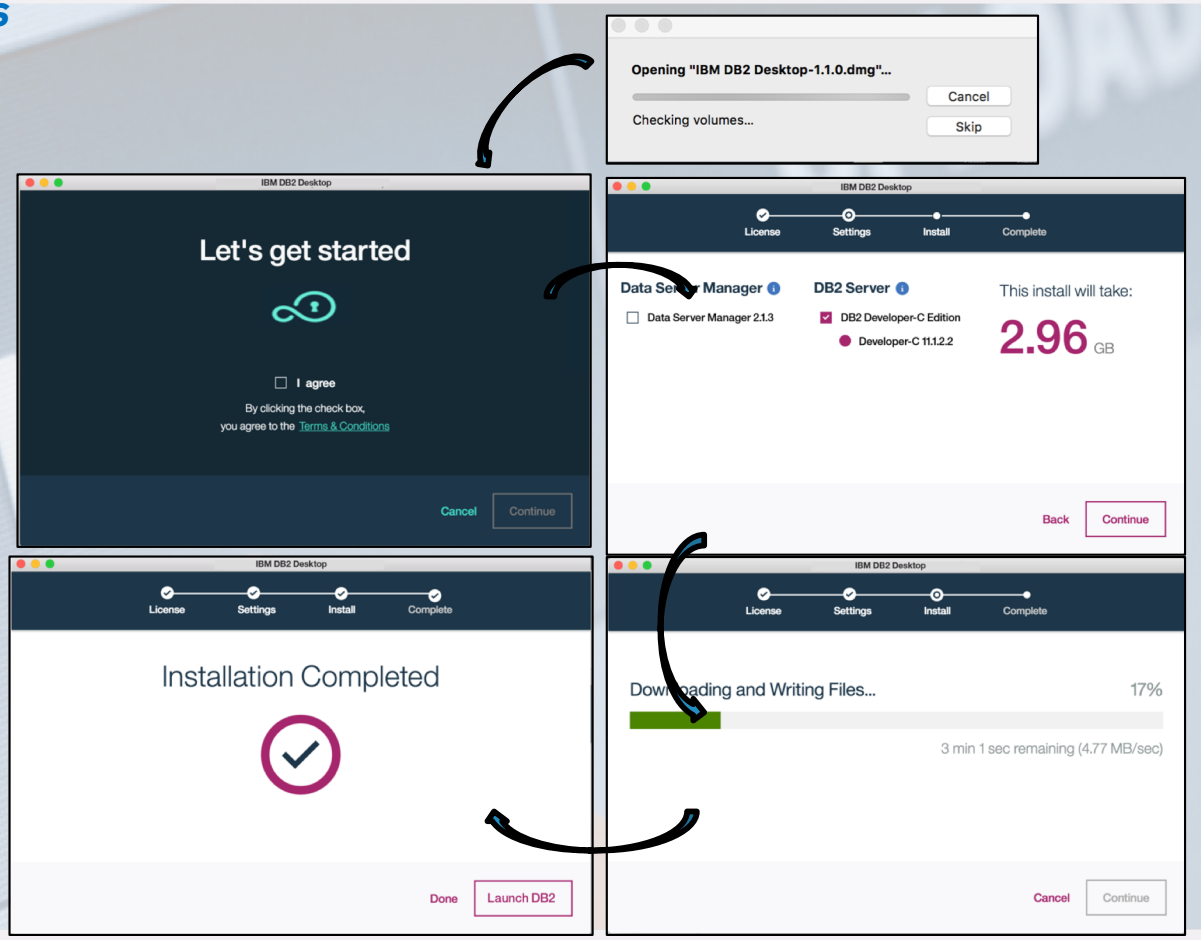
Db2 Developer Community Edition – Optimized for Docker

