

Connect your Azure Web Page to Raspberry Pi:

Follow these steps:

Step 1:

Install Git, Node.js, and NPM

Use the keyboard shortcut `Ctrl + Alt + T` to open a terminal and run the following commands:

```
sudo apt-get update

curl -sL https://deb.nodesource.com/setup_6.x | sudo -E bash -

sudo apt-get install -y nodejs

sudo apt-get install git
```

Step 2:

Install additional Node.js development tools

You use [gulp.js](#) to automate the deployment of the sample application to Pi. You also use the [device-discovery-cli](#) to retrieve network information about your IoT devices.

Install `gulp` and `device-discovery-cli` by running the following command in the terminal:

```
sudo npm install -g device-discovery-cli gulp
```

Step 3: Install Visual Studio Code: <https://code.visualstudio.com/docs/setup/linux>

Step 4: Install the Azure CLI

The Azure CLI provides a multiplatform command-line experience for Azure. You work directly from your command-line to provision and manage resources.

To install the Azure CLI, follow these steps:

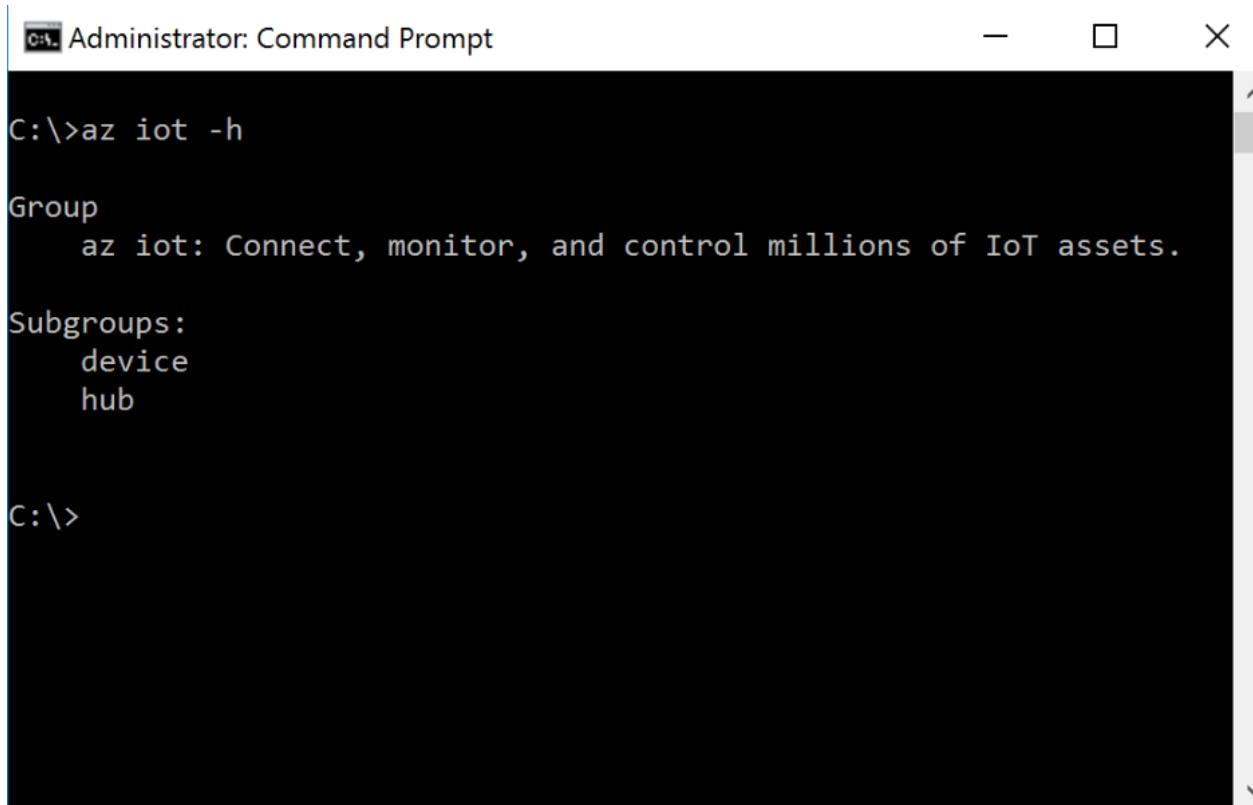
1. Open a Command Prompt window as an administrator.
2. Run the following commands:

```
pip install --upgrade azure-cli  
  
pip install --upgrade azure-cli-iot
```

