

# Developing Solutions for Microsoft Azure

AZ-204

AllDumpz

[sales@alldumpz.com](mailto:sales@alldumpz.com)

## Develop Azure compute solutions

### Testlet 1

#### Case study

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#### Current environment

##### Windows Server 2016 virtual machine

This virtual machine (VM) runs BizTalk 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 trucking 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.

#### Shipping Web Site

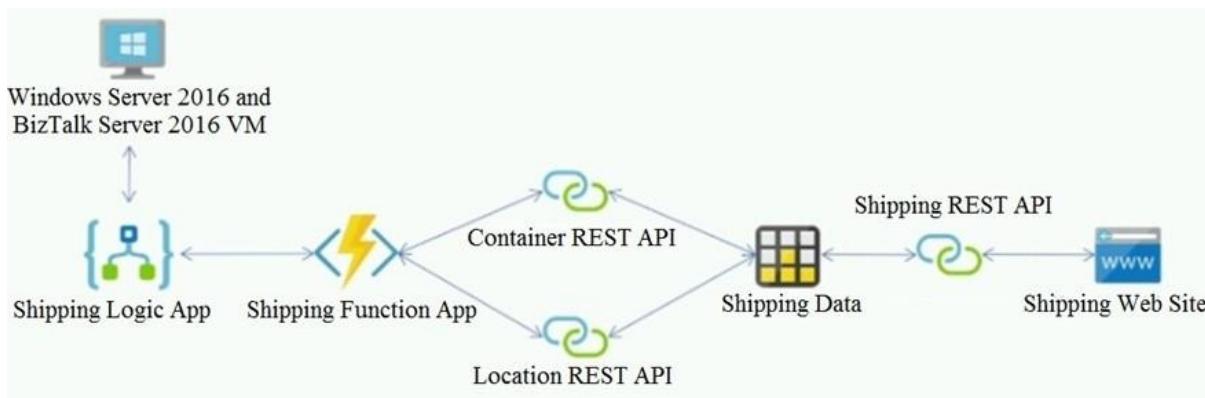
The site displays shipping container tracking information and container contents. The site is located at <http://shipping.wideworldimporters.com/>

#### Proposed solution

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:

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## Requirements

### 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.
- 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:

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

## QUESTION 1

### HOTSPOT

You need to configure Azure CDN for the Shipping web site.

Which configuration options should you use? To answer, select the appropriate options in the answer area.

**NOTE:** Each correct selection is worth one point.

**Hot Area:**

## Answer Area

Option	Value
Tier	<div style="border: 1px solid black; padding: 5px; width: fit-content;"><p>Standard</p><p>Premium</p></div>
Profile	<div style="border: 1px solid black; padding: 5px; width: fit-content;"><p>Akamai</p><p>Microsoft</p></div>
Optimization	<div style="border: 1px solid black; padding: 5px; width: fit-content;"><p>general web delivery</p><p>large file download</p><p>dynamic site acceleration</p><p>video-on-demand media streaming</p></div>

**Correct Answer:**

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## Answer Area

Option	Value
Tier	<div style="border: 1px solid black; padding: 5px; width: fit-content;"><div style="background-color: #c8e6c9; border-bottom: 1px solid black; padding: 2px;">Standard</div><div style="border-bottom: 1px solid black; padding: 2px;">Premium</div></div>
Profile	<div style="border: 1px solid black; padding: 5px; width: fit-content;"><div style="background-color: #c8e6c9; border-bottom: 1px solid black; padding: 2px;">Akamai</div><div style="border-bottom: 1px solid black; padding: 2px;">Microsoft</div></div>
Optimization	<div style="border: 1px solid black; padding: 5px; width: fit-content;"><div style="background-color: #c8e6c9; border-bottom: 1px solid black; padding: 2px;">general web delivery</div><div style="border-bottom: 1px solid black; padding: 2px;">large file download</div><div style="background-color: #c8e6c9; border-bottom: 1px solid black; padding: 2px;">dynamic site acceleration</div><div style="border-bottom: 1px solid black; padding: 2px;">video-on-demand media streaming</div></div>

**Section: (none)**

**Explanation**

**Explanation/Reference:**

Explanation:

Scenario: Shipping website

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

Tier: Standard

Profile: Akamai

Optimization: Dynamic site acceleration

Dynamic site acceleration (DSA) is available for Azure CDN Standard from Akamai, Azure CDN Standard from Verizon, and Azure CDN Premium from Verizon profiles.

DSA includes various techniques that benefit the latency and performance of dynamic content. Techniques include route and network optimization, TCP optimization, and more.

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You can use this optimization to accelerate a web app that includes numerous responses that aren't cacheable. Examples are search results, checkout transactions, or real-time data. You can continue to use core Azure CDN caching capabilities for static data.

Reference: <https://docs.microsoft.com/en-us/azure/cdn/cdn-optimization-overview>

## QUESTION 2 HOTSPOT

You need to correct the VM issues.

Which tools should you use? To answer, select the appropriate options in the answer area.

**NOTE:** Each correct selection is worth one point.

**Hot Area:**

### Answer Area

Issue	Tool
Backup and Restore	<div style="border: 1px solid black; padding: 5px;"><ul style="list-style-type: none"><li>Azure Site Recovery</li><li>Azure Backup</li><li>Azure Data Box</li><li>Azure Migrate</li></ul></div>
Performance	<div style="border: 1px solid black; padding: 5px;"><ul style="list-style-type: none"><li>Azure Network Watcher</li><li>Azure Traffic Manager</li><li>ExpressRoute</li><li>Accelerated Networking</li></ul></div>

**Correct Answer:**

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## Answer Area

Issue	Tool
Backup and Restore	Azure Site Recovery Azure Backup Azure Data Box Azure Migrate
Performance	Azure Network Watcher Azure Traffic Manager ExpressRoute Accelerated Networking

### Section: (none)

#### Explanation

#### Explanation/Reference:

Explanation:

#### Box 1: Azure Backup

The VM is critical and has not been backed up in the past. The VM must enable a quick restore from a 7day snapshot to include in-place restore of disks in case of failure.

In-Place restore of disks in IaaS VMs is a feature of Azure Backup.

#### Performance: Accelerated Networking

Scenario: The VM shows high network latency, jitter, and high CPU utilization.

#### Box 2: Accelerated networking

The VM shows high network latency, jitter, and high CPU utilization.

Accelerated networking enables single root I/O virtualization (SR-IOV) to a VM, greatly improving its networking performance. This high-performance path bypasses the host from the datapath, reducing latency, jitter, and CPU utilization, for use with the most demanding network workloads on supported VM types.

#### Reference:

<https://azure.microsoft.com/en-us/blog/an-easy-way-to-bring-back-your-azure-vm-with-in-place-restore/> **Develop Azure compute solutions**

#### Testlet 2

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### **Background**

City Power & Light company provides electrical infrastructure monitoring solutions for homes and businesses. The company is migrating solutions to Azure.

### **Current environment**

#### **Architecture overview**

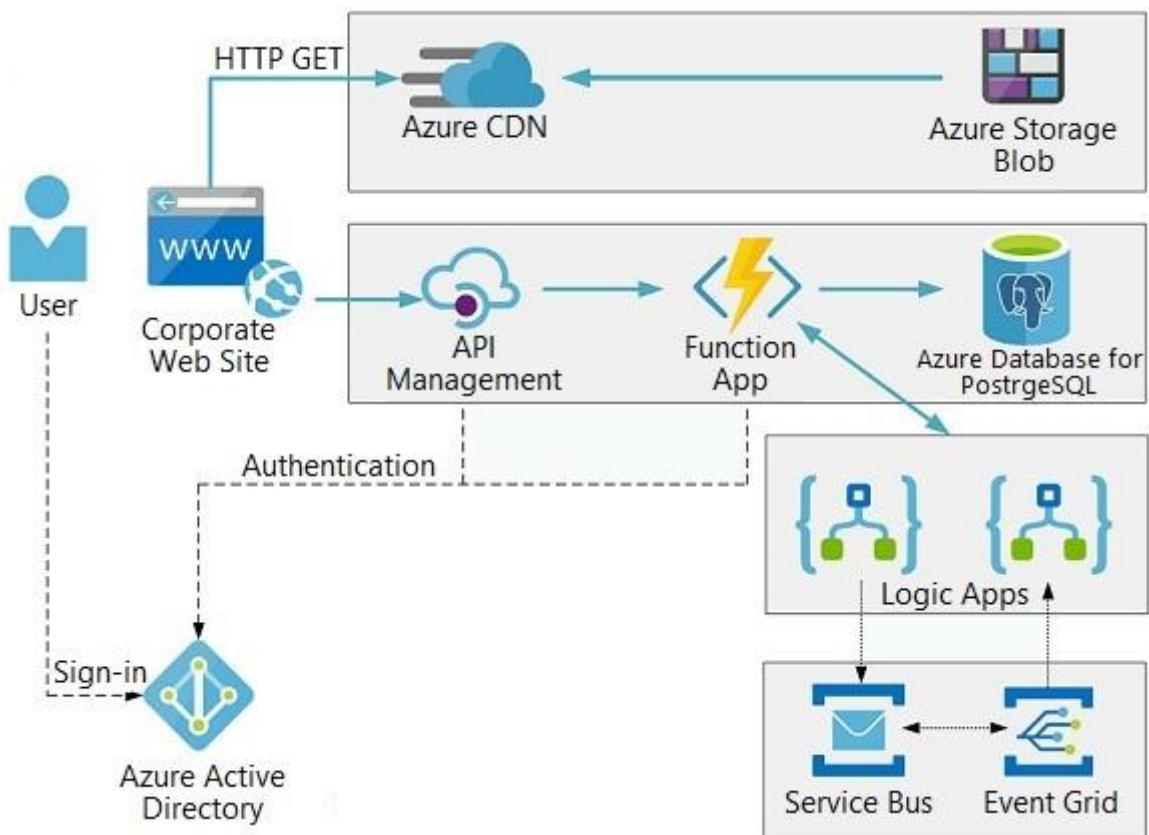
The company has a public website located at <http://www.cpandl.com/>. The site is a single-page web application that runs in Azure App Service on Linux. The website uses files stored in Azure Storage and cached in Azure Content Delivery Network (CDN) to serve static content.

API Management and Azure Function App functions are used to process and store data in Azure Database for PostgreSQL. API Management is used to broker communications to the Azure Function app functions for Logic app integration. Logic apps are used to orchestrate the data processing while Service Bus and Event Grid handle messaging and events.

The solution uses Application Insights, Azure Monitor, and Azure Key Vault.

#### **Architecture diagram**

The company has several applications and services that support their business. The company plans to implement serverless computing where possible. The overall architecture is shown below.



## User authentication

The following steps detail the user authentication process:

1. The user selects **Sign in** in the website.
2. The browser redirects the user to the Azure Active Directory (Azure AD) sign in page.
3. The user signs in.
4. Azure AD redirects the user's session back to the web application. The URL includes an access token.
5. The web application calls an API and includes the access token in the authentication header. The application ID is sent as the audience ('aud') claim in the access token.
6. The back-end API validates the access token.

## Requirements

### Corporate website

- Communications and content must be secured by using SSL.
- Communications must use HTTPS.
- Data must be replicated to a secondary region and three availability zones.
- Data storage costs must be minimized.

### Azure Database for PostgreSQL

The database connection string is stored in Azure Key Vault with the following attributes:

- Azure Key Vault name: cpandlkeyvault
- Secret name: PostgreSQLConn
- Id: 80df3e46ffcd4f1cb187f79905e9a1e8

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The connection information is updated frequently. The application must always use the latest information to connect to the database.

## Azure Service Bus and Azure Event Grid

- Azure Event Grid must use Azure Service Bus for queue-based load leveling.
- Events in Azure Event Grid must be routed directly to Service Bus queues for use in buffering. ▪ Events from Azure Service Bus and other Azure services must continue to be routed to Azure Event Grid for processing.

## Security

- All SSL certificates and credentials must be stored in Azure Key Vault.
- File access must restrict access by IP, protocol, and Azure AD rights.
- All user accounts and processes must receive only those privileges which are essential to perform their intended function.

## Compliance

Auditing of the file updates and transfers must be enabled to comply with General Data Protection Regulation (GDPR). The file updates must be read-only, stored in the order in which they occurred, include only create, update, delete, and copy operations, and be retained for compliance reasons.

## Issues

### Corporate website

While testing the site, the following error message displays:

```
CryptographicException: The system cannot find the file specified.
```

### Function app

You perform local testing for the RequestUserApproval function. The following error message displays:

```
'Timeout value of 00:10:00 exceeded by function: RequestUserApproval'
```

The same error message displays when you test the function in an Azure development environment when you run the following Kusto query:

```
FunctionAppLogs  
| where FunctionName == "RequestUserApproval"
```

### Logic app

You test the Logic app in a development environment. The following error message displays:

```
'400 Bad Request'
```

Troubleshooting of the error shows an HttpTrigger action to call the RequestUserApproval function.

## Code

### Corporate website

Security.cs:

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```

SC01 public class Security
SC02 {
SC03 var bytes = System.IO.File.ReadAllBytes("~/var/ssl/private");
SC04 var cert = new System.Security.Cryptography.X509Certificate2(bytes);
SC05 var certName = cert.FriendlyName;
SC06 }

```

## Function app

RequestUserApproval.cs:

```

RA01 public static class RequestUserApproval
RA02 {
RA03 [FunctionName("RequestUserApproval")]
RA04 public static async Task<IActionResult> Run(
RA05 [HttpTrigger(AuthorizationLevel.Function, "get", "post", Route = null)] HttpRequest req,
ILogger log)
RA06 {
RA07     log.LogInformation("RequestUserApproval function processed a request.");
RA08 ...
RA09     return ProcessRequest(req)
RA10     ? (ActionResult)new OkObjectResult($"User approval processed")
RA11     : new BadRequestObjectResult("Failed to process user approval");
RA12 }
RA13 private static bool ProcessRequest(HttpRequest req)
RA14 {
RA15     ...
RA16 }
RA17 }

```

## QUESTION 1

You need to correct the RequestUserApproval Function app error.

What should you do?

- A. Update line RA13 to use the `async` keyword and return an `HttpRequest` object value.
- B. Configure the Function app to use an App Service hosting plan. Enable the **Always On** setting of the hosting plan.
- C. Update the function to be stateful by using Durable Functions to process the request payload.
- D. Update the `functionTimeout` property of the `host.json` project file to 15 minutes.

**Correct Answer:** C

**Section:** (none)

**Explanation**

**Explanation/Reference:**

Explanation:

Async operation tracking

The HTTP response mentioned previously is designed to help implement long-running HTTP async APIs with Durable Functions. This pattern is sometimes referred to as the polling consumer pattern.

Both the client and server implementations of this pattern are built into the Durable Functions HTTP APIs.

## Function app

You perform local testing for the RequestUserApproval function. The following error message displays: 'Timeout value of 00:10:00 exceeded by function: RequestUserApproval'

The same error message displays when you test the function in an Azure development environment when you run the following Kusto query:

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```
FunctionAppLogs  
| where FunctionName == "RequestUserApproval"
```

Reference:

<https://docs.microsoft.com/en-us/azure/azure-functions/durable/durable-functions-http-features>

## Develop Azure compute solutions

### Testlet 3

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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.

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## **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.

## **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.

## **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.

## **App code**

### **EventGridController.cs**

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.

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```

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 = JArray.Parse(eventsJson);
EG07         foreach (var @event in events)
EG08         {
EG09             EventId.Value = @event["id"].ToString();
EG10             if (@event["topic"].ToString().Contains("providers/Microsoft.Storage"))
EG11             {
EG12                 SendToAnomalyDetectionService(@event["data"]["url"].ToString());
EG13             }
EG14         }
EG15         {
EG16             EnsureLogging(@event["subject"].ToString());
EG17         }
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                 "input1",
EG34                 new List<Dictionary<string, string>>()
EG35                 {
EG36                     new Dictionary<string, string>()
EG37                     {
EG38                         "logcontent", content
EG39                     }
EG40                 }
EG41             }
EG42         },
EG43     },
EG44     GlobalParameters = new Dictionary<string, string>() { }
EG45 };
EG46     var result = await (new HttpClient()).PostAsJsonAsync("...", scoreRequest);
EG47     var rawModelResult = await result.Content.ReadAsStringAsync();
EG48     var modelResult = JObject.Parse(rawModelResult);
EG49     if (modelResult["notify"].HasValues)
EG50     {
EG51         . . .
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 }

```

## LoginEvent.cs

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 }

```

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## QUESTION 1

You need to resolve a notification latency issue.

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

**NOTE:** Each correct selection is worth one point.

- A. Set Always On to **true**.
- B. Ensure that the Azure Function is using an App Service plan.
- C. Set Always On to **false**.
- D. Ensure that the Azure Function is set to use a consumption plan.

**Correct Answer:** AB

**Section:** (none)

**Explanation**

**Explanation/Reference:**

Explanation:

Azure Functions can run on either a Consumption Plan or a dedicated App Service Plan. If you run in a dedicated mode, you need to turn on the Always On setting for your Function App to run properly. The Function runtime will go idle after a few minutes of inactivity, so only HTTP triggers will actually "wake up" your functions. This is similar to how WebJobs must have Always On enabled.

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

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.

Reference: <https://github.com/Azure/Azure-Functions/wiki/Enable-Always-On-when-running-on-dedicated-App-ServicePlan>

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### Testlet 4

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business requirements, existing environment, and problem statements. When you are ready to answer a question, click the **Question** button to return to the question.

## Background

### Overview

You are a developer for Contoso, Ltd. The company has a social networking website that is developed as a Single Page Application (SPA). The main web application for the social networking website loads user uploaded content from blob storage.

You are developing a solution to monitor uploaded data for inappropriate content. The following process occurs when users upload content by using the SPA:

- Messages are sent to ContentUploadService.
- Content is processed by ContentAnalysisService.
- After processing is complete, the content is posted to the social network or a rejection message is posted in its place.

The ContentAnalysisService is deployed with Azure Container Instances from a private Azure Container Registry named contosoimages.

The solution will use eight CPU cores.

### Azure Active Directory

Contoso, Ltd. uses Azure Active Directory (Azure AD) for both internal and guest accounts.

### Requirements

#### ContentAnalysisService

The company's data science group built ContentAnalysisService which accepts user generated content as a string and returns a probable value for inappropriate content. Any values over a specific threshold must be reviewed by an employee of Contoso, Ltd.

You must create an Azure Function named CheckUserContent to perform the content checks.

### Costs

You must minimize costs for all Azure services.

### Manual review

To review content, the user must authenticate to the website portion of the ContentAnalysisService using their Azure AD credentials. The website is built using React and all pages and API endpoints require authentication. In order to review content a user must be part of a ContentReviewer role. All completed reviews must include the reviewer's email address for auditing purposes.

### High availability

All services must run in multiple regions. The failure of any service in a region must not impact overall application availability.

### Monitoring

An alert must be raised if the ContentUploadService uses more than 80 percent of available CPU cores.

### Security

You have the following security requirements:

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- Any web service accessible over the Internet must be protected from cross site scripting attacks.
- All websites and services must use SSL from a valid root certificate authority.
- Azure Storage access keys must only be stored in memory and must be available only to the service.
- All Internal services must only be accessible from internal Virtual Networks (VNets).
- All parts of the system must support inbound and outbound traffic restrictions. ▪ All service calls must be authenticated by using Azure AD.

## User agreements

When a user submits content, they must agree to a user agreement. The agreement allows employees of Contoso, Ltd. to review content, store cookies on user devices, and track user's IP addresses.

Information regarding agreements is used by multiple divisions within Contoso, Ltd.

User responses must not be lost and must be available to all parties regardless of individual service uptime. The volume of agreements is expected to be in the millions per hour.

## Validation testing

When a new version of the ContentAnalysisService is available the previous seven days of content must be processed with the new version to verify that the new version does not significantly deviate from the old version.

## Issues

Users of the ContentUploadService report that they occasionally see HTTP 502 responses on specific pages.

## Code

### ContentUploadService

```

CS01 apiVersion: '2018-10-01'
CS02 type: Microsoft.ContainerInstance/containerGroups
CS03 location: westus
CS04 name: contentUploadService
CS05 properties:
CS06   containers:
CS07     - name: service
CS08       properties:
CS09         image: contoso/contentUploadService:latest
CS10       ports:
CS11         - port: 80
CS12           protocol: TCP
CS13       resources:
CS14         requests:
CS15           cpu: 1.0
CS16           memoryInGB: 1.5
CS17
CS18 ipAddress:
CS19   ip: 10.23.121.112
CS20   ports:
CS21     - port: 80
CS22       protocol: TCP
CS23
CS24
CS25 networkProfile:
CS26
id: /subscriptions/98...19/resourceGroups/container/providers/Microsoft.Network/networkProfiles/subnet

```

## ApplicationManifest

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```
AM01 {
AM02     "id" : "2b079f03-9b06-2d44-98bb-e9182901fcb6",
AM03     "appId" : "7118a7f0-b5c2-4c9d-833c-3d711396fe65",
AM04
AM05     "createdDateTime" : "2019-12-24T06:01:44Z",
AM06     "logoUrl" : null,
AM07     "logoutUrl" : null,
AM08     "name" : "ContentAnalysisService",
AM09
AM10
AM11     "orgRestrictions" : [],
AM12     "parentalControlSettings" : {
AM13         "countriesBlockedForMinors" : [],
AM14         "legalAgeGroupRule" : "Allow"
AM15     },
AM16     "passwordCredentials" : []
AM17 }
```

#### QUESTION 1 HOTSPOT

You need to ensure that validation testing is triggered per the requirements.

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

**NOTE:** Each correct selection is worth one point.

**Hot Area:**

## Answer Area

```
var event = getEvent();
if (event.eventType === 'ImagePushed') {
    && event.data.target === 'contentanalysisservice'
    && event.type.contains('contosoimages'))
{
    startValidationTesting();
}
```

ImagePushed  
RepositoryItem  
ImageDeployed  
RepositoryUpdated

aci  
image  
service  
repository

topic  
service  
repository  
imageCollection

**Correct Answer:**

## Answer Area

```
var event = getEvent();
if (event.eventType === 'RepositoryUpdated')
    && event.data.target === 'contentanalysisservice'
    && event.data.imageCollection.contains('contosoimages'))
{
    startValidationTesting();
}
```

The screenshot shows a code editor with a context menu open. The menu has three dropdown boxes. The top box contains four items: 'ImagePushed', 'RepositoryItem', 'ImageDeployed', and 'RepositoryUpdated', with 'RepositoryUpdated' highlighted. The middle box contains four items: 'aci', 'image', 'service', and 'repository', with 'service' highlighted. The bottom box contains four items: 'topic', 'service', 'repository', and 'imageCollection', with 'imageCollection' highlighted.

### Section: (none)

### Explanation

#### Explanation/Reference:

Explanation:

Box 1: RepositoryUpdated

When a new version of the ContentAnalysisService is available the previous seven days of content must be processed with the new version to verify that the new version does not significantly deviate from the old version.

Box 2: service Box 3:

imageCollection

Reference: <https://docs.microsoft.com/en-us/azure/devops/notifications/oob-supported-event-types>

### Develop Azure compute solutions

## Question Set 5

### QUESTION 1

#### HOTSPOT

You are developing an ASP.NET Core web application. You plan to deploy the application to Azure Web App for Containers.

The application needs to store runtime diagnostic data that must be persisted across application restarts. You have the following code:

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```

public void SaveDiagData(string data)
{
    var path = Environment.GetEnvironmentVariable("DIAGDATA");
    File.WriteAllText(Path.Combine(path, "data"), data);
}

```

You need to configure the application settings so that diagnostic data is stored as required.

How should you configure the web app's settings? To answer, select the appropriate options in the answer area.

**NOTE:** Each correct selection is worth one point.

**Hot Area:**

### Answer Area

App setting	Value
LOCALAPPDATA	true
WEBSITE_LOCALCACHE_ENABLED	
DOTNET_HOSTING_OPTIMIZATION_CACHE	
WEBSITES_ENABLE_APP_SERVICE_STORAGE	
DIAGDATA	/home /local D:\home D:\local

**Correct Answer:**

### Answer Area

App setting	Value
LOCALAPPDATA	true
WEBSITE_LOCALCACHE_ENABLED	
DOTNET_HOSTING_OPTIMIZATION_CACHE	
WEBSITES_ENABLE_APP_SERVICE_STORAGE	
DIAGDATA	/home /local D:\home D:\local

**Section: (none)**

**Explanation**

**Explanation/Reference:**

Explanation:

Box 1: If WEBSITES\_ENABLE\_APP\_SERVICE\_STORAGE

If WEBSITES\_ENABLE\_APP\_SERVICE\_STORAGE setting is unspecified or set to true, the /home/ directory will be shared across scale instances, and files written will persist across restarts

Box 2: /home

Reference: <https://docs.microsoft.com/en-us/azure/app-service/containers/app-service-linux-faq>

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## QUESTION 2

You are developing a web app that is protected by Azure Web Application Firewall (WAF). All traffic to the web app is routed through an Azure Application Gateway instance that is used by multiple web apps. The web app address is contoso.azurewebsites.net.

All traffic must be secured with SSL. The Azure Application Gateway instance is used by multiple web apps.

You need to configure the Azure Application Gateway for the web app.

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

**NOTE:** Each correct selection is worth one point.

- A. In the Azure Application Gateway's HTTP setting, enable the **Use for App service** setting.
- B. Convert the web app to run in an Azure App service environment (ASE).
- C. Add an authentication certificate for contoso.azurewebsites.net to the Azure Application Gateway.
- D. In the Azure Application Gateway's HTTP setting, set the value of the Override backend path option to **contoso22.azurewebsites.net**.

**Correct Answer:** AD

**Section:** (none)

**Explanation**

**Explanation/Reference:**

Explanation:

D: The ability to specify a host override is defined in the HTTP settings and can be applied to any back-end pool during rule creation.

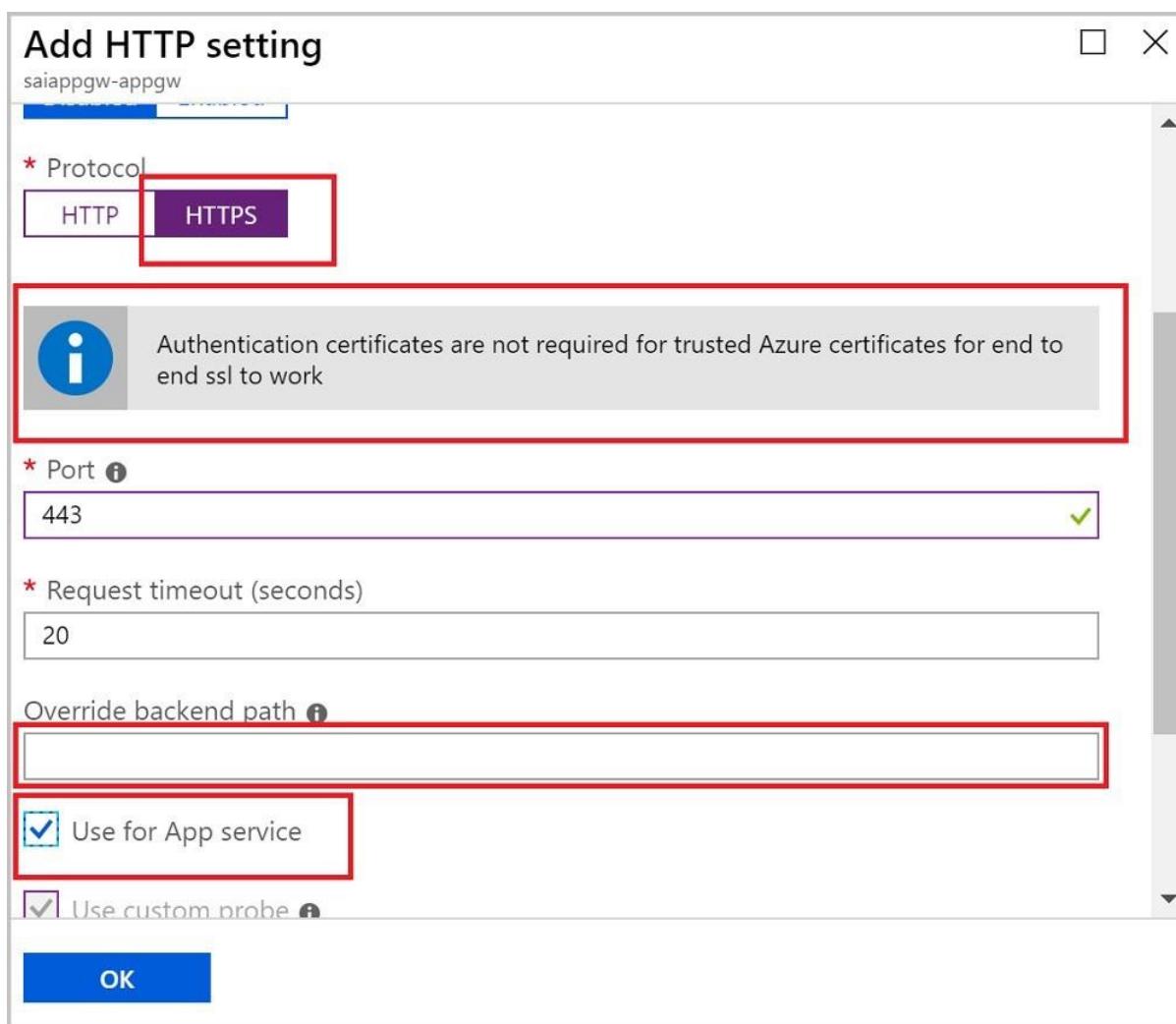
The ability to derive the host name from the IP or FQDN of the back-end pool members. HTTP settings also provide an option to dynamically pick the host name from a back-end pool member's FQDN if configured with the option to derive host name from an individual back-end pool member.

A (not C): SSL termination and end to end SSL with multi-tenant services.

In case of end to end SSL, trusted Azure services such as Azure App service web apps do not require whitelisting the backends in the application gateway. Therefore, there is no need to add any authentication certificates.

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Reference: <https://docs.microsoft.com/en-us/azure/application-gateway/application-gateway-web-app-overview>

### QUESTION 3

#### HOTSPOT

You are implementing a software as a service (SaaS) ASP.NET Core web service that will run as an Azure Web App. The web service will use an on-premises SQL Server database for storage. The web service also includes a WebJob that processes data updates. Four customers will use the web service.

- Each instance of the WebJob processes data for a single customer and must run as a singleton instance.
- Each deployment must be tested by using deployment slots prior to serving production data.
- Azure costs must be minimized.
- Azure resources must be located in an isolated network.

You need to configure the App Service plan for the Web App.

How should you configure the App Service plan? To answer, select the appropriate settings in the answer area.

**NOTE:** Each correct selection is worth one point.

**Hot Area:**

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## Answer Area

App service plan setting	Value				
Number of VM instances	<table><tr><td>2</td></tr><tr><td>4</td></tr><tr><td>8</td></tr><tr><td>16</td></tr></table>	2	4	8	16
2					
4					
8					
16					
Pricing tier	<table><tr><td>Isolated</td></tr><tr><td>Standard</td></tr><tr><td>Premium</td></tr><tr><td>Consumption</td></tr></table>	Isolated	Standard	Premium	Consumption
Isolated					
Standard					
Premium					
Consumption					

Correct Answer:

## Answer Area

App service plan setting	Value				
Number of VM instances	<table><tr><td>2</td></tr><tr><td>4</td></tr><tr><td>8</td></tr><tr><td>16</td></tr></table>	2	4	8	16
2					
4					
8					
16					
Pricing tier	<table><tr><td>Isolated</td></tr><tr><td>Standard</td></tr><tr><td>Premium</td></tr><tr><td>Consumption</td></tr></table>	Isolated	Standard	Premium	Consumption
Isolated					
Standard					
Premium					
Consumption					

Section: (none)

Explanation

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**Explanation/Reference:**

Explanation:

Number of VM instances: 4

You are not charged extra for deployment slots.

Pricing tier: Isolated

The App Service Environment (ASE) is a powerful feature offering of the Azure App Service that gives network isolation and improved scale capabilities. It is essentially a deployment of the Azure App Service into a subnet of a customer's Azure Virtual Network (VNet).

Reference: <https://azure.microsoft.com/sv-se/blog/announcing-app-service-isolated-more-power-scale-and-ease-of-use/>

**QUESTION 4 DRAG**

DROP

You are a developer for a software as a service (SaaS) company that uses an Azure Function to process orders. The Azure Function currently runs on an Azure Function app that is triggered by an Azure Storage queue.

You are preparing to migrate the Azure Function to Kubernetes using Kubernetes-based Event Driven Autoscaling (KEDA).

You need to configure Kubernetes Custom Resource Definitions (CRD) for the Azure Function.

Which CRDs should you configure? To answer, drag the appropriate CRD types to the correct locations. Each CRD 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**

CRD types	Setting	CRD type
Secret	Azure Function code	
Deployment		
ScaledObject	Polling interval	
TriggerAuthentication	Azure Storage connection string	

**Correct Answer:**

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sales@alldumpz.com

## Answer Area

CRD types	Setting	CRD type
Secret	Azure Function code	Deployment
Deployment	Polling interval	ScaledObject
ScaledObject	Azure Storage connection string	Secret
TriggerAuthentication		

### Section: (none)

#### Explanation

#### Explanation/Reference:

Explanation:

#### Box 1: Deployment

To deploy Azure Functions to Kubernetes use the func kubernetes deploy command has several attributes that directly control how our app scales, once it is deployed to Kubernetes.

#### Box 2: ScaledObject

With --polling-interval, we can control the interval used by KEDA to check Azure Service Bus Queue for messages.

Example of ScaledObject with polling interval

apiVersion: keda.k8s.io/v1alpha1 kind:

ScaledObject metadata:

```
  name: transformer-fn  namespace: tt
  labels:  deploymentName:
  transformer-fn spec:  scaleTargetRef:
  deploymentName: transformer-fn
    pollingInterval: 5  minReplicaCount:
  0  maxReplicaCount: 100
```

#### Box 3: Secret

Store connection strings in Kubernetes Secrets.

Example: to create the Secret in our demo Namespace:

```
# create the k8s demo namespace kubectl
create namespace tt

# grab connection string from Azure Service Bus
KEDA_SCALER_CONNECTION_STRING=$(az servicebus queue authorization-rule keys list \ -g
$RG_NAME \
--namespace-name $SBN_NAME \
--queue-name inbound \
-n keda-scaler \
--query "primaryConnectionString" \ -o
tsv)
```

```
# create the kubernetes secret kubectl create
secret generic tt-keda-auth \ --from-literal
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```

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```
KedaScaler=$KEDA_SCALER_CONNECTION_ST  
RING \ --namespace tt
```

Reference: <https://www.thinktecture.com/en/kubernetes/serverless-workloads-with-keda/>

## QUESTION 5

### HOTSPOT

You are creating a CLI script that creates an Azure web app and related services in Azure App Service. The web app uses the following variables:

Variable name	Value
\$gitrepo	<a href="https://github.com/Contos/webapp">https://github.com/Contos/webapp</a>
\$webappname	Webapp1103

You need to automatically deploy code from GitHub to the newly created web app.

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

**NOTE:** Each correct selection is worth one point.

### Hot Area:

#### Answer Area

```
az group create --location westeurope --name myResourceGroup  
    --name $webappname --resource-group myResourceGroup --sku FREE  
az webapp  
az appservice plan create  
az webapp deployment  
az group delete  
  
az webapp create  
az appservice plan create  
az webapp deployment  
az group delete  
  
--repo-url $gitrepo --branch master --manual-integration  
git clone $gitrepo  
-plan $webappname  
  
az webapp  
az appservice plan create  
az webapp deployment  
az group delete  
  
--resource-group myResourceGroup  
    --repo-url $gitrepo --branch master --manual-integration  
    git clone $gitrepo  
    -plan $webappname
```

### Correct Answer:

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## Answer Area

```
az group create --location westeurope --name myResourceGroup  
az webapp  
az appservice plan create  
az webapp deployment  
az group delete  
  
az webapp create  
az appservice plan create  
az webapp deployment  
az group delete  
  
--repo-url $gitrepo --branch master --manual-integration  
git clone $gitrepo  
--plan $webappname  
  
az webapp  
az appservice plan create  
az webapp deployment  
az group delete  
--resource-group myResourceGroup  
--repo-url $gitrepo --branch master --manual-integration  
git clone $gitrepo  
--plan $webappname
```

### Section: (none)

#### Explanation

#### Explanation/Reference:

Explanation:

Box 1: az appservice plan create

The azure group creates command successfully returns JSON result. Now we can use resource group to create a azure app service plan

Box 2: az webapp create Create a new web app..

Box 3: --plan \$webappname

..with the serviceplan we created in step 1.

Box 4: az webapp deployment

Continuous Delivery with GitHub. Example: az webapp deployment source config --name firstsamplewebsite1 --resource-group websites--repo-url \$gitrepo --branch master --git-token \$token

Box 5: --repo-url \$gitrepo --branch master --manual-integration

Reference: <https://medium.com/@satish1v/devops-your-way-to-azure-web-apps-with-azure-cli-206ed4b3e9b1>

#### QUESTION 6

Note: This question is part of a series of questions that present the same scenario. Each question in the series contains a unique solution that might meet the stated goals. Some question sets might have more than one correct solution, while others might not have a correct solution.

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**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 develop a software as a service (SaaS) offering to manage photographs. Users upload photos to a web service which then stores the photos in Azure Storage Blob storage. The storage account type is General-purpose V2.

When photos are uploaded, they must be processed to produce and save a mobile-friendly version of the image. The process to produce a mobile-friendly version of the image must start in less than one minute.

You need to design the process that starts the photo processing. Solution:

Trigger the photo processing from Blob storage events.

Does the solution meet the goal?

A. Yes

B. No

**Correct Answer: B**

**Section: (none)**

**Explanation**

**Explanation/Reference:**

Explanation:

You need to catch the triggered event, so move the photo processing to an Azure Function triggered from the blob upload

Note: Azure Storage events allow applications to react to events. Common Blob storage event scenarios include image or video processing, search indexing, or any file-oriented workflow.

Events are pushed using Azure Event Grid to subscribers such as Azure Functions, Azure Logic Apps, or even to your own http listener.

Note: Only storage accounts of kind StorageV2 (general purpose v2) and BlobStorage support event integration. Storage (general purpose v1) does not support integration with Event Grid.

Reference: <https://docs.microsoft.com/en-us/azure/storage/blobs/storage-blob-event-overview>

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

You develop and deploy an Azure App Service API app to a Windows-hosted deployment slot named Development. You create additional deployment slots named **Testing** and **Production**. You enable auto swap on the Production deployment slot.

You need to ensure that scripts run and resources are available before a swap operation occurs.

Solution: Update the web.config file to include the applicationInitialization configuration element. Specify custom initialization actions to run the scripts.

Does the solution meet the goal?

A. No

B. Yes

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**Correct Answer:** A

**Section:** (none)

**Explanation**

**Explanation/Reference:**

Explanation:

Specify custom warm-up.

Some apps might require custom warm-up actions before the swap. The applicationInitialization configuration element in web.config lets you specify custom initialization actions. The swap operation waits for this custom warm-up to finish before swapping with the target slot. Here's a sample web.config fragment.

```
<system.webServer>
  <applicationInitialization>
    <add initializationPage="/" hostName="[app hostname]" />
    <add initializationPage="/Home/About" hostName="[app hostname]" />
  </applicationInitialization>
</system.webServer>
```

Reference: <https://docs.microsoft.com/en-us/azure/app-service/deploy-staging-slots#troubleshoot-swaps>

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

You develop and deploy an Azure App Service API app to a Windows-hosted deployment slot named Development. You create additional deployment slots named **Testing** and **Production**. You enable auto swap on the Production deployment slot.

You need to ensure that scripts run and resources are available before a swap operation occurs.

Solution: Enable auto swap for the Testing slot. Deploy the app to the Testing slot.

Does the solution meet the goal?

A. No

B. Yes

**Correct Answer:** B

**Section:** (none)

**Explanation**

**Explanation/Reference:**

Explanation:

Instead update the web.config file to include the applicationInitialization configuration element. Specify custom initialization actions to run the scripts.

Note: Some apps might require custom warm-up actions before the swap. The applicationInitialization configuration element in web.config lets you specify custom initialization actions. The swap operation waits for this custom warm-up to finish before swapping with the target slot. Here's a sample web.config fragment.

```
<system.webServer>
  <applicationInitialization>
    <add initializationPage="/" hostName="[app hostname]" />
    <add initializationPage="/Home/About" hostName="[app hostname]" />
  </applicationInitialization>
</system.webServer>
```

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Reference: <https://docs.microsoft.com/en-us/azure/app-service/deploy-staging-slots#troubleshoot-swaps>

### 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 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 develop and deploy an Azure App Service API app to a Windows-hosted deployment slot named Development. You create additional deployment slots named **Testing** and **Production**. You enable auto swap on the Production deployment slot.

