

AZ-220^{Q&As}

Microsoft Azure IoT Developer

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QUESTION 1

DRAG DROP

Your company is creating a new camera security system that will use Azure IoT Hub.

You plan to use an Azure IoT Edge device that will run Ubuntu Server 18.04.

You need to configure the IoT Edge device.

Which three actions should you perform in sequence? To answer, move the appropriate actions from the list of actions to the answer area and arrange them in the correct order.

Select and Place:

Actions

Answer Area

- Create an individual device enrollment by using the Device Provisioning Service.
- Run the following commands.

```
sudo apt-get install moby-engine  
sudo apt-get install moby-cli  
sudo apt-get install iotedge
```
- Add the connection string to the /etc/iotedge/config.yaml file, and then run the following command.

```
sudo systemctl restart iotedge
```
- Install the IoT edge repository for Ubuntu Server 18.04 on the physical device. From IoT Hub, create a new IoT Edge device.
- From IoT Hub, create an IoT Edge device registry entry.



Correct Answer:

Actions

Create an individual device enrollment by using the Device Provisioning Service.

Install the IoT edge repository for Ubuntu Server 18.04 on the physical device. From IoT Hub, create a new IoT Edge device.

Answer Area

Run the following commands.

```
sudo apt-get install moby-engine
sudo apt-get install moby-cli
sudo apt-get install iotedge
```

From IoT Hub, create an IoT Edge device registry entry.

⏪
⏩

Add the connection string to the /etc/iotedge/config.yaml file, and then run the following command.

```
sudo systemctl restart iotedge
```

Step 1: Run the following commands

Install the container runtime.

Azure IoT Edge relies on an OCI-compatible container runtime. For production scenarios, we recommended that you use the Moby-based engine provided below. The Moby engine is the only container engine officially supported with Azure

IoT Edge. Docker CE/EE container images are compatible with the Moby runtime.

Install the Moby engine.

```
sudo apt-get install moby-engine
```

Install the Moby command-line interface (CLI). The CLI is useful for development but optional for production deployments.

```
sudo apt-get install moby-cli
```

Install the security daemon. The package is installed at /etc/iotedge/.

```
sudo apt-get install iotedge
```

Step 2: From IoT Hub, create an IoT Edge device registry entry.

Note: In your IoT Hub in the Azure portal, IoT Edge devices are created and managed separately from IoT devices that are not edge enabled.

Sign in to the Azure portal and navigate to your IoT hub.

In the left pane, select IoT Edge from the menu.

Select Add an IoT Edge device.

Provide a descriptive device ID. Use the default settings to auto-generate authentication keys and connect the new device to your hub.

Select Save.

Retrieve the connection string in the Azure portal

1.

When you're ready to set up your device, you need the connection string that links your physical device with its identity in the IoT hub.

2.

From the IoT Edge page in the portal, click on the device ID from the list of IoT Edge devices.

3.

Copy the value of either Primary Connection String or Secondary Connection String.

Step 3: Add the connection string to..

To manually provision a device, you need to provide it with a device connection string that you can create by registering a new device in your IoT hub.

Open the configuration file.

```
sudo nano /etc/iotedge/config.yaml
```

Find the provisioning configurations of the file and uncomment the Manual provisioning configuration section. Update the value of `device_connection_string` with the connection string from your IoT Edge device.

Save and close the file.

After entering the provisioning information in the configuration file, restart the daemon:

```
sudo systemctl restart iotedge
```

Reference: <https://docs.microsoft.com/en-us/azure/iot-edge/how-to-install-iot-edge-linux>

QUESTION 2

You have an Azure IoT solution that includes an Azure IoT hub, a Device Provisioning Service instance, and 1,000 connected IoT devices.

All the IoT devices are provisioned automatically by using one enrollment group.

You need to temporarily disable the IoT devices from the connecting to the IoT hub.

Solution: You delete the enrollment group from the Device Provisioning Service.

