

# DevZone Lab 4990 Getting started with Watson IoT Platform Data Management

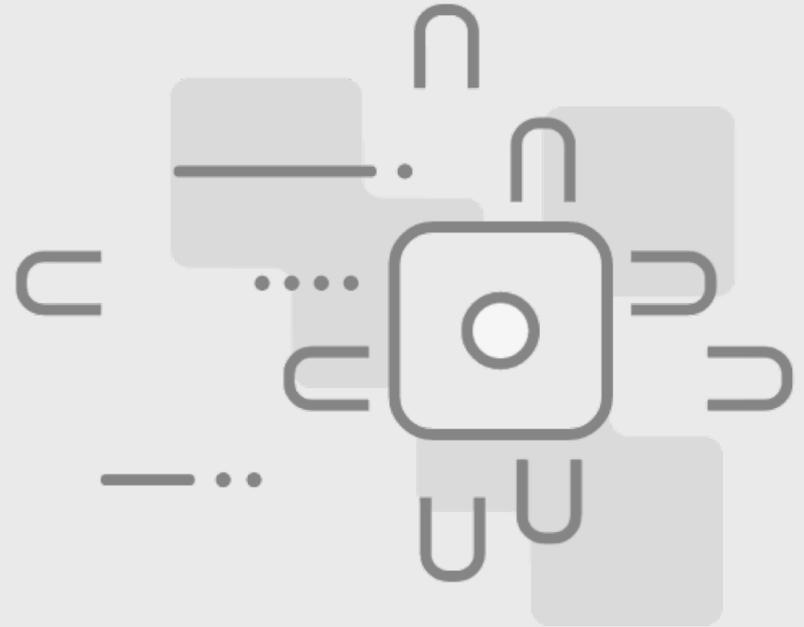
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# Data Management in Watson IoT Platform

**In this session we will show how to get started with the IoT Platform and use Data Management to transform and normalize data from connected devices**

Using Data Management, you can define event type schemas for your device messages and create interfaces that define abstractions and compute the state of for your devices

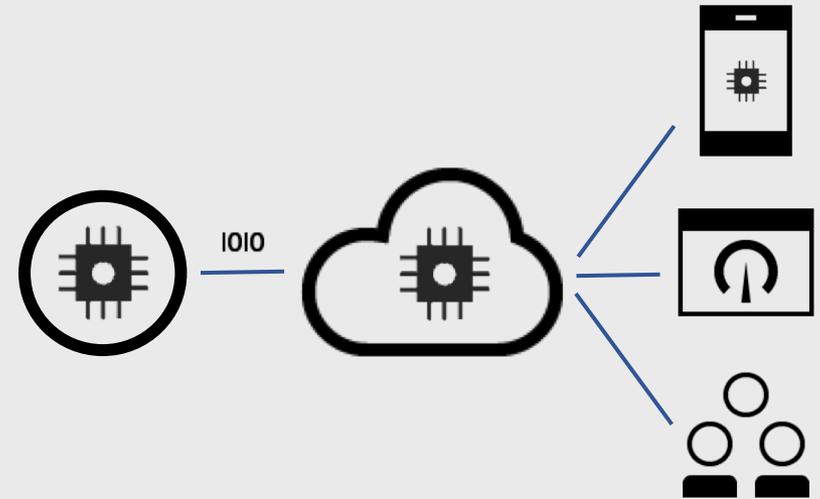


# What is the Watson IoT Platform?

**The IBM Watson Internet of Things Platform is a fully managed, cloud-hosted service available in IBM Cloud**

Devices connect and start sending data securely to the IBM Watson IoT Platform service using the light-weight standardized MQTT messaging protocol

From there, applications can access real-time device data, and devices can be managed using secure APIs or the IoT Platform dashboard



# What vocabulary are your devices taking?

## Devices of different brands and models uses different message schemas for sending data, even for the same units of measured data

We find that specific code is required to manage the schema variability of device event and command

- Developers need to improve their productivity and speed of delivery
- Developers need a simple programming model and an abstract interface model to insulate the schema variability
- Developers need the platform to take the load off the application code and manage device state and behavior

Celsius temperature as "ambientTemp"

```
{
  "d": {
    "myName": "sensortag",
    "ambientTemp": "30.25",
    "objectTemp": "21.88",
    "humidity": "53.24178",
    "pressure": "1031.17",
    "altitude": "1.43789",
    "accelX": "-0.03",
    "accelY": "0.02",
    "accelZ": "-1.06",
    "gyroX": "-0.85",
    "gyroY": "0.28",
    "gyroZ": "1.30",
    "magX": "46.47",
    "magY": "84.69",
    "magZ": "-45.42",
    "light": "9.49"
  }
}
```

Kelvin temperature as "value"

```
{
  "ts":
    "2017-10-02T08:09:34.310+0000",
  "d": {
    "value": 296.77,
    "time": 1506931831214
  }
}
```

Celsius temperature as "t"

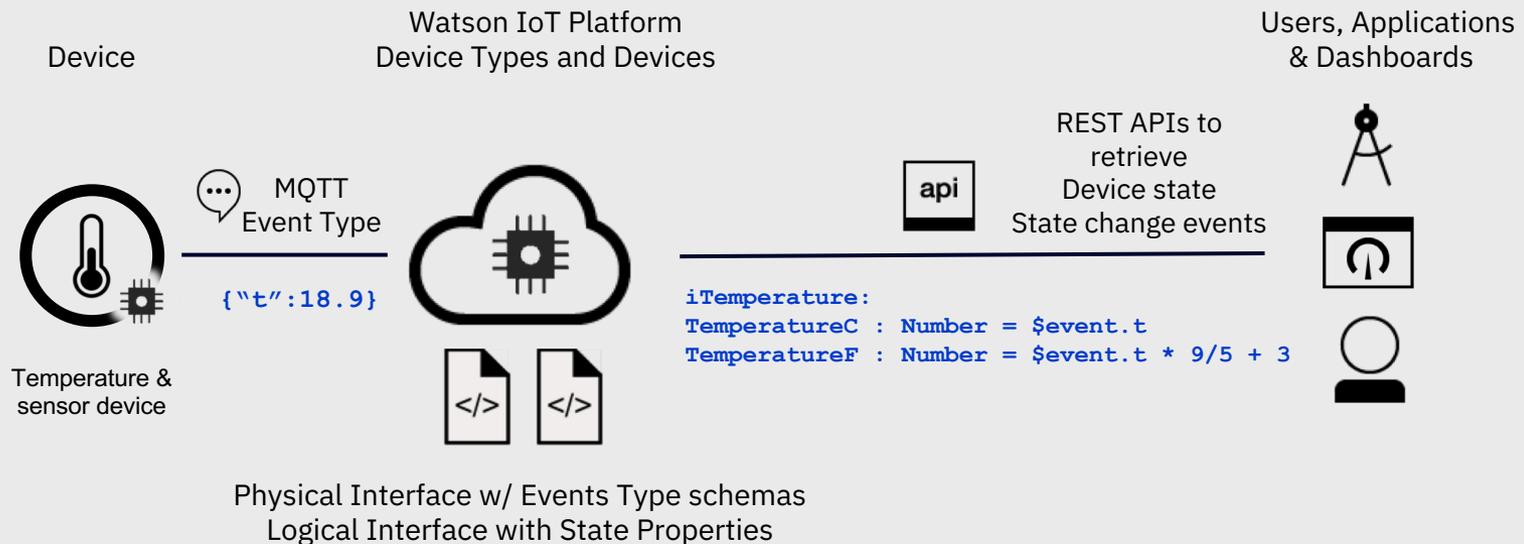
```
{"t": 18.9}
```



# Device Abstractions

## With Data Management we enable developers to

- Define Physical Interfaces that model events type schemas and filter events
- Define Logical Interfaces that model devices and expose state and change notifications to users and applications