3. Verify the installation by running the following command:

```
az iot -h
```

Output:



```
Administrator: Command Prompt  
C:\>az iot -h  
  
Group  
    az iot: Connect, monitor, and control millions of IoT assets.  
  
Subgroups:  
    device  
    hub  
  
C:\>
```

Step 5: Login to Azure account using:
`az login`

Output:

To sign in, use a web browser to open the page <https://aka.ms/devicelogin> and enter the code BURE2YALL to authenticate.

```
[
  {
    "cloudName": "AzureCloud",
    "id": "6e44c176-7aaa-4b78-ba41-1f1230c87a76",
    "isDefault": true,
    "name": "Free Trial",
    "state": "Enabled",
    "tenantId": "8d281d1d-9c4d-4bf7-b16e-032d15de9f6c",
    "user": {
      "name": "axm159230@utdallas.edu",
      "type": "user"
    }
  }
]
```

Step 6:

```
az account set --subscription Free Trial
```

Output:

```
az group create --name iot-sample --location westus
```

```
{
  "id": "/subscriptions/6e44c176-7aaa-4b78-ba41-1f1230c87a76/resourceGroups/iot-sample",
  "location": "westus",
  "managedBy": null,
  "name": "iot-sample",
  "properties": {
    "provisioningState": "Succeeded"
  },
  "tags": null
}
```

Step 7:

```
az provider register -n "Microsoft.Devices"

az group create --name iot-sample --location westus
```

```
az iot hub create --name lab3hub --resource-group iot-sample
```

output:

```
{
  "etag": "AAAAAADHJ68=",
  "id": "/subscriptions/6e44c176-7aaa-4b78-ba41-1f1230c87a76/resourceGroups/iot-
sample/providers/Microsoft.Devices/IotHubs/lab3hub",
  "location": "westus",
  "name": "lab3hub",
  "properties": {
    "authorizationPolicies": null,
    "cloudToDevice": {
      "defaultTtlAsIso8601": "1:00:00",
      "feedback": {
        "lockDurationAsIso8601": "0:01:00",
        "maxDeliveryCount": 10,
        "ttlAsIso8601": "1:00:00"
      },
      "maxDeliveryCount": 10
    },
    "comments": null,
    "enableFileUploadNotifications": false,
    "eventHubEndpoints": {
      "events": {
        "endpoint": "sb://ihsuprodbyres035dednamespace.servicebus.windows.net/",
        "partitionCount": 2,
        "partitionIds": [
          "0",
          "1"
        ],
        "path": "iothub-ehub-lab3hub-134187-2c5940e467",
        "retentionTimeInDays": 1
      },
      "operationsMonitoringEvents": {
        "endpoint": "sb://ihsuprodbyres059dednamespace.servicebus.windows.net/",
        "partitionCount": 2,
        "partitionIds": [
          "0",
          "1"
        ],
        "path": "iothub-ehub-lab3hub-134187-fc22159e86",
        "retentionTimeInDays": 1
      }
    },
    "features": "None",
  }
}
```

```
"hostname": "lab3hub.azure-devices.net",
"ipFilterRules": [],
"messagingEndpoints": {
  "fileNotifications": {
    "lockDurationAsIso8601": "0:01:00",
    "maxDeliveryCount": 10,
    "ttlAsIso8601": "1:00:00"
  }
},
"operationsMonitoringProperties": {
  "events": {
    "C2DCommands": "None",
    "Connections": "None",
    "DeviceIdentityOperations": "None",
    "DeviceTelemetry": "None",
    "FileUploadOperations": "None",
    "None": "None",
    "Routes": "None"
  }
},
"provisioningState": "Succeeded",
"storageEndpoints": {
  "$default": {
    "connectionString": "",
    "containerName": "",
    "sasTtlAsIso8601": "1:00:00"
  }
}
},
"resourceGroup": "iot-sample",
"resourcegroup": "iot-sample",
"sku": {
  "capacity": 1,
  "name": "F1",
  "tier": "Free"
},
"subscriptionid": "6e44c176-7aaa-4b78-ba41-1f1230c87a76",
"tags": {},
"type": "Microsoft.Devices/IotHubs"
}
```

