

Azure IoT 学院专题二: 动手实验一

1. 本次动手实验介绍

课程视频: <https://youtu.be/IJK0h1f7avY>

本次动手实验室旨在向大家介绍以下 Azure 相关服务和技术:

- Visual Studio Code
- Azure IoT Hub
- Azure Device Provisioning Service (DPS)
- Azure Virtual Machines
- Azure Edge for Linux on Windows (EFLOW)
- Azure IoT Edge Routing
- Azure IoT Edge Stream Analytics (ASA) Module
- Azure Logic Apps
- Azure Monitor & Azure Log Analytics

探索这些服务是因为它们通常是整体物联网解决方案的一部分。该实验室采用了一种简单的方法, 可以接触到具有不同技术经验的许多受众。

理想情况下, 参加本课程的各位需具备以下知识: - 熟悉 Azure 门户。 <https://portal.azure.com> - 完成物联网学院专题一的内容

熟悉 Azure IoT 的一个好方法是遵循 Azure IoT Developer Specialty 认证路径。您可以在以下链接中阅读更多内容: <https://docs.microsoft.com/en-us/learn/certifications/exams/az-220>

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2. 课前准备

2.1. 安装 Visual Studio Code

Visual Studio Code Download

2.2. 安装 VS Code 插件

1. 点击 extensions
2. 查找 **azure iot**
3. 点击安装 **Azure IoT Tools** 插件包
4. 查找 **bicep**
5. 点击安装 **Bicep** 插件

2.3. 请确认您已经在本地机器 Clone 好 IoT Academy Repo

2.4. 安装 Azure CLI

- <https://docs.microsoft.com/en-us/cli/azure/install-azure-cli>

2.5. 安装 Azure CLI Bicep Extension

2.6. 辅助学习材料

- <https://docs.microsoft.com/en-us/azure/azure-resource-manager/bicep/install>

在 VS Code 中打开终端并运行以下命令 终端 -> 新终端（如果尚未打开）

```
az bicep install
az bicep upgrade
az bicep version
```

3. 练习：使用 Bicep 部署 Azure 实验室资源

相关视频: <https://youtu.be/TMgfs9Eh2xY>

3.1. 资源

<https://docs.microsoft.com/en-us/azure/azure-resource-manager/bicep/overview?tabs=bicep>

<https://docs.microsoft.com/en-us/azure/azure-resource-manager/bicep/parameters>

<https://docs.microsoft.com/en-us/azure/azure-resource-manager/templates/>

3.2. 浏览 Bicep 文件

1. 相关 github repo: (https://github.com/AzureIoTGBB/iot-academy-april-2022-internal/tree/main/Month_2/Day_1/ho1_files)

2. 在以下位置找到相关文件并查看该文件的内容。

Month_2/Day_1/ho1_files/month2_day1.bicep

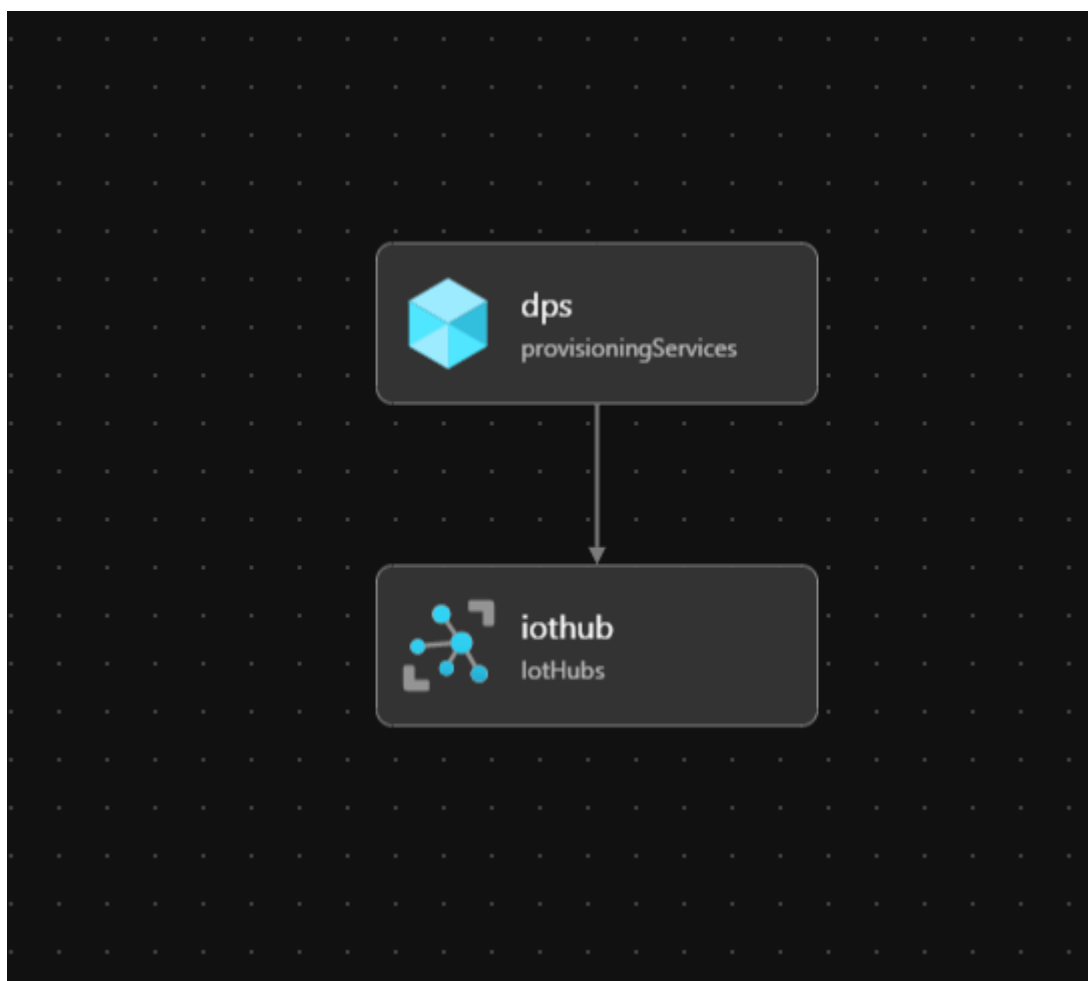
您将在文件中看到：

- 两种资源
- `iot_hub_name` 和 `location` 的两个可接受参数

```
Month_2 > Day_1 > hol_files_new > month2-day1.bicep > {} iothub
1 param location string = resourceGroup().location
2 param iot_hub_name string
3
4 resource iothub 'Microsoft.Devices/IotHubs@2021-07-02' = {
5   name: iot_hub_name
6   location: location
7   tags: {
8     environment: 'demo'
9   }
}
```

3.3. 使用 Bicep 可视化工具查看资源

1. 在 VS Code 中使用 `Ctrl+Shift+P` 启动 command palette，或单击菜单中的查看 command palette
2. 输入 `visual` 并选择 `Bicep: Open Bicep Visualizer to the Side` 条目，按回车。
3. 选择位于 `Month_2/Day_1/hol_files/month2_day1.bicep` 的 Bicep 文件
- 4.



5. 查看下图

3.4. 编辑你的 bicep 参数文件

1. 查找 `Month_2/Day_1/hol_files/month2_day1_params.json` 文件并打开它
2. 编辑相关值：
 1. 名字 - `first_name`
 2. 姓氏 - `last_name`
 3. 喜爱的动物 - `favorite_animal`: 这可以是任何随机字符串值。这在 Bicep 模板中使用，以确保获得唯一的资源名称
3. 查找 `Month_2/Day_1/hol_files/month2_day1_params.json` file 并打开该文件
4. 编辑相关值：
 1. 名字 - `first_name`
 2. 姓氏 - `last_name`
 3. 喜爱的动物 - `favorite_animal`: 这可以是任何随机字符串值。这在 Bicep 模板中使用，以确保获得唯一的资源名称

3.5. 确保您选择了订阅和正确的 Azure 用户

1. 运行以下命令以确保您的订阅成为开发环境的默认值

```
az account show
```

2. 如果选择了正确的订阅，请跳过此步骤

1. 如果您的订阅已列出但未设置为默认，请运行以下步骤

```
az account set -s "YourSubscriptionIdGoesHere"
```

2. 如果您的订阅已正确设置，请跳过以下步骤。如果没有，请继续。
3. 如果您的订阅未列出，则说明您登录了错误的租户。运行以下命令以注销并登录到正确的租户。

```
az logout  
az login
```

4. 出所有订阅以找到正确的订阅 ID

```
az account show
```

5. 找到您的 `SubscriptionId` 并运行步骤 1 以使其成为默认值

3. 将您的 SubscriptionId 保存在记事本中。运行 `az account show` 时，您的 SubscriptionID 对应 `"id"` 字段

3.6. 创建 Azure 资源组

在您的终端中运行以下命令。

命令运行后，如果运行成功会返回 `"provisioningState": "Succeeded"`

```
az group create --name rg-iot-academy --location northcentralus
```

3.7. 使用 Azure 资源管理器部署部署实验室资源

部署的资源是：

- 物联网中心
- DPS
- Logic App: 在实动手实验的后半部分会使用到

1. 将终端更改为 `hol_files` 目录

```
cd Month_2/Day_1/hol_files
```

2. 在 VS Code 的终端中运行以下命令

```
az deployment group create --resource-group rg-iot-academy --template-file month2_day1.bicep --parameters month2_day1_params.json
```

3. 转到 Azure 门户，打开 `rg-iot-academy` 资源组。
4. 单击部署，然后单击列表中的第一个部署。查看以下屏幕截图以了解预期结果

Microsoft Azure (Preview)Report a bug

Home > rg-iotacademy

rg-iotacademy | Deployments

Resource group

Search (Ctrl+ /)

RefreshCancelRedeployDeleteView template

Overview

Activity log

Access control (IAM)

Tags

Resource visualizer

Events

Settings

Deployments

Microsoft Azure (Preview)Report a bug

Search resources, services, and docs (G+ /)

Home > rg-iotacademy >

month2_day1 | Overview

Deployment

Search (Ctrl+ /)

DeleteCancelRedeployRefresh

Overview

Inputs

Outputs

Template

Deployment is in progress

Deployment name: month2_day1

Subscription: Alan Blythe FTE DevTest

Resource group: rg-iotacademy

Start time: 5/18/2022, 12:02:43 AM

Correlation ID: b08f53f7-b2a4-418b-b8e8-f6c6a549384f

Deployment details (Download)

| Resource | Type | Status |
|-------------------|---------------------------|---------|
| iot-3mf4kbck4ogcm | Microsoft.Devices/IotHubs | Created |

Microsoft Azure (Preview)Report a bug

Search resources, services, and docs (G+ /)

Home > rg-iotacademy >

month2_day1 | Overview

Deployment

Search (Ctrl+ /)

DeleteCancelRedeployRefresh

Overview

Inputs

Outputs

Template

Your deployment is complete

Deployment name: month2_day1

Subscription: Alan Blythe FTE DevTest

Resource group: rg-iotacademy

Start time: 5/18/2022, 12:02:43 AM

Correlation ID: b08f53f7-b2a4-418b-b8e8-f6c6a549384f

Deployment details (Download)

| Resource | Type |
|-------------------|--|
| dps-3mf4kbck4ogcm | Microsoft.Devices/provisioningServices |
| iot-3mf4kbck4ogcm | Microsoft.Devices/IotHubs |
| iot-3mf4kbck4ogcm | Microsoft.Devices/IotHubs |

Next steps

Go to resource group

5. 当命令运行完成后，在您的终端中可以看到以下内容

```
PROBLEMS OUTPUT DEBUG CONSOLE TERMINAL

    }
  ]
}
],
"provisioningState": "Succeeded",
"templateHash": "5329428304483879022",
"templateLink": null,
"timestamp": "2022-05-19T19:47:30.122735+00:00",
"validatedResources": null
},
"resourceGroup": "rg-iotacademy",
"tags": null,
"type": "Microsoft.Resources/deployments"
}
```

4. 练习: 部署 Windows 10 Azure 虚拟机

相关视频: <https://youtu.be/JffdKqj1kGA>

接下来, 我们会学习到:

- 使用 Bicep 部署 Azure Windows 10 VM
- 添加 IoT Edge 设备
- 检索边缘设备的设备凭据
- RDP 到 Windows 10 VM 以安装和配置 EFLOW

一些涵盖 EFLOW 和本节中的步骤的链接 <https://docs.microsoft.com/en-us/azure/iot-edge/iot-edge-for-linux-on-windows?view=iotedge-2020-11> <https://docs.microsoft.com/en-us/azure/iot-edge/quickstart?view=iotedge-2020-11#code-try-0>

4.1. 部署另一个 bicep 模板以创建 VM

注意: 选择 vm_size 时, VM 必须支持 Nested Virtualization。一些 VM 选择的建议: Standard_D2_v3 Standard_D2_v4 Standard_D2s_v3 Standard_D2s_v4

可以通过以下链接查看所有 VM SKU: <https://docs.microsoft.com/en-us/azure/virtual-machines/sizes-general>

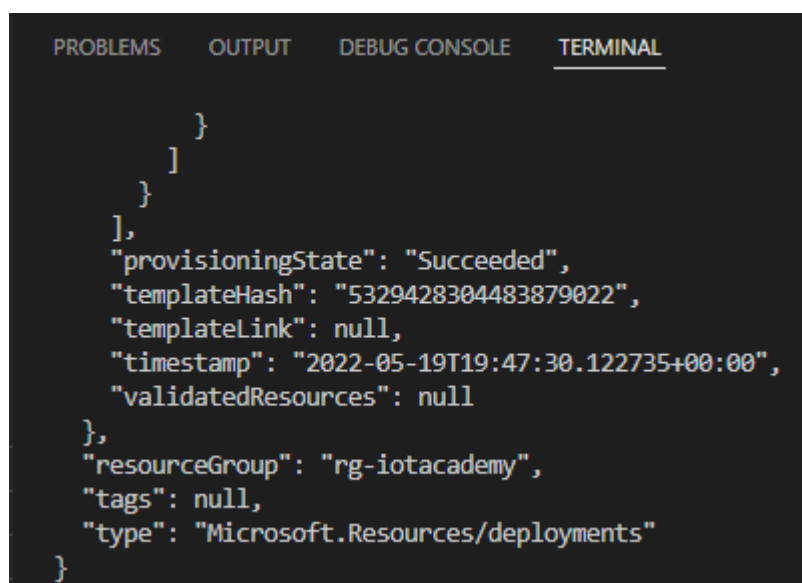
1. 打开 `Month_2/Day_1/hol_files/createvm.bicep` 文件并查看内容。请注意此文件中的许多资源以及由此提供的时间节省。
2. 打开 `Month_2/Day_1/hol_files/createvm_params.json` 文件
3. 设置字段的值类似于之前的 Bicep 部署
 1. vm_size: 您可能需要在您选择的位置找到可用的大小。这可以通过使用 Azure 门户创建 VM 并在 **预览和创建 - Review and Create** 之前取消该过程来完成
 2. vm_admin_password: 将值更改为您的偏好值或保留默认值。

3. client_ipaddress: 和专题一一样。使用bing搜索what is my ip, 替换为找到的 ip 值
4. first_name: 确保您使用与其他 Bicep 参数文件相同的值
5. last_name: 确保您使用与其他 Bicep 参数文件相同的值
6. favorite_animal: 确保你使用与其他 Bicep 参数文件相同的值

4. 创建您的部署组以部署您的 VM Bicep 模板

```
az deployment group create --resource-group rg-iot-academy --template-file createvm.bicep --parameters createvm_params.json
```

完成后你可以看到以下内容



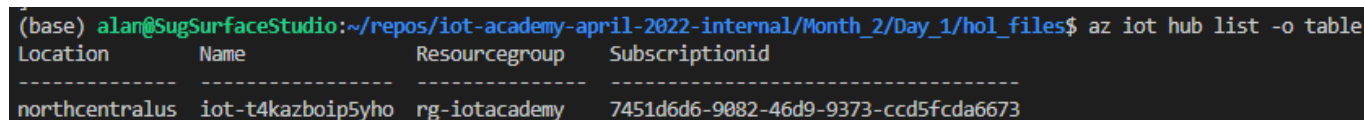
```
    }
  ]
},
{
  "provisioningState": "Succeeded",
  "templateHash": "5329428304483879022",
  "templateLink": null,
  "timestamp": "2022-05-19T19:47:30.122735+00:00",
  "validatedResources": null
},
{
  "resourceGroup": "rg-iotacademy",
  "tags": null,
  "type": "Microsoft.Resources/deployments"
}
```

4.2. 创建 Azure IoT DPS Enrollment

Resources <https://docs.microsoft.com/en-us/cli/azure/iot/dps/enrollment?view=azure-cli-latest#az-iot-dps-enrollment-create>

1. 使用以下命令查找您的 Azure IoT DPS 名称, 并记下您的 DPS 资源名称

```
az iot dps list -o table
```



```
(base) alan@SugSurfaceStudio:~/repos/iot-academy-april-2022-internal/Month_2/Day_1/hol_files$ az iot hub list -o table
Location      Name                Resourcegroup      Subscriptionid
-----
northcentralus iot-t4kazboip5yho  rg-iotacademy      7451d6d6-9082-46d9-9373-ccd5fcda6673
```

2. 将您的 dps_name 替换为您在上一个命令中找到的名称后运行以下命令

```
az iot dps enrollment create -g rg-iot-academy --dps-name {dps_name} --enrollment-id iot-academy-edge-device --edge-enabled true --tags "
```



```
{'environment':'dev'}" --attestation-type symmetrickey  
e.g. az iot dps enrollment create -g rg-iot-academy --dps-name dps-  
qdiyctqfomakk --enrollment-id iot-academy-edge-device --edge-enabled true  
--tags "{ 'environment':'dev'}" --attestation-type symmetrickey
```

3. 复制主键并将其保存到记事本

4. 运行以下命令以检索 DPS 实例的 scopeld。将 {name} 替换为您在本节第 1 步中找到的值

```
az iot dps show --name {name}
```

