Microsoft

AZ-220

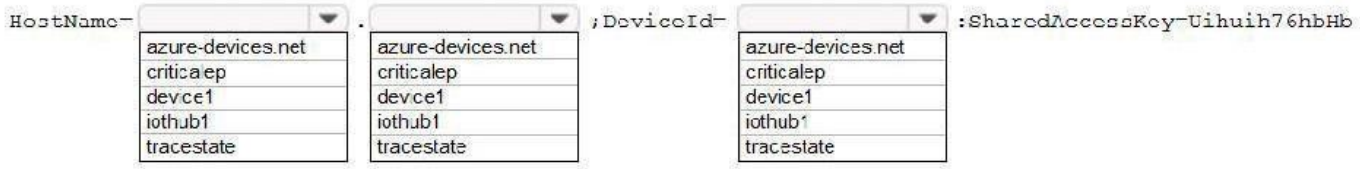
Microsoft Azure IoT Developer

QUESTION & ANSWERS

QUESTION 1

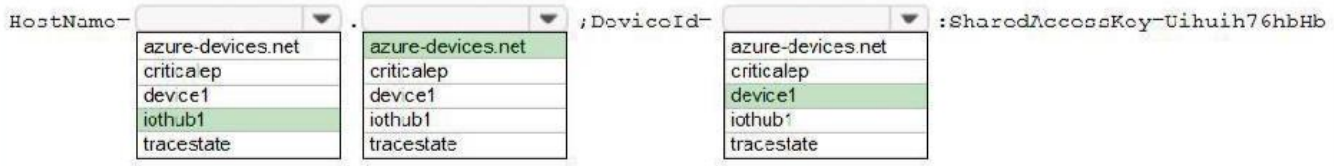
HOTSPOT
You create a new IoT device named device1 on iothub1. Device1 has a primary key of Uihuih76hbHb.
How should you complete the device connection string? To answer, select the appropriate options in the
answer area.
NOTE: Each correct selection is worth one point.

Answer Area



Correct Answer:

Answer Area



Explanation/Reference:

Explanation:
Box 1: iothub1
The Azure IoT hub is named iothub1.
Box 2: azure-devices.net
The format of the device connection string looks like:
HostName={YourIoTHubName}.azure-devices.net;DeviceId=MyNodeDevice;SharedAccessKey={YourSharedAccessKey}
Box 1: device1
Device1 has a primary key of Uihuih76hbHb.
Reference:
https://docs.microsoft.com/en-us/azure/iot-hub/quickstart-control-device-dotnet
Implement the IoT solution infrastructure
Question Set 2

QUESTION 2

You have an Azure IoT solution that includes an Azure IoT hub and 100 Azure IoT Edge devices.
You plan to deploy the IoT Edge devices to external networks. The firewalls of the external networks

only allow
traffic on port 80 and port 443.
You need to ensure that the devices can connect to the IoT hub. The solution must minimize costs.
What should you do?

A. Configure the devices for extended offline operations.
B. Configure the upstream protocol of the devices to use MQTT over WebSocket.
C. Connect the external networks to the IoT solution by using ExpressRoute.
D. Configure the devices to use an HTTPS proxy.

Correct Answer: B

Explanation/Reference:

Explanation:
MQTT over WebSockets uses port
443. Reference:
https://docs.microsoft.com/en-us/azure/iot-hub/iot-hub-devguide-protocols
Provision and manage devices
Testlet 1
Case Study
This is a case study. Case studies are not timed separately. You can use as much exam time as you would like to complete each case. However, there may be additional case studies and sections on this exam. You must manage your time to ensure that you are able to complete all questions included on this exam
in the time provided.
To answer the questions included in a case study, you will need to reference information that is provided in the
case study. Case studies might contain exhibits and other resources that provide more information about the
scenario that is described in the case study. Each question is independent of the other question on this case
study.
At the end of this case study, a review screen will appear. This screen allows you to review your answers and
to make changes before you move to the next sections of the exam. After you begin a new section, you cannot
return to this section.
To start the case study
To display the first question on this case study, click the Next button. Use the buttons in the left pane to explore
the content of the case study before you answer the questions. Clicking these buttons displays information
such as business requirements, existing environment, and problem statements. If the case study has an All
Information tab, note that the information displayed is identical to the information displayed on the subsequent
tabs. When you are ready to answer a question, click the Question button to return to the question.