You need to ensure that scripts run and resources are available before a swap operation occurs.

Solution: Disable auto swap. Update the app with a method named statuscheck to run the scripts. Reenable auto swap and deploy the app to the Production slot.

Does the solution meet the goal?

- A. No
- B. Yes

**Correct Answer:** B

**Section:** (none)

**Explanation**

**Explanation/Reference:**

Explanation:

Instead update the web.config file to include the applicationInitialization configuration element. Specify custom initialization actions to run the scripts.

Note: Some apps might require custom warm-up actions before the swap. The applicationInitialization configuration element in web.config lets you specify custom initialization actions. The swap operation waits for this custom warm-up to finish before swapping with the target slot. Here's a sample web.config fragment.

```
<system.webServer>
  <applicationInitialization>
    <add initializationPage="/" hostName="[app hostname]" />
    <add initializationPage="/Home/About" hostName="[app hostname]" />
  </applicationInitialization>
</system.webServer>
```

Reference:

<https://docs.microsoft.com/en-us/azure/app-service/deploy-staging-slots#troubleshoot-swaps>

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

You develop a software as a service (SaaS) offering to manage photographs. Users upload photos to a web service which then stores the photos in Azure Storage Blob storage. The storage account type is General-purpose V2.

When photos are uploaded, they must be processed to produce and save a mobile-friendly version of the image. The process to produce a mobile-friendly version of the image must start in less than one minute.

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You need to design the process that starts the photo processing.

Solution: Convert the Azure Storage account to a BlockBlobStorage storage account.

Does the solution meet the goal?

- A. Yes
- B. No

**Correct Answer:** B

**Section:** (none)

**Explanation**

**Explanation/Reference:**

Explanation:

Not necessary to convert the account, instead move photo processing to an Azure Function triggered from the blob upload..

Azure Storage events allow applications to react to events. Common Blob storage event scenarios include image or video processing, search indexing, or any file-oriented workflow.

Note: Only storage accounts of kind StorageV2 (general purpose v2) and BlobStorage support event integration.

Storage (general purpose v1) does not support integration with Event Grid.

Reference:

<https://docs.microsoft.com/en-us/azure/storage/blobs/storage-blob-event-overview>

## **QUESTION 11 HOTSPOT**

You are developing an Azure Web App. You configure TLS mutual authentication for the web app.

You need to validate the client certificate in the web app. To answer, select the appropriate options in the answer area.

**NOTE:** Each correct selection is worth one point.

**Hot Area:**

## Answer Area

Property	Value
Client certificate location	<div style="border: 1px solid black; padding: 5px;"><p>HTTP request header Client cookie HTTP message body URL query string</p></div>
Encoding type	<div style="border: 1px solid black; padding: 5px;"><p>HTML URL Unicode Base64</p></div>

Correct Answer:

## Answer Area

Property	Value
Client certificate location	<div style="border: 1px solid black; padding: 5px;"><p>HTTP request header Client cookie HTTP message body URL query string</p></div>
Encoding type	<div style="border: 1px solid black; padding: 5px;"><p>HTML URL Unicode Base64</p></div>

Section: (none)

Explanation

**Explanation/Reference:**

Explanation:

Accessing the client certificate from App Service.

If you are using ASP.NET and configure your app to use client certificate authentication, the certificate will be available through the `HttpRequest.ClientCertificate` property. For other application stacks, the client cert will be `AllDumpz`

[sales@alldumpz.com](mailto:sales@alldumpz.com)

available in your app through a base64 encoded value in the "X-ARR-ClientCert" request header. Your application can create a certificate from this value and then use it for authentication and authorization purposes in your application.

Reference:

<https://docs.microsoft.com/en-us/azure/app-service/app-service-web-configure-tls-mutual-auth>

### QUESTION 12

DRAG DROP

You are developing a Docker/Go using Azure App Service Web App for Containers. You plan to run the container in an App Service on Linux. You identify a Docker container image to use.

None of your current resource groups reside in a location that supports Linux. You must minimize the number of resource groups required.

You need to create the application and perform an initial deployment.

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

Select and Place:

#### Azure CLI Commands

az group create

az group update

az webapp update

az webapp create

az appservice plan create

#### Answer Area



Correct Answer:

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## Azure CLI Commands

az group create

az group update

az webapp update

az webapp create

az appservice plan create

## Answer Area

az group create

az appservice plan create

az webapp create



### Section: (none)

#### Explanation

#### Explanation/Reference:

Explanation:

You can host native Linux applications in the cloud by using Azure Web Apps. To create a Web App for Containers, you must run Azure CLI commands that create a group, then a service plan, and finally the web app itself.

Step 1: az group create

In the Cloud Shell, create a resource group with the az group create command.

Step 2: az appservice plan create

In the Cloud Shell, create an App Service plan in the resource group with the az appservice plan create command.

Step 3: az webapp create

In the Cloud Shell, create a web app in the myAppServicePlan App Service plan with the az webapp create command. Don't forget to replace with a unique app name, and <docker-ID> with your Docker ID.

Reference:

<https://docs.microsoft.com/mt-mt/azure/app-service/containers/quickstart-docker-go?view=sql-server-ver15>

## QUESTION 13

DRAG DROP

Fourth Coffee has an ASP.NET Core web app that runs in Docker. The app is mapped to the www.fourthcoffee.com domain.

Fourth Coffee is migrating this application to Azure.

You need to provision an App Service Web App to host this docker image and map the custom domain to the App Service web app.

A resource group named FourthCoffeePublicWebResourceGroup has been created in the WestUS region that contains an App Service Plan named AppServiceLinuxDockerPlan.

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Which order should the CLI commands be used to develop the solution? To answer, move all of the Azure CLI commands from the list of commands to the answer area and arrange them in the correct order.

**Select and Place:**

Azure CLI Commands	Answer Area
az webapp config container set --docker-custom-image-name \$dockerHubContainerPath --name \$appName --resource-group fourthCoffeePublicWebResourceGroup	
az webapp config hostname add --webapp-name \$appName --resource-group fourthCoffeePublicWebResourceGroup \ --hostname \$fqdn	
az webapp create --name \$appName --plan AppServiceLinuxDockerPlan --resource-group fourthCoffeePublicWebResourceGroup	
#/bin/bash appName="FourthCoffeePublicWeb\$random" location="WestUS" dockerHubContainerPath="FourthCoffee/publicweb:v1" fqdn="http://www.fourthcoffee.com">www.fourthcoffee.com	

**Correct Answer:**

Azure CLI Commands	Answer Area
az webapp config container set --docker-custom-image-name \$dockerHubContainerPath --name \$appName --resource-group fourthCoffeePublicWebResourceGroup	#/bin/bash appName="FourthCoffeePublicWeb\$random" location="WestUS" dockerHubContainerPath="FourthCoffee/publicweb:v1" fqdn="http://www.fourthcoffee.com">www.fourthcoffee.com
az webapp config hostname add --webapp-name \$appName --resource-group fourthCoffeePublicWebResourceGroup \ --hostname \$fqdn	
az webapp create --name \$appName --plan AppServiceLinuxDockerPlan --resource-group fourthCoffeePublicWebResourceGroup	
#/bin/bash appName="FourthCoffeePublicWeb\$random" location="WestUS" dockerHubContainerPath="FourthCoffee/publicweb:v1" fqdn="http://www.fourthcoffee.com">www.fourthcoffee.com	az webapp config container set --docker-custom-image-name \$dockerHubContainerPath --name \$appName --resource-group fourthCoffeePublicWebResourceGroup

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sales@alldumpz.com

**Section: (none)****Explanation****Explanation/Reference:**

Explanation:

Step 1: #bin/bash

The appName is used when the webapp-name is created in step 2.

Step 2: az webapp config hostname add

The webapp-name is used when the webapp is created in step 3.

Step 3: az webapp create

Create a web app. In the Cloud Shell, create a web app in the myAppServicePlan App Service plan with the az webapp create command.

Step : az webapp config container set

In Create a web app, you specified an image on Docker Hub in the az webapp create command. This is good enough for a public image. To use a private image, you need to configure your Docker account ID and password in your Azure web app.

In the Cloud Shell, follow the az webapp create command with az webapp config container set.

Reference:

<https://docs.microsoft.com/en-us/azure/app-service/containers/tutorial-custom-docker-image>

**QUESTION 14**

DRAG DROP

You are developing a serverless Java application on Azure. You create a new Azure Key Vault to work with secrets from a new Azure Functions application.

The application must meet the following requirements:

- Reference the Azure Key Vault without requiring any changes to the Java code.
- Dynamically add and remove instances of the Azure Functions host based on the number of incoming application events.
- Ensure that instances are perpetually warm to avoid any cold starts.
- Connect to a VNet.
- Authentication to the Azure Key Vault instance must be removed if the Azure Function application is deleted.

You need to grant the Azure Functions application access to the Azure Key Vault.

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:**

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Actions	Answer Area
Create a user-assigned managed identity for the application.	
Create the Azure Functions app with a Premium plan type.	
Create an access policy in Azure Key Vault for the application identity.	
Create an SSL certification in Azure Key Vault for the application identity.	
Create the Azure Functions app with an App Service plan type.	
Create the Azure Functions app with a Consumption plan type.	
Create a system-assigned managed identity for the application.	

#### Correct Answer:

Actions	Answer Area
Create a user-assigned managed identity for the application.	Create the Azure Functions app with a Consumption plan type.
Create the Azure Functions app with a Premium plan type.	Create a user-assigned managed identity for the application.
Create an access policy in Azure Key Vault for the application identity.	Create an access policy in Azure Key Vault for the application identity.
Create an SSL certification in Azure Key Vault for the application identity.	
Create the Azure Functions app with an App Service plan type.	
Create the Azure Functions app with a Consumption plan type.	
Create a system-assigned managed identity for the application.	

#### Section: (none)

#### Explanation

#### Explanation/Reference:

Explanation:

Step 1: Create the Azure Functions app with a Consumption plan type. Use the Consumption plan for serverless.

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Step 2: Create a system-assigned managed identity for the application. Create a system-assigned managed identity for your application.

Key Vault references currently only support system-assigned managed identities. User-assigned identities cannot be used.

Step 3: Create an access policy in Key Vault for the application identity.

Create an access policy in Key Vault for the application identity you created earlier. Enable the "Get" secret permission on this policy. Do not configure the "authorized application" or applicationId settings, as this is not compatible with a managed identity.

Reference:

<https://docs.microsoft.com/en-us/azure/app-service/app-service-key-vault-references>

## QUESTION 15

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 a virtual machine. Configure a Scale Set to increase the virtual machine instance count when the CPU load is high.
- D. 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.

**Correct Answer:** D

**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.

## QUESTION 16

HOTSPOT

A company is developing a Java web app. The web app code is hosted in a GitHub repository located at <https://github.com/Contoso/webapp>.

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[sales@alldumpz.com](mailto:sales@alldumpz.com)

The web app must be evaluated before it is moved to production. You must deploy the initial code release to a deployment slot named staging.

You need to create the web app and deploy the code.

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

**NOTE:** Each correct selection is worth one point.

### Hot Area:

#### Answer Area

gitrepo=https://github.com/Contoso/webapp webapppname=businesswebapp resourcegroupname=BusinessAppResourceGroup	az group create --location centralus --name \$resourcegroupname
az webapp create --name \$webapppname --resource-group \$resourcegroupname --sku S3	az appservice plan create --name \$webapppname --resource-group \$resourcegroupname --plan \$webapppname
az webapp deployment slot create --name \$webapppname --resource-group \$resourcegroupname --slot staging	az webapp config --name \$webapppname --resource-group \$resourcegroupname --slot staging --repo-url \$gitrepo --branch master --manual-integration

### Correct Answer:

## Answer Area

```
gitrepo=https://github.com/Contoso/webapp
webappname=businesswebapp
resourcegroupname=BusinessAppResourceGroup
az group create --location centralus --name $resourcegroupname
az appservice plan create --name $webappname --resource-group $resourcegroupname --sku S3
az webapp create --name $webappname --resource-group $resourcegroupname --plan $webappname
az webapp deployment slot create --name $webappname --resource-group $resourcegroupname --slot staging
az webapp deployment source config --name $webappname --resource-group $resourcegroupname \
--slot staging --repo-url $gitrepo --branch master --manual-integration
```

The screenshot shows the Azure CLI command history with five entries. Each entry consists of a command prompt (az), a dropdown menu of options, and the resulting command line. The dropdown menu items are: group, webapp, appservice plan, webapp deployment slot, and webapp deployment source. In each entry, the selected item is highlighted in green.

- Entry 1: az group create --location centralus --name \$resourcegroupname. The 'group' option is highlighted.
- Entry 2: az appservice plan create --name \$webappname --resource-group \$resourcegroupname --sku S3. The 'appservice plan' option is highlighted.
- Entry 3: az webapp create --name \$webappname --resource-group \$resourcegroupname --plan \$webappname. The 'webapp' option is highlighted.
- Entry 4: az webapp deployment slot create --name \$webappname --resource-group \$resourcegroupname --slot staging. The 'webapp deployment slot' option is highlighted.
- Entry 5: az webapp deployment source config --name \$webappname --resource-group \$resourcegroupname --slot staging --repo-url \$gitrepo --branch master --manual-integration. The 'webapp deployment source' option is highlighted.

### Section: (none)

### Explanation

#### Explanation/Reference:

Explanation:

Box 1: group

```
# Create a resource group. az group create --location westeurope --
name myResourceGroup
```

Box 2: appservice plan

```
# Create an App Service plan in STANDARD tier (minimum required by deployment slots). az appservice
plan create --name $webappname --resource-group myResourceGroup --sku S1
```

Box 3: webapp # Create a web app. az webapp create --name \$webappname --
resource-group myResourceGroup \ --plan \$webappname

Box 4: webapp deployment slot

```
#Create a deployment slot with the name "staging". az webapp deployment slot create --name
$webappname --resource-group myResourceGroup \ --slot staging
```

Box 5: webapp deployment source

```
# Deploy sample code to "staging" slot from GitHub.
az webapp deployment source config --name $webappname --resource-group myResourceGroup \ --slot staging
--repo-url $gitrepo --branch master --manual-integration
```

Reference:

<https://docs.microsoft.com/en-us/azure/app-service/scripts/cli-deploy-staging-environment>

## QUESTION 17

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sales@alldumpz.com

## HOTSPOT

You have a web service that is used to pay for food deliveries. The web service uses Azure Cosmos DB as the data store.

You plan to add a new feature that allows users to set a tip amount. The new feature requires that a property named **tip** on the document in Cosmos DB must be present and contain a numeric value.

There are many existing websites and mobile apps that use the web service that will not be updated to set the tip property for some time.

How should you complete the trigger?

**NOTE:** Each correct selection is worth one point.

### Hot Area:

### Answer Area

```
function ensureTip() {
    var r = 
    
    
    
    
    var i = r.getBody();
    
    if (!("tip" in i)) {
        if (request.getValue("tip") == null) {
            if (isNaN(i["tip"]) || i["tip"] == null) {
                if (typeof __.pluck("tip") == 'number') {
                    i["tip"] = 0;
                }
            }
        }
        
        
        
        
    }
}
```

### Correct Answer:

## Answer Area

```
function ensureTip() {
    var r = ___.value();
      ___.readDocument('item');
      getContext().getRequest();
      getContext().getResponse();
    var i = r.getBody();

    if (!("tip" in i)) {
        if (request.getValue("tip") === null) {
            if (isNaN(i["tip"]) || i["tip"] === null) {
                if (typeof __.pluck("tip") === 'number') {

                    i["tip"] = 0;
                }
            }
        }
    }

    r.setBody(i);
    r.setValue(i);
    ___.upsertDocument(i);
    ___.replaceDocument(i);
}
```

### Section: (none)

#### Explanation

#### Explanation/Reference:

### QUESTION 18

**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 develop an HTTP triggered Azure Function app to process Azure Storage blob data. The app is triggered using an output binding on the blob.

The app continues to time out after four minutes. The app must process the blob data.

You need to ensure the app does not time out and processes the blob data.

Solution: Use the Durable Function async pattern to process the blob data.

Does the solution meet the goal?

A. Yes

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[sales@alldumpz.com](mailto:sales@alldumpz.com)

B. No

**Correct Answer:** B

**Section:** (none)

**Explanation**

**Explanation/Reference:**

Explanation:

Instead pass the HTTP trigger payload into an Azure Service Bus queue to be processed by a queue trigger function and return an immediate HTTP success response.

Note: Large, long-running functions can cause unexpected timeout issues. General best practices include: Whenever possible, refactor large functions into smaller function sets that work together and return responses fast. For example, a webhook or HTTP trigger function might require an acknowledgment response within a certain time limit; it's common for webhooks to require an immediate response. You can pass the HTTP trigger payload into a queue to be processed by a queue trigger function. This approach lets you defer the actual work and return an immediate response.

Reference:

<https://docs.microsoft.com/en-us/azure/azure-functions/functions-best-practices>

**QUESTION 19**

**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 develop an HTTP triggered Azure Function app to process Azure Storage blob data. The app is triggered using an output binding on the blob.

The app continues to time out after four minutes. The app must process the blob data.

You need to ensure the app does not time out and processes the blob data.

Solution: Pass the HTTP trigger payload into an Azure Service Bus queue to be processed by a queue trigger function and return an immediate HTTP success response.

Does the solution meet the goal?

A. Yes

B. No

**Correct Answer:** A

**Section:** (none)

**Explanation**

**Explanation/Reference:**

Explanation:

Large, long-running functions can cause unexpected timeout issues. General best practices include: Whenever possible, refactor large functions into smaller function sets that work together and return responses fast. For example, a webhook or HTTP trigger function might require an acknowledgment response within a certain time limit; it's common for webhooks to require an immediate response. You can pass the HTTP trigger payload into a queue to be processed by a queue trigger function. This approach lets you defer the actual work and return an immediate response.

Reference:

AllDumpz

[sales@alldumpz.com](mailto:sales@alldumpz.com)

<https://docs.microsoft.com/en-us/azure/azure-functions/functions-best-practices>

## QUESTION 20

**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 develop an HTTP triggered Azure Function app to process Azure Storage blob data. The app is triggered using an output binding on the blob.

The app continues to time out after four minutes. The app must process the blob data.

You need to ensure the app does not time out and processes the blob data.

Solution: Configure the app to use an App Service hosting plan and enable the Always On setting.

Does the solution meet the goal?

- A. Yes
- B. No

**Correct Answer:** B

**Section:** (none)

**Explanation**

**Explanation/Reference:**

Explanation:

Instead pass the HTTP trigger payload into an Azure Service Bus queue to be processed by a queue trigger function and return an immediate HTTP success response.

Note: Large, long-running functions can cause unexpected timeout issues. General best practices include: Whenever possible, refactor large functions into smaller function sets that work together and return responses fast. For example, a webhook or HTTP trigger function might require an acknowledgment response within a certain time limit; it's common for webhooks to require an immediate response. You can pass the HTTP trigger payload into a queue to be processed by a queue trigger function. This approach lets you defer the actual work and return an immediate response.

Reference:

<https://docs.microsoft.com/en-us/azure/azure-functions/functions-best-practices>

## QUESTION 21

**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 develop a software as a service (SaaS) offering to manage photographs. Users upload photos to a web service which then stores the photos in Azure Storage Blob storage. The storage account type is General-purpose V2.

When photos are uploaded, they must be processed to produce and save a mobile-friendly version of the image. The process to produce a mobile-friendly version of the image must start in less than one minute.

You need to design the process that starts the photo processing.

Solution: Move photo processing to an Azure Function triggered from the blob upload.

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Does the solution meet the goal?

- A. Yes
- B. No

**Correct Answer:** A

**Section:** (none)

**Explanation**

**Explanation/Reference:**

Explanation:

Azure Storage events allow applications to react to events. Common Blob storage event scenarios include image or video processing, search indexing, or any file-oriented workflow.

Events are pushed using Azure Event Grid to subscribers such as Azure Functions, Azure Logic Apps, or even to your own http listener.

Note: Only storage accounts of kind StorageV2 (general purpose v2) and BlobStorage support event integration. Storage (general purpose v1) does not support integration with Event Grid.

Reference:

<https://docs.microsoft.com/en-us/azure/storage/blobs/storage-blob-event-overview>

## QUESTION 22

You are developing an application that uses Azure Blob storage.

The application must read the transaction logs of all the changes that occur to the blobs and the blob metadata in the storage account for auditing purposes. The changes must be in the order in which they occurred, include only create, update, delete, and copy operations and be retained for compliance reasons.

You need to process the transaction logs asynchronously.

What should you do?

- A. Process all Azure Blob storage events by using Azure Event Grid with a subscriber Azure Function app.
- B. Enable the change feed on the storage account and process all changes for available events.
- C. Process all Azure Storage Analytics logs for successful blob events.
- D. Use the Azure Monitor HTTP Data Collector API and scan the request body for successful blob events.

**Correct Answer:** B

**Section:** (none)

**Explanation**

**Explanation/Reference:**

Explanation:

Change feed support in Azure Blob Storage

The purpose of the change feed is to provide transaction logs of all the changes that occur to the blobs and the blob metadata in your storage account. The change feed provides ordered, guaranteed, durable, immutable, read-only log of these changes. Client applications can read these logs at any time, either in streaming or in batch mode. The change feed enables you to build efficient and scalable solutions that process change events that occur in your Blob Storage account at a low cost.

Reference:

<https://docs.microsoft.com/en-us/azure/storage/blobs/storage-blob-change-feed>

## QUESTION 23

DRAG DROP

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sales@alldumpz.com

You plan to create a Docker image that runs an ASP.NET Core application named ContosoApp. You have a setup script named setupScript.ps1 and a series of application files including ContosoApp.dll.

You need to create a Dockerfile document that meets the following requirements:

- Call setupScript.ps1 when the container is built.
- Run ContosoApp.dll when the container starts.

The Dockerfile document must be created in the same folder where ContosoApp.dll and setupScript.ps1 are stored.

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

**Select and Place:**

**Commands**

```
FROM microsoft/aspnetcore:latest  
WORKDIR /apps/ContosoApp  
CMD ["dotnet", "ContosoApp.dll"]  
COPY ./ .  
RUN powershell ./setupScript.ps1
```

**Answer Area**

**Correct Answer:**

**Commands**

```
FROM microsoft/aspnetcore:latest  
WORKDIR /apps/ContosoApp  
CMD ["dotnet", "ContosoApp.dll"]  
COPY ./ .  
RUN powershell ./setupScript.ps1
```

**Answer Area**

```
CMD ["dotnet", "ContosoApp.dll"]  
FROM microsoft/aspnetcore:latest  
WORKDIR /apps/ContosoApp  
COPY ./ .  
RUN powershell ./setupScript.ps1
```

**Section: (none)**

**Explanation**

**Explanation/Reference:**

Explanation:

Box 1: CMD [..]

Cmd starts a new instance of the command interpreter, Cmd.exe.

Syntax: CMD <string>

Specifies the command you want to carry out.

Box 2: FROM microsoft/aspnetcore-build:latest

Box 3: WORKDIR /apps/ContosoApp Box 4:

COPY ./ .

Box 5: RUN powershell ./setupScript.ps1

**QUESTION 24**

You are developing an Azure Function App that processes images that are uploaded to an Azure Blob container.

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sales@alldumpz.com

Images must be processed as quickly as possible after they are uploaded, and the solution must minimize latency. You create code to process images when the Function App is triggered.

You need to configure the Function App.

What should you do?

- A. Use an App Service plan. Configure the Function App to use an Azure Blob Storage input trigger.
- B. Use a Consumption plan. Configure the Function App to use an Azure Blob Storage trigger.
- C. Use a Consumption plan. Configure the Function App to use a Timer trigger.
- D. Use an App Service plan. Configure the Function App to use an Azure Blob Storage trigger.
- E. Use a Consumption plan. Configure the Function App to use an Azure Blob Storage input trigger.

**Correct Answer:** B

**Section:** (none)

**Explanation**

**Explanation/Reference:**

Explanation:

The Blob storage trigger starts a function when a new or updated blob is detected. The blob contents are provided as input to the function.

The Consumption plan limits a function app on one virtual machine (VM) to 1.5 GB of memory.

Reference:

<https://docs.microsoft.com/en-us/azure/azure-functions/functions-bindings-storage-blob-trigger>

## **QUESTION 25 HOTSPOT**

You are configuring a new development environment for a Java application.

The environment requires a Virtual Machine Scale Set (VMSS), several storage accounts, and networking components.

The VMSS must not be created until the storage accounts have been successfully created and an associated load balancer and virtual network is configured.

How should you complete the Azure Resource Manager template? To answer, select the appropriate options in the answer area.

**NOTE:** Each correct selection is worth one point.

**Hot Area:**

## Answer Area

```
{  
  . . .  
  "resources": [  
    {  
      "apiVersion": "2016-01-01",  
      "type": "Microsoft.Storage/storageAccounts",  
      "name": "[concat(  
        copy  
        copyIndex  
        priority  
        dependsOn  
      )], 'storage', uniqueString(resourceGroup().id))]",  
      "location": "[resourceGroup().location]",  
      . . .  
      "sku": {  
        "name": "Standard_LRS"  
      },  
      "kind": "Storage",  
      "properties": {},  
      "copy": {  
        "dependsOn": [  
          "name": "storagesetup",  
          "count": 3  
        ]  
      },  
      . . .  
    },  
    {  
      "apiVersion": "2015-06-15",  
      "type": "Microsoft.Compute/virtualMachines",  
      "name": "[concat('VM', uniqueString(resourceGroup().id))]",  
      "copy": [  
        "dependsOn": [  
          "[variables('loadBalancerName')]",  
          "[variables('virtualNetworkName')]",  
          "storagesetup",  
        ],  
        . . .  
      ]  
    },  
    "outputs": {}  
  ]  
}
```

## Correct Answer:

## Answer Area

```
{  
    . . .  
    "resources": [  
        {  
            "apiVersion": "2016-01-01",  
            "type": "Microsoft.Storage/storageAccounts",  
            "name": "[concat(  
                copy  
                copyIndex  
                priority  
                dependsOn  
            )], 'storage', uniqueString(resourceGroup().id))]",  
            "location": "[resourceGroup().location]",  
            . . .  
            "sku": {  
                "name": "Standard_LRS"  
            },  
            "kind": "Storage",  
            "properties": {},  
            "copy": {  
                "dependsOn": [  
                    "name": "storagesetup",  
                    "count": 3  
                ]  
            },  
            {  
                "apiVersion": "2015-06-15",  
                "type": "Microsoft.Compute/virtualMachines",  
                "name": "[concat('VM', uniqueString(resourceGroup().id))]",  
                "copy": [  
                    "dependsOn": [  
                        "[variables('loadBalancerName')]",  
                        "[variables('virtualNetworkName')]",  
                        "storagesetup",  
                    ],  
                    . . .  
                ]  
            },  
            "outputs": {}  
    ]  
}
```

### Section: (none)

#### Explanation

#### Explanation/Reference:

Explanation:

#### Box 1: copyIndex

Notice that the name of each resource includes the `copyIndex()` function, which returns the current iteration in the loop. `copyIndex()` is zero-based.

#### Box 2: copy

By adding the `copy` element to the resources section of your template, you can dynamically set the number of resources to deploy.

#### Box 3: dependsOn Example:

```
"type": "Microsoft.Compute/virtualMachineScaleSets",  
    "apiVersion": "2020-06-01",  
    "name": "[variables('namingInfix')]",  
    "location": "[parameters('location')]",
```

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sales@alldumpz.com

```

    "sku": {
        "name": "[parameters('vmSku')]",
        "tier": "Standard",
        "capacity": "[parameters('instanceCount')]"
    },
    "dependsOn": [
        "[resourceId('Microsoft.Network/loadBalancers', variables('loadBalancerName'))]",
        "[resourceId('Microsoft.Network/virtualNetworks', variables('virtualNetworkName'))]"
    ],

```

Reference: <https://docs.microsoft.com/en-us/azure/azure-resource-manager/templates/copy-resources>  
<https://docs.microsoft.com/en-us/azure/virtual-machine-scale-sets/quick-create-template-windows>

## QUESTION 26

### HOTSPOT

You are developing an Azure Function App by using Visual Studio. The app will process orders input by an Azure Web App. The web app places the order information into Azure Queue Storage.

You need to review the Azure Function App code shown below.

```

public static class OrderProcessor
{
    [FunctionName("ProcessOrders")]
    public static void ProcessOrders([QueueTrigger("incoming-orders")]CloudQueueMessage myQueueItem, [Table("Orders")]ICollector<Order> tableBindings, TraceWriter log)
    {
        log.Info($"Processing Order: {myQueueItem.Id}");
        log.Info($"Queue Insertion Time: {myQueueItem.InsertionTime}");
        log.Info($"Queue Expiration Time: {myQueueItem.ExpirationTime}");
        tableBindings.Add(JsonConvert.DeserializeObject<Order>(myQueueItem.AsString));
    }
    [FunctionName("ProcessOrders-Poison")]
    public static void ProcessFailedOrders([QueueTrigger("incoming-orders-poison")]CloudQueueMessage myQueueItem, TraceWriter log)
    {
        log.Error($"Failed to process order: {myQueueItem.AsString}");
        . .
    }
}

```

**NOTE:** Each correct selection is worth one point.

#### Hot Area:

#### Answer Area

Yes	No
<input type="radio"/>	<input type="radio"/>

The code will log the time that the order was processed from the queue.

When the ProcessOrders function fails, the function will retry up to five times for a given order, including the first try.

When there are multiple orders in the queue, a batch of orders will be retrieved from the queue and the ProcessOrders function will run multiple instances concurrently to process the orders.

The ProcessOrders function will output the order to an Orders table in Azure Table Storage.

#### Correct Answer:

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sales@alldumpz.com

## Answer Area

Yes      No

- |  |                                  |                                  |
|--|----------------------------------|----------------------------------|
| The code will log the time that the order was processed from the queue.  | <input type="radio"/>            | <input checked="" type="radio"/> |
| When the ProcessOrders function fails, the function will retry up to five times for a given order, including the first try.  | <input checked="" type="radio"/> | <input type="radio"/>            |
| When there are multiple orders in the queue, a batch of orders will be retrieved from the queue and the ProcessOrders function will run multiple instances concurrently to process the orders. | <input type="radio"/>            | <input checked="" type="radio"/> |
| The ProcessOrders function will output the order to an Orders table in Azure Table Storage.  | <input checked="" type="radio"/> | <input type="radio"/>            |

### Section: (none)

#### Explanation

#### Explanation/Reference:

Explanation:

Box 1: No

ExpirationTime - The time that the message expires.

InsertionTime - The time that the message was added to the queue.

Box 2: Yes maxDequeueCount - The number of times to try processing a message before moving it to the poison queue. Default value is 5.

Box 3: Yes

When there are multiple queue messages waiting, the queue trigger retrieves a batch of messages and invokes function instances concurrently to process them. By default, the batch size is 16. When the number being processed gets down to 8, the runtime gets another batch and starts processing those messages. So the maximum number of concurrent messages being processed per function on one virtual machine (VM) is 24.

Box 4: Yes

Reference:

<https://docs.microsoft.com/en-us/azure/azure-functions/functions-bindings-storage-queue>

## QUESTION 27 DRAG

DROP

You are developing a solution for a hospital to support the following use cases:

- The most recent patient status details must be retrieved even if multiple users in different locations have updated the patient record.
- Patient health monitoring data retrieved must be the current version or the prior version.
- After a patient is discharged and all charges have been assessed, the patient billing record contains the final charges.

You provision a Cosmos DB NoSQL database and set the default consistency level for the database account to **Strong**. You set the value for Indexing Mode to **Consistent**.

You need to minimize latency and any impact to the availability of the solution. You must override the default consistency level at the query level to meet the required consistency guarantees for the scenarios.

Which consistency levels should you implement? To answer, drag the appropriate consistency levels to the correct requirements. Each consistency level 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.

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**NOTE:** Each correct selection is worth one point.

**Select and Place:**

Consistency levels	
Strong	Bounded Staleness
Consistent Prefix	Eventual

**Answer Area**

Return the most recent patient status.

Consistency level

Return health monitoring data that is no less than one version behind.

Consistency level

After patient is discharged and all charges are assessed, retrieve the correct billing data with the final charges.

Consistency level

**Correct Answer:**

Consistency levels	
Strong	Bounded Staleness
Consistent Prefix	Eventual

**Answer Area**

Return the most recent patient status.

Strong

Return health monitoring data that is no less than one version behind.

Bounded Staleness

After patient is discharged and all charges are assessed, retrieve the correct billing data with the final charges.

Eventual

**Section: (none)**

**Explanation**

**Explanation/Reference:**

Explanation:

**Box 1: Strong**

**Strong:** Strong consistency offers a linearizability guarantee. The reads are guaranteed to return the most recent committed version of an item. A client never sees an uncommitted or partial write. Users are always guaranteed to read the latest committed write.

**Box 2: Bounded staleness**

**Bounded staleness:** The reads are guaranteed to honor the consistent-prefix guarantee. The reads might lag behind writes by at most "K" versions (that is "updates") of an item or by "t" time interval. When you choose bounded staleness, the "staleness" can be configured in two ways:

The number of versions (K) of the item

The time interval (t) by which the reads might lag behind the writes

**Box 3: Eventual**

**Eventual:** There's no ordering guarantee for reads. In the absence of any further writes, the replicas eventually converge.

**Incorrect Answers:**

**Consistent prefix:** Updates that are returned contain some prefix of all the updates, with no gaps. Consistent prefix guarantees that reads never see out-of-order writes.

**Reference:**

<https://docs.microsoft.com/en-us/azure/cosmos-db/consistency-levels>

**QUESTION 28**

**HOTSPOT**

You are configuring a development environment for your team. You deploy the latest Visual Studio image from the Azure Marketplace to your Azure subscription.

The development environment requires several software development kits (SDKs) and third-party components to support application development across the organization. You install and customize the deployed virtual machine

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(VM) for your development team. The customized VM must be saved to allow provisioning of a new team member development environment.

You need to save the customized VM for future provisioning.

Which tools or services should you use? To answer, select the appropriate options in the answer area.

**NOTE:** Each correct selection is worth one point.

**Hot Area:**

**Answer Area**

Action	Tool or service
Generalize the VM.	Azure PowerShell Visual Studio command prompt Azure Migrate Azure Backup
Store images.	Azure Blob Storage Azure Data Lake Storage Azure File Storage Azure Table Storage

**Correct Answer:**

**Answer Area**

Action	Tool or service
Generalize the VM.	Azure PowerShell Visual Studio command prompt Azure Migrate Azure Backup
Store images.	Azure Blob Storage Azure Data Lake Storage Azure File Storage Azure Table Storage

**Section: (none)**

**Explanation**

**Explanation/Reference:**

Explanation:

Box 1: Azure Powershell

Creating an image directly from the VM ensures that the image includes all of the disks associated with the VM, including the OS disk and any data disks.

Before you begin, make sure that you have the latest version of the Azure PowerShell module.

You use Sysprep to generalize the virtual machine, then use Azure PowerShell to create the image.

Box 2: Azure Blob Storage

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You can store images in Azure Blob Storage.

Reference: <https://docs.microsoft.com/en-us/azure/virtual-machines/windows/capture-image-resource#create-an-image-of-a-vm-using-powershell>

## QUESTION 29

You are preparing to deploy a website to an Azure Web App from a GitHub repository. The website includes static content generated by a script.

You plan to use the Azure Web App continuous deployment feature.

You need to run the static generation script before the website starts serving traffic.

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

**NOTE:** Each correct selection is worth one point.

- A. Add the path to the static content generation tool to WEBSITE\_RUN\_FROM\_PACKAGE setting in the host.json file.
- B. Add a PreBuild target in the websites csproj project file that runs the static content generation script.
- C. Create a file named **run.cmd** in the folder **/run** that calls a script which generates the static content and deploys the website.
- D. Create a file named **.deployment** in the root of the repository that calls a script which generates the static content and deploys the website.

**Correct Answer:** AD

**Section:** (none)

**Explanation**

**Explanation/Reference:**

Explanation:

A: In Azure, you can run your functions directly from a deployment package file in your function app. The other option is to deploy your files in the d:\home\site\wwwroot directory of your function app (see A above).

To enable your function app to run from a package, you just add a WEBSITE\_RUN\_FROM\_PACKAGE setting to your function app settings.

Note: The host.json metadata file contains global configuration options that affect all functions for a function app.

D: To customize your deployment, include a .deployment file in the repository root.

You just need to add a file to the root of your repository with the name **.deployment** and the content:

[config]

command = YOUR COMMAND TO RUN FOR DEPLOYMENT

this command can be just running a script (batch file) that has all that is required for your deployment, like copying files from the repository to the web root directory for example.

Reference: <https://github.com/projectkudu/kudu/wiki/Custom-Deployment-Script>

<https://docs.microsoft.com/bs-latn-ba/azure/azure-functions/run-functions-from-deployment-package>

## QUESTION 30

DRAG DROP

You are developing an application to use Azure Blob storage. You have configured Azure Blob storage to include change feeds.

A copy of your storage account must be created in another region. Data must be copied from the current storage account to the new storage account directly between the storage servers.

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You need to create a copy of the storage account in another region and copy the data.

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

**Select and Place:**

Actions	Answer Area
Use AZCopy to copy the data to the new storage account.	
Deploy the template to create a new storage account in the target region.	
Export a Resource Manager template.	
Create a new template deployment.	
Modify the template by changing the storage account name and region.	

**Correct Answer:**

Actions	Answer Area
Use AZCopy to copy the data to the new storage account.	Create a new template deployment.
Deploy the template to create a new storage account in the target region.	Export a Resource Manager template.
Export a Resource Manager template.	Modify the template by changing the storage account name and region.
Create a new template deployment.	Deploy the template to create a new storage account in the target region.
Modify the template by changing the storage account name and region.	Use AZCopy to copy the data to the new storage account.

**Section: (none)**

**Explanation**

**Explanation/Reference:**

Explanation:

To move a storage account, create a copy of your storage account in another region. Then, move your data to that account by using AzCopy, or another tool of your choice.

The steps are:

- Export a template.
- Modify the template by adding the target region and storage account name.
- Deploy the template to create the new storage account.

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- Configure the new storage account.
- Move data to the new storage account.
- Delete the resources in the source region.

Note: You must enable the change feed on your storage account to begin capturing and recording changes. You can enable and disable changes by using Azure Resource Manager templates on Portal or Powershell.

Reference:

<https://docs.microsoft.com/en-us/azure/storage/common/storage-account-move> <https://docs.microsoft.com/en-us/azure/storage/blobs/storage-blob-change-feed>

### QUESTION 31 DRAG

DROP

You are preparing to deploy an Azure virtual machine (VM)-based application.

The VMs that run the application have the following requirements:

- When a VM is provisioned the firewall must be automatically configured before it can access Azure resources.
- Supporting services must be installed by using an Azure PowerShell script that is stored in Azure Storage.

You need to ensure that the requirements are met.

Which features should you use? To answer, drag the appropriate features to the correct requirements. Each feature 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:

Features	Answer Area
Run Command	
Serial console	
Hybrid Runbook Worker	
Custom Script Extension	
Requirement	Feature
Firewall configuration	
Supporting services script	

#### Correct Answer:

Features	Answer Area
Serial console	
Custom Script Extension	
Requirement	Feature
Firewall configuration	Run Command
Supporting services script	Hybrid Runbook Worker

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**Section: (none)****Explanation****Explanation/Reference:**

Reference:

<https://docs.microsoft.com/en-us/azure/automation/automation-hybrid-runbook-worker><https://docs.microsoft.com/en-us/azure/virtual-machines/windows/run-command>**QUESTION 32 HOTSPOT**

A company is developing a Node.js web app. The web app code is hosted in a GitHub repository located at <https://github.com/TailSpinToys/webapp>.

The web app must be reviewed before it is moved to production. You must deploy the initial code release to a deployment slot named review.

You need to create the web app and deploy the code.