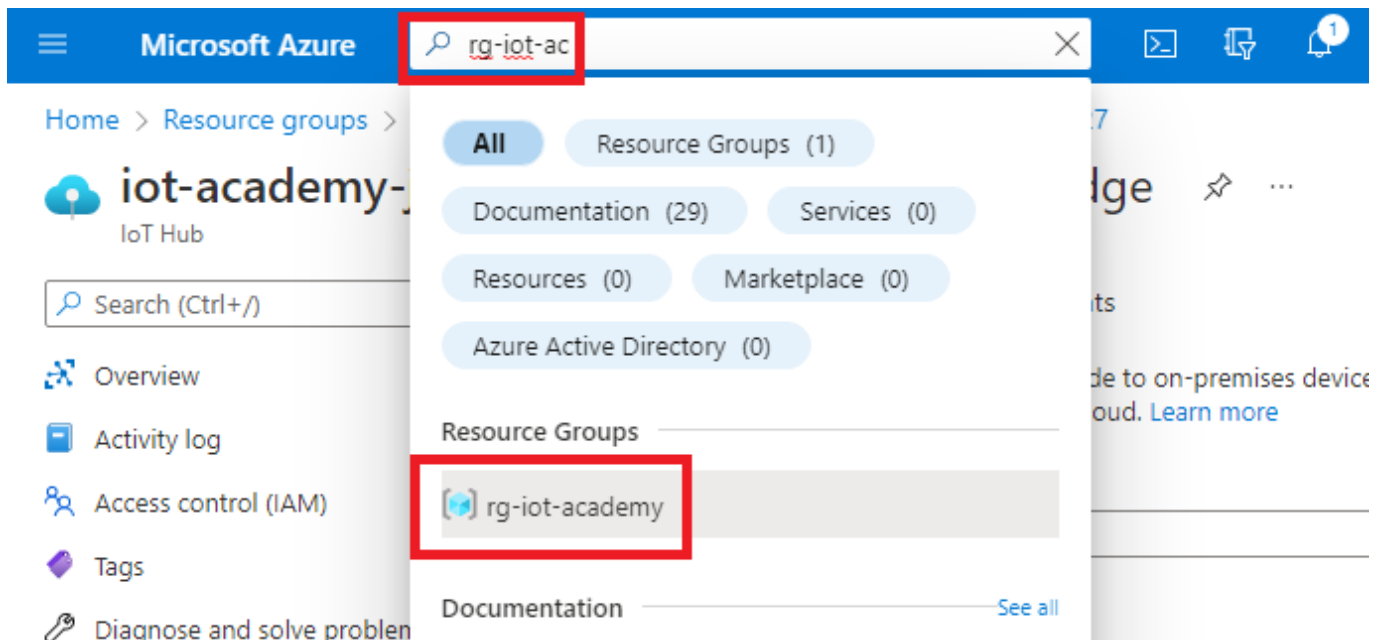
5. 找到 idScope 并记下记事本中的值，例如 "idScope": "One00600B86"

然后你会看到如下结果

```
(base) alan@SugSurfaceStudio:~/repos/iot-academy-april-2022-internal/Month_2/Day_1/hol_files$ az iot dps enrollment create -g rg-iot-academy --dps-name dps-qd-  
{  
  "allocationPolicy": null,  
  "attestation": {  
    "symmetricKey": {  
      "primaryKey": "gL03wFYIRLs02k0dVW [REDACTED] 10cIW0hz7ferG/4PU/L0p+Q==",  
      "secondaryKey": "0a59vz0cYsIPod1h [REDACTED] IWAgy4721avbqvTCs5SD3Rq5Q=="  
    },  
    "tpm": null,  
    "type": "symmetricKey",  
    "x509": null  
  },  
}
```

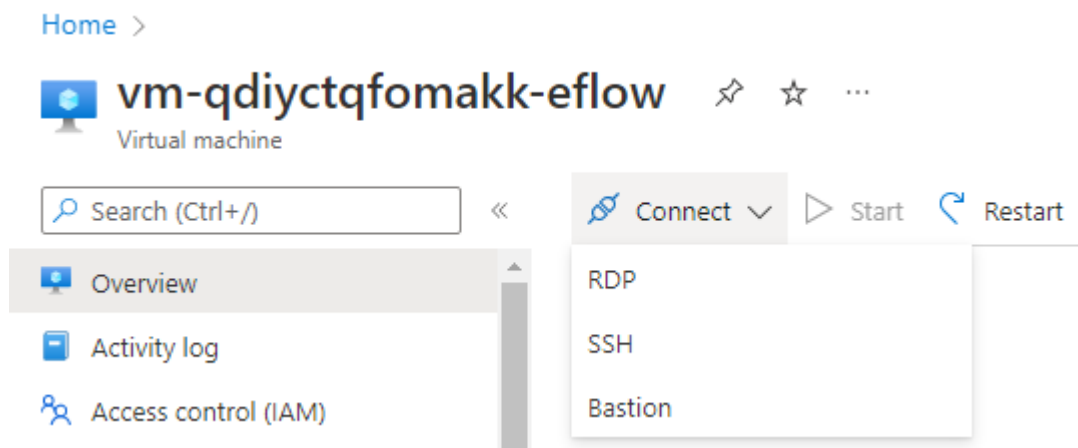
4.3. 登入你的 Windows 10 VM

1. 进入 Azure 门户并搜索您的资源组

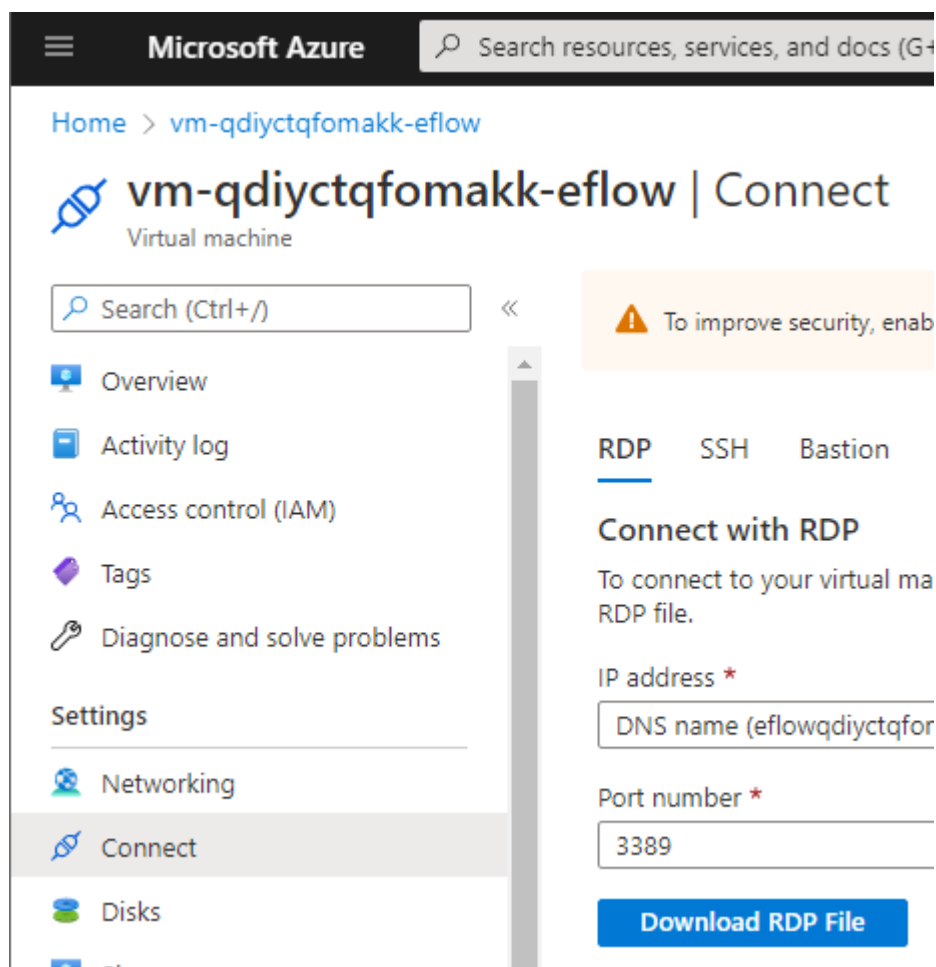


2. 在资源列表中找到你的虚拟机，前缀为 vm-，然后点击它

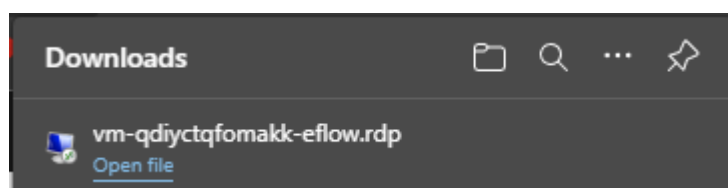
3. 选择 连接 - Connect 并点击 RDP



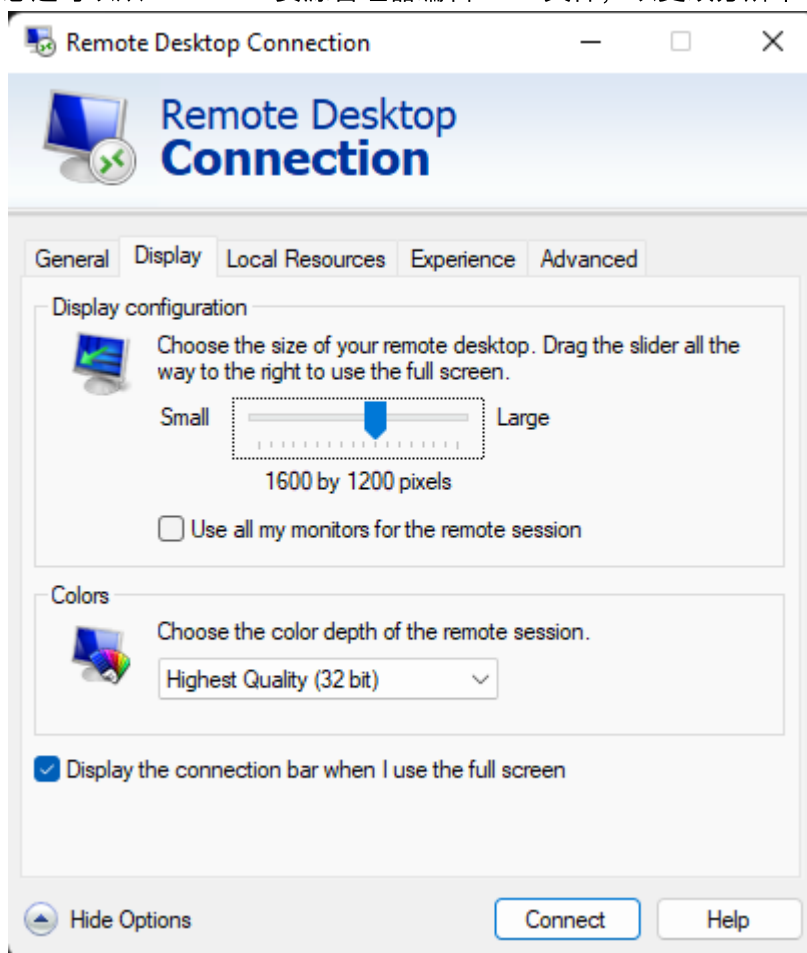
4. 选择 下载 RDP 文件 - Download RDP File



Notice the download in your browser



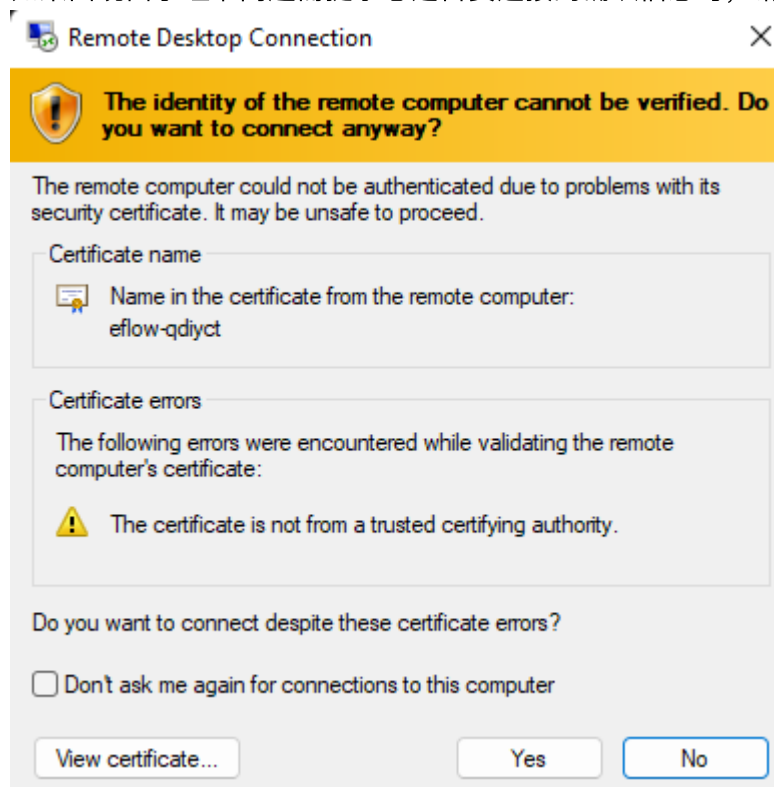
5. 可选步骤：您还可以从 Windows 资源管理器编辑 RDP 文件，以更改分辨率等设置，RDP 会话默认为



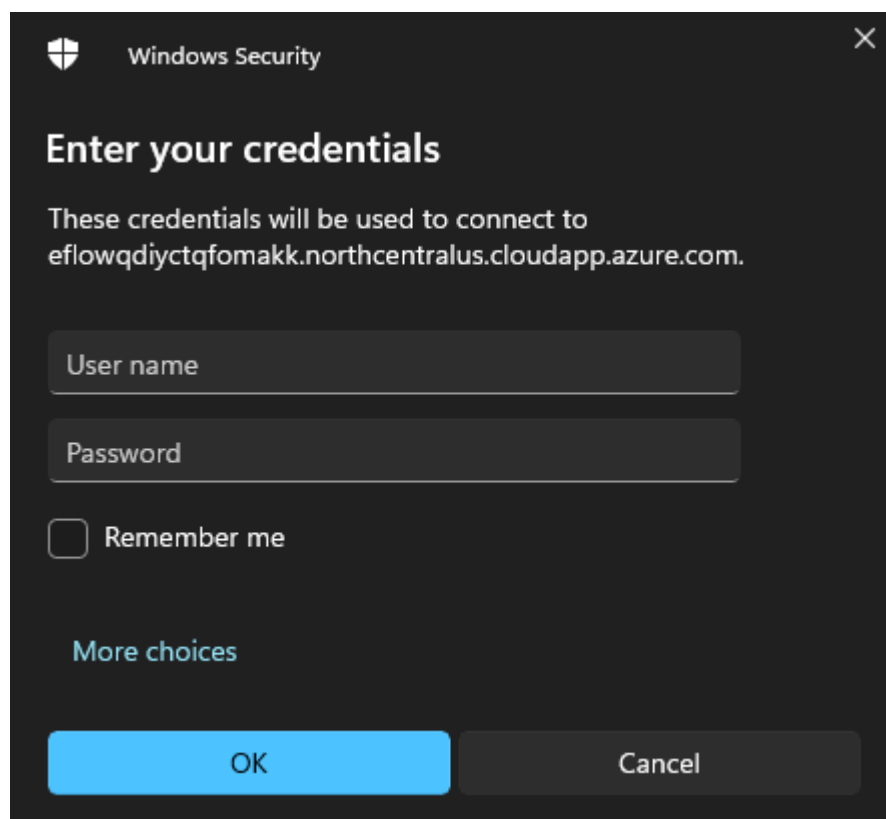
全屏显示。

6. 打开 RDP 文件

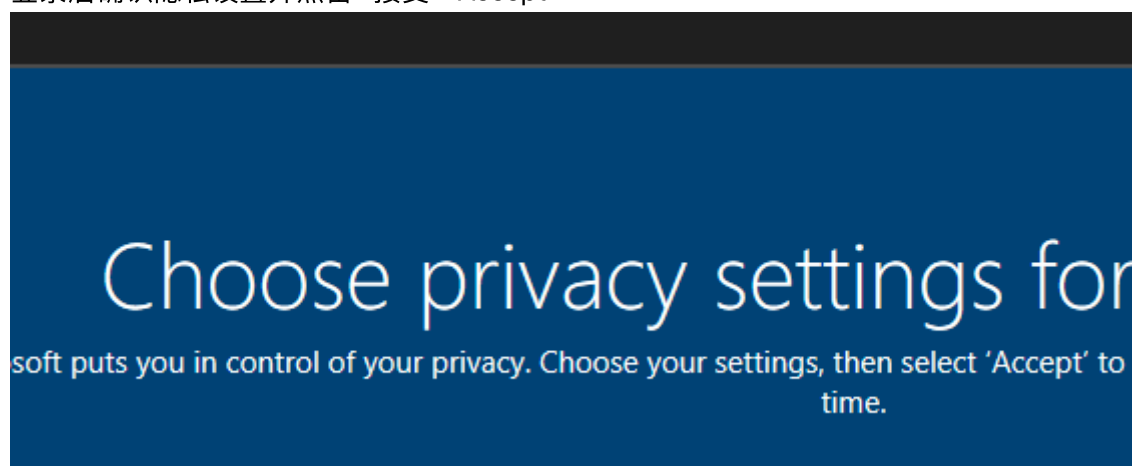
7. 如果出现由于证书问题而提示您是否要连接的确认信息时，请单击 '是 - Yes'



8. 输入您的凭据，您可以在 `Month_2/Day_1/hol_files/createvm.bicep` 文件中找到它



9. 登录后确认隐私设置并点击“接受 - Accept”



5. 练习: 在 Windows 上安装适用于 Linux 的 Azure IoT Edge (EFLOW)

