

[illegible][illegible]



Connected Factory

By Microsoft

Accelerate your journey to Industrie 4.0 - connect, monitor and control industrial devices for insights using OPC UA to drive operational productivity and profitability.



Remote Monitoring

By Microsoft

Connect and monitor your devices to analyze untapped data and improve business outcomes by automating processes.



Device Simulation

By Microsoft

Streamline your IoT solution development by using simulated IoT devices to both build and test your solution throughout the software development lifecycle.



Predictive Maintenance

By Microsoft

Anticipate maintenance needs and avoid unscheduled downtime by connecting and monitoring your devices for predictive maintenance.

Microsoft IoT solution Accelerators

IoT solution accelerators are complete, ready-to-deploy IoT solutions that implement common IoT scenarios.



Device Simulation

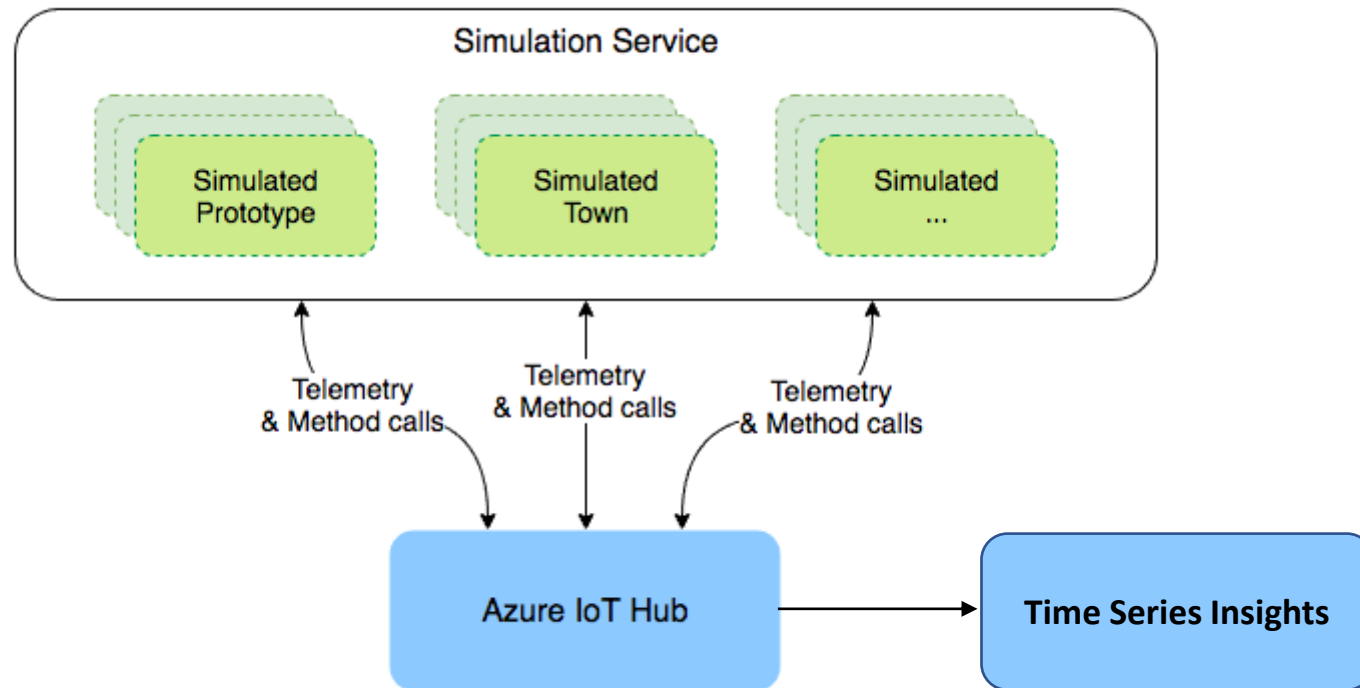
By Microsoft

Streamline your IoT solution development by using simulated IoT devices to both build and test your solution throughout the software development lifecycle.

Device Simulation Benefits

- Quickly get a **prototype** up and running and iterate by adjusting simulated device behavior on the fly
- **Validate** the solution works as expected from device to solution by simulating real-world device behavior
- **Scale test** your solution by simulating normal, peak and beyond peak load conditions