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

**NOTE:** Each correct selection is worth one point.

**Hot Area:****Answer Area**

```
$gitrepo="https://github.com/TailSpinToys/webapp"  
$webappname="TailSpinToysWeb"  
$location="WestUS2"
```

<input type="checkbox"/> New-AzWebAppSlot	-Name myResourceGroup -Location \$location
<input type="checkbox"/> New-AzWebApp	
<input type="checkbox"/> New-AzAppServicePlan	
<input type="checkbox"/> New-AzResourceGroup	
<input type="checkbox"/> New-AzWebAppSlot	-Name \$webappname -Location \$location -ResourceGroupName myResourceGroup -Tier Standard
<input type="checkbox"/> New-AzWebApp	
<input type="checkbox"/> New-AzAppServicePlan	
<input type="checkbox"/> New-AzResourceGroup	
<input type="checkbox"/> New-AzWebAppSlot	-Name \$webappname -Location \$location -AppServicePlan \$webappname -ResourceGroupName myResourceGroup
<input type="checkbox"/> New-AzWebApp	
<input type="checkbox"/> New-AzAppServicePlan	
<input type="checkbox"/> New-AzResourceGroup	
<input type="checkbox"/> New-AzWebAppSlot	-Name \$webappname -ResourceGroupName myResourceGroup -Slot review
<input type="checkbox"/> New-AzWebApp	
<input type="checkbox"/> New-AzAppServicePlan	
<input type="checkbox"/> New-AzResourceGroup	

```
$PropertiesObject = @{repoUrl = "$gitrepo";branch = "master";}  
Set-AzResource -PropertyObject $PropertiesObject -ResourceGroupName myResourceGroup -ResourceType  
Microsoft.Web/sites/slots/sourcecontrols -ResourceName $webappname/review/web -ApiVersion 2015-08-01 -Force  
Switch-AzWebAppSlot -Name $webappname -ResourceGroupName myResourceGroup  
-SourceSlotName review -DestinationSlotName production
```

**Correct Answer:**

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## Answer Area

```
$gitrepo="https://github.com/TailSpinToys/webapp"
$webappname="TailSpinToysWeb"
$location="WestUS2"
 New-AzResourceGroup -Name myResourceGroup -Location $location
 New-AzWebAppSlot
 New-AzWebApp
 New-AzAppServicePlan
 New-AzResourceGroup
 New-AzWebAppSlot
 New-AzWebApp
 New-AzAppServicePlan
 New-AzResourceGroup
 New-AzWebAppSlot
 New-AzWebApp
 New-AzAppServicePlan
 New-AzResourceGroup
 New-AzWebAppSlot
 New-AzWebApp
 New-AzAppServicePlan
 New-AzResourceGroup
$PropertiesObject = @{repoUrl = "$gitrepo";branch = "master";}
Set-AzResource -PropertyObject $PropertiesObject -ResourceGroupName myResourceGroup -ResourceType Microsoft.Web/sites/slots/sourcecontrols -ResourceName $webappname/review/web -ApiVersion 2015-08-01 -Force
Switch-AzWebAppSlot -Name $webappname -ResourceGroupName myResourceGroup
-SourceSlotName review -DestinationSlotName production
```

### Section: (none)

#### Explanation

#### Explanation/Reference:

Explanation:

#### Box 1: New-AzResourceGroup

The New-AzResourceGroup cmdlet creates an Azure resource group.

#### Box 2: New-AzAppServicePlan

The New-AzAppServicePlan cmdlet creates an Azure App Service plan in a given location

#### Box 3: New-AzWebApp

The New-AzWebApp cmdlet creates an Azure Web App in a given a resource group

#### Box 4: New-AzWebAppSlot

The New-AzWebAppSlot cmdlet creates an Azure Web App slot.

Reference: <https://docs.microsoft.com/en-us/powershell/module/az.resources/new-azresourcegroup?view=azps-2.3.2>  
<https://docs.microsoft.com/en-us/powershell/module/az.websites/new-azappserviceplan?view=azps-2.3.2>  
<https://docs.microsoft.com/en-us/powershell/module/az.websites/new-azwebapp?view=azps-2.3.2>  
<https://docs.microsoft.com/en-us/powershell/module/az.websites/new-azwebappslot?view=azps-2.3.2>

## QUESTION 33 HOTSPOT

You are developing an application that needs access to an Azure virtual machine (VM).

The access lifecycle for the application must be associated with the VM service instance.

You need to enable managed identity for the VM.

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

**NOTE:** Each correct selection is worth one point.

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**Hot Area:****Answer Area**

```
$vm = Get-AzVM -ResourceGroupName "ContosoRG" -Name "ContosoVM"
```

```
Update-AzVM -ResourceGroupName "ContosoRG" -VM $vm
```

-AssignIdentity:	▼
-IdentityId:	▼

**Correct Answer:****Answer Area**

```
$vm = Get-AzVM -ResourceGroupName "ContosoRG" -Name "ContosoVM"
```

```
Update-AzVM -ResourceGroupName "ContosoRG" -VM $vm
```

-AssignIdentity:	▼
\$SystemAssigned \$UserAssigned	▼

**Section: (none)****Explanation****Explanation/Reference:**

Explanation:

Box 1: -IdentityType

Enable system-assigned managed identity on an existing Azure VM:

To enable a system-assigned managed identity, use the -IdentityType switch on the Update-AzVM cmdlet (see below).

Box 2: \$SystemAssigned

```
$vm = Get-AzVM -ResourceGroupName myResourceGroup -Name myVM
```

```
Update-AzVM -ResourceGroupName myResourceGroup -VM $vm -IdentityType SystemAssigned
```

Reference:

<https://docs.microsoft.com/en-us/azure/active-directory/managed-identities-azure-resources/qs-configurepowershell-windows-vm>

**QUESTION 34**

**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 develop a software as a service (SaaS) offering to manage photographs. Users upload photos to a web service which then stores the photos in Azure Storage Blob storage. The storage account type is General-purpose V2.

When photos are uploaded, they must be processed to produce and save a mobile-friendly version of the image. The process to produce a mobile-friendly version of the image must start in less than one minute.

You need to design the process that starts the photo processing.

Solution: Create an Azure Function app that uses the Consumption hosting model and that is triggered from the blob upload.

Does the solution meet the goal?

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- A. Yes
- B. No

**Correct Answer:** A

**Section:** (none)

**Explanation**

**Explanation/Reference:**

Explanation:

In the Consumption hosting plan, resources are added dynamically as required by your functions.

Reference:

<https://docs.microsoft.com/en-us/azure/azure-functions/functions-create-storage-blob-triggered-function>

**Develop for Azure storage**

## 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 questions in 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 section 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 in 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. When you are ready to answer a question, click the **Question** button to return to the question.

### Background

#### Overview

You are a developer for Contoso, Ltd. The company has a social networking website that is developed as a Single Page Application (SPA). The main web application for the social networking website loads user uploaded content from blob storage.

You are developing a solution to monitor uploaded data for inappropriate content. The following process occurs when users upload content by using the SPA:

- Messages are sent to ContentUploadService.
- Content is processed by ContentAnalysisService.
- After processing is complete, the content is posted to the social network or a rejection message is posted in its place.

The ContentAnalysisService is deployed with Azure Container Instances from a private Azure Container Registry named contosoiimages.

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The solution will use eight CPU cores.

## Azure Active Directory

Contoso, Ltd. uses Azure Active Directory (Azure AD) for both internal and guest accounts.

## Requirements

### ContentAnalysisService

The company's data science group built ContentAnalysisService which accepts user generated content as a string and returns a probable value for inappropriate content. Any values over a specific threshold must be reviewed by an employee of Contoso, Ltd.

You must create an Azure Function named CheckUserContent to perform the content checks.

## Costs

You must minimize costs for all Azure services.

## Manual review

To review content, the user must authenticate to the website portion of the ContentAnalysisService using their Azure AD credentials. The website is built using React and all pages and API endpoints require authentication. In order to review content a user must be part of a ContentReviewer role. All completed reviews must include the reviewer's email address for auditing purposes.

## High availability

All services must run in multiple regions. The failure of any service in a region must not impact overall application availability.

## Monitoring

An alert must be raised if the ContentUploadService uses more than 80 percent of available CPU cores.

## Security

You have the following security requirements:

- Any web service accessible over the Internet must be protected from cross site scripting attacks.
- All websites and services must use SSL from a valid root certificate authority.
- Azure Storage access keys must only be stored in memory and must be available only to the service.
- All Internal services must only be accessible from internal Virtual Networks (VNets).
- All parts of the system must support inbound and outbound traffic restrictions. ▪ All service calls must be authenticated by using Azure AD.

## User agreements

When a user submits content, they must agree to a user agreement. The agreement allows employees of Contoso, Ltd. to review content, store cookies on user devices, and track user's IP addresses.

Information regarding agreements is used by multiple divisions within Contoso, Ltd.

User responses must not be lost and must be available to all parties regardless of individual service uptime. The volume of agreements is expected to be in the millions per hour.

## Validation testing

When a new version of the ContentAnalysisService is available the previous seven days of content must be processed with the new version to verify that the new version does not significantly deviate from the old version.

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## Issues

Users of the ContentUploadService report that they occasionally see HTTP 502 responses on specific pages.

## Code

### ContentUploadService

```
CS01 apiVersion: '2018-10-01'
CS02 type: Microsoft.ContainerInstance/containerGroups
CS03 location: westus
CS04 name: contentUploadService
CS05 properties:
CS06   containers:
CS07     - name: service
CS08       properties:
CS09         image: contoso/contentUploadService:latest
CS10       ports:
CS11         - port: 80
CS12           protocol: TCP
CS13       resources:
CS14         requests:
CS15           cpu: 1.0
CS16           memoryInGB: 1.5
CS17
CS18 ipAddress:
CS19   ip: 10.23.121.112
CS20   ports:
CS21     - port: 80
CS22     protocol: TCP
CS23
CS24
CS25 networkProfile:
CS26
id: /subscriptions/98...19/resourceGroups/container/providers/Microsoft.Network/networkProfiles/subnet
```

```
AM01 {
AM02   "id" : "2b079f03-9b06-2d44-98bb-e9182901fcb6",
AM03   "appId" : "7118a7f0-b5c2-4c9d-833c-3d711396fe65",
AM04
AM05   "createdDateTime" : "2019-12-24T06:01:44Z",
AM06   "logoUrl" : null,
AM07   "logoutUrl" : null,
AM08   "name" : "ContentAnalysisService",
AM09
AM10
AM11   "orgRestrictions" : [],
AM12   "parentalControlSettings" : {
AM13     "countriesBlockedForMinors" : [],
AM14     "legalAgeGroupRule" : "Allow"
AM15   },
AM16   "passwordCredentials" : []
AM17 }
```

## QUESTION 1

You need to configure the ContentUploadService deployment.

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

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[sales@alldumpz.com](mailto:sales@alldumpz.com)

**NOTE:** Each correct selection is worth one point.

- A. Add the following markup to line CS23: type:  
Private
- B. Add the following markup to line CS24: osType:  
Windows
- C. Add the following markup to line CS24: osType:  
Linux
- D. Add the following markup to line CS23: type:  
Public

**Correct Answer:** A

**Section:** (none)

**Explanation**

**Explanation/Reference:**

Explanation:

Scenario: All Internal services must only be accessible from Internal Virtual Networks (VNets) There are

three Network Location types – Private, Public and Domain

Reference: <https://devblogs.microsoft.com/powershell/setting-network-location-to-private/>

## **QUESTION 2**

You need to store the user agreements.

Where should you store the agreement after it is completed?

- A. Azure Storage queue
- B. Azure Event Hub
- C. Azure Service Bus topic
- D. Azure Event Grid topic

**Correct Answer:** B

**Section:** (none)

**Explanation**

**Explanation/Reference:**

Explanation:

Azure Event Hub is used for telemetry and distributed data streaming.

This service provides a single solution that enables rapid data retrieval for real-time processing as well as repeated replay of stored raw data. It can capture the streaming data into a file for processing and analysis.

It has the following characteristics:

- low latency
- capable of receiving and processing millions of events per second ▪ at least once delivery

Reference: <https://docs.microsoft.com/en-us/azure/event-grid/compare-messaging-services>

## **QUESTION 3 HOTSPOT**

You need to implement the bindings for the CheckUserContent function.

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

**NOTE:** Each correct selection is worth one point.

**Hot Area:**

## Answer Area

```
public static class CheckUserContent
{
    [FunctionName("CheckUserContent")]
    public static void Run(
        [QueueTrigger("userContent")]
        [BlobTrigger("userContent/{name}")]
        [CosmosDBTrigger("content", "userContent")]
        [Table("content", "userContent", "{name}")] string content,
        Stream output)
    {
        ...
    }
}
```

**Correct Answer:**

## Answer Area

```
public static class CheckUserContent
{
    [FunctionName("CheckUserContent")]
    public static void Run(
        [QueueTrigger("userContent")]
        [BlobTrigger("userContent/{name}")]
        [CosmosDBTrigger("content", "userContent")]
        [Table("content", "userContent", "{name}")]
```

▼ string content,

```
[Queue("userContent")]
[CosmosDB("content", "userContent")]
[Table("content", "userContent", "{name}")]
[Blob("userContent/{name}", FileAccess.Write)]
```

▼ Stream output)

```
{  
    ...  
}
```

### Section: (none)

#### Explanation

#### Explanation/Reference:

Explanation:

Box 1: [BlobTrigger(..)]

Box 2: [Blob(..)]

Azure Blob storage output binding for Azure Functions. The output binding allows you to modify and delete blob storage data in an Azure Function.

The attribute's constructor takes the path to the blob and a FileAccess parameter indicating read or write, as shown in the following example:

```
[FunctionName("ResizeImage")]
public static void Run(
    [BlobTrigger("sample-images/{name}")] Stream image,
    [Blob("sample-images-md/{name}", FileAccess.Write)] Stream imageSmall)
{  
    ...  
}
```

Scenario: You must create an Azure Function named CheckUserContent to perform the content checks. The company's data science group built ContentAnalysisService which accepts user generated content as a string and

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sales@alldumpz.com

returns a probable value for inappropriate content. Any values over a specific threshold must be reviewed by an employee of Contoso, Ltd.

Reference:

<https://docs.microsoft.com/en-us/azure/azure-functions/functions-bindings-storage-blob-output>

## Develop for Azure storage

### Testlet 2

#### 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.

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#### To start the case study

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#### Background

City Power & Light company provides electrical infrastructure monitoring solutions for homes and businesses. The company is migrating solutions to Azure.

#### Current environment

#### Architecture overview

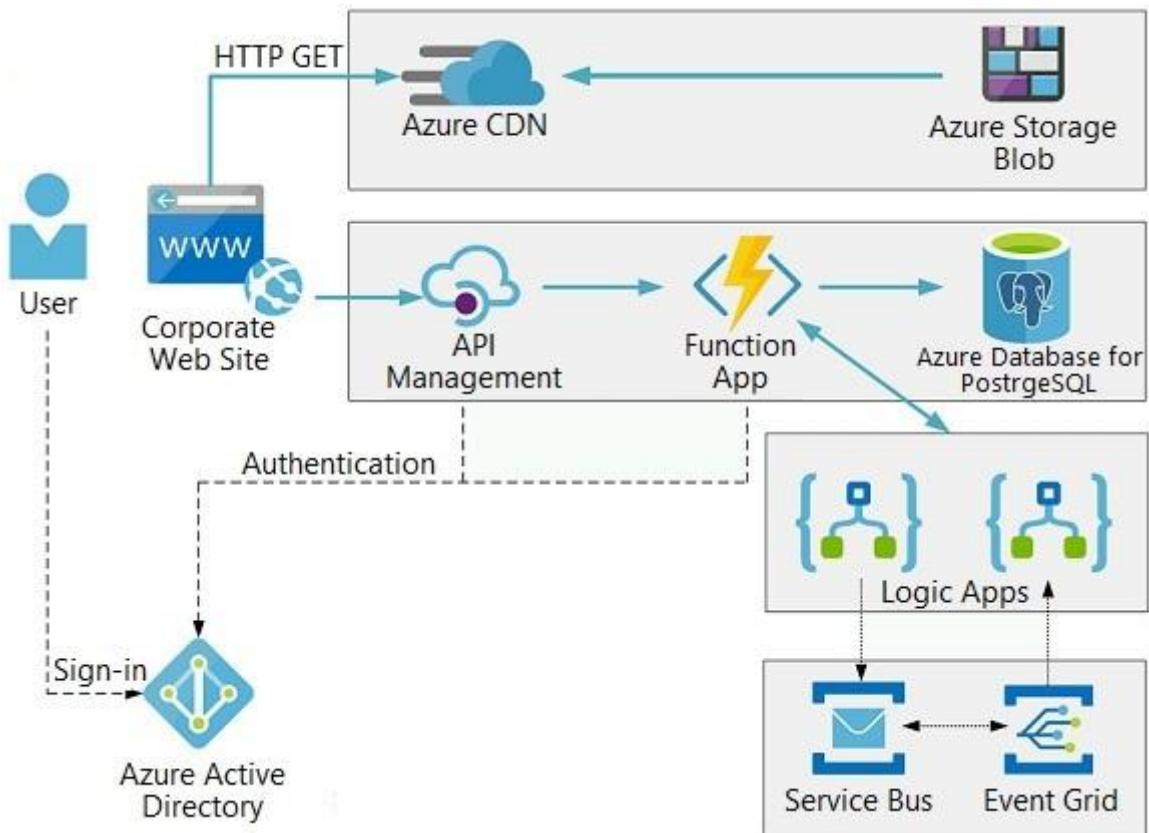
The company has a public website located at <http://www.cpndl.com/>. The site is a single-page web application that runs in Azure App Service on Linux. The website uses files stored in Azure Storage and cached in Azure Content Delivery Network (CDN) to serve static content.

API Management and Azure Function App functions are used to process and store data in Azure Database for PostgreSQL. API Management is used to broker communications to the Azure Function app functions for Logic app integration. Logic apps are used to orchestrate the data processing while Service Bus and Event Grid handle messaging and events.

The solution uses Application Insights, Azure Monitor, and Azure Key Vault.

#### Architecture diagram

The company has several applications and services that support their business. The company plans to implement serverless computing where possible. The overall architecture is shown below.



## User authentication

The following steps detail the user authentication process:

1. The user selects **Sign in** in the website.
2. The browser redirects the user to the Azure Active Directory (Azure AD) sign in page.
3. The user signs in.
4. Azure AD redirects the user's session back to the web application. The URL includes an access token.
5. The web application calls an API and includes the access token in the authentication header. The application ID is sent as the audience ('aud') claim in the access token.
6. The back-end API validates the access token.

## Requirements

### Corporate website

- Communications and content must be secured by using SSL.
- Communications must use HTTPS.
- Data must be replicated to a secondary region and three availability zones.
- Data storage costs must be minimized.

### Azure Database for PostgreSQL

The database connection string is stored in Azure Key Vault with the following attributes:

- Azure Key Vault name: cpandlkeyvault
- Secret name: PostgreSQLConn
- Id: 80df3e46ffcd4f1cb187f79905e9a1e8

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The connection information is updated frequently. The application must always use the latest information to connect to the database.

## Azure Service Bus and Azure Event Grid

- Azure Event Grid must use Azure Service Bus for queue-based load leveling.
- Events in Azure Event Grid must be routed directly to Service Bus queues for use in buffering.
- Events from Azure Service Bus and other Azure services must continue to be routed to Azure Event Grid for processing.

## Security

- All SSL certificates and credentials must be stored in Azure Key Vault.
- File access must restrict access by IP, protocol, and Azure AD rights.
- All user accounts and processes must receive only those privileges which are essential to perform their intended function.

## Compliance

Auditing of the file updates and transfers must be enabled to comply with General Data Protection Regulation (GDPR). The file updates must be read-only, stored in the order in which they occurred, include only create, update, delete, and copy operations, and be retained for compliance reasons.

## Issues

### Corporate website

While testing the site, the following error message displays:

```
CryptographicException: The system cannot find the file specified.
```

### Function app

You perform local testing for the RequestUserApproval function. The following error message displays:

```
'Timeout value of 00:10:00 exceeded by function: RequestUserApproval'
```

The same error message displays when you test the function in an Azure development environment when you run the following Kusto query:

```
FunctionAppLogs  
| where FunctionName == "RequestUserApproval"
```

### Logic app

You test the Logic app in a development environment. The following error message displays:

```
'400 Bad Request'
```

Troubleshooting of the error shows an HttpTrigger action to call the RequestUserApproval function.

## Code

### Corporate website

Security.cs:

```
SC01 public class Security  
SC02 {  
SC03 var bytes = System.IO.File.ReadAllBytes("~/var/ssl/private");  
SC04 var cert = new System.Security.Cryptography.X509Certificate2(bytes);  
SC05 var certName = cert.FriendlyName;  
SC06 }
```

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## Function app

RequestUserApproval.cs:

```
RA01 public static class RequestUserApproval
RA02 {
RA03 [FunctionName("RequestUserApproval")]
RA04 public static async Task<IActionResult> Run(
RA05 [HttpTrigger(AuthorizationLevel.Function, "get", "post", Route = null)] HttpRequest req,
RA06 ILogger log)
RA07 {
RA08     log.LogInformation("RequestUserApproval function processed a request.");
RA09     ...
RA10     ? (ActionResult)new OkObjectResult($"User approval processed")
RA11     : new BadRequestObjectResult("Failed to process user approval");
RA12 }
RA13 private static bool ProcessRequest(HttpRequest req)
RA14 {
RA15     ...
RA16 }
RA17 }
```

## QUESTION 1

### HOTSPOT

You need to configure the Account Kind, Replication, and Storage tier options for the corporate website's Azure Storage account.

How should you complete the configuration? To answer, select the appropriate options in the dialog box in the answer area.

**NOTE:** Each correct selection is worth one point.

**Hot Area:**

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## Create storage account

X

Basics Advanced Tags Review + create

Azure Storage is a Microsoft-managed service providing cloud storage that is highly available, secure, durable, scalable, and redundant. Azure Storage includes Azure Blobs (objects), Azure Data Lake Storage Gen2, Azure Files, Azure Queues, and Azure Tables. The cost of your storage account depends on the usage and the options you choose below. [Learn more](#)

### PROJECT DETAILS

Select the subscription to manage deployed resources and costs. Use resource groups like folders to organize and manage all your resources.

\* Subscription

Visual Studio Enterprise

\* Resource group

(New) cplcorporatesite

Create new

### INSTANCE DETAILS

The default deployment model is Resource Manager, which supports the latest Azure features. You may choose to deploy using the classic deployment model instead. [Choose classic deployment model](#)

\* Storage account name ⓘ

corporatewebsitecontent ✓

\* Location

(US) East US

Performance ⓘ

Standard  Premium

Account kind ⓘ

▼  
StorageV2 (general purpose v2)  
Storage (general purpose v1)  
BlobStorage

Replication ⓘ

▼  
Locally-redundant storage (LRS)  
Zone-redundant storage (ZRS)  
Geo-redundant storage (GRS)  
Read-access geo-redundant storage (RA-GRS)  
Geo-zone-redundant storage (GZRS)  
Read-access geo-zone-redundant storage (RA-GZRS)

Access tier (default) ⓘ

Cool  Hot

**Correct Answer:**

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## Create storage account

X

Basics Advanced Tags Review + create

Azure Storage is a Microsoft-managed service providing cloud storage that is highly available, secure, durable, scalable, and redundant. Azure Storage includes Azure Blobs (objects), Azure Data Lake Storage Gen2, Azure Files, Azure Queues, and Azure Tables. The cost of your storage account depends on the usage and the options you choose below. [Learn more](#)

### PROJECT DETAILS

Select the subscription to manage deployed resources and costs. Use resource groups like folders to organize and manage all your resources.

* Subscription	Visual Studio Enterprise
	▼
* Resource group	(New) cplcorporatesite
	▼
	Create new

### INSTANCE DETAILS

The default deployment model is Resource Manager, which supports the latest Azure features. You may choose to deploy using the classic deployment model instead. [Choose classic deployment model](#)

* Storage account name ⓘ	corporatewebsitecontent						
	✓						
* Location	(US) East US						
	▼						
Performance ⓘ	<input checked="" type="radio"/> Standard <input type="radio"/> Premium						
Account kind ⓘ	<table><tr><td>StorageV2 (general purpose v2)</td></tr><tr><td>Storage (general purpose v1)</td></tr><tr><td>BlobStorage</td></tr></table>	StorageV2 (general purpose v2)	Storage (general purpose v1)	BlobStorage			
StorageV2 (general purpose v2)							
Storage (general purpose v1)							
BlobStorage							
	▼						
Replication ⓘ	<table><tr><td>Locally-redundant storage (LRS)</td></tr><tr><td>Zone-redundant storage (ZRS)</td></tr><tr><td>Geo-redundant storage (GRS)</td></tr><tr><td>Read-access geo-redundant storage (RA-GRS)</td></tr><tr><td>Geo-zone-redundant storage (GZRS)</td></tr><tr><td>Read-access geo-zone-redundant storage (RA-GZRS)</td></tr></table>	Locally-redundant storage (LRS)	Zone-redundant storage (ZRS)	Geo-redundant storage (GRS)	Read-access geo-redundant storage (RA-GRS)	Geo-zone-redundant storage (GZRS)	Read-access geo-zone-redundant storage (RA-GZRS)
Locally-redundant storage (LRS)							
Zone-redundant storage (ZRS)							
Geo-redundant storage (GRS)							
Read-access geo-redundant storage (RA-GRS)							
Geo-zone-redundant storage (GZRS)							
Read-access geo-zone-redundant storage (RA-GZRS)							
	▼						
Access tier (default) ⓘ	<table><tr><td><input checked="" type="radio"/> Cool</td></tr><tr><td><input type="radio"/> Hot</td></tr></table>	<input checked="" type="radio"/> Cool	<input type="radio"/> Hot				
<input checked="" type="radio"/> Cool							
<input type="radio"/> Hot							

### Section: (none)

#### Explanation

#### Explanation/Reference:

Explanation:

Account Kind: StorageV2 (general-purpose v2)

Scenario: Azure Storage blob will be used (refer to the exhibit). Data storage costs must be minimized.

General-purpose v2 accounts: Basic storage account type for blobs, files, queues, and tables.

Recommended for most scenarios using Azure Storage.

Incorrect Answers:

BlockBlobStorage accounts: Storage accounts with premium performance characteristics for block blobs and append blobs. Recommended for scenarios with high transaction rates, or scenarios that use smaller objects or require consistently low storage latency.

General-purpose v1 accounts: Legacy account type for blobs, files, queues, and tables. Use generalpurpose v2 accounts instead when possible.

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## Replication: Geo-redundant Storage

Scenario: Data must be replicated to a secondary region and three availability zones.

Geo-redundant storage (GRS) copies your data synchronously three times within a single physical location in the primary region using LRS. It then copies your data asynchronously to a single physical location in the secondary region.

Incorrect Answers:

Geo-zone-redundant storage (GZRS), but it would be more costly.

Storage tier: Cool

Data storage costs must be minimized.

Note: Azure storage offers different access tiers, which allow you to store blob object data in the most costeffective manner. The available access tiers include:

Hot - Optimized for storing data that is accessed frequently.

Cool - Optimized for storing data that is infrequently accessed and stored for at least 30 days.

Reference: <https://docs.microsoft.com/en-us/azure/storage/common/storage-account-overview>

<https://docs.microsoft.com/en-us/azure/storage/common/storage-redundancy>

<https://docs.microsoft.com/en-us/azure/storage/blobs/storage-blob-storage-tiers?tabs=azure-portal>

## **Develop for Azure storage**

### **Testlet 3**

#### **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 questions in 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 section 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 in 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. When you are ready to answer a question, click the **Question** button to return to the question.

#### **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**

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Column	Description
UserId	unique identifier for an 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 WebAppIdentity.

## 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.

## 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.

## Requirements

### Receipt processing

Concurrent processing of a receipt must be prevented.

### 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

- User's 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 principle of least privilege 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.

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## 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.

## Application code

### 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 GetDRBBlob(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().CreateIfNotExistsAsync();
PC28         return cloudBlobClient.GetRootContainerReference();
PC29     }
PC30     private static async Task<StorageCredentials> GetCredentials()
PC31     {
PC32         ...
PC33     }
PC34     private static async Task<List<IListFileItem>> ListFiles()
PC35     {
PC36         ...
PC37     }
PC38     private KeyVaultClient _keyVaultClient = new KeyVaultClient("...");
PC39 }
```

### Database.cs

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```
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(HttpStatusCode response)
RU13     {
RU14
RU15     }
RU16 }
```

### ConfigureSSE.ps1

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```

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 DRAG

DROP

You need to add code at line PC32 in Processing.cs to implement the GetCredentials method in the Processing class.

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
MSITokenProvider("...", null)	var tp = new _____ code segment
tp.GetAccessTokenAsync("...")	var t = new TokenCredential(await _____ code segment );
AzureServiceTokenProvider()	return new StorageCredentials(t);
StringTokenProvider("storage", "msi")	
tp.GetAuthenticationHeaderAsync(CancellationToken.None)	

### Correct Answer:

Code segments	Answer Area
MSITokenProvider("...", null)	var tp = new AzureServiceTokenProvider()
_____	var t = new TokenCredential(await tp.GetAccessTokenAsync("..."))
_____	return new StorageCredentials(t);
StringTokenProvider("storage", "msi")	
tp.GetAuthenticationHeaderAsync(CancellationToken.None)	

### Section: (none)

### Explanation

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## **Explanation/Reference:**

Explanation:

Box 1: AzureServiceTokenProvider()

Box 2: tp.GetAccessTokenAsync("...")

Acquiring an access token is then quite easy. Example code:

```
private async Task<string> GetAccessTokenAsync()
{
    var tokenProvider = new AzureServiceTokenProvider();
    return await tokenProvider.GetAccessTokenAsync("https://storage.azure.com/");
}
```

Reference: <https://joonasw.net/view/azure-ad-authentication-with-azure-storage-and-managed-service-identity>

## **QUESTION 2 DRAG**

DROP

You need to ensure disaster recovery requirements are met.

What code should you add at line PC16?

To answer, drag the appropriate code fragments to the correct locations. Each code fragment 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:**

Values

- true
- SingleTransferContext
- ShouldTransferCallbackAsync
- false
- DirectoryTransferContext
- ShouldOverwriteCallbackAsync

### **Answer Area**

```
var copyOptions = new CopyOptions { };
var context = new [Value] = (source, destination) => Task.FromResult(true);
context. [Value] = (source, destination) => Task.FromResult(true);
await TransferManager.CopyAsync(blob, GetDRBlob(blob), isServiceCopy: [Value],
, context: context, options:copyOptions);
```

### **Correct Answer:**

Values

- true
- SingleTransferContext
- 
- 
- 
- ShouldOverwriteCallbackAsync

### **Answer Area**

```
var copyOptions = new CopyOptions { };
var context = new [DirectoryTransferContext] = (source, destination) => Task.FromResult(true);
context. [ShouldTransferCallbackAsync] = (source, destination) => Task.FromResult(true);
await TransferManager.CopyAsync(blob, GetDRBlob(blob), isServiceCopy: [false],
, context: context, options:copyOptions);
```

## **Section: (none)**

**Explanation**

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## **Explanation/Reference:**

Explanation:

Scenario: 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.

Box 1: DirectoryTransferContext

We transfer all files in the directory.

Note: The TransferContext object comes in two forms: SingleTransferContext and

DirectoryTransferContext. The former is for transferring a single file and the latter is for transferring a directory of files.

Box 2: ShouldTransferCallbackAsync

The DirectoryTransferContext.ShouldTransferCallbackAsync delegate callback is invoked to tell whether a transfer should be done.

Box 3: False

If you want to use the retry policy in Copy, and want the copy can be resume if break in the middle, you can use SyncCopy (isServiceCopy = false).

Note that if you choose to use service side copy ('isServiceCopy' set to true), Azure (currently) doesn't provide SLA for that. Setting 'isServiceCopy' to false will download the source blob loca

Reference: <https://docs.microsoft.com/en-us/azure/storage/common/storage-use-data-movement-library>

<https://docs.microsoft.com/en-us/dotnet/api/microsoft.windowsazure.storage.datamovement.directorytransfercontext.shouldtransfercallbackasync?view=azure-dotnet>

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## Develop for Azure storage

### Question Set 4

#### QUESTION 1

You develop Azure solutions.

You must connect to a No-SQL globally-distributed database by using the .NET API.

You need to create an object to configure and execute requests in the database.

Which code segment should you use?

- A. new Container(EndpointUri, PrimaryKey);
- B. new Database(EndpointUri, PrimaryKey);
- C. new CosmosClient(EndpointUri, PrimaryKey);

**Correct Answer:** C

**Section:** (none)

**Explanation**

**Explanation/Reference:**

Explanation:

Example:

```
// Create a new instance of the Cosmos Client
this.cosmosClient = new CosmosClient(EndpointUri, PrimaryKey)

//ADD THIS PART TO YOUR CODE
await this.CreateDatabaseAsync();
```

Reference: <https://docs.microsoft.com/en-us/azure/cosmos-db/sql-api-get-started>

#### QUESTION 2 DRAG

DROP

You are developing a new page for a website that uses Azure Cosmos DB for data storage. The feature uses documents that have the following format:

```
{
    "name": "John",
    "city" : "Seattle"
}
```

You must display data for the new page in a specific order. You create the following query for the page:

```
SELECT*
FROM People p
ORDER BY p.name, p.city DESC
```

You need to configure a Cosmos DB policy to support the query.

How should you configure the policy? To answer, drag the appropriate JSON segments to the correct locations. Each JSON 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.

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**Select and Place:**

JSON segments

orderBy  
sortOrder  
ascending  
descending  
compositeIndexes

Answer Area

```
{  
    "automatic": true,  
    "ngMode": "Consistent",  
    "includedPaths": [  
        {  
            "path": "/**"  
        }  
    ], "excludedPaths": [],  
    " [ ] ":" [  
        [  
            {  
                "path": "/name", "order": "descending"  
            },  
            {  
                "path": "/city", "order": " [ ] "  
            }  
        ]  
    ]  
}
```

**Correct Answer:**

JSON segments

orderBy  
sortOrder  
ascending  
descending  
compositeIndexes

Answer Area

```
{  
    "automatic": true,  
    "ngMode": "Consistent",  
    "includedPaths": [  
        {  
            "path": "/**"  
        }  
    ], "excludedPaths": [],  
    " [ compositeIndexes ] ":" [  
        [  
            {  
                "path": "/name", "order": "descending"  
            },  
            {  
                "path": "/city", "order": " [ ] " descending  
            }  
        ]  
    ]  
}
```

**Section: (none)****Explanation****Explanation/Reference:**

Explanation:

Box 1: compositeIndexes

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You can order by multiple properties. A query that orders by multiple properties requires a composite index.

Box 2: descending

Example: Composite index defined for (name ASC, age ASC):

It is optional to specify the order. If not specified, the order is ascending.

```
{  
    "automatic":true,  
    "indexingMode":"Consistent",  
    "includedPaths": [  
        {  
            "path": "*"  
        }  
    ],  
    "excludedPaths": [],  
    "compositeIndexes": [  
        [  
            {  
                "path": "/name",  
            },  
            {  
                "path": "/age",  
            }  
        ]  
    ]}  
}
```

### QUESTION 3

HOTSPOT

You are building a traffic monitoring system that monitors traffic along six highways. The system produces time series analysis-based reports for each highway. Data from traffic sensors are stored in Azure Event Hub.

Traffic data is consumed by four departments. Each department has an Azure Web App that displays the time series-based reports and contains a WebJob that processes the incoming data from Event Hub. All Web Apps run on App Service Plans with three instances.

Data throughput must be maximized. Latency must be minimized.

You need to implement the Azure Event Hub.

Which settings should you use? 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

Setting	Value
Number of partitions	<input type="button" value="▼"/> 3 4 6 12
Partition Key	<input type="button" value="▼"/> Highway Department Timestamp VM name

Correct Answer:

## Answer Area

Setting	Value
Number of partitions	<input type="button" value="▼"/> 3 4 6 12
Partition Key	<input type="button" value="▼"/> Highway Department Timestamp VM name

Section: (none)

Explanation

Explanation/Reference:

Explanation:

Box 1: 6

The number of partitions is specified at creation and must be between 2 and 32. There are 6 highways.

Box 2: Highway

Reference: <https://docs.microsoft.com/en-us/azure/event-hubs/event-hubs-features>

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**QUESTION 4 DRAG**

DROP

You are developing a microservices solution. You plan to deploy the solution to a multinode Azure Kubernetes Service (AKS) cluster.

You need to deploy a solution that includes the following features:

- reverse proxy capabilities
- configurable traffic routing
- TLS termination with a custom certificate

Which components should you use? To answer, drag the appropriate components to the correct requirements. Each component 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**

Components	Action	Component
Helm		
Draft	Deploy solution.	
Brigade	View cluster and external IP addressing.	
KubeCtl		
Ingress Controller	Implement a single, public IP endpoint that is routed to multiple microservices.	
CoreDNS		
Virtual Kubelet		

**Correct Answer:**

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## Answer Area

Components	Action	Component
Helm		
Draft	Deploy solution.	Helm
Brigade	View cluster and external IP addressing.	KubeCtl
KubeCtl		
Ingress Controller	Implement a single, public IP endpoint that is routed to multiple microservices.	Ingress Controller
CoreDNS		
Virtual Kubelet		

### Section: (none)

#### Explanation

#### Explanation/Reference:

Explanation:

Box 1: Helm

To create the ingress controller, use Helm to install nginx-ingress.

Box 2: kubectl

To find the cluster IP address of a Kubernetes pod, use the kubectl get pod command on your local machine, with the option -o wide .

Box 3: Ingress Controller

An ingress controller is a piece of software that provides reverse proxy, configurable traffic routing, and TLS termination for Kubernetes services. Kubernetes ingress resources are used to configure the ingress rules and routes for individual Kubernetes services.

Incorrect Answers:

Virtual Kubelet: Virtual Kubelet is an open-source Kubernetes kubelet implementation that masquerades as a kubelet. This allows Kubernetes nodes to be backed by Virtual Kubelet providers such as serverless cloud container platforms.

CoreDNS: CoreDNS is a flexible, extensible DNS server that can serve as the Kubernetes cluster DNS. Like Kubernetes, the CoreDNS project is hosted by the CNCF.

Reference: <https://docs.microsoft.com/bs-cyrl-ba/azure/aks/ingress-basic>

<https://www.digitalocean.com/community/tutorials/how-to-inspect-kubernetes-networking>

#### QUESTION 5 DRAG

DROP

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sales@alldumpz.com

You are implementing an order processing system. A point of sale application publishes orders to topics in an Azure Service Bus queue. The Label property for the topic includes the following data:

Property	Description
ShipLocation	the country/region where the order will be shipped
CorrelationId	a priority value for the order
Quantity	a user-defined field that stores the quantity of items in an order
AuditedAt	a user-defined field that records the date an order is audited

The system has the following requirements for subscriptions:

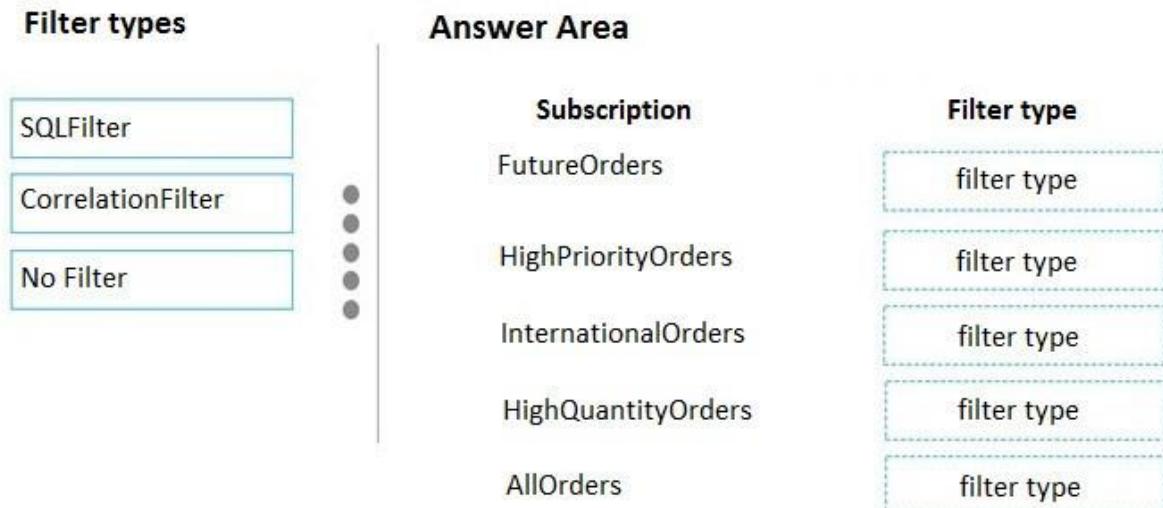
Subscription type	Comments
FutureOrders	This subscription is reserved for future use and must not receive any orders
HighPriorityOrders	Handle all high priority orders and international orders
InternationalOrders	Handle orders where the country/region is not United States
HighQuantityOrders	Handle only orders with quantities greater than 100 units
AllOrders	This subscription is used for auditing purposes. This subscription must receive every single order. AllOrders has an Action defined that updates the AuditedAt property to include the date and time it was received by the subscription.