相关视频: <https://youtu.be/AIFSLh7ihAw>

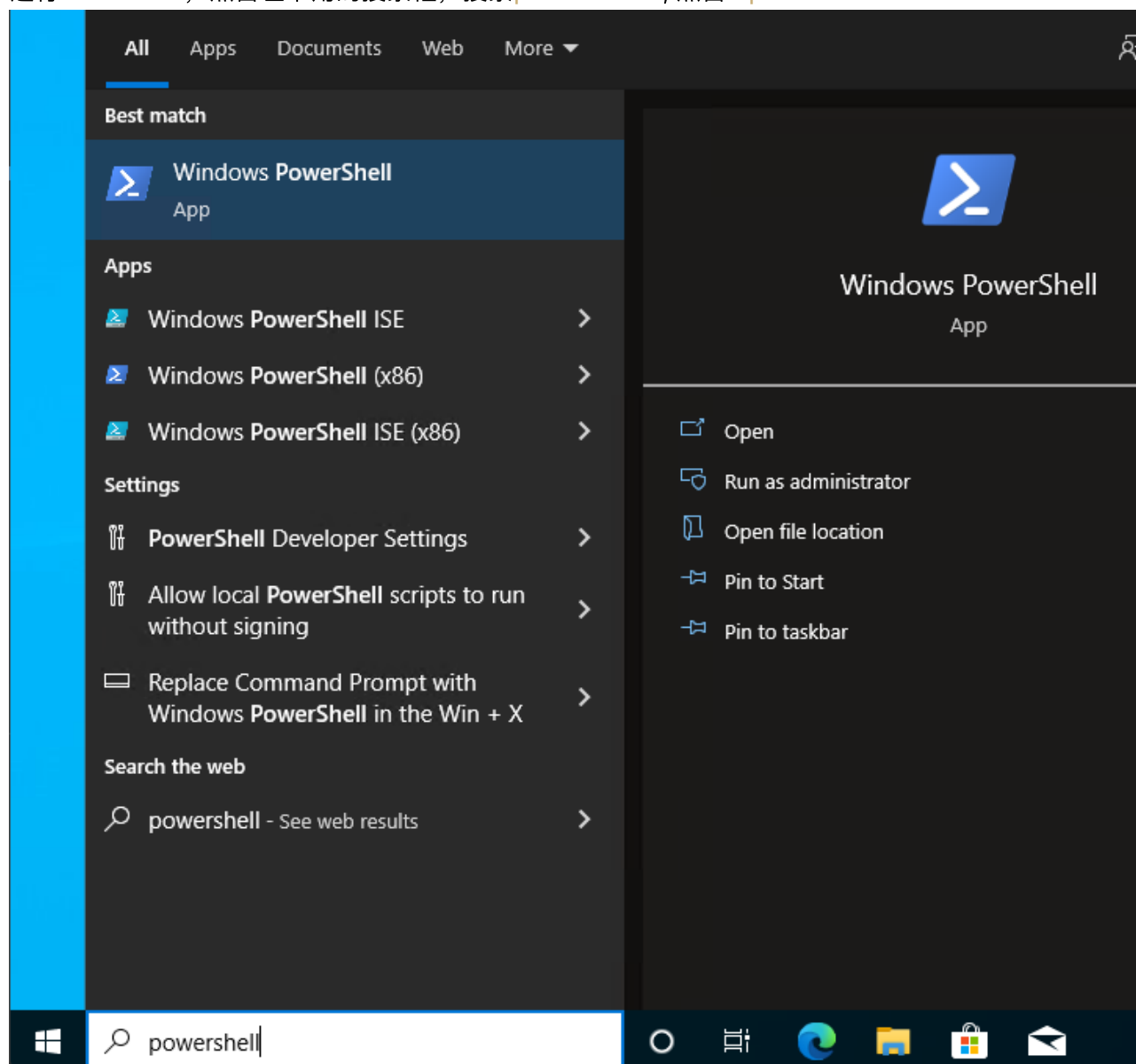
5.1. 安装 EFLOW

5.2. Resources

<https://docs.microsoft.com/en-us/azure/iot-edge/how-to-provision-single-device-linux-on-windows-symmetric?view=iotedge-2020-11&tabs=azure-portal%2Cpowershell> <https://docs.microsoft.com/en-us/azure/iot-edge/nested-virtualization?view=iotedge-2020-11> <https://docs.microsoft.com/en-us/azure/iot-edge/troubleshoot?view=iotedge-2020-11> <https://docs.microsoft.com/en-us/azure/iot-edge/reference-iot-edge-for-linux-on-windows-functions?view=iotedge-2020-11>

现在您已登录到虚拟机

1. 运行PowerShell, 点击左下角的搜索框, 搜索powershell, 点击 Open



2. 执行以下脚本

```
$msiPath = $([io.Path]::Combine($env:TEMP, 'AzureIoTEdge.msi'))  
$ProgressPreference = 'SilentlyContinue'  
Invoke-WebRequest "https://aka.ms/AzEflowMSI" -OutFile $msiPath
```

```
Start-Process -Wait msixexec -ArgumentList  
"/i","$([io.Path]::Combine($env:TEMP, 'AzureIoTEdge.msi'))","/qn"
```

3. 执行以下脚本

```
Deploy-Eflow
```

4. 接受协议并进入下一个问题

```

Limitation of incidental, consequential, or other damages.

[Y] Yes, I Agree [N] No, I decline [?] Help (default is "Y"): y

Diagnostic data

    Send diagnostic data to Microsoft

    Optional diagnostic data:
    Send information about how you use features, plus additional info
error reporting. Diagnostic data is used to help keep the service secure
product improvements. Required diagnostic data will always be included w
data. Regardless of your choice, the service will be equally secure and

    Required diagnostic data:
    Send only info about your installation of the service, its settin
performing properly. Diagnostic data is used to help keep this service se
make product improvements.

[O] Optional [R] Required [?] Help (default is "R"):

```

5. 出现提示时，允许 VM 重新启动。等待几分钟，然后继续下一步。

```

- Microsoft Update is enabled.

[05/20/2022 00:09:52] Step 1: Preparing host for Azure IoT Edge for Linux on Windows

[05/20/2022 00:09:52] Checking host for required features

- Checking the status of 'Microsoft-Hyper-V'
- Enabling 'Microsoft-Hyper-V' ...
- Checking the status of 'Microsoft-Hyper-V-Management-PowerShell'
- Checking the status of 'Microsoft-Hyper-V-Hypervisor'
- Checking the status of 'OpenSSH.Client*'

[05/20/2022 00:10:19] Required features were enabled. A Windows restart is required. After the
deployment again.

Press enter to reboot now or close the PowerShell window and reboot manually.:

```

6. VM 重新启动后，按照前面的步骤重新连接 RDP 会话。您可能需要等待几分钟才能重新启动。

7. 打开 PowerShell 再次运行 `Deploy-Eflow`

```
Deploy-Eflow -memoryInMB 2048 -acceptEula Yes -acceptOptionalTelemetry Yes
```

一段时间后，大概五分钟5 分钟，您应该会看到一条成功消息，如下面的屏幕截图所示。

8. 替换您之前记下的 `{primaryKey}` 和 `{scopeId}` 值，然后运行以下命令

```
Provision-EflowVm -provisioningType DpsSymmetricKey -scopeId {scopeId} -
registrationId iot-academy-edge-device -symmKey {primaryKey}
e.g. Provision-EflowVm -provisioningType DpsSymmetricKey -scopeId
```

```
0ne00600B86 -registrationId iot-academy-edge-device -symmKey  
Yh1Y5pVwuo1Kroa7yZWmD42CTNpB5aTcJvFl1mu5E=
```

运行命令成功后，您将看到一条消息，如下所示。

```
[05/20/2022 02:07:43] Provisioning virtual machine...  
  
[05/20/2022 02:07:44] Attention: iotedge was previously provisioned!  
  
[05/20/2022 02:07:49] Re-provisioning iotedge...  
  
[05/20/2022 02:07:49] Setting provisioning information for provisioning type: DpsSymmetricKey  
  
[05/20/2022 02:07:56] Provisioning Completed. iotedge service running.  
  
OK  
PS C:\Users\iotacademy>
```

9. 现在回到 Azure 门户并找到您的资源组并导航到它
10. 在前缀为“iot-”的列表中找到您的 IoT Hub 资源并选择它
11. 单击 IoT Edge。 点击您的设备“iot-academy-edge-device”

The screenshot shows the Microsoft Azure portal interface. The top navigation bar includes the Microsoft Azure logo and a search bar. The breadcrumb trail indicates the path: Home > rg-iot-academy > iot-qdiyctqfomakk. The main heading is 'iot-qdiyctqfomakk | IoT Edge', with 'IoT Hub' below it. A left-hand navigation pane lists various options: Overview, Activity log, Access control (IAM), Tags, Diagnose and solve problems, Events, Pricing and scale, and a 'Device management' section containing 'Devices' and 'IoT Edge' (which is highlighted). The main content area is titled 'IoT Edge Devices' and contains a search bar, a description of IoT Edge, a 'Device name' input field with the placeholder 'enter device ID', and a 'Find devices' button. Below this are links for '+ Add IoT Edge Device', 'Refresh', and 'Delete'. A table lists the devices, with one entry visible: 'iot-academy-edge-device' with a 'Runtime Response' of '417 -- The device's deployment c...'. The table has columns for 'Device ID' and 'Runtime Response'.

12. 一段时间后，您会注意到 edgeAgent 正在运行，并且 edgeHub 处于错误状态的情况，这是正常的因为我们没有提供配置

[Home](#) > [rg-iot-academy](#) > [iot-qdiyctqfomakk](#) >

iot-academy-edge-device

iot-qdiyctqfomakk

Save Set modules Manage child devices Troubleshoot Device twin Manage keys Refresh

| | |
|------------------------------|---|
| Device ID | iot-academy-edge-device |
| Primary Key | |
| Secondary Key | |
| Primary Connection String | |
| Secondary Connection String | |
| IoT Edge Runtime Response | 417 -- The device's deployment configuration is not set |
| Enable connection to IoT Hub | <input checked="" type="radio"/> Enable <input type="radio"/> Disable |
| Parent device | No parent device |

Modules [IoT Edge hub connections](#) [Deployments and Configurations](#)

| Name | Type | Specified in Deployment | Reported by Device | Runtime Status |
|-----------------------------|------------------------|-------------------------|--------------------|----------------|
| \$edgeAgent | IoT Edge System Module | ⊖ No | ✓ Yes | running |
| \$edgeHub | IoT Edge System Module | ⊖ No | ✓ Yes | Error |

6. 练习: 创建 Azure Stream Analytics 任务

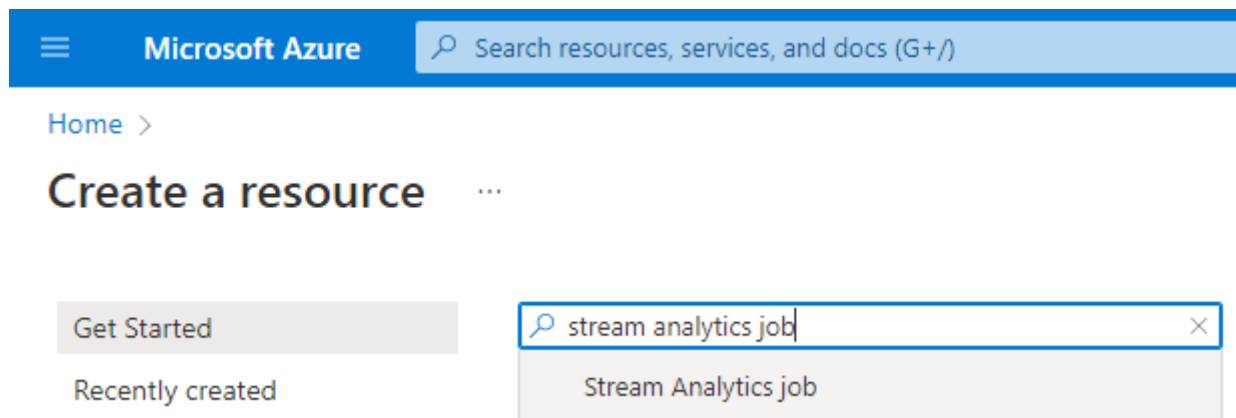
相关视频: <https://youtu.be/1T64Xnu0m3U>

6.1. 相关学习资源

<https://docs.microsoft.com/en-us/azure/iot-edge/reference-iot-edge-for-linux-on-windows-functions?view=iotedge-2020-11>

6.2. 创建新的 ASA 任务

1. 进入 Azure 门户主页
2. 选择 **创建资源 - Create a resource**
3. 搜索 **stream analytics job**

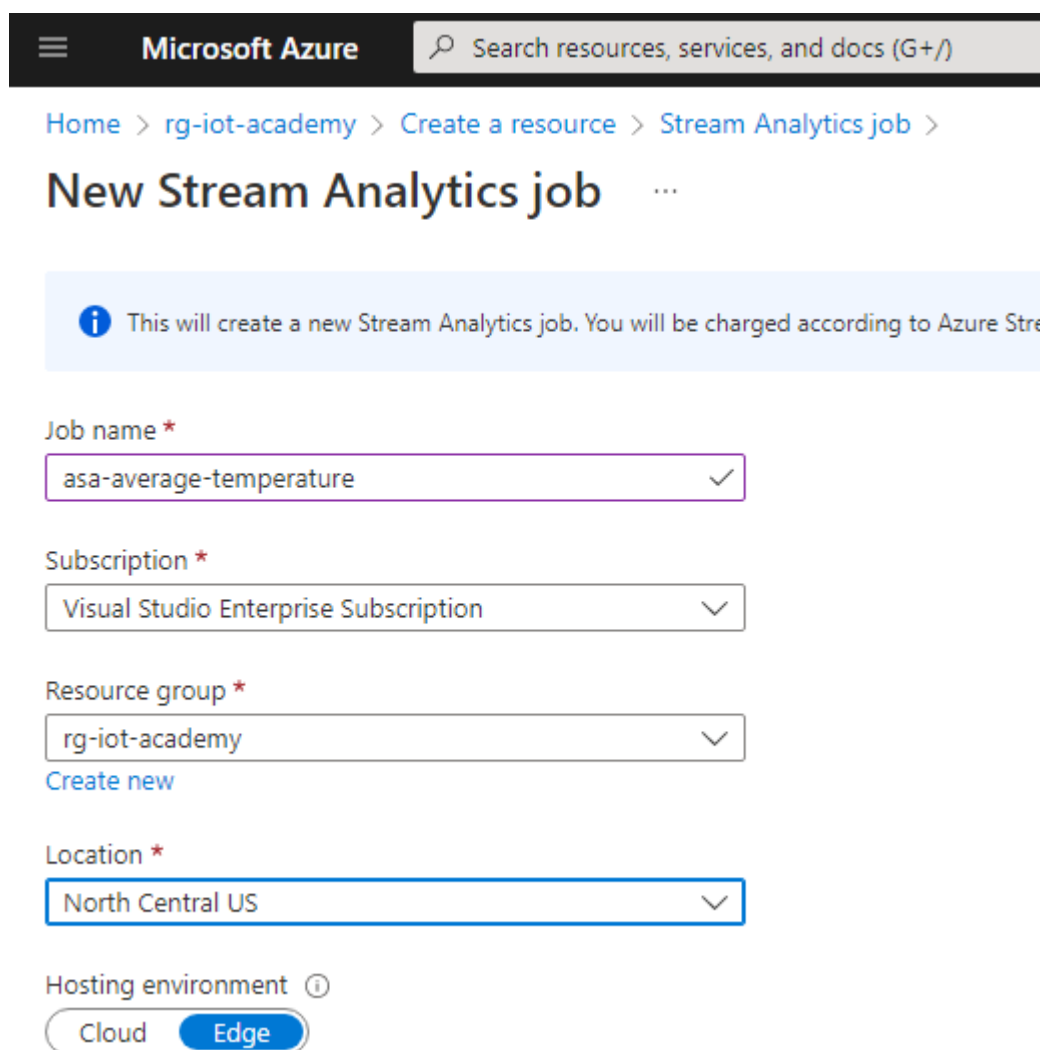


4. 选择 **Stream Analytics job**

5. 点击 **创建 - Create**

6. 输入以下详细信息:

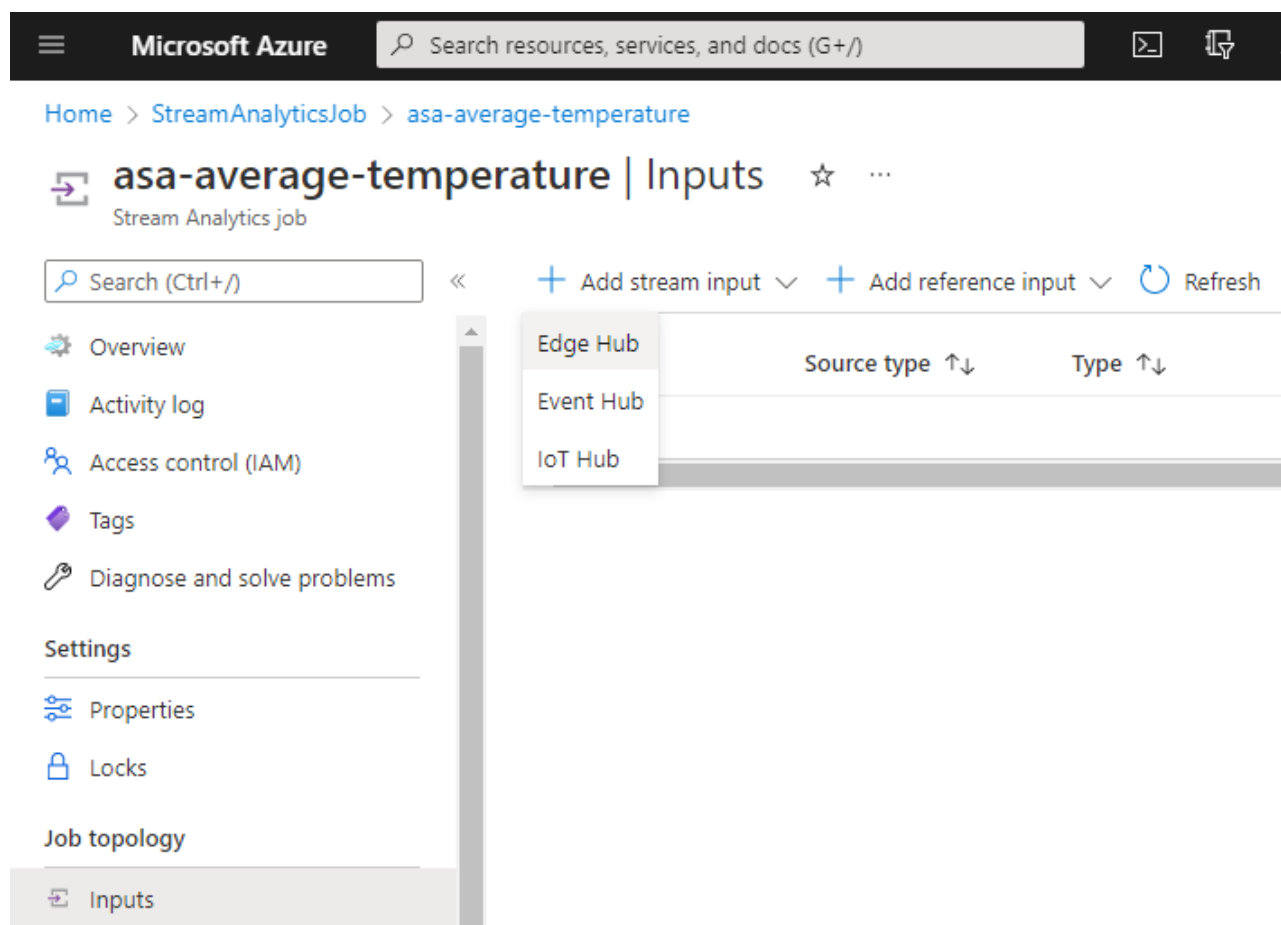
- 任务名称 - Job name: `asa-average-temperature`
- 资源组 - Resource group: `rg-iot-academy`
- 位置 - Location: 你的区域, 如 `East US 2`
- 托管环境 - Hosting environment: `Edge`



