

AZ-203.62q

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AZ-203



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Developing Solutions for Microsoft Azure

Testlet 1

Case Study

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Background

Wide World Importers is moving all their datacenters to Azure. The company has developed several applications and services to support supply chain operations and would like to leverage serverless computing where possible.

Current environment

Windows Server 2016 virtual machine

This virtual machine (VM) runs Biz Talk Server 2016. The VM runs the following workflows:

- Ocean Transport – This workflow gathers and validates container information including container contents and arrival notices at various shipping ports.
- Inland Transport – This workflow gathers and validates trucking information including fuel usage, number of stops, and routes.

The VM supports the following REST API calls:

- Container API – This API provides container information including weight, contents, and other attributes.
- Location API – This API provides location information regarding shipping ports of call and truck stops.
- Shipping REST API – This API provides shipping information for use and display on the shipping website.

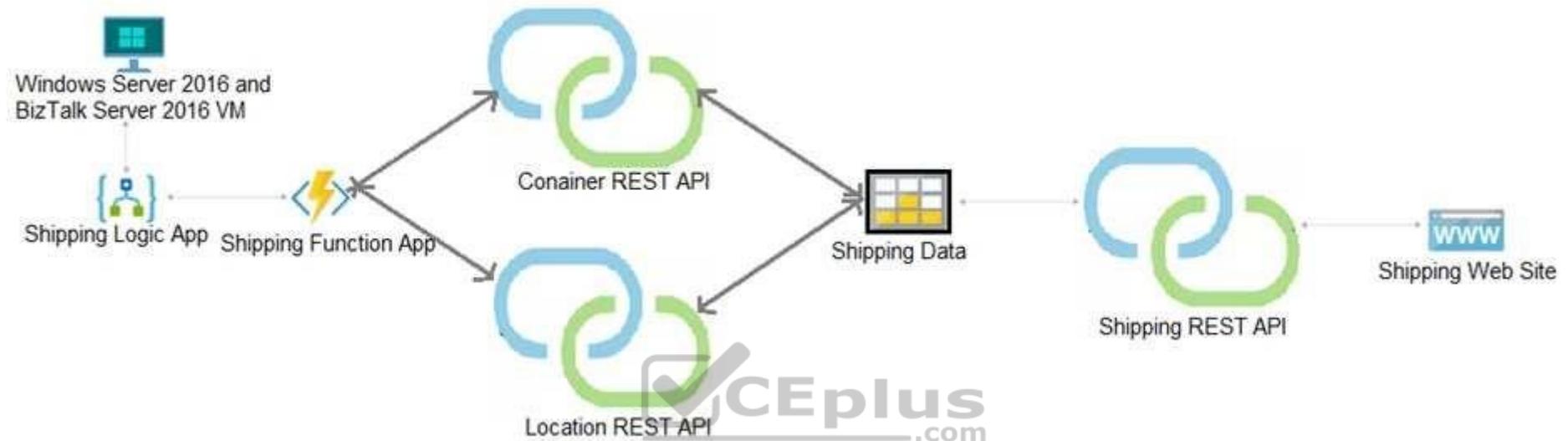
Shipping Data

The application uses MongoDB JSON document storage database for all container and transport information.

Proposed solution

The site displays shipping container tracking information and container contents. The site is located at <http://shipping.wideworldimporters.com>

The on-premises shipping application must be moved to Azure. The VM has been migrated to a new Standard_D16s_v3 Azure VM by using Azure Site Recovery and must remain running in Azure to complete the BizTalk component migrations. You create a Standard_D16s_v3 Azure VM to host BizTalk Server. The Azure architecture diagram for the proposed solution is shown below:



Shipping Logic App

The Shipping Logic app must meet the following requirements:

- Support the ocean transport and inland transport workflows by using a Logic App.
 - Support industry standard protocol X12 message format for various messages including vessel content details and arrival notices.
 - Secure resources to the corporate VNet and use dedicated storage resources with a fixed costing model. ▪
- Maintain on-premises connectivity to support legacy applications and final BizTalk migrations.

Shipping Function app

Implement secure function endpoints by using app-level security and include Azure Active Directory (Azure AD).

REST APIs

The REST API's that support the solution must meet the following requirements:

- Secure resources to the corporate VNet.
- Allow deployment to a testing location within Azure while not incurring additional costs.

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- Automatically scale to double capacity during peak shipping times while not causing application downtime.
- Minimize costs when selecting an Azure payment model.

Shipping data

Data migration from on-premises to Azure must minimize costs and downtime.

Shipping website

Use Azure Content Delivery Network (CDN) and ensure maximum performance for dynamic content while minimizing latency and costs.

Issues

Windows Server 2016 VM

The VM shows high network latency, jitter, and high CPU utilization. The VM is critical and has not been backed up in the past. The VM must enable a quick restore from a 7-day snapshot to include in-place restore of disks in case of failure. **Shipping website and REST APIs**

The following error message displays while you are testing the website:

```
Failed to load http://test-shippingapi.wideworldimporters.com/: No 'Access-Control-Allow-Origin' header is present on the requested resource. Origin 'http://testwideworldimporters.com/' is therefore not allowed access.
```

QUESTION 1

You need to support the requirements for the Shipping Logic App.



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should you use?

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- A. Azure Active Directory Application Proxy
- B. Point-to-Site (P2S) VPN connection
- C. Site-to-Site (S2S) VPN connection
- D. On-premises Data Gateway

Correct Answer: D

Section: [none]

Explanation

Explanation/Reference:

Explanation:

Before you can connect to on-premises data sources from Azure Logic Apps, download and install the on-premises data gateway on a local computer. The gateway works as a bridge that provides quick data transfer and encryption between data sources on premises (not in the cloud) and your logic apps.

The gateway supports BizTalk Server 2016.

Note: Microsoft have now fully incorporated the Azure BizTalk Services capabilities into Logic Apps and Azure App Service Hybrid Connections.

Logic Apps Enterprise Integration pack bring some of the enterprise B2B capabilities like AS2 and X12, EDI standards support

Scenario: The Shipping Logic app must meet the following requirements:

- Support the ocean transport and inland transport workflows by using a Logic App.
- Support industry standard protocol X12 message format for various messages including vessel content details and arrival notices.
- Secure resources to the corporate VNet and use dedicated storage resources with a fixed costing model. ▪

Maintain on-premises connectivity to support legacy applications and final BizTalk migrations.

References:

<https://docs.microsoft.com/en-us/azure/logic-apps/logic-apps-gateway-install>

Question Set 2

QUESTION 1

You are writing code to create and run an Azure Batch job.

You have created a pool of compute nodes.

You need to choose the right class and its method to submit a batch job to the Batch service.

Which method should you use?

- A. JobOperations.EnableJobAsync(String, IEnumerable<BatchClientBehavior>, CancellationToken)

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- B. JobOperations.CreateJob()
- C. CloudJob.Enable(IEnumerable<BatchClientBehavior>)
- D. JobOperations.EnableJob(String, IEnumerable<BatchClientBehavior>)
- E. CloudJob.CommitAsync(IEnumerable<BatchClientBehavior>, CancellationToken)

Correct Answer: E

Section: [none]

Explanation

Explanation/Reference:

Explanation:

A Batch job is a logical grouping of one or more tasks. A job includes settings common to the tasks, such as priority and the pool to run tasks on. The app uses the BatchClient.JobOperations.CreateJob method to create a job on your pool.

The Commit method submits the job to the Batch service. Initially the job has no tasks.

```
{  
    CloudJob job = batchClient.JobOperations.CreateJob();  
    job.Id = JobId;  
    job.PoolInformation = new PoolInformation { PoolId = PoolId };  
  
    job.Commit();  
}  
...
```



References: <https://docs.microsoft.com/en-us/azure/batch/quick-run-dotnet>

QUESTION 2

You are developing a software solution for an autonomous transportation system. The solution uses large data sets and Azure Batch processing to simulate navigation sets for entire fleets of vehicles.

You need to create compute nodes for the solution on Azure Batch.

What should you do?

- A. In the Azure portal, add a Job to a Batch account.
- B. In a .NET method, call the method: BatchClient.PoolOperations.CreateJob
- C. In Python, implement the class: JobAddParameter
- D. In Azure CLI, run the command: az batch pool create

- E. In a .NET method, call the method: `BatchClient.PoolOperations.CreatePool`
- F. In Python, implement the class: `TaskAddParameter`
- G. In the Azure CLI, run the command: `az batch account create`

Correct Answer: B

Section: [none]

Explanation

Explanation/Reference:

Explanation:

A Batch job is a logical grouping of one or more tasks. A job includes settings common to the tasks, such as priority and the pool to run tasks on. The app uses the `BatchClient.JobOperations.CreateJob` method to create a job on your pool.

Note:

Step 1: Create a pool of compute nodes. When you create a pool, you specify the number of compute nodes for the pool, their size, and the operating system.

When each task in your job runs, it's assigned to execute on one of the nodes in your pool.

Step 2: Create a job. A job manages a collection of tasks. You associate each job to a specific pool where that job's tasks will run.

Step 3: Add tasks to the job. Each task runs the application or script that you uploaded to process the data files it downloads from your Storage account. As each task completes, it can upload its output to Azure Storage.

Incorrect Answers:

C, F: To create a Batch pool in Python, the app uses the `PoolAddParameter` class to set the number of nodes, VM size, and a pool configuration.

E: `BatchClient.PoolOperations` does not have a `CreateJob` method.

References: <https://docs.microsoft.com/en-us/azure/batch/quick-run-dotnet> <https://docs.microsoft.com/en-us/azure/batch/quick-run-python>

QUESTION 3 DRAG DROP

You are deploying an Azure Kubernetes Services (AKS) cluster that will use multiple containers.

You need to create the cluster and verify that the services for the containers are configured correctly and available.

Which four commands should you use to develop the solution? To answer, move the appropriate command segments from the list of command segments to the answer area and arrange them in the correct order.

Select and Place:

Command segments

Answer Area

az aks get-credentials

az appservice plan create

az aks create

az group create

kubectl apply



Correct Answer:

Command segments

Answer Area

az aks get-credentials

az appservice plan create

az aks create

az group create

kubectl apply

az group create

az aks create

kubectl apply

az aks get-credentials



Section: [none]

Explanation

Explanation/Reference:

Explanation:

Step 1: az group create

Create a resource group with the az group create command. An Azure resource group is a logical group in which Azure resources are deployed and managed. Example: The following example creates a resource group named myAKSCluster in the eastus location. az group create --name myAKSCluster --location eastus

Step 2 : az aks create

Use the az aks create command to create an AKS cluster.

Step 3: kubectl apply

To deploy your application, use the kubectl apply command. This command parses the manifest file and creates the defined Kubernetes objects.

Step 4: az aks get-credentials

Configure it with the credentials for the new AKS cluster. Example:

az aks get-credentials --name aks-cluster --resource-group aks-resource-group

References:

<https://docs.bitnami.com/azure/get-started-aks/>



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LabelMaker app

Coho Winery produces bottles, and distributes a variety of wines globally. You are developer implementing highly scalable and resilient applications to support online order processing by using Azure solutions.

Coho Winery has a LabelMaker application that prints labels for wine bottles. The application sends **data** to several printers. The application consists of five modules that run independently on virtual machines (VMs). Coho Winery plans to move the application to Azure and continue to support label creation.

External partners send data to the **LabelMaker** application to include artwork and text for custom label designs.

Data

You identify the following requirements for data management and manipulation:

- Order data is stored as nonrelational JSON and must be queried using Structured Query Language (SQL).
- Changes to the Order data must reflect immediately across all partitions. All reads to the Order data must fetch the most recent writes.

You have the following security requirements:

- Users of Coho Winery applications must be able to provide access to documents, resources, and applications to external partners.
- External partners must use their own credentials and authenticate with their organization's identity management solution.
- External partner logins must be audited monthly for application use by a user account administrator to maintain company compliance.

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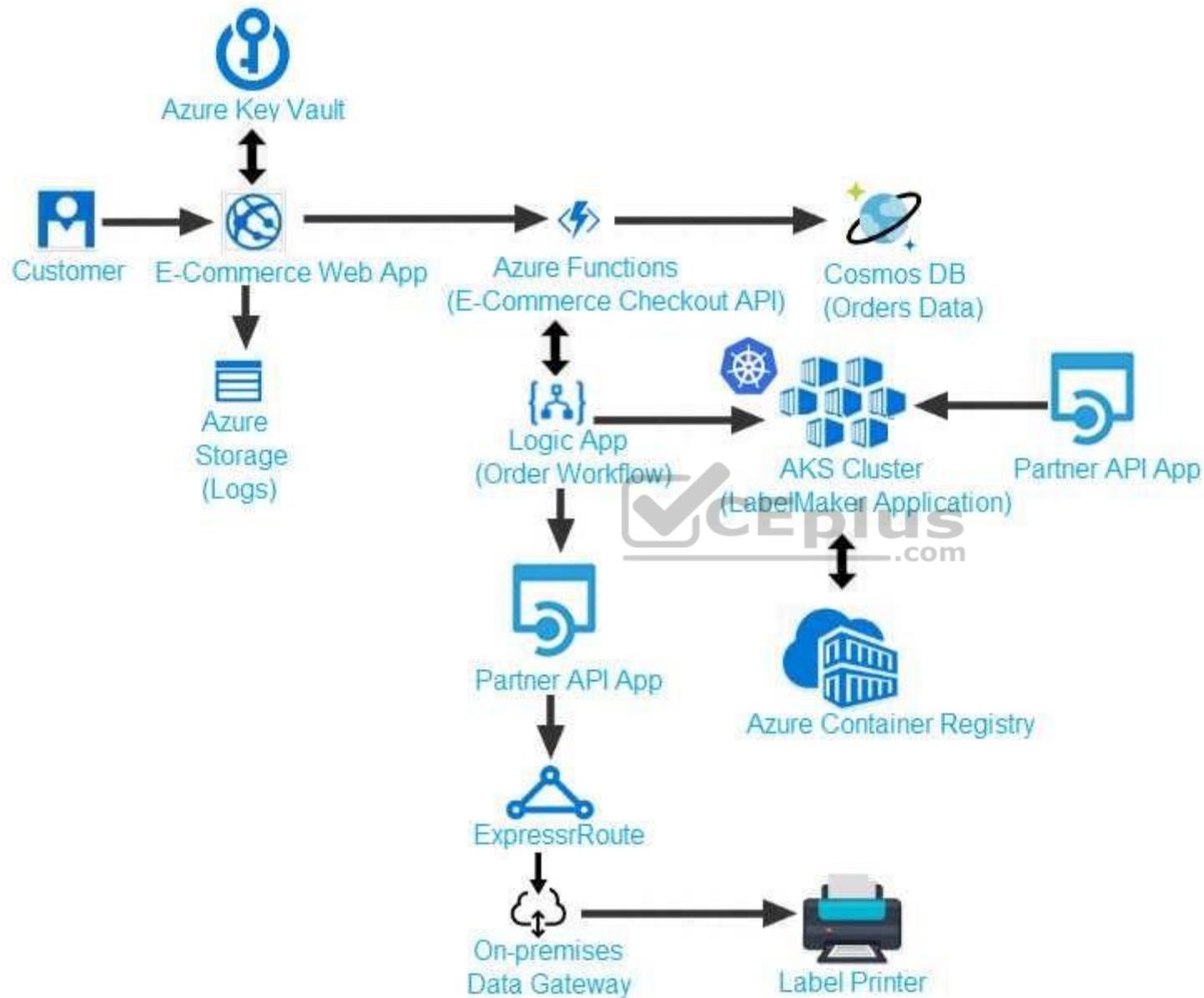
- Storage of e-commerce application settings must be maintained in Azure Key Vault.
- E-commerce application sign-ins must be secured by using Azure App Service authentication and Azure Active Directory (AAD).
- Conditional access policies must be applied at the application level to protect company content
 - The LabelMaker applications must be secured by using an AAD account that has full access to all namespaces of the Azure Kubernetes Service (AKS) cluster.

LabelMaker app

Azure Monitor Container Health must be used to monitor the performance of workloads that are deployed to Kubernetes environments and hosted on Azure Kubernetes Service (AKS).

You must use Azure Container Registry to publish images that support the AKS deployment.





Calls to the Printer API App fail periodically due to printer communication timeouts.

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Printer communications timeouts occur after 10 seconds. The label printer must only receive up to 5 attempts within one minute.

The order workflow fails to run upon initial deployment to Azure.

Order .json



```
01 {
02   "id" : 1,
03   "customers" : [
04     {
05       "familyName" : "Doe",
06       "givenName" : "John",
07       "customerid" : 5
08     }
09   ],
10   "line_items" : [
11     {
12       "fulfillable_quantity" : 1,
13       "id" : 6,
14       "price" : "199.99",
15       "product_id" : 7513594,
16       "quantity": 1,
17       "requires_shipping" : true,
18       "sku" : "SFC-342-N" ,
19       "title" : "Surface Go",
20       "vendor" : "Microsoft" ,
21       "name" : "Surface Go - 8GB",
22       "taxable" : true
```



QUESTION 1

You need to implement the e-commerce checkout API.