You need to implement filtering and maximize throughput while evaluating filters.

Which filter types should you implement? To answer, drag the appropriate filter types to the correct subscriptions. Each filter 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:



#### Correct Answer:

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sales@alldumpz.com

Filter types	Answer Area	Filter type
SQLFilter	Subscription	SQLFilter
CorrelationFilter	FutureOrders	CorrelationFilter
No Filter	HighPriorityOrders	SQLFilter
	InternationalOrders	SQLFilter
	HighQuantityOrders	SQLFilter
	AllOrders	No Filter

### Section: (none)

#### Explanation

#### Explanation/Reference:

Explanation:

FutureOrders: SQLFilter

HighPriorityOrders: CorrelationFilter CorrelationID  
only

InternationalOrders: SQLFilter

Country NOT USA requires an SQL Filter

HighQuantityOrders: SQLFilter

Need to use relational operators so an SQL Filter is needed.

AllOrders: No Filter

SQL Filter: SQL Filters - A SqlFilter holds a SQL-like conditional expression that is evaluated in the broker against the arriving messages' user-defined properties and system properties. All system properties must be prefixed with sys. in the conditional expression. The SQL-language subset for filter conditions tests for the existence of properties (EXISTS), as well as for null-values (IS NULL), logical NOT/AND/OR, relational operators, simple numeric arithmetic, and simple text pattern matching with LIKE.

Correlation Filters - A CorrelationFilter holds a set of conditions that are matched against one or more of an arriving message's user and system properties. A common use is to match against the CorrelationId property, but the application can also choose to match against ContentType, Label, MessageId, ReplyTo, ReplyToSessionId, SessionId, To, and any user-defined properties. A match exists when an arriving message's value for a property is equal to the value specified in the correlation filter. For string expressions, the comparison is case-sensitive. When specifying multiple match properties, the filter combines them as a logical AND condition, meaning for the filter to match, all conditions must match.

Boolean filters - The TrueFilter and FalseFilter either cause all arriving messages (true) or none of the arriving messages (false) to be selected for the subscription.

Reference: <https://docs.microsoft.com/en-us/azure/service-bus-messaging/topic-filters>

### QUESTION 6 DRAG

DROP

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sales@alldumpz.com

Your company has several websites that use a company logo image. You use Azure Content Delivery Network (CDN) to store the static image.

You need to determine the correct process of how the CDN and the Point of Presence (POP) server will distribute the image and list the items in the correct order.

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

#### Select and Place:

##### Actions

##### Answer Area

If no edge servers in the POP have the image in cache, the POP requests the file from the origin server.



A user requests the image from the CDN URL. The DNS routes the request to the best performing POP location.



Subsequent requests for the file may be directed to the same POP using the CDN logo image URL. The POP edge server returns the file from cache if the TTL has not expired.

The origin server returns the logo image to an edge server in the POP. An edge server in the POP caches the logo image and returns the image to the client.



#### Correct Answer:

##### Actions

##### Answer Area

If no edge servers in the POP have the image in cache, the POP requests the file from the origin server.



A user requests the image from the CDN URL. The DNS routes the request to the best performing POP location.

A user requests the image from the CDN URL. The DNS routes the request to the best performing POP location.



Subsequent requests for the file may be directed to the same POP using the CDN logo image URL. The POP edge server returns the file from cache if the TTL has not expired.

If no edge servers in the POP have the image in cache, the POP requests the file from the origin server.

The origin server returns the logo image to an edge server in the POP. An edge server in the POP caches the logo image and returns the image to the client.

The origin server returns the logo image to an edge server in the POP. An edge server in the POP caches the logo image and returns the image to the client.

Subsequent requests for the file may be directed to the same POP using the CDN logo image URL. The POP edge server returns the file from cache if the TTL has not expired.

#### Section: (none)

#### Explanation

#### Explanation/Reference:

Explanation:

Step 1: A user requests the image..

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sales@alldumpz.com

A user requests a file (also called an asset) by using a URL with a special domain name, such as <endpoint name>.azureedge.net. This name can be an endpoint hostname or a custom domain. The DNS routes the request to the best performing POP location, which is usually the POP that is geographically closest to the user.

Step 2: If no edge servers in the POP have the..

If no edge servers in the POP have the file in their cache, the POP requests the file from the origin server. The origin server can be an Azure Web App, Azure Cloud Service, Azure Storage account, or any publicly accessible web server.

Step 3: The origin server returns the..

The origin server returns the file to an edge server in the POP.

An edge server in the POP caches the file and returns the file to the original requestor (Alice). The file remains cached on the edge server in the POP until the time-to-live (TTL) specified by its HTTP headers expires. If the origin server didn't specify a TTL, the default TTL is seven days.

Step 4: Subsequent requests for..

Additional users can then request the same file by using the same URL that the original user used, and can also be directed to the same POP.

If the TTL for the file hasn't expired, the POP edge server returns the file directly from the cache. This process results in a faster, more responsive user experience.

Reference: <https://docs.microsoft.com/en-us/azure/cdn/cdn-overview>

## QUESTION 7

You are developing an Azure Cosmos DB solution by using the Azure Cosmos DB SQL API. The data includes millions of documents. Each document may contain hundreds of properties.

The properties of the documents do not contain distinct values for partitioning. Azure Cosmos DB must scale individual containers in the database to meet the performance needs of the application by spreading the workload evenly across all partitions over time.

You need to select a partition key.

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

**NOTE:** Each correct selection is worth one point.

- A. a single property value that does not appear frequently in the documents
- B. a value containing the collection name
- C. a single property value that appears frequently in the documents
- D. a concatenation of multiple property values with a random suffix appended
- E. a hash suffix appended to a property value

**Correct Answer:** DE

**Section:** (none)

**Explanation**

**Explanation/Reference:**

Explanation:

You can form a partition key by concatenating multiple property values into a single artificial partitionKey property. These keys are referred to as synthetic keys.

Another possible strategy to distribute the workload more evenly is to append a random number at the end of the partition key value. When you distribute items in this way, you can perform parallel write operations across partitions.

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Note: It's the best practice to have a partition key with many distinct values, such as hundreds or thousands. The goal is to distribute your data and workload evenly across the items associated with these partition key values. If such a property doesn't exist in your data, you can construct a synthetic partition key.

Reference: <https://docs.microsoft.com/en-us/azure/cosmos-db/synthetic-partition-keys>

## QUESTION 8 HOTSPOT

A company develops a series of mobile games. All games use a single leaderboard service.

You have the following requirements:

- Code must be scalable and allow for growth.
- Each record must consist of a playerId, gameId, score, and time played.
- When users reach a new high score, the system will save the new score using the SaveScore function below.
- Each game is assigned an Id based on the series title.

You plan to store customer information in 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 to save scores in the data store. (Line numbers are included for reference only.)

```
01 public void SaveScore(string gameId, string playerId, int score, long timePlayed)
02 {
03     CloudStorageAccount storageAccount = CloudStorageAccount.Parse(connectionString);
04     CloudTableClient tableClient = storageAccount.CreateCloudTableClient();
05     CloudTable table = tableClient.GetTableReference("scoreTable");
06     table.CreateIfNotExists();
07     var scoreRecord = new PlayerScore(gameId, playerId, score, timePlayed);
08     TableOperation insertOperation = TableOperation.Insert(scoreRecord);
09     table.Execute(insertOperation);
10 }
```

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

```
01 CloudTableClient tableClient = account.CreateCloudTableClient();
02 CloudTable table = tableClient.GetTableReference("people");
03 TableQuery<CustomerEntity> query = new TableQuery<CustomerEntity>()
04     .Where(TableQuery.CombineFilters(
05         TableQuery.GenerateFilterCondition("PartitionKey", QueryComparisons.Equal, "Smith"),
06         TableOperators.And,
07         TableQuery.GenerateFilterCondition("Email", QueryComparisons.Equal, "ssmith@contoso.com")
08     ));
09 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:**

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sales@alldumpz.com

## Answer Area

Statements	Yes	No
SaveScore will work with Cosmos DB.	<input type="radio"/>	<input type="radio"/>
SaveScore will update and replace a record if one already exists with the same playerId and gameId.	<input type="radio"/>	<input type="radio"/>
Leader board data for the game will be automatically partitioned using gameId.	<input type="radio"/>	<input type="radio"/>
SaveScore will store the values for the gameId and playerId parameters in the database.	<input type="radio"/>	<input type="radio"/>

## Correct Answer:

### Answer Area

Statements	Yes	No
SaveScore will work with Cosmos DB.	<input checked="" type="radio"/>	<input type="radio"/>
SaveScore will update and replace a record if one already exists with the same playerId and gameId.	<input type="radio"/>	<input checked="" type="radio"/>
Leader board data for the game will be automatically partitioned using gameId.	<input type="radio"/>	<input checked="" type="radio"/>
SaveScore will store the values for the gameId and playerId parameters in the database.	<input checked="" type="radio"/>	<input type="radio"/>

## Section: (none)

### Explanation

#### Explanation/Reference:

Explanation:

Box 1: Yes Create

a table.

A CloudTableClient object lets you get reference objects for tables and entities. The following code creates a CloudTableClient object and uses it to create a new CloudTable object, which represents a table // Retrieve storage account from connection-string.

```
CloudStorageAccount storageAccount =  
    CloudStorageAccount.parse(storageConnectionString);  
  
    // Create the table client.  
    CloudTableClient tableClient = storageAccount.createCloudTableClient();  
  
    // Create the table if it doesn't exist.
```

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```
String tableName = "people";
CloudTable cloudTable = tableClient.getTableReference(tableName);
cloudTable.createIfNotExists();
```

Box 2: No

New records are inserted with TableOperation.insert. Old records are not updated.

To update old records TableOperation.insertOrReplace should be used instead.

Box 3: No

Box 4: Yes

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

## QUESTION 9

HOTSPOT

You are developing a solution that uses the Azure Storage Client library for .NET. You have the following code: (Line numbers are included for reference only.)

```
01 CloudBlockBlob src = null;
02 try
03 {
04     src = container.ListBlobs().OfType<CloudBlockBlob>().FirstOrDefault();
05     var id = await src.AcquireLeaseAsync(null);
06     var dst = container.GetBlockBlobReference(src.Name);
07     string cpid = await dst.StartCopyAsync(src);
08     await dst.FetchAttributeAsync();
09     return id;
10 }
11 catch (Exception e)
12 {
13     throw;
14 }
15 finally
16 {
17     if (src != null)
18         await src.FetchAttributesAsync();
19     if (src.Properties.LeaseState != LeaseState.Available)
20         await src.BreakLeaseAsync(new TimeSpan(0));
21 }
```

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:**

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sales@alldumpz.com

## Answer Area

Statement	Yes	No
The code creates an infinite lease	<input type="radio"/>	<input type="radio"/>
The code at line 06 always creates a new blob	<input type="radio"/>	<input type="radio"/>
The finally block releases the lease	<input type="radio"/>	<input type="radio"/>

**Correct Answer:**

## Answer Area

Statement	Yes	No
The code creates an infinite lease	<input checked="" type="radio"/>	<input type="radio"/>
The code at line 06 always creates a new blob	<input type="radio"/>	<input checked="" type="radio"/>
The finally block releases the lease	<input checked="" type="radio"/>	<input type="radio"/>

**Section: (none)**

**Explanation**

**Explanation/Reference:**

Explanation:

Box 1: Yes

AcquireLeaseAsync does not specify leaseTime. leaseTime is a TimeSpan representing the span of time for which to acquire the lease, which will be rounded down to seconds. If null, an infinite lease will be acquired. If not null, this must be 15 to 60 seconds.

Box 2: No

The GetBlockBlobReference method just gets a reference to a block blob in this container.

Box 3: Yes

The BreakLeaseAsync method initiates an asynchronous operation that breaks the current lease on this container.

Reference: <https://docs.microsoft.com/en-us/dotnet/api/microsoft.azure.storage.blob.cloudblobcontainer.acquireleaseasync>

<https://docs.microsoft.com/en-us/dotnet/api/microsoft.azure.storage.blob.cloudblobcontainer.getblockblobreference>

<https://docs.microsoft.com/en-us/dotnet/api/microsoft.azure.storage.blob.cloudblobcontainer.breakleaseasync>

## QUESTION 10

You are building a website that uses Azure Blob storage for data storage. You configure Azure Blob storage lifecycle to move all blobs to the archive tier after 30 days.

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sales@alldumpz.com

Customers have requested a service-level agreement (SLA) for viewing data older than 30 days.

You need to document the minimum SLA for data recovery.

Which SLA should you use?

- A. at least two days
- B. between one and 15 hours
- C. at least one day
- D. between zero and 60 minutes

**Correct Answer:** B

**Section:** (none)

**Explanation**

**Explanation/Reference:**

Explanation:

The archive access tier has the lowest storage cost. But it has higher data retrieval costs compared to the hot and cool tiers. Data in the archive tier can take several hours to retrieve depending on the priority of the rehydration. For small objects, a high priority rehydrate may retrieve the object from archive in under 1 hour.

Reference:

<https://docs.microsoft.com/en-us/azure/storage/blobs/storage-blob-storage-tiers?tabs=azure-portal>

## QUESTION 11 HOTSPOT

You are developing a ticket reservation system for an airline.

The storage solution for the application must meet the following requirements:

- Ensure at least 99.99% availability and provide low latency.
- Accept reservations even when localized network outages or other unforeseen failures occur.
- Process reservations in the exact sequence as reservations are submitted to minimize overbooking or selling the same seat to multiple travelers.
- Allow simultaneous and out-of-order reservations with a maximum five-second tolerance window.

You provision a resource group named airlineResourceGroup in the Azure South-Central US region.

You need to provision a SQL API Cosmos DB account to support the app.

How should you complete the Azure CLI commands? To answer, select the appropriate options in the answer area.

**NOTE:** Each correct selection is worth one point.

**Hot Area:**

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sales@alldumpz.com

## Answer Area

```
resourceGroupName='airlineResourceGroup'  
name='docdb-airline-reservations'  
databaseName='docdb-tickets-database'  
collectionName='docdb-tickets-collection'  
consistencyLevel=
```

Strong
Eventual
ConsistentPrefix
BoundedStaleness

```
az cosmosdb create \  
--name $name \  

```

```
--enable-virtual-network true \  
--enable-automatic-failover true \  
--kind 'GlobalDocumentDB' \  
--kind 'MongoDB' \  

```

```
--resource-group $resourceGroupName \  
--max-interval 5 \  

```

```
--locations 'southcentralus'  
--locations 'eastus'  
--locations 'southcentralus=0 eastus=1 westus=2'  
--locations 'southcentralus=0'
```

```
--default-consistency-level = $consistencylevel
```

Correct Answer:

## Answer Area

```
resourceGroupName='airlineResourceGroup'  
name='docdb-airline-reservations'  
databaseName='docdb-tickets-database'  
collectionName='docdb-tickets-collection'  
consistencyLevel=
```

Strong
Eventual
ConsistentPrefix
BoundedStaleness

```
az cosmosdb create \  
--name $name \  

```

```
--enable-virtual-network true \  
--enable-automatic-failover true \  
--kind 'GlobalDocumentDB' \  
--kind 'MongoDB' \  

```

```
--resource-group $resourceGroupName \  
--max-interval 5 \  

```

```
--locations 'southcentralus'  
--locations 'eastus'  
--locations 'southcentralus=0 eastus=1 westus=2'  
--locations 'southcentralus=0'
```

```
--default-consistency-level = $consistencylevel
```

### Section: (none)

### Explanation

#### Explanation/Reference:

Explanation:

Box 1: BoundedStaleness

Bounded staleness: The reads are guaranteed to honor the consistent-prefix guarantee. The reads might lag behind writes by at most "K" versions (that is, "updates") of an item or by "T" time interval. In other words, when you choose bounded staleness, the "staleness" can be configured in two ways:

The number of versions (K) of the item

The time interval (T) by which the reads might lag behind the writes

Incorrect Answers: Strong

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sales@alldumpz.com

Strong consistency offers a linearizability guarantee. Linearizability refers to serving requests concurrently. The reads are guaranteed to return the most recent committed version of an item. A client never sees an uncommitted or partial write. Users are always guaranteed to read the latest committed write.

Box 2: --enable-automatic-failover true\

For multi-region Cosmos accounts that are configured with a single-write region, enable automatic-failover by using Azure CLI or Azure portal. After you enable automatic failover, whenever there is a regional disaster, Cosmos DB will automatically failover your account.

Question: Accept reservations event when localized network outages or other unforeseen failures occur.

Box 3: --locations'southcentralus=0 eastus=1 westus=2 Need  
multi-region.

Reference: <https://docs.microsoft.com/en-us/azure/cosmos-db/consistency-levels>

<https://github.com/MicrosoftDocs/azure-docs/blob/master/articles/cosmos-db/manage-with-cli.md>

## QUESTION 12

HOTSPOT

You are preparing to deploy a Python website to an Azure Web App using a container. The solution will use multiple containers in the same container group. The Dockerfile that builds the container is as follows:

```
FROM python:3
ADD website.py
CMD [ "python", "./website.py"]
```

You build a container by using the following command. The Azure Container Registry instance named images is a private registry.

```
docker build -t images.azurecr.io/website:v1.0.0
```

The user name and password for the registry is **admin**.

The Web App must always run the same version of the website regardless of future builds.

You need to create an Azure Web App to run the website.

How should you complete the commands? 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

```
az configure --defaults web=website
az configure --defaults group=website
az appservice plan create --name websitePlan
az webapp create --plan websitePlan
az webapp config
```

--sku SHARED  
--tags container  
--sku B1 --hyper-v  
--sku B1 --is-linux

--deployment-source-url images.azurecr.io/website:v1.0.0  
--deployment-source-url images.azurecr.io/website:latest  
--deployment-container-image-name images.azurecr.io/website:v1.0.0  
--deployment-container-image-name images.azurecr.io/website:latest

set --python-version 2.7 --generic-configurations user=admin password=admin  
set --python-version 3.6 --generic-configurations user=admin password=admin  
container set --docker-registry-server-url https://images.azurecr.io -u admin -p admin  
container set --docker-registry-server-url https://images.azurecr.io/wsebsite -u admin -p admin

## Correct Answer:

### Answer Area

```
az configure --defaults web=website
az configure --defaults group=website
az appservice plan create --name websitePlan
az webapp create --plan websitePlan
az webapp config
```

--sku SHARED  
--tags container  
**--sku B1 --hyper-v**  
--sku B1 --is-linux

--deployment-source-url images.azurecr.io/website:v1.0.0  
--deployment-source-url images.azurecr.io/website:latest  
--deployment-container-image-name images.azurecr.io/website:v1.0.0  
--deployment-container-image-name images.azurecr.io/website:latest

set --python-version 2.7 --generic-configurations user=admin password=admin  
set --python-version 3.6 --generic-configurations user=admin password=admin  
**container set --docker-registry-server-url https://images.azurecr.io -u admin -p admin**  
container set --docker-registry-server-url https://images.azurecr.io/wsebsite -u admin -p admin

## Section: (none)

### Explanation

#### Explanation/Reference:

Explanation:

Box 1: --SKU B1 --hyper-v

--hyper-v

Host web app on Windows container.

Box 2: --deployment-source-url images.azurecr.io/website:v1.0.0

--deployment-source-url -u

Git repository URL to link with manual integration.

The Web App must always run the same version of the website regardless of future builds.

Incorrect:

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```
--deployment-container-image-name -i  
Linux only. Container image name from Docker Hub, e.g. publisher/image-name:tag. Box 3: az  
webapp config container set -url https://images.azurecr.io -u admin -p admin
```

az webapp config container set Set a  
web app container's settings.

Parameter: --docker-registry-server-url -r The  
container registry server url.

The Azure Container Registry instance named images is a private registry.

Example:

```
az webapp config container set --docker-registry-server-url https://[azure-container-registryname].azurecr.io
```

Reference: <https://docs.microsoft.com/en-us/cli/azure/appservice/plan>

### QUESTION 13

#### 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.

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:**

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sales@alldumpz.com

## Answer Area

Scale rule x

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

\* Operation

- ▼
- Increase count by
- Increase count to
- Decrease count by
- Decrease count to

AllDumpz

sales@alldumpz.com

**Correct Answer:**

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[sales@alldumpz.com](mailto:sales@alldumpz.com)

## Answer Area

Scale rule x

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

\* Operation

- Increase count by
- Increase count to
- Decrease count by
- Decrease count to

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**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 14 DRAG**

DROP

You have an application that uses Azure Blob storage.

You need to update the metadata of the blobs.

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

Select and Place:

**Methods**

Metadata.Add

SetMetadataAsync

FetchAttributesAsync

UploadFileStream

SetPropertiesAsync

**Answer Area**

Correct Answer:

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## Methods

<b>FetchAttributesAsync</b>
<b>UploadFileStream</b>

## Answer Area

<b>Metadata.Add</b>
<b>SetMetadataAsync</b>
<b>SetPropertiesAsync</b>

### Section: (none)

#### Explanation

#### Explanation/Reference:

Explanation:

Metadata.Add example:

```
// Add metadata to the dictionary by calling the Add method      metadata.Add("docType",  
"textDocuments");
```

SetMetadataAsync example:

```
// Set the blob's metadata.  
await blob.SetMetadataAsync(metadata);
```

// Set the blob's properties. await

```
blob.SetPropertiesAsync();
```

Reference:

<https://docs.microsoft.com/en-us/azure/storage/blobs/storage-blob-properties-metadata>

### QUESTION 15

**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 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 data 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 the machine identifier as the partition key and enable capture.

Does the solution meet the goal?

A. Yes

B. No

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**Correct Answer:** A

**Section:** (none)

**Explanation**

**Explanation/Reference:**

Reference: <https://docs.microsoft.com/en-us/azure/event-grid/compare-messaging-services>

### **QUESTION 16**

You develop Azure solutions.

A .NET application needs to receive a message each time an Azure virtual machine finishes processing data. The messages must NOT persist after being processed by the receiving application.

You need to implement the .NET object that will receive the messages.

Which object should you use?

- A. QueueClient
- B. SubscriptionClient
- C. TopicClient
- D. CloudQueueClient

**Correct Answer:** D

**Section:** (none)

**Explanation**

**Explanation/Reference:**

Explanation:

A queue allows processing of a message by a single consumer. Need a CloudQueueClient to access the Azure VM.

Incorrect Answers:

B, C: In contrast to queues, topics and subscriptions provide a one-to-many form of communication in a publish and subscribe pattern. It's useful for scaling to large numbers of recipients.

Reference: <https://docs.microsoft.com/en-us/azure/service-bus-messaging/service-bus-queues-topics-subscriptions>

### **QUESTION 17**

DRAG DROP

You are maintaining an existing application that uses an Azure Blob GPv1 Premium storage account. Data older than three months is rarely used.

Data newer than three months must be available immediately. Data older than a year must be saved but does not need to be available immediately.

You need to configure the account to support a lifecycle management rule that moves blob data to archive storage for data not modified in the last year.

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:**

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Actions	Answer Area
Upgrade the storage account to GPv2	
Create a new GPv2 Standard account and set its default access tier level to cool	
Change the storage account access tier from hot to cool	
Copy the data to be archived to a Standard GPv2 storage account and then delete the data from the original storage account	

#### Correct Answer:

Actions	Answer Area
	Upgrade the storage account to GPv2
Create a new GPv2 Standard account and set its default access tier level to cool	
	Copy the data to be archived to a Standard GPv2 storage account and then delete the data from the original storage account

#### Section: (none)

#### Explanation

#### Explanation/Reference:

Explanation:

Step 1: Upgrade the storage account to GPv2

Object storage data tiering between hot, cool, and archive is supported in Blob Storage and General Purpose v2 (GPv2) accounts. General Purpose v1 (GPv1) accounts don't support tiering.

You can easily convert your existing GPv1 or Blob Storage accounts to GPv2 accounts through the Azure portal.

Step 2: Copy the data to be archived to a Standard GPv2 storage account and then delete the data from the original storage account

Step 3: Change the storage account access tier from hot to cool

Note: Hot - Optimized for storing data that is accessed frequently.

Cool - Optimized for storing data that is infrequently accessed and stored for at least 30 days.

Archive - Optimized for storing data that is rarely accessed and stored for at least 180 days with flexible latency requirements, on the order of hours.

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Only the hot and cool access tiers can be set at the account level. The archive access tier can only be set at the blob level.

Reference:

<https://docs.microsoft.com/en-us/azure/storage/blobs/storage-blob-storage-tiers>

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## Implement Azure security

### 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 questions in 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 section 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 in 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. When you are ready to answer a question, click the **Question** button to return to the question.

#### Background

##### Overview

You are a developer for Contoso, Ltd. The company has a social networking website that is developed as a Single Page Application (SPA). The main web application for the social networking website loads user uploaded content from blob storage.

You are developing a solution to monitor uploaded data for inappropriate content. The following process occurs when users upload content by using the SPA:

- Messages are sent to ContentUploadService.
- Content is processed by ContentAnalysisService.
- After processing is complete, the content is posted to the social network or a rejection message is posted in its place.

The ContentAnalysisService is deployed with Azure Container Instances from a private Azure Container Registry named contosoimages.

The solution will use eight CPU cores.

#### Azure Active Directory

Contoso, Ltd. uses Azure Active Directory (Azure AD) for both internal and guest accounts.

#### Requirements

##### ContentAnalysisService

The company's data science group built ContentAnalysisService which accepts user generated content as a string and returns a probable value for inappropriate content. Any values over a specific threshold must be reviewed by an employee of Contoso, Ltd.

You must create an Azure Function named CheckUserContent to perform the content checks.

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## **Costs**

You must minimize costs for all Azure services.

## **Manual review**

To review content, the user must authenticate to the website portion of the ContentAnalysisService using their Azure AD credentials. The website is built using React and all pages and API endpoints require authentication. In order to review content a user must be part of a ContentReviewer role. All completed reviews must include the reviewer's email address for auditing purposes.

## **High availability**

All services must run in multiple regions. The failure of any service in a region must not impact overall application availability.

## **Monitoring**

An alert must be raised if the ContentUploadService uses more than 80 percent of available CPU cores.

## **Security**

You have the following security requirements:

- Any web service accessible over the Internet must be protected from cross site scripting attacks.
- All websites and services must use SSL from a valid root certificate authority.
- Azure Storage access keys must only be stored in memory and must be available only to the service.
- All Internal services must only be accessible from internal Virtual Networks (VNets).
- All parts of the system must support inbound and outbound traffic restrictions. ▪ All service calls must be authenticated by using Azure AD.

## **User agreements**

When a user submits content, they must agree to a user agreement. The agreement allows employees of Contoso, Ltd. to review content, store cookies on user devices, and track user's IP addresses.

Information regarding agreements is used by multiple divisions within Contoso, Ltd.

User responses must not be lost and must be available to all parties regardless of individual service uptime. The volume of agreements is expected to be in the millions per hour.

## **Validation testing**

When a new version of the ContentAnalysisService is available the previous seven days of content must be processed with the new version to verify that the new version does not significantly deviate from the old version.

## **Issues**

Users of the ContentUploadService report that they occasionally see HTTP 502 responses on specific pages.

## **Code**

### **ContentUploadService**

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```

CS01 apiVersion: '2018-10-01'
CS02 type: Microsoft.ContainerInstance/containerGroups
CS03 location: westus
CS04 name: contentUploadService
CS05 properties:
CS06   containers:
CS07     - name: service
CS08       properties:
CS09         image: contoso/contentUploadService:latest
CS10       ports:
CS11         - port: 80
CS12           protocol: TCP
CS13       resources:
CS14         requests:
CS15           cpu: 1.0
CS16           memoryInGB: 1.5
CS17
CS18 ipAddress:
CS19   ip: 10.23.121.112
CS20   ports:
CS21     - port: 80
CS22       protocol: TCP
CS23
CS24
CS25 networkProfile:
CS26
id: /subscriptions/98...19/resourceGroups/container/providers/Microsoft.Network/networkProfiles/subnet

```

```

AM01 {
AM02   "id" : "2b079f03-9b06-2d44-98bb-e9182901fc6",
AM03   "appId" : "7118a7f0-b5c2-4c9d-833c-3d711396fe65",
AM04
AM05   "createdDateTime" : "2019-12-24T06:01:44Z",
AM06   "logoUrl" : null,
AM07   "logoutUrl" : null,
AM08   "name" : "ContentAnalysisService",
AM09
AM10
AM11   "orgRestrictions" : [],
AM12   "parentalControlSettings" : {
AM13     "countriesBlockedForMinors" : [],
AM14     "legalAgeGroupRule" : "Allow"
AM15   },
AM16   "passwordCredentials" : []
AM17 }

```

## QUESTION 1 DRAG

DROP

You need to add markup at line AM04 to implement the ContentReview role.

How should you complete the markup? To answer, drag the appropriate json segments to the correct locations. Each json 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.

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**NOTE:** Each correct selection is worth one point.

**Select and Place:**

Json segments	Answer Area
User	"appRoles": [
value	{ " [ ] ":" [
role	" [ ] "
Application	],
allowedMemberTypes	" [ ] ", "displayName": "ContentReviewer",
allowedAccountTypes	" [ ] ", "id": "e1c2ade8-98f8-45fd-aa4a-6d24b512c22a", "isEnabled" : true,
	" [ ] " : "ContentReviewer"
	}
	],

**Correct Answer:**

Json segments	Answer Area
User	"appRoles": [
value	{ " allowedMemberTypes ":" [
role	" User " "
Application	],
allowedMemberTypes	" [ ] ", "displayName": "ContentReviewer",
allowedAccountTypes	" [ ] ", "id": "e1c2ade8-98f8-45fd-aa4a-6d24b512c22a", "isEnabled" : true,
	" value " : "ContentReviewer"
	}
	],

**Section: (none)**

**Explanation**

**Explanation/Reference:**

Explanation:

Box 1: allowedMemberTypes

allowedMemberTypes specifies whether this app role definition can be assigned to users and groups by setting to "User", or to other applications (that are accessing this application in daemon service scenarios) by setting to "Application", or to both.

Note: The following example shows the appRoles that you can assign to users. "appId":

"8763f1c4-f988-489c-a51e-158e9ef97d6a",

"appRoles": [

{

"allowedMemberTypes": [  
 "User"

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```
],
  "displayName": "Writer",
  "id": "d1c2ade8-98f8-45fd-aa4a-6d06b947c66f",
  "isEnabled": true,
  "description": "Writers Have the ability to create tasks.",    "value": "Writer"
}

],
"availableToOtherTenants": false,
```

Box 2: User

Scenario: In order to review content a user must be part of a ContentReviewer role.

Box 3: value value specifies the value which will be included in the roles claim in authentication and access tokens.

Reference: <https://docs.microsoft.com/en-us/graph/api/resources/approle>

**QUESTION 2 HOTSPOT**

You need to add code at line AM09 to ensure that users can review content using ContentAnalysisService.

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:**

## Answer Area

"allowPublicClient":true  
"oauth2Permissions": ["login"]  
"oauth2AllowUrlPathMatching":true  
"oauth2AllowIdTokenImplicitFlow":true

"oauth2AllowImplicitFlow": true  
"oauth2RequiredPostResponse":true  
"preAuthorizedApplications":["SPA"]  
"knownClientApplications":["ContentAnalysisService"]

**Correct Answer:**

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## Answer Area

```
"allowPublicClient":true  
"oauth2Permissions": ["login"]  
"oauth2AllowUrlPathMatching":true  
"oauth2AllowIdTokenImplicitFlow":true
```

```
"oauth2AllowImplicitFlow": true  
"oauth2RequiredPostResponse":true  
"preAuthorizedApplications":["SPA"]  
"knownClientApplications":["ContentAnalysisService"]
```

### Section: (none)

#### Explanation

#### Explanation/Reference:

Explanation:

Box 1: "oauth2Permissions": ["login"] oauth2Permissions specifies the collection of OAuth 2.0 permission scopes that the web API (resource) app exposes to client apps. These permission scopes may be granted to client apps during consent.

Box 2: "oauth2AllowImplicitFlow":true

For applications (Angular, Ember.js, React.js, and so on), Microsoft identity platform supports the OAuth 2.0 Implicit Grant flow.

Reference: <https://docs.microsoft.com/en-us/azure/active-directory/develop/reference-app-manifest>

### QUESTION 3 HOTSPOT

You need to ensure that network security policies are met.

How should you configure network security? 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

Technology	Value
SSL certificate	<input type="checkbox"/> Valid root certificate <input type="checkbox"/> Self-signed certificate
Proxy type	<input type="checkbox"/> nginx <input type="checkbox"/> Azure Application Gateway

Correct Answer:

## Answer Area

Technology	Value
SSL certificate	<input checked="" type="checkbox"/> Valid root certificate <input type="checkbox"/> Self-signed certificate
Proxy type	<input type="checkbox"/> nginx <input checked="" type="checkbox"/> Azure Application Gateway

Section: (none)

Explanation

Explanation/Reference:

Explanation:

Box 1: Valid root certificate

Scenario: All websites and services must use SSL from a valid root certificate authority.

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## Box 2: Azure Application Gateway

### Scenario:

- Any web service accessible over the Internet must be protected from cross site scripting attacks.
- All Internal services must only be accessible from Internal Virtual Networks (VNets)
- All parts of the system must support inbound and outbound traffic restrictions.

Azure Web Application Firewall (WAF) on Azure Application Gateway provides centralized protection of your web applications from common exploits and vulnerabilities. Web applications are increasingly targeted by malicious attacks that exploit commonly known vulnerabilities. SQL injection and cross-site scripting are among the most common attacks.

Application Gateway supports autoscaling, SSL offloading, and end-to-end SSL, a web application firewall (WAF), cookie-based session affinity, URL path-based routing, multisite hosting, redirection, rewrite HTTP headers and other features.

Note: Both Nginx and Azure Application Gateway act as a reverse proxy with Layer 7 load-balancing features plus a WAF to ensure strong protection against common web vulnerabilities and exploits.

You can modify Nginx web server configuration/SSL for X-XSS protection. This helps to prevent cross-site scripting exploits by forcing the injection of HTTP headers with X-XSS protection.

### Reference:

<https://docs.microsoft.com/en-us/azure/web-application-firewall/ag/ag-overview>

<https://www.upguard.com/articles/10-tips-for-securig-your-nginx-deployment>

## QUESTION 4 DRAG

DROP

You need to add YAML markup at line CS17 to ensure that the ContentUploadService can access Azure Storage access keys.

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

YAML segments	Answer Area
secret	<p>YAML segment :</p> <pre>- mountPath: /mnt/secrets</pre>
envVar	<p>YAML segment :</p> <pre>name: accesskey</pre>
secretValues	<p>YAML segment :</p> <pre>- name: accesskey</pre>
volumes	<p>YAML segment :</p> <pre>key: TXkgZmlyc3Qgc2VjcmV0IEZPTwo=</pre>
volumeMounts	
environmentVariables	

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**Correct Answer:**

**YAML segments**

envVar
secretValues
environmentVariables

**Answer Area**

```
volumeMounts :  
  - mountPath: /mnt/secrets  
    name: accesskey  
volumes :  
  - name: accesskey  
secret :  
  key: TXkgZmlyc3Qgc2VjcmV0IEZPTwo=
```

**Section: (none)**

**Explanation**

**Explanation/Reference:**

Explanation:

Box 1: volumeMounts Example:

```
volumeMounts:  
- mountPath: /mnt/secrets  name:  
secretvolume1 volumes:  
- name: secretvolume1secret:  
mysecret1: TXkgZmlyc3Qgc2VjcmV0IEZPTwo=
```

Box 2: volumes

Box 3: secret

Reference: <https://docs.microsoft.com/en-us/azure/container-instances/container-instances-volume-secret>

**QUESTION 5**

HOTSPOT

You need to add code at line AM10 of the application manifest to ensure that the requirement for manually reviewing content can be met.

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:**

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## Answer Area

```
"optionalClaims": [  
    "acct",  
    "platf",  
    "sid",  
    "tenant_ctry"  
],  
    "  
        sid  
        upn  
        email  
        enfpolids  
    "
```

Correct Answer:

## Answer Area