# Advanced use of Device Abstractions

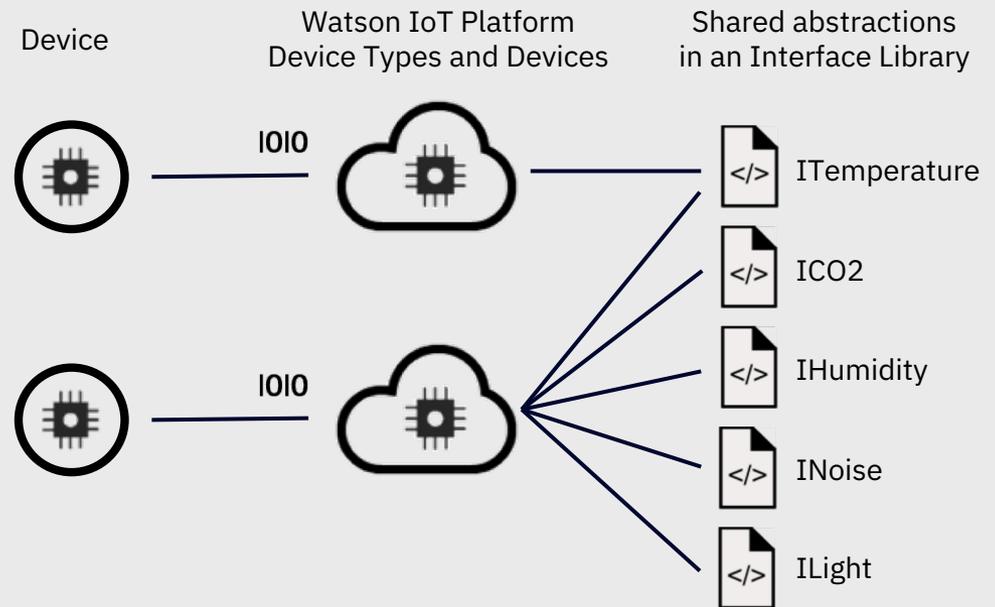
## Devices of different brands and models may use shared Logical Interface abstractions

Devices with common device behavior uses shared interfaces

Devices may expose different views of device data to different types of application consumers

Developers may reuse schemas and interfaces in a library across IoT solutions

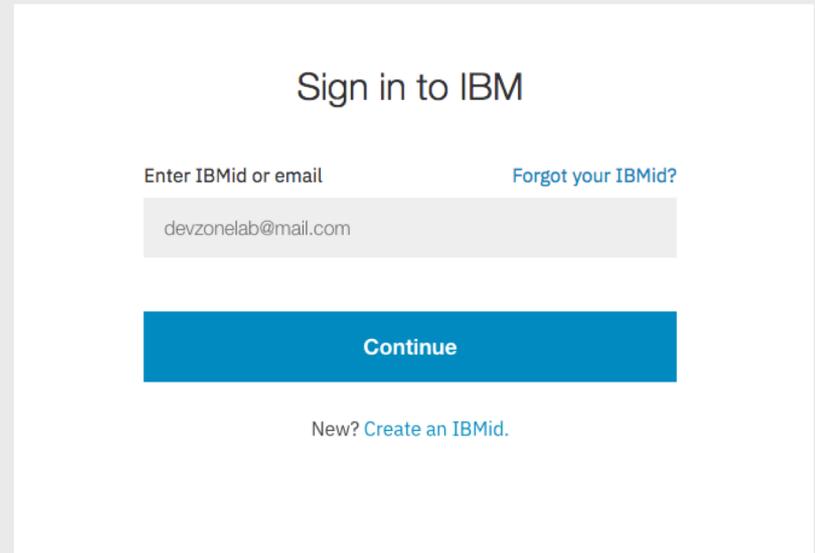
Developers may manage the lifecycle of schemas and interfaces across their versions



# Log into IBM Cloud and the Watson IoT Platform

## Lets first log into IBM Cloud

1. Open a browser window on your workstation
2. Go to <http://bluemix.net>
3. Log in as  
User: -  
Password: -

A screenshot of the IBM sign-in page. The page has a white background with the text "Sign in to IBM" at the top center. Below this, there is a label "Enter IBMid or email" and a link "Forgot your IBMid?". A text input field contains the email address "devzonelab@mail.com". Below the input field is a large blue button with the text "Continue". At the bottom of the page, there is a link "New? Create an IBMid." data-bbox="554 271 976 658"/>

Sign in to IBM

Enter IBMid or email [Forgot your IBMid?](#)

devzonelab@mail.com

Continue

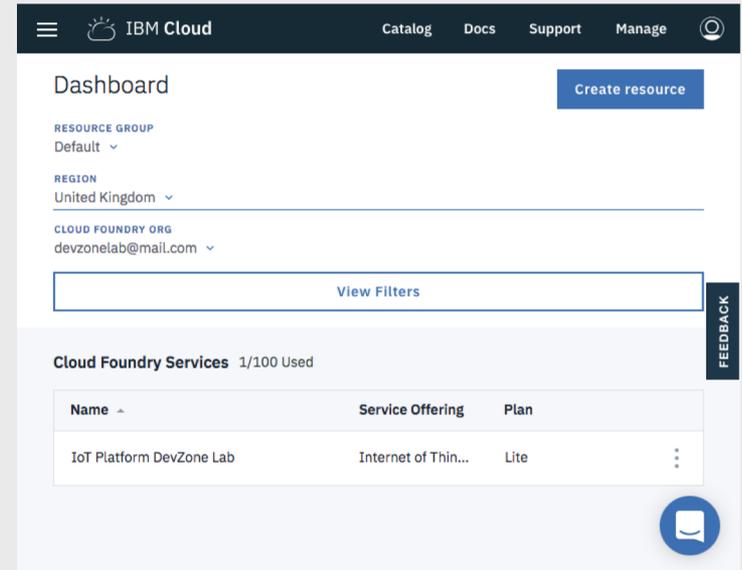
New? [Create an IBMid.](#)

Note: You have to log out from IBM cloud if you are logged in as another user

# Locate the Internet of Things Platform

## The IBM Cloud Dashboard is loaded

1. In the list of Services, click and open [IoT Platform DevZone Lab](#) [Internet of Things Platform service](#)
2. In the Watson IoT Platform service page, click [Launch](#) to open the IoT platform web interface

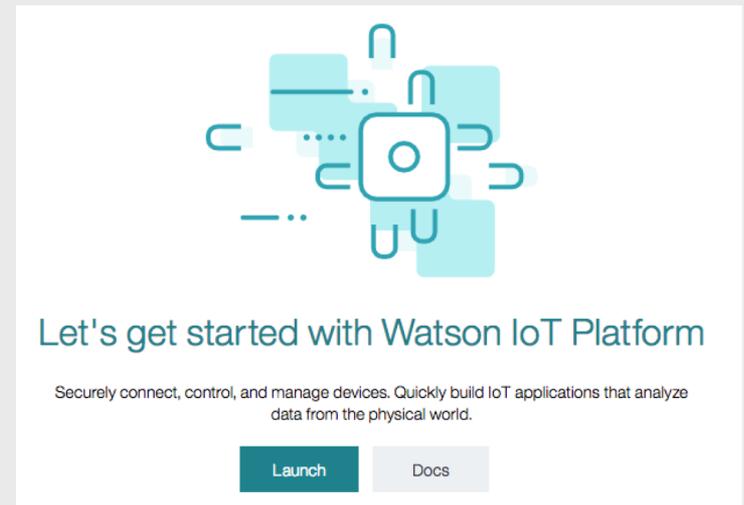


The screenshot shows the IBM Cloud Dashboard interface. At the top, there is a navigation bar with the IBM Cloud logo and links for Catalog, Docs, Support, and Manage. Below the navigation bar, the dashboard displays the following information:

- Dashboard** (with a "Create resource" button)
- RESOURCE GROUP**: Default
- REGION**: United Kingdom
- CLOUD FOUNDRY ORG**: devzonelab@mail.com
- View Filters** button
- Cloud Foundry Services**: 1/100 Used

Name	Service Offering	Plan
IoT Platform DevZone Lab	Internet of Thin...	Lite

A "FEEDBACK" button is visible on the right side of the dashboard.



The screenshot shows the Watson IoT Platform service page. It features a central graphic of a teal robot head with various symbols around it. Below the graphic, the text reads:

### Let's get started with Watson IoT Platform

Securely connect, control, and manage devices. Quickly build IoT applications that analyze data from the physical world.

At the bottom, there are two buttons: [Launch](#) and [Docs](#).