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

NOTE: Each correct selection is worth one point.

- A. Set the function template's Mode property to **Webhook** and the Webhook type property to **Generic JSON**.
- B. Create an Azure Function using the HTTP POST function template.
- C. In the Azure Function App, enable Cross-Origin Resource Sharing (CORS) with all origins permitted.
- D. In the Azure Function App, enable Managed Service Identity (MSI).
- E. Set the function template's Mode property to **Webhook** and the Webhook type property to **GitHub**.
- F. Create an Azure Function using the Generic webhook function template.

Correct Answer: ABD

Section: [none]

Explanation

Explanation/Reference:

Explanation:

Scenario: E-commerce application sign-ins must be secured by using Azure App Service authentication and Azure Active Directory (AAD).

D: A managed identity from Azure Active Directory allows your app to easily access other AAD-protected resources such as Azure Key Vault.

Incorrect Answers:

C: CORS is an HTTP feature that enables a web application running under one domain to access resources in another domain.

References: <https://docs.microsoft.com/en-us/azure/app-service/overview-managed-identity>

QUESTION 2

You need to provision and deploy the order workflow.

Which three components should you include? Each correct answer presents part of the solution.

NOTE: Each correct selection is worth one point.

- A. Connections
- B. On-premises Data Gateway

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- C. Workflow definition
- D. Resources
- E. Functions

Correct Answer: BCE

Section: [none]

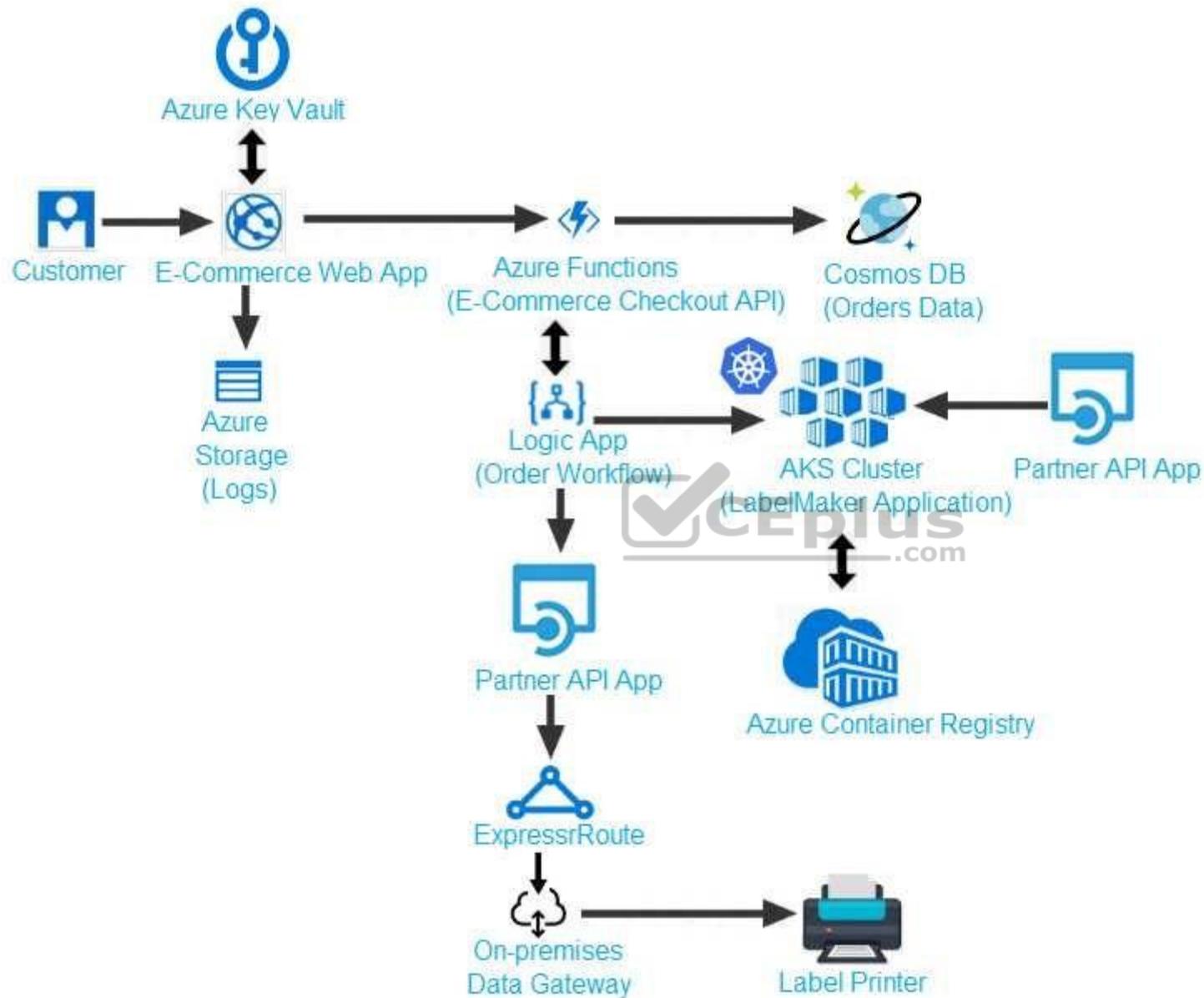
Explanation

Explanation/Reference:

Explanation:

Scenario: The order workflow fails to run upon initial deployment to Azure.





Question Set 2

QUESTION 1

You develop a serverless application using several Azure Functions. These functions connect to data from within the code.

You want to configure tracing for an Azure Function App project.

You need to change configuration settings in the host.json file.

Which tool should you use?

- A. Visual Studio
- B. Azure portal
- C. Azure PowerShell
- D. Azure Functions Core Tools (Azure CLI)

Correct Answer: B

Section: [none]

Explanation

Explanation/Reference:

Explanation:

The function editor built into the Azure portal lets you update the function.json file and the code file for a function. The host.json file, which contains some runtime-specific configurations, is in the root folder of the function app.

```
FunctionApp
| - host.json
| - Myfirstfunction
| | - function.json
| | - ...
| - mysecondfunction
| | - function.json
| | - ...
| - SharedCode
| - bin
```

References: <https://docs.microsoft.com/en-us/azure/azure-functions/functions-reference#fileupdate>

QUESTION 2

You are developing a mobile instant messaging app for a company.

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The mobile app must meet the following requirements:

- Support offline data sync.
- Update the latest messages during normal sync cycles.

You need to implement Offline Data Sync.

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

NOTE: Each correct selection is worth one point.

- A. Retrieve records from Offline Data Sync on every call to the PullAsync method.
- B. Retrieve records from Offline Data Sync using an Incremental Sync.
- C. Push records to Offline Data Sync using an Incremental Sync.
- D. Return the updatedAt column from the Mobile Service Backend and implement sorting by using the column.
- E. Return the updatedAt column from the Mobile Service Backend and implement sorting by the message id.

Correct Answer: BE

Section: [none]

Explanation



Explanation/Reference:

Explanation:

B: Incremental Sync: the first parameter to the pull operation is a query name that is used only on the client. If you use a non-null query name, the Azure Mobile SDK performs an incremental sync. Each time a pull operation returns a set of results, the latest updatedAt timestamp from that result set is stored in the SDK local system tables. Subsequent pull operations retrieve only records after that timestamp.

E (not D): To use incremental sync, your server must return meaningful updatedAt values and must also support sorting by this field. However, since the SDK adds its own sort on the updatedAt field, you cannot use a pull query that has its own orderBy clause.

References: <https://docs.microsoft.com/en-us/azure/app-service-mobile/app-service-mobile-offline-data-sync>

QUESTION 3

DRAG DROP You are developing a .NET Core model-view controller (MVC) application hosted on Azure for a health care

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system that allows providers access to their information.

You develop the following code:

```
services.AddAuthorization(options=>
{
    options.AddPolicy("ProviderPartner", policy =>
    {
        policy.AddAuthenticationSchemes("Cookies, Bearer");
        policy.RequireAuthenticatedUser();
        policy.RequireRole("ProviderAdmin", "SysAdmin");
        policy.RequireClaim("editor", "partner");
    });
});
```

You define a role named SysAdmin.

You need to ensure that the application meets the following authorization requirements:

- Allow the ProviderAdmin and SysAdmin roles access to the Partner controller regardless of whether the user holds an editor claim of partner. ▪ Limit access to the Manage action of the controller to users with an editor claim of partner who are also members of the SysAdmin role.

How should you complete the code? To answer, drag the appropriate code segments to the correct locations. Each code segment 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:

Code segments	Answer Area
<code>[Authorize (Policy = "ProviderPartner")]</code> <code>[Authorize (Role = "SysAdmin")]</code>	
<code>[Authorize (Role = "ProviderAdmin")]</code> <code>[Authorize (Role = "SysAdmin")]</code>	<code>public class PartnerController : Controller</code> {
<code>[Authorize (Role = "SysAdmin", "ProviderAdmin")]</code>	
<code>[Authorize (Policy = "ProviderPartner",</code> <code>Role = "SysAdmin")]</code>	<code>Public ActionResult Manage()</code> {
	}

Correct Answer:

Code segments	Answer Area
<code>[Authorize (Policy = "ProviderPartner")]</code> <code>[Authorize (Role = "SysAdmin")]</code>	<code>[Authorize (Role = "ProviderAdmin")]</code> <code>[Authorize (Role = "SysAdmin")]</code>
<code>[Authorize (Role = "ProviderAdmin")]</code> <code>[Authorize (Role = "SysAdmin")]</code>	<code>public class PartnerController : Controller</code> {
<code>[Authorize (Role = "SysAdmin", "ProviderAdmin")]</code>	<code>[Authorize (Policy = "ProviderPartner",</code> <code>Role = "SysAdmin")]</code>
<code>[Authorize (Policy = "ProviderPartner",</code> <code>Role = "SysAdmin")]</code>	<code>Public ActionResult Manage()</code> {
	}

Section: [none]

Explanation

Explanation/Reference:

Explanation:

Box 1:

Allow the ProviderAdmin and SysAdmin roles access to the Partner controller regardless of whether the user holds an editor claim of partner.

Box 2:

Limit access to the Manage action of the controller to users with an editor claim of partner who are also members of the SysAdmin role.

QUESTION 4

You are implementing an Azure API app that uses built-in authentication and authorization functionality.

All app actions must be associated with information about the current user.

You need to retrieve the information about the current user.

What are two ways to achieve the goal? Each correct answer presents a complete solution.

NOTE: Each correct selection is worth one point.

- A. HTTP headers
- B. environment variables
- C. /.auth/me HTTP endpoint
- D. /.auth/login endpoint

Correct Answer: AC

Section: [none]

Explanation



Explanation/Reference:

A: After App Service Authentication has been configured, users trying to access your API are prompted to sign in with their organizational account that belongs to the same Azure AD as the Azure AD application used to secure the API. After signing in, you are able to access the information about the current user through the HttpContext.Current.User property.

C: While the server code has access to request headers, client code can access GET /.auth/me to get the same access tokens (

References: <https://docs.microsoft.com/en-us/azure/app-service/app-service-web-tutorial-auth-aad>
<https://docs.microsoft.com/en-us/sharepoint/dev/spfx/web-parts/guidance/connect-to-api-secured-with-aad>

QUESTION 5

HOTSPOT

You are developing a back-end Azure App Service that scales based on the number of messages contained in a Service Bus queue.

A rule already exists to scale up the App Service when the average queue length of unprocessed and valid queue messages is greater than 1000.

You need to add a new rule that will continuously scale down the App Service as long as the scale up condition is not met.

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How should you configure the Scale rule? To answer, select the appropriate options in the answer area.

NOTE: Each correct selection is worth one point.

Hot Area:



Answer Area

Scale rule ✕

Metric source

▼

- Storage queue
- Service Bus queue
- Current resource
- Storage queue (classic)

Resource type

▼
 Service Bus Namespaces

Resource

▼
 MessageQueue1103

* Queues

▼
 itemqueue

Criteria

* Metric name

▼

- Message Count
- Active Message Count

1 minute time grain

* Time grain statistic ⓘ

▼

- Total
- Maximum
- Average
- Count

* Operator

▼

- Greater than
- Greater than or equal to
- Less than
- Less than or equal to

* Threshold

▼
 1000

Action

Correct Answer:



Answer Area

Scale rule ✕

Metric source
▼
Storage queue
Service Bus queue
Current resource
Storage queue (classic)

Resource type
▼
Service Bus Namespaces

Resource
▼
MessageQueue1103

Queues
▼
itemqueue

Criteria
Metric name
▼
Message Count
Active Message Count

1 minute time grain

Time grain statistic ⓘ
▼
Total
Maximum
Average
Count

Operator
▼
Greater than
Greater than or equal to
Less than
Less than or equal to

Threshold
1000

Action

Section: [none]

Explanation

Explanation/Reference:

Explanation:

Box 1: Service bus queue

You are developing a back-end Azure App Service that scales based on the number of messages contained in a Service Bus queue.

Box 2: ActiveMessage Count

ActiveMessageCount: Messages in the queue or subscription that are in the active state and ready for delivery.

Box 3: Count

Box 4: Less than or equal to

You need to add a new rule that will continuously scale down the App Service as long as the scale up condition is not met.

Box 5: Decrease count by

QUESTION 6

A company is developing a solution that allows smart refrigerators to send temperature information to a central location.

The solution must receive and store messages until they can be processed. You create an Azure Service Bus instance by providing a name, pricing tier, subscription, resource group, and location.

You need to complete the configuration.

Which Azure CLI or PowerShell command should you run? A.

```
New-AzureRmServiceBusNamespace  
-ResourceGroupName fridge-rg  
-NamespaceName fridge-ns  
-Location fridge-loc
```

```
az servicebus namespace create
  - -resource-group fridge-rg
  - -name fridge-ns
  - -location fridge-loc
New-AzureRmResourceGroup
  -Name fridge-rg
  -Location fridge-loc
New-AzureRmServiceBusQueue
  -ResourceGroupName fridge-rg
  -NamespaceName fridge-ns
  -Name fridge-q
  -EnablePartitioning $False
```

B.



C.

D.

Correct Answer: B

Section: [none]

Explanation

Explanation/Reference:

<https://vceplus.com/>

Explanation:

Create a Service Bus messaging namespace with a unique name. Example:

```
namespaceName=myNameSpace$RANDOM  
az servicebus namespace create --resource-group $resourceGroupName --name $namespaceName --location eastus
```

References: <https://docs.microsoft.com/en-us/azure/service-bus-messaging/service-bus-quickstart-cli>

QUESTION 7

You are a developer for a SaaS company that offers many web services.

All web services for the company must meet the following requirements:

- Use API Management to access the services
- Use OpenID Connect for authentication.
- Prevent anonymous usage

A recent security audit found that several web services can be called without any authentication.

Which API Management policy should you implement?

- A. validate-jwt
- B. jsonp
- C. authentication-certificate
- D. check-header

Correct Answer: A

Section: [none]

Explanation

Explanation/Reference:

Explanation:

Add the validate-jwt policy to validate the OAuth token for every incoming request.

Incorrect Answers:

B: The jsonp policy adds JSON with padding (JSONP) support to an operation or an API to allow cross-domain calls from JavaScript browser-based clients. JSONP is a method used in JavaScript programs to request data from a server in a different domain. JSONP bypasses the limitation enforced by most web browsers where access to web pages must be in the same domain.

JSONP - Adds JSON with padding (JSONP) support to an operation or an API to allow cross-domain calls from JavaScript browser-based clients.

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References: <https://docs.microsoft.com/en-us/azure/api-management/api-management-howto-protect-backend-with-aad>

QUESTION 8

You develop a website. You plan to host the website in Azure. You expect the website to experience high traffic volumes after it is published.

You must ensure that the website remains available and responsive while minimizing cost.

You need to deploy the website.

What should you do?

- A. Deploy the website to a virtual machine. Configure the virtual machine to automatically scale when the CPU load is high.
- B. Deploy the website to an App Service that uses the Shared service tier. Configure the App service plan to automatically scale when the CPU load is high.
- C. Deploy the website to an App Service that uses the Standard service tier. Configure the App service plan to automatically scale when the CPU load is high.
- D. Deploy the website to a virtual machine. Configure a Scale Set to increase the virtual machine instance count when the CPU load is high.

Correct Answer: C

Section: [none]

Explanation

Explanation/Reference:

Explanation:

Windows Azure Web Sites (WAWS) offers 3 modes: Standard, Free, and Shared.

Standard mode carries an enterprise-grade SLA (Service Level Agreement) of 99.9% monthly, even for sites with just one instance.

Standard mode runs on dedicated instances, making it different from the other ways to buy Windows Azure Web Sites.

Incorrect Answers:

B: Shared and Free modes do not offer the scaling flexibility of Standard, and they have some important limits.

Shared mode, just as the name states, also uses shared Compute resources, and also has a CPU limit. So, while neither Free nor Shared is likely to be the best choice for your production environment due to these limits.



