Microsoft

A Brief Journey from Device to Action …

hackster.io

IoT Virtual Bootcamp

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http://aka.ms/IoTVirtualBootcamp

Hardware Partners :

adafruit

Microsoft

IoT Properties, Jobs, Methods and TWINS

Kevin Saye

IoT Device Management is different

- Scale
- Different Sensors
- Different Hardware
- Different OS
- Different SKU
- No Person to Device Map
- Limited Physical Access
- Connectivity
- Criticality
- SLA
- Firmware Updates
- Configuration Update

Introducing:

- Device TWINs
  - Desired Properties
  - Reported Properties
  - TAGs
- Device Methods
- Jobs
  - Queries
  - Change Properties
  - Execute Methods

Deep Dive with Code: https://tinyurl.com/ybbj5uxr

TWINs

- JSON in language
- Include:
  - tags
  - Properties.Desired
  - Properties.Reported
- Can be queried

Methods

- Registered in code on the device
- Callable from the Cloud
- Can expire
- Supported in and out of the SDK

```
83  private async void connectToIoTHub()
84      {
85          deviceClient = DeviceClient.CreateFromConnectionString(IoTDeviceConnectionString, TransportTy
86          await deviceClient.OpenAsync();
87          await deviceClient.SetMethodHandlerAsync("changeInterval", changeInterval, null);
88  }
89
90  private async Task<MethodResponse> changeInterval(MethodRequest methodRequest, object userContext)
91  {
92      if (methodRequest.DataAsJson != null)
93      {
94          await dispatcher.RunAsync(Windows.UI.Core.CoreDispatcherPriority.Normal, ()=> {
95              // Do something amazing
96              timer.Stop();
97              timer.Interval = TimeSpan.FromMilliseconds(Convert.ToDouble(methodRequest.DataAsJson));
98              DelayText.Text = methodRequest.DataAsJson + "ms";
99              timer.Start();
100         });
101     };
102
103     await UpdateTwin("interval", Convert.ToDouble(methodRequest.DataAsJson.ToString()));
104     return null;
105 }
```

Jobs

- Cloud Side: SDK or REST
- Can be based on Query
- Can call Method
- Can Update Property
- Can expire
- Have quotas

```
0 references | 0 changes | 0 authors, 0 changes
void dosomething() {
    updateTwinsDesiredProperty("STARTSWITH(deviceId,'loadTest1') AND tags.location = 'Las Colinas' AND tags.floor = '3rd'", "heartbeat", "16").Wait();
}
1 reference | Kevin Saye, 162 days ago | 1 author, 1 change
static async Task updateTwinsDesiredProperty(string query, string property, string value)
{
    jobClient = JobClient.CreateFromConnectionString(iotHubConnectionString);
    var twin = new Twin();
    twin.Properties.Desired[property] = value;
    JobResponse result = await jobClient.ScheduleTwinUpdateAsync(Guid.NewGuid().ToString(),
                                                                 query,
                                                                 twin,
                                                                 DateTime.Now,
                                                                 100);
    Console.WriteLine("Started Twin Update Job for devices = '" + query + "' result = " + result.Status);
    // close the connection
    jobClient.CloseAsync().Wait();
}
```

Quotas (https://docs.microsoft.com/en-us/azure/iot-hub/iot-hub-devguide-quotas-throttling)

Throttle	Free and S1 hubs	S2 hubs	S3 hubs
Identity registry operations (create, retrieve, list, update, delete)	1.67/sec/unit (100/min/unit)	1.67/sec/unit (100/min/unit)	83.33/sec/unit (5000/min/unit)
Device connections	Higher of 100/sec or 12/sec/unit For example, two S1 units are 2*12 = 24/sec, but you have at least 100/sec across your units. With nine S1 units, you have 108/sec (9*12) across your units.	120/sec/unit	6000/sec/unit
Device-to-cloud sends	Higher of 100/sec or 12/sec/unit For example, two S1 units are 2*12 = 24/sec, but you have at least 100/sec across your units. With nine S1 units, you have 108/sec (9*12) across your units.	120/sec/unit	6000/sec/unit
Cloud-to-device sends	1.67/sec/unit (100/min/unit)	1.67/sec/unit (100/min/unit)	83.33/sec/unit (5000/min/unit)
Cloud-to-device receives (only when device uses HTTPS)	16.67/sec/unit (1000/min/unit)	16.67/sec/unit (1000/min/unit)	833.33/sec/unit (50000/min/unit)
File upload	1.67 file upload notifications/sec/unit (100/min/unit)	1.67 file upload notifications/sec/unit (100/min/unit)	83.33 file upload notifications/sec/unit (5000/min/unit)
Direct methods	20/sec/unit	60/sec/unit	3000/sec/unit
Device twin reads	10/sec	Higher of 10/sec or 1/sec/unit	50/sec/unit
Device twin updates	10/sec	Higher of 10/sec or 1/sec/unit	50/sec/unit
Jobs operations (create, update, list, delete)	1.67/sec/unit (100/min/unit)	1.67/sec/unit (100/min/unit)	83.33/sec/unit (5000/min/unit)
Jobs per-device operation throughput	10/sec	Higher of 10/sec or 1/sec/unit	50/sec/unit

Demonstrate

- Show Device Explorer
- C# Demo

Additional References:

- www.InternetofYourThings.com
- https://blogs.microsoft.com/iot/
- https://azure.microsoft.com/en-us/services/iot-hub/
- https://docs.microsoft.com/en-us/azure/iot-hub/

Summary:

Device management in IoT is not like desktop, server or mobile device management

4 key components for IoT device management:

- Properties -- what the device settings are
- TWINS -- what the device settings should be
- Methods -- how to take action on a device
- Jobs -- scheduled change to make

Device Management is a key component in IoT Hub

www.InternetofYourThings.com