API Management Custom Policies –Exposing Azure Blob Storage

Objective

In this lab, we will be exposing Azure Blob Storage as a REST endpoint through API Management. To do this, we will create a custom policy for API Management. Azure Blob Storage exposes several REST operations, which can be used to manage the container, as well as execute CRUD actions. In this lab we will use an API call to upload a file to a container, while abstracting the Blob Storage's specific authentication method from the API consumer. This means that our consumer does not need to know how to authenticate and communicate with API Management, but instead only needs to know how to do this with API Management, just like any other API which would be published through here. For more information around this and similar scenario's, check this blog post by Eldert Grootenboer.

Prerequisites

- Azure account - You can Open an Azure account for free or Activate Visual Studio subscriber benefits.
- Postman

Steps

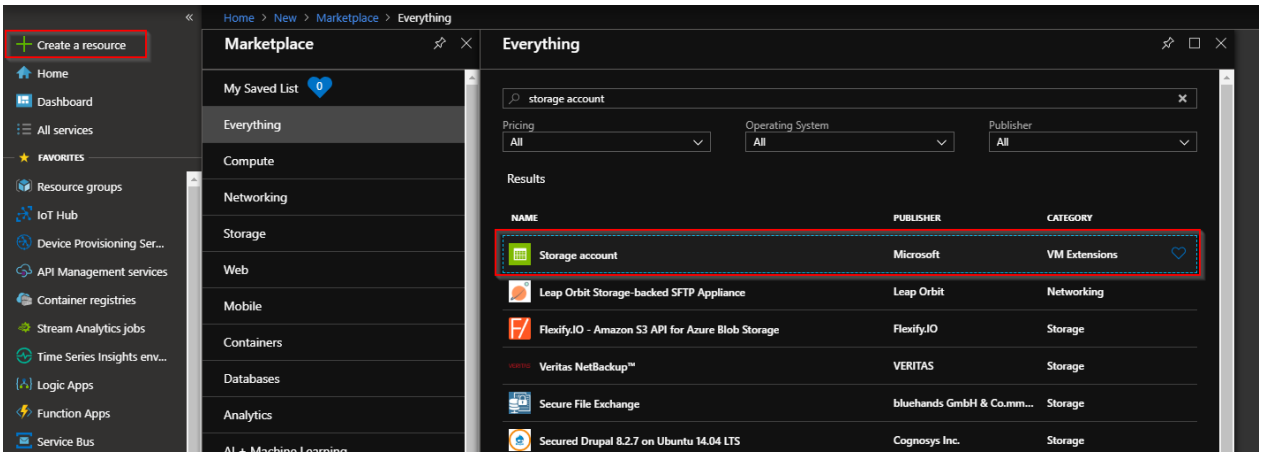
To build the solution in this lab you have to follow the steps described in this section. From a high level view the steps are:

1. Create storage container

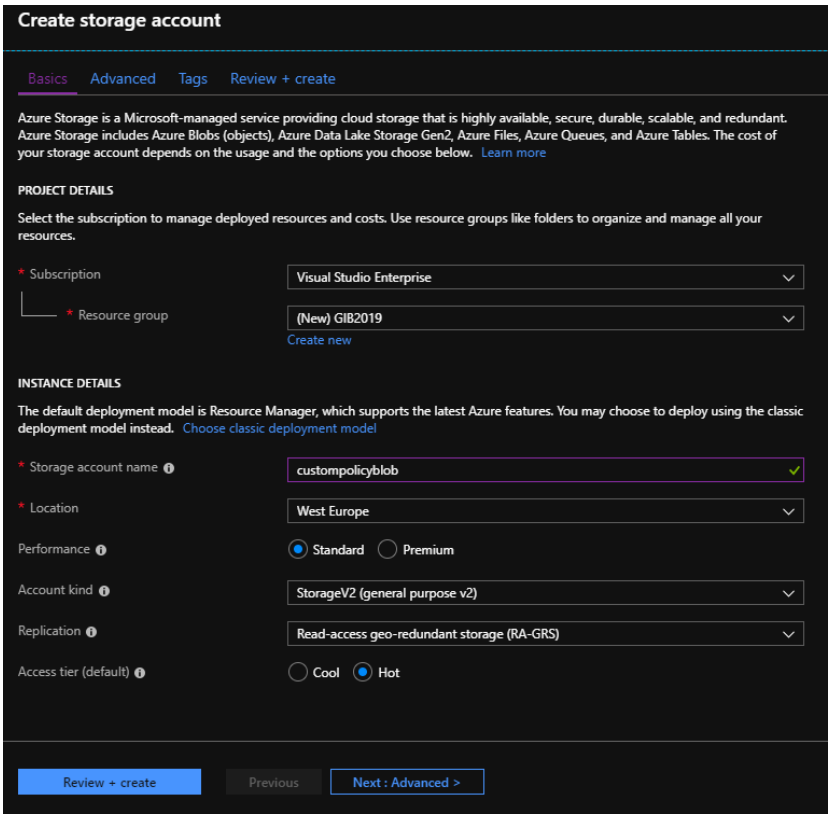
Create storage account

The first step in building the solution in this lab is to provision a storage account in Azure. We will be needing a storage account for storing the order request message in Blob Storage.

1. Go to the Azure Portal: https://portal.azure.com/
2. Login into the Azure portal with your account.
3. In the Market Place enter storage account and select it from the list as shown below.



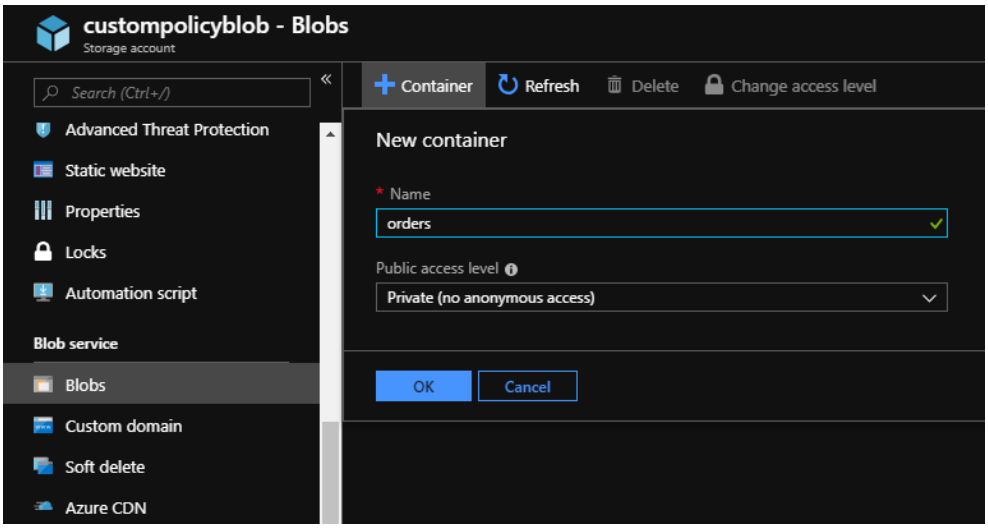
4. Click Create.
5. Specify a name, a Resource Group (you can create a new one here if you haven't created a resource group yet) and a location. Subsequently, click on Review + create.



Create storage container

Once the storage account has been provisioned you can navigate to it and click on it.