Overview

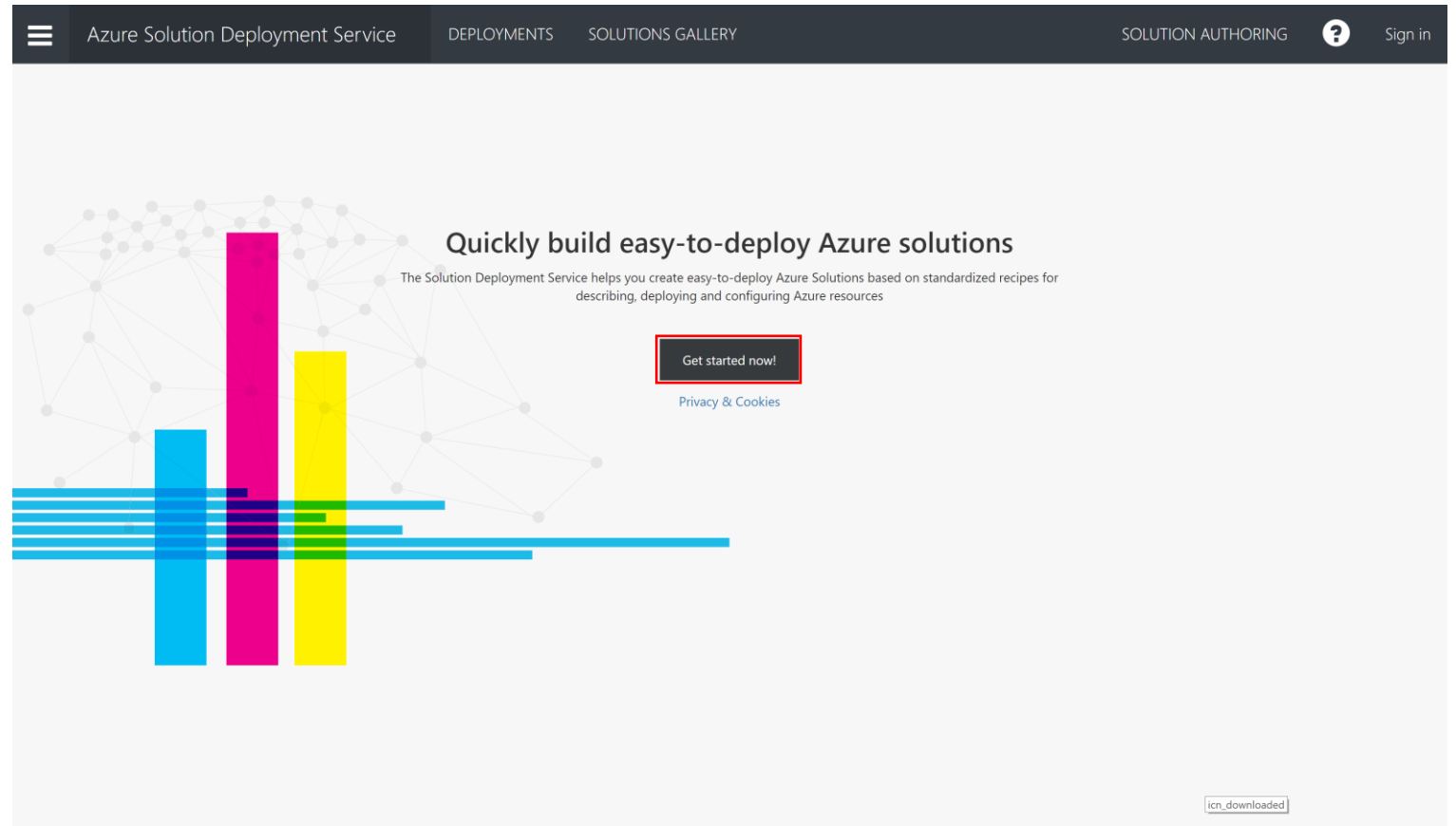


<https://github.com/Azure/device-simulation-dotnet>

Demo

1. Login to Azure Solution Deployment Service
2. Select the “Device Simulation” accelerator option
3. Create device simulator
4. Automatic resources provisioning
5. Verify deployment of resources in Azure portal
6. Launch the solution
7. Note the default device models
8. Select the “Sample Simple Simulation”
9. Run the simulation

Step 1



Step 2

The screenshot displays the Azure Solution Deployment Service interface. The top navigation bar includes 'Azure Solution Deployment Service', 'DEPLOYMENTS', 'SOLUTIONS GALLERY', and 'SOLUTION AUTHORIZING'. A red arrow points to the '+ New Deployment' button in the top right corner. Below the navigation bar, there is a dropdown menu for 'All Deployments' and a status indicator '0 deployment(s)'. The main content area features four solution templates: 'Connected Factory', 'Device Simulation' (highlighted with a red border and a red arrow), 'Intel Connected Logistics Platform', and 'Power BI'. The 'Device Simulation' template is described as a way to streamline IoT solution development by using simulated IoT devices.

Azure Solution Deployment Service DEPLOYMENTS SOLUTIONS GALLERY SOLUTION AUTHORIZING ?

All Deployments + New Deployment

0 deployment(s)

Connected Factory
Accelerate your journey to Industrie 4.0 - connect, monitor and control industrial devices for insights using OPC UA to drive operational productivity and profitability.

Device Simulation
Streamline your IoT solution development by using simulated IoT devices to both build and test your solution throughout the software development lifecycle.

Intel Connected Logistics Platform
Intel Connected Logistics Platform

Power BI
Azure IoT Central Analytics (legacy)
Monitor and analyze the data your devices send to your IoT Central legacy application in this Power BI solution template

[More...](#)

Step 3

☰

Azure Solution Deployment Service

DEPLOYMENTS

SOLUTIONS GALLERY

SOLUTION AUTHORIZING

?

1 | Solution details

2 | Resource provisioning (automated)

3 | Done

Device Simulation

Estimated Provisioning Time: 20 Minutes

* Deployment name

deviceSimulation

✓

This will be used to name the resource group created for this deployment. Deployment name must be between 1 and 24 characters, start with a letter, end with a letter or digit and contain only letters, digits and hyphens.

Azure subscription

sridhar's internal subscription

▼

Azure subscription ID: [REDACTED]

Deployment options

Provision new IoT Hub

▼

Azure location

South Central US

▼

Resources will be deployed to this Azure location.

License

Disclaimer

↘

Create

Step 4

☰

Azure Solution Deployment Service

DEPLOYMENTS

SOLUTIONS GALLERY

SOLUTION AUTHORIZING

?

1 | Solution details

2 | Resource provisioning (automated)