Does the solution meet the goal?

A. Yes

B. No

Correct Answer: B

Instead, from the Device Provisioning Service, you disable the enrollment group, and you disable device entries in the identity registry of the IoT hub to which the IoT devices are provisioned.

Reference: <https://docs.microsoft.com/bs-latn-ba/azure/iot-dps/how-to-unprovision-devices>

QUESTION 3

DRAG DROP

You have an Azure IoT hub.

You plan to attach three types of IoT devices as shown in the following table.

Name	Specification	Note
Transparent Field Gateway Device	High-power device with a fast processor and 4 GB of RAM	Will connect to multiple devices, each with its own credentials, by using the same TLS connection.
Low Resource Device	Low resource specifications, battery-operated, and 512 KB of RAM	Will connect directly to an IoT hub and will NOT connect to any other devices. Will use cloud-to-device messages.
Limited Sensor Device	Extremely low-power device with a limited microcontroller (MCU) and 256 KB of RAM	Will NOT support the Azure SDK. Messages must be as small as possible.

You need to select the appropriate communication protocol for each device.

What should you select? To answer, drag the appropriate protocols to the correct devices. Each protocol may be used once, more than once, or not at all. You may need to drag the split bar between panes or scroll to view content.

NOTE: Each correct selection is worth one point.

Select and Place:

Protocols

AMQP

HTTPS

MQTT

Answer Area

Device	Protocol
Transparent Field Gateway Device:	Protocol
Low Resource Device:	Protocol
Limited Sensor Device:	Protocol

Correct Answer:

Protocols

Answer Area

Device	Protocol
Transparent Field Gateway Device:	AMQP
Low Resource Device:	MQTT
Limited Sensor Device:	HTTPS

QUESTION 4

You have an Azure subscription that contains the resources shown in the following table.

Name	Type
Hub1	Azure IoT Hub
DPS1	Azure IoT Hub Device Provisioning service (DPS)
CA1	Certification authority (CA)

You create a group enrollment in DPS1 and enroll 100 IoT devices. Each device is issued a leaf certificate from CAT.

You need to deprovision a single IoT device from the group enrollment.

The solution must not affect the other devices.

Solution: You delete the device entry from the device registry of Hub1.

Does this meet the goal?

A. Yes

B. No

Correct Answer: B

QUESTION 5

You have three Azure IoT hubs named Hub1, Hub2, and Hub3, a Device Provisioning Service instance, and an IoT device named Device1.

Each IoT hub is deployed to a separate Azure region.

Device enrollment uses the Lowest latency allocation policy.

The Device Provisioning Service uses the Lowest latency allocation policy.

Device1 is auto-provisioned to Hub1 by using the Device Provisioning Service.

Device1 regularly moves between regions.

You need to ensure that Device1 always connects to the IoT hub that has the lowest latency.

What should you do?

A. Configure device attestation that uses X.509 certificates.

B. Implement device certificate rolling.

C. Disenroll and reenroll Device1.

D. Configure the re-provisioning policy.

Correct Answer: D

Automated re-provisioning support.

Microsoft added first-class support for device re-provisioning which allows devices to be reassigned to a different IoT solution sometime after the initial solution assignment. Re-provisioning support is available in two options:

Factory reset, in which the device twin data for the new IoT hub is populated from the enrollment list instead of the old IoT hub. This is common for factory reset scenarios as well as leased device scenarios.

Migration, in which device twin data is moved from the old IoT hub to the new IoT hub. This is common for scenarios in which a device is moving between geographies.

Reference:

<https://azure.microsoft.com/en-us/blog/new-year-newly-available-iot-hub-device-provisioning-service-features/>

QUESTION 6

You have an Azure IoT solution that contains an Azure IoT hub and the Azure IoT Edge gateways shown in the following table.

Name	Gateway pattern
Gateway1	Transparent
Gateway2	Protocol translation

You have the leaf devices shown in the following table.