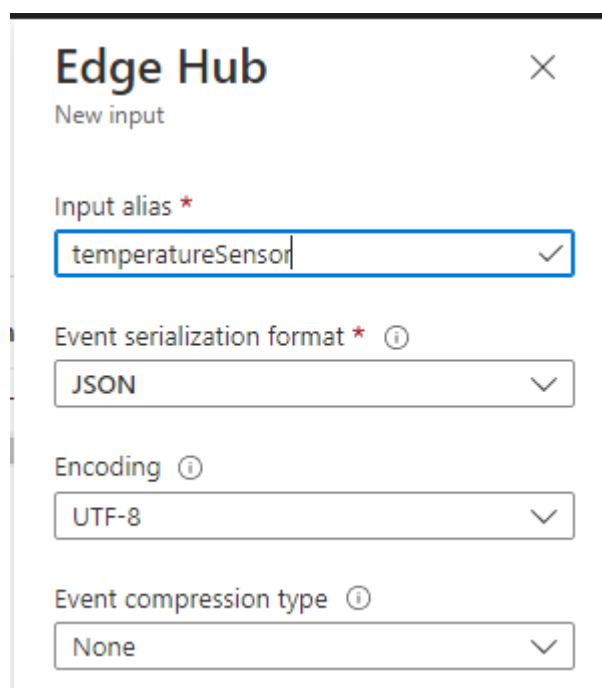
7. 部署完成后点击**转到资源 - Go to resource**

6.3. 创建 ASA 输入

- 选择 输入 Inputs, 再选择 添加流输入 - Add stream input, 点击 Edge Hub



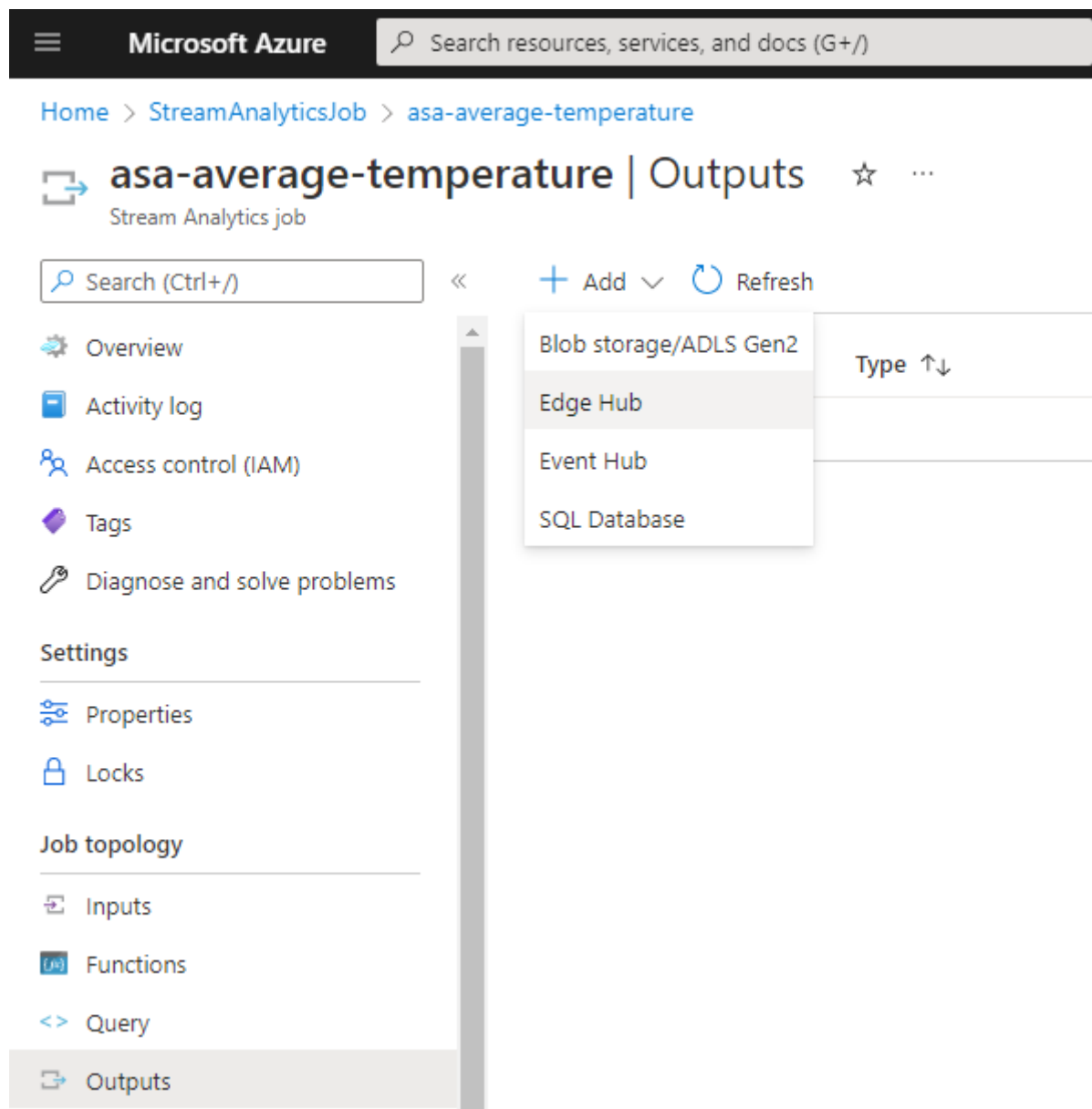
- 输入以下细节信息：
 - 输入别名 - Input alias: `temperatureSensor`
 - 其他值 - All other values: default



- 选择 **Save**

6.4. 创建 ASA 输出

1. 选择 **输出 - Outputs**
2. 选择 **添加 - Add**, 然后点击 **Edge Hub**



3. 输入以下详细信息
- 输出别名 - Output alias: **averageTemperature**
 - 其他值 - All other values: default

Edge Hub



New output

Output alias *

averageTemperature ✓

Event serialization format * ⓘ

JSON ▼

Format ⓘ

Line separated ▼

Encoding ⓘ

UTF-8 ▼

4. 点击 **保存 - Save**

6.5. 写一个 ASA 查询

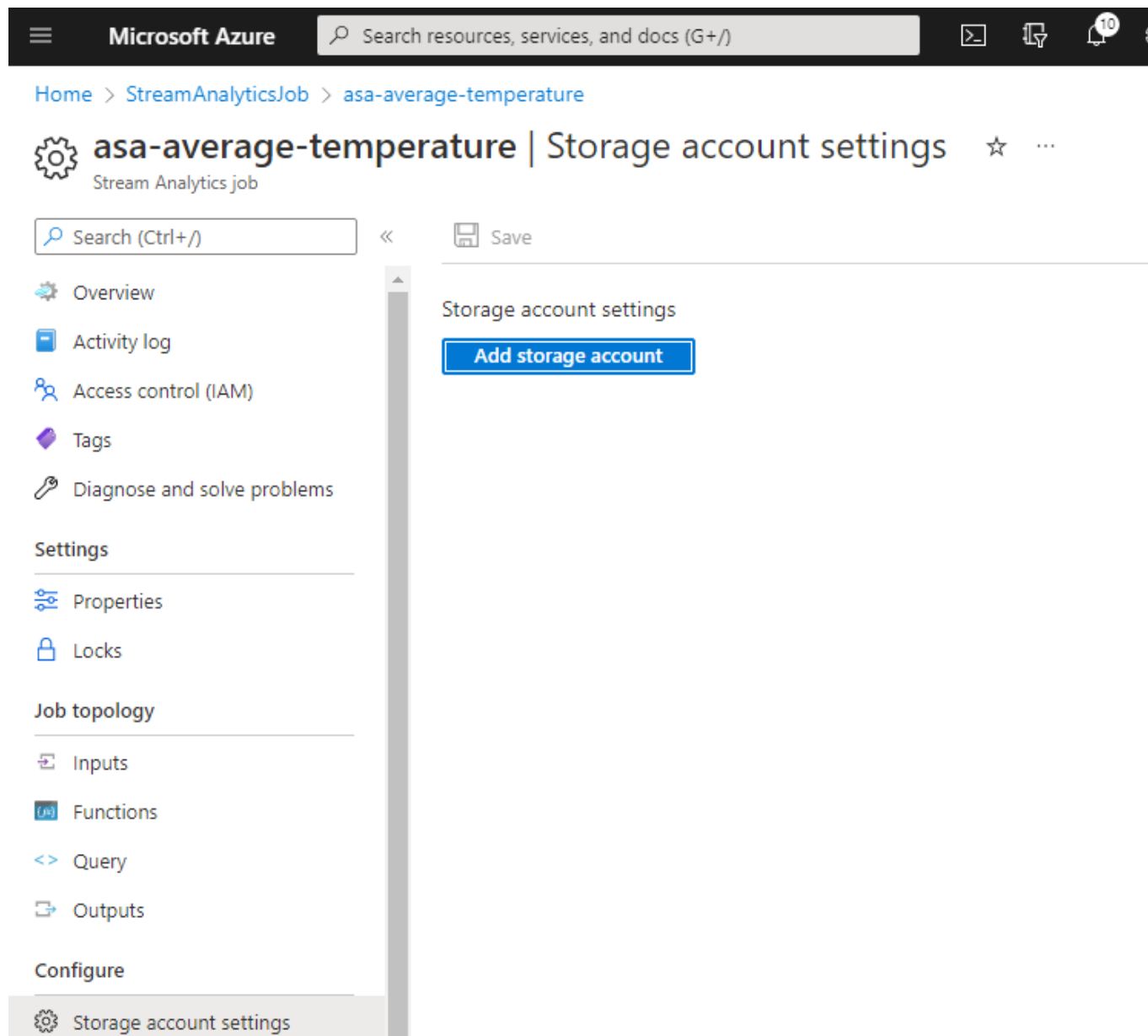
1. 选择 **查询 Query**

2. 将下面的查询复制并粘贴到查询窗口中

```
SELECT
    System.Timestamp() AS WindowEnd, avg(ambient.temperature)
AverageTemperature
INTO
    averageTemperature
FROM
    temperatureSensor
GROUP BY TumblingWindow(Duration(minute, 1))
```

3. 选择 **保存查询 - Save query**

4. 选择 **发布 - Publish**, 再选择 **存储账户设定 - Storage account settings**, 点击 **添加存储账户 - Add storage account**



Microsoft Azure

Search resources, services, and docs (G+/)

Home > StreamAnalyticsJob > asa-average-temperature

asa-average-temperature | Storage account settings

Stream Analytics job

Search (Ctrl+/) Save

Storage account settings

Add storage account

Overview

Activity log

Access control (IAM)

Tags

Diagnose and solve problems

Settings

Properties

Locks

Job topology

Inputs

Functions

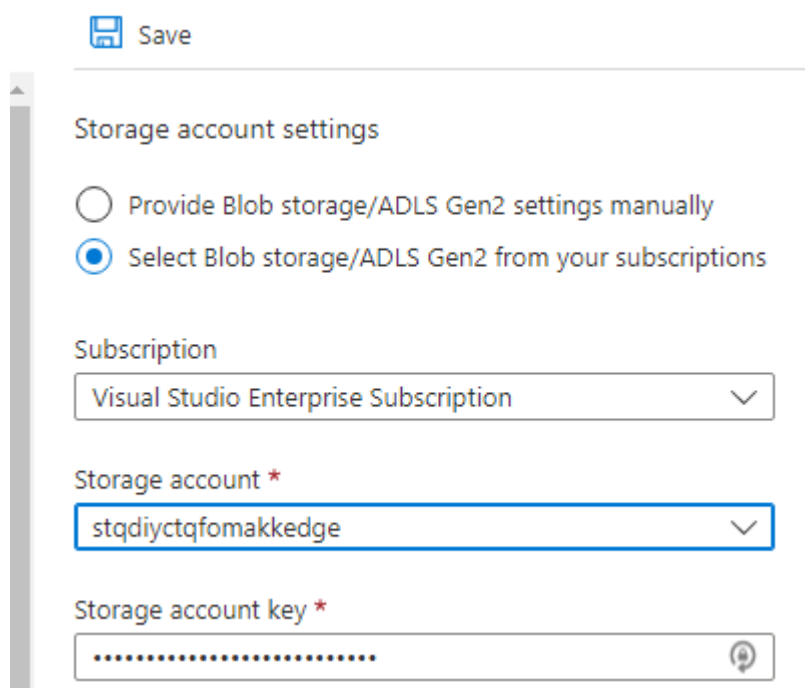
Query

Outputs

Configure

Storage account settings

5. 选择您的订阅，然后选择形成的存储帐户，例如“st*****edge”。您的常用前缀将代替 *****。



Save

Storage account settings

☐ Provide Blob storage/ADLS Gen2 settings manually

☒ Select Blob storage/ADLS Gen2 from your subscriptions

Subscription

Visual Studio Enterprise Subscription

Storage account *

stqdiyctqfomakkedge

Storage account key *

.....

6. 选择 **保存 - Save**

7. 选择 **发布 - Publish**. 然后点击 **是 - Yes**

The screenshot displays the Microsoft Azure portal interface for a Stream Analytics job named 'asa-average-temperature'. The top navigation bar includes the Microsoft Azure logo and a search bar. The breadcrumb trail shows 'Home > StreamAnalyticsJob > asa-average-temperature'. The job title 'asa-average-temperature | Publish' is prominently displayed, accompanied by a star icon and a menu icon. Below the title, the job is identified as a 'Stream Analytics job'. A search bar with the placeholder 'Search (Ctrl+ /)' is located above the left-hand navigation pane. The navigation pane lists various management options: Overview, Activity log, Access control (IAM), Tags, Diagnose and solve problems, Settings (including Properties and Locks), Job topology (including Inputs, Functions, Query, and Outputs), and Configure (including Storage account settings and Publish). The 'Publish' option is highlighted at the bottom of the navigation pane. The main content area features a 'Publish' button and a blue information box stating: 'Job URL can only be shown after publishing the job pa'.

8. 将 SAS URL 复制到记事本以供接下来使用

Microsoft Azure

Search resources, services, and docs (G+/)

Home > StreamAnalyticsJob > asa-average-temperature

asa-average-temperature | Publish ☆ ...

Stream Analytics job

Search (Ctrl+/) << Publish

The following SAS URL can now be used with an Azure SQL Database Edge module.

