The New Tools and Toys of Informix

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New Technology For Informix

- New Key Features of 12
- NoSQL
- Mongo Support
- REST Listener
- Node-Red
- Spark Accessibility
- IoT Data Visualization

New Features of V12.10

- New PSM storage manager
- Multitenancy
- Improved Timeseries Features
- SPL includes 'case' statement
- Grid Queries
- Bluemix Integration

NoSQL

- Unstructured data
- Often stored in JSON/BSON formats
  - **Previously XML was the preferred method**
- Key:Value pairs of data
- Supports many different types of data including arrays even nested ones
- It is a generic term so there are several types

NoSQL Types

- Key:Value pair databases
  - **Simple**
  - **Just stores lists of key/values for each element**
- Graph Stores
  - **Store related data for graphing networks**
- Wide-Columnar Databases
  - **Stores nested 'super' elements**
  - **Each can have multiple rows per super element**
- Document Databases
  - **Stores full documents, can be key/value pairs, arrays, nested arrays, documents, other data**

Document Database	Graph Databases
Couchbase MarkLogic mongoDB	Neo4j InfiniteGraph The Distributed Graph Database
Wide Column Stores	**Key-Value Databases**
redis amazon DynamoDB AEROSPIKE riak	accumulo HYPERTABLE INC Cassandra APACHE HBASE Amazon SimpleDB

@cloudtxt http://www.aryannava.com

JSON – JavaScript Object Notation

```
{
    "id": "0001",
    "type": "donut",
    "name": "Cake",
    "ppu": 0.55,
    "batters":
        {
            "batter":
                [
                    { "id": "1001", "type": "Regular" },
                    { "id": "1002", "type": "Chocolate" },
                    { "id": "1003", "type": "Blueberry" },
                    { "id": "1004", "type": "Devil's Food" }
                ]
        },
    "topping":
        [
            { "id": "5001", "type": "None" },
            { "id": "5002", "type": "Glazed" },
            { "id": "5005", "type": "Sugar" },
            { "id": "5007", "type": "Powdered Sugar" },
            { "id": "5006", "type": "Chocolate with Sprinkles" },
            { "id": "5003", "type": "Chocolate" },
            { "id": "5004", "type": "Maple" }
        ]
}
```

NoSQL Advantages

- Fast application development
  - **No waiting on schema changes**
- Easy to scale horizontally
- Easy to handle multiple versions
- Handle very different data elements in one place
- Fast inserts
- Can handle delayed inserts if using a middle layer
- Direct inserts without having to go through a database layer