Existing Environment. Current State ofDevelopment
Contoso produces a set of Bluetooth sensors that read the temperature and humidity. The sensors connect to
IoT gateway devices that relay the data.
All the IoT gateway devices connect to an Azure IoT hub named iothub1.
Existing Environment. Device Twin
You plan to implement device twins by using the following JSON sample.

```
{
  "deviceId": "device_n",
  "etag": "AAAAAAAAAAQ=",
  "deviceEtag": "NDcwMTU4Mzk=",
  "status": "enabled",
  "statusUpdateTime": "0001-01-01T00:00:00Z",
  "connectionState": "Disconnected",
  "lastActivityTime": "0001-01-01T00:00:00Z",
  "cloudToDeviceMessageCount": 0,
  "authenticationType": "sas",
  "x509Thumbprint": {
    "primaryThumbprint": null,
    "secondaryThumbprint": null
  },
  "version": 11,
  "properties": {
    "desired": {
      "fanSpeed": 70,
      "$metadata": {
        "$lastUpdated": "2019-10-16T09:43:42.2944169Z",
        "$lastUpdatedVersion": 4,
        "fanSpeed": {
          "$lastUpdated": "2019-10-16T09:43:42.2944169Z",
          "$lastUpdatedVersion": 4
        }
      },
      "$version": 4
    },
    "reported": {
      "fanSpeed": 80,
      "metadata": {
        "$lastUpdated": "2019-10-16T09:43:42.4035171Z",
        "fanSpeed": {
        "$lastUpdated": "2019-10-16T09:43:42.4035171Z"
        }
      },
      "$version": 7
    }
  },
  "capabilities": {
    "IotEdge": false
  }
}
```


Existing Environment. Azure Stream Analytics

Each room will have between three to five sensors that will generate readings that are sent to a single IoT gateway device. The IoT gateway device will forward all the readings to iothub1 at intervals of between 10 and 60 seconds.

You plan to use a gateway pattern so that each IoT gateway device will have its own IoT Hub device identity.
You draft the following query, which is missing the GROUP BY clause.

```
SELECT
AVG(temperature),
System.TimeStamp() AS
AsaTime FROM
Iothub
```

You plan to use a 30-second period to calculate the average temperature reading of the sensors. You plan to minimize latency between the condition reported by the sensors and the corresponding alert issued
by the Stream Analytics job.
Existing Environment. Device Messages
The IoT gateway devices will send messages that contain the following JSON data whenever the temperature
exceeds a specified threshold.

```
{
  "event": {
    "payload": "Temperature = 26.23 Humidity = 78.70597746416186 Button = 0",
    "properties": {
      "application": {
        "level": "critical"
      }
    }
  }
}
```

The level property will be used to route the messages to an Azure Service Bus queue endpoint named criticalep.
Existing Environment. Issues
You discover connectivity issues between the IoT gateway devices and iothub1, which cause IoT devices to
lose connectivity and messages.
Requirements. Planning Changes
Contoso plans to make the followingchanges:
Use Stream Analytics to process and view data.
Use Azure Time Series Insights to visualize data.
Implement a system to sync device statuses and required settings.
Add extra information to messages by using message enrichment.
Create a notification system to send an alert if a condition exceeds a specified threshold. Implement a system to identify what causes the intermittent connection issues and lost messages.
Requirements. Technical Requirements
Contoso must meet the followingrequirements:
Use the built-in functions of IoT Hub whenever possible. Minimize hardware and software costs whenever possible. Minimize administrative effort to provision devices at scale. Implement a system to trace message flow to and from iothub1.
Minimize the amount of custom coding required to implement the planned changes.
Prevent read operations from being negatively affected when you implement additional services.

QUESTION 3

You have the devices shown in the following table.