SAS URL

`https://stqdiyctqfomakkedge.blob.core.windows.net/...`

Overview

Activity log

Access control (IAM)

Tags

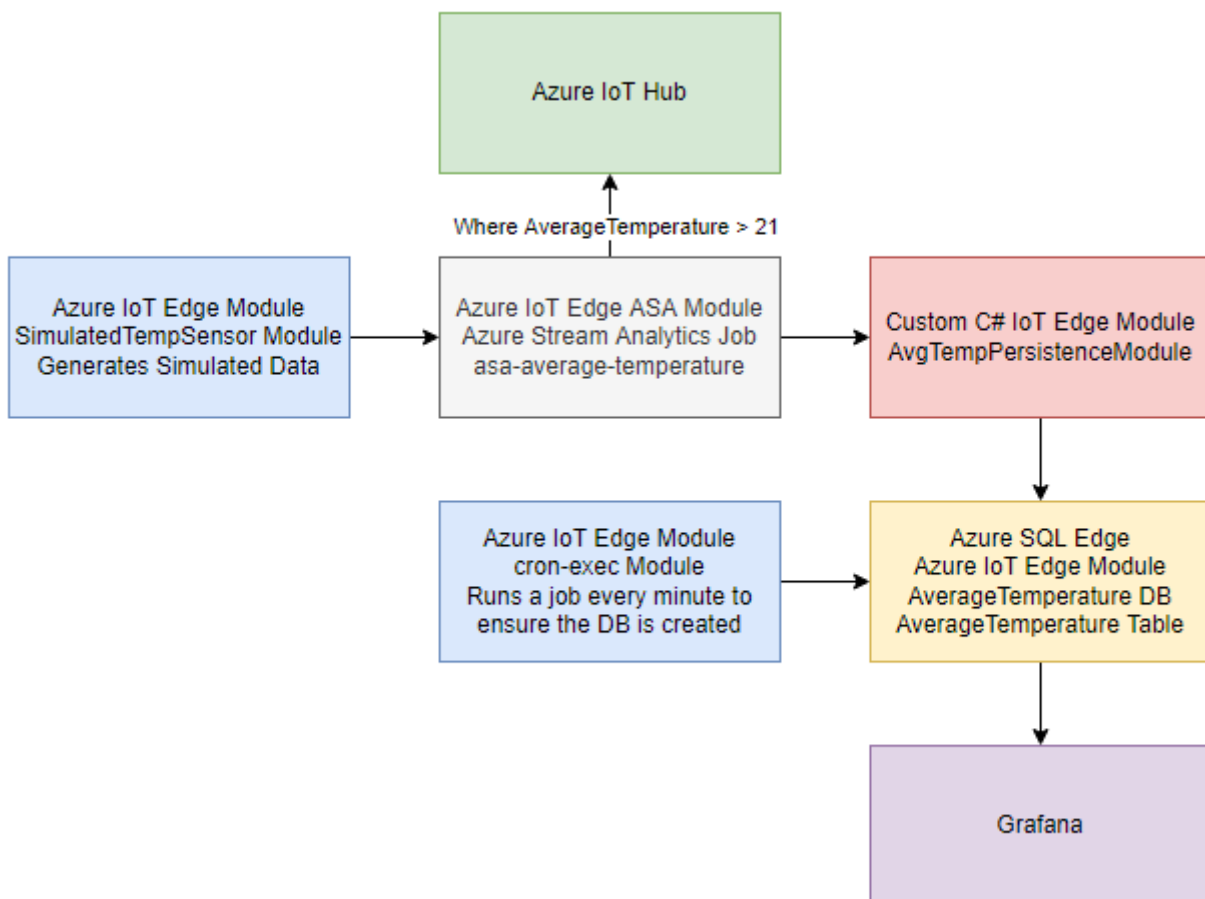
7. 练习: 更新 Azure IoT Edge 配置清单以添加模块和路由

Video: <https://youtu.be/UbGhG7gxmU>

7.1. 介绍 Edge 相关架构

这个部分的动手实验侧重于部署 Azure IoT Edge 模块和如何配置路由

下图显示了数据如何在每个步骤之间流动。



快速回顾组件：

- 模拟温度传感器模块
 - 每 5 秒生成一条消息，共 2000 条消息。有效载荷包括温度和湿度等数据。
 - 由 Microsoft 在 Azure 市场上分发
- Azure IoT Edge ASA 模块
 - 提供在边缘运行流分析作业的能力
 - 由 Microsoft 在 Azure 市场上分发
- 平均温度持续模块
 - 为本次动手实验编写的自定义模块，提供了如何实施 Azure IoT Edge 模块 SDK 的示例。此模块将记录插入 Azure SQL Edge 数据库。 -

[Month_2/Day_1/hol_files/avg_temp_persistence_module](#)

- Azure SQL 边缘模块
 - 设计用于运行 SQL Server 的模块。
 - 由 Microsoft 在 Azure 市场上分发
- cron-exec 模块
 - 运行自定义 docker 容器以运行 cron 作业。此实现中唯一的 cron 作业连接到 AzureSqlEdge 并为此 PoC 创建数据库和表（如果它不存在）。 -

[Month_2/Day_1/hol_files/cron_exec](#)

- Grafana
 - 运行一个容器镜像，为遥测可视化提供 Grafana。此 PoC 从 Azure SQL Edge AverageTemperature 数据库中提取遥测数据。 -

[Month_2/Day_1/hol_files/grafana_average_temp](#)

这种方法的一些替代方法是使用以下方法。选择此当前架构是为了展示和说明不同的方法。

1. 代替自定义模块的 Azure Function

1. <https://docs.microsoft.com/en-us/azure/iot-edge/tutorial-deploy-function?view=iotedge-2020-11>

2. 使用 Azure SQL Edge 数据流

1. <https://docs.microsoft.com/en-us/azure/azure-sql-edge/stream-data>
2. <https://docs.microsoft.com/en-us/azure/azure-sql-edge/create-stream-analytics-job>

7.2. 相关资源

<https://docs.microsoft.com/en-us/azure/iot-hub/iot-hub-devguide-messages-d2c>

<https://docs.microsoft.com/en-us/azure/iot-edge/module-composition?view=iotedge-2020-11>

<https://docs.microsoft.com/en-us/azure/stream-analytics/stream-analytics-edge>

<https://docs.microsoft.com/en-us/azure/iot-edge/how-to-vs-code-develop-module?view=iotedge-2020-11>

<https://docs.microsoft.com/en-us/azure/azure-sql-edge/tutorial-set-up-iot-edge-modules>

<https://docs.microsoft.com/en-us/azure/iot-edge/how-to-use-create-options?view=iotedge-2020-11>

<https://docs.docker.com/engine/api/v1.32/#operation/ContainerCreate> <https://github.com/marvin-garcia/AzureSqlEdge>

7.3. 查看部署配置清单

现在，我们将详细了解如何使用 Azure IoT Edge 协调所有组件的集成。

打开“Month_2/Day_1/hol_files/edge_manifest_modules.json”文件查看内容

注意模块和路由部分 以下屏幕截图显示了配置的路由。 您可以使用行号来浏览实际文件。

```

5  > "modules": {
6  >   "asa-average-temperature": { ...
20  >   },
21  >   "AvgTempPersistenceModule": { ...
30  >   },
31  >   "cron_exec": {
32     "version": "1.0",
33     "type": "docker",
34     "status": "running",
35     "restartPolicy": "always",
36  >   "settings": {
37     "image": "criotacademyspring2022.azurecr.io/cron_exec:latest",
38     "createOptions": ""
39   }
40   },
41  >   "SimulatedTemperatureSensor": { ...
58   },
59  >   "AzureSQLEdge": { ...
82   },
83  >   "grafana_average_temp": { ...
92   }
93   },
94  >   "runtime": { ...
106  },
107   "schemaVersion": "1.1",
108  >   "systemModules": { ...
125  },
126 }

128  > "$edgeHub": {
129  >   "properties.desired": {
130  >     "routes": {
131       "TempSensorToAverageTemp": "FROM /messages/modules/SimulatedTemperatureSensor/* INTO
132       BrokeredEndpoint(\"/modules/asa-average-temperature/inputs/temperatureSensor
133       FROM /messages/modules/asa-average-temperature/* INTO
134       BrokeredEndpoint(\"/modules/AvgTempPersistenceModule/inputs/input1
135       FROM /messages/modules/asa-average-temperature/* WHERE
136       $body.Weather.Temperature > 21 INTO
137       BrokeredEndpoint(\"/modules/AvgTempPersistenceModule/inputs/input1\")
138     }
139   }
140 }

```

```

FROM /messages/modules/SimulatedTemperatureSensor/* INTO
BrokeredEndpoint("/modules/asa-average-temperature/inputs/temperatureSensor
FROM /messages/modules/asa-average-temperature/* INTO
BrokeredEndpoint("/modules/AvgTempPersistenceModule/inputs/input1
FROM /messages/modules/asa-average-temperature/* WHERE
$body.Weather.Temperature > 21 INTO
BrokeredEndpoint("/modules/AvgTempPersistenceModule/inputs/input1")

```

7.4. 使用 CLI 创建 IoT Edge 部署

在前面的步骤中，你使用 EFLOW 成功部署了 Azure IoT Edge 设备。在此步骤中，您将配置边缘设备以运行 Azure IoT Edge 模块。

1. 列出您的 iot hubs 以获取名称

```
az iot hub list -o table
```

2. 编辑 `Month_2/Day_1/hol_files/edge_manifest_modules.json`
3. 将 `{sas_url}` 替换为之前保存在记事本中的 SAS URL
4. 将 `"{subscription_id}"` 替换为您之前保存在记事本中的 SubscriptionID
5. 替换下面的 `{hub_name}` 后，运行以下的命令

Notice the **target-condition** this is what is going to target your Edge device since it does in fact have the **dev** tag as follows: **tags.environment='dev'**.

```
az iot edge deployment create -d deploy-tempsensor-sink -n {hub_name} --  
content edge_manifest_modules.json --target-condition  
"tags.environment='dev'" --priority 3
```

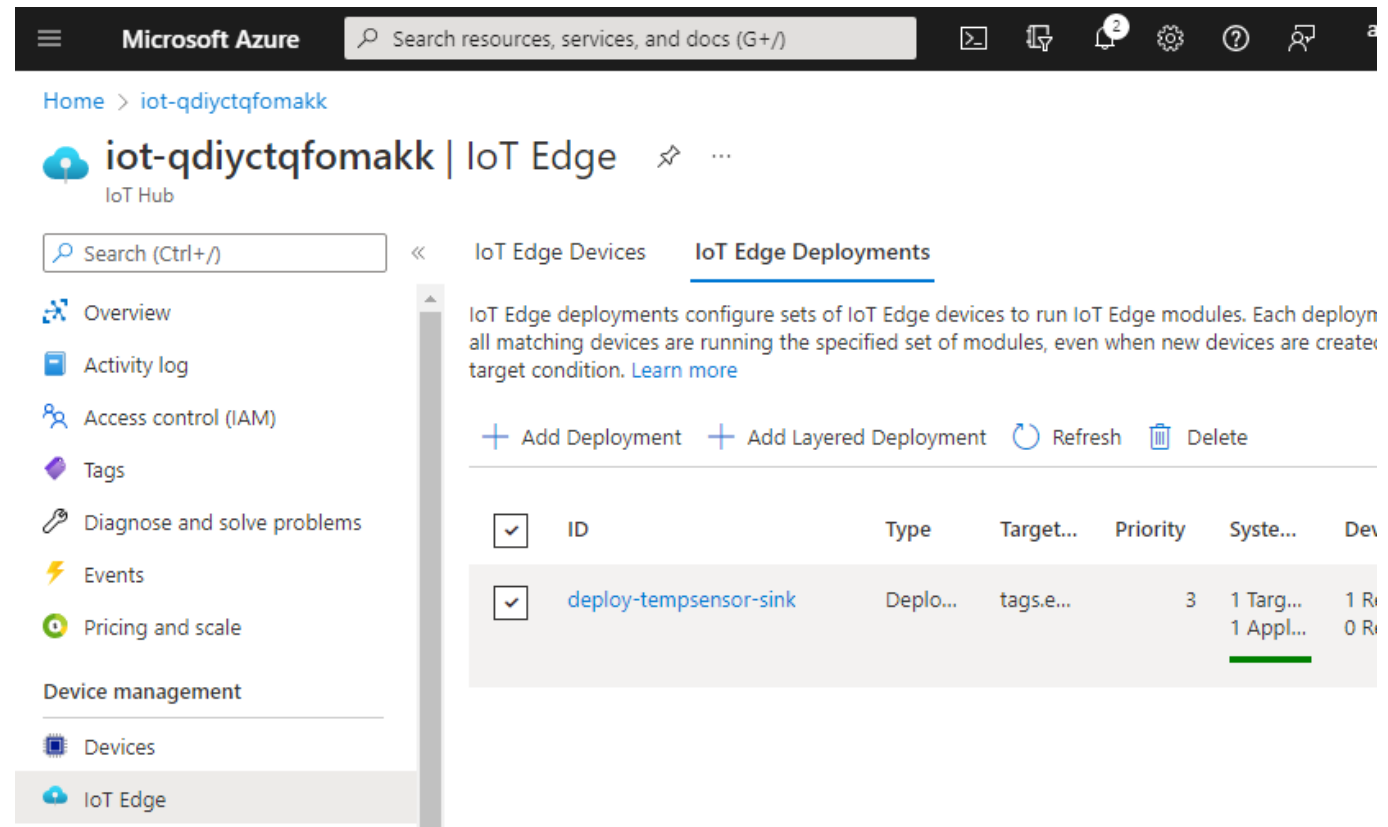
Some Examples

```
e.g. az iot edge deployment create -d deploy-tempsensor-sink -n iot-  
qdiyctqfomakk --content edge_manifest_modules.json --target-condition  
"tags.environment='dev'" --priority 3
```

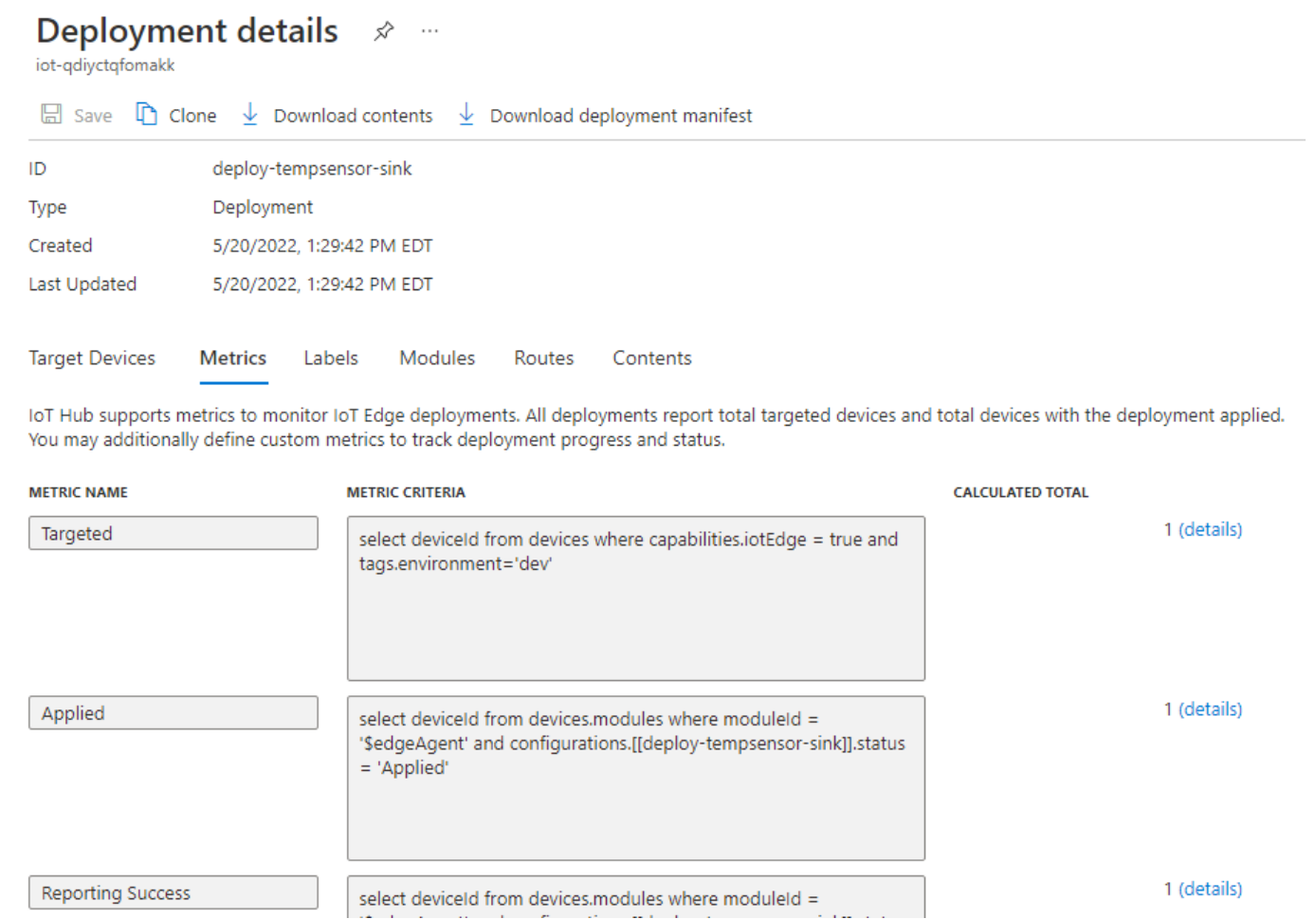
```
e.g. to delete, az iot edge deployment delete -d deploy-tempsensor-sink -n  
iot-qdiyctqfomakk
```

7.5. 在 Azure 门户中查看 IoT Edge 部署

1. 访问 Azure 门户，查看您的 IoT Hub，选择 IoT Edge，然后单击 IoT Edge 部署



2. 选择您的部署，可以在此处查看部署的详细信息：您的部署的模块、路由和相关指标



3. 等待您的设定部署到您的设备，然后继续下一部分。这可能需要一定时间。

如果您返回到第 1 步中使用的页面，可以点击刷新按钮，直到系统指标状态为“1 Targeted, 1 Applied”

8. 练习: 查看发送到 Grafana 的数据

Video: <https://youtu.be/TvzvFG79spE>

8.1. 登入 Windows 10 虚拟机

您应该仍然拥有之前的 RDP 会话。如果您关闭它或它已结束，请再次按照“登录到您的 Windows 10 VM”部分中的步骤操作

8.2. 获取 EFLOW 虚拟机的 IP 地址

1. 转到或打开 PowerShell 窗口
2. 运行以下命令获取 EFlow VM 的IP地址

```
Get-EflowVmAddr
```

You'll get a result such as **172.20.126.50** Replace `{eflow_vm_ip}` below with the value