3 | Done

🔧 deviceSimulation

Solution: Device Simulation

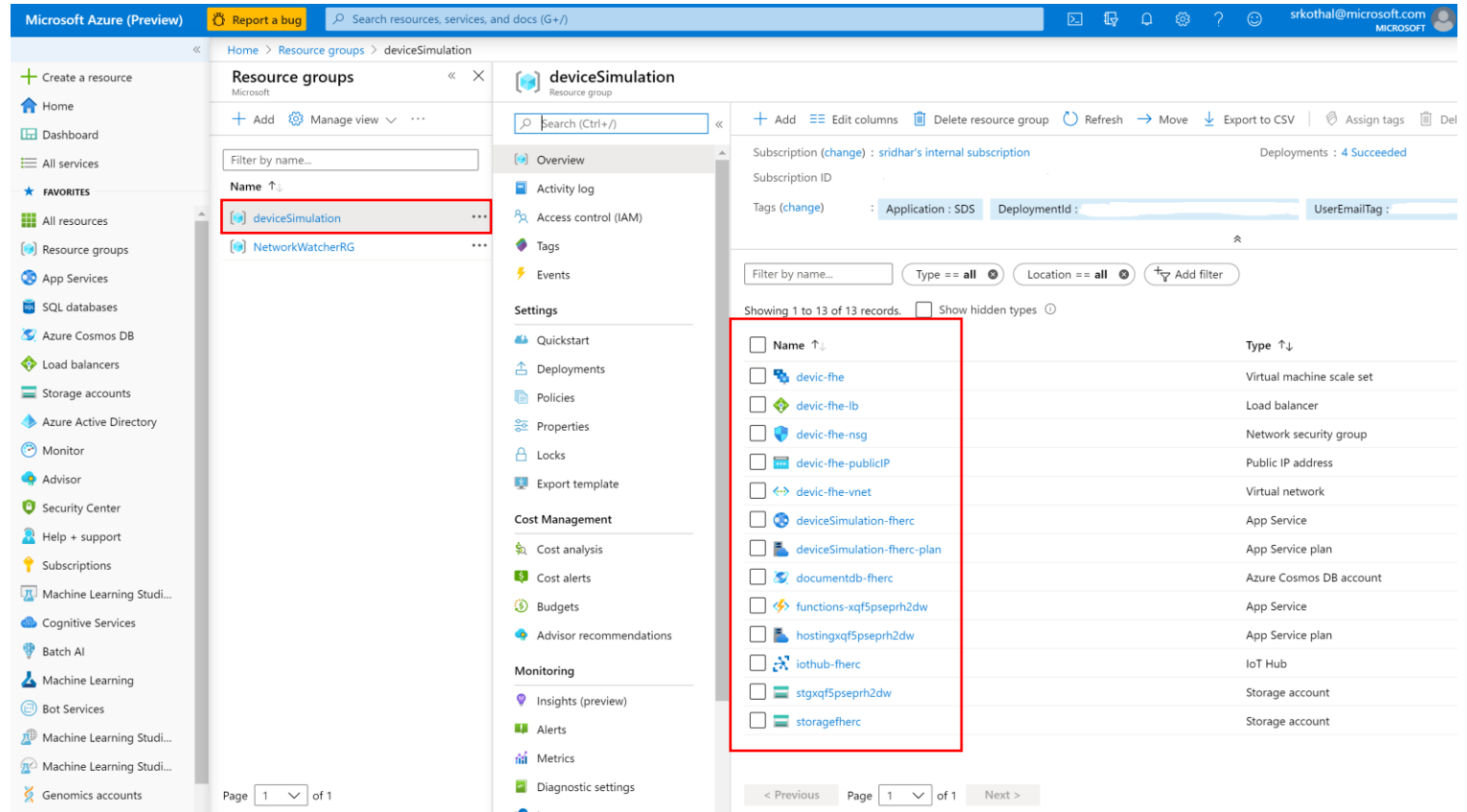
Resource group: deviceSimulation

Status: **Provisioning** | [Cancel](#)

Activity	Status	
✔ Generating resource names	Succeeded	i
✔ Creating a Storage Account	Succeeded	i
🔄 Bootstrapping Azure Function app	Running	i
⌛ Configuring VM credentials	Pending	
⌛ Creating AAD application	Pending	
⌛ Creating service principal	Pending	
⌛ Creating role assignment	Pending	
⌛ Generating certificate	Pending	
⌛ Retrieving default tenant domain	Pending	
⌛ Creating resources in Azure	Pending	
⌛ Waiting for website to be operable	Pending	

Wait for deployment to complete

Step 5



Microsoft Azure (Preview) Report a bug Search resources, services, and docs (G+)

Home > Resource groups > deviceSimulation

Resource groups

deviceSimulation

Subscription (change) : srldhar's internal subscription Deployments : 4 Succeeded

Subscription ID

Tags (change) : Application : SDS DeploymentId : UserEmailTag :

Filter by name... Type == all Location == all Add filter

Showing 1 to 13 of 13 records. Show hidden types

Name	Type
device-fhe	Virtual machine scale set
device-fhe-lb	Load balancer
device-fhe-nsg	Network security group
device-fhe-publicIP	Public IP address
device-fhe-vnet	Virtual network
deviceSimulation-fherc	App Service
deviceSimulation-fherc-plan	App Service plan
documentdb-fherc	Azure Cosmos DB account
functions-xqf5pseph2dw	App Service
hostingxqf5pseph2dw	App Service plan
iotHub-fherc	IoT Hub
stgxf5pseph2dw	Storage account
storagefherc	Storage account

Page 1 of 1

Note resources get deployed in your subscription

Step 6

Azure Solution Deployment Service

DEPLOYMENTS

SOLUTIONS GALLERY

SOLUTION AUTHORIZING

?

1 | Solution details

2 | Resource provisioning (automated)

3 | Done

🔧 deviceSimulation

Solution: Device Simulation

Resource group: [deviceSimulation](#)

Status: **Ready**

Links

[Azure activity log](#)

[Metrics](#)