Name	Type	Hardware configuration
Device1	Azure Sphere microcontroller unit (MCU)	4 MB of RAM ARM processor
Device2	Raspberry Pi single board computer (SBC)	1 GB of RAM ARM processor
Device3	Desktop computer	8 GB of RAM x64 processor
Device4	Apple iPhone	4 GB of RAM ARM processor

You are implementing a proof of concept (POC) for an Azure IoT solution.
You need to deploy an Azure IoT Edge device as part of the POC.
On which two devices can you deploy IOT Edge? Each correct answer presents a complete solution.
NOTE: Each correct selection is worth one point.

A. Device1
B. Device2
C. Device3
D. Device4

Correct Answer: B,C

Explanation/Reference:

Explanation:
Azure IoT Edge runs great on devices as small as a Raspberry Pi3 to server grade hardware.
Tier 1.
The systems listed in the following table are supported by Microsoft, either generally available or in public
preview, and are tested with each new release.

Operating System	AMD64	ARM32v7	ARM64
Raspbian Stretch		✓	
Ubuntu Server 16.04	✓		Public preview
Ubuntu Server 18.04	✓		Public preview
Windows 10 IoT Core, build 17763	✓		
Windows 10 IoT Enterprise, build 17763	✓		
Windows Server 2019, build 17763	✓		
Windows Server IoT 2019, build 17763	✓		

Reference:
https://docs.microsoft.com/en-us/azure/iot-edge/support
Process and manage data
Testlet 1
Case Study
This is a case study. Case studies are not timed separately. You can use as much exam time as you would like to complete each case. However, there may be additional case studies and sections on this exam. You must manage your time to ensure that you are able to complete all questions included on this exam
in the time provided.
To answer the questions included in a case study, you will need to reference information that is provided in the
case study. Case studies might contain exhibits and other resources that provide more information about the
scenario that is described in the case study. Each question is independent of the other question on this case
study.
At the end of this case study, a review screen will appear. This screen allows you to review your answers and
to make changes before you move to the next sections of the exam. After you begin a new section, you cannot
return to this section.
To start the case study
To display the first question on this case study, click the Next button. Use the buttons in the left pane to explore
the content of the case study before you answer the questions. Clicking these buttons displays information
such as business requirements, existing environment, and problem statements. If the case study has an All
Information tab, note that the information displayed is identical to the information displayed on the subsequent
tabs. When you are ready to answer a question, click the Question button to return to the question.

Existing Environment. Current State ofDevelopment
Contoso produces a set of Bluetooth sensors that read the temperature and humidity. The sensors connect to
IoT gateway devices that relay the data.
All the IoT gateway devices connect to an Azure IoT hub named iothub1.
Existing Environment. Device Twin
You plan to implement device twins by using the following JSON sample.

```
{
  "deviceId": "device_n",
  "etag": "AAAAAAAAAAQ=",
  "deviceEtag": "NDcwMTU4Mzk=",
  "status": "enabled",
  "statusUpdateTime": "0001-01-01T00:00:00Z",
  "connectionState": "Disconnected",
  "lastActivityTime": "0001-01-01T00:00:00Z",
  "cloudToDeviceMessageCount": 0,
  "authenticationType": "sas",
  "x509Thumbprint": {
    "primaryThumbprint": null,
    "secondaryThumbprint": null
  },
  "version": 11,
  "properties": {
    "desired": {
      "fanSpeed": 70,
      "$metadata": {
        "$lastUpdated": "2019-10-16T09:43:42.2944169Z",
        "$lastUpdatedVersion": 4,
        "fanSpeed": {
          "$lastUpdated": "2019-10-16T09:43:42.2944169Z",
          "$lastUpdatedVersion": 4
        }
      },
      "$version": 4
    },
    "reported": {
      "fanSpeed": 80,
      "metadata": {
        "$lastUpdated": "2019-10-16T09:43:42.4035171Z",
        "fanSpeed": {
        "$lastUpdated": "2019-10-16T09:43:42.4035171Z"
        }
      },
      "$version": 7
    }
  },
  "capabilities": {
    "IotEdge": false
  }
}
```


Existing Environment. Azure Stream Analytics

Each room will have between three to five sensors that will generate readings that are sent to a single IoT gateway device. The IoT gateway device will forward all the readings to iothub1 at intervals of between 10 and 60 seconds.