Step 8:

```
az iot device create --device-id myraspberrypi --hub lab3hub --resource-group iot-sample
```

```
{
  "authentication": {
    "symmetricKey": {
      "primaryKey": "HdJqvDJ3CLkj2iYJWSwe9ewevNLMH19hWTRcfOXgigk=",
      "secondaryKey": "BzAFLojq+3Giu4g2vyJnTozPSr+wR9OwOgQCwVeD+8Y="
    },
    "x509Thumbprint": {
      "primaryThumbprint": null,
      "secondaryThumbprint": null
    }
  },
  "cloudToDeviceMessageCount": 0,
  "connectionState": "Disconnected",
  "connectionStateUpdateTime": "0001-01-01T00:00:00",
  "deviceId": "myraspberrypi",
  "etag": "MA==",
  "generationId": "636260695923808096",
  "lastActivityTime": "0001-01-01T00:00:00",
  "status": "enabled",
  "statusReason": null,
  "statusUpdateTime": "0001-01-01T00:00:00"
}
```

Step 9:

```
az group deployment create --template-file arm-template.json --parameters @arm-template-param.json -g iot-sample
```

C:\Users\lganisha\iot-hub-c-raspberrypi-getting-started\Lesson3>az group deployment create --template-file arm-template.json --parameters @arm-template-param.json -g iot-sample