# Locate the Internet of Things Platform Organization

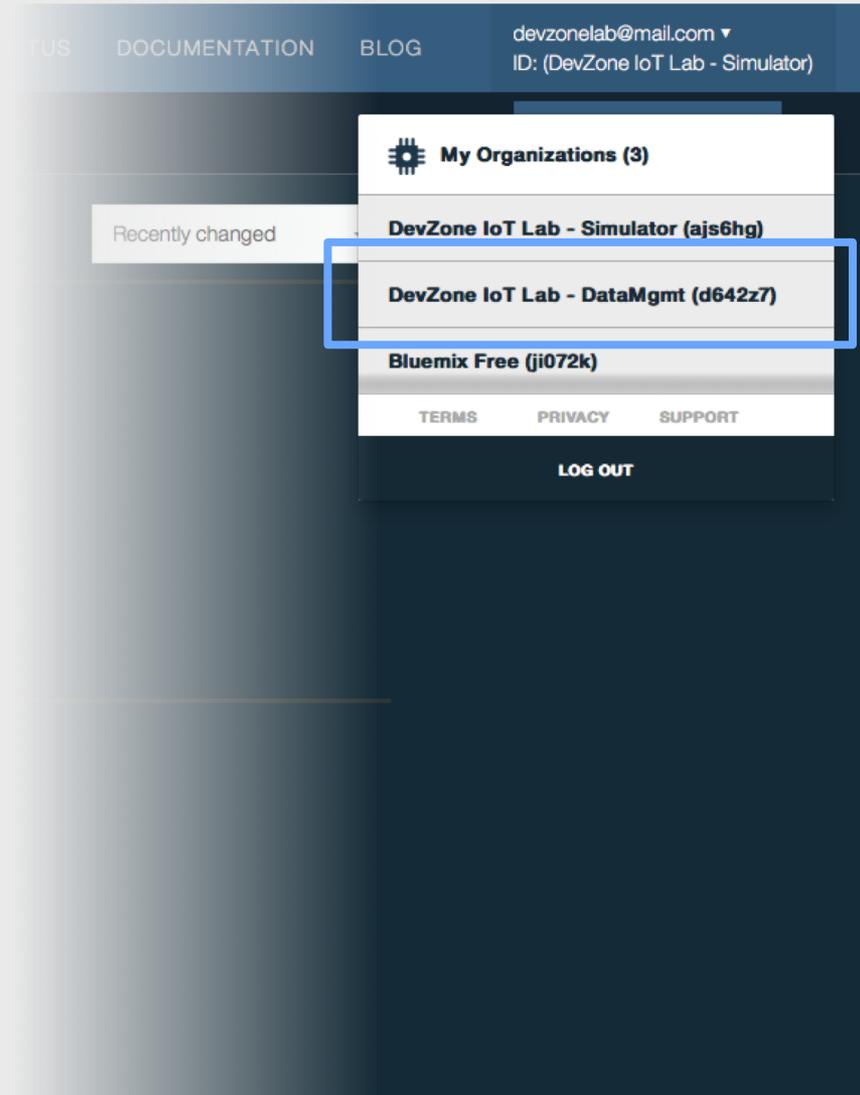
The IoT Platform is loaded

The devzonelab user is configured for multiple Think DevZones labs

In this lab we will use the the IoT organization with id [d642z7](#)

From the menu, in the top right part of the screen, choose

[DevZone IoT Lab – DataMgmt \(d642z7\)](#)



# 4 simple steps

We are now ready to start exploring IoT Platform Data Management

1

Explore  
Device Events

Monitor devices and the  
recently received events

2

Explore  
Physical Interfaces

View the Physical Interface  
and Event Types configured

3

Explore  
Logical Interfaces

View the state model and  
mapping expressions

4

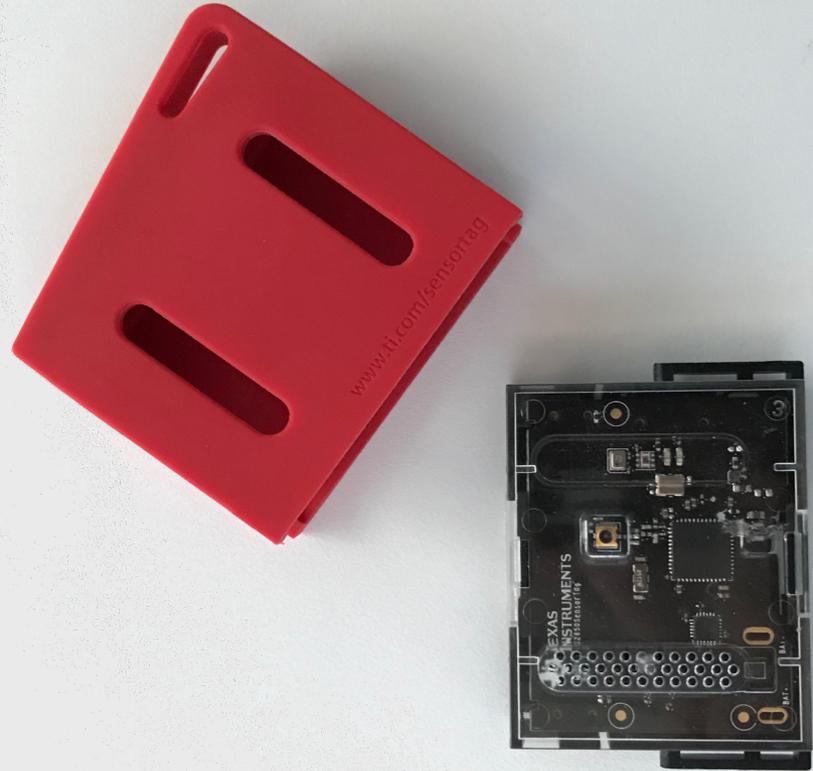
Explore  
Device State

View the device state  
of the logical interfaces

# Device Events

In this session we will use a TI SensorTag sending device data

```
{  
  "d": {  
    "myName": "TiSensorTag",  
    "ambientTemp": 24.72,  
    "objectTemp": 20.38,  
    "humidity": 49.92142,  
    "pressure": 1009.75,  
    "altitude": -0.08634908,  
    "accelX": -0.08,  
    "accelY": 0.07,  
    "accelZ": 0.96,  
    "gyroX": 1.79,  
    "gyroY": 3.37,  
    "gyroZ": 1.14,  
    "magX": 139.56,  
    "magY": 188.43,  
    "magZ": -343.73,  
    "light": 1519.36  
  }  
}
```



# 4 simple steps > Explore Device Events

## Explore Device Events

Monitor devices and the recently received events

1. Go to Devices
2. In the list of devices, click on TiSensorTag

The screenshot shows the IBM Watson IoT Platform interface. On the left, a dark sidebar contains a menu with items: BOARDS, DEVICES (circled in blue), MEMBERS, APPS, USAGE, RULES, SECURITY, SETTINGS, and EXTENSIONS. The main content area is titled 'Browse Devices' and includes a '+ Add Device' button. Below the title is a table with columns for Device ID, Device Type, and Class ID. The table contains two rows: 'TemperatureSensor' and 'TiSensorTag' (circled in blue). The table also shows '2 results' and a '+2' indicator.

Device ID	Device Type	Class ID
TemperatureSensor	TemperatureSensorType	Device
TiSensorTag	TiSensorTagType	Device

# 4 simple steps > Explore Device Events

## Explore Device Events

The device details are shown

1. Go to the Recent Events tab
2. Wait for the next event to be sent from the Sensor Tag to the IoT Platform
3. Click on the new event

IBM Watson IoT Platform

QUICKSTART SERVICE STATUS DOCUMENTATION BLOG devzone@ibm.com ID: (DevZone IoT Lab - DataMgmt)

Browse Diagnose Action Device Types Manage Schemas + Add Device

### Browse Devices

This table shows a summary of all devices that have been added. It can be filtered, organized, and searched on using different criteria. To get started, you can add devices by using the Add Device button, or by using API.

Device ID	Device Type	Class ID	Date Added	Descriptive Location
2 results				
TemperatureSensor	TemperatureSensorType	Device	23 Feb 2018 19:44	
TISensorTag	TISensorTagType	Device	23 Feb 2018 13:17	

Identity Device Information **Recent Events** State

Showing Raw Data | The recent events listed show the live stream of data that is coming and going from this device.