```
"optionalClaims": [  
    "acct",  
    "platf",  
    "sid",  
    "tenant_ctry"  
],  
    "  
        sid  
        upn  
        email  
        enfpolids  
    "
```

**Section: (none)**

**Explanation**

**Explanation/Reference:**

Explanation:

Box 1: sid

Sid: Session ID, used for per-session user sign-out. Personal and Azure AD accounts.

Scenario: Manual review

To review content, the user must authenticate to the website portion of the ContentAnalysisService using their Azure AD credentials. The website is built using React and all pages and API endpoints require authentication. In order to review content a user must be part of a ContentReviewer role.

Box 2: email

Scenario: All completed reviews must include the reviewer's email address for auditing purposes.

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## Implement Azure security

### Testlet 2

#### 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.

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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 section 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 in 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. When you are ready to answer a question, click the **Question** button to return to the question.

#### Current environment

##### Windows Server 2016 virtual machine

This virtual machine (VM) runs BizTalk 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 trucking stops.
- Shipping REST API – This API provides shipping information for use and display on the shipping website.

#### Shipping Data

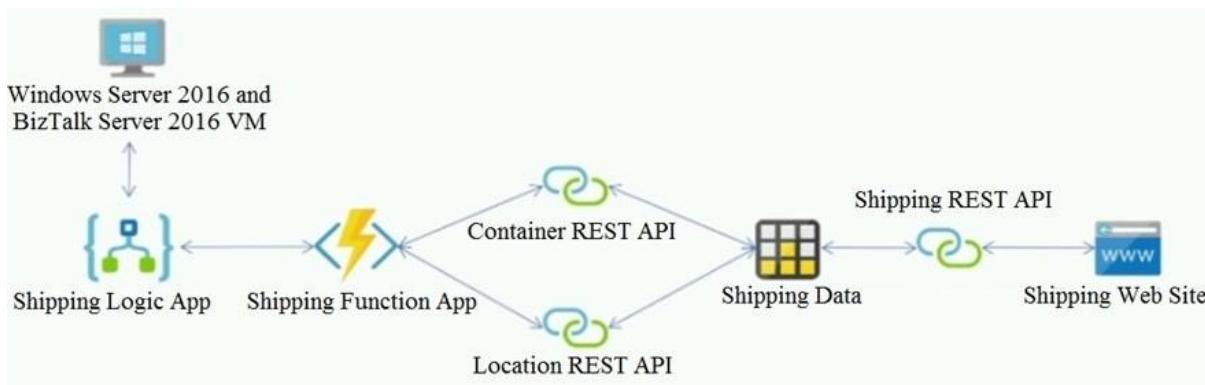
The application uses MongoDB JSON document storage database for all container and transport information.

#### Shipping Web Site

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

#### Proposed solution

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:



## Requirements

### 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.
- 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:

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

### QUESTION 1 HOTSPOT

You need to secure the Shipping Function app.

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

**NOTE:** Each correct selection is worth one point.

Hot Area:

## Answer Area

Setting	Value
Authorization level	<input type="checkbox"/> Function <input type="checkbox"/> Anonymous <input type="checkbox"/> Admin
User claims	<input type="checkbox"/> JSON Web Token (JWT) <input type="checkbox"/> Shared Access Signature (SAS) token <input type="checkbox"/> API Key
Trigger type	<input type="checkbox"/> blob <input type="checkbox"/> HTTP <input type="checkbox"/> queue <input type="checkbox"/> timer

**Correct Answer:**

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## Answer Area

Setting	Value
Authorization level	<div style="border: 1px solid black; padding: 5px; width: fit-content;"><p>Function</p><p>Anonymous</p><p>Admin</p></div>
User claims	<div style="border: 1px solid black; padding: 5px; width: fit-content;"><p>JSON Web Token (JWT)</p><p>Shared Access Signature (SAS) token</p><p>API Key</p></div>
Trigger type	<div style="border: 1px solid black; padding: 5px; width: fit-content;"><p>blob</p><p>HTTP</p><p>queue</p><p>timer</p></div>

**Section: (none)**

**Explanation**

**Explanation/Reference:**

Explanation:

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

Box 1: Function

Box 2: JSON based Token (JWT)

Azure AD uses JSON based tokens (JWTs) that contain claims

Box 3: HTTP

How a web app delegates sign-in to Azure AD and obtains a token

User authentication happens via the browser. The OpenID protocol uses standard HTTP protocol messages.

Reference: <https://docs.microsoft.com/en-us/azure/active-directory/develop/authentication-scenarios>

### QUESTION 2

You need to secure the Shipping Logic App.

What should you use?

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- A. Azure App Service Environment (ASE)
- B. Integration Service Environment (ISE)
- C. VNet service endpoint
- D. Azure AD B2B integration

**Correct Answer:** B

**Section:** (none)

**Explanation**

**Explanation/Reference:**

Explanation:

Scenario: The Shipping Logic App requires secure resources to the corporate VNet and use dedicated storage resources with a fixed costing model.

You can access to Azure Virtual Network resources from Azure Logic Apps by using integration service environments (ISEs).

Sometimes, your logic apps and integration accounts need access to secured resources, such as virtual machines (VMs) and other systems or services, that are inside an Azure virtual network. To set up this access, you can create an integration service environment (ISE) where you can run your logic apps and create your integration accounts.

Reference: <https://docs.microsoft.com/en-us/azure/logic-apps/connect-virtual-network-vnet-isolated-environmentoverview>

## Implement Azure security

### Testlet 3

#### 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.

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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 section 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 in 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. When you are ready to answer a question, click the **Question** button to return to the question.

#### Background

City Power & Light company provides electrical infrastructure monitoring solutions for homes and businesses. The company is migrating solutions to Azure.

#### Current environment

#### Architecture overview

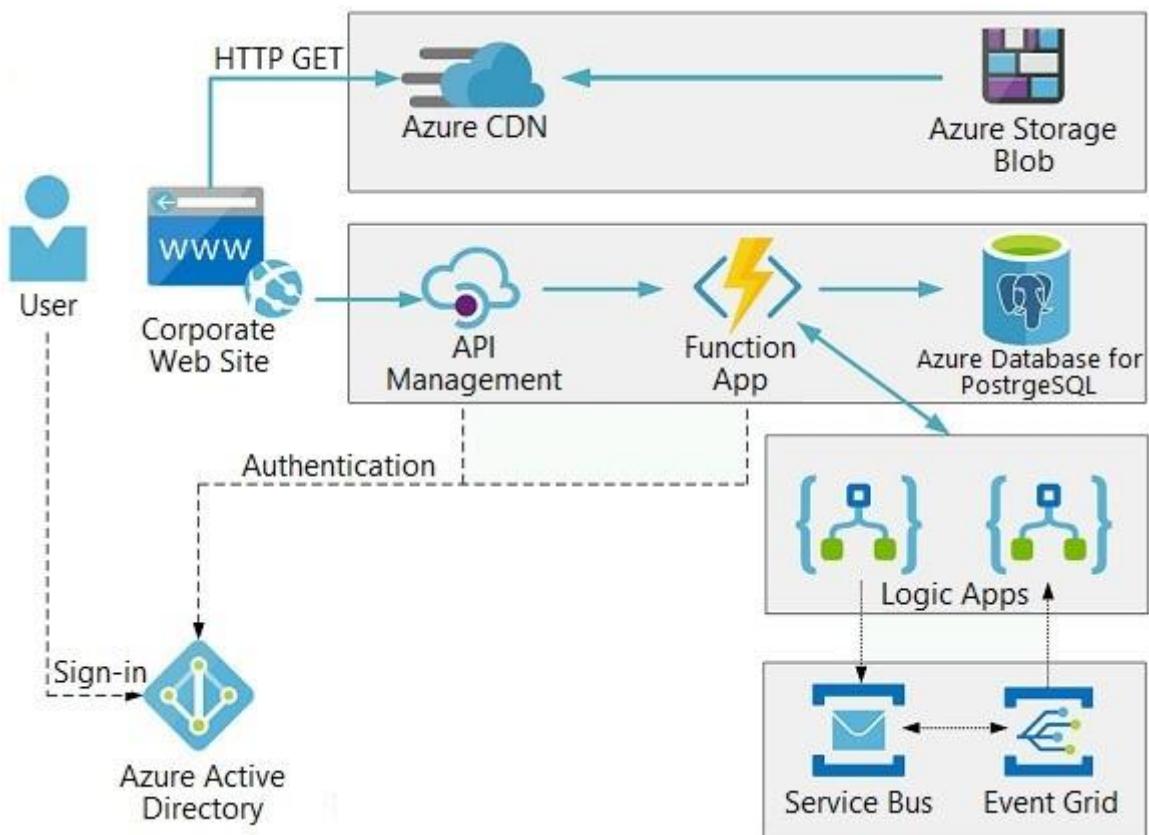
The company has a public website located at <http://www.cpandl.com/>. The site is a single-page web application that runs in Azure App Service on Linux. The website uses files stored in Azure Storage and cached in Azure Content Delivery Network (CDN) to serve static content.

API Management and Azure Function App functions are used to process and store data in Azure Database for PostgreSQL. API Management is used to broker communications to the Azure Function app functions for Logic app integration. Logic apps are used to orchestrate the data processing while Service Bus and Event Grid handle messaging and events.

The solution uses Application Insights, Azure Monitor, and Azure Key Vault.

#### Architecture diagram

The company has several applications and services that support their business. The company plans to implement serverless computing where possible. The overall architecture is shown below.



## User authentication

The following steps detail the user authentication process:

1. The user selects **Sign in** in the website.
2. The browser redirects the user to the Azure Active Directory (Azure AD) sign in page.
3. The user signs in.
4. Azure AD redirects the user's session back to the web application. The URL includes an access token.
5. The web application calls an API and includes the access token in the authentication header. The application ID is sent as the audience ('aud') claim in the access token.
6. The back-end API validates the access token.

## Requirements

### Corporate website

- Communications and content must be secured by using SSL.
- Communications must use HTTPS.
- Data must be replicated to a secondary region and three availability zones.
- Data storage costs must be minimized.

### Azure Database for PostgreSQL

The database connection string is stored in Azure Key Vault with the following attributes:

- Azure Key Vault name: cpandlkeyvault
- Secret name: PostgreSQLConn
- Id: 80df3e46ffcd4f1cb187f79905e9a1e8

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The connection information is updated frequently. The application must always use the latest information to connect to the database.

## Azure Service Bus and Azure Event Grid

- Azure Event Grid must use Azure Service Bus for queue-based load leveling.
- Events in Azure Event Grid must be routed directly to Service Bus queues for use in buffering. ▪ Events from Azure Service Bus and other Azure services must continue to be routed to Azure Event Grid for processing.

## Security

- All SSL certificates and credentials must be stored in Azure Key Vault.
- File access must restrict access by IP, protocol, and Azure AD rights.
- All user accounts and processes must receive only those privileges which are essential to perform their intended function.

## Compliance

Auditing of the file updates and transfers must be enabled to comply with General Data Protection Regulation (GDPR). The file updates must be read-only, stored in the order in which they occurred, include only create, update, delete, and copy operations, and be retained for compliance reasons.

## Issues

### Corporate website

While testing the site, the following error message displays:

```
CryptographicException: The system cannot find the file specified.
```

### Function app

You perform local testing for the RequestUserApproval function. The following error message displays:

```
'Timeout value of 00:10:00 exceeded by function: RequestUserApproval'
```

The same error message displays when you test the function in an Azure development environment when you run the following Kusto query:

```
FunctionAppLogs  
| where FunctionName == "RequestUserApproval"
```

### Logic app

You test the Logic app in a development environment. The following error message displays:

```
'400 Bad Request'
```

Troubleshooting of the error shows an HttpTrigger action to call the RequestUserApproval function.

## Code

### Corporate website

Security.cs:

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```

SC01 public class Security
SC02 {
SC03 var bytes = System.IO.File.ReadAllBytes("~/var/ssl/private");
SC04 var cert = new System.Security.Cryptography.X509Certificate2(bytes);
SC05 var certName = cert.FriendlyName;
SC06 }

```

## Function app

RequestUserApproval.cs:

```

RA01 public static class RequestUserApproval
RA02 {
RA03 [FunctionName("RequestUserApproval")]
RA04 public static async Task<IActionResult> Run(
RA05 [HttpTrigger(AuthorizationLevel.Function, "get", "post", Route = null)] HttpRequest req,
ILogger log)
RA06 {
RA07     log.LogInformation("RequestUserApproval function processed a request.");
RA08 ...
RA09 return ProcessRequest(req)
RA10     ? (ActionResult)new OkObjectResult($"User approval processed")
RA11     : new BadRequestObjectResult("Failed to process user approval");
RA12 }
RA13 private static bool ProcessRequest(HttpContext req)
RA14 {
RA15     ...
RA16 }
RA17 }

```

## QUESTION 1 HOTSPOT

You need to retrieve the database connection string.

Which values should you use? To answer, select the appropriate options in the answer area.

**NOTE:** Each correct selection is worth one point.

### Hot Area:

#### Answer Area

REST API Endpoint:

https://	▼	.vault.azure.net/secrets/	▼ /
cpandlkeyvault		cpandlkeyvault	
PostgreSQLConn		PostgreSQLConn	
80df3e46ffcd4f1cb187f79905e9a1e8		80df3e46ffcd4f1cb187f79905e9a1e8	

Variable type to access Azure Key Vault secret values:

▼
Environment
Session
ViewState
QueryString

## Correct Answer:

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## Answer Area

REST API Endpoint:

https://	cpandlkeyvault	.vault.azure.net/secrets/	/
	PostgreSQLConn 80df3e46ffcd4f1cb187f79905e9a1e8		

Variable type to access Azure Key Vault secret values:

Environment
Session
ViewState
QueryString

### Section: (none)

### Explanation

#### Explanation/Reference:

Explanation:

Azure database connection string retrieve REST API vault.azure.net/secrets/

Box 1: cpandlkeyvault

We specify the key vault, cpandlkeyvault.

Scenario: The database connection string is stored in Azure Key Vault with the following attributes:

Azure Key Vault name: cpandlkeyvault

Secret name: PostgreSQLConn

Id: 80df3e46ffcd4f1cb187f79905e9a1e8

Box 2: PostgreSQLConn

We specify the secret, PostgreSQLConn

Example, sample request:

<https://myvault.vault.azure.net/secrets/mysecretname/4387e9f3d6e14c459867679a90fd0f79?api-version=7.1> Box 3: Querystring

Reference: <https://docs.microsoft.com/en-us/rest/api/keyvault/getsecret/getsecret>

### QUESTION 2 DRAG

DROP

You need to correct the corporate website error.

Which four actions should you recommend be performed 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:

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Actions	Answer Area
Upload the certificate to Azure Key Vault.	
Update line SC05 of Security.cs to include error handling and then redeploy the code.	
Update line SC03 of Security.cs to include a using statement and then re-deploy the code.	
Add the certificate thumbprint to the WEBSITE_LOAD_CERTIFICATES app setting.	
Upload the certificate to source control.	
Import the certificate to Azure App Service.	
Generate a certificate.	

#### Correct Answer:

Actions	Answer Area
Upload the certificate to Azure Key Vault.	Generate a certificate.
Update line SC05 of Security.cs to include error handling and then redeploy the code.	Upload the certificate to Azure Key Vault.
Update line SC03 of Security.cs to include a using statement and then re-deploy the code.	 Import the certificate to Azure App Service.
Add the certificate thumbprint to the WEBSITE_LOAD_CERTIFICATES app setting.	 Update line SC05 of Security.cs to include error handling and then redeploy the code.
Upload the certificate to source control.	
Import the certificate to Azure App Service.	
Generate a certificate.	

#### Section: (none)

#### Explanation

#### Explanation/Reference:

Explanation:

Scenario: Corporate website

While testing the site, the following error message displays:

CryptographicException: The system cannot find the file specified.

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Step 1: Generate a certificate

Step 2: Upload the certificate to Azure Key Vault

Scenario: All SSL certificates and credentials must be stored in Azure Key Vault.

Step 3: Import the certificate to Azure App Service

Step 4: Update line 50 of Security.cs to include error handling and then redeploy the code

Reference: <https://docs.microsoft.com/en-us/azure/app-service/configure-ssl-certificate>

### QUESTION 3 HOTSPOT

You need to configure API Management for authentication.

Which policy values should you use? To answer, select the appropriate options in the answer area.

**NOTE:** Each correct selection is worth one point.

Hot Area:

### Answer Area

Setting	Value
---------	-------

Policy	▼
--------	---

- |                        |
|------------------------|
| Check HTTP header      |
| Restrict caller IPs    |
| Limit call rate by key |
| Validate JWT           |

Policy section	▼
----------------	---

- |          |
|----------|
| Inbound  |
| Outbound |

Correct Answer:

### Answer Area

Setting	Value
---------	-------

Policy	▼
--------	---

- |                        |
|------------------------|
| Check HTTP header      |
| Restrict caller IPs    |
| Limit call rate by key |
| Validate JWT           |

Policy section	▼
----------------	---

- |          |
|----------|
| Inbound  |
| Outbound |

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**Section: (none)****Explanation****Explanation/Reference:**

Explanation:

Box 1: Validate JWT

The validate-jwt policy enforces existence and validity of a JWT extracted from either a specified HTTP Header or a specified query parameter.

Scenario: User authentication (see step 5 below)

The following steps detail the user authentication process:

1. The user selects Sign in in the website.
2. The browser redirects the user to the Azure Active Directory (Azure AD) sign in page.
3. The user signs in.
4. Azure AD redirects the user's session back to the web application. The URL includes an access token.
5. The web application calls an API and includes the access token in the authentication header. The application ID is sent as the audience ('aud') claim in the access token.
6. The back-end API validates the access token.

Incorrect Answers:

- Limit call rate by key - Prevents API usage spikes by limiting call rate, on a per key basis.
- Restrict caller IPs - Filters (allows/denies) calls from specific IP addresses and/or address ranges.
- Check HTTP header - Enforces existence and/or value of a HTTP Header.

Box 2: Outbound

Reference: <https://docs.microsoft.com/en-us/azure/api-management/api-management-access-restriction-policies>

**QUESTION 4**

You need to authenticate the user to the corporate website as indicated by the architectural diagram.

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

**NOTE:** Each correct selection is worth one point.

- A. ID token signature
- B. ID token claims
- C. HTTP response code
- D. Azure AD endpoint URI
- E. Azure AD tenant ID

**Correct Answer:** AD

**Section: (none)****Explanation****Explanation/Reference:**

Explanation:

A: Claims in access tokens

JWTs (JSON Web Tokens) are split into three pieces:

- Header - Provides information about how to validate the token including information about the type of token and how it was signed.
- Payload - Contains all of the important data about the user or app that is attempting to call your service.
- Signature - Is the raw material used to validate the token.

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E: Your client can get an access token from either the v1.0 endpoint or the v2.0 endpoint using a variety of protocols.

Scenario: User authentication (see step 5 below)

The following steps detail the user authentication process:

1. The user selects Sign in in the website.
2. The browser redirects the user to the Azure Active Directory (Azure AD) sign in page.
3. The user signs in.
4. Azure AD redirects the user's session back to the web application. The URL includes an access token.
5. The web application calls an API and includes the access token in the authentication header. The application ID is sent as the audience ('aud') claim in the access token.
6. The back-end API validates the access token.

Reference: <https://docs.microsoft.com/en-us/azure/api-management/api-management-access-restriction-policies>

## QUESTION 5 HOTSPOT

You need to correct the Azure Logic app error message.

Which configuration values should you use? To answer, select the appropriate options in the answer area.

**NOTE:** Each correct selection is worth one point.

**Hot Area:**

### Answer Area

Setting	Value
authentication level	<input type="checkbox"/> anonymous <input type="checkbox"/> function <input type="checkbox"/> admin
managed identity	<input type="checkbox"/> system-assigned <input type="checkbox"/> user-assigned

**Correct Answer:**

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## Answer Area

Setting	Value
authentication level	anonymous function admin
managed identity	system-assigned user-assigned

### Section: (none)

#### Explanation

#### Explanation/Reference:

Explanation:

Scenario: You test the Logic app in a development environment. The following error message displays:

'400 Bad Request'

Troubleshooting of the error shows an HttpTrigger action to call the RequestUserApproval function.

Note: If the inbound call's request body doesn't match your schema, the trigger returns an HTTP 400 Bad Request error.

Box 1: function

If you have an Azure function where you want to use the system-assigned identity, first enable authentication for Azure functions.

Box 2: system-assigned

Your logic app or individual connections can use either the system-assigned identity or a single userassigned identity, which you can share across a group of logic apps, but not both.

Reference:

<https://docs.microsoft.com/en-us/azure/logic-apps/create-managed-service-identity>

## QUESTION 6 HOTSPOT

You need to configure Azure Service Bus to Event Grid integration.

Which Azure Service Bus settings should you use? 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

Setting	Value
Tier	<div style="border: 1px solid #ccc; padding: 5px; display: inline-block;"><span>Basic</span><span>Standard</span><span>Premium</span></div>
RBAC role	<div style="border: 1px solid #ccc; padding: 5px; display: inline-block;"><span>Owner</span><span>Contributor</span><span>Azure Service Bus Data Owner</span><span>Azure Service Bus Data Receiver</span></div>

Correct Answer:

## Answer Area

Setting	Value
Tier	<div style="border: 1px solid #ccc; padding: 5px; display: inline-block;"><span>Basic</span><span>Standard</span><span>Premium</span></div>
RBAC role	<div style="border: 1px solid #ccc; padding: 5px; display: inline-block;"><span>Owner</span><span>Contributor</span><span>Azure Service Bus Data Owner</span><span>Azure Service Bus Data Receiver</span></div>

Section: (none)

Explanation

Explanation/Reference:

Explanation:

Box 1: Premium

Service Bus can now emit events to Event Grid when there are messages in a queue or a subscription when no receivers are present. You can create Event Grid subscriptions to your Service Bus namespaces, listen to these events, and then react to the events by starting a receiver. With this feature, you can use Service Bus in reactive programming models.

To enable the feature, you need the following items:

A Service Bus Premium namespace with at least one Service Bus queue or a Service Bus topic with at least one subscription.

Contributor access to the Service Bus namespace.

Box 2: Contributor

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Reference: <https://docs.microsoft.com/en-us/azure/service-bus-messaging/service-bus-to-event-grid-integrationconcept>

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[sales@alldumpz.com](mailto:sales@alldumpz.com)

## Implement Azure security

### Testlet 4

#### 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 questions in this case study.

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#### To start the 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

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Column	Description
UserId	unique identifier for an 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 WebAppIdentity.

## 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.

## 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.

## Requirements

### Receipt processing

Concurrent processing of a receipt must be prevented.

### 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

- User's 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 principle of least privilege 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.

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## 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.

## Application code

### 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().CreateIfNotExistsAsync();
PC28         return cloudBlobClient.GetRootContainerReference();
PC29     }
PC30     private static async Task<StorageCredentials> GetCredentials()
PC31     {
PC32         ...
PC33     }
PC34     private static async Task<List<IListFileItem>> ListFiles()
PC35     {
PC36         ...
PC37     }
PC38     private KeyVaultClient _keyVaultClient = new KeyVaultClient("...");
PC39 }
```

### Database.cs

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```
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(HttpStatusCode response)
RU13     {
RU14
RU15     }
RU16 }
```

### ConfigureSSE.ps1

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```

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 HOTSPOT

You need to add code at line PC26 of Processing.cs to ensure that security policies are met.

How should you complete the code that you will add at line PC26? To answer, select the appropriate options in the answer area.

**NOTE:** Each correct selection is worth one point.

**Hot Area:**

### Answer Area

```

var resolver = new KeyVaultKeyResolver(_keyVaultClient);
var keyBundle = await _keyVaultClient.GetKeyAsync("...", "...");

```

```

var key = keyBundle.Key;
var key = keyBundle.KeyIdentifier.Identifier;
var key = await resolver.ResolveKeyAsync("encrypt", null);
var key = await resolver.ResolveKeyAsync(keyBundle.KeyIdentifier.Identifier, CancellationToken.None);

```

```

var x = keyBundle.Managed;
var x = AuthenticationScheme.SharedKey;
var x = new BlobEncryptionPolicy(key, resolver);
var x = new DeleteRetentionPolicy {Enabled = key.Kid != null};

```

```

cloudBlobClient.AuthenticationScheme = x;
cloudBlobClient.DefaultRequestOptions.RequireEncryption = x;
cloudBlobClient.DefaultRequestOptions.EncryptionPolicy = x;
cloudBlobClient.SetServiceProperties(new ServiceProperties(deleteRetentionPolicy:x));

```

**Correct Answer:**

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## Answer Area

```
var resolver = new KeyVaultKeyResolver(_keyVaultClient);
var keyBundle = await _keyVaultClient.GetKeyAsync("...", "...");
```

```
var key = keyBundle.Key;
var key = keyBundle.KeyIdentifier.Identifier;
var key = await resolver.ResolveKeyAsync("encrypt", null);
var key = await resolver.ResolveKeyAsync(keyBundle.KeyIdentifier.Identifier, CancellationToken.None);
```

```
var x = keyBundle.Managed;
var x = AuthenticationScheme.SharedKey;
var x = new BlobEncryptionPolicy(key, resolver);
var x = new DeleteRetentionPolicy {Enabled = key.Kid != null};
```

```
cloudBlobClient.AuthenticationScheme = x;
cloudBlobClient.DefaultRequestOptions.RequireEncryption = x;
cloudBlobClient.DefaultRequestOptions.EncryptionPolicy = x;
cloudBlobClient.SetServiceProperties(new ServiceProperties(deleteRetentionPolicy:x));
```

### Section: (none)

#### Explanation

#### Explanation/Reference:

Explanation:

Box 1: var key = await Resolver.ResolveKeyAsyn(keyBundle,KeyIdentifier.CancellationToken.None);

Box 2: var x = new BlobEncryptionPolicy(key,resolver); Example:

// We begin with cloudKey1, and a resolver capable of resolving and caching Key Vault secrets.

BlobEncryptionPolicy encryptionPolicy = new BlobEncryptionPolicy(cloudKey1, cachingResolver);

client.DefaultRequestOptions.EncryptionPolicy = encryptionPolicy; Box 3: cloudblobClient.

DefaultRequestOptions.EncryptionPolicy = x;

Reference: <https://github.com/Azure/azure-storage-net/blob/master/Samples/GettingStarted/EncryptionSamples/KeyRotation/Program.cs>

## QUESTION 2

You need to ensure the security policies are met.

What code do you add at line CS07 of ConfigureSSE.ps1?

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

### Correct Answer: B

#### Section: (none)

#### Explanation

#### Explanation/Reference:

Explanation:

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

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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

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

## Implement Azure security

### Question Set 5

#### QUESTION 1 DRAG

DROP

You are developing an application. You have an Azure user account that has access to two subscriptions.

You need to retrieve a storage account key secret from Azure Key Vault.

In which order should you arrange the PowerShell commands to develop the solution? To answer, move all commands from the list of commands to the answer area and arrange them in the correct order.

Select and Place:

#### Powershell commands

```
$secretvalue = ConvertTo-SecureString  
$storAcctkey -AsPlainText  
-Force  
    Set-AzKeyVaultSecret -VaultName  
$vaultName -Name $secretName  
-SecretValue $secretvalue
```

```
Get-AzStorageAccountKey -  
ResourceGroupName $resGroup -Name  
$storAcct
```

```
Set-AzContext -SubscriptionId  
$subscriptionID
```

```
Get-AzKeyVaultSecret -VaultName  
$vaultName
```

```
Get-AzSubscription
```

#### Answer Area



Correct Answer:

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## Powershell commands

```
$secretvalue = ConvertTo-SecureString  
$storAcctkey -AsPlainText  
-Force  
    Set-AzKeyVaultSecret -VaultName  
    $vaultName -Name $secretName  
    -SecretValue $secretvalue
```

```
Get-AzStorageAccountKey -  
ResourceGroupName $resGroup -Name  
$storAcct
```

```
Set-AzContext -SubscriptionId  
$subscriptionID
```

```
Get-AzKeyVaultSecret -VaultName  
$vaultName
```

```
Get-AzSubscription
```

## Answer Area

```
Get-AzSubscription
```

```
Set-AzContext -SubscriptionId  
$subscriptionID
```

```
Get-AzStorageAccountKey -  
ResourceGroupName $resGroup -Name  
$storAcct
```

```
$secretvalue = ConvertTo-SecureString  
$storAcctkey -AsPlainText  
-Force  
    Set-AzKeyVaultSecret -VaultName  
    $vaultName -Name $secretName  
    -SecretValue $secretvalue
```

```
Get-AzKeyVaultSecret -VaultName  
$vaultName
```



### Section: (none)

#### Explanation

#### Explanation/Reference:

Explanation:

#### Step 1: Get-AzSubscription

If you have multiple subscriptions, you might have to specify the one that was used to create your key vault. Enter the following to see the subscriptions for your account:

```
Get-AzSubscription
```

#### Step 2: Set-AzContext -SubscriptionId

To specify the subscription that's associated with the key vault you'll be logging, enter: Set-AzContext -SubscriptionId <subscriptionID>

#### Step 3: Get-AzStorageAccountKey

You must get that storage account key.

#### Step 4: \$secretvalue = ConvertTo-SecureString <storageAccountKey> -AsPlainText -Force

```
Set-AzKeyVaultSecret -VaultName <vaultName> -Name <secretName> -SecretValue $secretvalue
```

After retrieving your secret (in this case, your storage account key), you must convert that key to a secure string, and then create a secret with that value in your key vault.

#### Step 5: Get-AzKeyVaultSecret

Next, get the URI for the secret you created. You'll need this URI in a later step to call the key vault and retrieve your secret. Run the following PowerShell command and make note of the ID value, which is the secret's URI:

```
Get-AzKeyVaultSecret -VaultName <vaultName>
```

Reference: <https://docs.microsoft.com/en-us/bs-latn-ba/Azure/key-vault/key-vault-key-rotation-log-monitoring>

## 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.

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**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 develop Azure solutions.

You must grant a virtual machine (VM) access to specific resource groups in Azure Resource Manager.

You need to obtain an Azure Resource Manager access token.

Solution: Use an X.509 certificate to authenticate the VM with Azure Resource Manager.

Does the solution meet the goal?

- A. Yes
- B. No

**Correct Answer:** B

**Section:** (none)

**Explanation**

**Explanation/Reference:**

Explanation:

Instead run the Invoke-RestMethod cmdlet to make a request to the local managed identity for Azure resources endpoint.

Reference:

<https://docs.microsoft.com/en-us/azure/active-directory/managed-identities-azure-resources/tutorialwindows-vm-access-arm>

### **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 develop Azure solutions.

You must grant a virtual machine (VM) access to specific resource groups in Azure Resource Manager.

You need to obtain an Azure Resource Manager access token.

Solution: Use the Reader role-based access control (RBAC) role to authenticate the VM with Azure Resource Manager.

Does the solution meet the goal?

- A. Yes
- B. No

**Correct Answer:** B

**Section:** (none)

**Explanation**

**Explanation/Reference:**

Explanation:

Instead run the Invoke-RestMethod cmdlet to make a request to the local managed identity for Azure resources endpoint.

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Reference:

<https://docs.microsoft.com/en-us/azure/active-directory/managed-identities-azure-resources/tutorialwindows-vm-access-arm>

#### QUESTION 4

**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 develop Azure solutions.

You must grant a virtual machine (VM) access to specific resource groups in Azure Resource Manager.

You need to obtain an Azure Resource Manager access token.

Solution: Run the Invoke-RestMethod cmdlet to make a request to the local managed identity for Azure resources endpoint.

Does the solution meet the goal?

- A. Yes
- B. No

**Correct Answer: A**

**Section: (none)**

**Explanation**

**Explanation/Reference:**

Explanation:

Get an access token using the VM's system-assigned managed identity and use it to call Azure Resource Manager  
You will need to use PowerShell in this portion.

1. In the portal, navigate to Virtual Machines and go to your Windows virtual machine and in the Overview, click Connect.
2. Enter in your Username and Password for which you added when you created the Windows VM.
3. Now that you have created a Remote Desktop Connection with the virtual machine, open PowerShell in the remote session.
4. Using the Invoke-WebRequest cmdlet, make a request to the local managed identity for Azure resources endpoint to get an access token for Azure Resource Manager.

Example:

```
$response = Invoke-WebRequest -Uri 'http://169.254.169.254/metadata/identity/oauth2/token?api-version=2018-02-01&resource=https://management.azure.com/' -Method GET -Headers @ {Metadata="true"}
```

Reference:

<https://docs.microsoft.com/en-us/azure/active-directory/managed-identities-azure-resources/tutorialwindows-vm-access-arm>

#### QUESTION 5

HOTSPOT

You are building a website to access project data related to teams within your organization. The website does not allow anonymous access. Authentication is performed using an Azure Active Directory (Azure AD) app named **internal**.

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The website has the following authentication requirements:

- Azure AD users must be able to login to the website.
- Personalization of the website must be based on membership in Active Directory groups.

You need to configure the application's manifest to meet the authentication requirements.

How should you configure the manifest? To answer, select the appropriate configuration in the answer area.

**NOTE:** Each correct selection is worth one point.

**Hot Area:**

## Answer Area

```
{  
  "appId": "d61126e3-089b-4adb-b721-d5023213df7d",  
  "displayName": "internal",  
  "optionalClaims": "All",  
  "groupMembershipClaims": "true",  
  "allowPublicClient": true,  
  "oauth2Permissions": true,  
  "requiredResourceAccess": true,  
  "oauth2AllowImplicitFlow": true  
}
```

**Correct Answer:**

## Answer Area

```
{  
    "appId": "d61126e3-089b-4adb-b721-d5023213df7d",  
    "displayName": "internal",  
    "optionalClaims": { "groupMembershipClaims": "All" },  
    "allowPublicClient": true,  
    "oauth2Permissions": {  
        "requiredResourceAccess": {  
            "resourceAppId": "d61126e3-089b-4adb-b721-d5023213df7d",  
            "resourceAccess": [ { "id": "groupMembership", "type": "groupMembership" } ]  
        }  
    }  
}
```

### Section: (none)

#### Explanation

#### Explanation/Reference:

Explanation:

Box 1: groupMembershipClaims

Scenario: Personalization of the website must be based on membership in Active Directory groups.

Group claims can also be configured in the Optional Claims section of the Application Manifest. Enable group membership claims by changing the groupMembershipClaim

The valid values are:

- "All"
- "SecurityGroup"
- "DistributionList"
- "DirectoryRole"

Box 2: oauth2Permissions

Scenario: Azure AD users must be able to login to the website.

oauth2Permissions specifies the collection of OAuth 2.0 permission scopes that the web API (resource) app exposes to client apps. These permission scopes may be granted to client apps during consent.

Incorrect Answers: oauth2AllowImplicitFlow. oauth2AllowImplicitFlow specifies whether this web app can request OAuth2.0 implicit flow access tokens. The default is false. This flag is used for browser-based apps, like Javascript single-page apps.

Reference: <https://docs.microsoft.com/en-us/azure/active-directory/hybrid/how-to-connect-fed-group-claims>

## QUESTION 6

You develop an app that allows users to upload photos and videos to Azure storage. The app uses a

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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 when a new video is uploaded.

What should you do?

- A. Copy blobs to Container2 by using the **Put Blob** operation of the Blob Service REST API
- B. Create an **Event Grid** topic that uses the `Start-AzureStorageBlobCopy` cmdlet
- C. Use `AzCopy` with the Snapshot switch to copy blobs to Container2
- D. Download the blob to a virtual machine and then upload the blob 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.

Reference:

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

## QUESTION 7

You are developing an ASP.NET Core website that uses Azure FrontDoor. The website is used to build custom weather data sets for researchers. Data sets are downloaded by users as Comma Separated Value (CSV) files. The data is refreshed every 10 hours.

Specific files must be purged from the FrontDoor cache based upon Response Header values.

You need to purge individual assets from the Front Door cache.

Which type of cache purge should you use?

- A. single path
- B. wildcard
- C. root domain

**Correct Answer:** A

**Section:** (none)

**Explanation**

**Explanation/Reference:**

Explanation:

These formats are supported in the lists of paths to purge:

- Single path purge: Purge individual assets by specifying the full path of the asset (without the protocol and domain), with the file extension, for example, /pictures/strasbourg.png;

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- Wildcard purge: Asterisk (\*) may be used as a wildcard. Purge all folders, subfolders, and files under an endpoint with /\* in the path or purge all subfolders and files under a specific folder by specifying the folder followed by /\*, for example, /pictures/\*.
- Root domain purge: Purge the root of the endpoint with "/" in the path.

Reference: <https://docs.microsoft.com/en-us/azure/frontdoor/front-door-caching>

## QUESTION 8

Your company is developing an Azure API.

You need to implement authentication for the Azure API. You have the following requirements:

- All API calls must be secure.
- Callers to the API must not send credentials to the API.

Which authentication mechanism should you use?

- A. Basic
- B. Anonymous
- C. Managed identity
- D. Client certificate

**Correct Answer:** C

**Section:** (none)

**Explanation**

### Explanation/Reference:

Explanation:

Use the authentication-managed-identity policy to authenticate with a backend service using the managed identity of the API Management service. This policy essentially uses the managed identity to obtain an access token from Azure Active Directory for accessing the specified resource. After successfully obtaining the token, the policy will set the value of the token in the Authorization header using the Bearer scheme.

Reference: <https://docs.microsoft.com/bs-cyrl-ba/azure/api-management/api-management-authentication-policies>

## QUESTION 9

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

**Correct Answer:** D

**Section:** (none)

**Explanation**

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**Explanation/Reference:**

Explanation:

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

Incorrect Answers:

A: The jsonp policy adds JSON with padding (JSONP) support to an operation or an API to allow crossdomain 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.

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

**QUESTION 10**

DRAG DROP

Contoso, Ltd. provides an API to customers by using Azure API Management (APIM). The API authorizes users with a JWT token.

You must implement response caching for the APIM gateway. The caching mechanism must detect the user ID of the client that accesses data for a given location and cache the response for that user ID.

You need to add the following policies to the policies file:

- a set-variable policy to store the detected user identity
- a cache-lookup-value policy ▪ a cache-store-value policy ▪ a find-and-replace policy to update the response body with the user profile information

To which policy section should you add the policies? To answer, drag the appropriate sections to the correct policies. Each section 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:**

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## Answer Area

Policy section	Policy	Policy section
	Set-variable	
Inbound	Cache-lookup-value	
Outbound	Cache-store-value	
	Find-and-replace	

Correct Answer:

## Answer Area

Policy section	Policy	Policy section
	Set-variable	Inbound
Inbound	Cache-lookup-value	Inbound
Outbound	Cache-store-value	Outbound
	Find-and-replace	Outbound

Section: (none)

Explanation

Explanation/Reference:

Explanation:

Box 1: Inbound.