output:

```
{
  "id": "/subscriptions/6e44c176-7aaa-4b78-ba41-1f1230c87a76/resourceGroups/iot-sample/providers/Microsoft.Resources/deployments/arm-template",
  "name": "arm-template",
}
```

```
"properties": {
  "correlationId": "6726ae1a-6689-4f8d-a216-1b9e84a3f30d",
  "debugSetting": null,
  "dependencies": [
    {
      "dependsOn": [
        {
          "id": "/subscriptions/6e44c176-7aaa-4b78-ba41-1f1230c87a76/resourceGroups/iot-sample/providers/Microsoft.Storage/storageAccounts/lab3astorageIdl7jiorqkzk",
          "resourceGroup": "iot-sample",
          "resourceName": "lab3astorageIdl7jiorqkzk",
          "resourceType": "Microsoft.Storage/storageAccounts"
        }
      ],
      "id": "/subscriptions/6e44c176-7aaa-4b78-ba41-1f1230c87a76/resourceGroups/iot-sample/providers/Microsoft.Web/sites/lab3afuncIdl7jiorqkzkk",
      "resourceGroup": "iot-sample",
      "resourceName": "lab3afuncIdl7jiorqkzkk",
      "resourceType": "Microsoft.Web/sites"
    },
    {
      "dependsOn": [
        {
          "id": "/subscriptions/6e44c176-7aaa-4b78-ba41-1f1230c87a76/resourceGroups/iot-sample/providers/Microsoft.Web/sites/lab3afuncIdl7jiorqkzkk",
          "resourceGroup": "iot-sample",
          "resourceName": "lab3afuncIdl7jiorqkzkk",
          "resourceType": "Microsoft.Web/sites"
        }
      ],
      "id": "/subscriptions/6e44c176-7aaa-4b78-ba41-1f1230c87a76/resourceGroups/iot-sample/providers/Microsoft.Storage/storageAccounts/lab3astorageIdl7jiorqkzk",
      "resourceGroup": "iot-sample",
      "resourceName": "lab3astorageIdl7jiorqkzk",
      "resourceType": "Microsoft.Storage/storageAccounts"
    },
    {
      "id": "/subscriptions/6e44c176-7aaa-4b78-ba41-1f1230c87a76/resourceGroups/iot-sample/providers/Microsoft.Storage/storageAccounts/lab3astorageIdl7jiorqkzk",
      "resourceGroup": "iot-sample",
      "resourceName": "lab3astorageIdl7jiorqkzk",
      "resourceType": "Microsoft.Storage/storageAccounts"
    }
  ]
}
```

```
    "id": "/subscriptions/6e44c176-7aaa-4b78-ba41-1f1230c87a76/resourceGroups/iot-sample/providers/Microsoft.Devices/Iothubs/lab3hub",
    "resourceGroup": "iot-sample",
    "resourceName": "lab3hub",
    "resourceType": "Microsoft.Devices/Iothubs"
  },
  {
    "id": "/subscriptions/6e44c176-7aaa-4b78-ba41-1f1230c87a76/resourceGroups/iot-sample/providers/Microsoft.Devices/Iothubs/lab3hub/Iothubkeys/iothubowner",
    "resourceGroup": "iot-sample",
    "resourceName": "lab3hub/iothubowner",
    "resourceType": "Microsoft.Devices/Iothubs/Iothubkeys"
  }
],
  "id": "/subscriptions/6e44c176-7aaa-4b78-ba41-1f1230c87a76/resourceGroups/iot-sample/providers/Microsoft.Web/sites/lab3afuncldl7jiorqkzkk/config/appsettings",
  "resourceGroup": "iot-sample",
  "resourceName": "lab3afuncldl7jiorqkzkk/appsettings",
  "resourceType": "Microsoft.Web/sites/config"
},
{
  "dependsOn": [
    {
      "id": "/subscriptions/6e44c176-7aaa-4b78-ba41-1f1230c87a76/resourceGroups/iot-sample/providers/Microsoft.Web/sites/lab3afuncldl7jiorqkzkk",
      "resourceGroup": "iot-sample",
      "resourceName": "lab3afuncldl7jiorqkzkk",
      "resourceType": "Microsoft.Web/sites"
    },
    {
      "id": "/subscriptions/6e44c176-7aaa-4b78-ba41-1f1230c87a76/resourceGroups/iot-sample/providers/Microsoft.Web/Sites/lab3afuncldl7jiorqkzkk/config/appsettings",
      "resourceGroup": "iot-sample",
      "resourceName": "lab3afuncldl7jiorqkzkk/appsettings",
      "resourceType": "Microsoft.Web/Sites/config"
    }
  ],
  "id": "/subscriptions/6e44c176-7aaa-4b78-ba41-1f1230c87a76/resourceGroups/iot-sample/providers/Microsoft.Web/sites/lab3afuncldl7jiorqkzkk/sourcecontrols/web",
  "resourceGroup": "iot-sample",
  "resourceName": "lab3afuncldl7jiorqkzkk/web",
  "resourceType": "Microsoft.Web/sites/sourcecontrols"
},
{
```



```

"dependsOn": [
  {
    "id": "/subscriptions/6e44c176-7aaa-4b78-ba41-1f1230c87a76/resourceGroups/iot-sample/providers/Microsoft.Web/sites/lab3afuncldl7jiorqkzkk",
    "resourceGroup": "iot-sample",
    "resourceName": "lab3afuncldl7jiorqkzkk",
    "resourceType": "Microsoft.Web/sites"
  },
  {
    "id": "/subscriptions/6e44c176-7aaa-4b78-ba41-1f1230c87a76/resourceGroups/iot-sample/providers/Microsoft.Web/Sites/lab3afuncldl7jiorqkzkk/config/appsettings",
    "resourceGroup": "iot-sample",
    "resourceName": "lab3afuncldl7jiorqkzkk/appsettings",
    "resourceType": "Microsoft.Web/Sites/config"
  },
  {
    "id": "/subscriptions/6e44c176-7aaa-4b78-ba41-1f1230c87a76/resourceGroups/iot-sample/providers/Microsoft.Web/Sites/lab3afuncldl7jiorqkzkk/sourcecontrols/web",
    "resourceGroup": "iot-sample",
    "resourceName": "lab3afuncldl7jiorqkzkk/web",
    "resourceType": "Microsoft.Web/Sites/sourcecontrols"
  },
  {
    "id": "/subscriptions/6e44c176-7aaa-4b78-ba41-1f1230c87a76/resourceGroups/iot-sample/providers/Microsoft.Devices/Iothubs/lab3hub",
    "resourceGroup": "iot-sample",
    "resourceName": "lab3hub",
    "resourceType": "Microsoft.Devices/Iothubs"
  }
],
"id": "/subscriptions/6e44c176-7aaa-4b78-ba41-1f1230c87a76/resourceGroups/iot-sample/providers/Microsoft.Web/sites/lab3afuncldl7jiorqkzkk/functions/ReceiveDeviceMessages",
"resourceGroup": "iot-sample",
"resourceName": "lab3afuncldl7jiorqkzkk/ReceiveDeviceMessages",
"resourceType": "Microsoft.Web/sites/functions"
}
],
"mode": "Incremental",
"outputs": {},
"parameters": {
  "consumerGroupName": {
    "type": "String",
    "value": "cg1"
  }
},