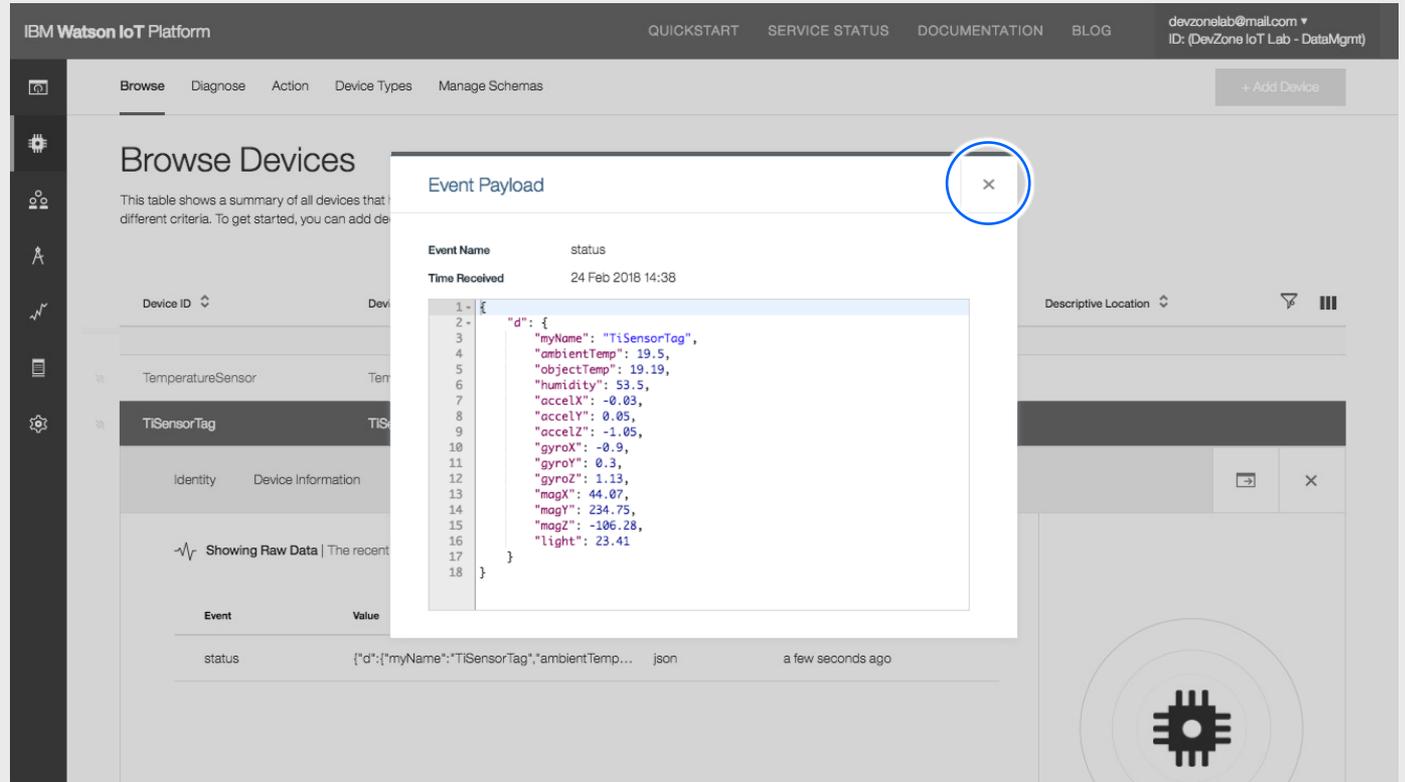
Event	Value	Format	Last Received
status	{\"d\":{\"myName\":\"TISensorTag\", \"ambientTemp...	json	a few seconds ago

# 4 simple steps > Explore Device Events

## Explore Device Events

The event message and payload is shown

1. View the event data
2. Close the dialog



IBM Watson IoT Platform

QUICKSTART SERVICE STATUS DOCUMENTATION BLOG devzone@ibm.com ID: (DevZone IoT Lab - DataMgmt)

Browse Diagnose Action Device Types Manage Schemas + Add Device

### Browse Devices

This table shows a summary of all devices that have been added to your organization. To get started, you can add devices using different criteria. To get started, you can add devices using different criteria.

Device ID	Device Name
TemperatureSensor	TemperatureSensor
TiSensorTag	TiSensorTag

Identity Device Information

Showing Raw Data | The recent events for this device.

Event	Value
status	{ "d": { "myName": "TiSensorTag", "ambientTemp": 19.5, "objectTemp": 19.19, "humidity": 53.5, "accelX": -0.03, "accelY": 0.05, "accelZ": -1.05, "gyroX": -0.9, "gyroY": 0.3, "gyroZ": 1.13, "magX": 44.07, "magY": 234.75, "magZ": -106.28, "light": 23.41 } } json a few seconds ago

#### Event Payload

```
1 {
2   "d": {
3     "myName": "TiSensorTag",
4     "ambientTemp": 19.5,
5     "objectTemp": 19.19,
6     "humidity": 53.5,
7     "accelX": -0.03,
8     "accelY": 0.05,
9     "accelZ": -1.05,
10    "gyroX": -0.9,
11    "gyroY": 0.3,
12    "gyroZ": 1.13,
13    "magX": 44.07,
14    "magY": 234.75,
15    "magZ": -106.28,
16    "light": 23.41
17  }
18 }
```

# 4 simple steps > Explore Device Events

Optionally, explore the TemperatureSensor device

## Explore Device Events

Repeat the steps and view the events received from the TemperatureSensor device

1. Select the TemperatureSensor device in the list
2. Select the Recent Events tab
3. Wait for an event
4. View the event message payload

The screenshot displays the IBM Watson IoT Platform interface. The main page is titled 'Browse Devices' and shows a table of devices. A modal window titled 'Event Payload' is open, displaying the following information:

Event Name	evt
Time Received	24 Feb 2018 14:45
1	{
2	"t": 23
3	}

The background interface includes a navigation menu on the left, a top navigation bar with links like 'QUICKSTART', 'SERVICE STATUS', 'DOCUMENTATION', and 'BLOG', and a user profile section in the top right corner. The main content area shows a list of devices, with 'TemperatureSensor' selected. Below the device list, there are tabs for 'Identity' and 'Device Information', and a section for 'Showing Raw Data'.

# 4 simple steps > Explore Device Events

1

## Explore Device Events

Monitor devices and the  
recently received events

### Conclusions

- Devices are sending MQTT event messages to the IoT platform
- The messages contain a JSON payload with the device data
- Messages use different message schemas depending on the device brand, make or version
- Developers need to make changes in the IoT application to adopt to new device message formats
- The IoT Platform and Data Management removes this need

# 4 simple steps > Explore Physical Interfaces

Lets start exploring Data Management Interfaces

## Explore Physical Interfaces

View the Physical Interface and Event Types configured

1. In the Device section
2. Click on the Device Type tab
3. In the list, select the TiSensorTag device type

The screenshot displays the IBM Watson IoT Platform interface. On the left is a dark navigation sidebar with the following menu items: BOARDS, DEVICES (highlighted with a blue circle), MEMBERS, APPS, USAGE, RULES, SECURITY, SETTINGS, and EXTENSIONS. The main content area is titled 'Device Types' and features a breadcrumb trail: Browse > Diagnose > Action > Device Types > Manage Schemas. The 'Device Types' tab is highlighted with a blue circle. Below the breadcrumb is a '+ Add Device Type' button. The main content area contains a table with the following data:

Name	Description	Number of Devices
TemperatureSensorType		1
TiSensorTagType		1

The 'TiSensorTagType' entry in the table is highlighted with a blue circle.

# 4 simple steps > Explore Physical Interfaces

Explore Physical Interfaces

The TiSensorTag row expands and show type details

Select the Interface tab

IBM Watson IoT Platform

QUICKSTART SERVICE STATUS DOCUMENTATION BLOG devzonelab@mail.com ID: (DevZone IoT Lab - DataMgmt)

Browse Diagnose Action **Device Types** Manage Schemas + Add Device Type

### Device Types

This table lists all device types that are defined. You can filter the list and search for the name and description. You can modify and configure existing device types and add new device types.

Name	Description	Number of Devices
TemperatureSensorType		1
<b>TiSensorTagType</b>		<b>1</b>

**Identity** Device Information **Interface**

**Device Type** TiSensorTagType  
**Date Created** 23 Feb 2018 13:17  
**Description**  
**Number of Devices** 1 Connected Device

# 4 simple steps > Explore Physical Interfaces

## Lets explore the Physical Interface

### Explore Physical Interfaces

The Interfaces tab shows all Physical and Logical interfaces defined for the type

Click the eye icon to view the Physical Interface

The screenshot displays the IBM Watson IoT Platform interface. At the top, the navigation bar includes 'QUICKSTART', 'SERVICE STATUS', 'DOCUMENTATION', and 'BLOG'. The user is logged in as 'devzone@lab@mail.com' with the role 'ID: (DevZone IoT Lab - DataMgmt)'. The main navigation menu shows 'Browse', 'Diagnose', 'Action', 'Device Types', and 'Manage Schemas'. The 'Device Types' tab is active, showing a table with columns for 'Name', 'Description', and 'Number of Devices'. The table lists 'TemperatureSensorType' and 'TISensorTagType', both with a count of 1. The 'TISensorTagType' entry is selected, and the 'Interface' tab is active. The interface configuration is split into two panels: 'Physical Interface' and 'Logical Interface'. The 'Physical Interface' panel shows a single entry, 'TISensorTagType\_PI', with a description 'The Physical Interface for the TISensorTag'. A blue circle highlights the eye icon next to this entry. The 'Logical Interface' panel shows three entries: 'IHumidity', 'IComfort', and 'ITemperature', each with a description and an eye icon. At the bottom of the interface, there are buttons for 'Invalid Changes' and 'Show Errors'.