Up, Running, and Productive in Minutes

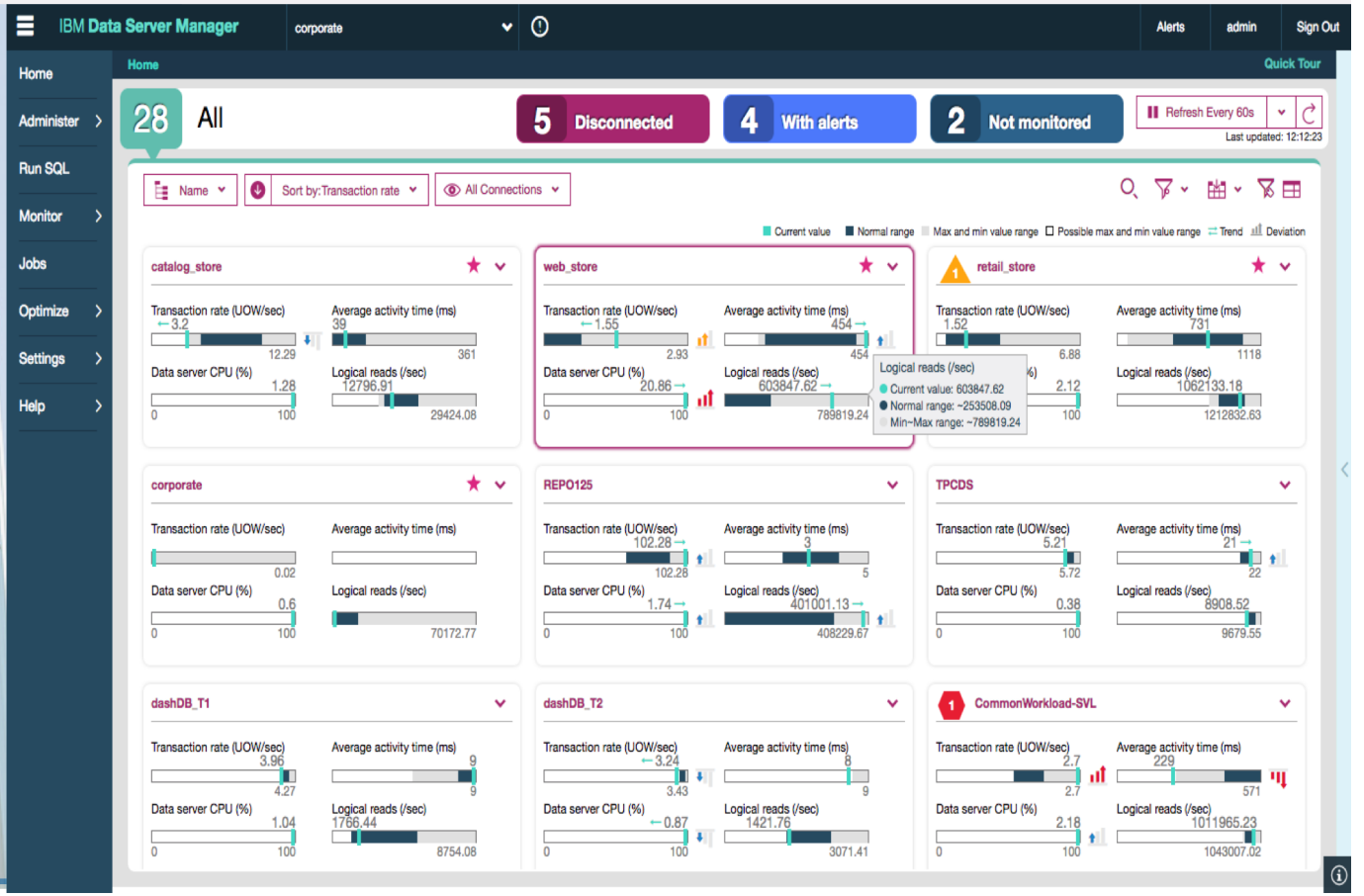
- **Marketplace or Discovery Portal – single point of download**
- **Download platform-specific executable (Mac, Windows, or Linux)**
- **Small download, less than 15 minutes from "I want" to "I got"**
- **3 clicks and userID/pwd input only**



IBM Data Server Manager – In a Docker Container

Monitor, Administer, Manage, and Tune your Environment

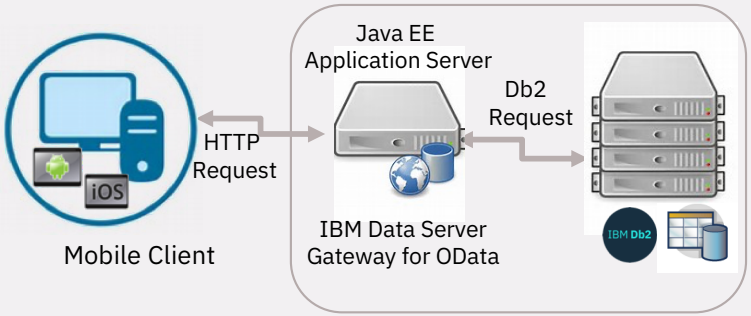
- **A single pane of glass**
- **Simple to install and setup**
- **Scales to 100s of databases**
- **Historical analysis:**
  - minutes, hours, days
- **Smart alerts with recommendations**