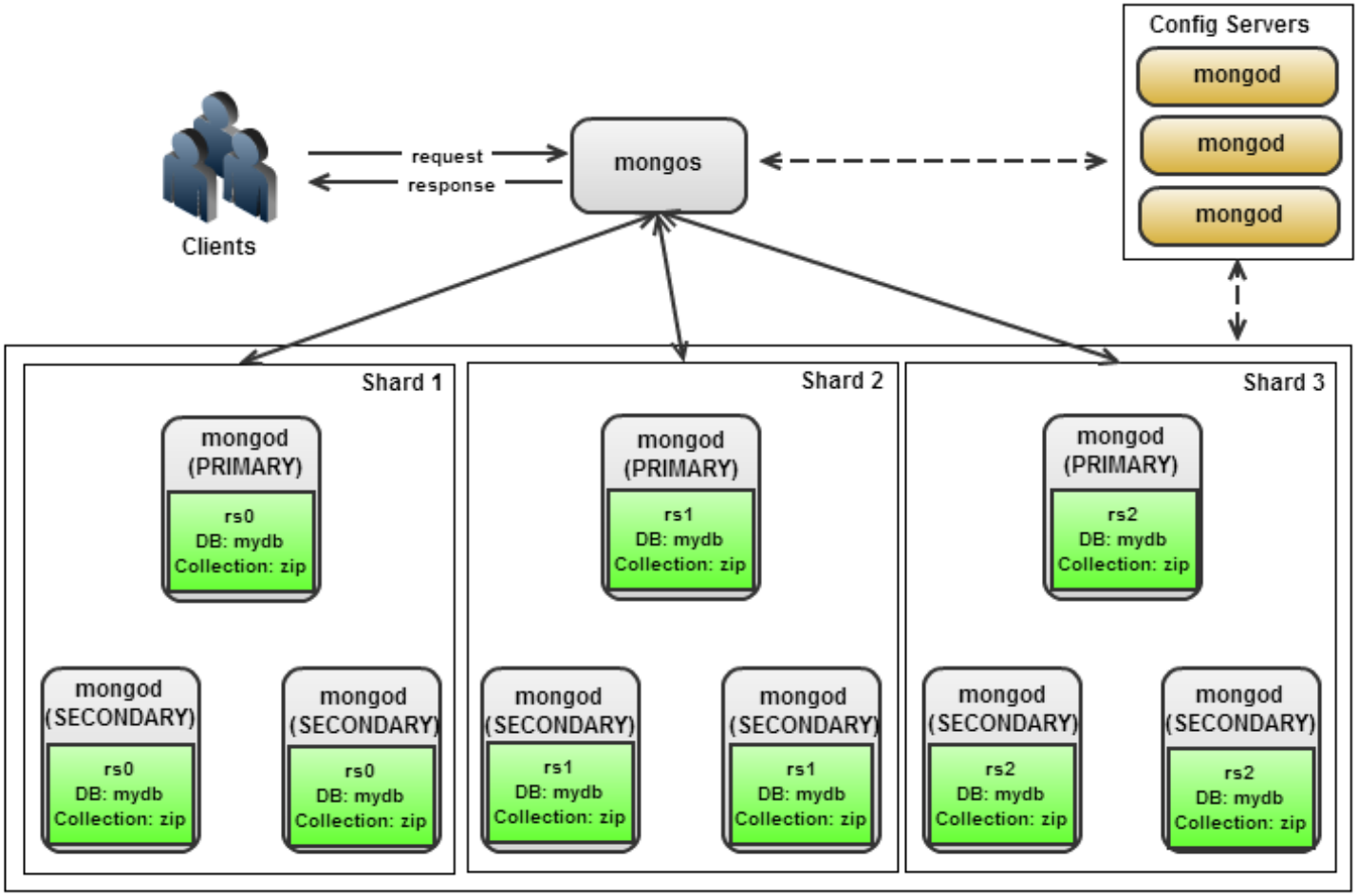
NoSQL Disadvantages

- Can be slower to update
- Lack of constraints
- Easier to get bad data in a database
- Hard to connect to linking data
- Elements such as default values need to be added by the application
- Need to trust your developers to get it right

Sharding

- Horizontal scaling
- Splitting data on to different nodes
- Sharded queries read the associated nodes in parallel
- Allows for very high performance and distributed queries without large boxes

Sharding



Neil Lunn - http://dba.stackexchange.com/questions/82551/data-distribution-in-mongos-with-shards-or-replica-sets

MongoDB

- Document Store style NoSQL database
- Open source
- Indexes (limited)
- Horizontal Replication
- Load Balancing
- Extensive querying syntax options