Go to your solution accelerator

Region

South Central US

Subscription ID

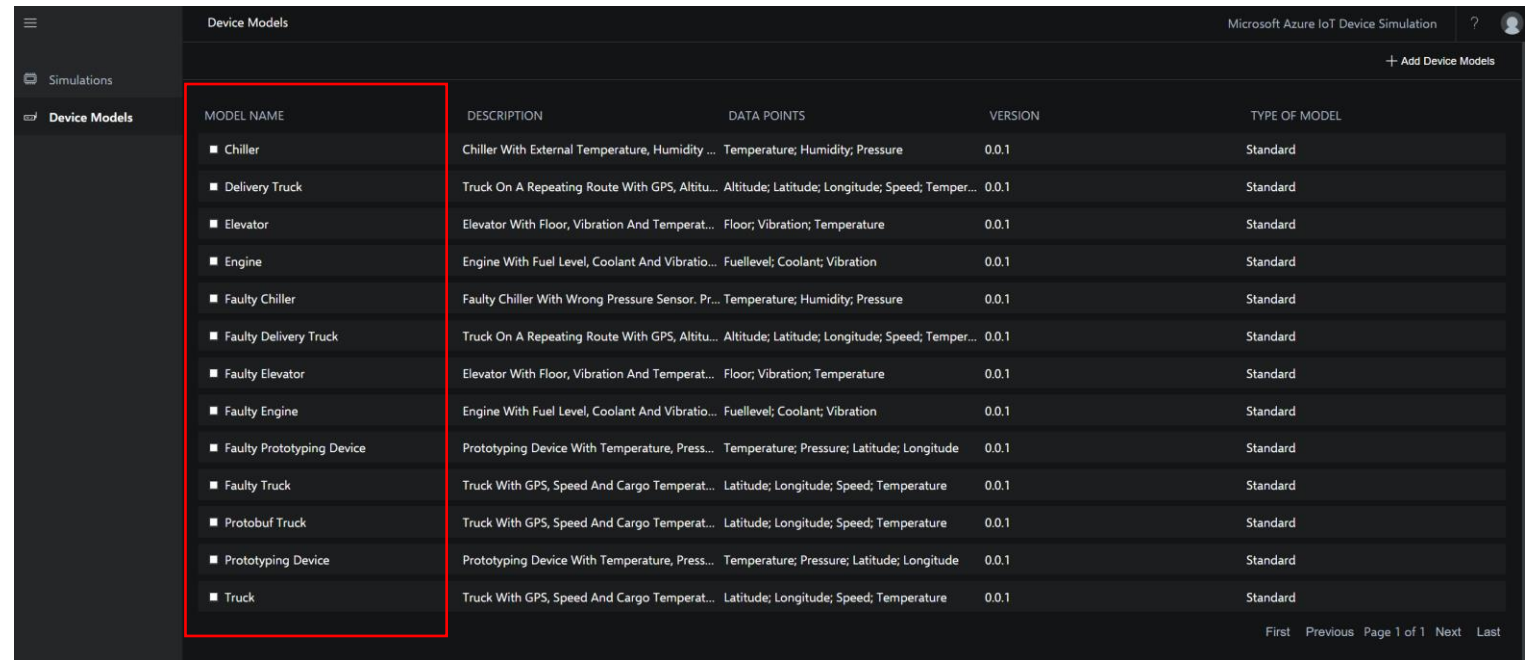
Modify your solution

View the source code for this solution accelerator on [GitHub](#)

Resources

[Developer Documentation](#)

Step 7



The screenshot displays the 'Device Models' section of the Microsoft Azure IoT Device Simulation interface. A table lists various default device models, with the 'MODEL NAME' column highlighted by a red box. The table includes columns for Model Name, Description, Data Points, Version, and Type of Model.

MODEL NAME	DESCRIPTION	DATA POINTS	VERSION	TYPE OF MODEL
■ Chiller	Chiller With External Temperature, Humidity ...	Temperature; Humidity; Pressure	0.0.1	Standard
■ Delivery Truck	Truck On A Repeating Route With GPS, Altitu...	Altitude; Latitude; Longitude; Speed; Temper...	0.0.1	Standard
■ Elevator	Elevator With Floor, Vibration And Temperat...	Floor; Vibration; Temperature	0.0.1	Standard
■ Engine	Engine With Fuel Level, Coolant And Vibratio...	Fuellevel; Coolant; Vibration	0.0.1	Standard
■ Faulty Chiller	Faulty Chiller With Wrong Pressure Sensor. Pr...	Temperature; Humidity; Pressure	0.0.1	Standard
■ Faulty Delivery Truck	Truck On A Repeating Route With GPS, Altitu...	Altitude; Latitude; Longitude; Speed; Temper...	0.0.1	Standard
■ Faulty Elevator	Elevator With Floor, Vibration And Temperat...	Floor; Vibration; Temperature	0.0.1	Standard
■ Faulty Engine	Engine With Fuel Level, Coolant And Vibratio...	Fuellevel; Coolant; Vibration	0.0.1	Standard
■ Faulty Prototyping Device	Prototyping Device With Temperature, Press...	Temperature; Pressure; Latitude; Longitude	0.0.1	Standard
■ Faulty Truck	Truck With GPS, Speed And Cargo Temperat...	Latitude; Longitude; Speed; Temperature	0.0.1	Standard
■ Protobuf Truck	Truck With GPS, Speed And Cargo Temperat...	Latitude; Longitude; Speed; Temperature	0.0.1	Standard
■ Prototyping Device	Prototyping Device With Temperature, Press...	Temperature; Pressure; Latitude; Longitude	0.0.1	Standard
■ Truck	Truck With GPS, Speed And Cargo Temperat...	Latitude; Longitude; Speed; Temperature	0.0.1	Standard

Default device models

Step 8

☰

Simulations

Device Models

Simulations

Microsoft Azure IoT Device Simulation

?