A set-variable policy to store the detected user identity. Example:

<policies>

  <inbound>

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```

<!-- How you determine user identity is application dependent -->
<set-variable
name="enduserid"
value="@({context.Request.Headers.Get
tValueOrDefault("Authorization", "")}.Split
lit(' '')[1].AsJwt()?.Subject)" />

```

**Box 2: Inbound**

A cache-lookup-value policy Example:

```

<inbound>
  <base />
  <cache-lookup vary-by-developer="true | false" vary-by-developer-groups="true | false" downstreamcaching-
type="none | private | public" must-revalidate="true | false">
    <vary-by-query-parameter>parameter name</vary-by-query-parameter> <!-- optional, can repeated several
times -->    </cache-lookup>  </inbound>

```

**Box 3: Outbound**

A cache-store-value policy.

Example:

```

<outbound>
  <base />
  <cache-store duration="3600" />
</outbound>

```

**Box 4: Outbound**

A find-and-replace policy to update the response body with the user profile information. Example:

```

<outbound>
  <!-- Update response body with user profile-->
  <find-and-replace
from="$userprofile$"
  to="@(({string)context.Variables["userprofile"]})" />
  <base />
</outbound>

```

Reference: <https://docs.microsoft.com/en-us/azure/api-management/api-management-caching-policies>

<https://docs.microsoft.com/en-us/azure/api-management/api-management-sample-cache-by-key>

**QUESTION 11 DRAG**

DROP

You develop a web application.

You need to register the application with an active Azure Active Directory (Azure AD) tenant.

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

**Select and Place:**

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Actions	Answer Area
Select <b>Manifest</b> from the middle-tier service registration.	
In Enterprise Applications, select <b>New application</b> .	
Add a Cryptographic key.	
Create a new application and provide the name, account type, and redirect URI.	 
Select the Azure AD instance.	 
Use an access token to access the secure resource.	
In App Registrations, select <b>New registration</b> .	

Correct Answer:

Actions	Answer Area
Select <b>Manifest</b> from the middle-tier service registration.	In App Registrations, select <b>New registration</b> .
In Enterprise Applications, select <b>New application</b> .	Select the Azure AD instance.
Add a Cryptographic key.	Create a new application and provide the name, account type, and redirect URI.
Create a new application and provide the name, account type, and redirect URI.	 
Select the Azure AD instance.	 
Use an access token to access the secure resource.	
In App Registrations, select <b>New registration</b> .	

Section: (none)  
Explanation

Explanation/Reference:

Explanation:

Register a new application using the Azure portal

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1. Sign in to the Azure portal using either a work or school account or a personal Microsoft account.
2. If your account gives you access to more than one tenant, select your account in the upper right corner.  
Set your portal session to the Azure AD tenant that you want.
3. Search for and select Azure Active Directory. Under Manage, select App registrations.
4. Select New registration. (Step 1)
5. In Register an application, enter a meaningful application name to display to users.
6. Specify who can use the application. Select the Azure AD instance. (Step 2)
7. Under Redirect URI (optional), select the type of app you're building: Web or Public client (mobile &desktop).  
Then enter the redirect URI, or reply URL, for your application. (Step 3)
8. When finished, select Register.

## QUESTION 12

You have a new Azure subscription. You are developing an internal website for employees to view sensitive data. The website uses Azure Active Directory (Azure AD) for authentication.

You need to implement multifactor authentication for the website.

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

**NOTE:** Each correct selection is worth one point.

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

**Correct Answer:** BC

**Section:** (none)

**Explanation**

**Explanation/Reference:**

Explanation:

B: 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.

C: 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

Reference:

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

## QUESTION 13

You are developing a Java application that uses Cassandra to store key and value data. You plan to use a

new Azure Cosmos DB resource and the Cassandra API in the application. You create an Azure Active Directory (Azure AD) group named **Cosmos DB Creators** to enable provisioning of Azure Cosmos accounts, databases, and containers.

The Azure AD group must not be able to access the keys that are required to access the data.

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You need to restrict access to the Azure AD group.

Which role-based access control should you use?

- A. DocumentDB Accounts Contributor
- B. Cosmos Backup Operator
- C. Cosmos DB Operator
- D. Cosmos DB Account Reader

**Correct Answer:** C

**Section:** (none)

**Explanation**

**Explanation/Reference:**

Explanation:

Azure Cosmos DB now provides a new RBAC role, Cosmos DB Operator. This new role lets you provision Azure Cosmos accounts, databases, and containers, but can't access the keys that are required to access the data. This role is intended for use in scenarios where the ability to grant access to Azure Active Directory service principals to manage deployment operations for Cosmos DB is needed, including the account, database, and containers.

Reference: <https://azure.microsoft.com/en-us/updates/azure-cosmos-db-operator-role-for-role-based-access-controlrbac-is-now-available/>

#### **QUESTION 14**

**Note:** This question is part of a series of questions that present the same scenario. Each question in the series contains a unique solution that might meet the stated goals. Some question sets might have more than one correct solution, while others might not have a correct solution.

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

You are developing a website that will run as an Azure Web App. Users will authenticate by using their Azure Active Directory (Azure AD) credentials.

You plan to assign users one of the following permission levels for the website: admin, normal, and reader. A user's Azure AD group membership must be used to determine the permission level.

You need to configure authorization.

Solution: Configure the Azure Web App for the website to allow only authenticated requests and require Azure AD log on.

Does the solution meet the goal?

- A. Yes
- B. No

**Correct Answer:** B

**Section:** (none)

**Explanation**

**Explanation/Reference:**

Explanation:

Instead in the Azure AD application's manifest, set value of the groupMembershipClaims option to All.

Reference:

<https://blogs.msdn.microsoft.com/waws/2017/03/13/azure-app-service-authentication-aad-groups/>

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## **QUESTION 15**

**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 are developing a website that will run as an Azure Web App. Users will authenticate by using their Azure Active Directory (Azure AD) credentials.

You plan to assign users one of the following permission levels for the website: admin, normal, and reader. A user's Azure AD group membership must be used to determine the permission level.

You need to configure authorization.

Solution:

- Create a new Azure AD application. In the application's manifest, set value of the groupMembershipClaims option to **All**.
- In the website, use the value of the groups claim from the JWT for the user to determine permissions.

Does the solution meet the goal?

- A. Yes
- B. No

**Correct Answer:** A

**Section:** (none)

**Explanation**

**Explanation/Reference:**

Explanation:

To configure Manifest to include Group Claims in Auth Token

1. Go to Azure Active Directory to configure the Manifest. Click on Azure Active Directory, and go to Appregistrations to find your application:
2. Click on your application (or search for it if you have a lot of apps) and edit the Manifest by clicking on it.
3. Locate the "groupMembershipClaims" setting. Set its value to either "SecurityGroup" or "All". To help you decide which:
  - "SecurityGroup" - groups claim will contain the identifiers of all security groups of which the user is a member.
  - "All" - groups claim will contain the identifiers of all security groups and all distribution lists of which the user is a member

Now your application will include group claims in your manifest and you can use this fact in your code.

Reference:

<https://blogs.msdn.microsoft.com/waws/2017/03/13/azure-app-service-authentication-aad-groups/>

## **QUESTION 16**

**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 are developing a website that will run as an Azure Web App. Users will authenticate by using their Azure Active Directory (Azure AD) credentials.

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sales@alldumpz.com

You plan to assign users one of the following permission levels for the website: admin, normal, and reader. A user's Azure AD group membership must be used to determine the permission level.

You need to configure authorization.

Solution:

- Create a new Azure AD application. In the application's manifest, define application roles that match the required permission levels for the application.
- Assign the appropriate Azure AD group to each role. In the website, use the value of the roles claim from the JWT for the user to determine permissions.

Does the solution meet the goal?

- A. Yes
- B. No

**Correct Answer:** B

**Section:** (none)

**Explanation**

**Explanation/Reference:**

Explanation:

To configure Manifest to include Group Claims in Auth Token

1. Go to Azure Active Directory to configure the Manifest. Click on Azure Active Directory, and go to App registrations to find your application:
2. Click on your application (or search for it if you have a lot of apps) and edit the Manifest by clicking on it.
3. Locate the "groupMembershipClaims" setting. Set its value to either "SecurityGroup" or "All". To help you decide which:
  - "SecurityGroup" - groups claim will contain the identifiers of all security groups of which the user is a member.
  - "All" - groups claim will contain the identifiers of all security groups and all distribution lists of which the user is a member

Now your application will include group claims in your manifest and you can use this fact in your code.

Reference:

<https://blogs.microsoft.com/waws/2017/03/13/azure-app-service-authentication-aad-groups/>

## QUESTION 17

DRAG DROP

You are developing an application to securely transfer data between on-premises file systems and Azure Blob storage. The application stores keys, secrets, and certificates in Azure Key Vault. The application uses the Azure Key Vault APIs.

The application must allow recovery of an accidental deletion of the key vault or key vault objects. Key vault objects must be retained for 90 days after deletion.

You need to protect the key vault and key vault objects.

Which Azure Key Vault feature should you use? To answer, drag the appropriate features to the correct actions. Each feature 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:**

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Features	Answer Area	Action	Feature
Access policy		Enable retention period and accidental deletion.	Feature
Purge protection		Enforce retention period and accidental deletion.	Feature
Soft delete			
Shared access signature			

### Correct Answer:

Features	Answer Area	Action	Feature
Access policy		Enable retention period and accidental deletion.	Soft delete
Purge protection		Enforce retention period and accidental deletion.	Purge protection
Soft delete			
Shared access signature			

### Section: (none)

#### Explanation

#### Explanation/Reference:

Explanation:

Box 1: Soft delete

When soft-delete is enabled, resources marked as deleted resources are retained for a specified period (90 days by default). The service further provides a mechanism for recovering the deleted object, essentially undoing the deletion.

Box 2: Purge protection

Purge protection is an optional Key Vault behavior and is not enabled by default. Purge protection can only be enabled once soft-delete is enabled.

When purge protection is on, a vault or an object in the deleted state cannot be purged until the retention period has passed. Soft-deleted vaults and objects can still be recovered, ensuring that the retention policy will be followed.

Reference:

<https://docs.microsoft.com/en-us/azure/key-vault/general/soft-delete-overview>

### QUESTION 18

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. Basic Authentication
- B. Digest Authentication
- C. Certificate Authentication
- D. OAuth Client Credential Grant

**Correct Answer:** CD

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**Section: (none)****Explanation****Explanation/Reference:****QUESTION 19**

DRAG DROP

You are developing an ASP.NET Core website that can be used to manage photographs which are stored in Azure Blob Storage containers.

Users of the website authenticate by using their Azure Active Directory (Azure AD) credentials.

You implement role-based access control (RBAC) role permissions on the containers that store photographs. You assign users to RBAC roles.

You need to configure the website's Azure AD Application so that user's permissions can be used with the Azure Blob containers.

How should you configure the application? To answer, drag the appropriate setting to the correct location. Each setting can 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:****Settings**

client_id
profile
delegated
application
user_impersonation

**Answer Area**

API	Permission	Type
Azure Storage	Setting	Setting
Microsoft Graph	User.Read	Setting

**Correct Answer:****Settings**

client_id
profile
delegated
application
user_impersonation

**Answer Area**

API	Permission	Type
Azure Storage	user_impersonation	delegated
Microsoft Graph	User.Read	delegated

**Section: (none)****Explanation****Explanation/Reference:**

Explanation:

Box 1: user\_impersonation

Box 2: delegated Example:

1. Select the API permissions section
2. Click the Add a permission button and then: Ensure that the My APIs tab is selected

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3. In the list of APIs, select the API TodoListService-aspnetcore.
4. In the Delegated permissions section, ensure that the right permissions are checked: user\_impersonation.
5. Select the Add permissions button.

Box 3: delegated

Example

1. Select the API permissions section
2. Click the Add a permission button and then, Ensure that the Microsoft APIs tab is selected
3. In the Commonly used Microsoft APIs section, click on Microsoft Graph
4. In the Delegated permissions section, ensure that the right permissions are checked: User.Read. Use the search box if necessary.
5. Select the Add permissions button

Reference:

<https://docs.microsoft.com/en-us/samples/azure-samples/active-directory-dotnet-webapp-webapiopenidconnect-aspnetcore/calling-a-web-api-in-an-aspnet-core-web-application-using-azure-ad/>

## QUESTION 20

HOTSPOT

You are developing an ASP.NET Core app that includes feature flags which are managed by Azure App Configuration. You create an Azure App Configuration store named **AppFeatureFlagStore** that contains a feature flag named Export.

You need to update the app to meet the following requirements:

- Use the Export feature in the app without requiring a restart of the app.
- Validate users before users are allowed access to secure resources.
- Permit users to access secure resources.

How should you complete the code segment? 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

```
public void Configure(IApplicationBuilder app, IWebHostEnvironment env)
{
    if (env.IsDevelopment())
    {
        app.UseDeveloperExceptionPage();
    }
    else
    {
        app.UseExceptionHandler("/Error");
    }

    app.      ();  


|                   |
|-------------------|
| UseAuthentication |
| UseStaticFiles    |
| UseSession        |
| UseCookiePolicy   |

    app.      ();  


|                     |
|---------------------|
| UseAuthorization    |
| UseHttpsRedirection |
| UseSession          |
| UseCookiePolicy     |

    app.      ();  


|                          |
|--------------------------|
| UseAzureAppConfiguration |
| UseRequestLocalization   |
| UseCors                  |
| UseStaticFiles           |

    app.UseEndpoint(endpoints =>
    {
        endpoints.MapRazorPages();
    });
}
```

**Correct Answer:**

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## Answer Area

```
public void Configure(IApplicationBuilder app, IWebHostEnvironment env)
{
    if (env.IsDevelopment())
    {
        app.UseDeveloperExceptionPage();
    }
    else
    {
        app.UseExceptionHandler("/Error");
    }

    app.(); // Box 1: UseAuthentication
    app.(); // Box 2: UseAuthorization
    app.(); // Box 3: UseStaticFiles

    app.UseEndpoint(endpoints =>
    {
        endpoints.MapRazorPages();
    });
}
```

### Section: (none)

#### Explanation

#### Explanation/Reference:

Explanation:

#### Box 1: UseAuthentication

Need to validate users before users are allowed access to secure resources.

UseAuthentication adds the AuthenticationMiddleware to the specified IApplicationBuilder, which enables authentication capabilities.

#### Box 2: UseAuthorization

Need to permit users to access secure resources.

UseAuthorization adds the AuthorizationMiddleware to the specified IApplicationBuilder, which enables authorization capabilities.

#### Box 3: UseStaticFiles

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Need to use the Export feature in the app without requiring a restart of the app. UseStaticFiles enables static file serving for the current request path

Reference:

<https://docs.microsoft.com/en-us/dotnet/api/microsoft.aspnetcore.builder.iapplicationbuilder?view=aspnetcore-5.0>

## QUESTION 21

You have an application that includes an Azure Web app and several Azure Function apps. Application secrets including connection strings and certificates are stored in Azure Key Vault.

Secrets must not be stored in the application or application runtime environment. Changes to Azure Active Directory (Azure AD) must be minimized.

You need to design the approach to loading application secrets.

What should you do?

- A. Create a single user-assigned Managed Identity with permission to access Key Vault and configure each App Service to use that Managed Identity.
- B. Create a single Azure AD Service Principal with permission to access Key Vault and use a client secret from within the App Services to access Key Vault.
- C. Create a system assigned Managed Identity in each App Service with permission to access Key Vault.
- D. Create an Azure AD Service Principal with Permissions to access Key Vault for each App Service and use a certificate from within the App Services to access Key Vault.

**Correct Answer:** C

**Section:** (none)

**Explanation**

**Explanation/Reference:**

Explanation:

Use Key Vault references for App Service and Azure Functions.

Key Vault references currently only support system-assigned managed identities. User-assigned identities cannot be used.

Reference:

<https://docs.microsoft.com/en-us/azure/app-service/app-service-key-vault-references>

## QUESTION 22

**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 are developing a medical records document management website. The website is used to store scanned copies of patient intake forms.

If the stored intake forms are downloaded from storage by a third party, the contents of the forms must not be compromised.

You need to store the intake forms according to the requirements.

Solution:

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[sales@alldumpz.com](mailto:sales@alldumpz.com)

1. Create an Azure Key Vault key named **skey**.
2. Encrypt the intake forms using the public key portion of **skey**.
3. Store the encrypted data in Azure Blob storage.

Does the solution meet the goal?

- A. Yes
- B. No

**Correct Answer:** A

**Section:** (none)

**Explanation**

**Explanation/Reference:**

### **QUESTION 23**

**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 are developing a medical records document management website. The website is used to store scanned copies of patient intake forms.

If the stored intake forms are downloaded from storage by a third party, the contents of the forms must not be compromised.

You need to store the intake forms according to the requirements.

**Solution:**

1. Create an Azure Cosmos DB database with Storage Service Encryption enabled.
2. Store the intake forms in the Azure Cosmos DB database.

Does the solution meet the goal?

- A. Yes
- B. No

**Correct Answer:** B

**Section:** (none)

**Explanation**

**Explanation/Reference:**

**Explanation:**

Instead use an Azure Key vault and public key encryption. Store the encrypted from in Azure Storage Blob storage.

### **QUESTION 24**

**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.**

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You are developing a medical records document management website. The website is used to store scanned copies of patient intake forms.

If the stored intake forms are downloaded from storage by a third party, the contents of the forms must not be compromised.

You need to store the intake forms according to the requirements.

Solution: Store the intake forms as Azure Key Vault secrets.

Does the solution meet the goal?

- A. Yes
- B. No

**Correct Answer:** B

**Section:** (none)

**Explanation**

**Explanation/Reference:**

Explanation:

Instead use an Azure Key vault and public key encryption. Store the encrypted form in Azure Storage Blob storage.

#### **QUESTION 25 HOTSPOT**

You plan to deploy a new application to a Linux virtual machine (VM) that is hosted in Azure.

The entire VM must be secured at rest by using industry-standard encryption technology to address organizational security and compliance requirements.

You need to configure Azure Disk Encryption for the VM.

How should you complete the Azure CLI commands? To answer, select the appropriate options in the answer area.

**NOTE:** Each correct selection is worth one point.

**Hot Area:**

### Answer Area

```
az provider register -n Microsoft.KeyVault
resourcegroup="myResourceGroup"
az group create --name $resourcegroup --location westus
keyvault_name=myvaultname$RANDOM
az [▼] create \
    vm
    keyvault
    keyvault key
    vm encryption

--name $keyvault_name \
--resource-group $resourcegroup \
--location eastus \
--enabled-for-disk-encryption True
az [▼] create \
    vm
    keyvault
    keyvault key
    vm encryption

--vault-name $keyvault_name \
--name Name1 \
--protection software
az [▼] create \
    vm
    keyvault
    keyvault key
    vm encryption

--resource-group $resourcegroup \
--name Name2 \
--image Canonical:UbuntuServer:16.04-LTS:latest \
--admin-username azureuser \
--generate-ssh-keys \
--data-disk-sizes-gb 5
az [▼] enable\
    vm
    keyvault
    keyvault key
    vm encryption

--resource-group $resourcegroup \
--name Name2 \
--disk-encryption-keyvault $keyvault_name \
--key-encryption-key Name1 \
--volume-type [▼]
    all
    data
    os
```

**Correct Answer:**

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sales@alldumpz.com

## Answer Area

```
az provider register -n Microsoft.KeyVault
resourcegroup="myResourceGroup"
az group create --name $resourcegroup --location westus
keyvault_name=myvaultname$RANDOM
az [▼
  vm
  keyvault
  keyvault key
  vm encryption
] create \
  --name $keyvault_name \
  --resource-group $resourcegroup \
  --location eastus \
  --enabled-for-disk-encryption True
az [▼
  vm
  keyvault
  keyvault key
  vm encryption
] create \
  --vault-name $keyvault_name \
  --name Name1 \
  --protection software
az [▼
  vm
  keyvault
  keyvault key
  vm encryption
] create \
  --resource-group $resourcegroup \
  --name Name2 \
  --image Canonical:UbuntuServer:16.04-LTS:latest \
  --admin-username azureuser \
  --generate-ssh-keys \
  --data-disk-sizes-gb 5
az [▼
  vm
  keyvault
  keyvault key
  vm encryption
] enable\
  --resource-group $resourcegroup \
  --name Name2 \
  --disk-encryption-keyvault $keyvault_name \
  --key-encryption-key Name1 \
  --volume-type [▼
    all
    data
    os
  ]
```

### Section: (none) Explanation

#### Explanation/Reference:

Explanation:

#### Box 1: keyvault

Create an Azure Key Vault with az keyvault create and enable the Key Vault for use with disk encryption. Specify a unique Key Vault name for keyvault\_name as follows:

```
keyvault_name=myvaultname$RANDOM
az keyvault create \
  --name $keyvault_name \
  --resource-group $resourcegroup \
  --location eastus \
  --enabled-for-disk-encryption True
```

#### Box 2: keyvault key

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The Azure platform needs to be granted access to request the cryptographic keys when the VM boots to decrypt the virtual disks. Create a cryptographic key in your Key Vault with az keyvault key create. The following example creates a key named myKey:

```
az keyvault key create \
--vault-name $keyvault_name \
--name myKey \
--protection software
```

Box 3: vm

Create a VM with az vm create. Only certain marketplace images support disk encryption. The following example creates a VM named myVM using an Ubuntu 16.04 LTS image:

```
az vm create \
--resource-group $resourcegroup \
--name myVM \
--image Canonical:UbuntuServer:16.04-LTS:latest \
--admin-username azureuser \
--generate-ssh-keys \
```

Box 4: vm encryption

Encrypt your VM with az vm encryption enable:

```
az vm encryption enable \
--resource-group $resourcegroup \
--name myVM \
--disk-encryption-keyvault $keyvault_name \
--key-encryption-key myKey \
--volume-type all
```

Note: seems to an error in the question. Should have enable instead of create.

Box 5: all

Encrypt both data and operating system.

Reference:

<https://docs.microsoft.com/en-us/azure/virtual-machines/linux/disk-encryption-cli-quickstart>

## QUESTION 26

Your company is developing an Azure API hosted in Azure.

You need to implement authentication for the Azure API to access other Azure resources. You have the following requirements:

- All API calls must be authenticated.
- Callers to the API must not send credentials to the API.

Which authentication mechanism should you use?

- A. Basic
- B. Anonymous
- C. Managed identity
- D. Client certificate

**Correct Answer: C**

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sales@alldumpz.com

**Section: (none)****Explanation****Explanation/Reference:**

Explanation:

Azure Active Directory Managed Service Identity (MSI) gives your code an automatically managed identity for authenticating to Azure services, so that you can keep credentials out of your code.

Note: Use the authentication-managed-identity policy to authenticate with a backend service using the managed identity. This policy essentially uses the managed identity to obtain an access token from Azure Active Directory for accessing the specified resource. After successfully obtaining the token, the policy will set the value of the token in the Authorization header using the Bearer scheme.

Incorrect Answers:

A: Use the authentication-basic policy to authenticate with a backend service using Basic authentication. This policy effectively sets the HTTP Authorization header to the value corresponding to the credentials provided in the policy.

B: Anonymous is no authentication at all.

D: Your code needs credentials to authenticate to cloud services, but you want to limit the visibility of those credentials as much as possible. Ideally, they never appear on a developer's workstation or get checked-in to source control. Azure Key Vault can store credentials securely so they aren't in your code, but to retrieve them you need to authenticate to Azure Key Vault. To authenticate to Key Vault, you need a credential! A classic bootstrap problem.

Reference:

<https://azure.microsoft.com/en-us/blog/keep-credentials-out-of-code-introducing-azure-ad-managedservice-identity/> <https://docs.microsoft.com/en-us/azure/api-management/api-management-authentication-policies>

## **Monitor, troubleshoot, and optimize Azure solutions**

### **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.

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#### **To start the case study**

To display the first question in 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. When you are ready to answer a question, click the **Question** button to return to the question.

#### **Background**

##### **Overview**

You are a developer for Contoso, Ltd. The company has a social networking website that is developed as a Single Page Application (SPA). The main web application for the social networking website loads user uploaded content from blob storage.

You are developing a solution to monitor uploaded data for inappropriate content. The following process occurs when users upload content by using the SPA:

- Messages are sent to ContentUploadService.
- Content is processed by ContentAnalysisService.
- After processing is complete, the content is posted to the social network or a rejection message is posted in its place.

The ContentAnalysisService is deployed with Azure Container Instances from a private Azure Container Registry named contosoimages.

The solution will use eight CPU cores.

#### **Azure Active Directory**

Contoso, Ltd. uses Azure Active Directory (Azure AD) for both internal and guest accounts.

#### **Requirements**

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sales@alldumpz.com

## **ContentAnalysisService**

The company's data science group built ContentAnalysisService which accepts user generated content as a string and returns a probable value for inappropriate content. Any values over a specific threshold must be reviewed by an employee of Contoso, Ltd.

You must create an Azure Function named CheckUserContent to perform the content checks.

### **Costs**

You must minimize costs for all Azure services.

### **Manual review**

To review content, the user must authenticate to the website portion of the ContentAnalysisService using their Azure AD credentials. The website is built using React and all pages and API endpoints require authentication. In order to review content a user must be part of a ContentReviewer role. All completed reviews must include the reviewer's email address for auditing purposes.

### **High availability**

All services must run in multiple regions. The failure of any service in a region must not impact overall application availability.

### **Monitoring**

An alert must be raised if the ContentUploadService uses more than 80 percent of available CPU cores.

### **Security**

You have the following security requirements:

- Any web service accessible over the Internet must be protected from cross site scripting attacks.
- All websites and services must use SSL from a valid root certificate authority.
- Azure Storage access keys must only be stored in memory and must be available only to the service.
- All Internal services must only be accessible from internal Virtual Networks (VNets).
- All parts of the system must support inbound and outbound traffic restrictions. ▪ All service calls must be authenticated by using Azure AD.

### **User agreements**

When a user submits content, they must agree to a user agreement. The agreement allows employees of Contoso, Ltd. to review content, store cookies on user devices, and track user's IP addresses.

Information regarding agreements is used by multiple divisions within Contoso, Ltd.

User responses must not be lost and must be available to all parties regardless of individual service uptime. The volume of agreements is expected to be in the millions per hour.

### **Validation testing**

When a new version of the ContentAnalysisService is available the previous seven days of content must be processed with the new version to verify that the new version does not significantly deviate from the old version.

### **Issues**

Users of the ContentUploadService report that they occasionally see HTTP 502 responses on specific pages.

### **Code**

#### **ContentUploadService**

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[sales@alldumpz.com](mailto:sales@alldumpz.com)

```

CS01 apiVersion: '2018-10-01'
CS02 type: Microsoft.ContainerInstance/containerGroups
CS03 location: westus
CS04 name: contentUploadService
CS05 properties:
CS06   containers:
CS07     - name: service
CS08       properties:
CS09         image: contoso/contentUploadService:latest
CS10       ports:
CS11         - port: 80
CS12           protocol: TCP
CS13       resources:
CS14         requests:
CS15           cpu: 1.0
CS16           memoryInGB: 1.5
CS17
CS18 ipAddress:
CS19   ip: 10.23.121.112
CS20   ports:
CS21     - port: 80
CS22       protocol: TCP
CS23
CS24
CS25 networkProfile:
CS26
id: /subscriptions/98...19/resourceGroups/container/providers/Microsoft.Network/networkProfiles/subnet

```

```

AM01 {
AM02   "id" : "2b079f03-9b06-2d44-98bb-e9182901fcb6",
AM03   "appId" : "7118a7f0-b5c2-4c9d-833c-3d711396fe65",
AM04
AM05   "createdDateTime" : "2019-12-24T06:01:44Z",
AM06   "logoUrl" : null,
AM07   "logoutUrl" : null,
AM08   "name" : "ContentAnalysisService",
AM09
AM10
AM11   "orgRestrictions" : [],
AM12   "parentalControlSettings" : {
AM13     "countriesBlockedForMinors" : [],
AM14       "legalAgeGroupRule" : "Allow"
AM15     },
AM16   "passwordCredentials" : []
AM17 }

```

## QUESTION 1

You need to monitor ContentUploadService according to the requirements.

Which command should you use?

- A. az monitor metrics alert create -n alert -g ... - --scopes ... - --condition "avg Percentage CPU > 8"
- B. az monitor metrics alert create -n alert -g ... - --scopes ... - --condition "avg Percentage CPU > 800"

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[sales@alldumpz.com](mailto:sales@alldumpz.com)

- C. az monitor metrics alert create -n alert -g ... --scopes ... --condition "CPU Usage > 800"
- D. az monitor metrics alert create -n alert -g ... --scopes ... --condition "CPU Usage > 8"

**Correct Answer:** B

**Section:** (none)

**Explanation**

**Explanation/Reference:**

Explanation:

Scenario: An alert must be raised if the ContentUploadService uses more than 80 percent of available CPU cores

Reference:

<https://docs.microsoft.com/en-us/cli/azure/monitor/alert>

## **QUESTION 2**

You need to investigate the http server log output to resolve the issue with the ContentUploadService.

Which command should you use first?

- A. az webapp log
- B. az ams live-output
- C. az monitor activity-log
- D. az container attach

**Correct Answer:** C

**Section:** (none)

**Explanation**

**Explanation/Reference:**

Explanation:

Scenario: Users of the ContentUploadService report that they occasionally see HTTP 502 responses on specific pages.

"502 bad gateway" and "503 service unavailable" are common errors in your app hosted in Azure App Service.

Microsoft Azure publicizes each time there is a service interruption or performance degradation.

The az monitor activity-log command manages activity logs.

Note: Troubleshooting can be divided into three distinct tasks, in sequential order:

1. Observe and monitor application behavior
2. Collect data
3. Mitigate the issue

Reference:

<https://docs.microsoft.com/en-us/cli/azure/monitor/activity-log>

## **Monitor, troubleshoot, and optimize Azure solutions**

### **Testlet 2**

#### **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.

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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 questions in this case study.

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### **To start the case study**

To display the first question in 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. When you are ready to answer a question, click the **Question** button to return to the question.

### **Background**

City Power & Light company provides electrical infrastructure monitoring solutions for homes and businesses. The company is migrating solutions to Azure.

### **Current environment**

#### **Architecture overview**

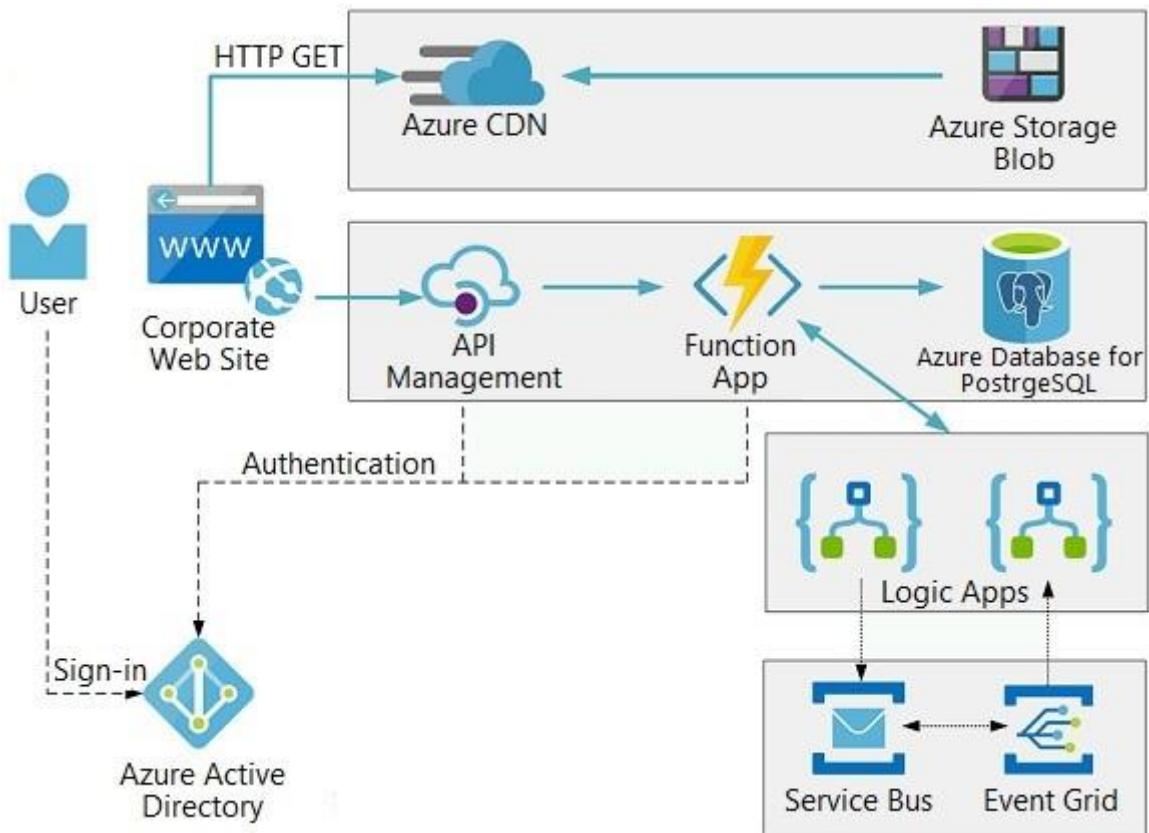
The company has a public website located at <http://www.cpandl.com/>. The site is a single-page web application that runs in Azure App Service on Linux. The website uses files stored in Azure Storage and cached in Azure Content Delivery Network (CDN) to serve static content.

API Management and Azure Function App functions are used to process and store data in Azure Database for PostgreSQL. API Management is used to broker communications to the Azure Function app functions for Logic app integration. Logic apps are used to orchestrate the data processing while Service Bus and Event Grid handle messaging and events.

The solution uses Application Insights, Azure Monitor, and Azure Key Vault.

#### **Architecture diagram**

The company has several applications and services that support their business. The company plans to implement serverless computing where possible. The overall architecture is shown below.



## User authentication

The following steps detail the user authentication process:

1. The user selects **Sign in** in the website.
2. The browser redirects the user to the Azure Active Directory (Azure AD) sign in page.
3. The user signs in.
4. Azure AD redirects the user's session back to the web application. The URL includes an access token.
5. The web application calls an API and includes the access token in the authentication header. The application ID is sent as the audience ('aud') claim in the access token.
6. The back-end API validates the access token.

## Requirements

### Corporate website

- Communications and content must be secured by using SSL.
- Communications must use HTTPS.
- Data must be replicated to a secondary region and three availability zones.
- Data storage costs must be minimized.

### Azure Database for PostgreSQL

The database connection string is stored in Azure Key Vault with the following attributes:

- Azure Key Vault name: cpandlkeyvault
- Secret name: PostgreSQLConn
- Id: 80df3e46ffcd4f1cb187f79905e9a1e8

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The connection information is updated frequently. The application must always use the latest information to connect to the database.

## Azure Service Bus and Azure Event Grid

- Azure Event Grid must use Azure Service Bus for queue-based load leveling.
- Events in Azure Event Grid must be routed directly to Service Bus queues for use in buffering.
- Events from Azure Service Bus and other Azure services must continue to be routed to Azure Event Grid for processing.

## Security

- All SSL certificates and credentials must be stored in Azure Key Vault.
- File access must restrict access by IP, protocol, and Azure AD rights.
- All user accounts and processes must receive only those privileges which are essential to perform their intended function.

## Compliance

Auditing of the file updates and transfers must be enabled to comply with General Data Protection Regulation (GDPR). The file updates must be read-only, stored in the order in which they occurred, include only create, update, delete, and copy operations, and be retained for compliance reasons.

## Issues

### Corporate website

While testing the site, the following error message displays:

CryptographicException: The system cannot find the file specified.

### Function app

You perform local testing for the RequestUserApproval function. The following error message displays:

'Timeout value of 00:10:00 exceeded by function: RequestUserApproval'

The same error message displays when you test the function in an Azure development environment when you run the following Kusto query:

```
FunctionAppLogs  
| where FunctionName == "RequestUserApproval"
```

### Logic app

You test the Logic app in a development environment. The following error message displays:

'400 Bad Request'

Troubleshooting of the error shows an HttpTrigger action to call the RequestUserApproval function.

## Code

### Corporate website

Security.cs:

```
SC01 public class Security  
SC02 {  
SC03 var bytes = System.IO.File.ReadAllBytes("~/var/ssl/private");  
SC04 var cert = new System.Security.Cryptography.X509Certificate2(bytes);  
SC05 var certName = cert.FriendlyName;  
SC06 }
```

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## Function app

RequestUserApproval.cs:

```
RA01 public static class RequestUserApproval
RA02 {
RA03 [FunctionName("RequestUserApproval")]
RA04 public static async Task<IActionResult> Run(
RA05 [HttpTrigger(AuthorizationLevel.Function, "get", "post", Route = null)] HttpRequest req,
RA06 ILogger log)
RA07 {
RA08     log.LogInformation("RequestUserApproval function processed a request.");
RA09     ...
RA10     return ProcessRequest(req)
RA11     ? (ActionResult)new OkObjectResult($"User approval processed")
RA12     : new BadRequestObjectResult("Failed to process user approval");
RA13 }
RA14 private static bool ProcessRequest(HttpRequest req)
RA15 {
RA16     ...
RA17 }
```

### QUESTION 1

You need to investigate the Azure Function app error message in the development environment.

What should you do?

- A. Connect Live Metrics Stream from Application Insights to the Azure Function app and filter the metrics.
- B. Create a new Azure Log Analytics workspace and instrument the Azure Function app with ApplicationInsights.
- C. Update the Azure Function app with extension methods from Microsoft.Extensions.Logging to log events by using the log instance.
- D. Add a new diagnostic setting to the Azure Function app to send logs to Log Analytics.

**Correct Answer:** A

**Section:** (none)

**Explanation**

**Explanation/Reference:**

Explanation:

Azure Functions offers built-in integration with Azure Application Insights to monitor functions.

The following areas of Application Insights can be helpful when evaluating the behavior, performance, and errors in your functions:

Live Metrics: View metrics data as it's created in near real-time.

Failures

Performance Metrics

Reference: <https://docs.microsoft.com/en-us/azure/azure-functions/functions-monitoring>

### QUESTION 2 HOTSPOT

You need to configure security and compliance for the corporate website files.

Which Azure Blob storage settings should you use? 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

Action	Setting
Restrict file access	role-based access control (RBAC) managed identity shared access signature (SAS) token connection string
Enable file auditing	access tier change feed blob indexer storage account type

Correct Answer:

## Answer Area

Action	Setting
Restrict file access	role-based access control (RBAC) managed identity shared access signature (SAS) token connection string
Enable file auditing	access tier change feed blob indexer storage account type

Section: (none)

Explanation

**Explanation/Reference:**

Explanation:

Box 1: role-based access control (RBAC)

Azure Storage supports authentication and authorization with Azure AD for the Blob and Queue services via Azure role-based access control (Azure RBAC).

Scenario: File access must restrict access by IP, protocol, and Azure AD rights.

Box 2: storage account type

Scenario: The website uses files stored in Azure Storage

Auditing of the file updates and transfers must be enabled to comply with General Data Protection Regulation (GDPR).

Creating a diagnostic setting:

1. Sign in to the Azure portal.
2. Navigate to your storage account.

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3. In the Monitoring section, click Diagnostic settings (preview).

The screenshot shows the 'mystorageaccount- Diagnostic settings (preview)' page in the Azure portal. The left sidebar lists monitoring options: Files, Table service, Queue service, Monitoring (classic), and Diagnostic settings (preview). The 'Diagnostic settings (preview)' option is highlighted with a red box. The main content area displays a table of resources:

NAME	RESOURCE TYPE	RESOURCE GROUP	DIAGNOSTICS STATUS
mystorageaccount	Storage account	my-resource-group	Disabled
blob	Storage account	my-resource-group	Disabled
queue	Storage account	my-resource-group	Disabled
table	Storage account	my-resource-group	Disabled
file	Storage account	my-resource-group	Disabled

4. Choose file as the type of storage that you want to enable logs for.

5. Click Add diagnostic setting.

Reference:

<https://docs.microsoft.com/en-us/azure/storage/common/storage-introduction> <https://docs.microsoft.com/en-us/azure/storage/files/storage-files-monitoring>

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## **Monitor, troubleshoot, and optimize Azure solutions**

### **Testlet 3**

#### **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 questions in 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 section 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 in 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. 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.

#### **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**

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

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- 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.

## 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.

### App code

#### EventGridController.cs

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 = JArray.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 }

```

## LoginEvent.cs

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 }

```

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[sales@alldumpz.com](mailto:sales@alldumpz.com)

## QUESTION 1 DRAG

DROP

You need to implement the Log policy.

How should you complete the Azure Event Grid subscription? To answer, drag the appropriate JSON segments to the correct locations. Each JSON segment may be used once, more than once, or not at all. You may need to drag the split bar between panes to view content.

**NOTE:** Each correct selection is worth one point.

### Select and Place:

#### Code segment

- All
- WebHook
- EventHub
- subjectEndsWith
- Microsoft.Storage
- subjectBeginsWith
- Microsoft.Storage.BlobCreated

#### Answer Area

```
{  
  "name": "newlogs",  
  "properties": {  
    "topic": "/subscriptions/. . ./providers/Microsoft.EventGrid/topics/. . .",  
    "destination": {  
      "endpointType" : "code segment" },  
      "filter": {  
        "code segment": "/blobServices/default/containers/logdrop/",  
        "includedEventTypes": [ "code segment" ] },  
    },  
    "labels": [],  
    "eventDeliverySchema": "EventGridSchema"
```

### Correct Answer:

#### Code segment

- All
- WebHook
- EventHub
- subjectEndsWith
- Microsoft.Storage
- subjectBeginsWith
- Microsoft.Storage.BlobCreated

#### Answer Area

```
{  
  "name": "newlogs",  
  "properties": {  
    "topic": "/subscriptions/. . ./providers/Microsoft.EventGrid/topics/. . .",  
    "destination": {  
      "endpointType" : "WebHook" },  
      "filter": {  
        "subjectBeginsWith": "/blobServices/default/containers/logdrop/",  
        "includedEventTypes": [ "Microsoft.Storage.BlobCreated" ] },  
    },  
    "labels": [],  
    "eventDeliverySchema": "EventGridSchema"
```

### Section: (none)

### Explanation

#### Explanation/Reference:

Explanation:

Box 1:WebHook

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

endpointType: The type of endpoint for the subscription (webhook/HTTP, Event Hub, or queue).

Box 2: SubjectBeginsWith

Box 3: Microsoft.Storage.BlobCreated

Scenario: 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.

Example subscription schema

```
{  
  "AllDumpz
```

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```

"properties": {
  "destination": {
    "endpointType": "webhook",
    "properties": {
      "endpointUrl": "https://example.azurewebsites.net/api/HttpTriggerCSharp1?
code=VXbGWce53I48Mt8wuotr0GPmyJ/nDT4hgdFj9DpBiRt38qqnnm5OFg=="
    }
  },
  "filter": {
    "includedEventTypes": [ "Microsoft.Storage.BlobCreated", "Microsoft.Storage.BlobDeleted" ],
    "subjectBeginsWith": "blobServices/default/containers/mycontainer/log",
    "subjectEndsWith": ".jpg",
    "isSubjectCaseSensitive": "true"
  }
}

```

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

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

**Correct Answer:** D

**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.

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

## QUESTION 3 DRAG

DROP

You need to implement telemetry for non-user actions.

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How should you complete the Filter class? 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

```
/health  
/status  
RequestTelemetry  
PageViewTelemetry  
ITelemetryProcessor  
ITelemetryInitializer
```

#### Answer Area

```
public class Filter : [code segment]  
{  
    private readonly [code segment] _next;  
    public (Filter [code segment] next)  
    {  
        _next = next;  
    }  
    public void Process(ITelemetry item)  
    {  
        var x = item as [code segment];  
        if (x?.Url.AbsolutePath == "[code segment]")  
        {  
            return;  
        }  
        _next.Process(item);  
    }  
}
```

### Correct Answer:

#### Code segments

```
/health  
/status  
RequestTelemetry  
PageViewTelemetry  
ITelemetryProcessor  
ITelemetryInitializer
```

#### Answer Area

```
public class Filter : ITelemetryProcessor  
{  
    private readonly ITelemetryProcessor _next;  
    public (Filter ITelemetryProcessor next)  
    {  
        _next = next;  
    }  
    public void Process(ITelemetry item)  
    {  
        var x = item as RequestTelemetry;  
        if (x?.Url.AbsolutePath == "/health")  
        {  
            return;  
        }  
        _next.Process(item);  
    }  
}
```

### Section: (none)

#### Explanation

#### Explanation/Reference:

Explanation:

Scenario: Exclude non-user actions from Application Insights telemetry.

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#### Box 1: ITelemetryProcessor

To create a filter, implement ITelemetryProcessor. This technique gives you more direct control over what is included or excluded from the telemetry stream.

#### Box 2: ITelemetryProcessor

#### Box 3: ITelemetryProcessor Box 4:

RequestTelemetry Box 5: /health

To filter out an item, just terminate the chain.

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

#### QUESTION 4 DRAG

DROP

You need to ensure that PolicyLib requirements are met.

How should you complete the code segment? 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
Process	public class IncludeEventId : <span style="border: 1px dotted #ccc; padding: 2px;">code segment</span>
Initialize	{ public void <span style="border: 1px dotted #ccc; padding: 2px;">code segment</span> (ITelemetry telemetry)
telemetry.Sequence	{
ITelemetryProcessor	
ITelemetryInitializer	
telemetry.Context	<span style="border: 1px dotted #ccc; padding: 2px;">code segment</span> .Properties["EventId"] =
EventGridController.EventId.Value	<span style="border: 1px dotted #ccc; padding: 2px;">code segment</span> ;
((EventTelemetry)telemetry).Properties["EventId"]	}

#### Correct Answer:

Code segments	Answer Area
Process	public class IncludeEventId : ITelemetryInitializer
Initialize	{
telemetry.Sequence	public void <span style="border: 1px dotted #ccc; padding: 2px;">Initialize</span> (ITelemetry telemetry)
ITelemetryProcessor	{
ITelemetryInitializer	
telemetry.Context	<span style="border: 1px dotted #ccc; padding: 2px;">telemetry.Context</span> .Properties["EventId"] =
EventGridController.EventId.Value	<span style="border: 1px dotted #ccc; padding: 2px;">((EventTelemetry)telemetry).Properties["EventId"]</span> ;
((EventTelemetry)telemetry).Properties["EventId"]	}

#### Section: (none)

#### Explanation

#### Explanation/Reference:

Explanation:

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:

- 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.