MongoDB Downsides

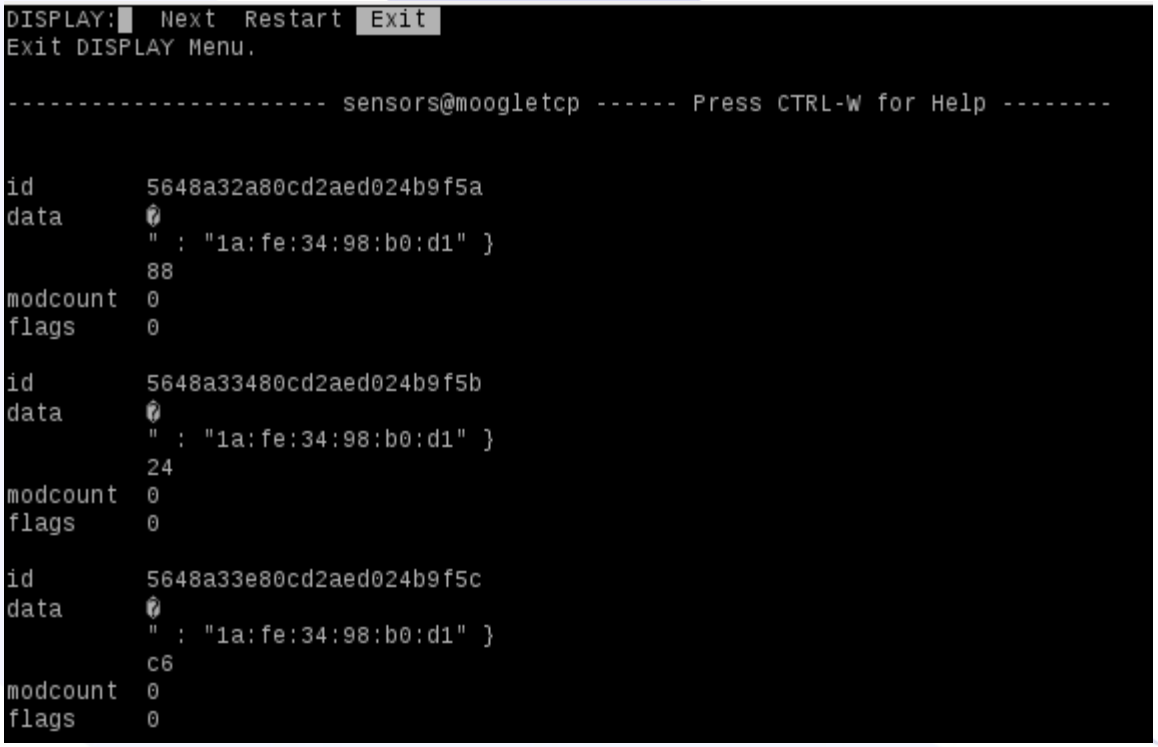
- No traditional constraints
- No transactions
- Limited types of indexes
- Did not scale vertically well
- Stability issues
- Reliability issues

Informix + Mongo

- In 12.10xc2 support for the Mongo API was introduced
- New additions to Informix:
  - **full support for the mongo command set**
  - **Added in the json and bson data types**
  - **Added the mongo wire listener**
  - **Data sharding**

Selecting Data

- Select id, data, modcount, flags from sensor_json



Selecting Data – Casing To JSON

- select id, data::json, modcount, flags from sensor_json

```
DISPLAY:  Next  Restart  Exit
Display next page of results.

---------------------- sensors@moogletcp ------ Press CTRL-W for Help --------


id              5648a32a80cd2aed024b9f5a
(expression)    {"topic":"sensors/temp","payload":"{ "data" : "32" , "sensor_id"
                : "1a:fe:34:98:b0:d1" }","qos":0,"retain":false,"_msgid":"8952797
                8.76ad88","_id":ObjectId("5648a32a80cd2aed024b9f5a")}
modcount        0
flags           0

id              5648a33480cd2aed024b9f5b
(expression)    {"topic":"sensors/temp","payload":"{ "data" : "20" , "sensor_id"
                : "1a:fe:34:98:b0:d1" }","qos":0,"retain":false,"_msgid":"5aacdb3
                8.a55324","_id":ObjectId("5648a33480cd2aed024b9f5b")}
modcount        0
flags           0

id              5648a33e80cd2aed024b9f5c
(expression)    {"topic":"sensors/temp","payload":"{ "data" : "25" , "sensor_id"
                : "1a:fe:34:98:b0:d1" }","qos":0,"retain":false,"_msgid":"34243a0
                1.cbdbc6","_id":ObjectId("5648a33e80cd2aed024b9f5c")}
modcount        0
flags           0
```

Setting Up

- Set up the Mongo listener
  - **Configure jsonlistener.properties**
  - **Start the listener**
    - Command Line
    - SQL
- Start storing NoSQL data

jsonlistener.properties

- Sample in $INFORMIXDIR/etc/ jsonlistener-example.properties
- Content:

```
listener.type=mongo              #Mongo or REST
listener.hostName=localhost      #Use hostname if you want remote connections
listener.port=26351              #Port for mongo listener to run on
security.sql.passthrough=false   # allow embedded SQL in the mongo commands
url=jdbc:informix-sqli://moogle:10098/sysmaster:INFORMIXSERVER=mooglenosql;USER=nosql;PASSWORD=n0sql!
```