```

```
"functionSku": {
  "type": "String",
  "value": "Free"
},
"iotHubName": {
  "type": "String",
  "value": "lab3hub"
},
"resourcePrefix": {
  "type": "String",
  "value": "lab3a"
}
},
"parametersLink": null,
"providers": [
{
  "id": null,
  "namespace": "Microsoft.Devices",
  "registrationState": null,
  "resourceTypes": [
    {
      "aliases": null,
      "apiVersions": null,
      "locations": [
        null
      ],
      "properties": null,
      "resourceType": "iotHubs/eventhubEndpoints/ConsumerGroups"
    }
  ]
},
{
  "id": null,
  "namespace": "Microsoft.Storage",
  "registrationState": null,
  "resourceTypes": [
    {
      "aliases": null,
      "apiVersions": null,
      "locations": [
        "westus"
      ],
      "properties": null,
      "resourceType": "storageAccounts"
```

```
}
]
},
{
  "id": null,
  "namespace": "Microsoft.Web",
  "registrationState": null,
  "resourceTypes": [
    {
      "aliases": null,
      "apiVersions": null,
      "locations": [
        "westus"
      ],
      "properties": null,
      "resourceType": "sites"
    },
    {
      "aliases": null,
      "apiVersions": null,
      "locations": [
        null
      ],
      "properties": null,
      "resourceType": "sites/config"
    },
    {
      "aliases": null,
      "apiVersions": null,
      "locations": [
        null
      ],
      "properties": null,
      "resourceType": "sites/sourcecontrols"
    },
    {
      "aliases": null,
      "apiVersions": null,
      "locations": [
        null
      ],
      "properties": null,
      "resourceType": "sites/functions"
    }
  ]
}
```

```

    ]
  }
},
"provisioningState": "Succeeded",
"template": null,
"templateLink": null,
"timestamp": "2017-03-25T22:09:57.666377+00:00"
},
"resourceGroup": "iot-sample"
}