#### Box 1: ITelemetryInitializer

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Use telemetry initializers to define global properties that are sent with all telemetry; and to override selected behavior of the standard telemetry modules.

Box 2: Initialize

Box 3: Telemetry.Context

Box 4: ((EventTelemetry)telemetry).Properties["EventID"]

Reference:

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

## Monitor, troubleshoot, and optimize Azure solutions

### Testlet 4

#### 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 questions in 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 section 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 in 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 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

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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 an 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 WebAppIdentity.

### 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.

### 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.

### Requirements

#### Receipt processing

Concurrent processing of a receipt must be prevented.

#### 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

- User's 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 principle of least privilege 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.

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## 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.

### Application code

#### 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().CreateIfNotExistsAsync();
PC28         return cloudBlobClient.GetRootContainerReference();
PC29     }
PC30     private static async Task<StorageCredentials> GetCredentials()
PC31     {
PC32         . .
PC33     }
PC34     private static async Task<List<IListFileItem>> ListFiles()
PC35     {
PC36         . .
PC37     }
PC37     private KeyVaultClient _keyVaultClient = new KeyVaultClient(" . . .");
PC38 }
```

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### 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(HttpStatusCode response)
RU13     {
RU14
RU15     }
RU16 }
```

### ConfigureSSE.ps1

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```

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 ensure receipt processing occurs correctly.

What should you do?

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

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

## QUESTION 2

You need to resolve the capacity issue.

What should you do?

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

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**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      }
```

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

### **QUESTION 3**

You need to resolve the log capacity issue.

What should you do?

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

**Correct Answer:** C

**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.

Reference:

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

### **Monitor, troubleshoot, and optimize Azure solutions**

#### **Question Set 5**

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[sales@alldumpz.com](mailto:sales@alldumpz.com)

## 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. 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:** A

**Section:** (none)

**Explanation**

**Explanation/Reference:**

Explanation:

The session state provider for Azure Cache for Redis enables you to share session information between different instances of an ASP.NET web application.

The same connection can be used by multiple concurrent threads.

Redis supports both read and write operations.

The output cache provider for Azure Cache for Redis enables you to save the HTTP responses generated by an ASP.NET web application.

Note: Using the Azure portal, you can also configure the eviction policy of the cache, and control access to the cache by adding users to the roles provided. These roles, which define the operations that members can perform, include Owner, Contributor, and Reader. For example, members of the Owner role have complete control over the cache (including security) and its contents, members of the Contributor role can read and write information in the cache, and members of the Reader role can only retrieve data from the cache.

Reference: <https://docs.microsoft.com/en-us/azure/architecture/best-practices/caching>

## QUESTION 2

HOTSPOT

You are debugging an application that is running on Azure Kubernetes cluster named cluster1. The cluster uses Azure Monitor for containers to monitor the cluster.

The application has sticky sessions enabled on the ingress controller.

Some customers report a large number of errors in the application over the last 24 hours.

You need to determine on which virtual machines (VMs) the errors are occurring.

How should you complete the Azure Monitor query? To answer, select the appropriate options in the answer area.

**NOTE:** Each correct selection is worth one point.

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**Hot Area:**

## Answer Area

```
let startTimestamp =
```

- ago(1d)
- since(1d)
- totimespan(1d)
- date(now() - 1d)

```
let ContainerIDs = KubePodInventory  
| where ClusterName == "Cluster1"
```

- top ContainerID
- union ContainerID
- sample ContainerID
- distinct ContainerID

ContainerLog

```
| fork containerIDs  
| where ContainerID in (ContainerIDs)  
| restrict ContainerID in (ContainerIDs)  
| join ContainerID == ContainerIDs.ContainerID
```

```
| where TimeGenerated > startTimestamp  
| where LogEntrySource == "stderr"
```

- project by Computer
- summarize by Computer
- partition count() by Computer
- summarize count() by Computer

**Correct Answer:**

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sales@alldumpz.com

## Answer Area

```
let startTimestamp = ;  
    ago(1d)  
    since(1d)  
    totimespan(1d)  
    date(now() - 1d)  
  
let ContainerIDs = KubePodInventory  
| where ClusterName == "Cluster1"  
| ;  
| top ContainerID  
| union ContainerID  
| sample ContainerID  
| distinct ContainerID  
  
ContainerLog  
| ;  
| fork containerIDs  
| where ContainerID in (ContainerIDs)  
| restrict ContainerID in (ContainerIDs)  
| join ContainerID == ContainerIDs.ContainerID  
  
| where TimeGenerated > startTimestamp  
| where LogEntrySource == "stderr"  
| ;  
| project by Computer  
| summarize by Computer  
| partition count() by Computer  
| summarize count() by Computer
```

### Section: (none)

#### Explanation

#### Explanation/Reference:

Explanation:

Box 1: ago(1d)

Box 2: distinct containerID

Box 3: where ContainerID in (ContainerIDs)

Box 4: summarize Count by Computer

Summarize: aggregate groups of rows

Use summarize to identify groups of records, according to one or more columns, and apply aggregations to them.

The most common use of summarize is count, which returns the number of results in each group.

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sales@alldumpz.com

Reference: <https://docs.microsoft.com/en-us/azure/azure-monitor/log-query/get-started-queries>

<https://docs.microsoft.com/en-us/azure/azure-monitor/log-query/query-optimization> **QUESTION 3**

#### HOTSPOT

You plan to deploy a web app to App Service on Linux. You create an App Service plan. You create and push a custom Docker image that contains the web app to Azure Container Registry.

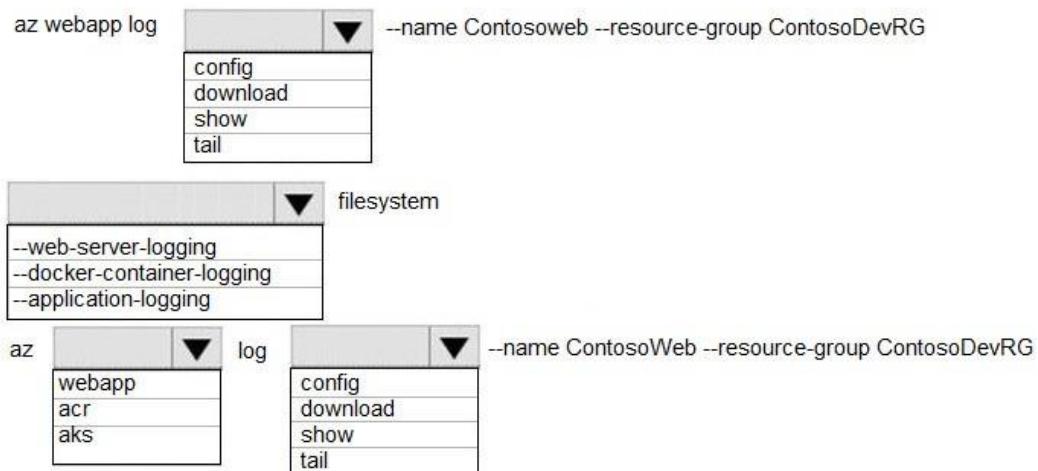
You need to access the console logs generated from inside the container in real-time.

How should you complete the Azure CLI command? To answer, select the appropriate options in the answer area.

**NOTE:** Each correct selection is worth one point.

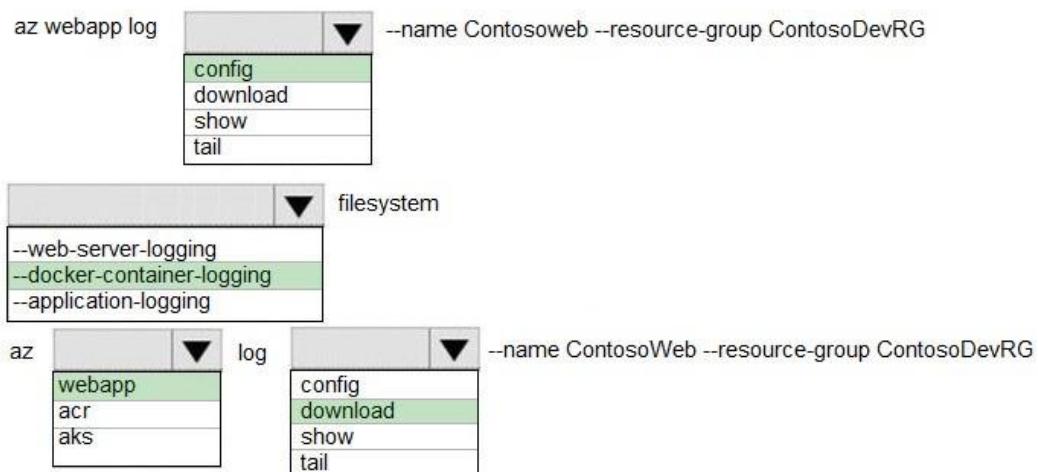
#### Hot Area:

#### Answer Area



#### Correct Answer:

#### Answer Area



#### Section: (none)

#### Explanation

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**Explanation/Reference:**

Explanation:

Box 1: config

To Configure logging for a web app use the command: az  
webapp log config

Box 2: --docker-container-logging Syntax include: az webapp log config  
[--docker-container-logging {filesystem, off}]

Box 3: webapp

To download a web app's log history as a zip file use the command:  
az webapp log download

Box 4: download

Reference: <https://docs.microsoft.com/en-us/cli/azure/webapp/log>

**QUESTION 4**

You develop and deploy an ASP.NET web app to Azure App Service. You use Application Insights telemetry to monitor the app.

You must test the app to ensure that the app is available and responsive from various points around the world and at regular intervals. If the app is not responding, you must send an alert to support staff.

You need to configure a test for the web app.

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

**NOTE:** Each correct selection is worth one point.

- A. integration
- B. multi-step web
- C. URL ping
- D. unit
- E. load

**Correct Answer:** BC

**Section:** (none)

**Explanation**

**Explanation/Reference:**

Explanation:

There are three types of availability tests:

- URL ping test: a simple test that you can create in the Azure portal.
- Multi-step web test: A recording of a sequence of web requests, which can be played back to test more complex scenarios. Multi-step web tests are created in Visual Studio Enterprise and uploaded to the portal for execution.
- Custom Track Availability Tests: If you decide to create a custom application to run availability tests, the TrackAvailability() method can be used to send the results to Application Insights.

Reference: <https://docs.microsoft.com/en-us/azure/azure-monitor/app/monitor-web-app-availability>

**QUESTION 5 DRAG**

DROP

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A web service provides customer summary information for e-commerce partners. The web service is implemented as an Azure Function app with an HTTP trigger. Access to the API is provided by an Azure API Management instance. The API Management instance is configured in consumption plan mode. All API calls are authenticated by using OAuth.

API calls must be cached. Customers must not be able to view cached data for other customers.

You need to configure API Management policies for caching.

How should you complete the policy statement?

### Select and Place:

Targets	Answer Area
Expect	<policies> <inbound> <base /> <cache-lookup caching-type="
Public	<input type="text" value="Target"/> " downstream-caching-type = "
Private	<input type="text" value="Target"/> " >
Internal	</vary-by-header> </cache-lookup> </inbound>
External	</policies>
Authorization	

### Correct Answer:

Targets	Answer Area
Expect	<policies> <inbound> <base /> <cache-lookup caching-type="
Public	<input type="text" value="Internal"/> " downstream-caching-type = "
Private	<input type="text" value="Private"/> " >
Internal	</vary-by-header> </cache-lookup> </inbound>
External	</policies>
Authorization	<input type="text" value="Authorization"/>

### Section: (none)

#### Explanation:

#### Explanation/Reference:

Explanation:

Box 1: internal caching-type

Choose between the following values of the attribute:

- internal to use the built-in API Management cache,
- external to use the external cache as Azure Cache for Redis
- prefer-external to use external cache if configured or internal cache otherwise.

Box 2: private downstream-caching-type

This attribute must be set to one of the following values.

- none - downstream caching is not allowed.
- private - downstream private caching is allowed.
- public - private and shared downstream caching is allowed.

Box 3: Authorization

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```
<vary-by-header>Authorization</vary-by-header>
<!-- should be present when allow-private-response-caching is "true"-->
```

Note: Start caching responses per value of specified header, such as Accept, Accept-Charset, Accept-Encoding, Accept-Language, Authorization, Expect, From, Host, If-Match

Reference: <https://docs.microsoft.com/en-us/azure/api-management/api-management-caching-policies>

## QUESTION 6

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 use? Each correct answer presents part of the solution.

**NOTE:** Each correct selection is worth one point.

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

**Correct Answer:** BD

**Section:** (none)

**Explanation**

**Explanation/Reference:**

Explanation:

Example:

```
public async Task Enqueue(string payload)
{
    // StartOperation is a helper method that initializes the telemetry item // and allows correlation of this
    // operation with its parent and children. var operation =
    telemetryClient.StartOperation<DependencyTelemetry>("enqueue " + queueName);

    operation.Telemetry.Type = "Azure Service Bus"; operation.Telemetry.Data =
    "Enqueue " + queueName;

    var message = new BrokeredMessage(payload);
    // Service Bus queue allows the property bag to pass along with the message. //
    We will use them to pass our correlation identifiers (and other context) // to the
    consumer.

    message.Properties.Add("ParentId", operation.Telemetry.Id); message.Properties.Add("RootId",
    operation.Telemetry.Context.Operation.Id);
```

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

## QUESTION 7 HOTSPOT

You are using Azure Front Door Service.

You are expecting inbound files to be compressed by using Brotli compression. You discover that inbound XML files are not compressed. The files are 9 megabytes (MB) in size.

You need to determine the root cause for the issue.

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To answer, select the appropriate options in the answer area.

**NOTE:** Each correct selection is worth one point.

**Hot Area:**

## Answer Area

Statement	Yes	No
The file MIME type is supported by the service.	<input type="radio"/>	<input type="radio"/>
Edge nodes must be purged of all cache assets.	<input type="radio"/>	<input type="radio"/>
The compression type is supported.	<input type="radio"/>	<input type="radio"/>

**Correct Answer:**

## Answer Area

Statement	Yes	No
The file MIME type is supported by the service.	<input type="radio"/>	<input checked="" type="radio"/>
Edge nodes must be purged of all cache assets.	<input checked="" type="radio"/>	<input type="radio"/>
The compression type is supported.	<input checked="" type="radio"/>	<input type="radio"/>

**Section: (none)**

**Explanation**

**Explanation/Reference:**

Explanation:

Box 1: No

Front Door can dynamically compress content on the edge, resulting in a smaller and faster response to your clients. All files are eligible for compression. However, a file must be of a MIME type that is eligible for compression list.

Box 2: No

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sales@alldumpz.com

Sometimes you may wish to purge cached content from all edge nodes and force them all to retrieve new updated assets. This might be due to updates to your web application, or to quickly update assets that contain incorrect information.

Box 3: Yes

These profiles support the following compression encodings: Gzip (GNU zip), Brotli

Reference:

<https://docs.microsoft.com/en-us/azure/frontdoor/front-door-caching>

## QUESTION 8

### HOTSPOT

You are developing an Azure App Service hosted ASP.NET Core web app to deliver video-on-demand streaming media. You enable an Azure Content Delivery Network (CDN) Standard for the web endpoint. Customer videos are downloaded from the web app by using the following example URL: http://www.contoso.com/content.mp4?quality=1

All media content must expire from the cache after one hour. Customer videos with varying quality must be delivered to the closest regional point of presence (POP) node.

You need to configure Azure CDN caching rules.

Which options should you use? 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

Setting	Action
Caching behavior	<div style="border: 1px solid black; padding: 5px; width: fit-content;"><p>▼</p><ul style="list-style-type: none"><li>Bypass cache</li><li>Override</li><li>Set if missing</li></ul></div>
Cache expiration duration	<div style="border: 1px solid black; padding: 5px; width: fit-content;"><p>▼</p><ul style="list-style-type: none"><li>1 second</li><li>1 minute</li><li>1 hour</li><li>1 day</li></ul></div>
Query string caching behavior	<div style="border: 1px solid black; padding: 5px; width: fit-content;"><p>▼</p><ul style="list-style-type: none"><li>Ignore query strings</li><li>Bypass caching for query strings</li><li>Cache every unique URL</li></ul></div>

**Correct Answer:**

## Answer Area

Setting	Action
Caching behavior	<div style="border: 1px solid black; padding: 5px; width: fit-content;"><p>Bypass cache</p><p>Override</p><p>Set if missing</p></div>
Cache expiration duration	<div style="border: 1px solid black; padding: 5px; width: fit-content;"><p>1 second</p><p>1 minute</p><p>1 hour</p><p>1 day</p></div>
Query string caching behavior	<div style="border: 1px solid black; padding: 5px; width: fit-content;"><p>Ignore query strings</p><p>Bypass caching for query strings</p><p>Cache every unique URL</p></div>

### Section: (none)

#### Explanation

#### Explanation/Reference:

Explanation:

#### Box 1: Override

Override: Ignore origin-provided cache duration; use the provided cache duration instead. This will not override cache-control: no-cache.

Set if missing: Honor origin-provided cache-directive headers, if they exist; otherwise, use the provided cache duration.

Incorrect:

Bypass cache: Do not cache and ignore origin-provided cache-directive headers.

#### Box 2: 1 hour

All media content must expire from the cache after one hour.

#### Box 3: Cache every unique URL

Cache every unique URL: In this mode, each request with a unique URL, including the query string, is treated as a unique asset with its own cache. For example, the response from the origin server for a request for example.ashx?q=test1 is cached at the POP node and returned for subsequent caches with the same query string. A request for example.ashx?q=test2 is cached as a separate asset with its own time-to-live setting.

Incorrect Answers:

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Bypass caching for query strings: In this mode, requests with query strings are not cached at the CDN POP node. The POP node retrieves the asset directly from the origin server and passes it to the requestor with each request.

Ignore query strings: Default mode. In this mode, the CDN point-of-presence (POP) node passes the query strings from the requestor to the origin server on the first request and caches the asset. All subsequent requests for the asset that are served from the POP ignore the query strings until the cached asset expires.

Reference: <https://docs.microsoft.com/en-us/azure/cdn/cdn-query-string>

### QUESTION 9 DRAG

DROP

You develop a web app that uses tier D1 app service plan by using the Web Apps 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

Configure the web app to the Premium App Service tier.



Configure the web app to the Standard App Service tier.

Enable autoscaling on the web app.



Add a Scale rule.

Switch to an Azure App Services consumption plan.

Configure a Scale condition.

Correct Answer:

AllDumpz

sales@alldumpz.com

## Actions

## Answer Area

Configure the web app to the Premium App Service tier.

Configure the web app to the Standard App Service tier.

Configure the web app to the Standard App Service tier.

Enable autoscaling on the web app.

Enable autoscaling on the web app.

Add a Scale rule.

Add a Scale rule.

Configure a Scale condition.

Switch to an Azure App Services consumption plan.

Configure a Scale condition.



### 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 condition

Reference:

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

### 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. 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.

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sales@alldumpz.com

- 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: Enable Application Request Routing (ARR).

Does the solution meet the goal?

- A. Yes
- B. No

**Correct Answer:** B

**Section:** (none)

**Explanation**

**Explanation/Reference:**

Explanation:

Instead deploy and configure Azure Cache for Redis. Update the web applications.

Reference: <https://docs.microsoft.com/en-us/azure/architecture/best-practices/caching#managing-concurrency-in-cache>

## 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. 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
- B. No

**Correct Answer:** B

**Section:** (none)

**Explanation**

**Explanation/Reference:**

Explanation:

Instead deploy and configure Azure Cache for Redis. Update the web applications.

Reference: <https://docs.microsoft.com/en-us/azure/architecture/best-practices/caching#managing-concurrency-in-cache>

## QUESTION 12

HOTSPOT

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sales@alldumpz.com

A company is developing a gaming platform. Users can join teams to play online and see leaderboards that include player statistics. The solution includes an entity named Team.

You plan to implement an Azure Redis Cache instance to improve the efficiency of data operations for entities that rarely change.

You need to invalidate the cache when team data is changed.

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:**

## Answer Area

```
void ClearCachedTeams()
```

```
{
```

```
IDatabase cache = Connection.GetDatabase();  
ICache cache = Connection.GetDatabase();
```

```
cache.KeyDelete("Team");  
cache.StringSet("Team", "");  
cache.ValueDelete("Team");  
cache.StringGet("Team", "");
```

```
ViewBag.msg += "Team data removed from cache.";
```

```
}
```

**Correct Answer:**

## Answer Area

```
void ClearCachedTeams()

{
    IDatabase cache = Connection.GetDatabase();
    ICache cache = Connection.GetDatabase();

    cache.KeyDelete("Team");
    cache.StringSet("Team", "");
    cache.ValueDelete("Team");
    cache.StringGet("Team");

    ViewBag.msg += "Team data removed from cache.";
}
```

**Section: (none)**

**Explanation**

**Explanation/Reference:**

Explanation:

Box 1: IDatabase cache = connection.GetDatabase();

Connection refers to a previously configured ConnectionMultiplexer.

Box 2: cache.StringSet("teams", "")

To specify the expiration of an item in the cache, use the TimeSpan parameter of StringSet. cache.StringSet("key1", "value1", TimeSpan.FromMinutes(90));

Reference:

<https://azure.microsoft.com/sv-se/blog/lap-around-azure-redis-cache-preview/> <https://docs.microsoft.com/en-us/cli/azure/webapp/config/container>

### QUESTION 13

DRAG DROP

A company has multiple warehouse. Each warehouse contains IoT temperature devices which deliver temperature data to an Azure Service Bus queue.

You need to send email alerts to facility supervisors immediately if the temperature at a warehouse goes above or below specified threshold temperatures.

Which five 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.

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sales@alldumpz.com

**Select and Place:****Actions**

Add a logic app trigger that fires when one or more messages arrive in the queue.

Add a Recurrence trigger that schedules the app to run every 15 minutes.

Add an action that sends an email to specified personnel if the temperature is outside of those thresholds.

Add a trigger that reads IoT temperature data from a Service Bus queue.

Add a logic app action that fires when one or more messages arrive in the queue.

Add a condition that compares the temperature against the upper and lower thresholds.

Create a blank Logic app.

Add an action that reads IoT temperature data from the Service Bus queue.

**Answer Area****Correct Answer:****Actions**

Add a logic app trigger that fires when one or more messages arrive in the queue.

Add a Recurrence trigger that schedules the app to run every 15 minutes.

Add an action that sends an email to specified personnel if the temperature is outside of those thresholds.

Add a trigger that reads IoT temperature data from a Service Bus queue.

Add a logic app action that fires when one or more messages arrive in the queue.

Add a condition that compares the temperature against the upper and lower thresholds.

Create a blank Logic app.

Add an action that reads IoT temperature data from the Service Bus queue.

**Answer Area**

Create a blank Logic app.

Add a logic app action that fires when one or more messages arrive in the queue.

Add an action that reads IoT temperature data from the Service Bus queue.

Add a condition that compares the temperature against the upper and lower thresholds.

Add an action that sends an email to specified personnel if the temperature is outside of those thresholds.

**Section: (none)****Explanation****Explanation/Reference:**

Explanation:

Step 1: Create a blank Logic app.

Create and configure a Logic App.

Step 2: Add a logical app trigger that fires when one or more messages arrive in the queue.

Configure the logic app trigger.

Under Triggers, select When one or more messages arrive in a queue (auto-complete).

Step 3: Add an action that reads IoT temperature data from the Service Bus queue

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Step 4: Add a condition that compares the temperature against the upper and lower thresholds.

Step 5: Add an action that sends an email to specified personnel if the temperature is outside of those thresholds

Reference: <https://docs.microsoft.com/en-us/azure/iot-hub/iot-hub-monitoring-notifications-with-azure-logicapps>

## QUESTION 14

DRAG DROP

You develop an ASP.NET Core MVC application. You configure the application to track webpages and custom events.

You need to identify trends in application usage.

Which Azure Application Insights Usage Analysis features should you use? To answer, drag the appropriate features to the correct requirements. Each feature 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:

Features	Answer Area	Requirement	Feature
Users		Which pages visited by users most often correlate to a product purchase?	Feature
Funnels		How does load time of the product display page affect a user's decision to purchase a product?	Feature
Impact		Which events most influence a user's decision to continue to use the application?	Feature
Retention		Are there places in the application that users often perform repetitive actions?	Feature
User Flows			

### Correct Answer:

Features	Answer Area	Requirement	Feature
Users		Which pages visited by users most often correlate to a product purchase?	Users
Funnels		How does load time of the product display page affect a user's decision to purchase a product?	Impact
Impact		Which events most influence a user's decision to continue to use the application?	Retention
Retention		Are there places in the application that users often perform repetitive actions?	User Flows
User Flows			

### Section: (none)

### Explanation

#### Explanation/Reference:

Explanation:

Box 1: Users

Box 2: Impact

One way to think of Impact is as the ultimate tool for settling arguments with someone on your team about how slowness in some aspect of your site is affecting whether users stick around. While users may tolerate a certain amount of slowness, Impact gives you insight into how best to balance optimization and performance to maximize user conversion.

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#### Box 3: Retention

The retention feature in Azure Application Insights helps you analyze how many users return to your app, and how often they perform particular tasks or achieve goals. For example, if you run a game site, you could compare the numbers of users who return to the site after losing a game with the number who return after winning. This knowledge can help you improve both your user experience and your business strategy.

#### Box 4: User flows

The User Flows tool visualizes how users navigate between the pages and features of your site. It's great for answering questions like:

- How do users navigate away from a page on your site?
- What do users click on a page on your site?
- Where are the places that users churn most from your site?
- Are there places where users repeat the same action over and over?

Incorrect Answers:

Funnel: If your application involves multiple stages, you need to know if most customers are progressing through the entire process, or if they are ending the process at some point. The progression through a series of steps in a web application is known as a funnel. You can use Azure Application Insights Funnels to gain insights into your users, and monitor step-by-step conversion rates.

Reference:

<https://docs.microsoft.com/en-us/azure/azure-monitor/app/usage-impact>

### QUESTION 15

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
```

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```
PS C:\>$apimContext = New-AzureRmApiManagementContext -ResourceGroupName "Api-DefaultWestUS" -  
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.

Reference: <https://docs.microsoft.com/en-us/powershell/module/azurerm.apimanagement/newazurermapimanagementbackendproxy?view=azurermps-6.13.0>

## QUESTION 16

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 resents part of the solution.

**NOTE:** Each correct selection is worth one point.

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

**Correct Answer:** AD

**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.

A: 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:

B, E: 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.

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## 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.

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

## QUESTION 17

You are developing an Azure function that connects to an Azure SQL Database instance. The function is triggered by an Azure Storage queue.

You receive reports of numerous System.InvalidOperationExceptions with the following message:

"Timeout expired. The timeout period elapsed prior to obtaining a connection from the pool. This may have occurred because all pooled connections were in use and max pool size was reached."

You need to prevent the exception.

What should you do?

- A. In the host.json file, decrease the value of the **batchSize** option
- B. Convert the trigger to Azure Event Hub
- C. Convert the Azure Function to the Premium plan
- D. In the function.json file, change the value of the **type** option to **queueScaling**

**Correct Answer:** C

**Section:** (none)

**Explanation**

**Explanation/Reference:**

Explanation:

With the Premium plan the max outbound connections per instance is unbounded compared to the 600 active (1200 total) in a Consumption plan.

Note: The number of available connections is limited partly because a function app runs in a sandbox environment. One of the restrictions that the sandbox imposes on your code is a limit on the number of outbound connections, which is currently 600 active (1,200 total) connections per instance. When you reach this limit, the functions runtime writes the following message to the logs: Host thresholds exceeded: Connections.

Reference: <https://docs.microsoft.com/en-us/azure/azure-functions/manage-connections>

<https://docs.microsoft.com/en-us/azure/azure-functions/functions-scale#service-limits>

## Connect to and consume Azure services and third-party services

### Testlet 1

#### Case study

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### **To start the case study**

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### **Current environment**

#### **Windows Server 2016 virtual machine**

This virtual machine (VM) runs BizTalk 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 trucking stops.
- Shipping REST API – This API provides shipping information for use and display on the shipping website.

### **Shipping Data**

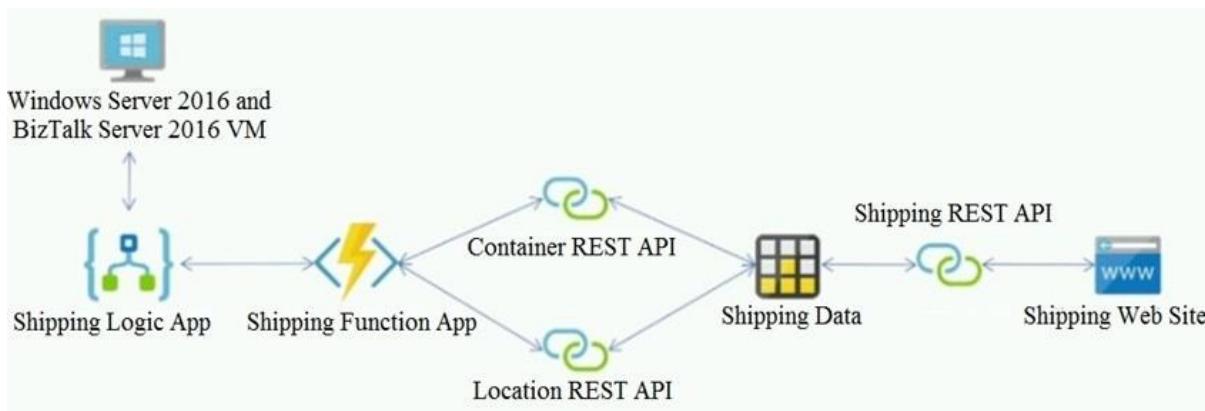
The application uses MongoDB JSON document storage database for all container and transport information.

### **Shipping Web Site**

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

### **Proposed solution**

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:



## Requirements

### 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.
- 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:

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

### QUESTION 1 DRAG

DROP

You need to support the message processing for the ocean transport workflow.

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.

**Select and Place:**

Actions	Answer Area
Link the Logic App to the integration account.	
Add partners, schemas, certificates, maps, and agreements.	
Update the Logic App to use the partners, schemas, certificates, maps, and agreements.	
Create a custom connector for the Logic App.	
Link the custom connector to the Logic App.	
Create an integration account in the Azure portal.	

**Correct Answer:**

Actions	Answer Area
Link the Logic App to the integration account.	Create an integration account in the Azure portal.
Add partners, schemas, certificates, maps, and agreements.	Link the Logic App to the integration account.
Update the Logic App to use the partners, schemas, certificates, maps, and agreements.	Add partners, schemas, certificates, maps, and agreements.
Create a custom connector for the Logic App.	Create a custom connector for the Logic App.
Link the custom connector to the Logic App.	
Create an integration account in the Azure portal.	

**Section: (none)**

**Explanation**

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**Explanation/Reference:**

Explanation:

Step 1: Create an integration account in the Azure portal

You can define custom metadata for artifacts in integration accounts and get that metadata during runtime for your logic app to use. For example, you can provide metadata for artifacts, such as partners, agreements, schemas, and maps - all store metadata using key-value pairs.

Step 2: Link the Logic App to the integration account

A logic app that's linked to the integration account and artifact metadata you want to use.

Step 3: Add partners, schemas, certificates, maps, and agreements

Step 4: Create a custom connector for the Logic App.

Reference: <https://docs.microsoft.com/bs-latn-ba/azure/logic-apps/logic-apps-enterprise-integration-metadata>

**QUESTION 2**

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

What should you use?

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

**Correct Answer:** C

**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.

Reference:

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

**Connect to and consume Azure services and third-party services****Testlet 2**

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## **Case study**

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### **To start the case study**

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### **Background**

City Power & Light company provides electrical infrastructure monitoring solutions for homes and businesses. The company is migrating solutions to Azure.

### **Current environment**

#### **Architecture overview**

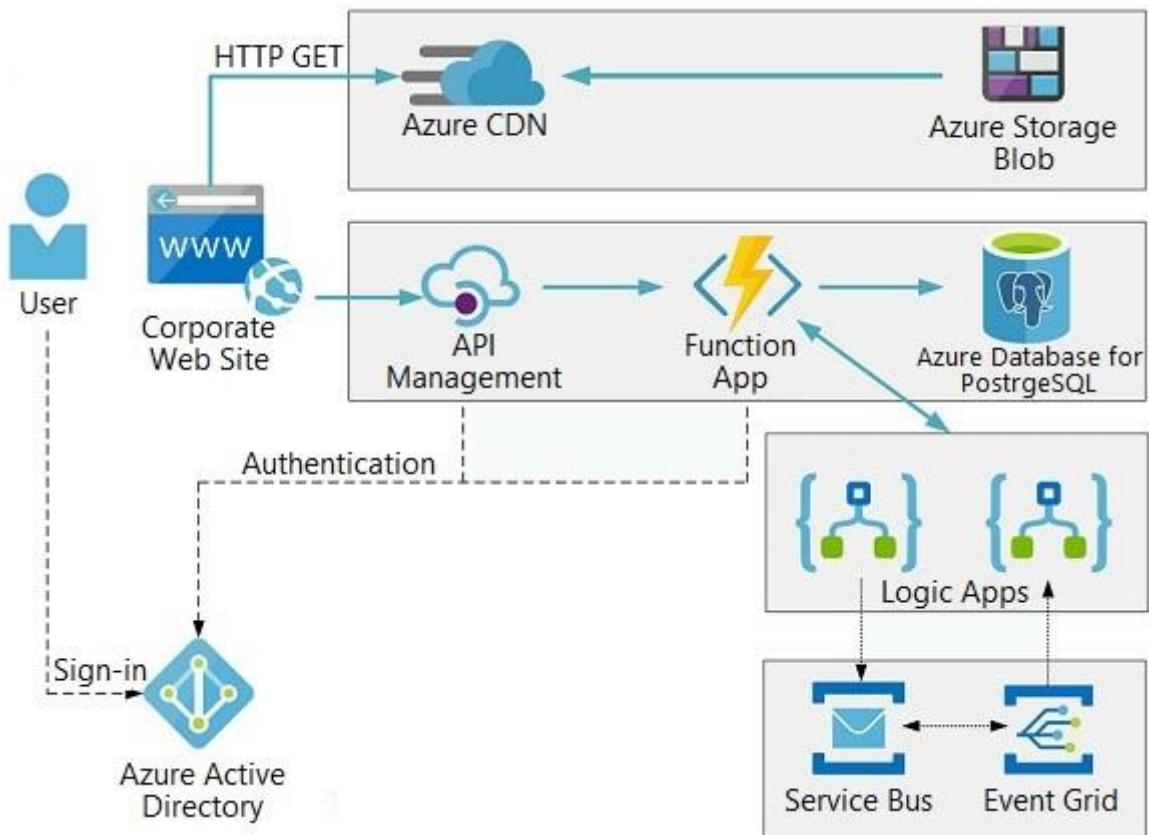
The company has a public website located at <http://www.cpndl.com/>. The site is a single-page web application that runs in Azure App Service on Linux. The website uses files stored in Azure Storage and cached in Azure Content Delivery Network (CDN) to serve static content.

API Management and Azure Function App functions are used to process and store data in Azure Database for PostgreSQL. API Management is used to broker communications to the Azure Function app functions for Logic app integration. Logic apps are used to orchestrate the data processing while Service Bus and Event Grid handle messaging and events.

The solution uses Application Insights, Azure Monitor, and Azure Key Vault.

#### **Architecture diagram**

The company has several applications and services that support their business. The company plans to implement serverless computing where possible. The overall architecture is shown below.



## User authentication

The following steps detail the user authentication process:

1. The user selects **Sign in** in the website.
2. The browser redirects the user to the Azure Active Directory (Azure AD) sign in page.
3. The user signs in.
4. Azure AD redirects the user's session back to the web application. The URL includes an access token.
5. The web application calls an API and includes the access token in the authentication header. The application ID is sent as the audience ('aud') claim in the access token.
6. The back-end API validates the access token.

## Requirements

### Corporate website

- Communications and content must be secured by using SSL.
- Communications must use HTTPS.
- Data must be replicated to a secondary region and three availability zones.
- Data storage costs must be minimized.

### Azure Database for PostgreSQL

The database connection string is stored in Azure Key Vault with the following attributes:

- Azure Key Vault name: cpandlkeyvault
- Secret name: PostgreSQLConn
- Id: 80df3e46ffcd4f1cb187f79905e9a1e8

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The connection information is updated frequently. The application must always use the latest information to connect to the database.

## Azure Service Bus and Azure Event Grid

- Azure Event Grid must use Azure Service Bus for queue-based load leveling.
- Events in Azure Event Grid must be routed directly to Service Bus queues for use in buffering. ▪ Events from Azure Service Bus and other Azure services must continue to be routed to Azure Event Grid for processing.

## Security

- All SSL certificates and credentials must be stored in Azure Key Vault.
- File access must restrict access by IP, protocol, and Azure AD rights.
- All user accounts and processes must receive only those privileges which are essential to perform their intended function.

## Compliance

Auditing of the file updates and transfers must be enabled to comply with General Data Protection Regulation (GDPR). The file updates must be read-only, stored in the order in which they occurred, include only create, update, delete, and copy operations, and be retained for compliance reasons.

## Issues

### Corporate website

While testing the site, the following error message displays:

```
CryptographicException: The system cannot find the file specified.
```

### Function app

You perform local testing for the RequestUserApproval function. The following error message displays:

```
'Timeout value of 00:10:00 exceeded by function: RequestUserApproval'
```

The same error message displays when you test the function in an Azure development environment when you run the following Kusto query:

```
FunctionAppLogs  
| where FunctionName == "RequestUserApproval"
```

### Logic app

You test the Logic app in a development environment. The following error message displays:

```
'400 Bad Request'
```

Troubleshooting of the error shows an HttpTrigger action to call the RequestUserApproval function.

## Code

### Corporate website

Security.cs:

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```

SC01 public class Security
SC02 {
SC03 var bytes = System.IO.File.ReadAllBytes("~/var/ssl/private");
SC04 var cert = new System.Security.Cryptography.X509Certificate2(bytes);
SC05 var certName = cert.FriendlyName;
SC06 }

```

## Function app

RequestUserApproval.cs:

```

RA01 public static class RequestUserApproval
RA02 {
RA03 [FunctionName("RequestUserApproval")]
RA04 public static async Task<IActionResult> Run(
RA05 [HttpTrigger(AuthorizationLevel.Function, "get", "post", Route = null)] HttpRequest req,
ILogger log)
RA06 {
RA07     log.LogInformation("RequestUserApproval function processed a request.");
RA08 ...
RA09     return ProcessRequest(req)
RA10     ? (ActionResult)new OkObjectResult($"User approval processed")
RA11     : new BadRequestObjectResult("Failed to process user approval");
RA12 }
RA13 private static bool ProcessRequest(HttpRequest req)
RA14 {
RA15     ...
RA16 }
RA17 }

```

## QUESTION 1 HOTSPOT

You need to configure the integration for Azure Service Bus and Azure Event Grid.

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

**NOTE:** Each correct selection is worth one point.

### Hot Area:

#### Answer Area

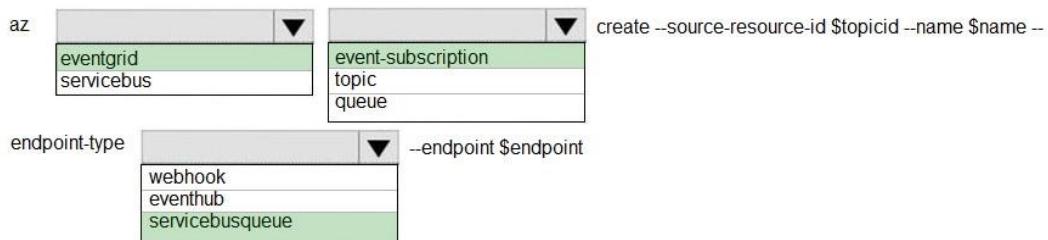
az	<input type="button" value="▼"/> eventgrid servicebus	<input type="button" value="▼"/> event-subscription topic queue	create --source-resource-id \$topicid --name \$name --
endpoint-type	<input type="button" value="▼"/> webhook eventhub servicebusqueue	--endpoint \$endpoint	

## Correct Answer:

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## Answer Area



### Section: (none)

#### Explanation

#### Explanation/Reference:

Explanation:

Box 1: eventgrid

To create event subscription use: az eventgrid event-subscription create

Box 2: event-subscription

Box 3: servicebusqueue

Scenario: Azure Service Bus and Azure Event Grid

Azure Event Grid must use Azure Service Bus for queue-based load leveling.

Events in Azure Event Grid must be routed directly to Service Bus queues for use in buffering.

Events from Azure Service Bus and other Azure services must continue to be routed to Azure Event Grid for processing.