Testlet 1

Case Study

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Background

You are a developer for Litware Inc., a SaaS company that provides a solution for managing employee expenses. The solution consists of an ASP.NET Core Web API project that is deployed as an Azure Web App.

Overall architecture

Employees upload receipts for the system to process. When processing is complete, the employee receives a summary report email that details the processing results. Employees then use a web application to manage their receipts and perform any additional tasks needed for reimbursement.

Receipt processing

Employees may upload receipts in two ways:

- Uploading using an Azure Files mounted folder
- Uploading using the web application

Data Storage

Receipt and employee information is stored in an Azure SQL database.

Documentation

Employees are provided with a getting started document when they first use the solution. The documentation includes details on supported operating systems for Azure File upload, and instructions on how to configure the mounted folder.

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Solution details

Users table

Column	Description
UserId	unique identifier for and employee
ExpenseAccount	employees expense account number in the format 1234-123-1234
AllowedAmount	limit of allowed expenses before approval is needed
SupervisorId	unique identifier for employee's supervisor
SecurityPin	value used to validate user identity

Web Application

You enable MSI for the Web App and configure the Web App to use the security principal name.

Processing

Processing is performed by an Azure Function that uses version 2 of the Azure Function runtime. Once processing is completed, results are stored in Azure Blob Storage and an Azure SQL database. Then, an email summary is sent to the user with a link to the processing report. The link to the report must remain valid if the email is forwarded to another user.

Requirements

Receipt processing

Concurrent processing of a receipt must be prevented.

Logging

Azure Application Insights is used for telemetry and logging in both the processor and the web application. The processor also has TraceWriter logging enabled. Application Insights must always contain all log messages.

Disaster recovery

Regional outage must not impact application availability. All DR operations must not be dependent on application running and must ensure that data in the DR region is up to date.

Security

- Users' SecurityPin must be stored in such a way that access to the database does not allow the viewing of SecurityPins. The web application is the only system that should have access to SecurityPins.
- All certificates and secrets used to secure data must be stored in Azure Key Vault.

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- You must adhere to the Least Privilege Principal and provide privileges which are essential to perform the intended function.
- All access to Azure Storage and Azure SQL database must use the application's Managed Service Identity (MSI) ▪ Receipt data must always be encrypted at rest.
- All data must be protected in transit.
- User's expense account number must be visible only to logged in users. All other views of the expense account number should include only the last segment with the remaining parts obscured.
- In the case of a security breach, access to all summary reports must be revoked without impacting other parts of the system.

Issues

Upload format issue

Employees occasionally report an issue with uploading a receipt using the web application. They report that when they upload a receipt using the Azure File Share, the receipt does not appear in their profile. When this occurs, they delete the file in the file share and use the web application, which returns a 500 Internal Server error page.

Capacity issue

During busy periods, employees report long delays between the time they upload the receipt and when it appears in the web application.

Log capacity issue

Developers report that the number of log messages in the trace output for the processor is too high, resulting in lost log messages.

Processing.cs

```
PC01 public static class Processing
PC02 {
PC03     public static class Function
PC04     {
PC05         [FunctionName ("IssueWork")]
PC06         public static async Task Run ([TimerTrigger("0 */5" ****")] TimerInfo timer, ILogger log)
PC07         {
PC08             var container = await GetCloudBlobContainer();
PC09             foreach (var fileItem in await ListFiles())
PC10             {
PC11                 var file = new CloudFile (fileItem.StorageUri.PrimaryUri);
PC12                 var ms = new MemoryStream();
PC13                 await file.DownloadToStreamAsync(ms);
PC14                 var blob = container.GetBlockBlobReference (fileItem.Uri.ToString());
PC15                 await blob.UploadFromStreamAsync(ms);
PC16             }
PC17         }
PC18     }
PC19     private static CloudBlockBlob GetDRBlob (CloudBlockBlob sourceBlob)
PC20     {
PC21         . . .
PC22     }
PC23     private static async Task<CloudBlobContainer> GetCloudBlobContainer()
PC24     {
PC25         var cloudBlobClient = new CloudBlobClient (new Uri(" . . ."), await GetCredentials());
PC26
PC27         await cloudBlobClient.GetRootContainerReference().CreatIfNotExistAsync();
PC28         return cloudBlobClient.GetRootContainerReference();
PC29     }
PC30     private static async Task<StorageCredentials> GetCredentials()
PC31     {
PC32         . . .
PC33     }
```

Database.cs

```
DB01 public class Database
DB02 {
DB03     private string ConnectionString =
DB04
DB05     public async Task<object> LoadUserDetails(string userId)
DB06     {
DB07
DB08     return await policy.ExecuteAsync (async () =>
DB09     {
DB10         using (var connection = new SqlConnection (ConnectionString))
DB11         {
DB12             await connection.OpenAsync();
DB13             using (var command = new SqlCommand("_", connection))
DB14             using (var reader = command.ExecuteReader())
DB15             {
DB16                 -
DB17             }
DB18         }
DB19     }
DB20 }
DB21 }
```

ReceiptUploader.cs

```
RU01 public class ReceiptUploader
RU02 {
RU03     public async Task UploadFile(string file, byte[ ] binary)
RU04     {
RU05         var httpClient = new HttpClient();
RU06         var response = await httpClient.PutAsync( "...", new ByteArrayContent(binary));
RU07         while (ShouldRetry (response))
RU08         {
RU09             response = await httpClient.PutAsync ( "...", new ByteArrayContent(binary));
RU10         }
RU11     }
RU12 private bool ShouldRetry(HttpResponseMessage response)
RU13 {
RU14
RU15     }
RU16 }
```



ConfigureSSE.ps1

```
CS01 $storageAccount = Get-AzureRmStorageAccount -ResourceGroupName "...\" -AccountName "...\"
CS02 $keyVault = Get-AzureRmKeyVault -VaultName "...\"
CS03 $key = Get-AzureKeyVaultKey -VaultName $keyVault.VaultName -Name "...\"
CS04 Set-AzureRmKeyVaultAccessPolicy'
CS05 -VaultName $keyVault.VaultName'
CS06 -ObjectId $storageAccount.Identity.PrincipalId'
CS07
CS08
CS09 Set-AzureRmStorageAccount\"
CS10 -ResourceGroupName $storageAccount.ResourceGroupName'
CS11 -AccountName $storageAccount.StorageAccountName'
CS12 -EnableEncryptionService File `
CS13 -KeyvaultEncryption'
CS14 -KeyName $key.Name
CS15 -KeyVersion $key.Version'
CS16 -KeyVaultUri $keyVault.VaultUri
```



QUESTION 1

You need to construct the link to the summary report for the email that is sent to users.



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should you do?

- A. Create a SharedAccessBlobPolicy and add it to the containers SharedAccessPolicies. Call GetSharedAccessSignature on the blob and use the resulting link.
- B. Create a SharedAccessAccountPolicy and call GetSharedAccessSignature on storage account and use the resulting link.
- C. Create a SharedAccessBlobPolicy and set the expiry time to two weeks from today. Call GetSharedAccessSignature on the blob and use the resulting link.

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D. Create a SharedAccessBlobPolicy and set the expiry time to two weeks from today. Call GetSharedAccessSignature on the container and use the resulting link.

Correct Answer: D

Section: [none]

Explanation

Explanation/Reference:

Explanation:

Scenario: Processing is performed by an Azure Function that uses version 2 of the Azure Function runtime. Once processing is completed, results are stored in Azure Blob Storage and an Azure SQL database. Then, an email summary is sent to the user with a link to the processing report. The link to the report must remain valid if the email is forwarded to another user.

Create a stored access policy to manage signatures on a container's resources, and then generate the shared access signature on the container, setting the constraints directly on the signature.

Code example: Add a method that generates the shared access signature for the container and returns the signature URI.

```
static string GetContainerSasUri(CloudBlobContainer container)
{
    //Set the expiry time and permissions for the container.
    //In this case no start time is specified, so the shared access signature becomes valid immediately.
    SharedAccessBlobPolicy sasConstraints = new SharedAccessBlobPolicy();
    sasConstraints.SharedAccessExpiryTime = DateTimeOffset.UtcNow.AddHours(24);
    sasConstraints.Permissions = SharedAccessBlobPermissions.List | SharedAccessBlobPermissions.Write;

    //Generate the shared access signature on the container, setting the constraints directly on the signature.
    string sasContainerToken = container.GetSharedAccessSignature(sasConstraints);

    //Return the URI string for the container, including the SAS token.
    return container.Uri + sasContainerToken;
}
```

Incorrect Answers:

C: Call GetSharedAccessSignature on the container, not on the blob.

References:

<https://docs.microsoft.com/en-us/azure/storage/blobs/storage-dotnet-shared-access-signature-part-2>

Testlet 2

Case Study

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Background

Wide World Importers is moving all their datacenters to Azure. The company has developed several applications and services to support supply chain operations and would like to leverage serverless computing where possible.

Current environment

Windows Server 2016 virtual machine

This virtual machine (VM) runs Biz Talk Server 2016. The VM runs the following workflows:

- Ocean Transport – This workflow gathers and validates container information including container contents and arrival notices at various shipping ports.
- Inland Transport – This workflow gathers and validates trucking information including fuel usage, number of stops, and routes.

The VM supports the following REST API calls:

- Container API – This API provides container information including weight, contents, and other attributes.
- Location API – This API provides location information regarding shipping ports of call and truck stops.
- Shipping REST API – This API provides shipping information for use and display on the shipping website.

Shipping Data

The application uses MongoDB JSON document storage database for all container and transport information.

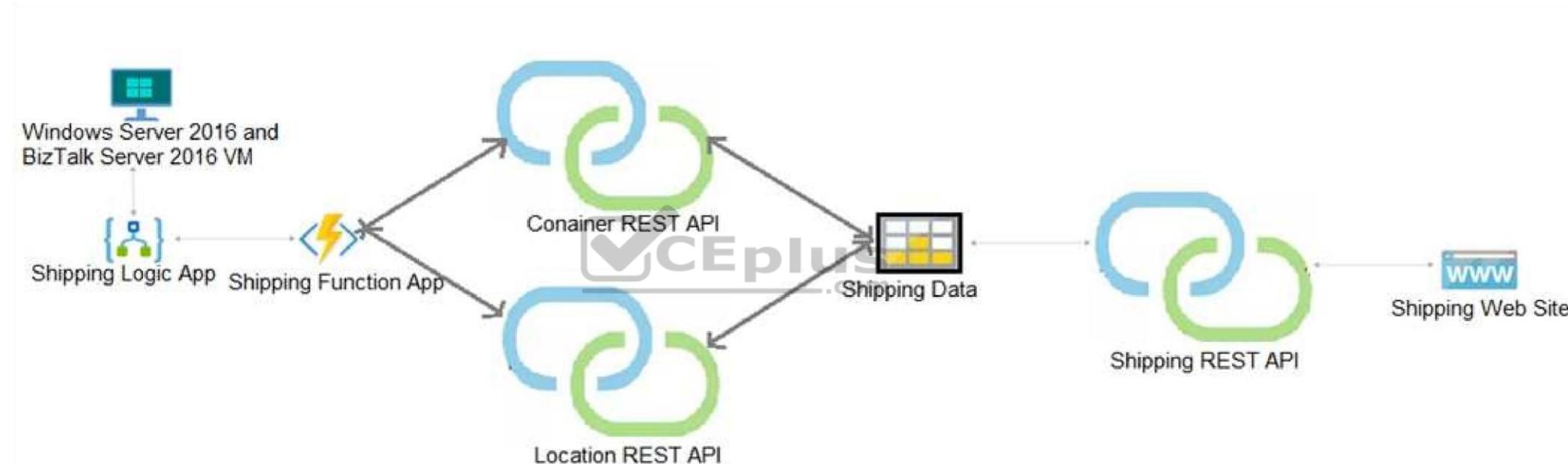
Proposed solution

The site displays shipping container tracking information and container contents. The site is located at <http://shipping.wideworldimporters.com>

The on-premises shipping application must be moved to Azure. The VM has been migrated to a new Standard_D16s_v3 Azure VM by using Azure Site Recovery and must remain running in Azure to complete the BizTalk component migrations. You create a Standard_D16s_v3 Azure VM to host BizTalk Server. The Azure architecture diagram for the proposed solution is shown below:

Shipping Logic App

The Shipping Logic app must meet the following requirements:



- Support the ocean transport and inland transport workflows by using a Logic App.
 - Support industry standard protocol X12 message format for various messages including vessel content details and arrival notices.
 - Secure resources to the corporate VNet and use dedicated storage resources with a fixed costing model. ▪
- Maintain on-premises connectivity to support legacy applications and final BizTalk migrations.

Shipping Function app

Implement secure function endpoints by using app-level security and include Azure Active Directory (Azure AD).

REST APIs

The REST API's that support the solution must meet the following requirements:

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- Secure resources to the corporate VNet.
- Allow deployment to a testing location within Azure while not incurring additional costs.
- Automatically scale to double capacity during peak shipping times while not causing application downtime.
- Minimize costs when selecting an Azure payment model.

Shipping data

Data migration from on-premises to Azure must minimize costs and downtime.

Shipping website

Use Azure Content Delivery Network (CDN) and ensure maximum performance for dynamic content while minimizing latency and costs.

Issues

Windows Server 2016 VM

The VM shows high network latency, jitter, and high CPU utilization. The VM is critical and has not been backed up in the past. The VM must enable a quick restore from a 7-day snapshot to include in-place restore of disks in case of failure. **Shipping website and REST APIs**

The following error message displays while you are testing the website:

```
Failed to load http://test-shippingapi.wideworldimporters.com/: No 'Access-Control-Allow-Origin' header is present on the requested resource. Origin 'http://testwideworldimporters.com/' is therefore not allowed access.
```

QUESTION 1

You need to migrate on-premises shipping data to Azure.

What should you use?

- A. Azure Cosmos DB Data Migration tool (dt.exe)
- B. Azure Database Migration service
- C. AzCopy
- D. Azure Migrate

Correct Answer: B

Section: [none]

Explanation

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Explanation/Reference:

Explanation:

Migrate from on-premises or cloud implementations of MongoDB to Azure Cosmos DB with minimal downtime by using Azure Database Migration Service. Perform resilient migrations of MongoDB data at scale and with high reliability.

Scenario: Data migration from on-premises to Azure must minimize costs and downtime.

The application uses MongoDB JSON document storage database for all container and transport information.

References: <https://azure.microsoft.com/en-us/updates/mongodb-to-azure-cosmos-db-online-and-offline-migrations-are-now-available/> **Question Set 3**

QUESTION 1

You use Azure Table storage to store customer information for an application. The data contains customer details and is partitioned by last name.

You need to create a query that returns all customers with the last name Smith.

Which code segment should you use?

- A. `TableQuery.GenerateFilterCondition("PartitionKey", Equals, "Smith")`
- B. `TableQuery.GenerateFilterCondition("LastName", Equals, "Smith")`
- C. `TableQuery.GenerateFilterCondition("PartitionKey", QueryComparisons.Equal, "Smith")`
- D. `TableQuery.GenerateFilterCondition("LastName", QueryComparisons.Equal, "Smith")`

Correct Answer: C

Section: [none]

Explanation

Explanation/Reference:

Explanation:

Retrieve all entities in a partition. The following code example specifies a filter for entities where 'Smith' is the partition key. This example prints the fields of each entity in the query results to the console.

Construct the query operation for all customer entities where PartitionKey="Smith".

```
TableQuery<CustomerEntity> query = new TableQuery<CustomerEntity>().Where(TableQuery.GenerateFilterCondition("PartitionKey", QueryComparisons.Equal, "Smith"));
```

References: <https://docs.microsoft.com/en-us/azure/cosmos-db/table-storage-how-to-use-dotnet>

QUESTION 2

HOTSPOT

You are developing an app that manages users for a video game. You plan to store the region, email address, and phone number for the player. Some players may not have a phone number. The player's region will be used to load-balance data.

Data for the app must be stored in Azure Table Storage.

You need to develop code to retrieve data for an individual player.

How should you complete the code? To answer, select the appropriate options in the answer area.

NOTE: Each correct selection is worth one point.

Hot Area:

Correct Answer:

Section: [none]

Explanation

Explanation/Reference:

Explanation:

Box 1: region

The player's region will be used to load-balance data.

Choosing the PartitionKey.

The core of any table's design is based on its scalability, the queries used to access it, and storage operation requirements. The PartitionKey values you choose will dictate how a table will be partitioned and the type of queries that can be used. Storage operations, in particular inserts, can also affect your choice of PartitionKey values.

Box 2: email

Not phone number some players may not have a phone number.

Box 3: CloudTable

Box 4 : TableOperation query =..

Box 5: TableResult

References: <https://docs.microsoft.com/en-us/rest/api/storageservices/designing-a-scalable-partitioning-strategy-for-azure-table-storage>

QUESTION 3

You must implement Application Insights instrumentation capabilities utilizing the Azure Mobile Apps SDK to provide meaningful analysis of user interactions with a mobile app.

You need to capture the data required to implement the Usage Analytics feature of Application Insights.

Which three data values should you capture? Each correct answer presents part of the solution.