```

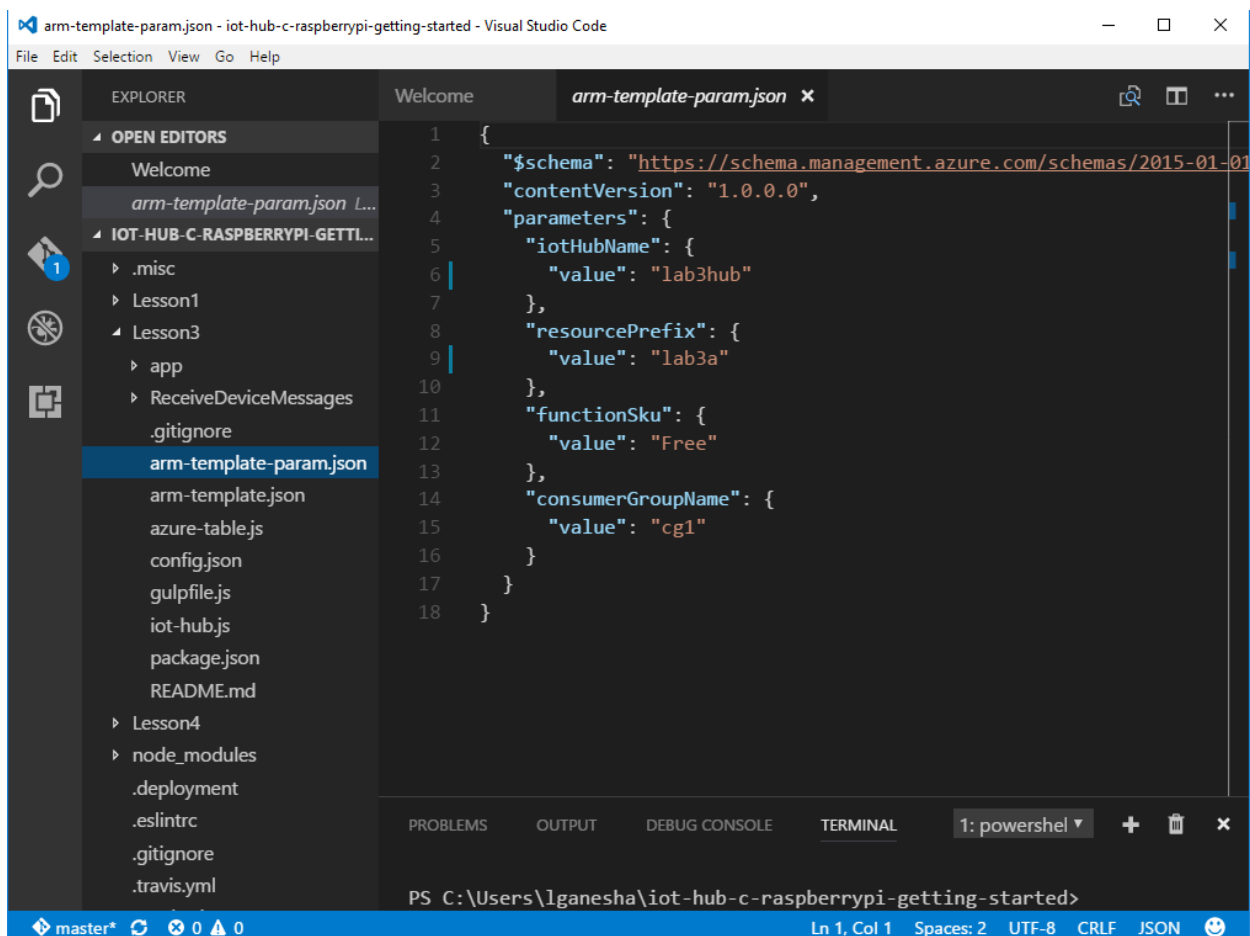
Step 10: Create a sample app to connect to Raspberry pi using Visual Studio Code.