Reference:

[https://docs.microsoft.com/en-us/cli/azure/eventgrid/event-subscription?view=azure-cli-latest#az\\_eventgrid\\_event\\_subscription\\_create](https://docs.microsoft.com/en-us/cli/azure/eventgrid/event-subscription?view=azure-cli-latest#az_eventgrid_event_subscription_create)

## QUESTION 2

You need to ensure that all messages from Azure Event Grid are processed.

What should you use?

- A. Azure Event Grid topic
- B. Azure Service Bus topic
- C. Azure Service Bus queue
- D. Azure Storage queue
- E. Azure Logic App custom connector

### Correct Answer: C

#### Section: (none)

#### Explanation

#### Explanation/Reference:

Explanation:

As a solution architect/developer, you should consider using Service Bus queues when:

- Your solution needs to receive messages without having to poll the queue. With Service Bus, you can achieve it by using a long-polling receive operation using the TCP-based protocols that Service Bus supports.

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Reference: <https://docs.microsoft.com/en-us/azure/service-bus-messaging/service-bus-azure-and-service-bus-queuescompared-contrasted>

## Connect to and consume Azure services and third-party services

### 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.

## 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.

## App code

### EventGridController.cs

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.

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```

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 = JArray.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                     "input",
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     }

```

## LoginEvent.cs

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 }

```

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## QUESTION 1 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

topic  
status  
eventType  
Succeeded  
operationName  
resourceProvider

#### Answer Area

```
if {  
    @event[ "data" ][ " code segment " ].ToString() == " code segment "  
    &&  
    @event[ "data" ][ " code segment " ].ToString() == "Microsoft.Web/sites/write"  
}
```

### Correct Answer:

#### Code segments

topic  
status  
eventType  
Succeeded  
operationName  
resourceProvider

#### Answer Area

```
if {  
    @event[ "data" ][ " status " ].ToString() == " Succeeded "  
    &&  
    @event[ "data" ][ " operationName " ].ToString() == "Microsoft.Web/sites/write"  
}
```

### 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.

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

## QUESTION 2

HOTSPOT

You need to insert code at line LE03 of LoginEvent.cs to ensure that all authentication events are processed correctly.

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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:**

## Answer Area

public string  ( get; set; )

id  
 eventType  
 dataVersion  
 metadataVersion

public string  ( get; set; )

id  
 eventType  
 dataVersion  
 metadataVersion

public string  ( get; set; )

id  
 eventType  
 dataVersion  
 metadataVersion

**Correct Answer:**

## Answer Area

public string	( get; set; )
id	
eventType	
dataVersion	
metadataVersion	

public string	( get; set; )
id	
eventType	
dataVersion	
metadataVersion	

public string	( get; set; )
id	
eventType	
dataVersion	
metadataVersion	

### Section: (none)

#### Explanation

#### Explanation/Reference:

Explanation:

Box 1: id id is a unique identifier for the event.

Box 2: eventType eventType is one of the registered event types for this event source.

Box 3: dataVersion dataVersion is the schema version of the data object. The publisher defines the schema version.

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.

The following example shows the properties that are used by all event publishers:

```
[  
{  
  "topic": string,  
  "subject": string,  
  "id": string,  
  "eventType": string,  
  "eventTime": string,  
  "data":{
```

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```

    object-unique-to-each-publisher
},
"dataVersion": string,
"metadataVersion": string
}
]

```

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

### QUESTION 3 HOTSPOT

You need to implement the Log policy.

How should you complete the EnsureLogging method in EventGridController.cs? To answer, select the appropriate options in the answer area.

**NOTE:** Each correct selection is worth one point.

**Hot Area:**

**Answer Area**

```

var client = new WebSiteManagementClient(. . .);
var id = ParseResourceID(resource);
var appSettings = new StringDictionary(name: "properties",
    properties: new Dictionary<string, string> {
        {"DIAGNOSTICS_AZUREBLOBCONTAINERSASURL", BlobStoreAccountSAS("  ")},
        {"DIAGNOSTICS_AZUREBLOBRETENTIONINDAYS", "  "}
    });
    
});
client.WebApps. 

(id.resourceGroup,
id.name, appSettings);

```

**Correct Answer:**

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## Answer Area

```
var client = new WebSiteManagementClient(. . .);
var id = ParseResourceID(resource);
var appSettings = new StringDictionary(name: "properties",
    properties: new Dictionary<string, string> {
        {"DIAGNOSTICS_AZUREBLOBCONTAINERSASURL", BlobStoreAccountSAS("logs")},
        {"DIAGNOSTICS_AZUREBLOBRETENTIONINDAYS", "15"}
    });
client.WebApps.UpdateApplicationSetting(  
    id.resourceGroup,  
    id.name, appSettings);
```

### Section: (none)

#### Explanation

#### Explanation/Reference:

Explanation:

Box 1: logdrop

All log files should be saved to a container named logdrop.

Box 2: 15

Logs must remain in the container for 15 days.

Box 3: UpdateApplicationSettings

All Azure App Service Web Apps must write logs to Azure Blob storage.

Reference: <https://blog.hompus.nl/2017/05/29/adding-application-logging-blob-to-a-azure-web-app-service-usingpowershell/>

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## Connect to and consume Azure services and third-party services

### Question Set 4

#### QUESTION 1 HOTSPOT

You are working for Contoso, Ltd.

You define an API Policy object by using the following XML markup:

```
<set-variable name="bodySize" value="@{context.Request.Headers["Content-Length"] [0]}"/>
<choose>
  <when condition="@(int.Parse(context.Variables.GetValueOrDefault<string> ("bodySize"))<512000)">
  </when>
  <otherwise>
    <rewrite-uri template="/put"/>
    <set-backend-service base-url="http://contoso.com/api/9.1/">
  </otherwise>
</choose>
```

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

Statement	Yes	No
The XML segment belongs in the <inbound> section of the policy.	<input type="radio"/>	<input type="radio"/>
If the body size is >256k, an error will occur.	<input type="radio"/>	<input type="radio"/>
If the request is http://contoso.com/api/9.2/, the policy will retain the higher version.	<input type="radio"/>	<input type="radio"/>

**Correct Answer:**

#### Answer Area

Statement	Yes	No
The XML segment belongs in the <inbound> section of the policy.	<input checked="" type="radio"/>	<input type="radio"/>
If the body size is >256k, an error will occur.	<input type="radio"/>	<input checked="" type="radio"/>
If the request is http://contoso.com/api/9.2/, the policy will retain the higher version.	<input type="radio"/>	<input checked="" type="radio"/>

**Section: (none)**

**Explanation**

**Explanation/Reference:**

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Explanation:

Box 1: Yes

Use the set-backend-service policy to redirect an incoming request to a different backend than the one specified in the API settings for that operation. Syntax: <set-backend-service base-url="base URL of the backend service" />

Box 2: No

The condition is on 512k, not on 256k.

Box 3: No

The set-backend-service policy changes the backend service base URL of the incoming request to the one specified in the policy.

Reference: <https://docs.microsoft.com/en-us/azure/api-management/api-management-transformation-policies>

## QUESTION 2

You are developing a solution that will use Azure messaging services.

You need to ensure that the solution uses a publish-subscribe model and eliminates the need for constant polling.

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

**NOTE:** Each correct selection is worth one point.

- A. Service Bus
- B. Event Hub
- C. Event Grid
- D. Queue

**Correct Answer:** AC

**Section:** (none)

**Explanation**

**Explanation/Reference:**

Explanation:

It is strongly recommended to use available messaging products and services that support a publishsubscribe model, rather than building your own. In Azure, consider using Service Bus or Event Grid. Other technologies that can be used for pub/sub messaging include Redis, RabbitMQ, and Apache Kafka.

Reference: <https://docs.microsoft.com/en-us/azure/architecture/patterns/publisher-subscriber>

## QUESTION 3

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 ensure that the subscription client processes all messages.

Which code segment should you use?

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

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```
D. subscriptionClient.RegisterMessageHandler(ProcessMessagesAsync,  
    messageHandlerOptions);
```

**Correct Answer:** D

**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.

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

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

**QUESTION 4**

**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 are developing an Azure Service application that processes queue data when it receives a message from a mobile application. Messages may not be sent to the service consistently.

You have the following requirements:

- Queue size must not grow larger than 80 gigabytes (GB).
- Use first-in-first-out (FIFO) ordering of messages.
- Minimize Azure costs.

You need to implement the messaging solution.

Solution: Use the .Net API to add a message to an Azure Storage Queue from the mobile application. Create an Azure VM that is triggered from Azure Storage Queue events.

Does the solution meet the goal?

- A. Yes
- B. No

**Correct Answer:** B

**Section:** (none)

**Explanation**

**Explanation/Reference:**

Explanation:

Don't use a VM, instead create an Azure Function App that uses an Azure Service Bus Queue trigger.

Reference: <https://docs.microsoft.com/en-us/azure/azure-functions/functions-create-storage-queue-triggered-function>

**QUESTION 5**

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

You are developing an Azure Service application that processes queue data when it receives a message from a mobile application. Messages may not be sent to the service consistently.

You have the following requirements:

- Queue size must not grow larger than 80 gigabytes (GB).
- Use first-in-first-out (FIFO) ordering of messages.
- Minimize Azure costs.

You need to implement the messaging solution.

Solution: Use the .Net API to add a message to an Azure Service Bus Queue from the mobile application. Create an Azure Windows VM that is triggered from Azure Service Bus Queue.

Does the solution meet the goal?

- A. Yes
- B. No

**Correct Answer: B**

**Section: (none)**

**Explanation**

**Explanation/Reference:**

Explanation:

Don't use a VM, instead create an Azure Function App that uses an Azure Service Bus Queue trigger.

Reference: <https://docs.microsoft.com/en-us/azure/azure-functions/functions-create-storage-queue-triggered-function>

## **QUESTION 6 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:**

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**Policy types**

- Inbound
- Outbound
- Backend

**Answer Area****Requirement**

- Rewrite the request URL to match to the format expected by the web service.
- Remove formatting text from responses.
- Forward the user ID that is associated with the subscription key for the original request to the back-end service.

**Policy type**

- policy type
- policy type
- policy type

**Correct Answer:****Policy types**

- Inbound
- Outbound
- Backend

**Answer Area****Requirement**

- Rewrite the request URL to match to the format expected by the web service.
- Remove formatting text from responses.
- Forward the user ID that is associated with the subscription key for the original request to the back-end service.

**Policy type**

- Outbound
- Inbound
- Backend

**Section: (none)****Explanation****Explanation/Reference:****QUESTION 7**

You are developing an e-commerce solution that uses a microservice architecture.

You need to design a communication backplane for communicating transactional messages between various parts of the solution. Messages must be communicated in first-in-first-out (FIFO) order.

What should you use?

- A. Azure Storage Queue
- B. Azure Event Hub
- C. Azure Service Bus
- D. Azure Event Grid

**Correct Answer: A****Section: (none)****Explanation****Explanation/Reference:**

Explanation:

As a solution architect/developer, you should consider using Service Bus queues when:

- Your solution requires the queue to provide a guaranteed first-in-first-out (FIFO) ordered delivery.

Reference: <https://docs.microsoft.com/en-us/azure/service-bus-messaging/service-bus-azure-and-service-bus-queuescompared-contrasted>

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## QUESTION 8 DRAG

DROP

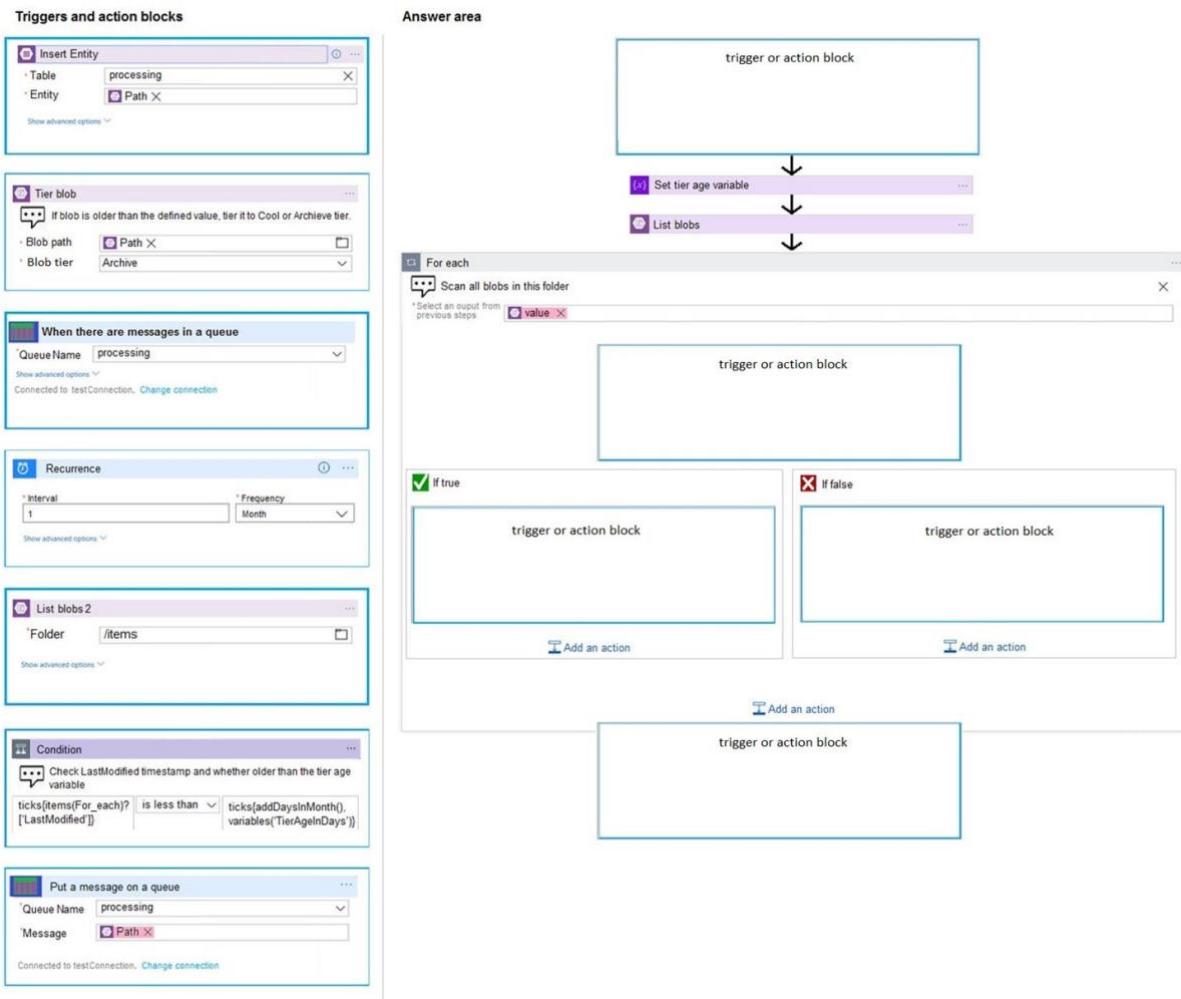
A company backs up all manufacturing data to Azure Blob Storage. Admins move blobs from hot storage to archive tier storage every month.

You must automatically move blobs to Archive tier after they have not been modified within 180 days. The path for any item that is not archived must be placed in an existing queue. This operation must be performed automatically once a month. You set the value of TierAgeInDays to **-180**.

How should you configure the Logic App? To answer, drag the appropriate triggers or action blocks to the correct trigger or action slots. Each trigger or action block 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.

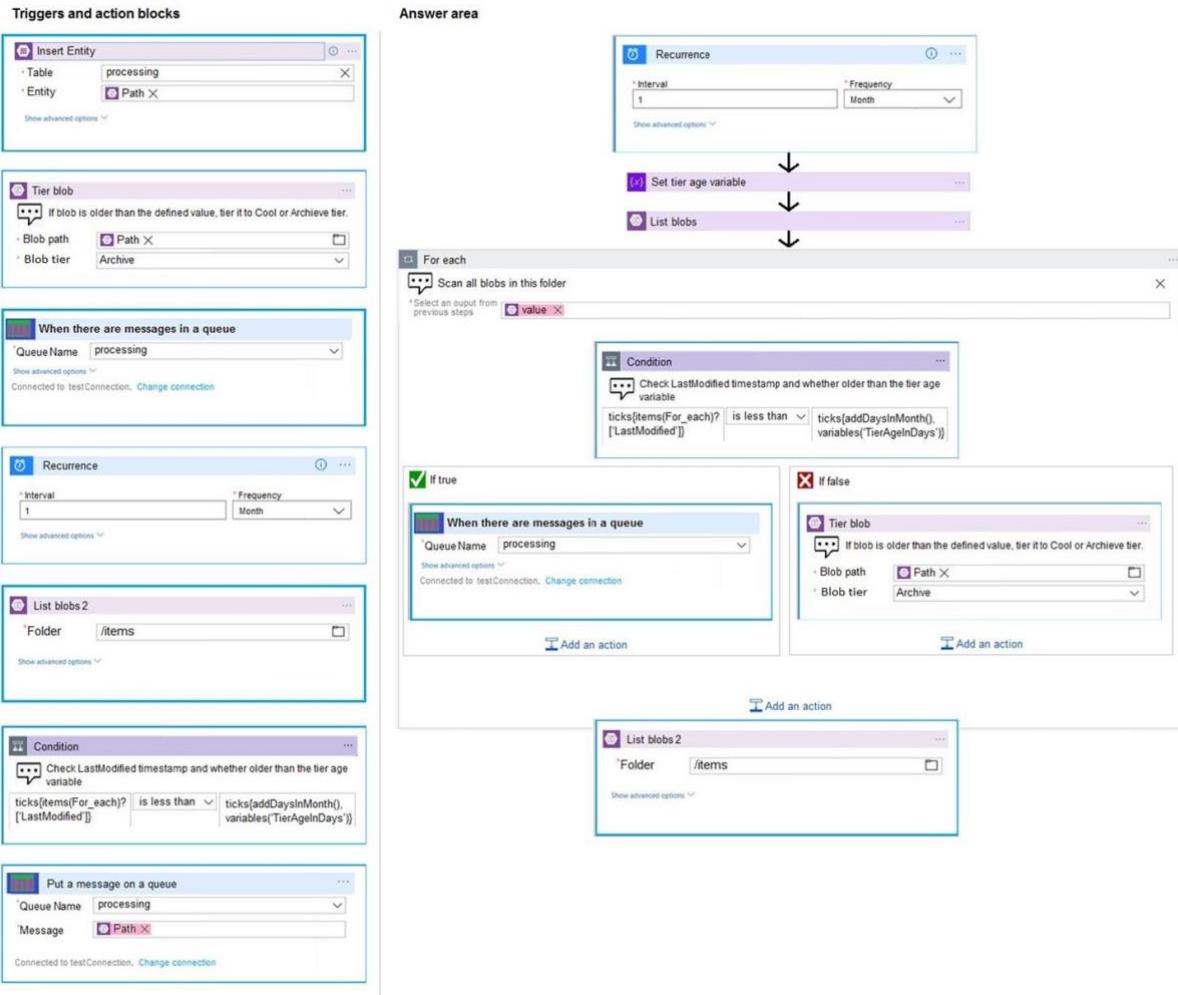
### Select and Place:



### Correct Answer:

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## Section: (none)

### Explanation

#### Explanation/Reference:

Explanation:

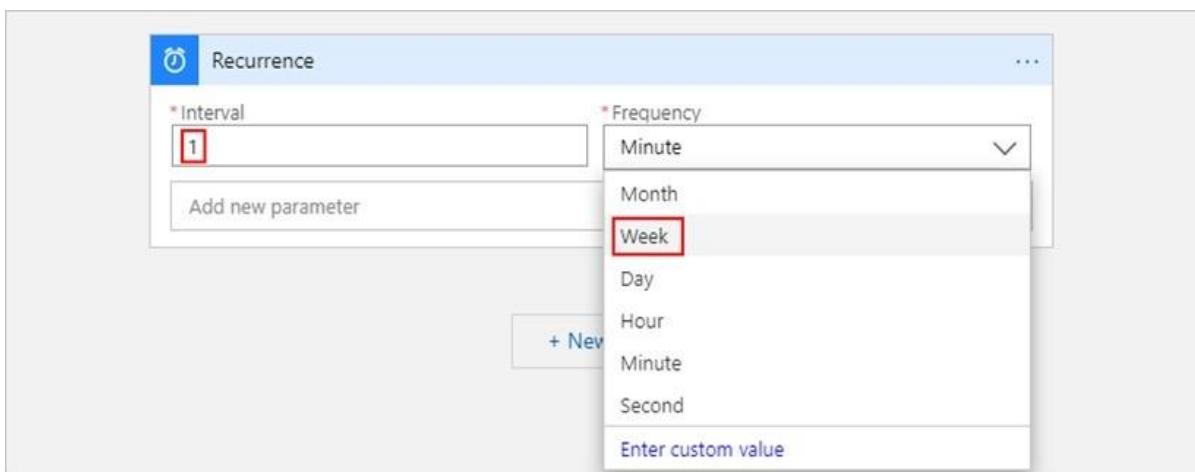
Box 1: Reoccurrence..

To regularly run tasks, processes, or jobs on specific schedule, you can start your logic app workflow with the built-in Recurrence - Schedule trigger. You can set a date and time as well as a time zone for starting the workflow and a recurrence for repeating that workflow.

Set the interval and frequency for the recurrence. In this example, set these properties to run your workflow every week.

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**Box 2: Condition..**

To run specific actions in your logic app only after passing a specified condition, add a conditional statement. This control structure compares the data in your workflow against specific values or fields. You can then specify different actions that run based on whether or not the data meets the condition.

**Box 3: Put a message on a queue**

The path for any item that is not archived must be placed in an existing queue.

Note: Under If true and If false, add the steps to perform based on whether the condition is met.

**Box 4: ..tier it to Cool or Archive tier.**

Archive item. Box 5: List blobs 2

Reference: <https://docs.microsoft.com/en-us/azure/connectors/connectors-native-recurrence>

<https://docs.microsoft.com/en-us/azure/logic-apps/logic-apps-control-flow-loops>

<https://docs.microsoft.com/en-us/azure/logic-apps/logic-apps-control-flow-conditional-statement>

**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 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 are developing an Azure Service application that processes queue data when it receives a message from a mobile application. Messages may not be sent to the service consistently.

You have the following requirements:

- Queue size must not grow larger than 80 gigabytes (GB).
- Use first-in-first-out (FIFO) ordering of messages.
- Minimize Azure costs.

You need to implement the messaging solution.

Solution: Use the .Net API to add a message to an Azure Service Bus Queue from the mobile application. Create an Azure Function App that uses an Azure Service Bus Queue trigger.

Does the solution meet the goal?

A. Yes

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B. No

**Correct Answer:** A

**Section:** (none)

**Explanation**

**Explanation/Reference:**

Explanation:

You can create a function that is triggered when messages are submitted to an Azure Storage queue.

Reference:

<https://docs.microsoft.com/en-us/azure/azure-functions/functions-create-storage-queue-triggered-function>

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

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 data 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 Notification Hub. Register all devices with the hub.

Does the solution meet the goal?

A. Yes

B. No

**Correct Answer:** B

**Section:** (none)

**Explanation**

**Explanation/Reference:**

Explanation:

Instead use an Azure Service Bus, which is used for order processing and financial transactions.

Reference: <https://docs.microsoft.com/en-us/azure/event-grid/compare-messaging-services>

## **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.

**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 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.

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You must store the device data 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 Service Bus. Configure a topic to receive the device data by using a correlation filter.

Does the solution meet the goal?

- A. Yes
- B. No

**Correct Answer:** A

**Section:** (none)

**Explanation**

**Explanation/Reference:**

Explanation:

A message is raw data produced by a service to be consumed or stored elsewhere. The Service Bus is for high-value enterprise messaging, and is used for order processing and financial transactions.

Reference: <https://docs.microsoft.com/en-us/azure/event-grid/compare-messaging-services>

## QUESTION 12

**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 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 data 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:**

Explanation:

Instead use an Azure Service Bus, which is used for order processing and financial transactions.

Note: An event is a lightweight notification of a condition or a state change. Event hubs are usually used reacting to status changes.

Reference: <https://docs.microsoft.com/en-us/azure/event-grid/compare-messaging-services>

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**QUESTION 13 DRAG**

DROP

You manage several existing Logic Apps.

You need to change definitions, add new logic, and optimize these apps on a regular basis.

What should you use? To answer, drag the appropriate tools to the correct functionalities. Each tool 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**

Tools	Functionality	Tool
Logic Apps Designer	Edit B2B workflows	
Code View Editor	Edit definitions in JSON	
Enterprise Integration Pack	Visually add functionality	

**Correct Answer:**

**Answer Area**

Tools	Functionality	Tool
Logic Apps Designer	Edit B2B workflows	Enterprise Integration Pack
Code View Editor	Edit definitions in JSON	Code View Editor
Enterprise Integration Pack	Visually add functionality	Logic Apps Designer

**Section: (none)**

**Explanation**

**Explanation/Reference:**

Explanation:

Box 1: Enterprise Integration Pack

For business-to-business (B2B) solutions and seamless communication between organizations, you can build automated scalable enterprise integration workflows by using the Enterprise Integration Pack (EIP) with Azure Logic Apps.

Box 2: Code View Editor Edit

JSON - Azure portal 1. Sign in to the Azure portal.

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2. From the left menu, choose All services. In the search box, find "logic apps", and then from the results, select your logic app.
3. On your logic app's menu, under Development Tools, select Logic App Code View.
4. The Code View editor opens and shows your logic app definition in JSON format.

Reference:

<https://docs.microsoft.com/en-us/azure/logic-apps/logic-apps-enterprise-integration-overview>

<https://docs.microsoft.com/en-us/azure/logic-apps/logic-apps-author-definitions>

#### **QUESTION 14**

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.

B.

C.

D.

**Correct Answer:** A

**Section:** (none)

**Explanation**

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**Explanation/Reference:**

Explanation:

```
az servicebus queue create
--resource-group fridge-rg
--namespace-name fridge-ns
--name fridge-q

New-AzureRmResourceGroup
-Name fridge-rg
-Location fridge-loc

az servicebus namespace create
--resource-group fridge-rg
--name fridge-ns
--location fridge-loc

connectionString=$(az servicebus namespace authorization-rule keys list
--resource-group fridge-rg
--namespace-name fridge-ns
--query primaryConnectionString --output tsv)
```

A service bus instance has already been created (Step 2 below). Next is step 3, Create a Service Bus queue.

Note:

Steps:

Step 1: # Create a resource group

```
resourceGroupName="myResourceGroup" az group create --name
$resourceGroupName --location eastus
```

Step 2: # Create a Service Bus messaging namespace with a unique name

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

Step 3: # Create a Service Bus queue az servicebus queue create --resource-group
\$resourceGroupName --namespace-name \$namespaceName --name BasicQueue

Step 4: # Get the connection string for the namespace

```
connectionString=$(az servicebus namespace authorization-rule keys list --resource-group
$resourceGroupName --namespace-name $namespaceName --name RootManageSharedAccessKey -query
primaryConnectionString --output tsv)
```

Reference:

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

**QUESTION 15 HOTSPOT**

You are developing an application that uses Azure Storage Queues.

You have the following code:

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```

CloudStorageAccount storageAccount = CloudStorageAccount.Parse
(CloudConfigurationManager.GetSetting("StorageConnectionString"));
CloudQueueClient queueClient = storageAccount.CreateCloudQueueClient();

CloudQueue queue = queueClient.GetQueueReference("appqueue");
await queue.CreateIfNotExistsAsync();

CloudQueueMessage peekedMessage = await queue.PeekMessageAsync();
if (peekedMessage != null)
{
    Console.WriteLine("The peeked message is: {0}", peekedMessage.AsString);
}
CloudQueueMessage message = await queue.GetMessageAsync() ;

```

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

Statement	Yes	No
The code configures the lock duration for the queue.	<input type="radio"/>	<input type="radio"/>
The last message read remains in the queue after the code runs.	<input type="radio"/>	<input type="radio"/>
The storage queue remains in the storage account after the code runs.	<input type="radio"/>	<input type="radio"/>

**Correct Answer:**

### Answer Area

Statement	Yes	No
The code configures the lock duration for the queue.	<input type="radio"/>	<input checked="" type="radio"/>
The last message read remains in the queue after the code runs.	<input checked="" type="radio"/>	<input type="radio"/>
The storage queue remains in the storage account after the code runs.	<input checked="" type="radio"/>	<input type="radio"/>

**Section: (none)**

**Explanation**

**Explanation/Reference:**

Explanation:

Box 1: No

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The QueueDescription.LockDuration property gets or sets the duration of a peek lock; that is, the amount of time that the message is locked for other receivers. The maximum value for LockDuration is 5 minutes; the default value is 1 minute.

Box 2: Yes

You can peek at the message in the front of a queue without removing it from the queue by calling the PeekMessage method.

Box 3: Yes

Reference: <https://docs.microsoft.com/en-us/azure/storage/queues/storage-dotnet-how-to-use-queues>  
<https://docs.microsoft.com/en-us/dotnet/api/microsoft.servicebus.messaging.queuedescription.lockduration>

## QUESTION 16

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.

```
az group create
  --name fridge-rg
  --location fridge-loc

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

New-AzureRmServiceBusQueue
  -ResourceGroupName fridge-rg
  -NamespaceName fridge-ns
  -Name fridge-q
  -EnablePartitioning $False

Get-AzureRmServiceBusKey
  -ResourceGroupName fridge-rg
  -Namespace fridge-ns
  -Name RootManageSharedAccessKey
```

B.

C.

D.

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**Correct Answer:** C

**Section:** (none)

**Explanation**

**Explanation/Reference:**

Explanation:

A service bus instance has already been created (Step 2 below). Next is step 3, Create a Service Bus queue.

Note:

Steps:

Step 1: # Create a resource group

```
resourceGroupName="myResourceGroup" az group create --name
```

```
$resourceGroupName --location eastus
```

Step 2: # Create a Service Bus messaging namespace with a unique name

```
namespaceName=myNameSpace$RANDOM
```

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

Step 3: # Create a Service Bus queue

```
az servicebus queue create --resource-group $resourceGroupName --namespace-name $namespaceName --name BasicQueue
```

Step 4: # Get the connection string for the namespace

```
connectionString=$(az servicebus namespace authorization-rule keys list --resource-group  
$resourceGroupName --namespace-name $namespaceName --name RootManageSharedAccessKey -query  
primaryConnectionString --output tsv)
```

Reference:

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

## QUESTION 17

**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 are developing an Azure Service application that processes queue data when it receives a message from a mobile application. Messages may not be sent to the service consistently.

You have the following requirements:

- Queue size must not grow larger than 80 gigabytes (GB).
- Use first-in-first-out (FIFO) ordering of messages.
- Minimize Azure costs.

You need to implement the messaging solution.

Solution: Use the .Net API to add a message to an Azure Storage Queue from the mobile application. Create an Azure Function App that uses an Azure Storage Queue trigger.

Does the solution meet the goal?

A. Yes

B. No

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**Correct Answer:** B

**Section:** (none)

**Explanation**

**Explanation/Reference:**

Explanation:

Create an Azure Function App that uses an Azure Service Bus Queue trigger.

Reference:

<https://docs.microsoft.com/en-us/azure/azure-functions/functions-create-storage-queue-triggered-function>

## QUESTION 18

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 from 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**

- Create a single Service Bus topic.
- Create a Service Bus Namespace for each restaurat 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 s single Service Bus Namespace.
- Create a Service Bus topic for each restaurant for which a driver can receive messages.

**Answer Area**

**Correct Answer:**

**Actions**

- Create a single Service Bus topic.
- Create a Service Bus Namespace for each restaurat 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 s single Service Bus Namespace.
- Create a Service Bus topic for each restaurant for which a driver can receive messages.

**Answer Area**

- Create s single Service Bus Namespace.
- Create a Service Bus topic for each restaurant for which a driver can receive messages.
- Create a Service Bus subscription for each restaurant for which a driver can receive orders.

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**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.

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

**QUESTION 19****HOTSPOT**

You develop a news and blog content app for Windows devices.

A notification must arrive on a user's device when there is a new article available for them to view.

You need to implement push notifications.

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

**NOTE:** Each correct selection is worth one point.

**Hot Area:**

## Answer Area

```
string notificationHubName = "contoso_hub";
string notificationHubConnection = "connection_string";
hub =
NotificationHubClient
NotificationHubClientSettings
NotificationHubJob
NotificationDetails
.
.
.
NotificationHubClient
NotificationHubClientSettings
NotificationHubJob
NotificationDetails
GetInstallation
CreateClientFromConnectionString
CreateOrUpdateInstallation
PatchInstallation

(notificationHubConnection, notificationHubName);
string windowsToastPayload =
@"<toast><visual><binding template=""ToastText01""><text id=""1"">" +
@"New item to view" + @"</text></binding></visual></toast>";
try
{
var result =
await hub.
SendWindowsNativeNotificationAsync
SubmitNotificationHubJobAsync
ScheduleNotificationAsync
SendAppleNativeNotificationAsync
}
catch (System.Exception ex)
{
...
}
...
```

Correct Answer:

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## Answer Area

```
string notificationHubName = "contoso_hub";
string notificationHubConnection = "connection_string";
hub =
NotificationHubClient
NotificationHubClientSettings
NotificationHubJob
NotificationDetails

NotificationHubClient
NotificationHubClientSettings
NotificationHubJob
NotificationDetails

(notificationHubConnection, notificationHubName);
string windowsToastPayload =
@<toast><visual><binding template=""ToastText01""><text id=""1"">" +
@"New item to view" + @</text></binding></visual></toast>;
try
{
var result =
await hub.
(v) (windowsToastPayload);

SendWindowsNativeNotificationAsync
SubmitNotificationHubJobAsync
ScheduleNotificationAsync
SendAppleNativeNotificationAsync

...
}
catch (System.Exception ex)
{
...
}
...
...
```

### Section: (none)

#### Explanation

#### Explanation/Reference:

Explanation:

Box 1: NotificationHubClient

Box 2: NotificationHubClient

Box 3: CreateClientFromConnectionString

// Initialize the Notification Hub

```
NotificationHubClient hub = NotificationHubClient.CreateClientFromConnectionString(listenConnString, hubName);
```

Box 4: SendWindowsNativeNotificationAsync Send the push notification. var result = await  
hub.SendWindowsNativeNotificationAsync(windowsToastPayload);

Reference:

<https://docs.microsoft.com/en-us/azure/notification-hubs/notification-hubs-push-notification-registration-management>

<https://github.com/MicrosoftDocs/azure-docs/blob/master/articles/app-service-mobile/app-service-mobile-windows-store-dotnet-get-started-push.md>

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## QUESTION 20

You are developing an Azure messaging solution.

You need to ensure that the solution meets the following requirements:

- Provide transactional support.
- Provide duplicate detection.
- Store the messages for an unlimited period of time.

Which two technologies will meet the requirements? Each correct answer presents a complete solution.

**NOTE:** Each correct selection is worth one point.

- A. Azure Service Bus Topic
- B. Azure Service Bus Queue
- C. Azure Storage Queue
- D. Azure Event Hub

**Correct Answer:** AB

**Section:** (none)

**Explanation**

**Explanation/Reference:**

Explanation:

The Azure Service Bus Queue and Topic has duplicate detection.

Enabling duplicate detection helps keep track of the application-controlled MessageId of all messages sent into a queue or topic during a specified time window.

Incorrect Answers:

C: There is just no mechanism that can query a Storage queue and find out if a message with the same contents is already there or was there before. D: Azure Event Hub does not have duplicate detection

Reference:

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

## QUESTION 21 HOTSPOT

You are developing an application that uses Azure Storage Queues.

You have the following code:

```
CloudStorageAccount storageAccount = CloudStorageAccount.Parse  
    (CloudConfigurationManager.GetSetting("StorageConnectionString"));  
CloudQueueClient queueClient = storageAccount.CreateCloudQueueClient();  
  
CloudQueue queue = queueClient.GetQueueReference("appqueue");  
await queue.CreateIfNotExistsAsync();  
  
CloudQueueMessage peekedMessage = await queue.PeekMessageAsync();  
if (peekedMessage != null)  
{  
    Console.WriteLine("The peeked message is: {0}", peekedMessage.AsString);  
}  
CloudQueueMessage message = await queue.GetMessageAsync() ;
```

For each of the following statements, select Yes if the statement is true. Otherwise, select No.

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**NOTE:** Each correct selection is worth one point.

**Hot Area:**  
**Answer Area**

<b>Statement</b>	<b>Yes</b>	<b>No</b>
The code configures the lock duration for the queue.	<input type="radio"/>	<input type="radio"/>
The last message is no longer visible in the queue after the code runs.	<input type="radio"/>	<input type="radio"/>
The storage queue remains in the storage account after the code runs.	<input type="radio"/>	<input type="radio"/>

**Correct Answer:**  
**Answer Area**

<b>Statement</b>	<b>Yes</b>	<b>No</b>
The code configures the lock duration for the queue.	<input type="radio"/>	<input checked="" type="radio"/>
The last message is no longer visible in the queue after the code runs.	<input checked="" type="radio"/>	<input type="radio"/>
The storage queue remains in the storage account after the code runs.	<input checked="" type="radio"/>	<input type="radio"/>

**Section: (none)**  
**Explanation**

**Explanation/Reference:**

Explanation:

Box 1: No

The code does not configure the lock duration.

Note: Default lock duration is 30 seconds. Lock duration will be set even if it is not specified in code.

Box 2: Yes

Peeking messages will not remove them from the queue.

Box 3: Yes

Reference: <https://docs.microsoft.com/en-us/azure/storage/queues/storage-dotnet-how-to-use-queues>

<https://docs.microsoft.com/en-us/dotnet/api/microsoft.servicebus.messaging.queuedescription.lockduration>

**QUESTION 22 DRAG  
DROP**

You develop a gateway solution for a public facing news API.

The news API back end is implemented as a RESTful service and hosted in an Azure App Service instance.

You need to configure back-end authentication for the API Management service instance.

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Which target and gateway credential type should you use? To answer, drag the appropriate values to the correct parameters. Each value 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:**

Values	Answer Area
Azure Resource	Configuration parameter Value
HTTP(s) endpoint	Target
Basic	Gateway credentials
Client cert	

**Correct Answer:**

Values	Answer Area
	Configuration parameter Value
HTTP(s) endpoint	Target Azure Resource
Basic	Gateway credentials Client cert

**Section: (none)**

**Explanation**

**Explanation/Reference:**

Explanation:

Box 1: Azure Resource

Box 2: Client cert

API Management allows to secure access to the back-end service of an API using client certificates.

Reference: <https://docs.microsoft.com/en-us/rest/api/apimanagement/apimanagementrest/azure-api-managementrest-api-backend-entity>

**QUESTION 23**

**HOTSPOT**

You are creating an app that uses Event Grid to connect with other services. Your app's event data will be sent to a serverless function that checks compliance. This function is maintained by your company.

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You write a new event subscription at the scope of your resource. The event must be invalidated after a specific period of time.

You need to configure Event Grid.

What should you do? To answer, select the appropriate options in the answer area.

**NOTE:** Each correct selection is worth one point.

**Hot Area:**

### Answer Area

Option	Value
WebHook event delivery	<ul style="list-style-type: none"><li>SAS tokens</li><li>Key authentication</li><li>Management Access Control</li></ul>
Topic publishing	<ul style="list-style-type: none"><li>ValidationCode handshake</li><li>ValidationURL handshake</li><li>JWT token</li></ul>

**Correct Answer:**

### Answer Area

Option	Value
WebHook event delivery	<ul style="list-style-type: none"><li>SAS tokens</li><li>Key authentication</li><li>Management Access Control</li></ul>
Topic publishing	<ul style="list-style-type: none"><li>ValidationCode handshake</li><li>ValidationURL handshake</li><li>JWT token</li></ul>

**Section: (none)**

**Explanation**

**Explanation/Reference:**

Explanation:

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#### Box 1: SAS tokens

Custom topics use either Shared Access Signature (SAS) or key authentication. Microsoft recommends SAS, but key authentication provides simple programming, and is compatible with many existing webhook publishers. In this case we need the expiration time provided by SAS tokens.

#### Box 2: ValidationCode handshake

Event Grid supports two ways of validating the subscription: ValidationCode handshake (programmatic) and ValidationURL handshake (manual).

If you control the source code for your endpoint, this method is recommended.

#### Incorrect Answers:

ValidationURL handshake (manual): In certain cases, you can't access the source code of the endpoint to implement the ValidationCode handshake. For example, if you use a third-party service (like Zapier or IFTTT), you can't programmatically respond with the validation code.

#### Reference:

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