Lab 9 – Collecting real time smartphone data using Watson IoT

This tutorial walks you through setting up an IoT device, gathering data in the Watson IoT Platform, exploring data and creating visualizations and analyze data.

Objectives
1. Set up IoT Simulator and send collection data to Watson IoT Platform.
2. Create visualizations.
3. Store historical data in IBM Cloudant

This tutorial uses the following runtimes and services:
- IBM Watson IoT Platform
- Node.js Application
- IBM Cloudant

Network Architecture used in this exercise is illustrated in Figure 1 below which has following components -
- Smartphone device send sensor data to IBM Watson IoT Platform using MQTT protocol
- Historical data is exported into a IBM Cloudant database
- Watson™ Studio pulls data from this database
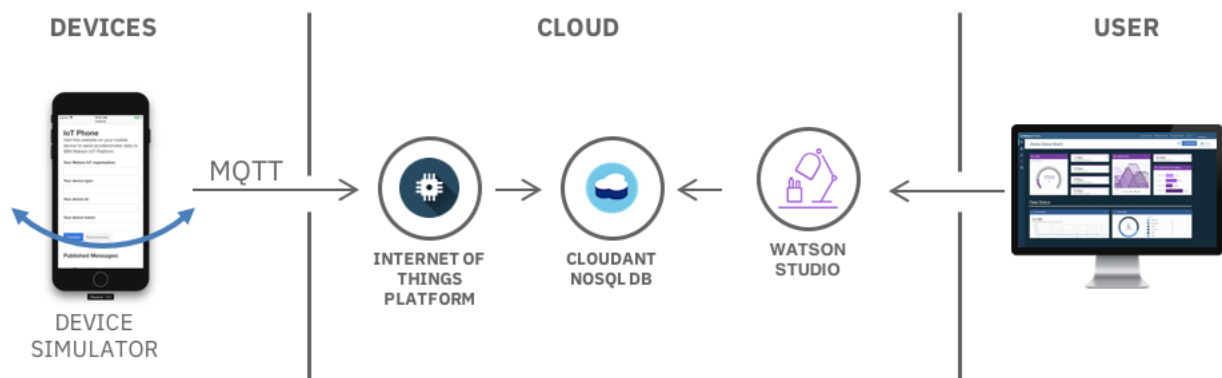- Data is visualized using IBM Watson IoT Platform

Figure 1: Network Architecture for this exercises

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1. Set up IoT Simulator and send collection data to Watson IoT Platform -

    1.1. **Create IoT Platform** -To begin, you will create Internet of Things Platform service - The hub which can manage devices, securely connect and collect data, and make historical data available for visualizations and applications. Follow the steps below to create the IoT platform.

        - Go to the **IBM Cloud Catalog** and select **Internet of Things Platform** under the Internet of Things section.
        - Enter IoT demo hub as the service name, click **Create** and **Launch** the dashboard.
        - From the side menu, select **Security > Connection Security** and choose **TLS Optional** under **Default Rule** > **Security Level** and click **Save**.
        - From the side menu, select **Devices** > **Device Types** and **+ Add Device Type**.
        - Enter simulator as the **Name** and click **Next** and **Done**.
        - Next, click on **Register Devices**
        - Choose simulator for Select **Existing Device Type** and then enter phone for **Device ID**.
        - Click **Next** until the **Device Security** (under Security tab) screen is displayed.
        - Enter a value for the **Authentication Token,** for example: myauthtoken and

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click **Next.**

- After clicking **Done**, your connection information is displayed. Keep this tab open as you need **Device Credentials** in the next step.

The IoT platform is now configured to start receiving data. Devices will need to send their data to the IoT Platform with the Device Type, ID and Token specified.

1.2. **Create device simulator** - Next, you will deploy a Node.js web application and visit it on your phone, which will connect to and send device accelerometer and orientation data to the IoT Platform.

- Make sure Cloud Foundry CLI is installed in your machine. To do so, go to your command line of your machine and login to PaaS of IBM cloud using CF commands below –

  cf login or *cf l -a* https://api.ng.bluemix.net

> If Cloud Foundry CLI is NOT installed -
> - Contact your tutor if you are using CQU lab computers
> - If you are doing this lab from home –
>   - Download the Cloud Foundary (CF) installer - https://github.com/cloudfoundry/cli/releases
>   - Install it and you will be good to use CF command line and commands.