+ New simulation

Simulations

Show all simulations

Sample Simple Simulation

Created 09/03/20 07:44:12 PM

Ended -

10 Truck

0

Average messages per second

Total messages sent 0

Sample Multi-Model Simulation

Created 09/03/20 07:44:12 PM

Ended -

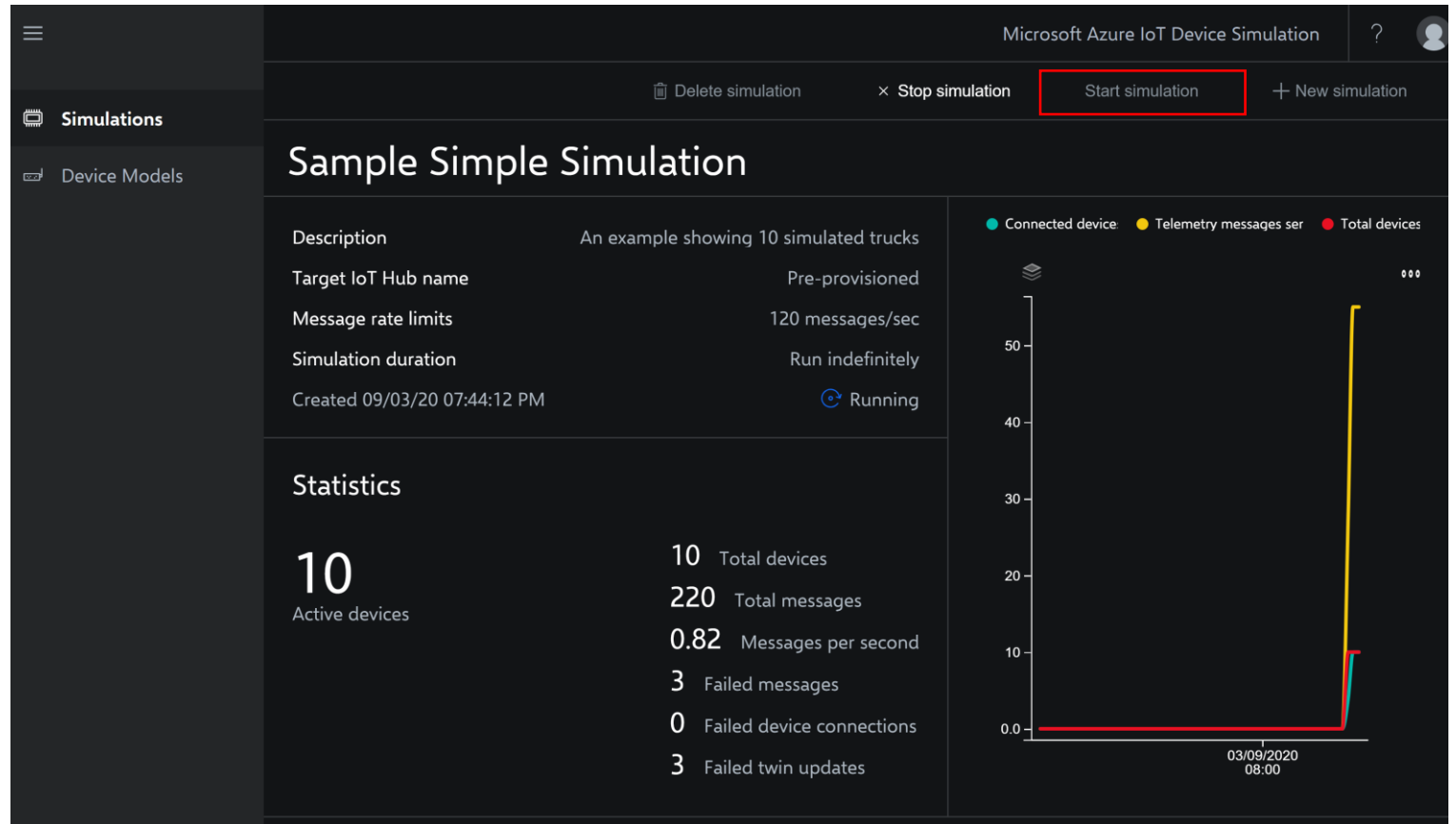
50 Chiller
10 Elevator

0

Average messages per second

Total messages sent 0

Step 9



Setup Time Series Insights

Add a Time Series Insights resource to the same resource group and configure it like below

[Home](#) > [Resource groups](#) > [deviceSimulation](#) > [New](#) > [Time Series Insights](#) > Create Time Series Insights environment

Create Time Series Insights environment

Microsoft

[Basics](#) [Event Source](#) [Review + Create](#)

Create a Time Series Insights environment that you'll use to explore and query time series data. [Learn more](#)

ENVIRONMENT DETAILS

Choose the subscription that will house your new environment. Use resource groups to organize and manage resources in that subscription. Note that these details can't be edited after they're saved.

Environment name * ⓘ

Subscription * ⓘ

Resource group * ⓘ [Create new](#)

Location * ⓘ

PRICING

Choose a pricing tier. If you aren't sure which tier to choose, [visit our pricing page](#) to learn more.

Tier * ⓘ ☒ S1 ☐ S2 ☐ PAYG (Preview)

Capacity * ⓘ

Ingress rate: 1 M events per day
Storage capacity: 30 M events
Estimated cost: **USD 150.00 / month**

[Review + create](#) [Next: Event Source »](#) [Download a template for automation](#)

[Home](#) > [Resource groups](#) > [deviceSimulation](#) > [New](#) > [Time Series Insights](#) > Create Time Series Insights environment

Create Time Series Insights environment

Microsoft

[Basics](#) [Event Source](#) [Review + Create](#)

An event source is the IoT Hub or Event Hub that feeds data into your Time Series Insights environment. [Learn more](#).

EVENT SOURCE DETAILS

Create an event source? * ⓘ ☒ Yes ☐ No

Name * ⓘ

Source type * ⓘ

Select a hub * ⓘ

Subscription * ⓘ

IoT Hub name * ⓘ

IoT Hub access policy name * ⓘ

CONSUMER GROUP

i This consumer group should be used exclusively for this event source as there can be only one active reader from a given consumer group at a time.

IoT Hub consumer group * ⓘ [New](#)

TIMESTAMP

Create an event source timestamp property name. If you don't enter a value, we'll use the message enqueued time from the event source. [Learn more](#).