# 4 simple steps > Explore Physical Interfaces

## Explore Physical Interfaces

1. View the Identity information for the Physical Interface
2. Click Next

The screenshot displays the IBM Watson IoT Platform interface. At the top, the navigation bar includes 'QUICKSTART', 'SERVICE STATUS', 'DOCUMENTATION', and 'BLOG'. The user's email 'devzonalab@mail.com' and the lab name 'ID: (DevZone IoT Lab - DataMgmt)' are visible. The main navigation menu shows 'Browse', 'Diagnose', 'Action', 'Device Types', and 'Manage Schemas'. A '+ Add Device Type' button is located in the top right.

The 'Device Types' section contains a table with the following data:

Name	Description	Number of Devices
TemperatureSensorType		1
TiSensorTagType		1

The 'TiSensorTagType' entry is selected, and the 'Interface' tab is active. The main content area is titled 'Edit Physical Interface: TiSensorTagType\_PI'. It features a sidebar with 'Identity' and 'Event Types and Payload' sections. The 'Identity' section displays the following information:

- Name:** TiSensorTagType\_PI
- Description:** The Physical Interface for the TiSensorTag

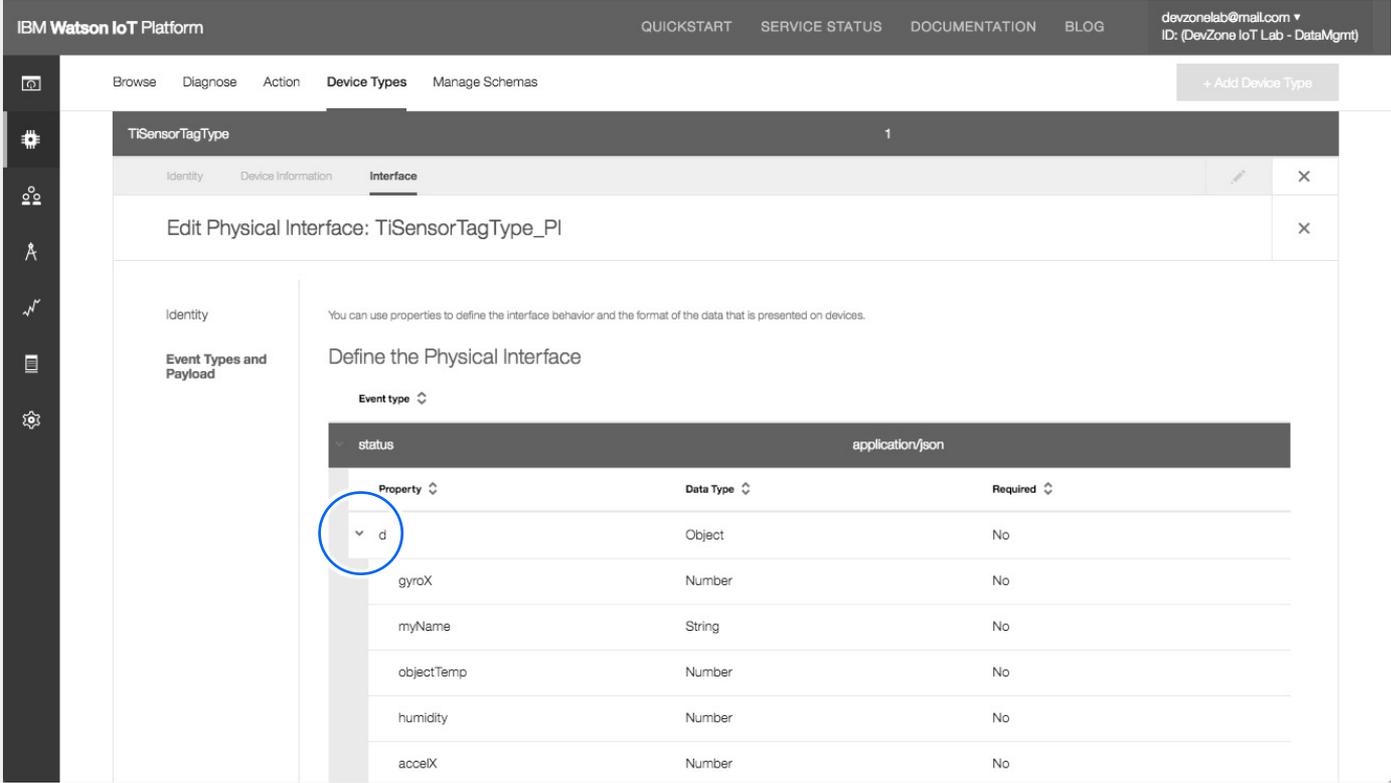
The main content area contains a diagram illustrating the physical interface. It shows a 'Device' (represented by a circular icon) connected to a 'Physical Interface' (represented by a rectangular box). This physical interface is further divided into three 'Logical Interface' components. These logical interfaces are connected to 'Applications' (represented by person icons). Below the diagram, the labels 'Device', 'Advanced Interface Creator', and 'Applications' are visible.

At the bottom right of the interface, a 'Next' button is circled in blue, indicating the next step in the process.

# 4 simple steps > Explore Physical Interfaces

## Explore Physical Interfaces

1. View the Event Type schema for Status events
2. Expand the event type schema hierarchy
3. Click Done to return to the Interfaces page



# 4 simple steps > Explore Physical Interfaces

2

## Explore Physical Interfaces

View the Physical Interface  
and Event Types configured

### Conclusions

- A Physical Interface declares the Event Type schemas for a Device Type
- Events with a matching event type schema will be processed by Data Management
- Events with an unrecognized event type schema will be ignored and not processed. This provides a mechanism to filter device events
- Developers can reuse Event Type schemas across Device Types and their Physical Interfaces

# 4 simple steps > Explore Logical Interfaces

Lets explore the Logical Interfaces

## Explore Logical Interfaces

View the state model and mapping expressions

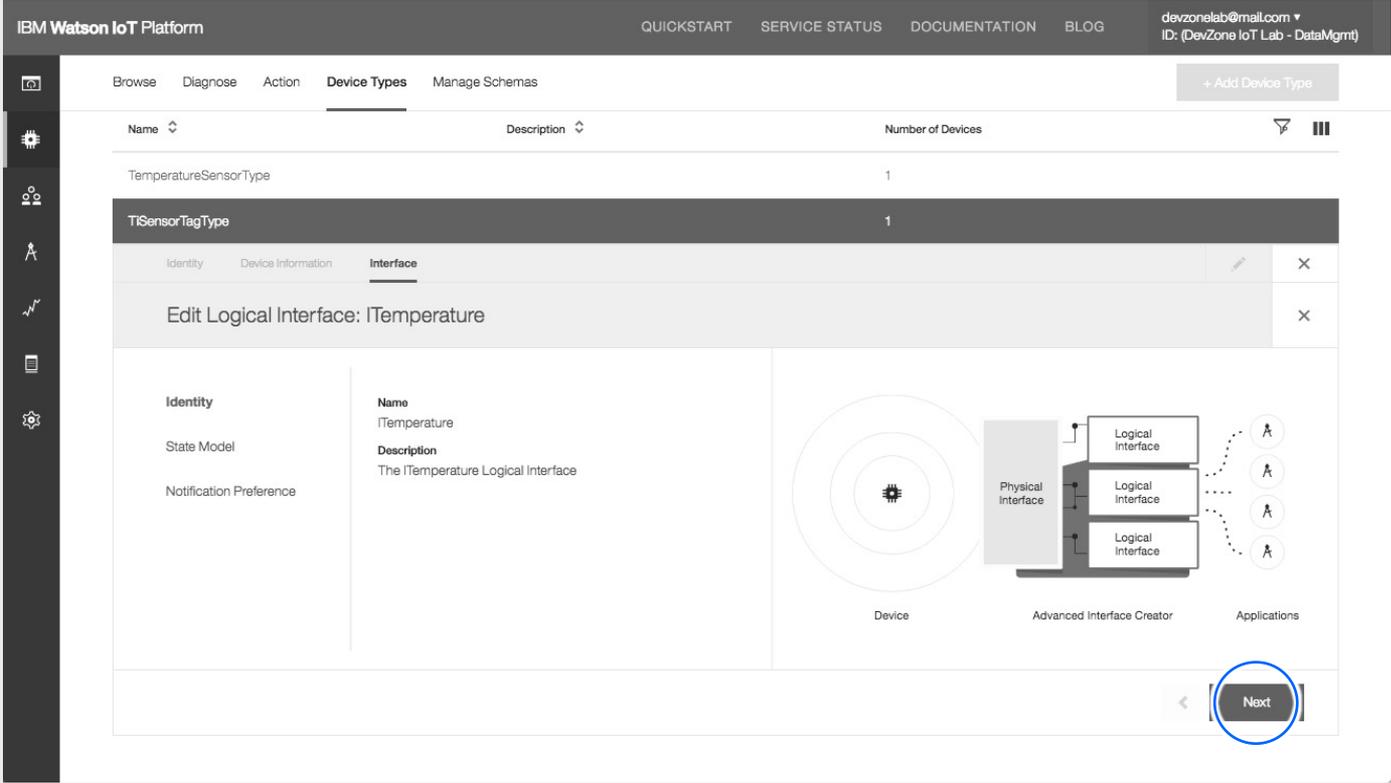
On the Interface tab, click the eye icon on the ITemperature Logical Interface