NOTE: Each correct selection is worth one point.

- A. Trace
- B. Session Id
- C. Exception
- D. User Id
- E. Events

Correct Answer: ADE

Section: [none]

Explanation

Explanation/Reference:

Explanation:

Application Insights is a service for monitoring the performance and usage of your apps. This module allows you to send telemetry of various kinds (events, traces, etc.) to the Application Insights service where your data can be visualized in the Azure Portal.

Application Insights manages the ID of a session for you.

References: <https://github.com/microsoft/ApplicationInsights-Android>

QUESTION 4

You develop a solution that uses an Azure SQL Database to store user information for a mobile app.

The app stores sensitive information about users.

You need to hide sensitive information from developers that query the data for the mobile app.

Which three items must you identify when configuring dynamic data masking? Each correct answer presents a part of the solution.

NOTE: Each correct selection is worth one point.

- A. Column

- B. Table
- C. Trigger
- D. Index
- E. Schema

Correct Answer: ABE

Section: [none]

Explanation

Explanation/Reference:

Explanation:

In the Dynamic Data Masking configuration page, you may see some database columns that the recommendations engine has flagged for masking. In order to accept the recommendations, just click Add Mask for one or more columns and a mask is created based on the default type for this column. You can change the masking function by clicking on the masking rule and editing the masking field format to a different format of your choice.



Dynamic Data Masking
demo_database

Save Discard Add Mask

 Downlevel clients require the use of Security Enabled Connection Strings. 

Masking Rules

MASK NAME	MASK FUNCTION
You haven't created any masking rules.	

SQL users excluded from masking (administrators are always excluded) 



Recommended fields to mask

SCHEMA	TABLE	COLUMN	
SalesLT	Customer	FirstName	ADD MASK
SalesLT	Customer	LastName	ADD MASK
SalesLT	Customer	EmailAddress	ADD MASK
SalesLT	Customer	Phone	ADD MASK
SalesLT	CustomerAddress	AddressID	ADD MASK

References: <https://docs.microsoft.com/en-us/azure/sql-database/sql-database-dynamic-data-masking-get-started-portal>

QUESTION 5

HOTSPOT

You store customer information in an Azure Cosmos DB. The following data already exists in the database:

PartitionKey	RowKey	Email
Harp	Walter	wharp@contoso.com
Smith	Steve	ssmith@contoso.com
Smith	Jeff	jsmith@contoso.com

You develop the following code. (Line numbers are included for reference only.)

```
1 CloudTableClient tableClient = account.CreateCloudTableClient();
2 CloudTable table = tableClient.GetTableReference("people");
3 TableQuery<CustomerEntity> query = new TableQuery<CustomerEntity>()
4     .Where(TableQuery.CombineFilters(
5         TableQuery.GenerateFilterCondition(PartitionKey, QueryComparisons.Equal, "Smith"),
6         TableOperators.And, TableQuery.
7             GenerateFilterCondition(Email, QueryComparisons.Equal, "ssmith@contoso.com")
8     ));
8 await table.ExecuteQuerySegmentedAsync<CustomerEntity>(query null);
```

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

	Yes	No
The code returns every Record where the surname equals Smith .	<input type="radio"/>	<input type="radio"/>
The table endpoint <code>https://<mytableendpoint>/People (PartitionKey='Smith',RowKey='Steve')</code> returns the same results as the code.	<input type="radio"/>	<input type="radio"/>

Correct Answer:

Answer Area

	Yes	No
The code returns every Record where the surname equals Smith .	<input type="radio"/>	<input checked="" type="radio"/>
The table endpoint <code>https://<mytableendpoint>/People.com (PartitionKey='Smith',RowKey='Steve')</code> returns the same results as the code.	<input checked="" type="radio"/>	<input type="radio"/>

Section: [none]

Explanation

Explanation/Reference:

Explanation:

Box 1: No

Only the second row is returned thank to the Email filter condition.

Box 2: Yes

This also returns the second row.

QUESTION 6

A company uses Azure SQL Database to store data for an app. The data includes sensitive information.

You need to implement measures that allow only members of the managers group to see sensitive information.

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

NOTE: Each correct selection is worth one point.

- A. Include the managers group.
- B. Exclude the managers group.
- C. Exclude the administrators group.
- D. Navigate to the following URL:

```
PUT https://management.azure.com/subscriptions/00000000-1111-2222-3333-444444444444  
/resourceGroups/rg01/providers/Microsoft.Sql/servers/server01/databases/customers  
/transparentDataEncryption/current?api-version=2014-04-01
```

- E. Run the following Azure PowerShell command:

```
New-AzureRmSqlDatabaseDataMaskingRule -SchemaName "dbo" -TableName "customers" ` -ColumnName "ssn" -MaskingFunction "Default"
```

Correct Answer: BE

Section: [none]

Explanation



Explanation/Reference:

Explanation:

Dynamic data masking helps prevent unauthorized access to sensitive data by enabling customers to designate how much of the sensitive data to reveal with minimal impact on the application layer.

SQL users excluded from masking - A set of SQL users or AAD identities that get unmasked data in the SQL query results.

Note: The New-AzureRmSqlDatabaseDataMaskingRule cmdlet creates a data masking rule for an Azure SQL database.

References: <https://docs.microsoft.com/en-us/powershell/module/azurearm/sql/new-azurermsqldatabasedatamaskingrule?view=azurermps-6.13.0>

QUESTION 7

You develop an app that allows users to upload photos and videos to Azure storage. The app uses a storage REST API call to upload the media to a blob storage account named Account1. You have blob storage containers named Container1 and Container2.

Uploading of videos occurs on an irregular basis.

You need to copy specific blobs from Container1 to Container2 in real time when specific requirements are met, excluding backup blob copies.

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What should you do?

- A. Download the blob to a virtual machine and then upload the blob to Container2.
- B. Run the Azure PowerShell command Start-AzureStorageBlobCopy.
- C. Copy blobs to Container2 by using the Put Blob operation of the Blob Service REST API.
- D. Use AzCopy with the Snapshot switch blobs to Container2.

Correct Answer: B

Section: [none]

Explanation

Explanation/Reference:

Explanation:

The Start-AzureStorageBlobCopy cmdlet starts to copy a blob.

Example 1: Copy a named blob

```
C:\PS>Start-AzureStorageBlobCopy -SrcBlob "ContosoPlanning2015" -DestContainer "ContosoArchives" -SrcContainer "ContosoUploads"
```

This command starts the copy operation of the blob named ContosoPlanning2015 from the container named ContosoUploads to the container named ContosoArchives.

References: <https://docs.microsoft.com/en-us/powershell/module/azure.storage/start-azurestorageblobcopy?view=azuremps-6.13.0>

QUESTION 8

Note: This question is part of a series of questions that present the same scenario. Each question in the series contains a unique solution. Determine whether the solution meets the stated goals.

You are developing and deploying several ASP.Net web applications to Azure App Service. You plan to save session state information and HTML output. You must use a storage mechanism with the following requirements:

- Share session state across all ASP.NET web applications
- Support controlled, concurrent access to the same session state data for multiple readers and a single writer
- Save full HTTP responses for concurrent requests

You need to store the information.

Proposed Solution: Deploy and configure an Azure Database for PostgreSQL. Update the web applications.

Does the solution meet the goal?

- A. Yes

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B. No

Correct Answer: B

Section: [none]

Explanation

Explanation/Reference:

QUESTION 9

Note: This question is part of a series of questions that present the same scenario. Each question in the series contains a unique solution. Determine whether the solution meets the stated goals.

You are developing and deploying several ASP.Net web applications to Azure App Service. You plan to save session state information and HTML output. You must use a storage mechanism with the following requirements:

- Share session state across all ASP.NET web applications
- Support controlled, concurrent access to the same session state data for multiple readers and a single writer
- Save full HTTP responses for concurrent requests

You need to store the information.

Proposed Solution: Deploy and configure Azure Cache for Redis. Update the web applications.

Does the solution meet the goal?

A. Yes

B. No

Correct Answer: B

Section: [none]

Explanation

Explanation/Reference:

QUESTION 10

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.

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You are developing an Azure solution to collect point-of-sale (POS) device data from 2,000 stores located throughout the world. A single device can produce 2 megabytes (MB) of data every 24 hours. Each store location has one to five devices that send data.

You must store the device in Azure Blob storage. Device data must be correlated based on a device identifier. Additional stores are expected to open in the future.

You need to implement a solution to receive the device data.

Solution: Provision an Azure Event Hub. Configure the machine identifier as the partition key and enable capture.

Does the solution meet the goal?

- A. Yes
- B. No

Correct Answer: A

Section: [none]

Explanation

Explanation/Reference:

References: <https://docs.microsoft.com/en-us/azure/event-hubs/event-hubs-programming-guide>

QUESTION 11

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.

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You must store the device in Azure Blob storage. Device data must be correlated based on a device identifier. Additional stores are expected to open in the future.

You need to implement a solution to receive the device data.

Solution: Provision an Azure Event Grid. Configure event filtering to evaluate the device identifier.

Does the solution meet the goal?

- A. Yes
- B. No

Correct Answer: B

Section: [none]

Explanation

Explanation/Reference:

References:

<https://docs.microsoft.com/en-us/azure/event-grid/event-filtering>



Testlet 1

Case Study

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To start the case study

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Coho Winery produces bottles, and distributes a variety of wines globally. You are developer implementing highly scalable and resilient applications to support online order processing by using Azure solutions.

Coho Winery has a LabelMaker application that prints labels for wine bottles. The application sends **data** to several printers. The application consists of five modules that run independently on virtual machines (VMs). Coho Winery plans to move the application to Azure and continue to support label creation.

External partners send data to the **LabelMaker application** to include artwork and text for custom label designs.

Data

You identify the following requirements for data management and manipulation:

- Order data is stored as nonrelational JSON and must be queried using Structured Query Language (SQL).
- Changes to the Order data must reflect immediately across all partitions. All reads to the Order data must fetch the most recent writes.

You have the following security requirements:

- Users of Coho Winery applications must be able to provide access to documents, resources, and applications to external partners.
- External partners must use their own credentials and authenticate with their organization's identity management solution.
- External partner logins must be audited monthly for application use by a user account administrator to maintain company compliance.
- Storage of e-commerce application settings must be maintained in Azure Key Vault.

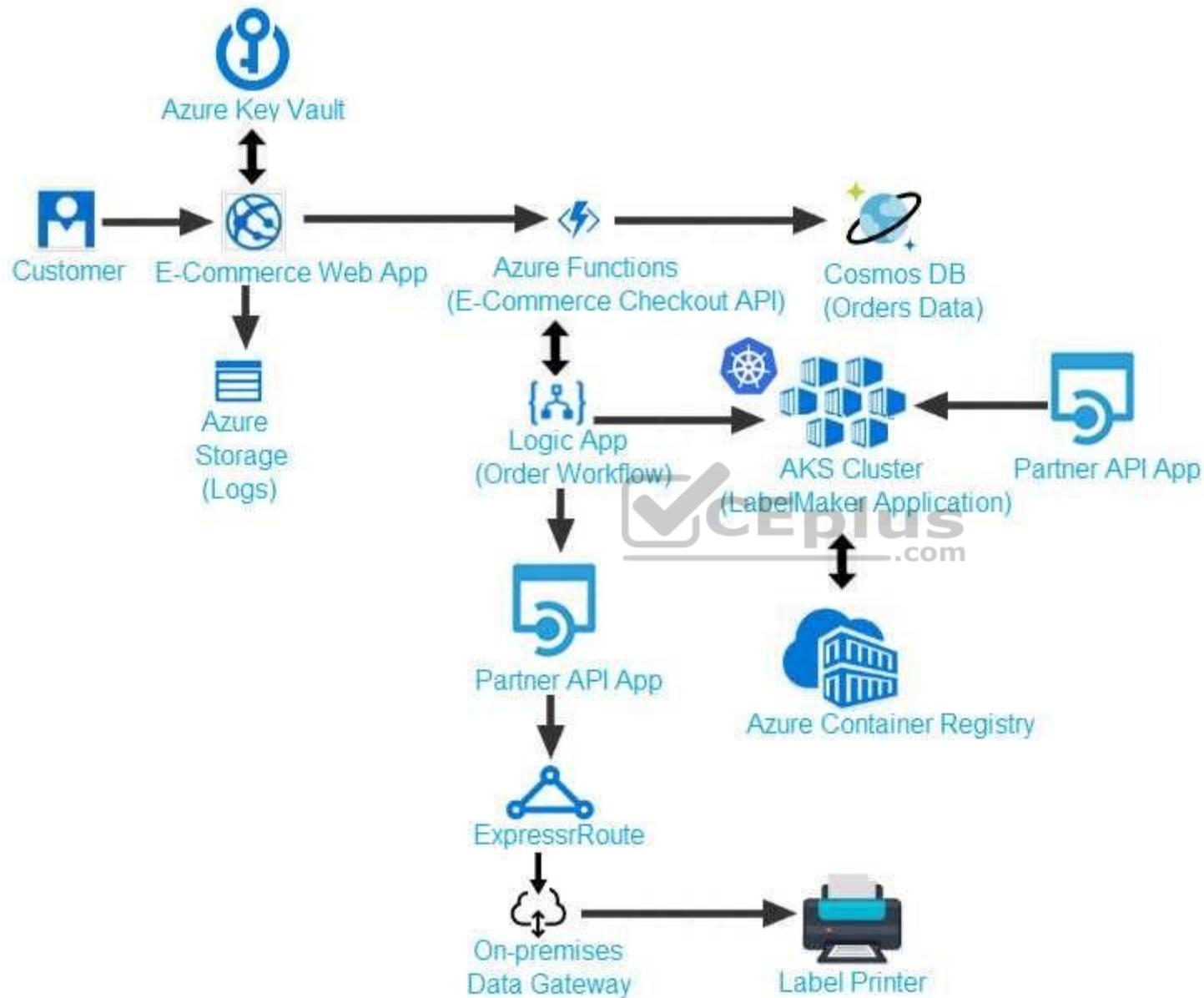
- E-commerce application sign-ins must be secured by using Azure App Service authentication and Azure Active Directory (AAD). ▪ Conditional access policies must be applied at the application level to protect company content
 - The LabelMaker applications must be secured by using an AAD account that has full access to all namespaces of the Azure Kubernetes Service (AKS) cluster.

LabelMaker app

Azure Monitor Container Health must be used to monitor the performance of workloads that are deployed to Kubernetes environments and hosted on Azure Kubernetes Service (AKS).

You must use Azure Container Registry to publish images that support the AKS deployment.





Calls to the Printer API App fail periodically due to printer communication timeouts.

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Printer communications timeouts occur after 10 seconds. The label printer must only receive up to 5 attempts within one minute.

The order workflow fails to run upon initial deployment to Azure.

Order .json



```
01 {
02  "id" : 1,
03  "customers" : [
04  {
05    "familyName" : "Doe",
06    "givenName" : "John",
07    "customerid" : 5
08  }
09  ],
10  "line_items" : [
11  {
12    "fulfillable_quantity" : 1,
13    "id" : 6,
14    "price" : "199.99",
15    "product_id" : 7513594,
16    "quantity": 1,
17    "requires_shipping" : true,
18    "sku" : "SFC-342-N" ,
19    "title" : "Surface Go",
20    "vendor" : "Microsoft" ,
21    "name" : "Surface Go - 8GB",
22    "taxable" : true
```



QUESTION 1

You need to meet the security requirements for the E-Commerce Web App.

Which two steps should you take? Each correct answer presents part of the solution.

NOTE: Each correct selection is worth one point.

- A. Update the E-Commerce Web App with the service principal's client secret.
- B. Enable Managed Service Identity (MSI) on the E-Commerce Web App.
- C. Add a policy to the Azure Key Vault to grant access to the E-Commerce Web App.
- D. Create an Azure AD service principal.

Correct Answer: BC

Section: [none]

Explanation

Explanation/Reference:

Explanation:

Scenario: E-commerce application sign-ins must be secured by using Azure App Service authentication and Azure Active Directory (AAD).

A managed identity from Azure Active Directory allows your app to easily access other AAD-protected resources such as Azure Key Vault.

T

References: <https://docs.microsoft.com/en-us/azure/app-service/overview-managed-identity>

QUESTION 2

You need to access user claims in the e-commerce web app.

What should you do first?

- A. Using the Azure CLI, enable Cross-origin resource sharing (CORS) from the e-commerce checkout API to the e-commerce web app.
- B. Update the e-commerce web app to read the HTTP request header values.
- C. Assign the Contributor RBAC role to the e-commerce web app by using the Resource Manager create role assignment API.
- D. Write custom code to make a Microsoft Graph API call from the e-commerce web app.

Correct Answer: D

Section: [none]

Explanation

<https://vceplus.com/>

Explanation/Reference:

Explanation:

If you want more information about the user, you'll need to use the Azure AD Graph API.

References: <https://docs.microsoft.com/en-us/azure/architecture/multitenant-identity/claims>

QUESTION 3

You need to meet the LabelMaker application security requirement.

What should you do?