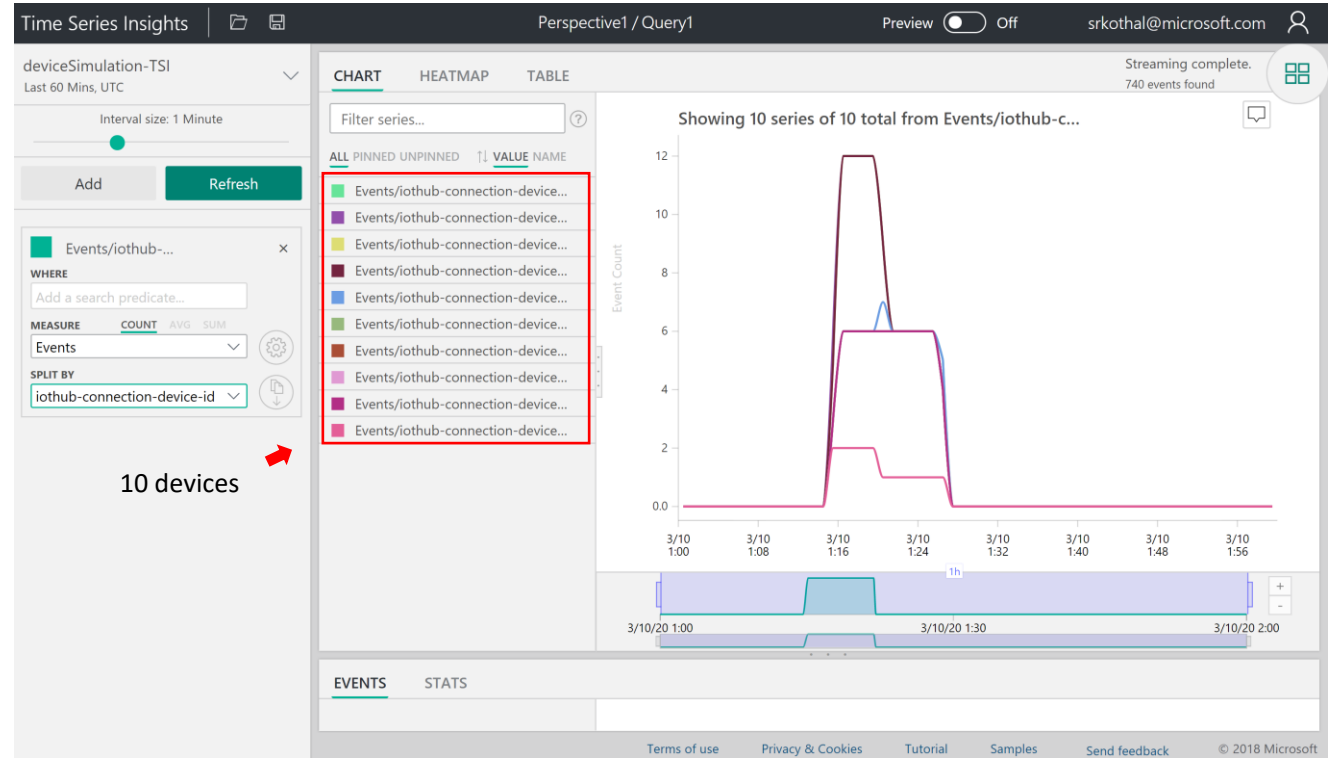
Property name ⓘ

[Review + create](#) [« Previous: Basics](#) [Download a template for automation](#)

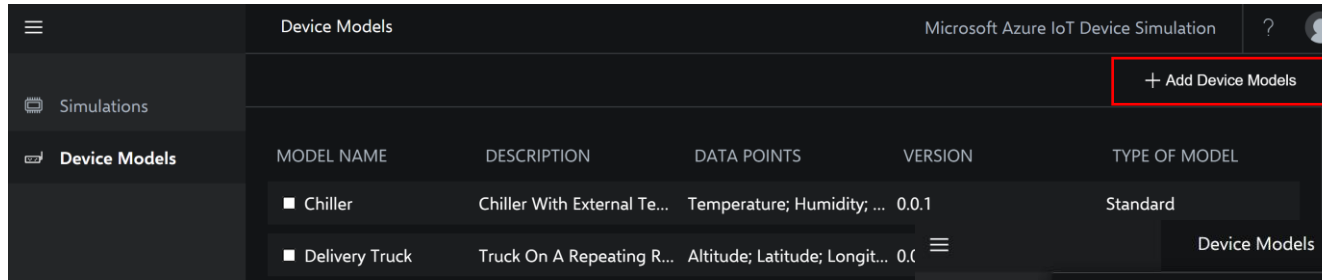
Setup Time Series Insights

Steps:


- Create an instance of Time Series Insights
- Point it to the IoT Hub
- View the events from the devices