The screenshot displays the IBM Watson IoT Platform interface. At the top, there is a navigation bar with options like 'QUICKSTART', 'SERVICE STATUS', 'DOCUMENTATION', and 'BLOG'. Below this, a breadcrumb trail shows 'Browse', 'Diagnose', 'Action', 'Device Types', and 'Manage Schemas'. A table lists device types, with 'TemperatureSensorType' and 'TISensorTagType' both having a count of 1. The 'TISensorTagType' entry is selected, and the 'Interface' tab is active. This tab is divided into 'Physical Interface' and 'Logical Interface' sections. The 'Physical Interface' section shows 'TISensorTagType\_PI' with the description 'The Physical Interface for the TISensorTag'. The 'Logical Interface' section lists three interfaces: 'IHumidity', 'IComfort', and 'ITemperature'. The 'ITemperature' interface is highlighted in grey, and its eye icon is circled in blue. At the bottom of the interface, there are status indicators for 'Invalid Changes' and a 'Show Errors' button.

# 4 simple steps > Explore Logical Interfaces

**Explore Logical Interfaces**

1. View the Identity information for the Logical Interface
2. Click Next



# 4 simple steps > Explore Logical Interfaces

## Explore Logical Interfaces

The Logical Interface editor shows the state properties defined in the ITemperature logical interface

The interface declares

- TemperatureC  
the Celsius temperature
- TemperatureF  
the Fahrenheit temperature

Click on the eye icon to view the mapping expression for TemperatureF

The screenshot displays the IBM Watson IoT Platform interface. The top navigation bar includes 'QUICKSTART', 'SERVICE STATUS', 'DOCUMENTATION', and 'BLOG'. The main content area is titled 'Device Types' and shows a list of device types. The 'TemperatureSensorType' and 'TISensorTagType' are listed with a 'Number of Devices' of 1. The 'TISensorTagType' is selected, and the 'Interface' tab is active. The 'Define the Interface' section shows a table with the following data:

Property	Mapped Payloads	Data Type
TemperatureC	ambientTemp [status]	Number
TemperatureF	ambientTemp x 9 ÷ 5 + 32	Number

The 'TemperatureF' row has an eye icon circled in blue, indicating that the mapping expression is visible. The 'Next' button is located at the bottom right of the interface editor.

# 4 simple steps > Explore Logical Interfaces

## Explore Logical Interfaces

The mapping expression for TemperatureF is shown in the dialog

The mapping expression computes the temperature using the formula

$$T_F = T_C * 9/5 + 32$$

The  $T_C$  temperature value is mapped to the d.ambientTemp value in the Status event

1. Close the dialog
2. Click Next

The screenshot shows the IBM Watson IoT Platform interface. The main window displays a list of device types, including TemperatureSensorType and TISensorTagType. A 'View Property' dialog is open, showing the details for the TemperatureF property. The dialog includes fields for Name (TemperatureF) and Type (number). The Mapping section shows the expression:  $d.ambientTemp * 9 / 5 + 32$ . The expression is highlighted with a blue circle. The dialog also has an 'Advanced Editor' toggle and a 'Close' button.

# 4 simple steps > Explore Logical Interfaces

## Explore Logical Interfaces

The ITemperature interface has been configured to only send notifications to applications when the state value changes. This reduces network traffic and events sent to cloud applications

Click Done to return to the Interface page

The screenshot displays the IBM Watson IoT Platform interface for configuring a logical interface. The top navigation bar includes 'QUICKSTART', 'SERVICE STATUS', 'DOCUMENTATION', and 'BLOG'. The user profile is 'devzone1ab@mail.com' with ID '(DevZone IoT Lab - DataMgmt)'. The main navigation menu shows 'Browse', 'Diagnose', 'Action', 'Device Types', and 'Manage Schemas'. The current view is 'TIensorTagType' with a sub-tab 'Interface'. The page title is 'Edit Logical Interface: ITemperature'. The 'Notification Preference' section is active, showing three options: 'No Event Notifications', 'For State Changes', and 'For All Events'. The 'For State Changes' option is selected, indicated by a blue circle around its radio button. Below the options, a 'Done' button is also circled in blue. The interface includes a sidebar with various icons and a top-right '+ Add Device Type' button.

# 4 simple steps > Explore Logical Interfaces

## Explore Logical Interfaces

Repeat the steps to view the other interfaces

- IHumidity
- IComfort

Start by clicking the eye icon on the IHumidity interface

The screenshot displays the IBM Watson IoT Platform interface. At the top, the navigation bar includes 'QUICKSTART', 'SERVICE STATUS', 'DOCUMENTATION', and 'BLOG'. The user's profile is shown as 'devzone@lab@mail.com' with the ID '(DevZone IoT Lab - DataMgmt)'. The main navigation menu includes 'Browse', 'Diagnose', 'Action', 'Device Types', and 'Manage Schemas'. The 'Device Types' section is active, showing a list of device types: 'TemperatureSensorType' (count 1) and 'TiSensorTagType' (count 1). The 'TiSensorTagType' device type is selected, and the 'Interface' tab is active. The interface configuration is divided into two sections: 'Physical Interface' and 'Logical Interface'. The 'Physical Interface' section contains one entry: 'TiSensorTagType\_PI' with the description 'The Physical Interface for the TiSensorTag'. The 'Logical Interface' section contains three entries: 'IHumidity' (The IHumidity Logical Interface), 'IComfort' (The IComfort Logical Interface), and 'ITemperature' (The ITemperature Logical Interface). Each entry has an eye icon to its right. A blue circle highlights the eye icon for the 'IHumidity' interface. At the bottom of the interface, there are three buttons: 'Invalid Changes' (with a warning icon), 'Invalid Changes', and 'Show Errors'.

# 4 simple steps > Explore Logical Interfaces

## Explore Logical Interfaces

1. In the IHumidity interface, click Next to view the state properties
2. Click on the eye icon on the Humidity property

Note, the property is simply returning the d.humidity sensor reading

3. Click Next and then Done to return to the Interface tab

The screenshot displays the IBM Watson IoT Platform interface. The main window shows the 'Edit Logical Interface: IHumidity' configuration page. A 'View Property' dialog box is open, showing the following details:

Name	Humidity
Type	number

Below the table, the 'Mapping' section shows 'Event Type: state is' and 'Advanced Editor' (checked). The mapping expression is displayed as '= d.humidity', which is circled in blue. The dialog has a 'Close' button at the bottom right.