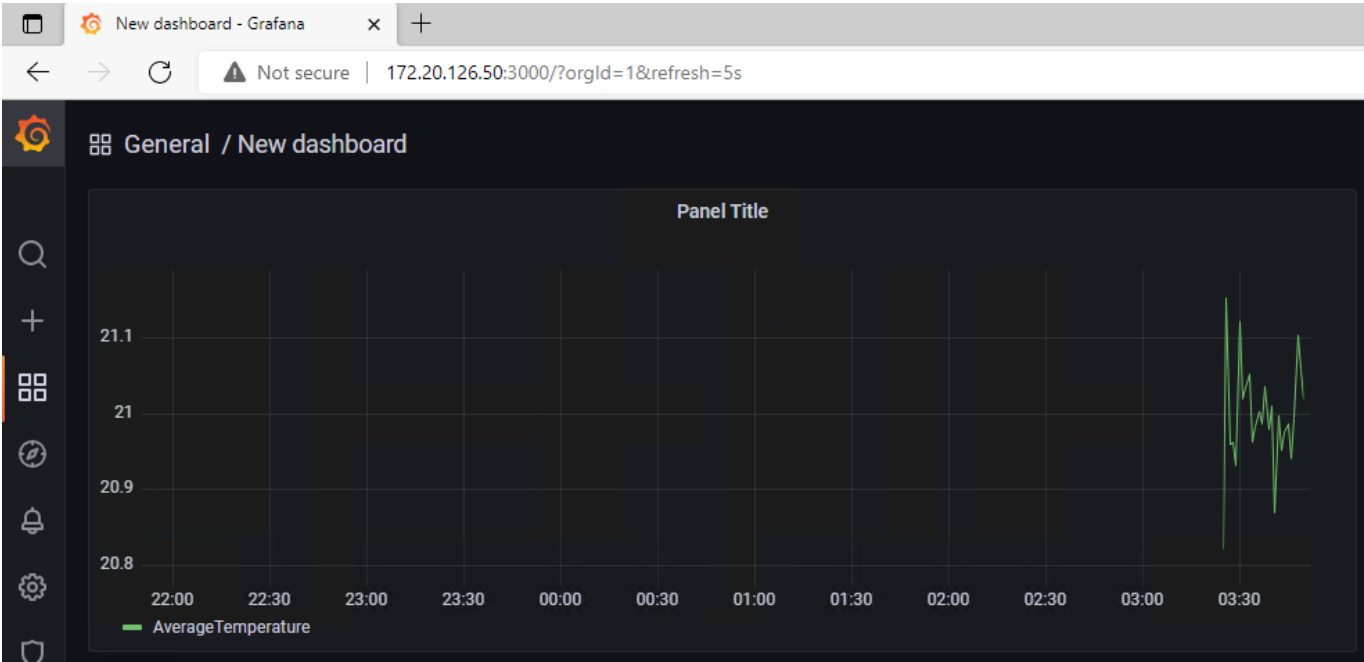
8.3. 登录到 Grafana

1. 在 VM 中打开 Edge 浏览器并导航到 `http://{eflow_vm_ip}:3000`
2. 页面加载后，登录：
 - 用户名 - username: **admin**
 - 密码 - password: **admin**
1. 当提示更改密码时，在密码和确认框中使用“password1!”，然后单击“确定 - ok”。

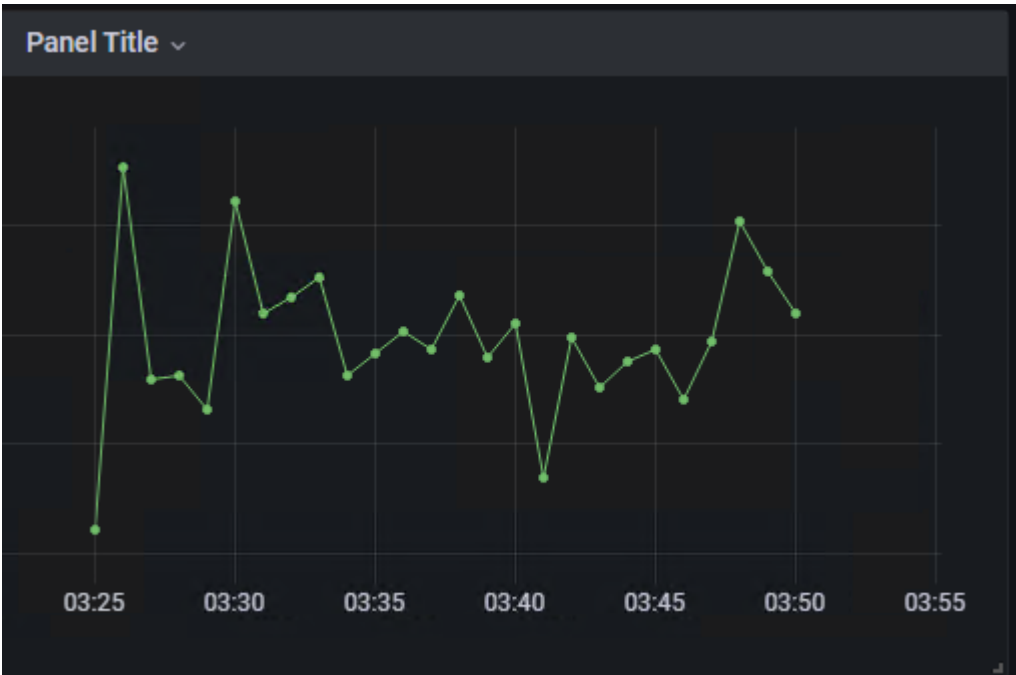
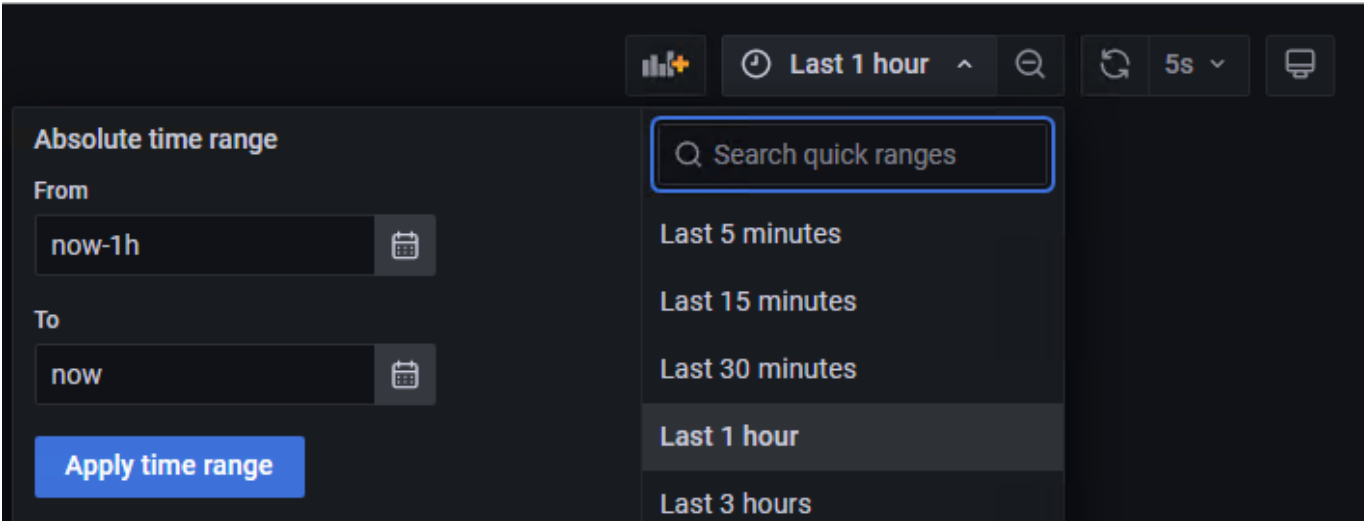
8.4. 查看动手实验室提供的仪表板和图表

1. 查看所提供图表上的数据。

您可能需要等待一段时间才能在图表上显示大量数据



您还可以将时间范围更改为更短的时间并查看更好的图表。你也可以使用自动刷新选项。



2. 看到数据后，继续进入下一个练习

9. 练习：监控 IoT Hub 事件

相关视频: <https://youtu.be/cWtMkYIbII0>

9.1. 资源

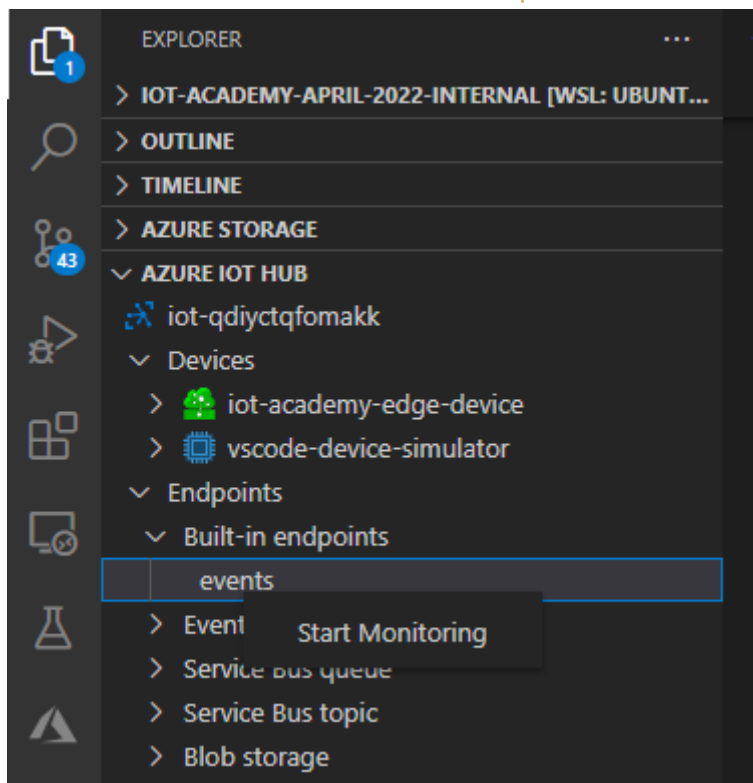
<https://docs.microsoft.com/en-us/azure/iot-hub/iot-hub-vscode-iot-toolkit-cloud-device-messaging>

9.2. 登录并选择正确的 IoT Hub

1. 打开 VSCode
2. 使用 command palette, View -> Command Palette
3. 输入 `select iot` 选择 `Azure IoT Hub: Select IoT Hub` 按回车
4. 选择您的订阅。如果成功跳到步骤 6
5. 如果它不可见，您需要使用正确的帐户登录
 1. Command Palette `Azure: Sign Out`
 2. Command Palette `Azure: 登录 Azure Cloud`
6. 选择为此动手实验实验室创建的 IoT Hub`

9.3. 开始监视 IoT Hub 内置事件端点

1. 右键选择 `Explorer -> Azure IoT Hub -> Your Hub -> Built-in endpoints ->`



`events` and 点击 `Start Monitoring`

2. 平均温度遥测每分钟生成一次。由于并非所有平均温度都符合“AverageTemperature > 21”的标准，因此可能需要一些时间才能看到事件的流动。当它们达到时，您将在输出窗口中显示事件。

```
[IoTHubMonitor] [11:20:00 AM] Message received from [iot-academy-edge-device/asa-average-temperature]:  
{  
  "WindowEnd": "2022-05-22T15:20:00.000000Z",  
  "AverageTemperature": 21.078679946986345  
}  
[IoTHubMonitor] [11:21:00 AM] Message received from [iot-academy-edge-device/asa-average-temperature]:  
{  
  "WindowEnd": "2022-05-22T15:21:00.000000Z",  
  "AverageTemperature": 21.12592386504657  
}
```

10. 练习:创建 Azure Logic App 以监视来自 IoT 中心的事件

Video: <https://youtu.be/n0ATDWwxfRg>

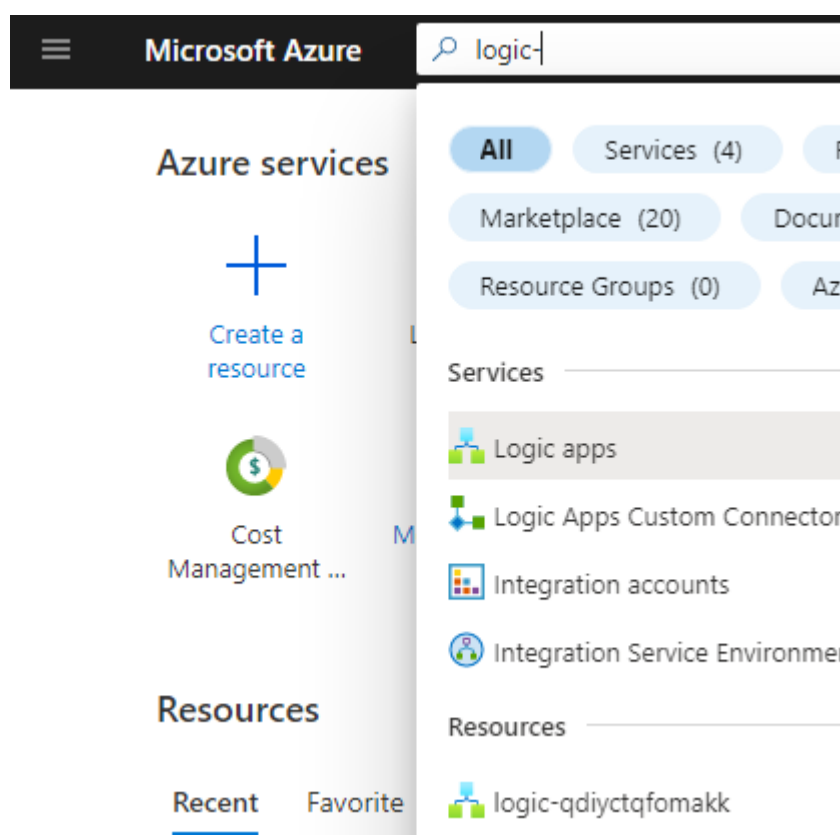
10.1. 资源

<https://docs.microsoft.com/en-us/azure/event-grid/publish-iot-hub-events-to-logic-apps>

<https://docs.microsoft.com/en-us/connectors/azureloganalyticsdatacollector/#creating-a-connection>

10.2. 在门户中打开您预先创建的 Logic App

转到 Azure 门户，搜索 **logic-**，搜索 **Logic App** 并选择它



10.3. 向 Logic App 添加 HTTP 请求触发器

1. 选择 **空的 Logic App – Blank Logic App**

[Home](#) > [logic-qdiyctqfomakk](#) >

Logic Apps Designer ...

Choose a template below to create your Logic App.

Blank Logic App



2. 查找 **http request** 选择 **When a HTTP request is received**



When a HTTP request is received
Request

4. 选择 **Use sample payload to generate schema** 将 json 复制到剪贴板

```
[
  {
    "id": "5749a230-6ebf-950f-3d26-53cc8315a4ad",
    "topic": "/SUBSCRIPTIONS/7451D6D6-9082-46D9-9373-CCD5FCDA6673/RESOURCEGROUPS/RG-IOT-ACADEMY/PROVIDERS/MICROSOFT.DEVICES/IOTHUBS/IOT-QDIYCTQFOMAKK",
    "subject": "devices/iot-academy-edge-device/asa-average-temperature",
    "eventType": "Microsoft.Devices.DeviceTelemetry",
    "data": {
      "properties": {},
      "systemProperties": {
        "iothub-content-type": "application/json",
        "iothub-content-encoding": "utf-8",
        "iothub-connection-device-id": "iot-academy-edge-device",
        "iothub-connection-module-id": "asa-average-
```



```
temperature",
    "iothub-connection-auth-method": "
{\"scope\":\"module\", \"type\":\"sas\", \"issuer\":\"iothub\", \"acceptingIp
FilterRule\":null}\",
    "iothub-connection-auth-generation-id":
"637886649142604368",
    "iothub-enqueuedtime": "2022-05-22T20:19:00.3160000Z",
    "iothub-message-source": "Telemetry"
  },
  "body": {
    "WindowEnd": "2022-05-22T20:19:00.0000000Z",
    "AverageTemperature": 21.038353595978126
  }
},
"dataVersion": "",
"metadataVersion": "1",
"eventTime": "2022-05-22T20:19:00.316Z"
}
]
```

5. 粘贴到 json

6. 点击 完成 – Done



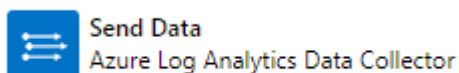
7. 点击 保存 – Save

8. 将“HTTP Post URL”复制到剪贴板，保存在记事本中

10.4. 添加用将数据发送到 Azure Log Analytics 工作区的步骤

1. 点击 New step

2. 查找 Send data. 选择 Send Data: Azure Log Analytics Data Collector



3. 接下来，您会注意到需要 Log Analytics 工作区的连接信息。

The screenshot shows a Logic App workflow step configuration. The trigger is "When a HTTP request is received". The action is "Azure Log Analytics Data Collector". The configuration fields are:

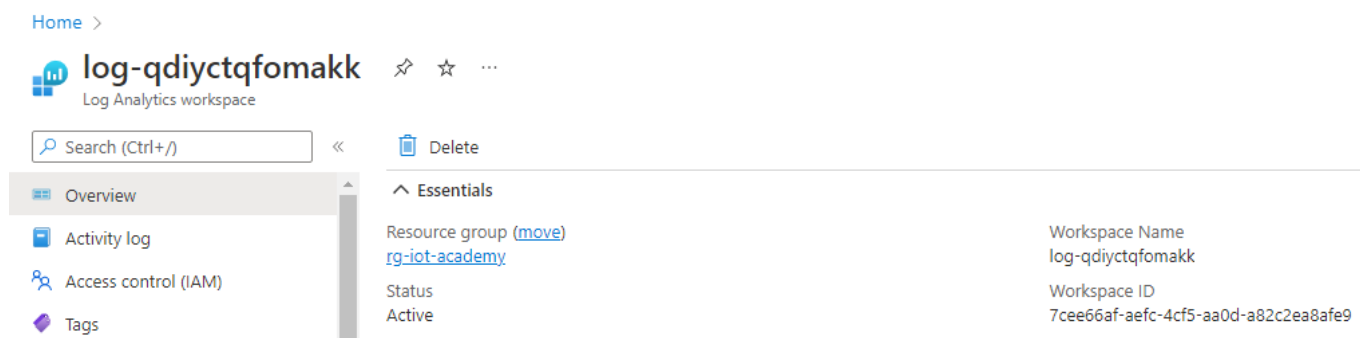
- * Connection name: Enter name for connection
- * Workspace ID ⓘ: The unique identifier of the Azure Log Analytics workspace.
- * Workspace Key ⓘ: The primary or secondary key of the Azure Log Analytics workspace.

A "Create" button is at the bottom.

4. 名字: `log-analytics`

5. 在另一个浏览器选项卡中，转到 Azure 门户。搜索“日志-”。单击您的 Log Analytics 资源。

6. 将 `Workspace ID` 复制到剪贴板，例如 `7cee66af-aefc-4cf5-aa0d-a82c2ea8afe9`



7. 返回您的 Logic App 浏览器选项卡。将您的“工作区 ID - Workspace ID”粘贴到相应的框中

8. 返回您的 Log Analytics 选项卡。单击“代理管理 - Agents Management”。将“主键 - Primary Key”复制到剪贴板

Microsoft Azure

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Home > log-qdiyctqfomakk

log-qdiyctqfomakk | Agents management

Log Analytics workspace

Search (Ctrl+/)

Windows servers Linux servers

0 Windows computers connected

Go to logs

Download agent

Download an agent for your operating system, then install and configure it using the keys for your workspace ID. You'll need the Workspace ID and Key to install the agent.