- A. Create a conditional access policy and assign it to the Azure Kubernetes Service cluster.
- B. Place the Azure Active Directory account into an Azure AD group. Create a ClusterRoleBinding and assign it to the group.
- C. Create a RoleBinding and assign it to the Azure AD account.
- D. Create a Microsoft Azure Active Directory service principal and assign it to the Azure Kubernetes Service (AKS) cluster.

Correct Answer: B

Section: [none]

Explanation

Explanation/Reference:

Explanation:

Scenario: The LabelMaker applications must be secured by using an AAD account that has full access to all namespaces of the Azure Kubernetes Service (AKS) cluster.

Permissions can be granted within a namespace with a RoleBinding, or cluster-wide with a ClusterRoleBinding.

References:

<https://kubernetes.io/docs/reference/access-authn-authz/rbac/>

Testlet 2**Case Study**

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Background

You are a developer for Litware Inc., a SaaS company that provides a solution for managing employee expenses. The solution consists of an ASP.NET Core Web API project that is deployed as an Azure Web App.

Overall architecture

Employees upload receipts for the system to process. When processing is complete, the employee receives a summary report email that details the processing results. Employees then use a web application to manage their receipts and perform any additional tasks needed for reimbursement.

Receipt processing

Employees may upload receipts in two ways:

- Uploading using an Azure Files mounted folder
- Uploading using the web application



Data Storage

Receipt and employee information is stored in an Azure SQL database.

Documentation

Employees are provided with a getting started document when they first use the solution. The documentation includes details on supported operating systems for Azure File upload, and instructions on how to configure the mounted folder.

Solution details

Users table

Column	Description
UserId	unique identifier for and employee
ExpenseAccount	employees expense account number in the format 1234-123-1234
AllowedAmount	limit of allowed expenses before approval is needed
SupervisorId	unique identifier for employee's supervisor
SecurityPin	value used to validate user identity

Web Application

You enable MSI for the Web App and configure the Web App to use the security principal name.

Processing

Processing is performed by an Azure Function that uses version 2 of the Azure Function runtime. Once processing is completed, results are stored in Azure Blob Storage and an Azure SQL database. Then, an email summary is sent to the user with a link to the processing report. The link to the report must remain valid if the email is forwarded to another user.

Requirements

Receipt processing

Concurrent processing of a receipt must be prevented.

Logging

Azure Application Insights is used for telemetry and logging in both the processor and the web application. The processor also has TraceWriter logging enabled. Application Insights must always contain all log messages.

Disaster recovery

Regional outage must not impact application availability. All DR operations must not be dependent on application running and must ensure that data in the DR region is up to date.

Security

- Users' SecurityPin must be stored in such a way that access to the database does not allow the viewing of SecurityPins. The web application is the only system that should have access to SecurityPins.
- All certificates and secrets used to secure data must be stored in Azure Key Vault.
- You must adhere to the Least Privilege Principal and provide privileges which are essential to perform the intended function.
- All access to Azure Storage and Azure SQL database must use the application's Managed Service Identity (MSI) ▪ Receipt data must always be encrypted at rest.

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- All data must be protected in transit.
- User's expense account number must be visible only to logged in users. All other views of the expense account number should include only the last segment with the remaining parts obscured.
- In the case of a security breach, access to all summary reports must be revoked without impacting other parts of the system.

Issues

Upload format issue

Employees occasionally report an issue with uploading a receipt using the web application. They report that when they upload a receipt using the Azure File Share, the receipt does not appear in their profile. When this occurs, they delete the file in the file share and use the web application, which returns a 500 Internal Server error page.

Capacity issue

During busy periods, employees report long delays between the time they upload the receipt and when it appears in the web application.

Log capacity issue

Developers report that the number of log messages in the trace output for the processor is too high, resulting in lost log messages.

Processing.cs



```
PC01 public static class Processing
PC02 {
PC03     public static class Function
PC04     {
PC05         [FunctionName ("IssueWork")]
PC06         public static async Task Run ([TimerTrigger("0 */5" ****")] TimerInfo timer, ILogger log)
PC07         {
PC08             var container = await GetCloudBlobContainer();
PC09             foreach (var fileItem in await ListFiles())
PC10             {
PC11                 var file = new CloudFile (fileItem.StorageUri.PrimaryUri);
PC12                 var ms = new MemoryStream();
PC13                 await file.DownloadToStreamAsync(ms);
PC14                 var blob = container.GetBlockBlobReference (fileItem.Uri.ToString());
PC15                 await blob.UploadFromStreamAsync(ms);
PC16             }
PC17         }
PC18     }
PC19     private static CloudBlockBlob GetDRBlob (CloudBlockBlob sourceBlob)
PC20     {
PC21         . . .
PC22     }
PC23     private static async Task<CloudBlobContainer> GetCloudBlobContainer()
PC24     {
PC25         var cloudBlobClient = new CloudBlobClient (new Uri(" . . ."), await GetCredentials());
PC26
PC27         await cloudBlobClient.GetRootContainerReference().CreatIfNotExistAsync();
PC28         return cloudBlobClient.GetRootContainerReference();
PC29     }
PC30     private static async Task<StorageCredentials> GetCredentials()
PC31     {
PC32         . . .
PC33     }
```

Database.cs

```
DB01 public class Database
DB02 {
DB03     private string ConnectionString =
DB04
DB05     public async Task<object> LoadUserDetails(string userId)
DB06     {
DB07
DB08     return await policy.ExecuteAsync (async () =>
DB09     {
DB10         using (var connection = new SqlConnection (ConnectionString))
DB11         {
DB12             await connection.OpenAsync();
DB13             using (var command = new SqlCommand("_", connection))
DB14             using (var reader = command.ExecuteReader())
DB15             {
DB16                 -
DB17             }
DB18         }
DB19     }
DB20 }
DB21 }
```

ReceiptUploader.cs

```
RU01 public class ReceiptUploader
RU02 {
RU03     public async Task UploadFile(string file, byte[ ] binary)
RU04     {
RU05         var httpClient = new HttpClient();
RU06         var response = await httpClient.PutAsync( "...", new ByteArrayContent(binary));
RU07         while (ShouldRetry (response))
RU08         {
RU09             response = await httpClient.PutAsync ( "...", new ByteArrayContent(binary));
RU10         }
RU11     }
RU12 private bool ShouldRetry(HttpResponseMessage response)
RU13 {
RU14
RU15     }
RU16 }
```



ConfigureSSE.ps1

```
CS01 $storageAccount = Get-AzureRmStorageAccount -ResourceGroupName "...\" -AccountName "...\"
CS02 $keyVault = Get-AzureRmKeyVault -VaultName "...\"
CS03 $key = Get-AzureKeyVaultKey -VaultName $keyVault.VaultName -Name "...\"
CS04 Set-AzureRmKeyVaultAccessPolicy'
CS05 -VaultName $keyVault.VaultName'
CS06 -ObjectId $storageAccount.Identity.PrincipalId'
CS07
CS08
CS09 Set-AzureRmStorageAccount\"
CS10 -ResourceGroupName $storageAccount.ResourceGroupName'
CS11 -AccountName $storageAccount.StorageAccountName'
CS12 -EnableEncryptionService File `
CS13 -KeyvaultEncryption'
CS14 -KeyName $key.Name
CS15 -KeyVersion $key.Version'
CS16 -KeyVaultUri $keyVault.VaultUri
```



QUESTION 1

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 need to ensure that the SecurityPin security requirements are met.

Solution: Enable Always Encrypted for the SecurityPin column using a certificate based on a trusted certificate authority. Update the Getting Started document with instructions to ensure that the certificate is installed on user machines.

Does the solution meet the goal?

- A. Yes
- B. No

Correct Answer: B

Section: [none]

Explanation

Explanation/Reference:

Explanation:

Enable Always Encrypted is correct, but only the WebAppIdentity service principal should be given access to the certificate.

Scenario: Users' SecurityPin must be stored in such a way that access to the database does not allow the viewing of SecurityPins. The web application is the only system that should have access to SecurityPins.

QUESTION 2

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 need to ensure that the SecurityPin security requirements are met.

Solution: Using the Azure Portal, add Data Masking to the SecurityPin column, and exclude the dbo user. Add a SQL security policy with a filter predicate based on the user identity.

Does the solution meet the goal?

A. Yes

B. No

Correct Answer: B

Section: [none]

Explanation

Explanation/Reference:

Explanation:

Instead of DataMasing, enable Always Encrypted for the SecurityPin column.

Scenario: Users' SecurityPin must be stored in such a way that access to the database does not allow the viewing of SecurityPins. The web application is the only system that should have access to SecurityPins.

QUESTION 3

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 need to ensure that the SecurityPin security requirements are met.

Solution: Enable Always Encrypted for the SecurityPin column using a certificate contained in Azure Key Vault and grant the WebAppIdentity service principal access to the certificate.

Does the solution meet the goal?

- A. Yes
- B. No

Correct Answer: A

Section: [none]

Explanation

Explanation/Reference:

Explanation:

Scenario: Users' SecurityPin must be stored in such a way that access to the database does not allow the viewing of SecurityPins. The web application is the only system that should have access to SecurityPins.

QUESTION 4

You need to ensure the security policies are met.

What code do you add at line CS07?

- A. -PermissionsToCertificates create, encrypt, decrypt
- B. -PermissionsToKeys wrapkey, unwrapkey, get
- C. -PermissionsToCertificates wrapkey, unwrapkey, get
- D. -PermissionsToKeys create, encrypt, decrypt

Correct Answer: A

Section: [none]

Explanation

Explanation/Reference:

Explanation:

Scenario: All certificates and secrets used to secure data must be stored in Azure Key Vault.

You must adhere to the principle of least privilege and provide privileges which are essential to perform the intended function.

The Set-AzureRmKeyVaultAccessPolicy parameter -PermissionsToKeys specifies an array of key operation permissions to grant to a user or service principal. The acceptable values for this parameter: decrypt, encrypt, unwrapKey, wrapKey, verify, sign, get, list, update, create, import, delete, backup, restore, recover, purge

Incorrect Answers:

A, C: The Set-AzureRmKeyVaultAccessPolicy parameter -PermissionsToCertificates specifies an array of certificate permissions to grant to a user or service principal. The acceptable values for this parameter: get, list, delete, create, import, update, managecontacts, getissuers, listissuers, setissuers, deleteissuers, manageissuers, recover, purge, backup, restore

References: <https://docs.microsoft.com/en-us/powershell/module/azurerm/keyvault/set-azurermkeyvaultaccesspolicy>

QUESTION 5

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 need to ensure that the SecurityPin security requirements are met.

Solution: Configure the web application to connect to the database using the WebAppIdentity security principal. Using the Azure Portal, add Data Masking to the SecurityPin column and exclude the WebAppIdentity service principal.

Does the solution meet the goal?

- A. Yes
- B. No

Correct Answer: A

Section: [none]

Explanation

Explanation/Reference:

Explanation:

Scenario: Users' SecurityPin must be stored in such a way that access to the database does not allow the viewing of SecurityPins. The web application is the only system that should have access to SecurityPins.

All certificates and secrets used to secure data must be stored in Azure Key Vault.

Testlet 3

Case study

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Background

You are a developer for Proseware, Inc. You are developing an application that applies a set of governance policies for Proseware's internal services, external services, and applications. The application will also provide a shared library for common functionality. **Requirements Policy service**

You develop and deploy a stateful ASP.NET Core 2.1 web application named Policy service to an Azure App Service Web App. The application reacts to events from Azure Event Grid and performs policy actions based on those events.

The application must include the Event Grid Event ID field in all Application Insights telemetry.

Policy service must use Application Insights to automatically scale with the number of policy actions that it is performing.

Policies

Log Policy

All Azure App Service Web Apps must write logs to Azure Blob storage. All log files should be saved to a container named **logdrop**. Logs must remain in the container for 15 days.

Authentication events

Authentication events are used to monitor users signing in and signing out. All authentication events must be processed by Policy service. Sign outs must be processed as quickly as possible.

PolicyLib

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You have a shared library named **PolicyLib** that contains functionality common to all ASP.NET Core web services and applications. The **PolicyLib** library must:

- Exclude non-user actions from Application Insights telemetry.
- Provide methods that allow a web service to scale itself
- Ensure that scaling actions do not disrupt application usage

Other

Anomaly detection service

You have an anomaly detection service that analyzes log information for anomalies. It is implemented as an Azure Machine Learning model. The model is deployed as a web service.

If an anomaly is detected, an Azure Function that emails administrators is called by using an HTTP WebHook.

Health monitoring

All web applications and services have health monitoring at the /health service endpoint.

Policy loss

When you deploy Policy service, policies may not be applied if they were in the process of being applied during the deployment.

Performance issue

When under heavy load, the anomaly detection service undergoes slowdowns and rejects connections.

Notification latency

Users report that anomaly detection emails can sometimes arrive several minutes after an anomaly is detected.

Relevant portions of the app files are shown below. Line numbers are included for reference only and include a two-character prefix that denotes the specific file to which they belong.

EventGridController.cs

```
EG01 public class EventGridController : Controller
EG02 {
EG03     public static AsyncLocal<string> EventId = new AsyncLocal<string>();
EG04     public IActionResult Process([FromBody] string eventsJson
EG05     {
EG06         var events = JObject.Parse(eventsJson);
EG07
EG08         foreach (var @event in events)
EG09         {
EG10             EventId.Value = @event ["id"].ToString();
EG11             if (@event["topic"].ToString().Contains("providers/Microsoft.Storage"))
EG12             {
EG13                 SendToAnomalyDetectionService(@event["data"]["url"].ToString());
EG14             }
EG15
EG16             {
EG17                 EnsureLogging(@event["subject"].ToString());
EG18             }
EG19         }
EG20         return null;
EG21     }
EG22     private void EnsureLogging(string resource)
EG23     {
EG24         . . .
EG25     }
EG26     private async Task SendToAnomalyDetectionService(string uri)
EG27     {
EG28         var content = GetLogData(uri);
EG29         var scoreRequest = new
EG30         {
EG31             Inputs = new Dictionary<string, List<Dictionary<string, string>>>()
EG32             {
EG33                 {
EG34                     "input1",
```

```
EG35         new List<Dictionary<string, string>>()
EG36         {
EG37             new Dictionary<string, string>()
EG38             {
EG39                 {
EG40                     "logcontent", content
EG41                 }
EG42             }
EG43         }
EG44     },
EG45 },
EG46     GlobalParameters = new Dictionary<string, string>() { }
EG47 };
EG48 var result = await (new HttpClient()).PostAsJsonAsync(". . .", scoreRequest);
EG49 var rawModelResult = await result.Content.ReadAsStringAsync();
EG50 var modelResult = JObject.Parse(rawModelResult);
EG51 if (modelResult["notify"].HasValues)
EG52 {
EG53     . . .
EG54 }
EG55 }
EG56 private (string name, string resourceGroup) ParseResourceId(string
resourceId)
EG57 {
EG58     . . .
EG59 }
EG60 private string GetLogData(string uri)
EG61 {
EG62     . . .
EG63 }
EG64 static string BlobStoreAccountSAS(string containerName)
EG65 {
EG66     . . .
EG67 }
EG68 }
```

Relevant portions of the app files are shown below. Line numbers are included for reference only and include a two-character prefix that denotes the specific file to which they belong.

```
LoginEvent.cs
LE01 public class LoginEvent
LE02 {
LE03
LE04 public string subject { get; set; }
LE05 public DateTime eventTime { get; set; }
LE06 public Dictionary<string, string> data { get; set; }
LE07 public string Serialize()
LE08 {
LE09     return JsonConvert.SerializeObject(this);
LE10 }
LE11 }
```

QUESTION 1

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 need to ensure that authentication events are triggered and processed according to the authentication events policy.

Solution: Create a new Azure Event Grid subscription for all authentication that delivers messages to an Azure Event Hub. Use the subscription to process signout events.

Does the solution meet the goal?

- A. Yes
- B. No

Correct Answer: B

Section: [none]

Explanation

Explanation/Reference:

Explanation:

Use a separate Azure Event Grid topics and subscriptions for sign-in and sign-out events.

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Scenario: Authentication events are used to monitor users signing in and signing out. All authentication events must be processed by Policy service. Sign outs must be processed as quickly as possible.



Question Set 4

QUESTION 1

You are developing an internal website for employees to view sensitive data. The website uses Azure Active Directory (AAD) for authentication.

You need to implement multifactor authentication for the website.

What should you do? Each correct answer presents part of the solution.

NOTE: Each correct selection is worth one point.

- A. Upgrade to Azure AD Premium.
- B. In Azure AD conditional access, enable the baseline policy.
- C. In Azure AD, create a new conditional access policy.
- D. In Azure AD, enable application proxy.
- E. Configure the website to use Azure AD B2C.

Correct Answer: AC

Section: [none]

Explanation

Explanation/Reference:

Explanation:

A: Multi-Factor Authentication comes as part of the following offerings:

- Azure Active Directory Premium licenses - Full featured use of Azure Multi-Factor Authentication Service (Cloud) or Azure Multi-Factor Authentication Server (On-premises).
- Multi-Factor Authentication for Office 365
- Azure Active Directory Global Administrators

C: MFA Enabled by conditional access policy. It is the most flexible means to enable two-step verification for your users. Enabling using conditional access policy only works for Azure MFA in the cloud and is a premium feature of Azure AD.