Download the sample app from:

<https://github.com/Azure-Samples/iot-hub-node-raspberrypi-getting-started>

output:

edit arm-template param.json like this:



Step 11:

Get you IoT hub and device connection settings:

- List all your IoT hubs in your resource group by running the following Azure CLI command:

```
az iot hub list -g iot-sample --query [].name
```

- Get the IoT hub connection string by running the following Azure CLI command:

```
az iot hub show-connection-string --name lab3hub-g iot-sample
```

- Get the device connection string by running the following command:

```
az iot device show-connection-string --hub-name {my hub name} --device-id myraspberrypi -g iot-sample
```

Configure the device connection

1. Initialize the configuration file by running the following commands:

```
npm install  
gulp init
```

2. Open the device configuration file `config-raspberrypi.json` in Visual Studio Code by running the following command:

```
``bash
```

For Windows command prompt

```
code %USERPROFILE%.iot-hub-getting-started\config-raspberrypi.json
```

Output:

```
- file './app/package.json' transferred
[18:00:12] Finished 'deploy' after 1.03 min
[18:00:12] Starting 'query-iot-hub-messages'...
[18:00:12] Finished 'query-iot-hub-messages' after 15 ms
[18:00:12] Starting 'send-device-to-cloud-messages'...
[18:00:12] Starting 'run-internal'...
[18:00:12] Finished 'send-device-to-cloud-messages' after 1.61 ms
[18:00:12] Starting 'run'...
[18:00:12] Finished 'run' after 11 µs
[18:00:12] Finished 'default' after 1.07 min
[Device] Client connected

[Device] Sending message #1: {"deviceId":"myraspberrypi","messageId":1}
[IoT Hub] Received message: {"deviceId":"myraspberrypi","messageId":1}

[Device] Sending message #2: {"deviceId":"myraspberrypi","messageId":2}
[IoT Hub] Received message: {"deviceId":"myraspberrypi","messageId":2}

[Device] Sending message #3: {"deviceId":"myraspberrypi","messageId":3}
[IoT Hub] Received message: {"deviceId":"myraspberrypi","messageId":3}

[Device] Sending message #4: {"deviceId":"myraspberrypi","messageId":4}
[IoT Hub] Received message: {"deviceId":"myraspberrypi","messageId":4}

[Device] Sending message #5: {"deviceId":"myraspberrypi","messageId":5}
[IoT Hub] Received message: {"deviceId":"myraspberrypi","messageId":5}

[Device] Sending message #6: {"deviceId":"myraspberrypi","messageId":6}
[IoT Hub] Received message: {"deviceId":"myraspberrypi","messageId":6}
```

Step 12:

Deploy and Run the application:

```
[18:06:55] Using gulpfile ~/Documents/lessons/Lesson4/gulpfile.js
[18:06:55] Starting 'default'...
[18:06:55] Starting 'install-tools'...
[18:06:56] Finished 'install-tools' after 1.31 s
[18:06:56] Starting 'deploy'...
- file './app/app.js' transferred
- file './app/package.json' transferred
[18:07:59] Finished 'deploy' after 1.03 min
[18:07:59] Starting 'run-internal'...
[18:07:59] Starting 'send-cloud-to-device-messages'...
[18:07:59] Finished 'send-cloud-to-device-messages' after 307 ms
[IoT Hub] Client connected

[Device] Client connected

[IoT Hub] Sending message #1: {"command":"blink","messageId":1}
[Device] Received message: {"command":"blink","messageId":1}

[IoT Hub] Sending message #2: {"command":"blink","messageId":2}
[Device] Received message: {"command":"blink","messageId":2}

[IoT Hub] Sending message #3: {"command":"blink","messageId":3}
[Device] Received message: {"command":"blink","messageId":3}

[IoT Hub] Sending message #4: {"command":"blink","messageId":4}
[Device] Received message: {"command":"blink","messageId":4}


```

The client is now connected.