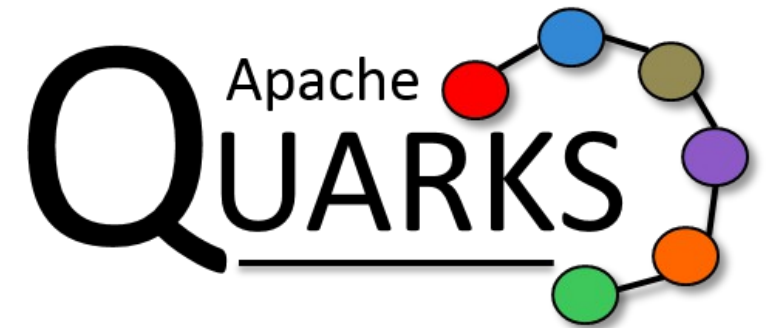# Creating a Quarks Application

April 13, 2016

Apache Quarks is currently undergoing Incubation at the Apache Software Foundation.

Quarks – The Connected Perspective

- Quarks communicates through *connectors* to relay data to a central analytics cluster (Spark, IBM Streams)

- Quarks provides several of these:
  - Watson Internet of Things (MQTT with device registration)
  - Kafka
  - JDBC
  - (and more!)

- We are primarily concerned with Watson IoT
  - Easy to set up
  - Integrates well with BlueMix

Creating a Watson IoT Device - BlueMix

- BlueMix has a free Watson IoT service

Creating a Watson IoT Device - Service

- Create a BlueMix account.

- Create a Watson IoT Service

    - Create a device. Record its access token.

    - Create an API Key. Record its token.

- Using the tokens, create the device.conf file. This will be used to connect to Watson IoT, for example:

    org=9wmrlu
    type=RaspberryPi
    id=Pi-001
    auth-method=token
    auth-token=Ro?2(pcQARJhrj5erprwGcE

Creating a Watson IoT Device - Code

```
public static void main(String[] args) throws Exception {

}
```

- Starting from main…

Creating a Watson IoT Device - Code

```java
public static void main(String[] args) throws Exception {
    String deviceCfg = "device.cfg";
}
```

- Keep track of the path to your device's config file.

Creating a Watson IoT Device - Code

```java
public static void main(String[] args) throws Exception {
    String deviceCfg = "device.cfg";
    IotProvider provider = new IotProvider(
        topology -> new IotfDevice(topology, new File(deviceCfg)));
}
```

- Using the config file, create a new IoTProvider object.

- The IoTProvider takes a function that creates an IotfDevice object given a topology as a parameter.
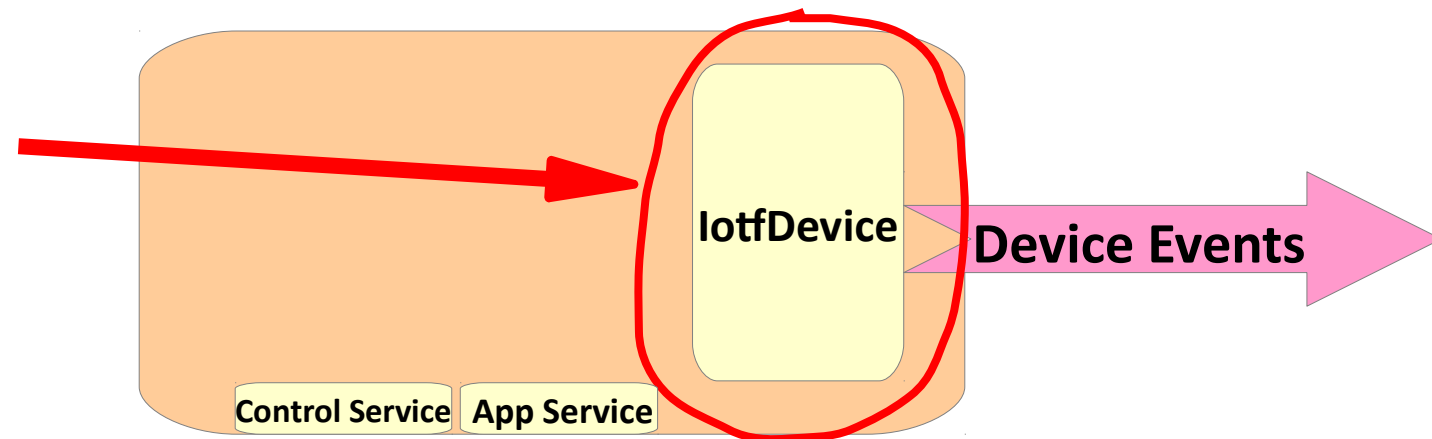
Creating a Watson IoT Device - Code

```java
public static void main(String[] args) throws Exception {
    String deviceCfg = "device.cfg";
    IotProvider provider = new IotProvider(
        topology -> new IotfDevice(topology, new File(deviceCfg)));
}
```

- This function is used to create a Quarks Application which talks to the Watson IoT message hub through the created IotfDevice.