You plan to use a gateway pattern so that each IoT gateway device will have its own IoT Hub device identity.
You draft the following query, which is missing the GROUP BY clause.

```
SELECT
AVG(temperature),
System.TimeStamp() AS
AsaTime FROM
Iothub
```

You plan to use a 30-second period to calculate the average temperature reading of the sensors. You plan to minimize latency between the condition reported by the sensors and the corresponding alert issued
by the Stream Analytics job.
Existing Environment. Device Messages
The IoT gateway devices will send messages that contain the following JSON data whenever the temperature
exceeds a specified threshold.

```
{
  "event": {
    "payload": "Temperature = 26.23 Humidity = 78.70597746416186 Button = 0",
    "properties": {
      "application": {
        "level": "critical"
      }
    }
  }
}
```

The level property will be used to route the messages to an Azure Service Bus queue endpoint named criticalep.
Existing Environment. Issues
You discover connectivity issues between the IoT gateway devices and iothub1, which cause IoT devices to
lose connectivity and messages.
Requirements. Planning Changes
Contoso plans to make the followingchanges:
Use Stream Analytics to process and view data.
Use Azure Time Series Insights to visualize data.
Implement a system to sync device statuses and required settings.
Add extra information to messages by using message enrichment.
Create a notification system to send an alert if a condition exceeds a specified threshold. Implement a system to identify what causes the intermittent connection issues and lost messages.
Requirements. Technical Requirements
Contoso must meet the followingrequirements:
Use the built-in functions of IoT Hub whenever possible. Minimize hardware and software costs whenever possible. Minimize administrative effort to provision devices at scale. Implement a system to trace message flow to and from iothub1.
Minimize the amount of custom coding required to implement the planned changes.
Prevent read operations from being negatively affected when you implement additional services.

QUESTION 4

You have 20 devices that connect to an Azure IoT hub.
You open Azure Monitor as shown in the exhibit. (Click the Exhibit tab.)