Open Data Protocol Gateway

Simplifying Access to Data Sources from Mobile Devices

- **The IBM OData Gateway provides a RESTful service that provides for the following operations:**
  - GET (SELECT)
  - POST (INSERT)
  - PUT (UPDATE a full row)
  - PATCH (UPDATE selected columns in a row)
  - DELETE (Delete a row)

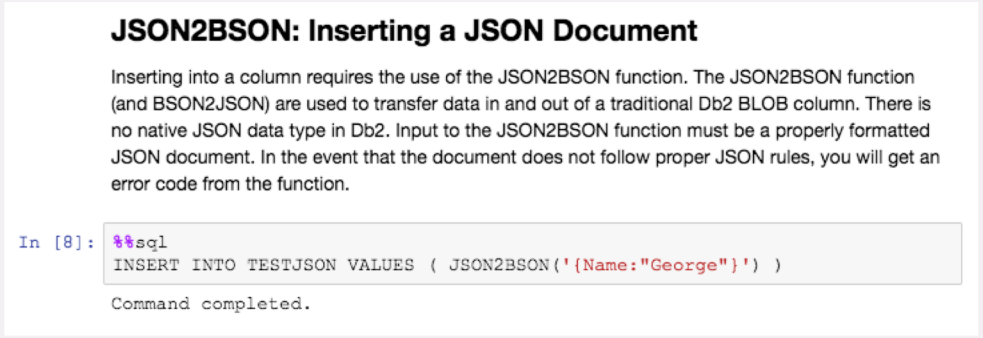



```
url = http://localhost:9080/ODataOne/ODataService/SAMPLE-db2ab6eeb40d4a75a525333ee610fb50

header = {
         'Content-Type':'application/json',
         'Accept':'application/json'
         }

OData = "/EMPLOYEES?$select=LASTNAME,SALARY&$filter=SALARY gt 50000"

RESTful.get(url + OData, headers=header)
```

Jupyter Notebooks and Python

A Modern Approach to Document and Prototype Code

- **Combine SQL, Python, Scala with Documentation - Markdown**
- **Combine SQL with the power of advanced analytics**
- **One line pivot**
- **Simple sort and group**
- **Powerful graphing**
- **Document management processes**
- **Built to share**



JSON2BSON: Inserting a JSON Document

Inserting into a column requires the use of the JSON2BSON function. The JSON2BSON function (and BSON2JSON) are used to transfer data in and out of a traditional Db2 BLOB column. There is no native JSON data type in Db2. Input to the JSON2BSON function must be a properly formatted JSON document. In the event that the document does not follow proper JSON rules, you will get an error code from the function.

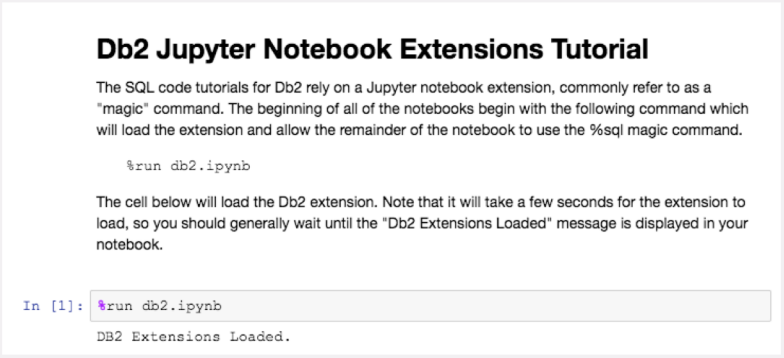
```
In [8]: %%sql
        INSERT INTO TESTJSON VALUES ( JSON2BSON('{Name:"George"}') )
```

```
Command completed.
```

Making Magic with Db2

Extending Jupyter Notebooks to Access Db2

- **Dedicated Db2 Magic Commands**
- **Secure and persistent database connections**
- **One command from SQL to DataFrame**
- **SQL Formatting in Cell**
- **Graphing**