References: <https://docs.microsoft.com/en-us/azure/active-directory/authentication/howto-mfa-getstarted>

QUESTION 2

You have an Azure App Services Web App Azure SQL Database instance Azure Storage Account, and an Azure Redis Cache instance in a resource group.

A developer must be able to publish code to the web app. You must grant the developer the Contributor role to the web app.

You need to grant the role.

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Which two commands can you use? Each correct answer presents a complete solution.

NOTE: Each correct selection is worth one point.

- A. az role assignment create
- B. az role definition create
- C. New-AzureRmRoleAssignment
- D. New-AzureRmRoleDefinition

Correct Answer: AC

Section: [none]

Explanation

Explanation/Reference:

Explanation:

A: The az role assignment create command creates a new role assignment for a user, group, or service principal.

Example: Create role assignment for an assignee. az role assignment create --assignee sp_name --role a_role

C: The New-AzureRmRoleAssignment command assigns the specified RBAC role to the specified principal, at the specified scope.

Incorrect Answers:

B, D: Creates a custom role in Azure RBAC.

References: <https://docs.microsoft.com/en-us/cli/azure/role/assignment?view=azure-cli-latest#az-role-assignment-create>
<https://docs.microsoft.com/en-us/powershell/module/azurerm.resources/new-azurermroleassignment?view=azurerm-ps-6.13.0>

QUESTION 3

You provide an Azure API Management managed web service to clients. The back-end web service implements HTTP Strict Transport Security (HSTS).

Every request to the backend service must include a valid HTTP authorization header.

You need to configure the Azure API Management instance with an authentication policy.

Which two policies can you use? Each correct answer presents a complete solution.

NOTE: Each correct selection is worth one point.

- A. OAuth Client Credential Grant

- B. Basic Authentication
- C. Certificate Authentication
- D. Digest Authentication

Correct Answer: AC

Section: [none]

Explanation

Explanation/Reference:



Testlet 1

Case Study

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Background

You are a developer for Proseware, Inc. You are developing an application that applies a set of governance policies for Proseware's internal services, external services, and applications. The application will also provide a shared library for common functionality.

Policy service

You develop and deploy a stateful ASP.NET Core 2.1 web application named Policy service to an Azure App Service Web App. The application reacts to events from Azure Event Grid and performs policy actions based on those events.

The application must include the Event Grid Event ID field in all Application Insights telemetry.

Policy service must use Application Insights to automatically scale with the number of policy actions that it is performing.

Other

Anomaly detection service

You have an anomaly detection service that analyzes log information for anomalies. It is implemented as an Azure Machine Learning model. The model is deployed as a web service.

If an anomaly is detected, an Azure Function that emails administrators is called by using an HTTP WebHook.

Health monitoring

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All web applications and services have health monitoring at the /health service endpoint.

Issues

Policy loss

When you deploy Policy service, policies may not be applied if they were in the process of being applied during the deployment.

Performance issue

When under heavy load, the anomaly detection service undergoes slowdowns and rejects connections.

Notification latency

Users report that anomaly detection emails can sometimes arrive several minutes after an anomaly is detected.

Policies

Log policy

All Azure App Service Web Apps must write logs to Azure Blob storage. All log files should be saved to a container named logdrop. Logs must remain in the container for 15 days.

Authentication events

Authentication events are used to monitor users signing in and signing out. All authentication events must be processed by Policy service. Sign outs must be processed as quickly as possible.

PolicyLib

You have a shared library named PolicyLib that contains functionality common to all ASP.NET Core web services and applications. The PolicyLib library must:

- Exclude non-user actions from Application Insights telemetry.
- Provide methods that allow a web service to scale itself.
- Ensure that scaling actions do not disrupt application usage.

Relevant portions of the app files are shown below. Line numbers are included for reference only and include a two-character prefix that denotes the specific file to which they belong.

EventGridController.cs

```
EG01 public class EventGridController : Controller
EG02 {
EG03     public static AsyncLocal<string> EventId = new AsyncLocal<string>();
EG04     public IActionResult Process([FromBody] string eventsJson)
EG05     {
EG06         var events = JObject.Parse(eventsJson);
EG07
EG08         foreach (var @event in events)
EG09         {
EG10             EventId.Value = @event["id"].ToString();
EG11             if (@event["topic"].ToString(). Contains("providers/Microsoft.Storage"))
EG12             {
EG13                 SendToAnomalyDetection Service(@event["data"]["url"].ToString());
EG14             }
EG15
EG16             {
EG17                 EnsureLogging(@event["subject"].ToString());
EG18             }
EG19         }
EG20         return null;
EG21     }
EG22     private void EnsureLogging(string resource)
EG23     {
EG24         . . .
EG25     }
EG26     private async Task SendToAnomalyDetectionService(string uri)
EG27     {
EG28         var content = GetLogData(uri)
EG29         var scoreRequest = new
EG30         {
EG31             Inputs = new Dictionary<string, List<Dictionary<string, string>>>()
EG32             {
EG33                 {
EG34                     "input1",
```

Relevant portions of the app files are shown below. Line numbers are included for reference only and include a two-character prefix that denotes the specific file to which they belong.

LoginEvent.cs

```
LE01 public class LoginEvent
LE02 {
LE03
LE04 public string subject { get ; set ; }
LE05 public DateTime eventTime { get ; set ; }
LE06 public Dictionary<string, string> data { get; set; }
LE07 public string Serialize()
LE08 {
LE09     return JsonConvert.SerializeObject(this);
LE10 }
LE11 }
```

QUESTION 1

You need to meet the scaling requirements for Policy Service.



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What should you store in Azure Redis Cache?

- A. TempData
- B. HttpContext.Items
- C. ViewState
- D. Session state

Correct Answer: D

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Section: [none]

Explanation

Explanation/Reference:

Explanation:

Azure Cache for Redis provides a session state provider that you can use to store your session state in-memory with Azure Cache for Redis instead of a SQL Server database.

Scenario: You have a shared library named PolicyLib that contains functionality common to all ASP.NET Core web services and applications. The PolicyLib library must:

Ensure that scaling actions do not disrupt application usage.

References: <https://docs.microsoft.com/en-us/azure/azure-cache-for-redis/cache-aspnet-session-state-provider>

QUESTION 2

You need to ensure that the solution can meet the scaling requirements for Policy Service.

Which Azure Application Insights data model should you use?

- A. an Application Insights metric
- B. an Application Insights trace
- C. an Application Insights dependency
- D. an Application Insights event



Correct Answer: A

Section: [none]

Explanation

Explanation/Reference:

Explanation:

Application Insights provides three additional data types for custom telemetry:

Trace - used either directly, or through an adapter to implement diagnostics logging using an instrumentation framework that is familiar to you, such as Log4Net or System.Diagnostics.

Event - typically used to capture user interaction with your service, to analyze usage patterns.

Metric - used to report periodic scalar measurements.

Scenario:

Policy service must use Application Insights to automatically scale with the number of policy actions that it is performing.

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References:

<https://docs.microsoft.com/en-us/azure/azure-monitor/app/data-model>



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Testlet 2

Case Study

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Background

You are a developer for Litware Inc., a SaaS company that provides a solution for managing employee expenses. The solution consists of an ASP.NET Core Web API project that is deployed as an Azure Web App.

Overall architecture

Employees upload receipts for the system to process. When processing is complete, the employee receives a summary report email that details the processing results. Employees then use a web application to manage their receipts and perform any additional tasks needed for reimbursement.

Receipt processing

Employees may upload receipts in two ways:

- Uploading using an Azure Files mounted folder
- Uploading using the web application

Data Storage

Receipt and employee information is stored in an Azure SQL database.

Documentation

Employees are provided with a getting started document when they first use the solution. The documentation includes details on supported operating systems for Azure File upload, and instructions on how to configure the mounted folder.

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Solution details

Users table

Column	Description
UserId	unique identifier for and employee
ExpenseAccount	employees expense account number in the format 1234-123-1234
AllowedAmount	limit of allowed expenses before approval is needed
SupervisorId	unique identifier for employee's supervisor
SecurityPin	value used to validate user identity

Web Application

You enable MSI for the Web App and configure the Web App to use the security principal name.

Processing

Processing is performed by an Azure Function that uses version 2 of the Azure Function runtime. Once processing is completed, results are stored in Azure Blob Storage and an Azure SQL database. Then, an email summary is sent to the user with a link to the processing report. The link to the report must remain valid if the email is forwarded to another user.

Requirements

Receipt processing

Concurrent processing of a receipt must be prevented.

Logging

Azure Application Insights is used for telemetry and logging in both the processor and the web application. The processor also has TraceWriter logging enabled. Application Insights must always contain all log messages.

Disaster recovery

Regional outage must not impact application availability. All DR operations must not be dependent on application running and must ensure that data in the DR region is up to date.

Security

- Users' SecurityPin must be stored in such a way that access to the database does not allow the viewing of SecurityPins. The web application is the only system that should have access to SecurityPins.
- All certificates and secrets used to secure data must be stored in Azure Key Vault.

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- You must adhere to the Least Privilege Principal and provide privileges which are essential to perform the intended function.
- All access to Azure Storage and Azure SQL database must use the application's Managed Service Identity (MSI) ▪ Receipt data must always be encrypted at rest.
- All data must be protected in transit.
- User's expense account number must be visible only to logged in users. All other views of the expense account number should include only the last segment with the remaining parts obscured.
- In the case of a security breach, access to all summary reports must be revoked without impacting other parts of the system.

Issues

Upload format issue

Employees occasionally report an issue with uploading a receipt using the web application. They report that when they upload a receipt using the Azure File Share, the receipt does not appear in their profile. When this occurs, they delete the file in the file share and use the web application, which returns a 500 Internal Server error page.

Capacity issue

During busy periods, employees report long delays between the time they upload the receipt and when it appears in the web application.

Log capacity issue

Developers report that the number of log messages in the trace output for the processor is too high, resulting in lost log messages.

Processing.cs

```
PC01 public static class Processing
PC02 {
PC03     public static class Function
PC04     {
PC05         [FunctionName ("IssueWork")]
PC06         public static async Task Run ([TimerTrigger("0 */5" ****")] TimerInfo timer, ILogger log)
PC07         {
PC08             var container = await GetCloudBlobContainer();
PC09             foreach (var fileItem in await ListFiles())
PC10             {
PC11                 var file = new CloudFile (fileItem.StorageUri.PrimaryUri);
PC12                 var ms = new MemoryStream();
PC13                 await file.DownloadToStreamAsync(ms);
PC14                 var blob = container.GetBlockBlobReference (fileItem.Uri.ToString());
PC15                 await blob.UploadFromStreamAsync(ms);
PC16             }
PC17         }
PC18     }
PC19     private static CloudBlockBlob GetDRBlob (CloudBlockBlob sourceBlob)
PC20     {
PC21         . . .
PC22     }
PC23     private static async Task<CloudBlobContainer> GetCloudBlobContainer()
PC24     {
PC25         var cloudBlobClient = new CloudBlobClient (new Uri(" . . ."), await GetCredentials());
PC26
PC27         await cloudBlobClient.GetRootContainerReference().CreatIfNotExistAsync();
PC28         return cloudBlobClient.GetRootContainerReference();
PC29     }
PC30     private static async Task<StorageCredentials> GetCredentials()
PC31     {
PC32         . . .
PC33     }
```

Database.cs

```
DB01 public class Database
DB02 {
DB03     private string ConnectionString =
DB04
DB05     public async Task<object> LoadUserDetails(string userId)
DB06     {
DB07
DB08     return await policy.ExecuteAsync (async () =>
DB09     {
DB10         using (var connection = new SqlConnection (ConnectionString))
DB11         {
DB12             await connection.OpenAsync();
DB13             using (var command = new SqlCommand("_", connection))
DB14             using (var reader = command.ExecuteReader())
DB15             {
DB16                 -
DB17             }
DB18         }
DB19     }
DB20 }
DB21 }
```

ReceiptUploader.cs

```
RU01 public class ReceiptUploader
RU02 {
RU03     public async Task UploadFile(string file, byte[ ] binary)
RU04     {
RU05         var httpClient = new HttpClient();
RU06         var response = await httpClient.PutAsync( "...", new ByteArrayContent(binary));
RU07         while (ShouldRetry (response))
RU08         {
RU09             response = await httpClient.PutAsync ( "...", new ByteArrayContent(binary));
RU10         }
RU11     }
RU12 private bool ShouldRetry(HttpResponseMessage response)
RU13 {
RU14
RU15     }
RU16 }
```

ConfigureSSE.ps1



```
CS01 $storageAccount = Get-AzureRmStorageAccount -ResourceGroupName "...\" -AccountName "...\"
CS02 $keyVault = Get-AzureRmKeyVault -VaultName "...\"
CS03 $key = Get-AzureKeyVaultKey -VaultName $keyVault.VaultName -Name "...\"
CS04 Set-AzureRmKeyVaultAccessPolicy'
CS05 -VaultName $keyVault.VaultName'
CS06 -ObjectId $storageAccount.Identity.PrincipalId'
CS07
CS08
CS09 Set-AzureRmStorageAccount''
CS10 -ResourceGroupName $storageAccount.ResourceGroupName'
CS11 -AccountName $storageAccount.StorageAccountName'
CS12 -EnableEncryptionService File `
CS13 -KeyvaultEncryption'
CS14 -KeyName $key.Name
CS15 -KeyVersion $key.Version'
CS16 -KeyVaultUri $keyVault.VaultUri
```



QUESTION 1

You need to resolve the log capacity issue.

What should you do?

- A. Set a LogCategoryFilter during startup.
- B. Create an Application Insights Telemetry Filter.
- C. Change the minimum log level in the host.json file for the function.
- D. Implement Application Insights Sampling.

Correct Answer: D

Section: [none]

Explanation

Explanation/Reference:

Explanation:

Scenario, the log capacity issue: Developers report that the number of log message in the trace output for the processor is too high, resulting in lost log messages.

Sampling is a feature in Azure Application Insights. It is the recommended way to reduce telemetry traffic and storage, while preserving a statistically correct analysis of application data. The filter selects items that are related, so that you can navigate between items when you are doing diagnostic investigations. When metric counts are presented to you in the portal, they are renormalized to take account of the sampling, to minimize any effect on the statistics.

Sampling reduces traffic and data costs, and helps you avoid throttling.

References: <https://docs.microsoft.com/en-us/azure/azure-monitor/app/sampling>

QUESTION 2

You need to resolve the capacity issue.

What should you do?

- A. Move the Azure Function to a dedicated App Service Plan.
- B. Convert the trigger on the Azure Function to a File Trigger.
- C. Ensure that the consumption plan is configured correctly to allow for scaling.
- D. Update the loop starting on line PC09 to process items in parallel.

Correct Answer: D

Section: [none]

Explanation

Explanation/Reference:

Explanation:

If you want to read the files in parallel, you cannot use forEach. Each of the async callback function calls does return a promise. You can await the array of promises that you'll get with Promise.all.

Scenario: Capacity issue: During busy periods, employees report long delays between the time they upload the receipt and when it appears in the web application.

```
PC08     var container = await GetCloudBlobContainer();
PC09     foreach (var fileItem in await ListFiles())
PC10     {
PC11         var file = new CloudFile (fileItem.StorageUri.PrimaryUri);
PC12         var ms = new MemoryStream();
PC13         await file.DownloadToStreamAsync(ms);
PC14         var blob = container.GetBlockBlobReference (fileItem.Uri.ToString());
PC15         await blob.UploadFromStreamAsync(ms);
PC16
PC17     }
```

References: <https://stackoverflow.com/questions/37576685/using-async-await-with-a-foreach-loop>

QUESTION 3

You need to ensure receipt processing occurs correctly.

What should you do?

- A. Use blob metadata to prevent concurrency problems.
- B. Use blob SnapshotTime to prevent concurrency problems.
- C. Use blob leases to prevent concurrency problems.
- D. Use blob properties to prevent concurrency problems.



Correct Answer: B

Section: [none]

Explanation

Explanation/Reference:

Explanation:

You can create a snapshot of a blob. A snapshot is a read-only version of a blob that's taken at a point in time. Once a snapshot has been created, it can be read, copied, or deleted, but not modified. Snapshots provide a way to back up a blob as it appears at a moment in time.

Scenario: Processing is performed by an Azure Function that uses version 2 of the Azure Function runtime. Once processing is completed, results are stored in Azure Blob Storage and an Azure SQL database. Then, an email summary is sent to the user with a link to the processing report. The link to the report must remain valid if the email is forwarded to another user.

References:

<https://docs.microsoft.com/en-us/rest/api/storageservices/creating-a-snapshot-of-a-blob>

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Testlet 3

Case Study

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LabelMaker app

Coho Winery produces bottles, and distributes a variety of wines globally. You are developer implementing highly scalable and resilient applications to support online order processing by using Azure solutions.