Name	Asset ID	Gateway ID	Device ID	Message body
Device1	Asset1	Gateway1	Device1	Asset ID, temperature
Device2	Null	Gateway1	Device2	Temperature
Device3	Asset3	Gateway2	Null	Asset ID, temperature
Device4	Asset4	Gateway2	Null	Asset ID, temperature

The IoT hub receives the messages shown in the following table.

From device	Message
Device1	<pre>{ "DeviceId": "Device1", "GatewayId": "Gateway1", "Payload": { "AssetId": "Asset1", "Temperature": "72", } }</pre>
Device2	<pre>{ "DeviceId": "Device2", "GatewayId": "Gateway1", "Payload": { "AssetId": null, "Temperature": "36", } }</pre>
Device3	<pre>{ "DeviceId": "Gateway2", "GatewayId": "Gateway2", "Payload": { "AssetId": "Asset2", "Temperature": "48", } }</pre>
Device4	<pre>{ "DeviceId": "Gateway2", "GatewayId": "Gateway2", "Payload": { "AssetId": "Asset4", "Temperature": "54", } }</pre>

You plan to a deploy a new Azure Time Series Insight environment.

You need to recommend a Time Series ID property name to ensure that the telemetry of each device will be stored in a separate time series instance.

What should you recommend?

- A. Device ID
- B. Device ID and Asset ID
- C. Device ID and Gateway ID
- D. Device ID. Asset ID, and Temperature

Correct Answer: C

QUESTION 7

DRAG DROP

You have an Azure IoT Central application.

You need to connect IoT devices that use SAS tokens to the application without first registering the devices.

In which order should you perform the actions? To answer, move all actions from the list of actions to the answer area and arrange them in the correct order.

Select and Place:

Actions

Generate device SAS keys.

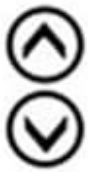
Obtain the group primary key.

Flash unique credentials to the devices.

Associate the devices to a template and approve the connections.

Connect the devices to IoT Central.

Answer Area



Correct Answer:

Actions

Answer Area

	Obtain the group primary key.	
	Generate device SAS keys.	
⏪	Flash unique credentials to the devices.	⏩
⏩	Connect the devices to IoT Central.	⏪
	Associate the devices to a template and approve the connections.	

QUESTION 8

You are configuring a production environment for an Azure IoT solution.

You plan to deploy 1,000 IoT devices. Each device will send one device-to-cloud message every hour. Each message will be 4 KB.

You need to deploy an Azure IoT hub that will support the IoT device deployment. The solution must meet the following requirements:

Perform bulk device operations such as creating multiple device identities.

Minimize costs

What should you deploy?

- A. one unit of the B1 tier
- B. one unit of the free tier
- C. one unit of the S1 tier
- D. one unit of the S2 tier

Correct Answer: B

Reference: <https://docs.microsoft.com/en-us/azure/iot-hub/iot-hub-devguide-quotas-throttling>

QUESTION 9

HOTSPOT

You have an Azure IoT hub You have four Azure IoT Edge devices and. The device twin code shown in the following table.

Name	Code
Device1	<pre>"tags": { "office": "Seattle-1" },</pre>
Device2	<pre>"tags": { "office": "Seattle-2" },</pre>
Device3	<pre>"tags": { "office": "London" },</pre>
Device4	<pre>"tags": { "office": "LDN" },</pre>

You have three deployments and the deployment code shown in the following table.