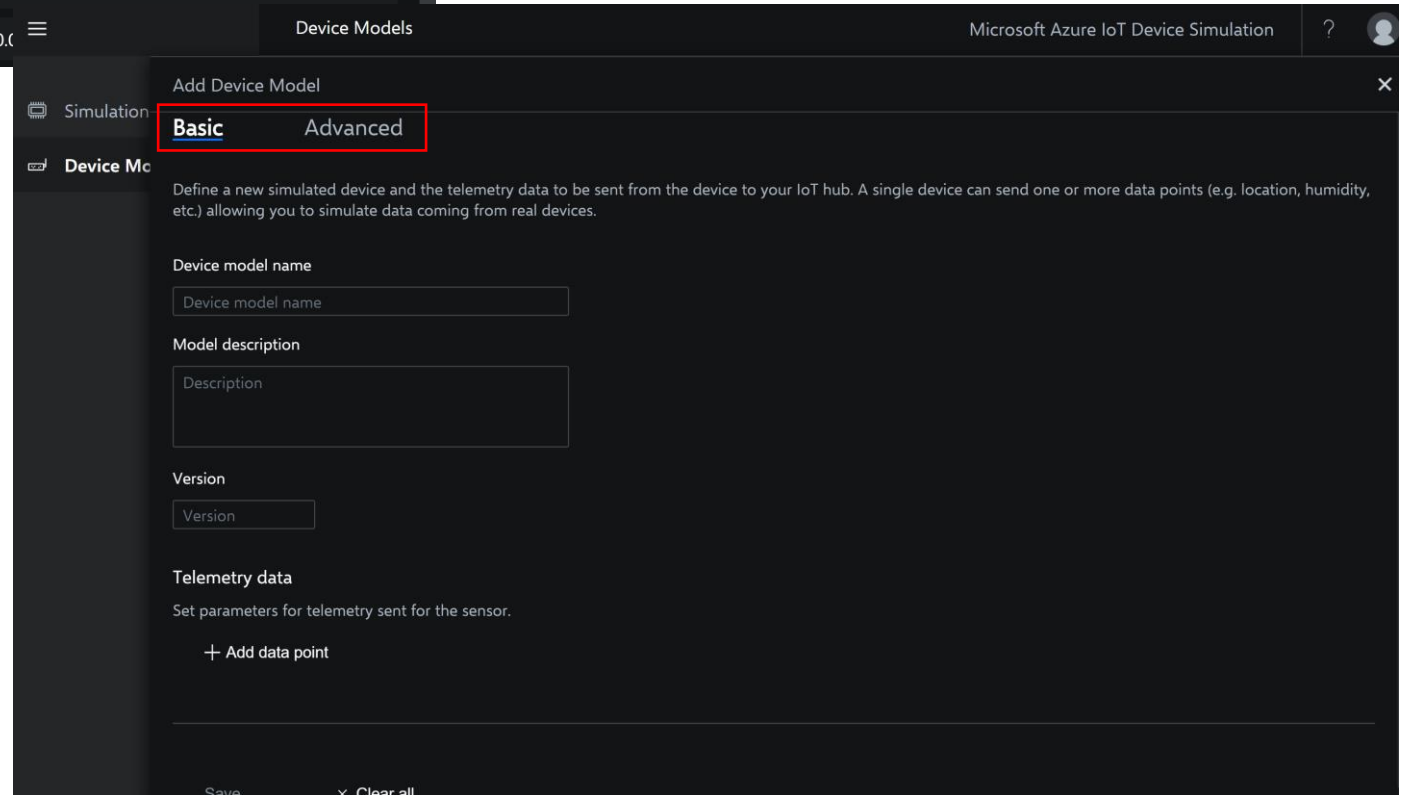


Add Device Models



Device Models					
	MODEL NAME	DESCRIPTION	DATA POINTS	VERSION	TYPE OF MODEL
■	Chiller	Chiller With External Te...	Temperature; Humidity; ...	0.0.1	Standard
■	Delivery Truck	Truck On A Repeating R...	Altitude; Latitude; Longit...	0.0	

Two options “Basic” and “Advanced” available 



Device Models

Microsoft Azure IoT Device Simulation

Simulation

Device Models

Add Device Model

Basic Advanced

Define a new simulated device and the telemetry data to be sent from the device to your IoT hub. A single device can send one or more data points (e.g. location, humidity, etc.) allowing you to simulate data coming from real devices.

Device model name

Device model name

Model description

Description

Version

Version

Telemetry data

Set parameters for telemetry sent for the sensor.

+ Add data point

Save Clear all

Add “Basic” Device Model

Device Models

Microsoft Azure IoT Device Simulation

Simulations

Device Model

Add Device Model

Basic

Advanced

Define a new simulated device and the telemetry data to be sent from the device to your IoT hub. A single device can send one or more data points (e.g. location, humidity, etc.) allowing you to simulate data coming from real devices.

Device model name

MyBasicDevice

Model description

My basic device

Version

1.0

Telemetry data

Set parameters for telemetry sent for the sensor.