Download Windows Agent (64 bit)

Download Windows Agent (32 bit)

Workspace ID: 7cee66af-aefc-4cf5-aa0d-a82c2ea8afe9

Primary key: Trr2Q6DCvpzhWD3bhbHaLRxgwGDN2so... Regenerate

Secondary key: vxuG997de2seJb3TRgEtOZBSirr8fxgZ2oeq... Regenerate

9. 返回您的 Logic App 浏览器选项卡。粘贴您的“主键”。单击确定。

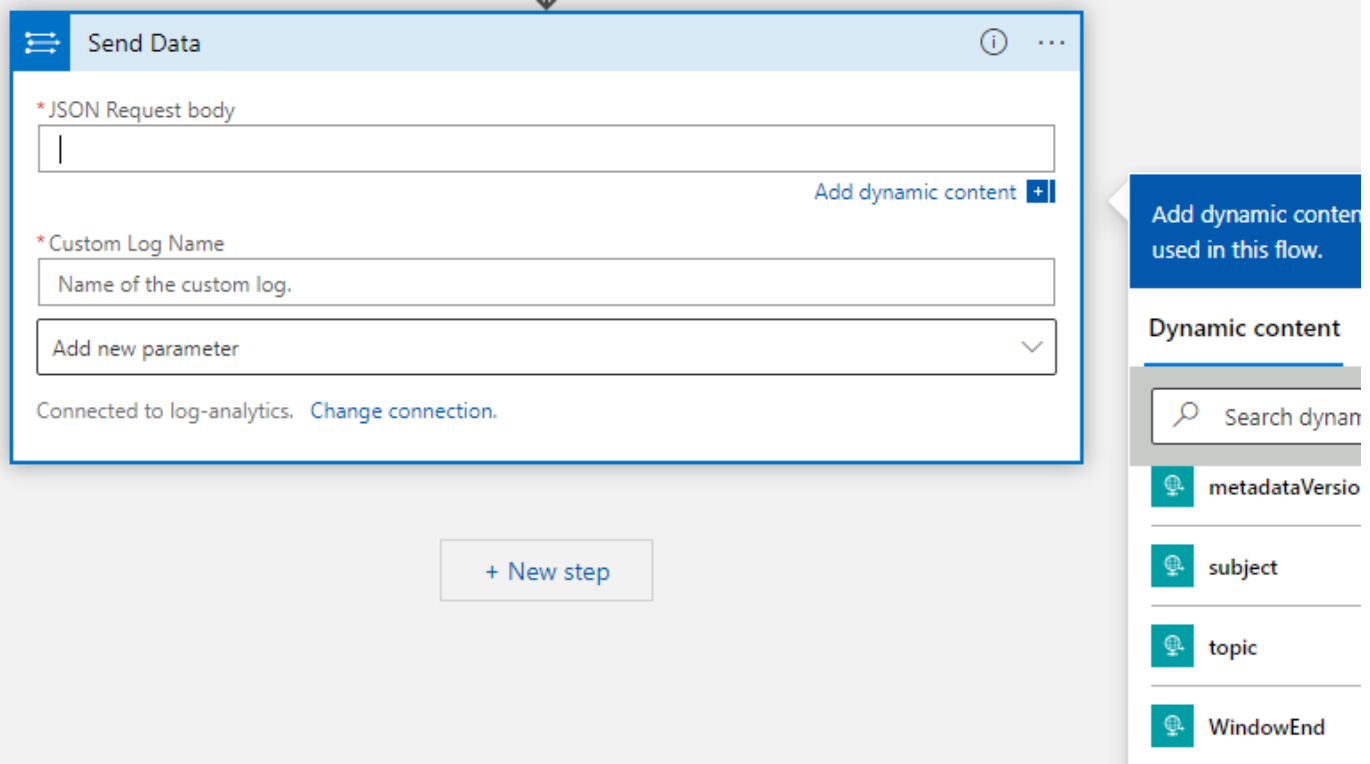
10. 点击“创建”

11. 点击“保存”

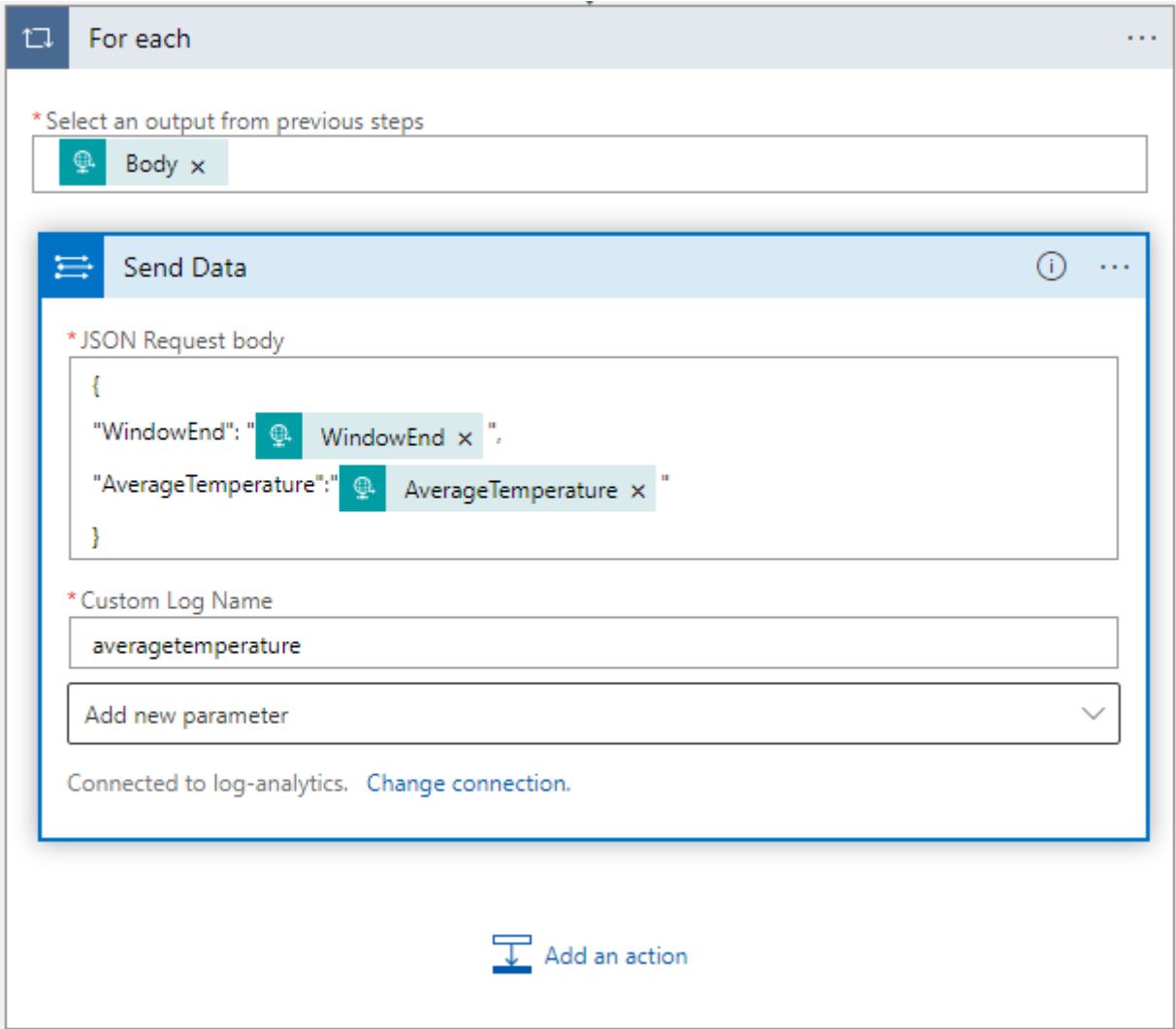
12. 将以下 json 粘贴到 **JSON Request body** 框中

```
{
  "WindowEnd": "@{items('For_each')?['data']?['body']?['WindowEnd']}",
  "AverageTemperature": "@{items('For_each')?['data']?['body']?
  ['AverageTemperature']}"
}
```

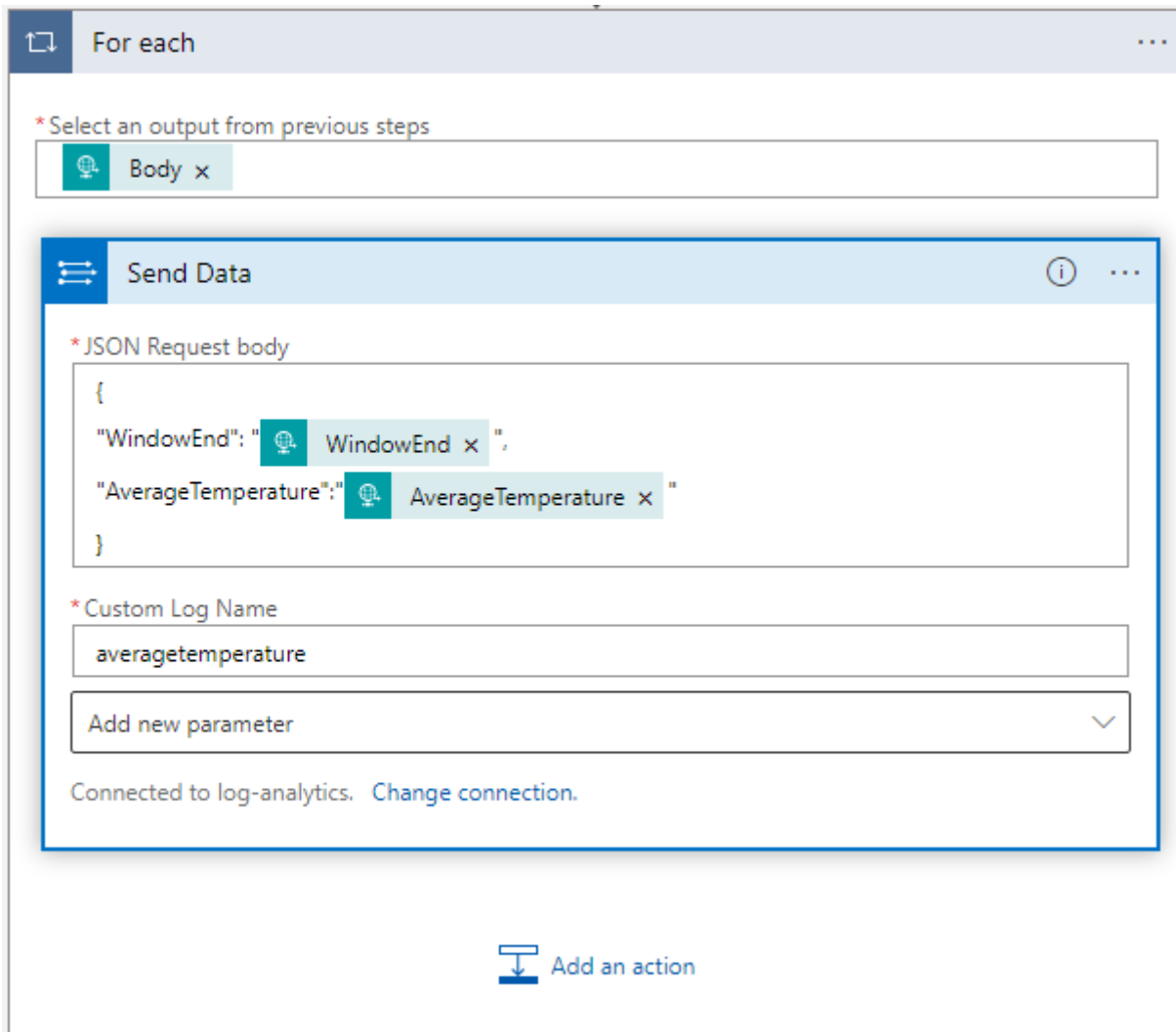
13. 单击 JSON 请求正文段并在动态内容框中选择“WindowEnd”。



14. 请注意，由于 json 的嵌套，Logic app 设计器会自动为您插入一个 foreach。

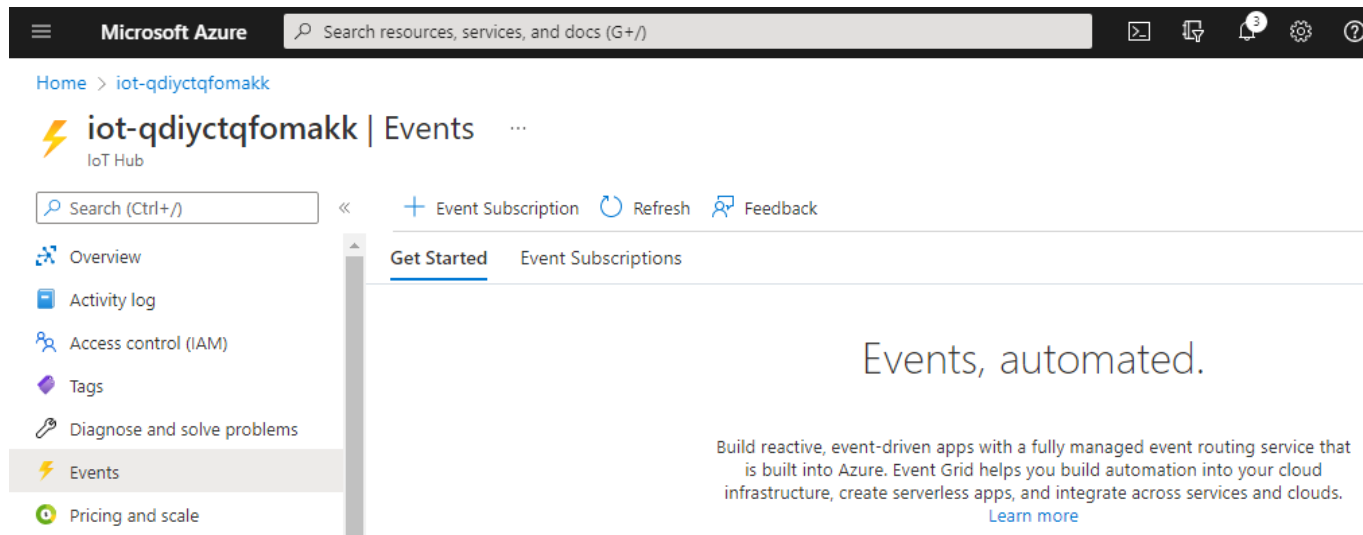


15. 单击 WindowEnd 字段上的“x”。将光标放在两个"之间。查看右侧面板动态字段并单击 WindowEnd。
16. 输入详细信息并单击“保存”



10.5. 配置 IoT Hub 将事件发送到 Logic App

1. 在新的浏览器选项卡中，搜索 **iot-**。选择您的 IoT Hub 实例。
2. 单击事件。点击 **+活动订阅 - + Event Subscription**



Microsoft Azure

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Home > **iot-qdiyctqfomakk**

iot-qdiyctqfomakk | Events ...

IoT Hub

Search (Ctrl+J)

« + Event Subscription Refresh Feedback

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Events

Pricing and scale

Get Started Event Subscriptions

Events, automated.

Build reactive, event-driven apps with a fully managed event routing service that is built into Azure. Event Grid helps you build automation into your cloud infrastructure, create serverless apps, and integrate across services and clouds.

[Learn more](#)

3. 输入以下信息

- 名称 - Name: logicapp
- 网格事件架构 - Event Grid Schema
- 过滤到事件类型 - Filter to Event Types: Only Device Telemetry
- 断点 - Endpoint: The **HTTP Post URL** you saved to your notepad

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3

[Home](#) > [iot-qdiyctqfomakk](#) >

Create Event Subscription

Event Grid

[Basic](#) [Filters](#) [Additional Features](#) [Delivery Properties](#) [Advanced Editor](#)

Event Subscriptions listen for events emitted by the topic resource and send them to the endpoint resource. [Learn more](#)

EVENT SUBSCRIPTION DETAILS

Name *

logicapp

Event Schema

Event Grid Schema

TOPIC DETAILS

Pick a topic resource for which events should be pushed to your destination. [Learn more](#)

Topic Type

IoT Hub

Source Resource

iot-qdiyctqfomakk

System Topic Name * ⓘ

average-temperature

EVENT TYPES

Pick which event types get pushed to your destination. [Learn more](#)

Filter to Event Types *

Device Telemetry

ENDPOINT DETAILS

Pick an event handler to receive your events. [Learn more](#)

Endpoint Type *

Web Hook [\(change\)](#)

Endpoint *

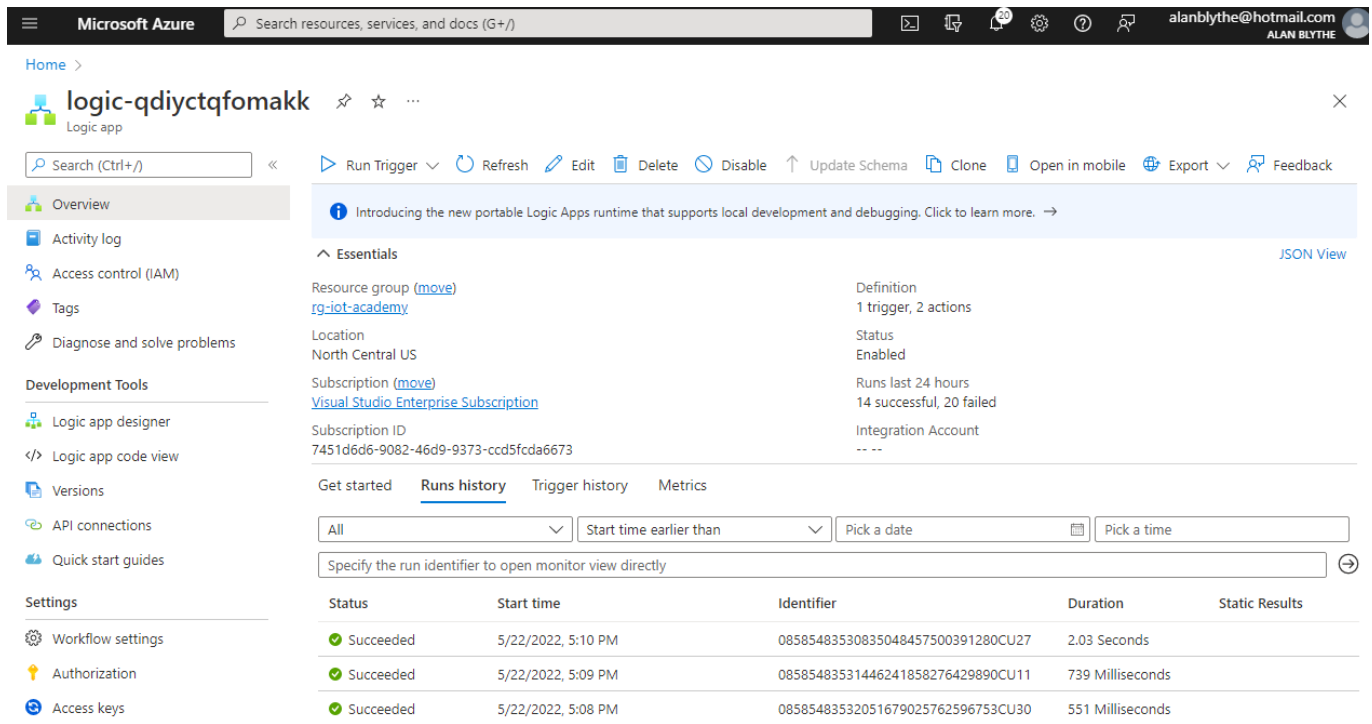
https://prod-30.northcentralus.logic.azure.com:443/workflows/361615642de043128d22724ab21e8c94/triggers/manual/paths/in

4. 点击 [创建](#) – Create

注意：也可以在此处添加过滤器，类似于我们在早前动手实验为 > 21 过滤遥测数据的方式。

10.6. 确保您的 Logic 正在成功接收 webhook

1. 导航回打开 Logic App 的浏览器选项卡
2. 查看概览页面上的执行历史记录。如果您没有看到任何运行，请等待几分钟以显示。如有必要，请使用刷新按钮。



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alanblythe@hotmail.com

Home > logic-qdiyctqfomakk

Logic app

Search (Ctrl+/)

Run Trigger Refresh Edit Delete Disable Update Schema Clone Open in mobile Export Feedback

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Logic app designer

Logic app code view

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Quick start guides

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Workflow settings

Authorization

Access keys

Introducing the new portable Logic Apps runtime that supports local development and debugging. Click to learn more.