Name	Code
Deployment1	<pre>{ "id": "deploysim", "priority": 10, "targetCondition": "tags.office='Seattle-*' ", .. "\$edgeHub": { "properties.desired": { "routes": { "MyModule1": "FROM /messages/modules/ MyModule1/* INTO \$upstream" } } } }</pre>
Deployment2	<pre>{ "id": "deploysim", "priority": 20, "targetCondition": "tags.office='London' ", .. "\$edgeHub": { "properties.desired": { "routes": { "MyModule1": "FROM /messages/modules/ MyModule1/* INTO \$upstream" } } } }</pre>
Deployment3	<pre>{ "id": "deploysim", "priority": 30, "targetCondition": "tags.office='London' OR tags.office='LDN' ", .. "\$edgeHub": { "properties.desired": { "routes": { "MyModule2": "FROM /messages/modules/ MyModule2/* INTO \$upstream" } } } }</pre>

For each of the following statements, select Yes if the statement is true. Otherwise, select No. NOTE: Each correct selection is worth one point.

Hot Area:

Answer Area		
Statements	Yes	No
The IoT hub receives messages from the MyModule1 route of Device2.	<input type="checkbox"/>	<input type="checkbox"/>
The IoT hub receives messages from the MyModule2 route of Device3.	<input type="checkbox"/>	<input type="checkbox"/>
The IoT hub receives messages from the MyModule2 route of Device4.	<input type="checkbox"/>	<input type="checkbox"/>

Correct Answer:

Answer Area		
Statements	Yes	No
The IoT hub receives messages from the MyModule1 route of Device2.	<input checked="" type="checkbox"/>	<input type="checkbox"/>
The IoT hub receives messages from the MyModule2 route of Device3.	<input type="checkbox"/>	<input checked="" type="checkbox"/>
The IoT hub receives messages from the MyModule2 route of Device4.	<input checked="" type="checkbox"/>	<input type="checkbox"/>

QUESTION 10

You plan to develop modules for an Azure IoT Edge solution.

You need to recommend a development tool that supports the following:

1.

Node.js

2.

Module templates

3.

Development on Linux workstations What should you recommend?

- A. the Azure IoT explorer
- B. Microsoft Visual Studio
- C. Microsoft Visual Studio Online
- D. Microsoft Visual Studio Code

Correct Answer: C

Use Visual Studio Code to develop Node.js code and deploy it to a device running Azure IoT Edge.

You can use IoT Edge modules with Linux containers to deploy code that implements your business logic directly to your IoT Edge devices.

Reference:

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

QUESTION 11

You have 10 IoT devices that connect to an Azure IoT hub named Hub1.

From Azure Cloud Shell, you run `az iot hub monitor-events --hub-name Hub1` and receive the following error message: "az iot hub: `monitor-events` is not in the `az iot hub` command group. See `az iot hub --help`."

You need to ensure that you can run the command successfully.

What should you run first?

- A. `az iot hub monitor-feedback --hub-name Hub1`
- B. `az iot hub generate-sas-token --hub-name Hub1`
- C. `az iot hub configuration list --hub-name Hub1`
- D. `az extension add -name azure-cli-iot-ext`

Correct Answer: D

Execute `az extension add --name azure-cli-iot-ext` once and try again.

In order to read the telemetry from your hub by CLI, you have to enable IoT Extension with the following commands:

Add: `az extension add --name azure-cli-iot-ext`

Reference: <https://github.com/MicrosoftDocs/azure-docs/issues/20843>

QUESTION 12

You have 10,000 IoT devices that connect to an Azure IoT hub. The devices do not support over-the-air (OTA) updates.

You need to decommission 1,000 devices. The solution must prevent connections and autoenrollment for the decommissioned devices.

Which two actions should you perform? Each correct answer presents part of the solution.

NOTE: Each correct selection is worth one point.

- A. Update the connectionState device twin property on all the devices.
- B. Blacklist the X.509 root certification authority (CA) certificate for the enrollment group.
- C. Delete the enrollment entry for the devices.
- D. Remove the identity certificate from the hardware security module (HSM) of the devices.
- E. Delete the device identity from the device registry of the IoT hub.

Correct Answer: BC

B: X.509 certificates are typically arranged in a certificate chain of trust. If a certificate at any stage in a chain becomes compromised, trust is broken. The certificate must be blacklisted to prevent Device Provisioning Service from provisioning devices downstream in any chain that contains that certificate.