- Sqlhosts:
  - **mooglenosql onsoctcp cubietruck 10098**

Starting Mongo Listener

```
CLASSPATH=${INFORMIXDIR}/lib/ifxjdbc.jar
  /usr/bin/java \
      -jar ${INFORMIXDIR}/bin/jsonListener.jar \
      -config ${INFORMIXDIR}/etc/jsonListener.properties \
      -logfile ${INFORMIXDIR}/tmp/jsonListener.log \
      -start &
```

Or:

```
EXECUTE FUNCTION task("start json listener",
    "/opt/informix/etc/jsonListener.properties");
```

Connecting To Informix

- Install Mongo Client pacakge
- mongo <server>:<port>/<database>
- mongo localhost:26351/sensors
  - **Will open the mongo shell**
  - **If it returns an error check the log from the startup script**

Using Mongo

- db.<table>.find()
  - **Equilivent to select * from <table>**
- db.sensor_json.find({_msgid:"d72c79f8.28d388"})
  - **{ "topic" : "sensors/temp", "_msgid" : "d72c79f8.28d388", "_id" : ObjectId("5648a37a80cd2aed024b9f62") }**
- Inserts automatically create the table as needed

Selecting Using Mongo

```
informix@cubie:~/nosql$ mongo localhost:26351/sensors
MongoDB shell version: 2.4.10
connecting to: localhost:26351/sensors
> db.sensor_json.find()
{ "topic" : "sensors/temp", "payload" : "{ \"data\" : \"32\" , \"sensor_id\" : \"1a:fe:34:98:b0:d1\" }", "qo
{ "topic" : "sensors/temp", "payload" : "{ \"data\" : \"20\" , \"sensor_id\" : \"1a:fe:34:98:b0:d1\" }", "qo
{ "topic" : "sensors/temp", "payload" : "{ \"data\" : \"25\" , \"sensor_id\" : \"1a:fe:34:98:b0:d1\" }", "qo
{ "topic" : "sensors/temp", "payload" : "{ \"data\" : \"32\" , \"sensor_id\" : \"1a:fe:34:98:b0:d1\" }", "qo
{ "topic" : "sensors/temp", "payload" : "{ \"data\" : \"21\" , \"sensor_id\" : \"1a:fe:34:98:b0:d1\" }", "qo
{ "topic" : "sensors/temp", "payload" : "{ \"data\" : \"35\" , \"sensor_id\" : \"1a:fe:34:98:b0:d1\" }", "qo
{ "topic" : "sensors/temp", "payload" : "{ \"data\" : \"33\" , \"sensor_id\" : \"1a:fe:34:98:b0:d1\" }", "qo
{ "topic" : "sensors/temp", "payload" : "{ \"data\" : \"21\" , \"sensor_id\" : \"1a:fe:34:98:b0:d1\" }", "qo
{ "topic" : "sensors/temp", "payload" : "{ \"data\" : \"38\" , \"sensor_id\" : \"1a:fe:34:98:b0:d1\" }", "qo
{ "topic" : "sensors/temp", "payload" : "{ \"data\" : \"34\" , \"sensor_id\" : \"1a:fe:34:98:b0:d1\" }", "qo
{ "topic" : "sensors/temp", "payload" : "{ \"data\" : \"21\" , \"sensor_id\" : \"1a:fe:34:98:b0:d1\" }", "qo
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{ "topic" : "sensors/temp", "payload" : "{ \"data\" : \"25\" , \"sensor_id\" : \"1a:fe:34:98:b0:d1\" }", "qo
{ "topic" : "sensors/temp", "payload" : "{ \"data\" : \"28\" , \"sensor_id\" : \"1a:fe:34:98:b0:d1\" }", "qo
{ "topic" : "sensors/temp", "payload" : "{ \"data\" : \"33\" , \"sensor_id\" : \"1a:fe:34:98:b0:d1\" }", "qo
{ "topic" : "sensors/temp", "payload" : "{ \"data\" : \"25\" , \"sensor_id\" : \"1a:fe:34:98:b0:d1\" }", "qo
{ "topic" : "sensors/temp", "payload" : "{ \"data\" : \"22\" , \"sensor_id\" : \"1a:fe:34:98:b0:d1\" }", "qo
{ "topic" : "sensors/temp", "payload" : "{ \"data\" : \"21\" , \"sensor_id\" : \"1a:fe:34:98:b0:d1\" }", "qo
{ "topic" : "sensors/temp", "payload" : "{ \"data\" : \"21\" , \"sensor_id\" : \"1a:fe:34:98:b0:d1\" }", "qo
Type "it" for more
>
```