- Download 'iot-device-phone-simulator.zip' from Moodle and extract the .zip file. Open the **manifest.yml** file in a text viewing program like 'TextPad' of your choice and change the name in the **manifest.yml** file to a unique value.
- In Command line (CLI) of your computer go to the location of the folder 'iot-device-phone-simulator' by typing '*cd [path of the folder]\iot-device-phone-simulator'*
- Push the application to the IBM Cloud using Cloud Foundry CLI by typing '*cf push'* in the command line. [Remember you have to be in the location of the folder 'iot-device-phone-simulator' by typing '*cd [path of the folder]\iot-device-phone-simulator'*]
- In a few minutes, your application will be deployed and you should see a URL similar to <UNIQUE_NAME>.mybluemix.net [make sure your URL has only 'http' not 'https' as our application does not have digital certificate embedded in it]
- Visit this URL on your phone using a browser.
- Enter the connection information from your IoT Dashboard tab under **Device Credentials** and click **Connect**.
- Your phone will start transmitting data. Back in the **IBM Watson IoT Platform tab**, check for new entires in the **Recent Events** section.

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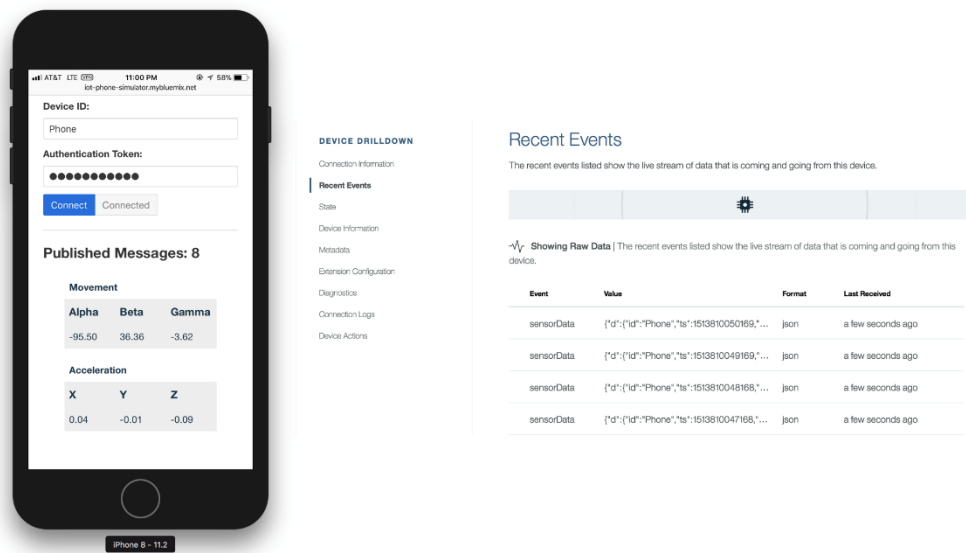
2. Create visualizations - Next, you will create a board and cards to display device data in the dashboard. For more information about boards and cards, see Visualizing real-time data by using boards and cards.

2.1. <u>Create a board –</u>

- Open the **IBM Watson IoT Platform dashboard**.
- Select **Boards** from the left menu, and then click **Create New Board**.
- Enter a name for the board, Simulators as example, and click **Next** and then **Submit**.
- Select the board that you just created to open it.