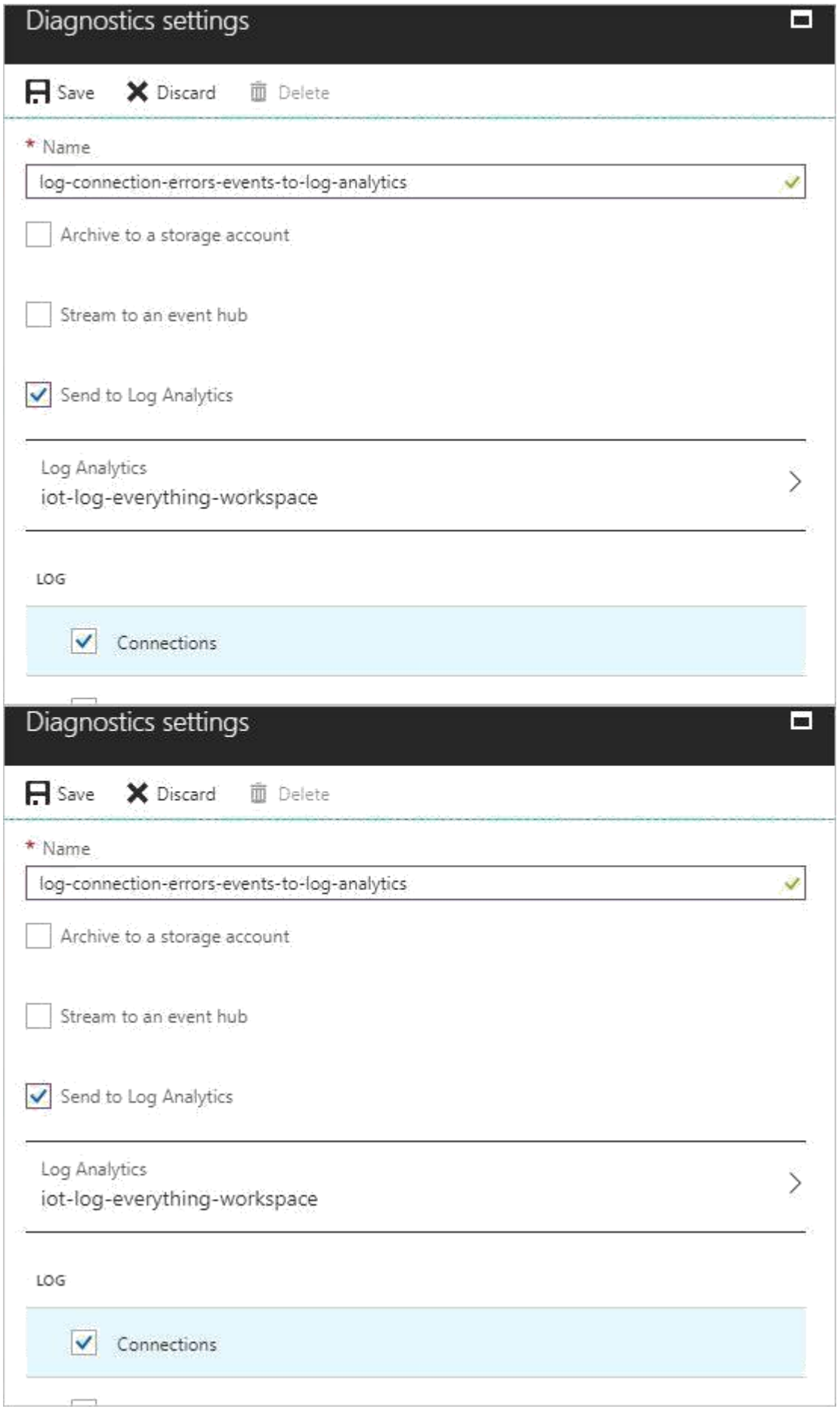
You discover that telemetry is not being received from five IoT devices.
You need to identify the names of the devices that are not generating telemetry and visualize the data.
What should you do first?

A. Add the Number of throttling errors metric and archive the logs to an Azure storageaccount. B. Configure diagnostics for Routes and stream the logs to Azure Event Hubs.
C. Add the Telemetry messages sent metric and archieve the logs to an Azure Storage account.
D. Configure diagnostics for Connections and send the logs to Azure Log Analytics.

Correct Answer: D

Explanation/Reference:

Explanation:
To log device connection events and errors, turn on diagnostics for IoT Hub. We recommend turning on these
logs as early as possible, because if diagnostic logs aren't enabled, when device disconnects occur, you won't
have any information to troubleshoot the problem with.
1. Sign in to the Azure portal.
2. Browse to your IoT hub.
3. Select Diagnostics settings.
4. Select Turn on diagnostics.
5. Enable Connections logs to be collected.
6. For easier analysis, turn on Send to Log Analytics



Reference:
https://docs.microsoft.com/bs-cyrl-ba/azure/iot-hub/iot-hub-troubleshoot-connectivity

QUESTION 5

You have an Azure IoT solution that includes a standard tier Azure IoT hub and an IoT device.
The device sends one 100-KB device-to-cloud message every hour.
You need to calculate the total daily message consumption of the device.
What is the total daily message consumption of the device?

A. 24
B. 600
C. 2,400
D. 4,800

Correct Answer: B

Explanation/Reference:

Explanation:
100 KB * 24 is around 2,400 bytes.
The 100 KB message is divided into 4 KB blocks, and it is billed for 25 messages. 25 times 24 is 600
Note: The maximum message size for messages sent from a device to the cloud is 256 KB. These messages
are metered in 4 KB blocks for the paid tiers so for instance if the device sends a 16 KB message via the paid
tiers it will be billed as 4 messages.
Reference:
https://azure.microsoft.com/en-us/pricing/details/iot-hub/

QUESTION 6

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

Explanation/Reference:

Explanation:
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/