Mongo Commands

Mongo Command	Informix Statement
db.customer.insert({ name: “John", age: 65 })	INSERT INTO customer (name, age) VALUES (“John”,65)
db.customer.find()	SELECT * FROM customer
db.customer.find({age: { $gt:65 } })	SELECT * FROM customer WHERE age > 65
db.customer.drop()	DROP TABLE customer
db.customer.ensureIndex({ name : 1, age : -1 })	CREATE INDEX idx_1 on customer(name , age DESC)
db.customer.remove({age: { $gt:65 } })	DELETE FROM customer where age > 65
db.customer.update({ age: { $gt: 64 } }, { $set: { status: “Retire" } }, { multi: true })	UPDATE customer SET status = “Retire" WHERE age > 64

REST Listener

- Set up and started the same way as the Mongo listener
- Change listener.type to rest
- Sets up a listener that handles REST POST/GET commands such as from a web server or even from javascript
- Uses JSON to pass/receive data
- REST Syntax is used for Bluemix data transfer
- No drivers needed

REST Methods

- Get – Query
- Post – Insert
- Delete – Delete
- Put - Update

REST Examples

- GET /mydb/people?sort={age:1}&fields={_id:0,lastName:0}
- [{"firstName":"Sherry","age":31},

{"firstName":"John","age":31},

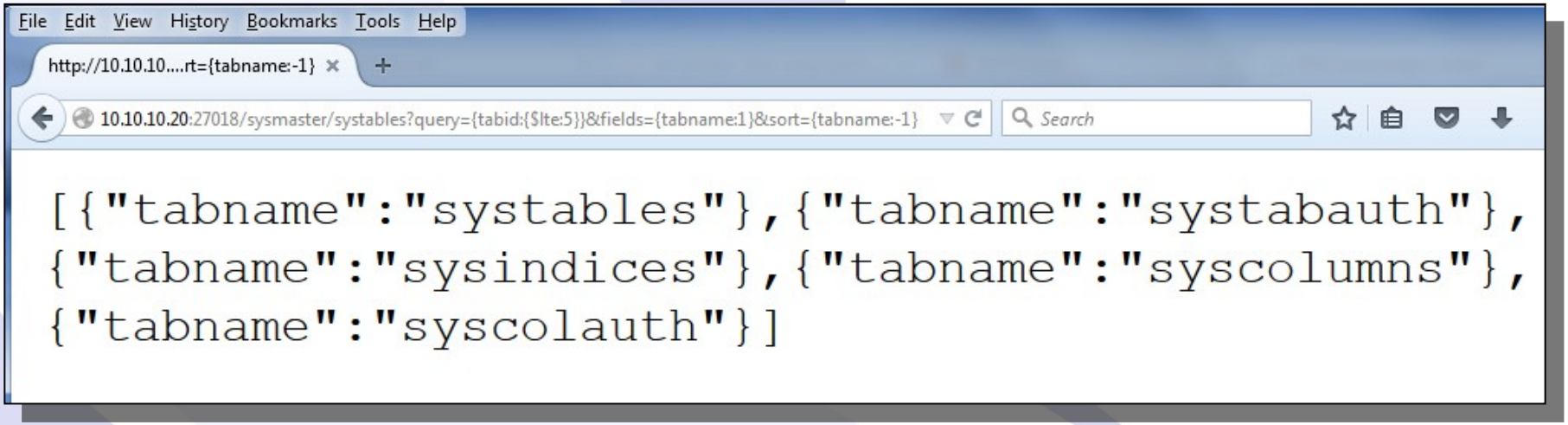
{"firstName":"Bob","age":47},

{"firstName":"Larry","age":49}]