Coho Winery has a LabelMaker application that prints labels for wine bottles. The application sends **data** to several printers. The application consists of five modules that run independently on virtual machines (VMs). Coho Winery plans to move the application to Azure and continue to support label creation.

External partners send data to the **LabelMaker** application to include artwork and text for custom label designs.

Data

You identify the following requirements for data management and manipulation:

- Order data is stored as nonrelational JSON and must be queried using Structured Query Language (SQL).
- Changes to the Order data must reflect immediately across all partitions. All reads to the Order data must fetch the most recent writes.

You have the following security requirements:

- Users of Coho Winery applications must be able to provide access to documents, resources, and applications to external partners.
- External partners must use their own credentials and authenticate with their organization's identity management solution.
- External partner logins must be audited monthly for application use by a user account administrator to maintain company compliance.

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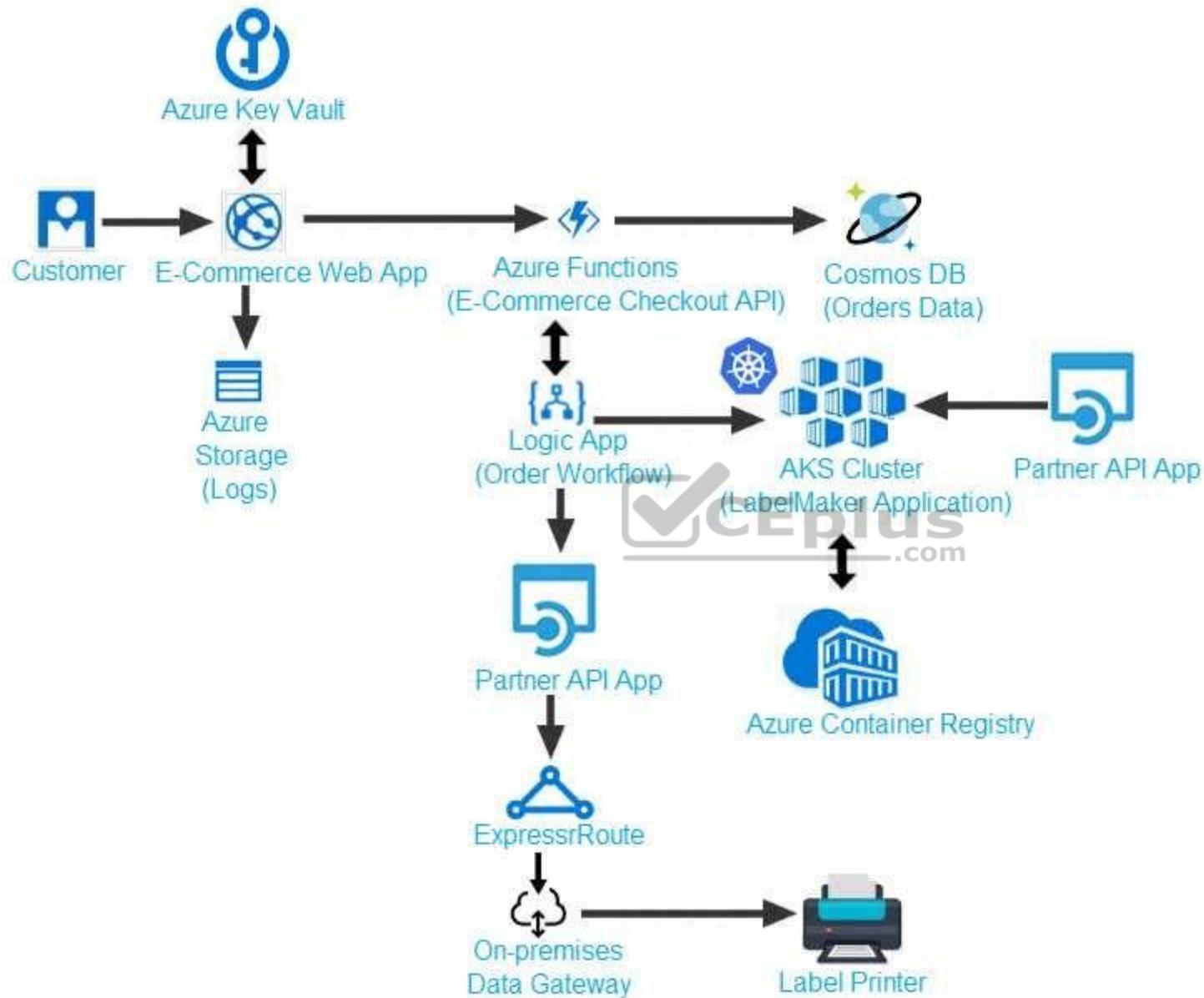
- Storage of e-commerce application settings must be maintained in Azure Key Vault.
- E-commerce application sign-ins must be secured by using Azure App Service authentication and Azure Active Directory (AAD).
- Conditional access policies must be applied at the application level to protect company content
 - The LabelMaker applications must be secured by using an AAD account that has full access to all namespaces of the Azure Kubernetes Service (AKS) cluster.

LabelMaker app

Azure Monitor Container Health must be used to monitor the performance of workloads that are deployed to Kubernetes environments and hosted on Azure Kubernetes Service (AKS).

You must use Azure Container Registry to publish images that support the AKS deployment.





Calls to the Printer API App fail periodically due to printer communication timeouts.

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Printer communications timeouts occur after 10 seconds. The label printer must only receive up to 5 attempts within one minute.

The order workflow fails to run upon initial deployment to Azure.

Order .json



```
01 {
02   "id" : 1,
03   "customers" : [
04     {
05       "familyName" : "Doe",
06       "givenName" : "John",
07       "customerid" : 5
08     }
09   ],
10   "line_items" : [
11     {
12       "fulfillable_quantity" : 1,
13       "id" : 6,
14       "price" : "199.99",
15       "product_id" : 7513594,
16       "quantity": 1,
17       "requires_shipping" : true,
18       "sku" : "SFC-342-N" ,
19       "title" : "Surface Go",
20       "vendor" : "Microsoft" ,
21       "name" : "Surface Go - 8GB",
22       "taxable" : true
```



QUESTION 1

You need to troubleshoot the order workflow.

What should you do? Each correct answer presents part of the solution.

NOTE: Each correct selection is worth one point.

- A. Review the trigger history.
- B. Review the API connections.
- C. Review the run history.
- D. Review the activity log.

Correct Answer: AD

Section: [none]

Explanation

Explanation/Reference:

Explanation:

Scenario: The order workflow fails to run upon initial deployment to Azure.

Deployment errors arise from conditions that occur during the deployment process. They appear in the activity log.

References:

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

Question Set 4

QUESTION 1

You are developing an ASP.NET Core Web API web service. The web service uses Azure Application Insights for all telemetry and dependency tracking. The web service reads and writes data to a database other than Microsoft SQL Server.

You need to ensure that dependency tracking works for calls to the third-party database.

Which two Dependency Telemetry properties should you store in the database? Each correct answer presents part of the solution.

NOTE: Each correct selection is worth one point.

- A. Telemetry.Context.Operation.Id
- B. Telemetry.Name
- C. Telemetry.Context.Cloud.RoleInstance
- D. Telemetry.Context.Session.Id

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E. Telemetry.Id

Correct Answer: AE

Section: [none]

Explanation

Explanation/Reference:

References: <https://docs.microsoft.com/en-us/azure/azure-monitor/app/custom-operations-tracking>

QUESTION 2

You are creating a hazard notification system that has a single signaling server which triggers audio and visual alarms to start and stop.

You implement Azure Service Bus to publish alarms. Each alarm controller uses Azure Service Bus to receive alarm signals as part of a transaction. Alarm events must be recorded for audit purposes. Each transaction record must include information about the alarm type that was activated.

You need to implement a reply trail auditing solution. Which two actions should you perform? Each correct answer presents part of the solution.

NOTE: Each correct selection is worth one point.

- A. Assign the value of the hazard message MessageId property to the DeliveryCount property.
- B. Assign the value of the hazard message SequenceNumber property to the DeliveryCount property.
- C. Assign the value of the hazard message MessageId property to the SequenceNumber property.
- D. Assign the value of the hazard message MessageId property to the CorrelationId property.
- E. Assign the value of the hazard message SessionID property to the SequenceNumber property..
- F. Assign the value of the hazard message SessionID property to the ReplyToSessionId property.

Correct Answer: DF

Section: [none]

Explanation

Explanation/Reference:

Explanation:

D: CorrelationId: Enables an application to specify a context for the message for the purposes of correlation; for example, reflecting the MessageId of a message that is being replied to.

F: ReplyToSessionId: This value augments the ReplyTo information and specifies which SessionId should be set for the reply when sent to the reply entity.

Incorrect Answers:

A, B: DeliveryCount

Number of deliveries that have been attempted for this message. The count is incremented when a message lock expires, or the message is explicitly abandoned by the receiver. This property is read-only.

C, E: SequenceNumber

The sequence number is a unique 64-bit integer assigned to a message as it is accepted and stored by the broker and functions as its true identifier. For partitioned entities, the topmost 16 bits reflect the partition identifier. Sequence numbers monotonically increase and are gapless. They roll over to 0 when the 48-64 bit range is exhausted. This property is read-only.

References: <https://docs.microsoft.com/en-us/azure/service-bus-messaging/service-bus-messages-payloads>

QUESTION 3

You develop a gateway solution for a public facing news API. The news API back end is implemented as a RESTful service and uses an OpenAPI specification.

You need to ensure that you can access the news API by using an Azure API Management service instance.

Which Azure PowerShell command should you run?

- A. `Import-AzureRmApiManagementApi -Context $ApiMgmtContext -SpecificationFormat "Swagger" -SpecificationPath $SwaggerPath -Path $Path`
- B. `New-AzureRmApiManagementBackend -Context $ApiMgmtContext -Url $Url -Protocol http`
- C. `New-AzureRmApiManagement -ResourceGroupName $ResourceGroup -Name $Name -Location $Location -Organization $Org -AdminEmail $AdminEmail`
- D. `New-AzureRmApiManagementBackendProxy -Url $ApiUrl`

Correct Answer: D

Section: [none]

Explanation

Explanation/Reference:

Explanation:

New-AzureRmApiManagementBackendProxy creates a new Backend Proxy Object which can be piped when creating a new Backend entity.

Example: Create a Backend Proxy In-Memory Object

```
PS C:\>$secpassword = ConvertTo-SecureString "PlainTextPassword" -AsPlainText -Force
```

```
PS C:\>$proxyCreds = New-Object System.Management.Automation.PSCredential ("foo", $secpassword)
```

```
PS C:\>$credential = New-AzureRmApiManagementBackendProxy -Url "http://12.168.1.1:8080" -ProxyCredential $proxyCreds
```

```
PS C:\>$apimContext = New-AzureRmApiManagementContext -ResourceGroupName "Api-Default-WestUS" -ServiceName "contoso"
```

```
PS C:\>$backend = New-AzureRmApiManagementBackend -Context $apimContext -BackendId 123 -Url 'https://contoso.com/awesomeapi' -Protocol http -Title "first backend" -SkipCertificateChainValidation $true -Proxy $credential -Description "backend with proxy server" Creates a Backend Proxy Object and sets up Backend
```

Incorrect Answers:

A: The Import-AzureRmApiManagementApi cmdlet imports an Azure API Management API from a file or a URL in Web Application Description Language (WADL), Web Services Description Language (WSDL), or Swagger format.

B: New-AzureRmApiManagementBackend creates a new backend entity in Api Management.

C: The New-AzureRmApiManagement cmdlet creates an API Management deployment in Azure API Management.

References: <https://docs.microsoft.com/en-us/powershell/module/azure/arm.apimanagement/new-azurermapimanagementbackendproxy?view=azurermps-6.13.0>

QUESTION 4

You are developing a project management service by using ASP.NET. The service hosts conversations, files, to-do lists, and a calendar that users can interact with at any time.

The application uses Azure Search for allowing users to search for keywords in the project data.

You need to implement code that creates the object which is used to create indexes in the Azure Search service.

Which two objects should you use? Each correct answer presents part of the solution.

NOTE: Each correct selection is worth one point.

- A. SearchCredentials
- B. SearchIndexClient
- C. SearchServiceClient
- D. SearchService

Correct Answer: BC

Section: [none]

Explanation

Explanation/Reference:

Explanation:

The various client libraries define classes like Index, Field, and Document, as well as operations like Indexes.Create and Documents.Search on the SearchServiceClient and SearchIndexClient classes.

Example:

The sample application we'll be exploring creates a new index named "hotels", populates it with a few documents, then executes some search queries. Here is the main program, showing the overall flow:

```
/ This sample shows how to delete, create, upload documents and query an index
static void Main(string[] args)
{
    IConfigurationBuilder builder = new ConfigurationBuilder().AddJsonFile("appsettings.json");
    IConfigurationRoot configuration = builder.Build();

    SearchServiceClient serviceClient = CreateSearchServiceClient(configuration);

    Console.WriteLine("{0}", "Deleting index...\n");
    DeleteHotelsIndexIfExists(serviceClient);

    Console.WriteLine("{0}", "Creating index...\n");
    CreateHotelsIndex(serviceClient);

    ISearchIndexClient indexClient = serviceClient.Indexes.GetClient("hotels");
}
```

References: <https://docs.microsoft.com/en-us/azure/search/search-howto-dotnet-sdk>

QUESTION 5

DRAG DROP

You develop a web app that uses the tier D1 app service plan by using the Web App feature of Microsoft Azure App Service.

Spikes in traffic have caused increases in page load times.

You need to ensure that the web app automatically scales when CPU load is about 85 percent and minimize costs.

Which four 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.

NOTE: More than one order of answer choices is correct. You will receive credit for any of the correct orders you select.

Select and Place:

Actions	Answer Area
Enable autoscaling on the web app.	
Configure a Scale condition.	
Configure the web app to the Standard App Service tier. ⏪	⏩
Configure the web app to the Premium App Service tier. ⏩	⏪
Switch to an Azure App Services consumption plan	
Add a Scale rule.	

Correct Answer:

Actions	Answer Area
Enable autoscaling on the web app.	Configure the web app to the Standard App Service tier.
Configure a Scale condition.	Enable autoscaling on the web app.
Configure the web app to the Standard App Service tier. ⏪	Add a Scale rule. ⏩
Configure the web app to the Premium App Service tier. ⏩	Configure a Scale condition. ⏪
Switch to an Azure App Services consumption plan	
Add a Scale rule.	

Section: [none]

Explanation

Explanation/Reference:

Explanation:

Step 1: Configure the web app to the Standard App Service Tier
The Standard tier supports auto-scaling, and we should minimize the cost.

Step 2: Enable autoscaling on the web app
First enable autoscale

Step 3: Add a scale rule Step 4:

Add a Scale condidation

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References:

<https://docs.microsoft.com/en-us/azure/monitoring-and-diagnostics/monitoring-autoscale-get-started>

<https://azure.microsoft.com/en-us/pricing/details/app-service/plans/>



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.

Background

You are a developer for Proseware, Inc. You are developing an application that applies a set of governance policies for Proseware's internal services, external services, and applications. The application will also provide a shared library for common functionality.

Policy service

You develop and deploy a stateful ASP.NET Core 2.1 web application named Policy service to an Azure App Service Web App. The application reacts to events from Azure Event Grid and performs policy actions based on those events.

The application must include the Event Grid Event ID field in all Application Insights telemetry.

Policy service must use Application Insights to automatically scale with the number of policy actions that it is performing.

Other

Anomaly detection service

You have an anomaly detection service that analyzes log information for anomalies. It is implemented as an Azure Machine Learning model. The model is deployed as a web service.

If an anomaly is detected, an Azure Function that emails administrators is called by using an HTTP WebHook.

Health monitoring

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All web applications and services have health monitoring at the /health service endpoint.

Issues

Policy loss

When you deploy Policy service, policies may not be applied if they were in the process of being applied during the deployment.

Performance issue

When under heavy load, the anomaly detection service undergoes slowdowns and rejects connections.

Notification latency

Users report that anomaly detection emails can sometimes arrive several minutes after an anomaly is detected.

Policies

Log policy

All Azure App Service Web Apps must write logs to Azure Blob storage. All log files should be saved to a container named logdrop. Logs must remain in the container for 15 days.

Authentication events

Authentication events are used to monitor users signing in and signing out. All authentication events must be processed by Policy service. Sign outs must be processed as quickly as possible.

PolicyLib

You have a shared library named PolicyLib that contains functionality common to all ASP.NET Core web services and applications. The PolicyLib library must:

- Exclude non-user actions from Application Insights telemetry.
- Provide methods that allow a web service to scale itself.
- Ensure that scaling actions do not disrupt application usage.

Relevant portions of the app files are shown below. Line numbers are included for reference only and include a two-character prefix that denotes the specific file to which they belong.