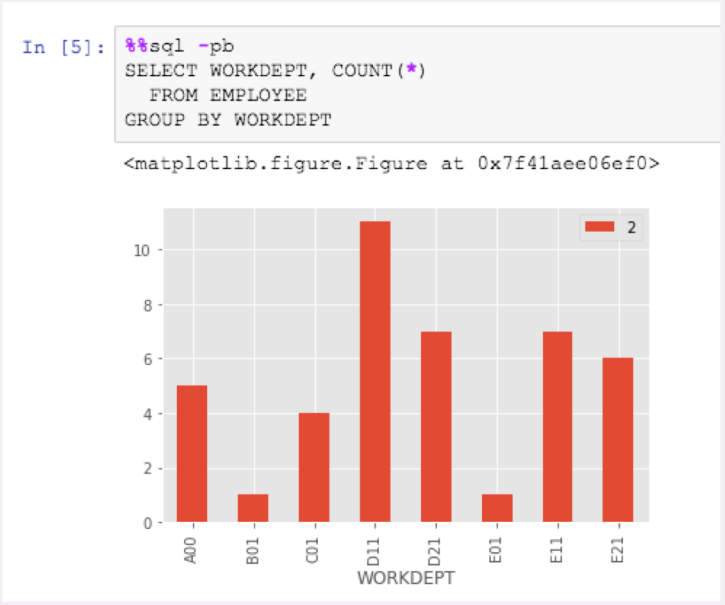
Db2 Jupyter Notebook Extensions Tutorial

The SQL code tutorials for Db2 rely on a Jupyter notebook extension, commonly refer to as a "magic" command. The beginning of all of the notebooks begin with the following command which will load the extension and allow the remainder of the notebook to use the %sql magic command.

```
%run db2.ipynb
```

The cell below will load the Db2 extension. Note that it will take a few seconds for the extension to load, so you should generally wait until the "Db2 Extensions Loaded" message is displayed in your notebook.

```
In [1]: %run db2.ipynb
DB2 Extensions Loaded.
```



```
In [5]: %%sql -pb
SELECT WORKDEPT, COUNT(*)
  FROM EMPLOYEE
GROUP BY WORKDEPT
```

```
<matplotlib.figure.Figure at 0x7f41aee06ef0>
```


github.com/DB2-Samples/db2jupyter

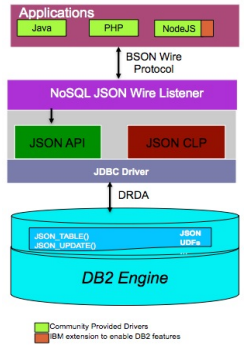
What is JSON?

JSON Explained

NoSQL Wire Listener

JSON support

- **Initial JSON support in Db2 10.5 FP1 consisted of:**
  - IBM NoSQL Wire Listener, JSON Java APIs, JSON command line
- **Db2 11.1.2.2 will add full support for direct SQL access to underlying JSON interfaces used by externals above**
  - Integrated installation/configuration during database creation or migration update
    - No need to catalog JSON functions manually
  - High-level documentation on their existence similar to what Db2 for z/OS already provides
    - JSON2BSON, BSON2JSON are catalogued as part of SYSIBM schema
    - JSON_VAL is function built into the SQL syntax
    - All other JSON functions are part of the SYSTOOLS schema
  - Overview of all functions and how to use them can be found in Db2 11 ebook at: http://ibm.box.com/v/DB2v11eBook



11.1.2.2 SQL functions

Schema	Name	Comments
SYSTOOL	BSON2JSON	Convert BSON formatted document into JSON strings
SYSTOOL	BSON_VALIDATE	Checks to make sure that a BSON field in a BLOB object is in a correct format
SYSTOOL	JSON2BSON	Convert JSON strings into a BSON document format
SYSTOOL	JSON_GET_POS_ARR_INDEX	Find a value within an array
SYSTOOL	JSON_LEN	Returns the count of elements in an array type inside a document
SYSTOOL	JSON_TABLE	Returns a table of values for an array field
SYSTOOL	JSON_TYPE	Returns the data type of a specific field within a JSON document
SYSTOOL	JSON_UPDATE	Update a field or document using set syntax
SYSIBM	JSON_VAL	Extracts data from a JSON document into SQL data types

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