Visually, it creates this portion of the scenario

(by default, creating an IotProvider also initializes the control and application services)

IotfDevice

Device Events

Control Service   **App Service**

Creating a Watson IoT Device - Code

```java
public static void main(String[] args) throws Exception {
    String deviceCfg = "device.cfg";
    IotProvider provider = new IotProvider(
        topology -> new IotfDevice(topology, new File(deviceCfg)));

    provider.registerTopology("Heartbeat",
        (iotDevice,config) -> IotfSensors.heartBeat(iotDevice, true));
}
```

- The IoTProvider allows the user to register functions which build an application.

Creating a Watson IoT Device - Code

```java
public static void main(String[] args) throws Exception {
    String deviceCfg = "device.cfg";
    IotProvider provider = new IotProvider(
        topology -> new IotfDevice(topology, new File(deviceCfg)));

    provider.registerTopology("Heartbeat",
        (iotDevice,config) -> IotfSensors.heartBeat(iotDevice, true));
}
```
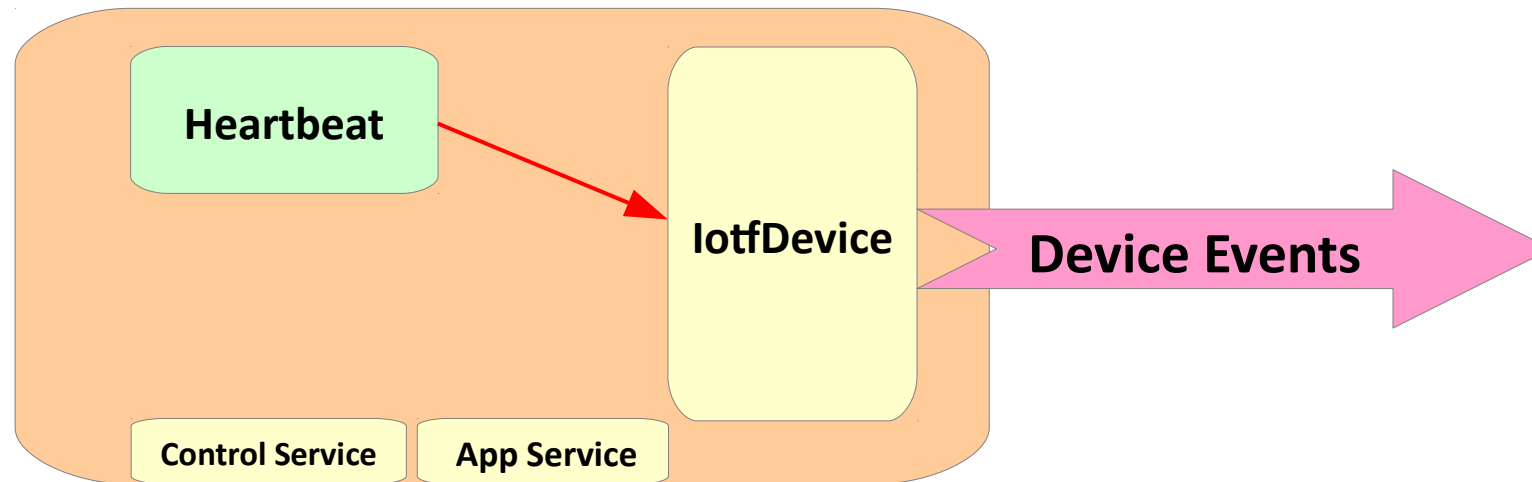
- When invoked, this function takes the iotDevice and uses it to construct an application which sends a heartbeat message to the central analytics cluster every minute.

Creating a Watson IoT Device - Code

With the IotfDevice and the heartbeat messages the scenario looks like this:

Creating a Watson IoT Device - Code

```java
public static void main(String[] args) throws Exception {
    String deviceCfg = "device.cfg";
    IotProvider provider = new IotProvider(
        topology -> new IotfDevice(topology, new File(deviceCfg)));

    provider.registerTopology("Heartbeat",
        (iotDevice,config) -> IotfSensors.heartBeat(iotDevice, true));
    provider.registerTopology("Sensors",
        (iotDevice,config) -> IotfSensors.simulatedSensors(iotDevice, true));
}
```

- Similarly, we can register a function which, when invoked, creates an application that simulates sensor readings and sends them to the central analytics cluster.

- **These are two separate applications**

Creating a Watson IoT Device - Code

With the IotfDevice, the heartbeat messages, and the sensor readings, the scenario looks like this: