AZ-220$^{Q\&As}$

Microsoft Azure IoT Developer

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QUESTION 1

You have 1,000 devices that connect to an Azure IoT hub.

You are performing a scheduled check of deployed IoT devices.

You plan to run the following command from the Azure CLI prompt.

az iot hub query --hub-name hub1 --query-command "SELECT * FROM devices WHERE connectionState = \\'Disconnected\\'"

What does the command return?

A. the Device Disconnected events

B. the device twins

C. the Connections logs

D. the device credentials

Correct Answer: A

The IoT Hub publishes the Microsoft.Devices.DeviceDisconnected event type, which is published when a device is disconnected from an IoT hub.

Reference: https://docs.microsoft.com/en-us/azure/iot-hub/iot-hub-event-grid#event-types

QUESTION 2

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 3

You have 1,000 devices that connect to a standard tier Azure IoT hub.

All the devices are commissioned and send telemetry events to the built-in IoT Hub endpoint.

You configure message enrichment on the events endpoint and set the enrichment value to $twin.tags.ipV4.

When you inspect messages on the events endpoint, you discover that all the messages are stamped with a string of "$twin.tags.ipV4".

What are two possible causes of the issue? Each correct answer presents a complete solution.

NOTE: Each correct selection is worth one point.

A. The ipV4 tag is a restricted twin property that is unavailable for message enrichment.

B. A standard tier IoT hub does not support device twin properties in message enrichments.

C. The device sending the message has no device twin.

D. Message enrichment cannot be added to messages going to a built-in endpoint.

E. The device twin path used for the value of the enrichment does not exist.

F. The device twin property value used for message enrichment is set to "$twin.tags.ipV4".

Correct Answer: CE

In some cases, if you are applying an enrichment with a value set to a tag or property in the device twin, the value will be stamped as a string value. For example, if an enrichment value is set to $twin.tags.field, the messages will be stamped with the string "$twin.tags.field" rather than the value of that field from the twin. This happens in the following cases:

(C)

Your IoT Hub is in the standard tier, but the device sending the message has no device twin.

(E)

Your IoT Hub is in the standard tier, but the device twin path used for the value of the enrichment does not exist. For example, if the enrichment value is set to $twin.tags.location, and the device twin does not have a location property under

tags, the message is stamped with the string "$twin.tags.location".

Your IoT Hub is in the basic tier. Basic tier IoT hubs do not support device twins.

Reference:

https://docs.microsoft.com/en-us/azure/iot-hub/iot-hub-message-enrichments-overview

QUESTION 4

You have an Azure Stream Analytics job that connects to an Azure IoT hub named Hub1445 as a streaming data source. Hub1445 is configured as shown in the exhibit.

The Stream Analytics job fails to receive any messages from the IoT hub. What should you do to resolve the issue?

A. Change the Route1 route query to true.

B. Enable the Route3 route.

C. Disable the Route2 route.

D. Enable the fallback route.

Correct Answer: A

The device telemetry is usually passed as JSON from the device through the IoT Hub - this is handled nicely by Azure Streaming Analytics queries. The IoT Hub message routing should be configured as follows:

Data source: Device Telemetry Messages

Routing query: true (as the routing query is an expression that evaluates to true or false for each received message, the simplest way to send all messages to the endpoint is to just supply true as the query).

Reference:

https://darenmay.com/blog/azure-iot-streaming-analytics-data-lake-analytics-and-json/

QUESTION 5

You have an Azure IoT Central application.

You add an IoT device named Oven1 to the application. Oven1 uses an IoT Central template for industrial ovens.

You need to send an email to the managers group at your company as soon as the oven temperature falls below 400 degrees.

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

NOTE: Each correct selection is worth one point.

A. Create a SendGrid account in the same resource group as the IoT Central application.

B. Add a condition that has Time Aggregation set to Off.

C. Add a condition that has Aggregation set to Minimum.

D. Add the Manager role to the IoT Central application.

E. From IoT Central, create a telemetry rule for the template.

Correct Answer: BE

Devices use telemetry to send numerical data from the device. A rule triggers when the selected telemetry crosses a specified threshold.

E: To create a telemetry rule, the device template must include at least one telemetry value. The rule monitors the temperature reported by the device and sends an email when it falls below 400 degrees.

B: Configure the rule conditions.

Conditions define the criteria that the rule monitors. In this tutorial, you configure the rule to fire when the temperature exceeds 70?F.

1.

 Select Temperature in the Telemetry dropdown.

2.

 Next, choose Is less than as the Operator and enter 400 as the Value.

3.

 Optionally, you can set a Time aggregation. When you select a time aggregation, you must also select an aggregation type, such as average or sum from the aggregation drop-down.

Without aggregation, the rule triggers for each telemetry data point that meets the condition.

With aggregation, the rule triggers if the aggregate value of the telemetry data points in the time window meets the condition.

Reference: https://docs.microsoft.com/en-us/azure/iot-central/core/tutorial-create-telemetry-rules
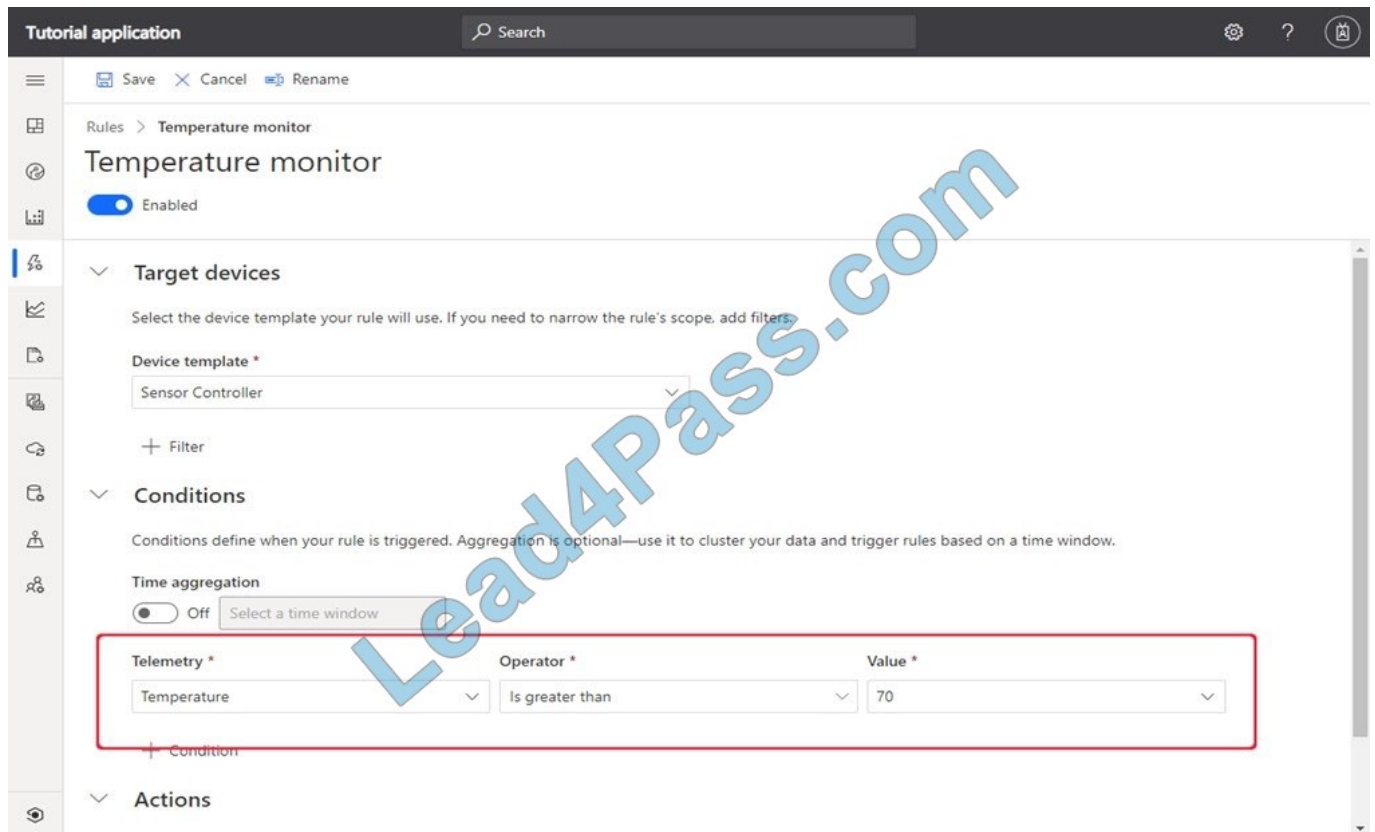
QUESTION 6

HOTSPOT

You are writing code to provision IoT devices by using the Device Provisioning Service.

Which two details from the Overview blade of the Device Provisioning Service are required to provision a new IoT client device? To answer, select the appropriate detail in the answer area.

NOTE: Each correct selection is worth one point.

Hot Area:

Correct Answer:

Box 1: ID Scope

In the Azure portal, select the Overview blade for your Device Provisioning service and copy the ID Scope value. The ID Scope is generated by the service and guarantees uniqueness. It is immutable and used to uniquely identify the

registration IDs.

Box 2: Global device endpoint

The global_prov_uri variable, which allows the IoT Hub client registration API IoTHubClient_LL_CreateFromDeviceAuth to connect with the designated Device Provisioning Service instance.

Example code:

static const char* global_prov_uri = "global.azure-devices-provisioning.net";

static const char* id_scope = "[ID Scope]";

Reference:

https://docs.microsoft.com/en-us/azure/iot-dps/tutorial-set-up-device

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QUESTION 7

You have an Azure IoT hub that has a hostname of contoso-hub.azure-devices.net and an MCU-based IoT device named Device1. Device1 does NOT support Azure IoT SDKs.

You plan to connect Device1 to the IoT hub by using the Message Queuing Telemetry Transport (MQTT) protocol and to authenticate by using X.509 certificates.

You need to ensure that Device1 can authenticate to the IoT hub.

What should you do?

A. Create an Azure key vault and enable the encryption of data at rest for the IoT hub by using a customer-managed key.

B. Enable a hardware security module (HSM) on Device1.

C. From the Azure portal, create an IoT Hub Device Provisioning Service (DPS) instance and add a certificate enrollment for Device1.

D. Add the DigiCert Baltimore Root Certificate to Device1.

Correct Answer: D

The connection to Azure IoT Hub with MQTT is secured using TLS.

The Azure IoT Hub library requires the provisioning of the following certificates and a private key for a successful TLS connection:

1.

 Baltimore CyberTrust Root certificate - Server certificate, used to verify the server\\'s certificate while connecting.

2.

 Device certificate - generated by the procedures described in Creating Azure IoT Hub certificates , used by Azure IoT Hub to authenticate the device.

3.

Private key of the device.

Reference: https://developer.nordicsemi.com/nRF_Connect_SDK/doc/latest/nrf/include/net/azure_iot_hub.html

QUESTION 8

You have an Azure IoT hub that uses a Device Provisioning Service instance.

You have 1,000 legacy IoT devices that only support MAC address or serial number identities. The devices do NOT have a security feature that can be used to securely identify the device or a hardware security module (HSM).

You plan to deploy the devices to a secure environment.

You need to configure the Device Provisioning Service instance to ensure that all the devices are identified securely before they receive updates.

Which attestation mechanism should you choose?

A. Trusted Platform Module (TPM) 1.2 attestation

B. symmetric key attestation

C. X.509 certificates

Correct Answer: B

A common problem with many legacy devices is that they often have an identity that is composed of a single piece of information. This identity information is usually a MAC address or a serial number. Legacy devices may not have a certificate, TPM, or any other security feature that can be used to securely identify the device. The Device Provisioning Service for IoT hub includes symmetric key attestation. Symmetric key attestation can be used to identify a device based off information like the MAC address or a serial number.

Reference: https://docs.microsoft.com/bs-latn-ba/azure/iot-dps/how-to-legacy-device-symm-key

QUESTION 9

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 10

You have an existing Azure IoT hub.

You need to connect physical IoT devices to the IoT hub.

You are connecting the devices through a firewall that allows only port 443 and port 80.

Which three communication protocols can you use? Each correct answer presents a complete solution.

NOTE: Each correct selection is worth one point.