DATA POINT	BEHAVIOR	MIN VALUE	MAX VALUE	UNIT
Random	Random	1	100	1

+ Add data point

Save

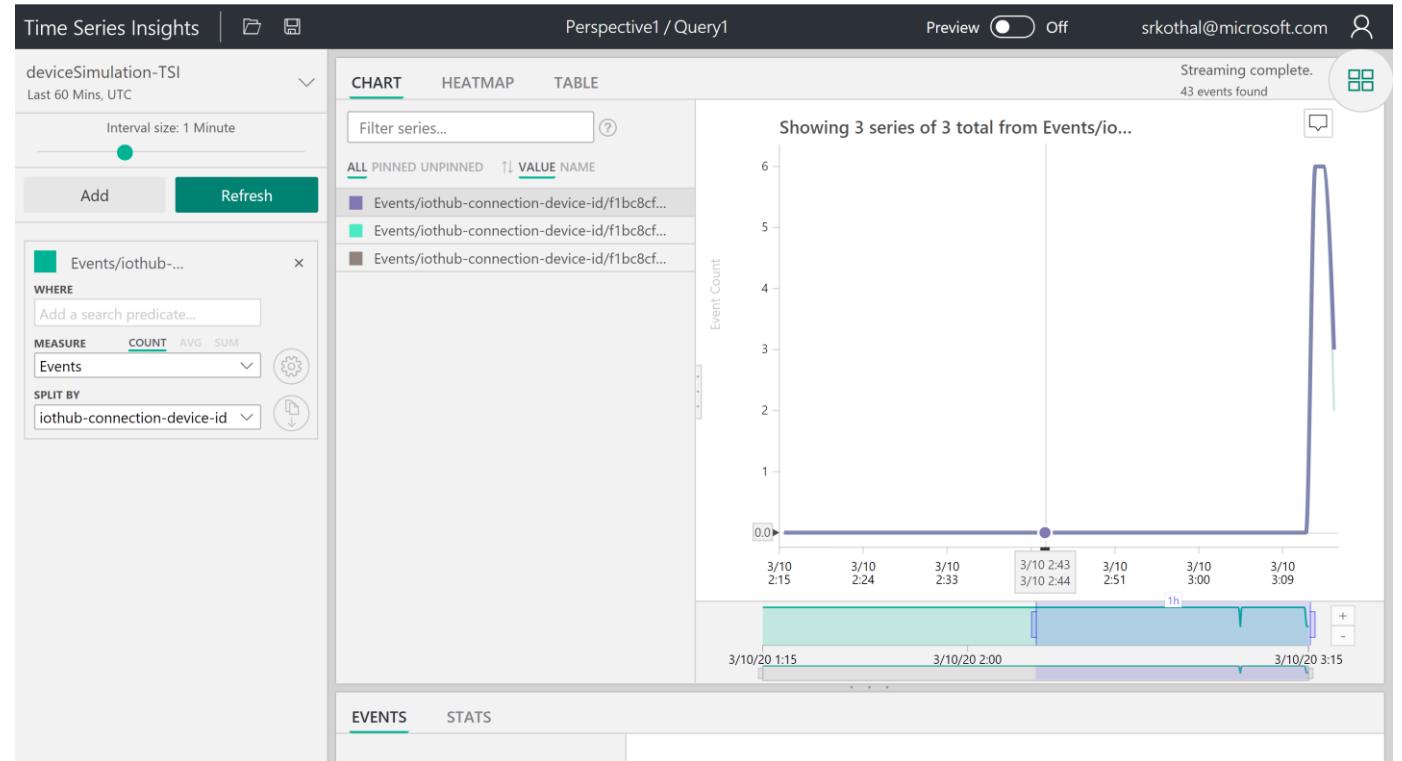
× Clear all

Device Models
MODEL NAME
■ Chiller
■ Delivery Truck
■ Elevator
■ Engine
■ Faulty Chiller
■ Faulty Delivery Truck
■ Faulty Elevator
■ Faulty Engine
■ Faulty Prototyping ...
■ Faulty Truck
■ MyBasicDevice
■ Protobuf Truck
■ Prototyping Device
■ Truck

Setup Time Series Insights

Steps:

- Refresh the instance of Time Series Insights
- Select Measure as “Events”
- Select Split By as “iothub-connection-device-id”



New simulation with “Basic” device model

The screenshot displays the Microsoft Azure IoT Device Simulation web interface. The main area shows a list of simulations, including 'Sample Simple Simulation' and 'Sample Multi-Model Simulation'. The 'Sample Simple Simulation' card shows it was created on 09/03/20 at 07:44:12 PM, ended on 09/03/20 at 08:38:15 PM, and has 10 Trucks. The 'Sample Multi-Model Simulation' card shows it was created on 09/03/20 at 07:44:12 PM and has 50 Chillers and 10 Elevators.

The right sidebar shows the 'Simulation setup' form for a new simulation. The form includes the following fields and options:

- Name:** MyBasicDevice simulation
- Description:** MyBasicDevice simulation
- Simulation duration:** Set how long the simulation will run. Options: End in: (HH MM SS) or **Run indefinitely** (selected).
- Device model:** Choose type of device to simulate. Table below:

NAME	AMOUNT	MESSAGE/SEC	HH MM SS
MyBasicDevice	3	0.3	00 00 10

Below the table is a '+ Add a device type' button.

Target IoT Hub name: Add the connection string for your IoT Hub. Options: Use pre-provisioned IoT Hub (selected) or a custom connection string.

Specify the IoT Hub throttling limits to use for this simulation. [View Hub limits](#)

- ☐ S1 Standard
- ☒ S2 Standard
- ☐ S3 Standard

Number of units: 1

Warning: This simulation will be throttled at 120 messages per second with these settings.

☐ Delete all devices when the simulation is complete

> Start simulation

Add “Advanced” device model

Microsoft Azure IoT Device Simulation

Device Models

Add Device Model

Basic **Advanced**

Each simulated device is derived from a specific device model. Device models define the device's capabilities and behavior including what messages to send, which methods are supported, etc.

Device models consist of one JSON configuration file, one JavaScript file defining the simulation behavior, and optionally one JavaScript file for each cloud to device method supported by the device. Advanced device models give you full control over these files. [Learn More](#)

Upload device model files **Browse**

Device model name
Drone

Uploaded files:

drone.json	✓
drone-state.js	✓
droneRecall-method.js	✓

Save × Clear all



Device Models	
Simulations	
Device Models	MODEL NAME
	■ Chiller
	■ Delivery Truck
	■ Drone
	■ Elevator
	■ Engine
	■ Faulty Chiller
	■ Faulty Delivery Truck
	■ Faulty Elevator
	■ Faulty Engine
	■ Faulty Prototyping ...
	■ Faulty Truck
	■ MyBasicDevice
	■ Protobuf Truck
	■ Prototyping Device

Download the drone device model files from
<https://github.com/dhanow/iot-solution-accelerators/tree/master/scripts/device-simulation>

New simulation with “Advanced” device model

The screenshot displays the Microsoft Azure IoT Device Simulation interface. The main view shows a list of simulations under the 'Simulations' tab. Two sample simulations are visible: 'Sample Simple Simulation' and 'Sample Multi-Model Simulation'. The 'Sample Simple Simulation' shows a '10 Truck' device model with an average of 0.92 messages per second and a total of 1256 messages sent. The 'Sample Multi-Model Simulation' shows a '50 Chiller' and '10 Elevator' device models.

A red box highlights the '+ New simulation' button in the top right corner of the main view.

The right-hand pane shows the 'Simulation setup' form for a new simulation. The form includes the following fields and options:

- Name:** MyAdvancedModel Sim
- Description:** MyAdvancedModel Simulation
- Simulation duration:** Set how long the simulation will run. Options: ☐ End in: HH MM SS, ☒ Run indefinitely.
- Device model:** Choose type of device to simulate. A table lists the device models:

NAME	AMOUNT	MESSAGE/SEC	HH MM SS
Drone	5	1	00 00 05

+ Add a device type

- Target IoT Hub name:** Add the connection string for your IoT Hub. Options: ☒ Use pre-provisioned IoT Hub, ☐ Add new IoT Hub.
- Specify the IoT Hub throttling limits to use for this simulation. [View Hub limits](#)**
 - ☐ S1 Standard
 - ☒ S2 Standard
 - ☐ S3 Standard
- Number of units:** 1
- Warning:** This simulation will be throttled at 120 messages per second with these settings.
- ☐ Delete all devices when the simulation is complete

A red box highlights the 'Start simulation' button at the bottom of the setup form.

Q&A