2.2. <u>Display device data</u>

- Click **Add New Card**, and then select the **Line Chart** card type, which is located in the Devices section.
- Select your device from the list, then click **Next**.
- Click **Connect new data set**.
- In the Create Value Card page, select or enter the following values and click **Next**.
    - o Event: sensorData
    - o Property: ob
    - o Name: OrientationBeta
    - o Type: Float
    - o Min: -180
    - o Max: 180
- In the Card Preview page, select **L** for the line chart size, and click **Next** > **Submit**
- The card appears on the dashboard and includes a line chart of the live temperature data.
- Use your mobile phone browser to launch the simulator again and slowly tilt the phone forward and backward.
- Back in the **IBM Watson IoT Platform tab**, you should see the chart getting updated.
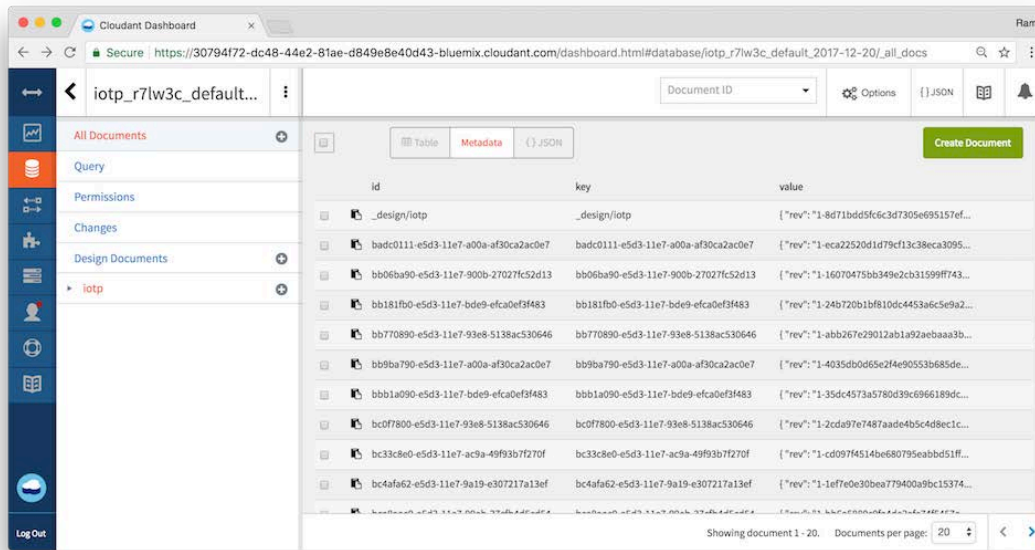
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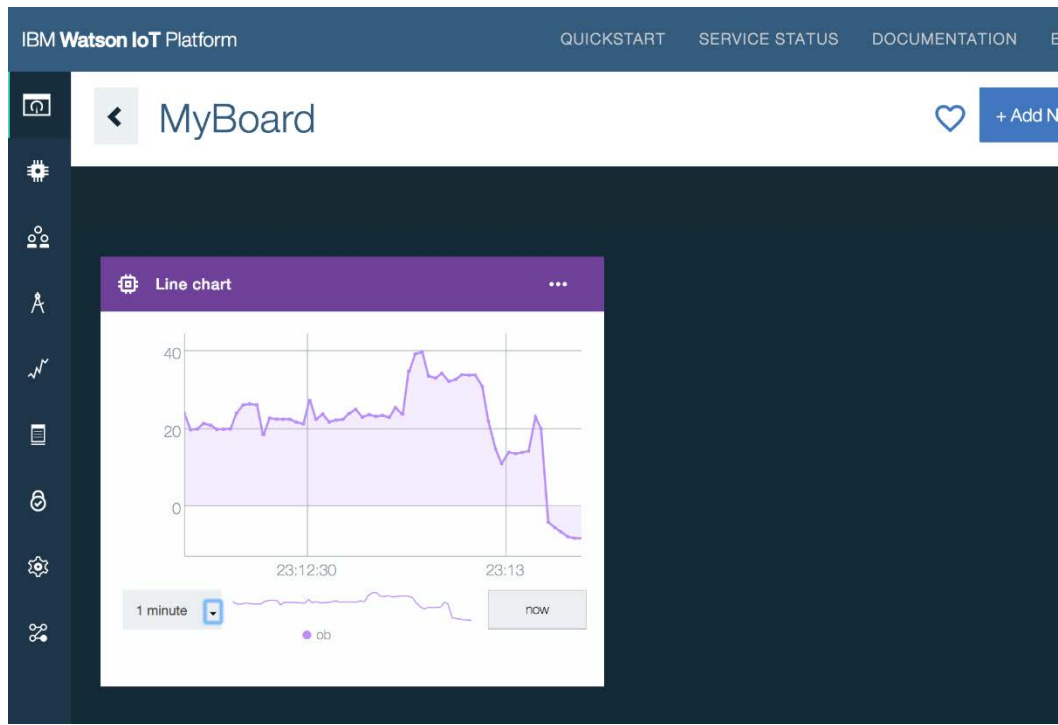
3. Store historical data in IBM Cloudant

- Go to the **IBM Cloud Catalog** and create a new IBM Cloudant named iot-db.
- Under **Connections**:
    - o **Create connection**
    - o Select the Cloud Foundry location, organization and space where an alias to the IBM Cloudant service should be created.
    - o Expand the space name in the **Connection Location** table and use the **Connect** button next to **iot demo hub** to create an alias for the IBM Cloudant service in that space.
    - o Connect and restage the app.
- Open the **IBM Watson IoT Platform dashboard**.
- Select **Extensions** from the left menu, and then click **Setup** under **Historical Data Storage**.
- Select the iot-db IBM Cloudant database.
- Enter devicedata for **Database Name** and click **Done**.
- A new window should load prompting for authorization. If you don't see this window, disable your pop-up blocker and refresh the page.

Your device data is now saved in IBM Cloudant. After a few minutes, launch the IBM Cloudant dashboard to see your data.

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End of Lab 9