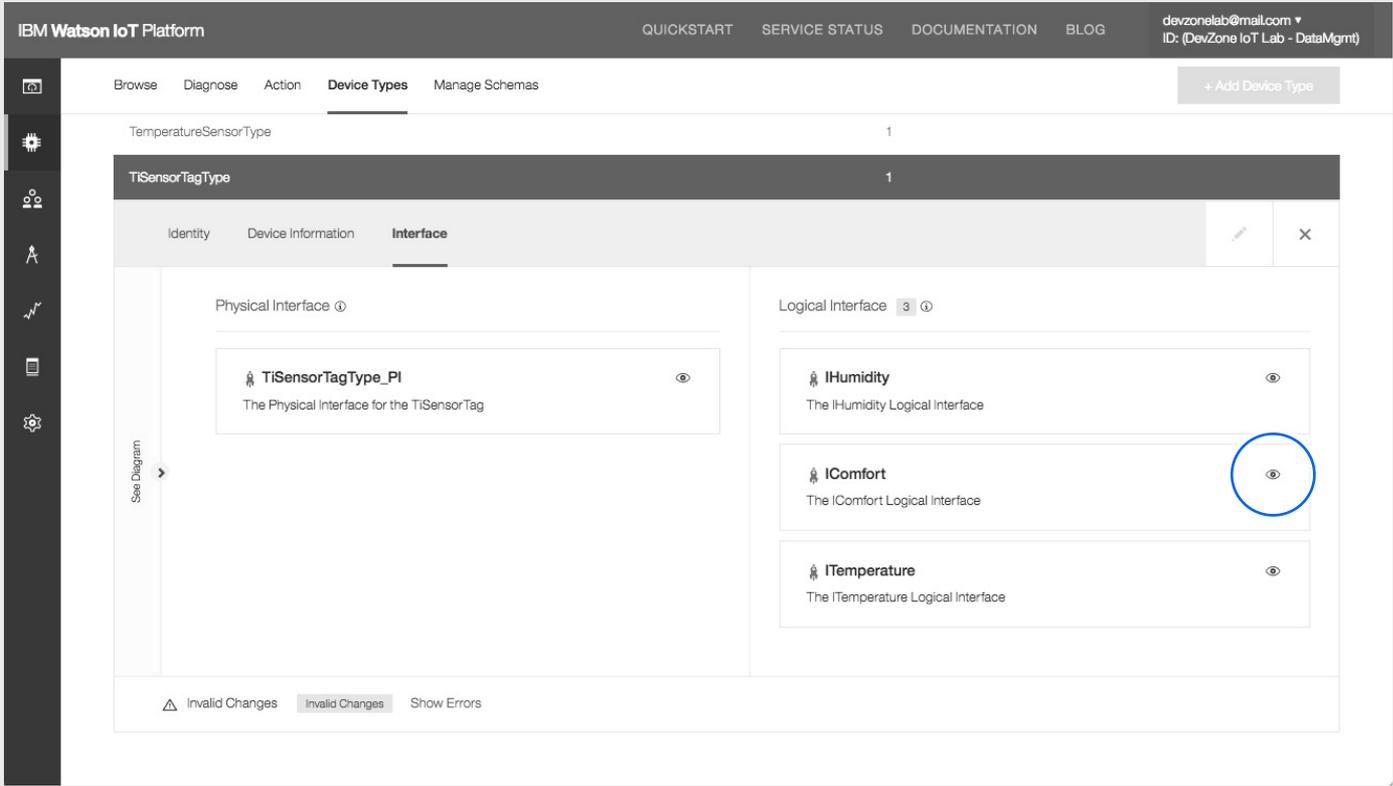
The background interface includes a top navigation bar with 'QUICKSTART', 'SERVICE STATUS', 'DOCUMENTATION', and 'BLOG'. The main navigation bar shows 'Browse', 'Diagnose', 'Action', 'Device Types', and 'Manage Schemas'. The left sidebar contains various icons for navigation. The right sidebar shows '+ Add Device Type' and a user profile 'mats.gothe@sa.ibm.com ID: (DevZone IoT Lab)'. The bottom right corner of the main window has a 'Next' button.

# 4 simple steps > Explore Logical Interfaces

Explore Logical Interfaces

Repeat the steps to view the IComfort interface

Start by clicking the eye icon on the IComfort interface



# 4 simple steps > Explore Logical Interfaces

## Explore Logical Interfaces

Repeat the steps to view the isComfortable property

The mapping expression for the 'isComfortable' state property is defined by a JSONata expression using the 'advanced' code editor

The expression sets the state to True if the temperature is between 16 and 25 degrees and the humidity is below 60%

Click Next and then Done to return to the Interface tab

IBM Watson IoT Platform

QUICKSTART SERVICE STATUS DOCUMENTATION BLOG devzone@ibm.com ID: (DevZone IoT Lab - DataMgmt)

Browse Diagnose Action **Device Types** Manage Schemas + Add Device Type

Name

TemperatureSensorType

TISensorTagType

Identity Device Information Int...

Edit Logical Interface: IC

Identity

State Model

Notification Preference

**View Property**

Name isComfortable

Type boolean

Advanced

Mapping Event Type: status  Advanced Editor

= (((event.d.ambientTemp > 16.0) and (event.d.ambientTemp < 25.0)) and (event.d.humidity < 60.0))

Close

Next

# 4 simple steps > Explore Logical Interfaces

3

## Explore Logical Interfaces

View the state model and  
mapping expressions

### Conclusions

- A logical interface is an abstraction of a device behavior
- A logical interface declares the state properties
- A device type exposing a logical interface needs to provide mapping statements for the state properties of the interface
- A mapping is a JSONata expression that uses the `$event` object to reference event data
- A mapping expression may also reference `$state` of the interface, or device metadata using `$instance`

# 4 simple steps > Explore Device State

## Lets explore the Device State

### Explore Device State

View the device state of the logical interfaces

1. Return to the device list by clicking on Browse
2. Select the TiSensorTag device
3. Select the State tab

IBM Watson IoT Platform

QUICKSTART SERVICE STATUS DOCUMENTATION BLOG devzonelab@mail.com ID: (DevZone IoT Lab - DataMgmt)

Browse Diagnose Action Device Types Manage Schemas + Add Device

### Browse Devices

This table shows a summary of all devices that have been added. It can be filtered, organized, and searched on using different criteria. To get started, you can add devices by using the Add Device button, or by using API.

Device ID	Device Type	Class ID	Date Added	Descriptive Location
2 results				
TemperatureSensor	TemperatureSensorType	Device	23 Feb 2018 19:44	
TiSensorTag	TiSensorTagType	Device	23 Feb 2018 13:17	

Identity Device Information Recent Events State

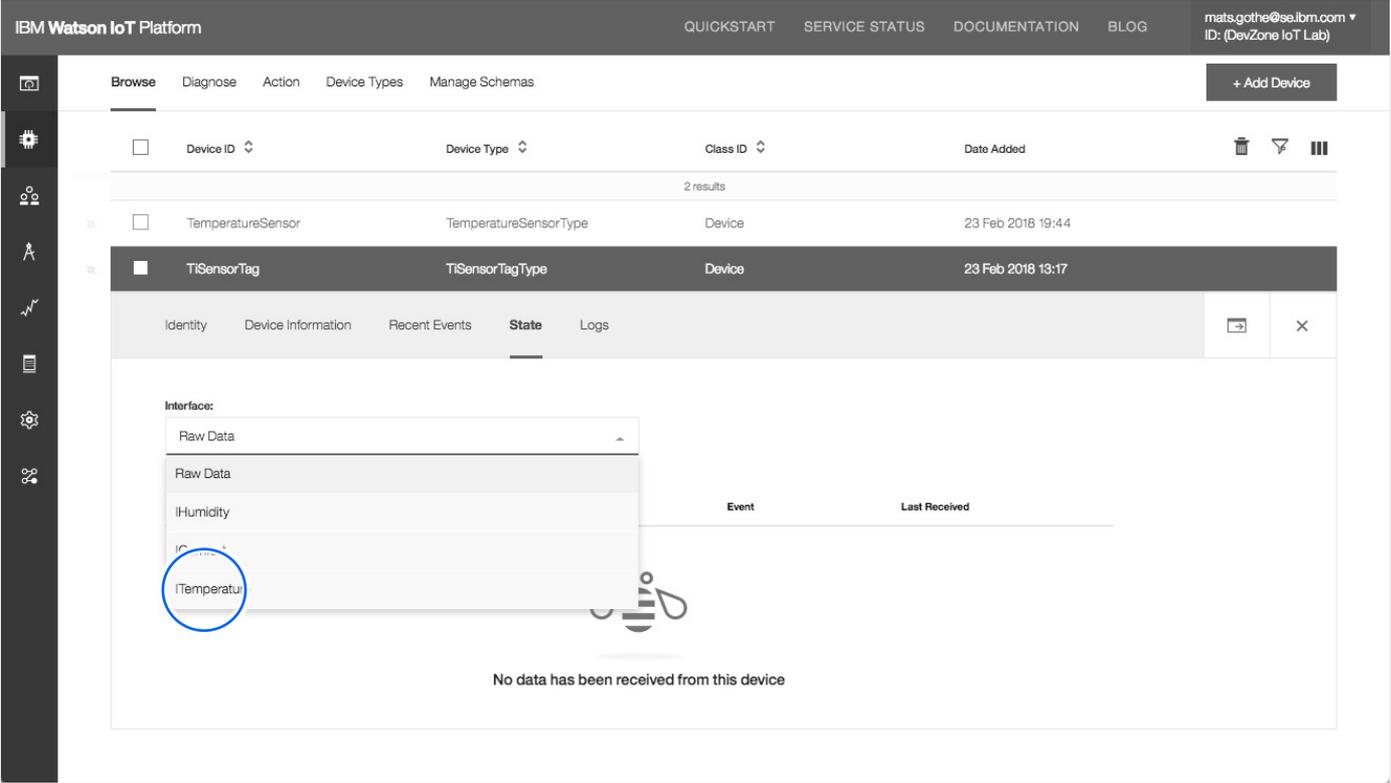
Device ID	TiSensorTag
Device Type	TiSensorTagType
Date Added	23 Feb 2018 13:17
Added By	mats.gothe@se.ibm.com
Connection Status	Disconnected

# 4 simple steps > Explore Device State

Explore Device State

The State pages loads and shows the state of a selected interface

Select ITemperature in the list of interfaces



# 4 simple steps > Explore Device State

## Explore Device State

1. Wait for a new event to be received from the device
2. The state updates and shows the current device Celsius temperature and the computed Fahrenheit value
3. Wait for new events to be received and the state to be updated

The screenshot displays the IBM Watson IoT Platform interface. At the top, there are navigation links: QUICKSTART, SERVICE STATUS, DOCUMENTATION, and BLOG. The user's email address, devzone1ab@gmail.com, and the ID (DevZone IoT Lab - DataMgmt) are shown in the top right corner. The main navigation bar includes options like Browse, Diagnose, Action, Device Types, and Manage Schemas. A '+ Add Device' button is visible in the top right.