C: Individual enrollments apply to a single device and can use either X.509 certificates or SAS tokens (in a real or virtual TPM) as the attestation mechanism. (Devices that use SAS tokens as their attestation mechanism can be provisioned only through an individual enrollment.) To blacklist a device that has an individual enrollment, you can either disable or delete its enrollment entry.

To blacklist a device that has an individual enrollment, you can either disable or delete its enrollment entry.

Reference: <https://docs.microsoft.com/en-us/azure/iot-dps/how-to-revoke-device-access-portal>

QUESTION 13

You have an Azure Stream Analytics job that receives input from an Azure IoT hub and sends the outputs to Azure Blob storage. The job has compatibility level 1.1 and six streaming units. You have the following query for the job.

```
SELECT COUNT(*) AS Count, TollBoothID
INTO BlobOutput
FROM IotHubInput
GROUP BY TumblingWindow(minute, 3), TollBoothID
```

You plan to increase the streaming unit count to 12.

You need to optimize the job to take advantage of the additional streaming units and increase the throughput.

Solution: You change the query to the following.

```
WITH Step1 AS (  
SELECT COUNT(*) AS Count, TollBoothID, PartitionID  
FROM IoTHubInput PARTITION BY PartitionID  
GROUP BY TumblingWindow(minute, 3), TollBoothID, PartitionID  
)  
SELECT SUM(Count) AS Count, TollBoothID  
INTO BlobOutput  
FROM Step1  
GROUP BY TumblingWindow(minute, 3), TollBoothID
```

Does this meet the goal?

A. Yes

B. No

Correct Answer: A

Max number of Streaming Units with one step and with no partitions is 6.

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

QUESTION 14

Note: This question is part of a series of questions that present the same scenario. Each question in the series contains a unique solution that might meet the stated goals. Some question sets might have more than one correct solution, while

others might not have a correct solution.

After you answer a question in this question, you will NOT be able to return to it. As a result, these questions will not appear in the review screen.

You have devices that connect to an Azure IoT hub. Each device has a fixed GPS location that includes latitude and longitude.

You discover that a device entry in the identity registry of the IoT hub is missing the GPS location.

You need to configure the GPS location for the device entry. The solution must prevent the changes from being propagated to the physical device.

Solution: You use an Azure policy to apply tags to a resource group.

Does the solution meet the goal?

A. Yes

B. No

Correct Answer: B

Instead add the desired properties to the device twin.

Note: Device Twins are used to synchronize state between an IoT solution's cloud service and its devices. Each device's twin exposes a set of desired properties and reported properties. The cloud service populates the desired properties with values it wishes to send to the device. When a device connects it requests and/or subscribes for its desired properties and acts on them.

Reference: <https://azure.microsoft.com/sv-se/blog/deep-dive-into-azure-iot-hub-notifications-and-device-twin/>

QUESTION 15

You have IoT devices that connect to an Azure IoT hub.

From IoT Hub, you create an Event subscription to be notified when devices are registered to IoT Hub. You select webhook endpoint as a handler for the Event subscription.

Which two types of Event Grid messages will be received by the webhook? Each correct answer presents a complete solution.

NOTE: Each correct selection is worth one point.

- A. Microsoft.Devices.DeviceCreated
- B. Microsoft.Resources.ResourceWriteSuccess
- C. Microsoft.EventGrid.SubscriptionValidationEvent
- D. Microsoft.Devices.DeviceConnected

Correct Answer: AC

Microsoft.Devices.DeviceCreated: Published when a device is registered to an IoT hub.

The first thing you want to do is handle Microsoft.EventGrid.SubscriptionValidationEvent events. Every time someone subscribes to an event, Event Grid sends a validation event to the endpoint with a validationCode in the data payload.

Reference: <https://docs.microsoft.com/en-us/azure/iot-hub/iot-hub-event-grid> <https://docs.microsoft.com/en-us/azure/event-grid/receive-events>

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