A. MQTT over WebSocket

B. AMQP

C. AMQP over WebSocket

D. MQTT

E. HTTPS

Correct Answer: ACE

MQTT over WebSockets, AMQP over WebSocket, and HTTPS use port 443.

Reference: https://docs.microsoft.com/en-us/azure/iot-hub/iot-hub-devguide-protocols

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QUESTION 11

You are troubleshooting an Azure IoT hub.

You discover that some telemetry messages are dropped before they reach downstream processing.

You suspect that IoT Hub throttling is the root cause.

Which log in the Diagnostics settings of the IoT hub should you use to capture the throttling error events?

A. Routes

B. DeviceTelemetry

C. Connections

D. C2DCommands

Correct Answer: B

The device telemetry category tracks errors that occur at the IoT hub and are related to the telemetry pipeline. This category includes errors that occur when sending telemetry events (such as throttling) and receiving telemetry events (such as unauthorized reader). This category cannot catch errors caused by code running on the device itself.

Note: The metric d2c.telemetry.ingress.sendThrottle is the number of throttling errors due to device throughput throttles.

Reference: https://docs.microsoft.com/en-us/azure/iot-hub/iot-hub-monitor-resource-health

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QUESTION 12

HOTSPOT

You have an Azure IoT Central application that has a custom device template.

You need to configure the device template to support the following activities:

Return the reported power consumption.

Configure the desired fan speed.

Run the device reset routine.

Read the fan serial number.

Which option should you use for each activity? Each correct answer presents part of the solution.

NOTE: Each correct selection is worth one point.

Hot Area:

Answer Area

Return the reported power consumption:

Command
Measurement
Properties
Settings

Configure the desired fan speed:

Command
Measurement
Properties
Settings

Read the fan serial number:

Command
Measurement
Properties
Settings

Run the device reset routine:

Command
Measurement
Properties
Settings

Correct Answer:

Answer Area

Return the reported power consumption:

| ▼ |

| Command |
| Measurement |
| Properties |
| Settings |

Configure the desired fan speed:

| ▼ |

| Command |
| Measurement |
| Properties |
| Settings |

Read the fan serial number:

| ▼ |

| Command |
| Measurement |
| Properties |
| Settings |

Run the device reset routine:

| ▼ |

| Command |
| Measurement |
| Properties |
| Settings |

Box 1: Measurement

Telemetry/measurement is a stream of values sent from the device, typically from a sensor. For example, a sensor might report the ambient temperature.

Box 2: Property

The template can provide a writeable fan speed property

Properties represent point-in-time values. For example, a device can use a property to report the target temperature it\\'s trying to reach. You can set writeable properties from IoT Central.

Box 3: Settings

Box 4: Command

You can call device commands from IoT Central. Commands optionally pass parameters to the device and receive a response from the device. For example, you can call a command to reboot a device in 10 seconds.

Reference:

https://docs.microsoft.com/en-us/azure/iot-central/core/howto-set-up-template

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QUESTION 13

You need to recommend the format of telemetry messages to meet the POV requirements. What should you recommend?

A. XML

B. Avro

C. JSON

Correct Answer: C

Scenario: POV Requirements

Ensure that all message content during this phase is human readable to simplify debugging.

Avro uses a binary format, so it is not human readable.

The more lightweight JSON (Javascript object notation) has become a popular alternative to XML for various reasons. A couple obvious ones are:

Less verbose- XML uses more words than necessary

JSON is faster- Parsing XML software is slow and cumbersome.

Reference: https://blog.cloud-elements.com/json-better-xml

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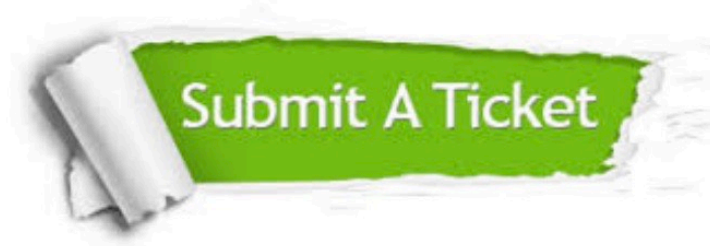Multi-Platform capabilities - Windows, Mac, Android, iPhone, iPod, iPad, Kindle

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