JSON View

Essentials

Resource group (move) rg-iot-academy

Location North Central US

Subscription (move) Visual Studio Enterprise Subscription

Subscription ID 7451d6d6-9082-46d9-9373-ccd5fcd6673

Definition 1 trigger, 2 actions

Status Enabled

Runs last 24 hours 14 successful, 20 failed

Integration Account ---

Get started Runs history Trigger history Metrics

All Start time earlier than Pick a date Pick a time

Specify the run identifier to open monitor view directly

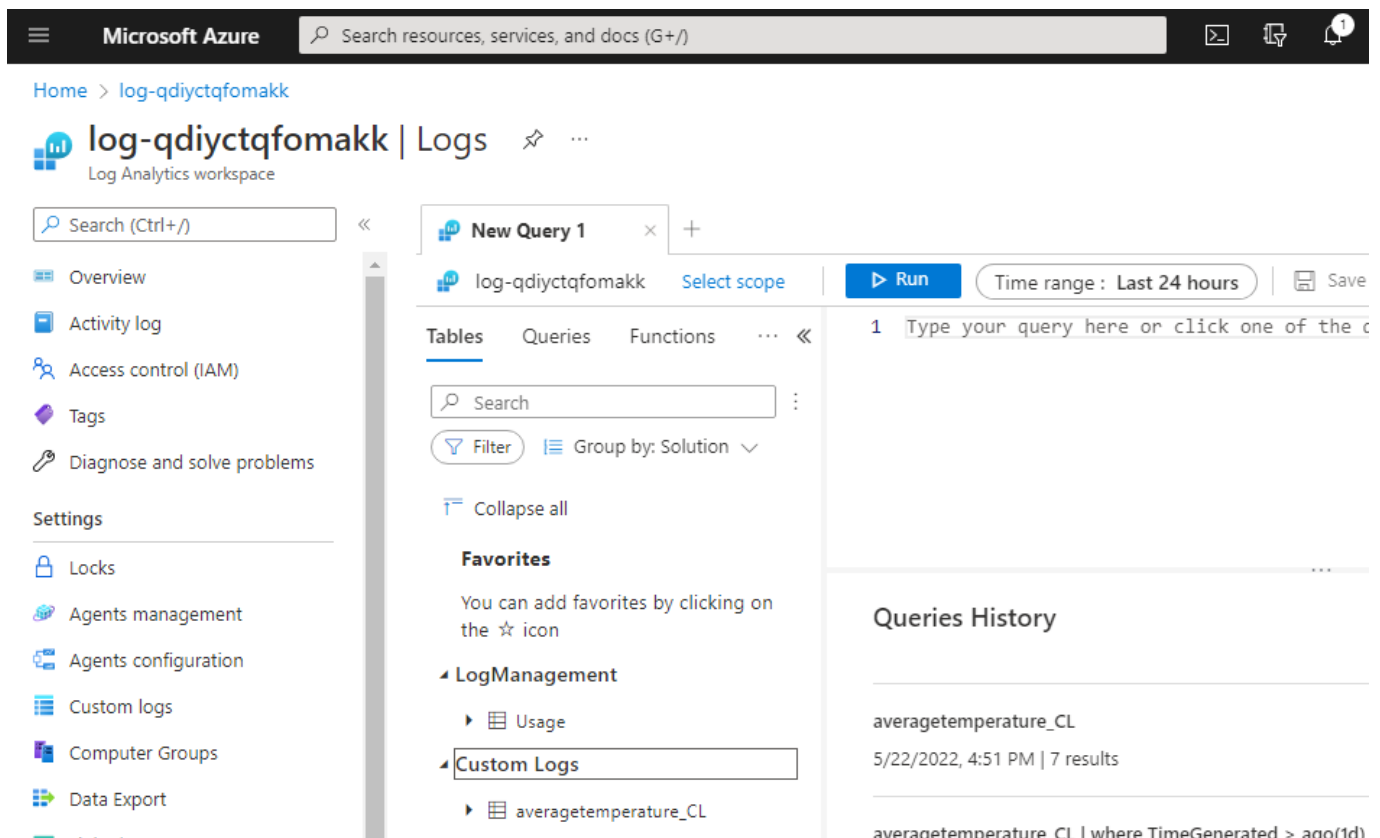
| Status | Start time | Identifier | Duration | Static Results |
|-----------|--------------------|-----------------------------------|------------------|----------------|
| Succeeded | 5/22/2022, 5:10 PM | 08585483530835048457500391280CU27 | 2.03 Seconds | |
| Succeeded | 5/22/2022, 5:09 PM | 08585483531446241858276429890CU11 | 739 Milliseconds | |
| Succeeded | 5/22/2022, 5:08 PM | 08585483532051679025762596753CU30 | 551 Milliseconds | |

11. 联系: 查看 Log Analytics 数据并设置警报

相关视频: <https://youtu.be/GhwsPXFdy0>

11.1. 查询 Log Analytics 数据

1. 返回到打开 Log Analytics 的浏览器选项卡。如果找不到，请搜索 **iot-**
2. 点击“日志”，并关闭弹出的“查询”窗口。



Microsoft Azure

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log-qdiyctqfomakk | Logs

Log Analytics workspace

Search (Ctrl+/)

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Locks

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Agents configuration

Custom logs

Computer Groups

Data Export

New Query 1

log-qdiyctqfomakk Select scope Run Time range: Last 24 hours Save

Tables Queries Functions

Search

Filter Group by: Solution

Collapse all

Favorites

You can add favorites by clicking on the ☆ icon

LogManagement

Usage

Custom Logs

averagetemperature_CL

Queries History

averagetemperature_CL

5/22/2022, 4:51 PM | 7 results

averagetemperature CL | where TimeGenerated > ago(1d)

3. 确保您看到 `averagetemperature_CL` 表。如果没有，可能需要一些时间才能显示

4. 将`averagetemperature_CL`粘贴到查询窗口中，然后点击 [运行按钮](#)

The screenshot shows the Azure Monitor Logs interface. On the left, the 'LogManagement' section is expanded, showing 'Custom Logs' with 'averagetemperature_CL' selected. The main area displays a query window with the text 'averagetemperature_CL' and a 'Run' button. Below the query window, the 'Results' tab is active, showing a table with the following data:

| TimeGenerated [UTC] | WindowEnd_t [UTC] | AverageTemperature_s |
|-----------------------------|---------------------------|----------------------|
| > 5/22/2022, 8:51:01.317 PM | 5/22/2022, 8:51:00.000 PM | 21.1041244077981 |
| > 5/22/2022, 9:01:06.106 PM | 5/22/2022, 9:01:00.000 PM | 21.0509246656781 |
| > 5/22/2022, 9:13:00.911 PM | 5/22/2022, 9:13:00.000 PM | 21.1051254380829 |
| > 5/22/2022, 9:15:04.803 PM | 5/22/2022, 9:15:00.000 PM | 21.012134579404 |
| > 5/22/2022, 9:18:02.530 PM | 5/22/2022, 9:18:00.000 PM | 21.0730604355486 |

5. 一旦你看到日志移动到下一部分

11.2. 创建 Azure Monitor 警报

1. 在右上角单击 [新建警报规则](#) - [New alert rule](#)

The screenshot shows the Azure Monitor Logs interface with the 'New alert rule' button visible in the top right corner. The query window still contains 'averagetemperature_CL'. The 'Results' tab is active, showing the same data as before, but with an additional 'Type' column:

| TimeGenerated [UTC] | WindowEnd_t [UTC] | AverageTemperature_s | Type |
|-----------------------------|---------------------------|----------------------|--------------------|
| > 5/22/2022, 8:51:01.317 PM | 5/22/2022, 8:51:00.000 PM | 21.1041244077981 | averagetemperature |
| > 5/22/2022, 9:01:06.106 PM | 5/22/2022, 9:01:00.000 PM | 21.0509246656781 | averagetemperature |

2. 现在在“条件 - Conditions”选项卡上。输入以下内容

- 搜索查询 - Search Query: `averagetemperature_CL`
- 测量 - Measure: `Table Rows`
- 聚合类型 - Aggregation Type: `Count`

- 聚合粒度 - Aggregation Granularity: 5 minutes
- 算子 - Operator: Greater than
- 阈值 - Threshold Value: 2
- 评估频率 - Frequency of Evaluation: 5 minutes

3. 单击“下一步 - Next”。查看“操作”选项卡。您可以在此处配置要发送的电子邮件或短信。

4. 单击下一步：详细信息 - Next: Details

5. 输入名称：alert-averagetemperature

6. 将严重性更改为：Warning

7. 地区：默认或您的地区

8. 保留结果默认值，确保已启用

Scope Condition Actions **Details** Tags Review + create

Project details

Select the subscription and resource group in which to save the alert rule.

Subscription * ⓘ

Visual Studio Enterprise Subscription

Resource group * ⓘ

rg-iot-academy

[Create new](#)

Alert rule details

Severity * ⓘ

2 - Warning

Alert rule name * ⓘ

alert-averagetemperature

Alert rule description ⓘ

Region * ⓘ

North Central US

^ Advanced options

Enable upon creation ⓘ

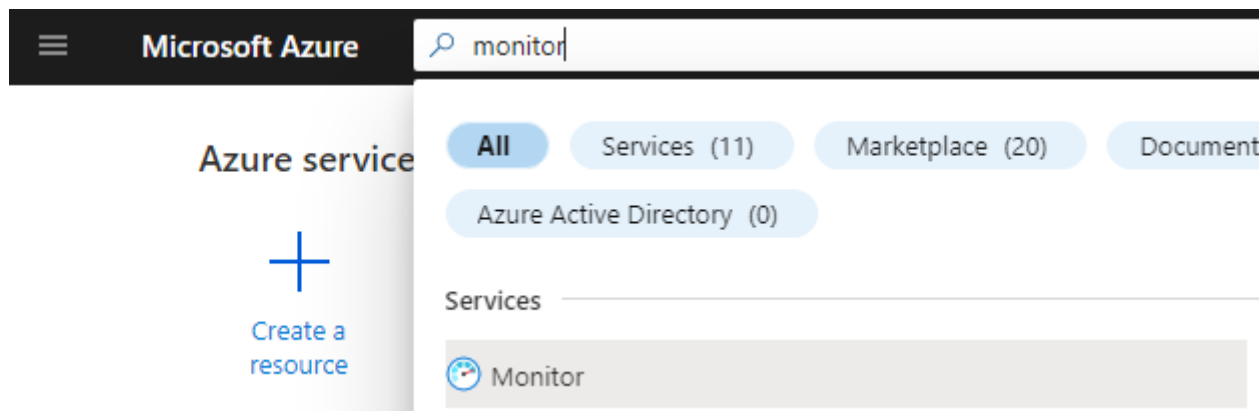


9. 单击“查看和创建 - Review and Create”

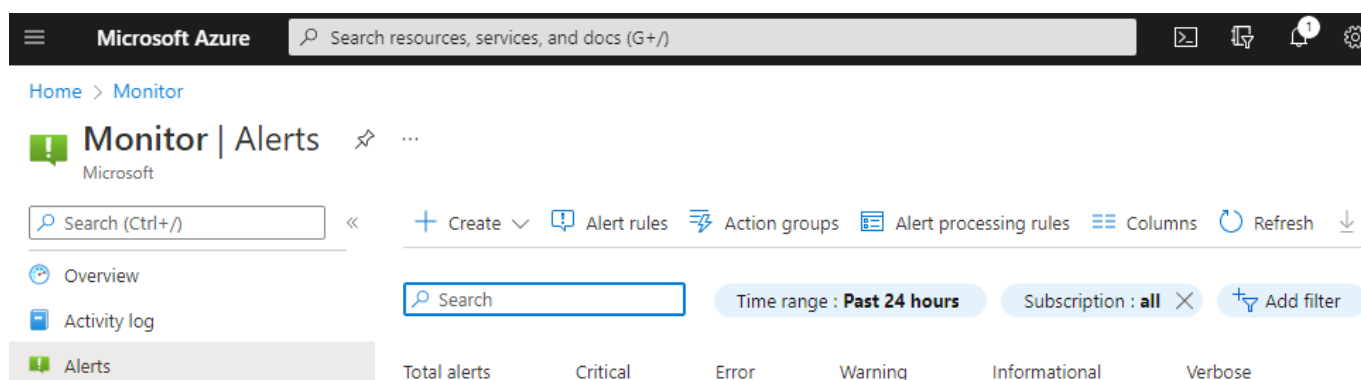
10. 单击创建 - Create

11.3. 在 Azure Monitor 中查看警报

1. 打开一个新的浏览器选项卡到 <https://portal.azure.com> 并搜索 Monitor。单击监控 - Monitor。



2. 选择“警报”。查看警报页面

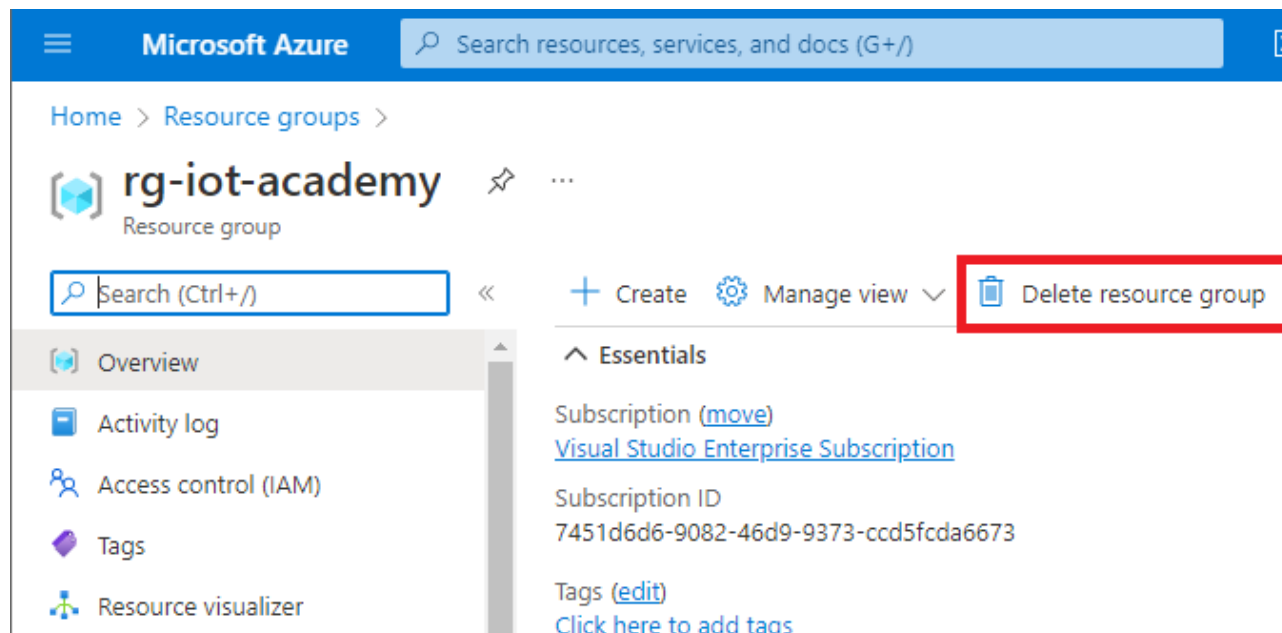


1. 等待一段时间后，根据发送的数据触发警报。需要使用“刷新”按钮来查看新警报的到达。

12. 清空资源

不要在下一次 Azure IoT Academy 动手实验之前超额使用 Azure 资源，

1. 导航到 Azure 门户主页
2. 选择 资源组 - Resource groups*
3. 选择 rg-iot-academy
4. 点击 删除资源组 - rg-iot-academy



5. 键入您的资源组的名称，然后单击 删除 - Delete