REST

Example: Connect from a browser to an Informix database

http://10.10.10.20:27018/sysmaster/systables?query={tabid:{$lte:5}}&fields={tabname:1}&sort={tabname:-1}

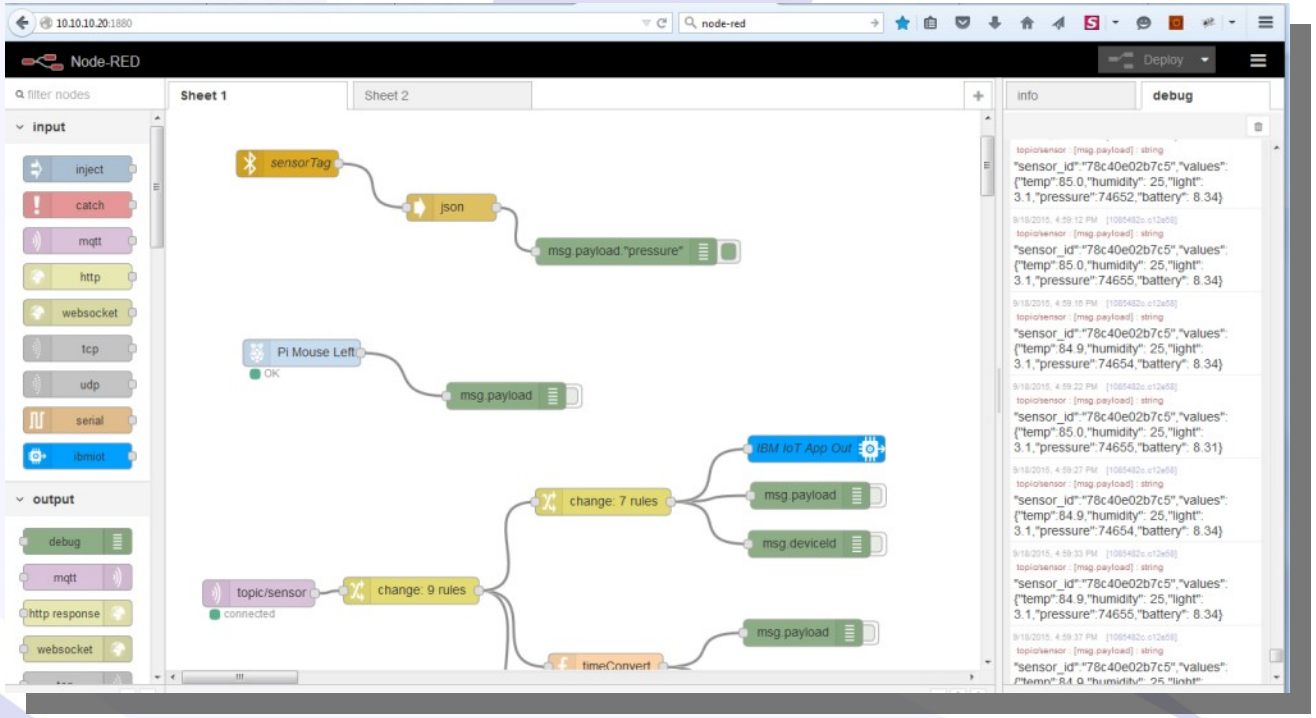


Node RED

- Free opensource tool based on node.js
- Visual tool, little to no programming needed
- Drag and drop elements to set up data flows
- Can handle many types of data through freely available modules
- Interfaces extensively with IBM services
  - **Streams**
  - **Watson**
  - **Bluemix**

Node-RED

- Graphical tool – run in a browser
- Use to put together data flows and apply operations
- Additional “nodes” can be added to increase the functionality
- Custom “nodes” can be written