The main content area shows a summary of all devices added, with a note that the table can be filtered, organized, and searched. Below this is a table with columns: Device ID, Device Type, Class ID, Date Added, and Descriptive Location. Two results are shown:

Device ID	Device Type	Class ID	Date Added	Descriptive Location
TemperatureSensor	TemperatureSensorType	Device	23 Feb 2018 19:44	
TISensorTag	TISensorTagType	Device	23 Feb 2018 13:17	

The 'TISensorTag' device is selected, and its state is displayed. The 'State' tab is active, showing a dropdown menu for the interface set to 'Temperature'. Below this is a table with columns: Property, Value, Type, Event, and Last Received. The 'TemperatureC' and 'TemperatureF' rows are circled in blue.

Property	Value	Type	Event	Last Received
TemperatureC	25.5	Number		a few seconds ago
TemperatureF	77.9	Number		a few seconds ago

# 4 simple steps > Explore Device State

- ## Explore Device State
1. Select the IComfort interface in the list
  2. Wait for the next event and view the computed comfort level

IBM Watson IoT Platform

QUICKSTART SERVICE STATUS DOCUMENTATION BLOG devzone1ab@mail.com ID: (DevZone IoT Lab - DataMgmt)

Browse Diagnose Action Device Types Manage Schemas + Add Device

### Browse Devices

This table shows a summary of all devices that have been added. It can be filtered, organized, and searched on using different criteria. To get started, you can add devices by using the Add Device button, or by using API.

Device ID	Device Type	Class ID	Date Added	Descriptive Location
2 results				
TemperatureSensor	TemperatureSensorType	Device	23 Feb 2018 19:44	
TISensorTag	TISensorTagType	Device	23 Feb 2018 13:17	

Identity Device Information Recent Events **State**

Interface: IComfort

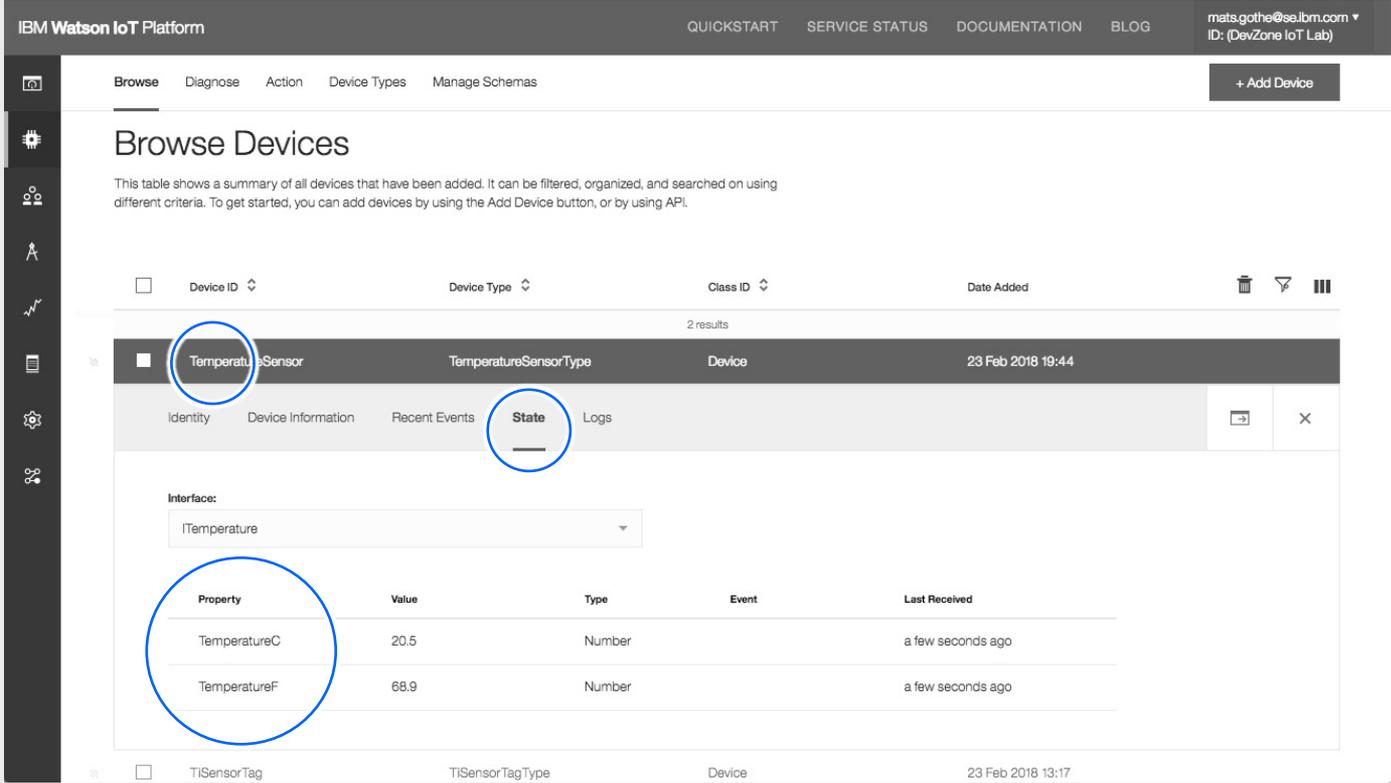
Property	Value	Type	Event	Last Received
isComfortable	false	Boolean		a few seconds ago

# 4 simple steps > Explore Device State

**Explore Device State**

Repeat the steps to view the state of the TemperatureSensor device

1. Select the TemperatureSensor device in the list
2. Choose the State tab
3. Select the ITemperature interface
4. View the device temperature



# 4 simple steps > Explore Device State

4

## Explore Device State

View the device state  
of the logical interfaces

### Conclusions

- Data Management is maintaining the device state of each logical interfaces exposed by the device type
- The device states may be viewed in the IoT platform dashboard or accessed using the IoT platform APIs or CLIs
- Applications may also subscribe to state change notification events from the IoT platform when a device state is updated

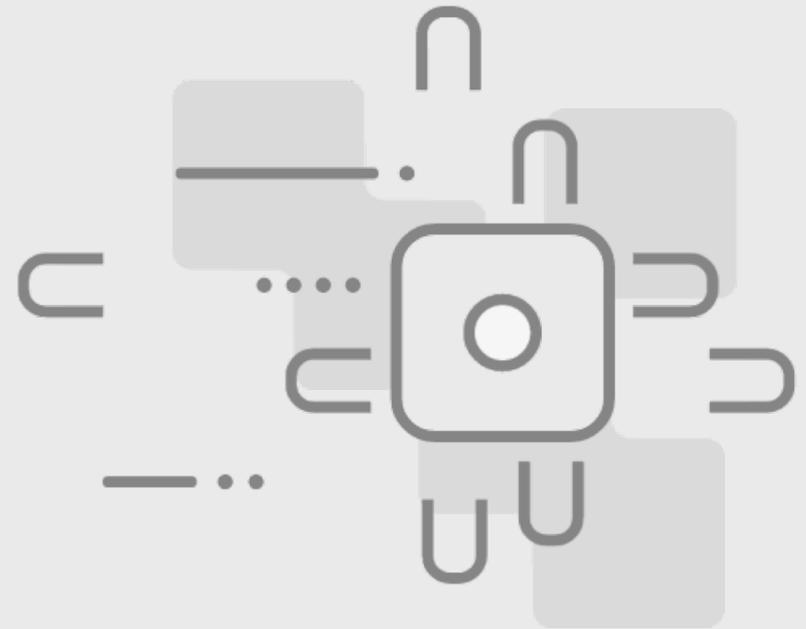
# Getting started with Watson IoT Platform Data Management

## You have now completed this lab

In this lab you have explored how to get started with the IoT Platform and Data Management

You have

- Learned about Data Management
- Explored device events
- Created a physical interface
- Created a logical interface
- Viewed device state be computed from device events by the IoT Platform



# Getting started with Watson IoT Platform Data Management

## Learn more about the IoT Platform

- Create your own free IBM Cloud account and explore IoT
- [www.ibm.com/iot](http://www.ibm.com/iot)
- [developer.ibm.com/iotplatform/](http://developer.ibm.com/iotplatform/)