EventGridController.cs

```
EG01 public class EventGridController : Controller
EG02 {
EG03     public static AsyncLocal<string> EventId = new AsyncLocal<string>();
EG04     public IActionResult Process([FromBody] string eventsJson)
EG05     {
EG06         var events = JObject.Parse(eventsJson);
EG07
EG08         foreach (var @event in events)
EG09         {
EG10             EventId.Value = @event["id"].ToString();
EG11             if (@event["topic"].ToString(). Contains("providers/Microsoft.Storage"))
EG12             {
EG13                 SendToAnomalyDetection Service(@event["data"]["url"].ToString());
EG14             }
EG15
EG16             {
EG17                 EnsureLogging(@event["subject"].ToString());
EG18             }
EG19         }
EG20         return null;
EG21     }
EG22     private void EnsureLogging(string resource)
EG23     {
EG24         . . .
EG25     }
EG26     private async Task SendToAnomalyDetectionService(string uri)
EG27     {
EG28         var content = GetLogData(uri)
EG29         var scoreRequest = new
EG30         {
EG31             Inputs = new Dictionary<string, List<Dictionary<string, string>>>()
EG32             {
EG33                 {
EG34                     "input1",
```

Relevant portions of the app files are shown below. Line numbers are included for reference only and include a two-character prefix that denotes the specific file to which they belong.

LoginEvent.cs

```
LE01 public class LoginEvent
LE02 {
LE03
LE04 public string subject { get ; set ; }
LE05 public DateTime eventTime { get ; set ; }
LE06 public Dictionary<string, string> data { get; set; }
LE07 public string Serialize()
LE08 {
LE09     return JsonConvert.SerializeObject(this);
LE10 }
LE11 }
```

QUESTION 1

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

You need to ensure that authentication events are triggered and processed according to the authentication events policy.

Solution: Create a new Azure Event Grid topic and add a subscription for the events.

Does the solution meet the goal?

- A. Yes
- B. No

Correct Answer: B

Section: [none]

Explanation

Explanation/Reference:

Explanation:

Instead ensure that signout events have a subject prefix. Create an Azure Event Grid subscription that uses the subjectBeginsWith filter.

Scenario: Authentication events are used to monitor users signing in and signing out. All authentication events must be processed by Policy service. Sign outs must be processed as quickly as possible.

QUESTION 2

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

You need to ensure that authentication events are triggered and processed according to the authentication events policy.

Solution: Create separate Azure Event Grid topics and subscriptions for sign-in and sign-out events.

Does the solution meet the goal?

- A. Yes
- B. No

Correct Answer: B

Section: [none]

Explanation

Explanation/Reference:

Explanation:

Instead ensure that signout events have a subject prefix. Create an Azure Event Grid subscription that uses the subjectBeginsWith filter.

Scenario: Authentication events are used to monitor users signing in and signing out. All authentication events must be processed by Policy service. Sign outs must be processed as quickly as possible.

QUESTION 3

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

You need to ensure that authentication events are triggered and processed according to the authentication events policy.

Solution: Ensure that signout events have a subject prefix. Create an Azure Event Grid subscription that uses the subjectBeginsWith filter.

Does the solution meet the goal?

- A. Yes

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B. No

Correct Answer: A

Section: [none]

Explanation

Explanation/Reference:

Explanation:

Scenario: Authentication events are used to monitor users signing in and signing out. All authentication events must be processed by Policy service. Sign outs must be processed as quickly as possible.

References: <https://docs.microsoft.com/en-us/azure/event-grid/subscription-creation-schema>

QUESTION 4

DRAG DROP

You need to add code at line EG15 in EventGridController.cs to ensure that the Log policy applies to all services.

How should you complete the code? To answer, drag the appropriate code segments to the correct locations. Each code segment 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:

Code segments	Answer Area
topic	<pre> if (Event["data"]["] .ToString() == ") { Event["data"]["] .ToString() == "Microsoft.Web/sites/write" } </pre>
status	
eventType	
Succeeded	
operationName	
resourceProvider	

Correct Answer:

Code segments	Answer Area
topic:	if {
status	Event["data"][" status "].ToString() == " Succeeded "
eventType:	++
Succeeded	Event["data"][" operationName "].ToString() == "Microsoft.Web/sites/write"
operationName:	}
resourceProvider	

Section: [none]

Explanation

Explanation/Reference:

Explanation:

Scenario, Log policy: All Azure App Service Web Apps must write logs to Azure Blob storage.

Box 1: Status

Box 2: Succeeded

Box 3: operationName

Microsoft.Web/sites/write is resource provider operation. It creates a new Web App or updates an existing one.

References:

<https://docs.microsoft.com/en-us/azure/role-based-access-control/resource-provider-operations>

Question Set 2

QUESTION 1

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.

Margie's Travel is an international travel and bookings management service. The company is expanding into restaurant bookings. You are tasked with implementing Azure Search for the restaurants listed in their solution.

You create the index in Azure Search.

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You need to import the restaurant data into the Azure Search service by using the Azure Search .NET SDK.

Solution:

1. Create a SearchServiceClient object to connect to the search index.
2. Create a DataContainer that contains the documents which must be added.
3. Create a DataSource instance and set its Container property to the DataContainer.
4. Call the Documents.Suggest method of the SearchIndexClient and pass the DataSource.

Does the solution meet the goal?

- A. Yes
- B. No



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Correct Answer: B

Section: [none]

Explanation

Explanation/Reference:

Explanation: Use the following method:

1. - Create a SearchIndexClient object to connect to the search index
2. - Create an IndexBatch that contains the documents which must be added.
3. - Call the Documents.Index method of the SearchIndexClient and pass the IndexBatch.

References: <https://docs.microsoft.com/en-us/azure/search/search-howto-dotnet-sdk>

QUESTION 2

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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.

Margie's Travel is an international travel and bookings management service. The company is expanding into restaurant bookings. You are tasked with implementing Azure Search for the restaurants listed in their solution.

You create the index in Azure Search.

You need to import the restaurant data into the Azure Search service by using the Azure Search .NET SDK.

Solution:

1. Create a SearchIndexClient object to connect to the search index
2. Create an IndexBatch that contains the documents which must be added.
3. Call the Documents.Index method of the SearchIndexClient and pass the IndexBatch.

Does the solution meet the goal?

- A. Yes
- B. No



Correct Answer: A

Section: [none]

Explanation

Explanation/Reference:

Explanation:

1. The index needs to be populated. To do this, we will need a SearchIndexClient. There are two ways to obtain one: by constructing it, or by calling Indexes.GetClient on the SearchServiceClient. Here we will use the first method.
2. Create the indexBatch with the documents

Something like:

```
var hotels = new Hotel[];  
{  
    new Hotel()  
    {  
        HotelId = "3",  
        BaseRate = 129.99,  
    }  
}
```

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```
        Description = "Close to town hall and the river"  
    }  
};  
...  
var batch = IndexBatch.Upload(hotels);
```

3. The next step is to populate the newly-created index

Example:

```
var batch = IndexBatch.Upload(hotels);
```

```
try  
{  
    indexClient.Documents.Index(batch);  
}
```

References: <https://docs.microsoft.com/en-us/azure/search/search-howto-dotnet-sdk>

QUESTION 3

DRAG DROP



You develop software solutions for a mobile delivery service. You are developing a mobile app that users can use to order from a restaurant in their area. The app uses the following workflow:

1. - A driver selects the restaurants for which they will deliver orders.
2. - Orders are sent to all available drivers in an area.
3. - Only orders for the selected restaurants will appear for the driver.
4. - The first driver to accept an order removes it from the list of available orders.

You need to implement an Azure Service Bus solution.

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 a Service Bus subscription for each restaurant for which a driver can receive orders.	
Create a single Service Bus topic.	
Create a single Service Bus subscription.	⬅
Create a Service Bus topic for each restaurant for which a driver can receive messages.	➡
Create a single Service Bus Namespace.	⬆
Create a Service Bus Namespace for each restaurant for which a driver can receive messages.	⬇

Correct Answer:

Actions	Answer area
Create a Service Bus subscription for each restaurant for which a driver can receive orders.	Create a single Service Bus Namespace.
Create a single Service Bus topic.	Create a Service Bus topic for each restaurant for which a driver can receive messages.
Create a single Service Bus subscription.	Create a Service Bus subscription for each restaurant for which a driver can receive orders. ⬆
Create a Service Bus topic for each restaurant for which a driver can receive messages.	⬇
Create a single Service Bus Namespace.	
Create a Service Bus Namespace for each restaurant for which a driver can receive messages.	

Section: [none]
Explanation

Explanation/Reference:

Explanation:

Box 1: Create a single Service Bus Namespace

To begin using Service Bus messaging entities in Azure, you must first create a namespace with a name that is unique across Azure. A namespace provides a scoping container for addressing Service Bus resources within your application.

Box 2: Create a Service Bus Topic for each restaurant for which a driver can receive messages.
Create topics.

Box 3: Create a Service Bus subscription for each restaurant for which a driver can receive orders.
Topics can have multiple, independent subscriptions.

References: <https://docs.microsoft.com/en-us/azure/service-bus-messaging/service-bus-messaging-overview>

QUESTION 4

A company is implementing a publish-subscribe (Pub/Sub) messaging component by using Azure Service Bus. You are developing the first subscription application.

In the Azure portal you see that messages are being sent to the subscription for each topic. You create and initialize a subscription client object by supplying the correct details, but the subscription application is still not consuming the messages.

You need to complete the source code of the subscription client

What should you do?

- A. `await subscriptionClient.CloseAsync();`
- B. `await subscriptionClient.AddRuleAsync(new RuleDescription(RuleDescription.DefaultRuleName, new TrueFilter()));`
- C. `subscriptionClient.RegisterMessageHandler(ProcessMessagesAsync, messageHandlerOptions);`
- D. `subscriptionClient = new SubscriptionClient(ServiceBusConnectionString, TopicName, SubscriptionName);`

Correct Answer: C

Section: [none]

Explanation

Explanation/Reference:

Explanation:

Using topic client, call RegisterMessageHandler which is used to receive messages continuously from the entity. It registers a message handler and begins a new thread to receive messages. This handler is waited on every time a new message is received by the receiver.

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```
subscriptionClient.RegisterMessageHandler(ReceiveMessagesAsync, messageHandlerOptions);
```

References: <https://www.c-sharpcorner.com/article/azure-service-bus-topic-and-subscription-pub-sub/>

QUESTION 5

DRAG DROP

You have an application that provides weather forecasting data to external partners. You use Azure API Management to publish APIs.

You must change the behavior of the API to meet the following requirements:

- Support alternative input parameters.
- Remove formatting text from responses.
- Provide additional context to back-end services.

Which types of policies should you implement? To answer, drag the policy types to the correct scenarios. Each policy type 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:



Answer Area

Policy types	Requirement	Policy type
<input type="text" value="Inbound"/>	Rewrite the request URL to match to the format expected by the web service.	<input type="text"/>
<input type="text" value="Outbound"/>	Remove formatting text from responses.	<input type="text"/>
<input type="text" value="Backend"/>	Forward the user ID that is associated with the subscription key for the original request to the back-end service	<input type="text"/>

Correct Answer:

Answer Area

Policy types	Requirement	Policy type
<input type="checkbox"/> Inbound	Rewrite the request URL to match to the format expected by the web service.	<input type="checkbox"/> Outbound
<input type="checkbox"/> Outbound	Remove formatting text from responses.	<input type="checkbox"/> Inbound
<input type="checkbox"/> Backend	Forward the user ID that is associated with the subscription key for the original request to the back-end service	<input type="checkbox"/> Backend

Section: [none]

Explanation

Explanation/Reference:

Explanation:



QUESTION 6

HOTSPOT

You are developing a .NET Core MVC application for customers to research hotels. The application will use Azure Search. The application will search the index by using various criteria to locate documents related to hotels. The index will include search fields for rate, a list of amenities, and distance to the nearest airport.

The application must support the following scenarios for specifying search criteria and organizing results:

- Search the index by using regular expressions.
- Organize results by counts for name-value pairs.
- List hotels within a specified distance to an airport and that fall within a specific price range.

You need to configure the SearchParameters class.

Which properties should you configure? To answer, select the appropriate options in the answer area.

NOTE: Each correct selection is worth one point.

Hot Area:

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Answer Area

Scenario	Property								
Search the index by using regular expressions.	<table border="1"><tr><td></td><td>▼</td></tr><tr><td>QueryType</td><td></td></tr><tr><td>OrderBy</td><td></td></tr><tr><td>SearchMode</td><td></td></tr></table>		▼	QueryType		OrderBy		SearchMode	
	▼								
QueryType									
OrderBy									
SearchMode									
Organize results by counts for name-value pairs.	<table border="1"><tr><td></td><td>▼</td></tr><tr><td>Facets</td><td></td></tr><tr><td>Filter</td><td></td></tr><tr><td>SearchMode</td><td></td></tr></table>		▼	Facets		Filter		SearchMode	
	▼								
Facets									
Filter									
SearchMode									
List hotels within a specified distance to an airport and that fall within a specific price range.	<table border="1"><tr><td></td><td>▼</td></tr><tr><td>Order by</td><td></td></tr><tr><td>Top</td><td></td></tr><tr><td>Filter</td><td></td></tr></table>		▼	Order by		Top		Filter	
	▼								
Order by									
Top									
Filter									

Correct Answer:

Answer Area

Scenario	Property
Search the index by using regular expressions.	<div style="border: 1px solid black; padding: 2px;"> <div style="background-color: #cccccc; padding: 2px; text-align: right;">▼</div> <div style="padding: 2px;"> <p>QueryType</p> <p>OrderBy</p> <p>SearchMode</p> </div> </div>
Organize results by counts for name-value pairs.	<div style="border: 1px solid black; padding: 2px;"> <div style="background-color: #cccccc; padding: 2px; text-align: right;">▼</div> <div style="padding: 2px;"> <p>Facets</p> <p>Filter</p> <p>SearchMode</p> </div> </div>
List hotels within a specified distance to an airport and that fall within a specific price range.	<div style="border: 1px solid black; padding: 2px;"> <div style="background-color: #cccccc; padding: 2px; text-align: right;">▼</div> <div style="padding: 2px;"> <p>Order by</p> <p>Top</p> <p>Filter</p> </div> </div>

Section: [none]

Explanation

Explanation/Reference:

Explanation:

Box 1: QueryType

The SearchParameters.QueryType Property gets or sets a value that specifies the syntax of the search query. The default is 'simple'. Use 'full' if your query uses the Lucene query syntax.

You can write queries against Azure Search based on the rich Lucene Query Parser syntax for specialized query forms: wildcard, fuzzy search, proximity search, regular expressions are a few examples.

Box 2: Facets

The facets property gets or sets the list of facet expressions to apply to the search query. Each facet expression contains a field name, optionally followed by a comma-separated list of name:value pairs.

Box 3: Filter

The Filter property gets or sets the OData \$filter expression to apply to the search query.

References:

<https://docs.microsoft.com/en-us/dotnet/api/microsoft.azure.search.models.searchparameters> <https://docs.microsoft.com/en-us/azure/search/query-lucene-syntax> <https://docs.microsoft.com/en-us/dotnet/api/microsoft.azure.search.models.searchparameters.querytype>

QUESTION 7

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.

Margie's Travel is an international travel and bookings management service. The company is expanding into restaurant bookings. You are tasked with implementing Azure Search for the restaurants listed in their solution.

You create the index in Azure Search.

You need to import the restaurant data into the Azure Search service by using the Azure Search .NET SDK.

Solution:

1. Create a SearchIndexClient object to connect to the search index.
2. Create a DataContainer that contains the documents which must be added.
3. Create a DataSource instance and set its Container property to the DataContainer.
4. Call the Documents.Suggest method of the SearchIndexClient and pass the DataSource.

Does the solution meet the goal?

- A. Yes
- B. No

Correct Answer: B

Section: [none]

Explanation

Explanation/Reference:

Explanation:

Use the following method:

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1. - Create a SearchIndexClient object to connect to the search index
2. - Create an IndexBatch that contains the documents which must be added.
3. - Call the Documents.Index method of the SearchIndexClient and pass the IndexBatch.

References: <https://docs.microsoft.com/en-us/azure/search/search-howto-dotnet-sdk>

QUESTION 8

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.

Margie's Travel is an international travel and bookings management service. The company is expanding into restaurant bookings. You are tasked with implementing Azure Search for the restaurants listed in their solution.

You create the index in Azure Search.

You need to import the restaurant data into the Azure Search service by using the Azure Search .NET SDK.

Solution:

1. Create a SearchServiceClient object to connect to the search index.
2. Create a DataContainer that contains the documents which must be added.
3. Create a DataSource instance and set its Container property to the DataContainer.
4. Set the DataSources property of the SearchServiceClient.

Does the solution meet the goal?

- A. Yes
- B. No

Correct Answer: B

Section: [none]

Explanation

Explanation/Reference:

Explanation:

Use the following method:

1. - Create a SearchIndexClient object to connect to the search index
2. - Create an IndexBatch that contains the documents which must be added.

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3. - Call the Documents.Index method of the SearchIndexClient and pass the IndexBatch.

References: <https://docs.microsoft.com/en-us/azure/search/search-howto-dotnet-sdk>



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