Advanced DataTools

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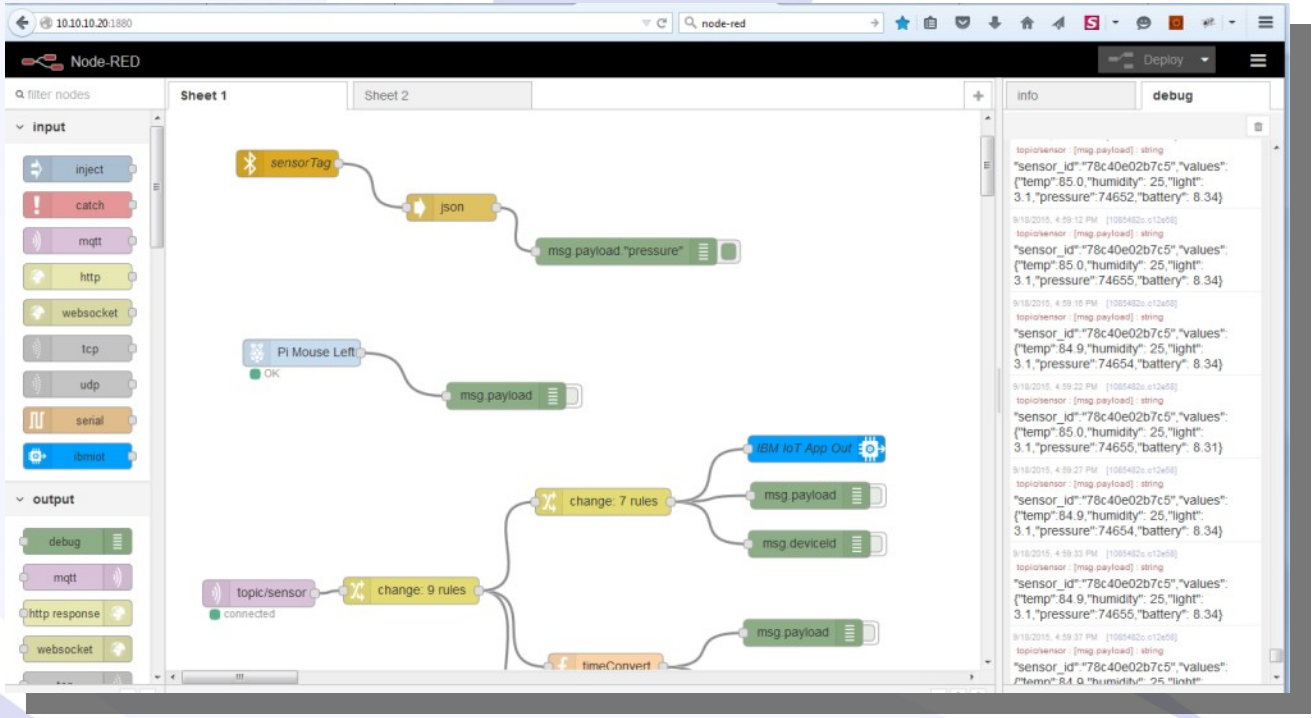

Advanced DataTools

Node-RED Install

- sudo npm install -g node-red
- node-red
- No step 3

Node-RED Modules

- cd ~/.node-red
- npm install node-red-node-{filename}

- That is it.
- Another node.js utility called pm2 can be useful to control the service

MQTT

- MQ Telemetry Transport
- Publisher nodes connect and send data
- Subscribers see the data and make use of it
- Many available servers
  - **Including Websphere**

Links

- https://www.mongodb.com/nosql-explained
- https://adobe.github.io/Spry/samples/data_region/JSONDataSetSample.html
- **https://hub.docker.com/r/ibmcom/iotvisualization**
- **http://ibm.co/1N0XcKU**
  - **setting up the wire listener**
- **http://www-01.ibm.com/support/docview.wss?uid=swg27041825**
  - **Mongo and Informix command comparison**
- **http://ibm.co/1MSiSWz**
  - **REST Api Information**
- **http://nodered.org/docs/getting-started/running.html**
- **http://flows.nodered.org/**

Questions?

Send follow-up questions to
tom@advancedatatools.com

More Resources

- Webcasts covering Informix, ARM, Internet of Things:

  http://advancedatatools.com/Informix/Webcasts.html

- Compare Informix versions:

  http://www.ibm.com/developerworks/data/library/techarticle/dm-0801doe

- Docker Site:

  https://hub.docker.com/r/ibmcom/informix-innovator-c/

- Advanced DataToolsTraining:

  http://advancedatatools.com/Training/InformixTraining.html

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