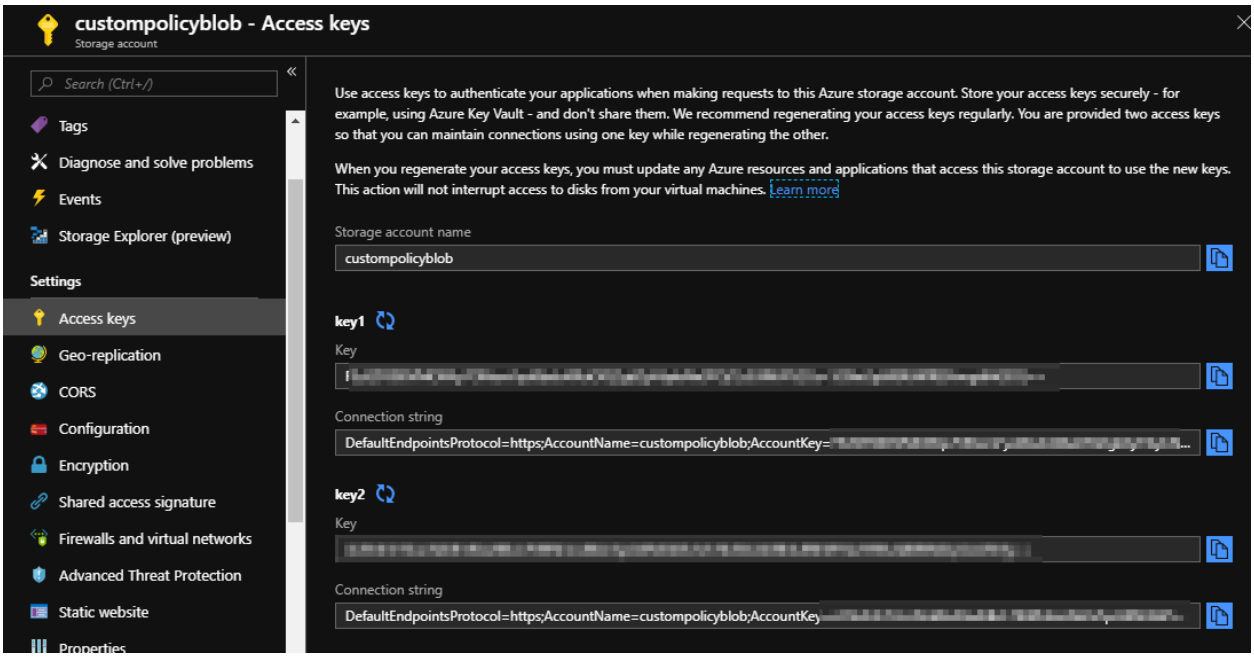
1. In the storage account click on Blobs.
2. Click on + Container and specify the name and Access Type: Private.



Get storage account key

Once the container has been created, go back to the storage account.

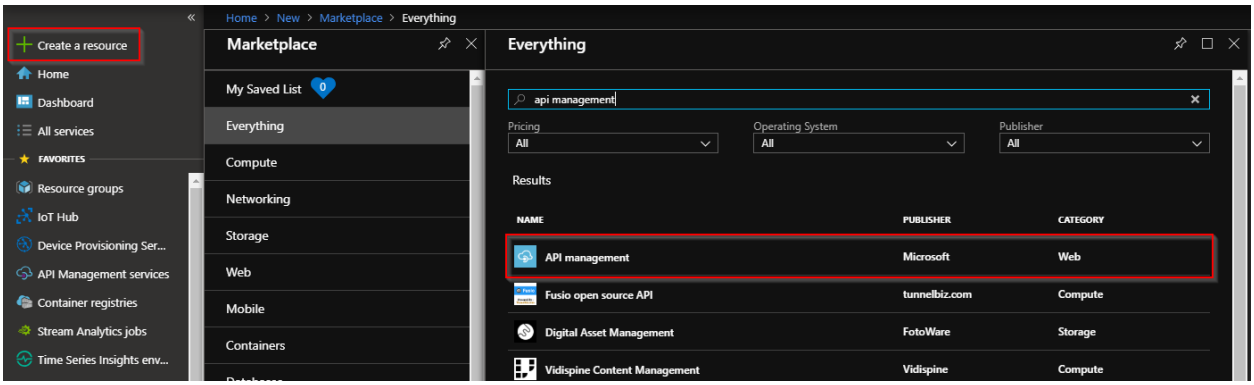
1. Open Access keys.
2. Grab one of the two keys, this will be needed later.



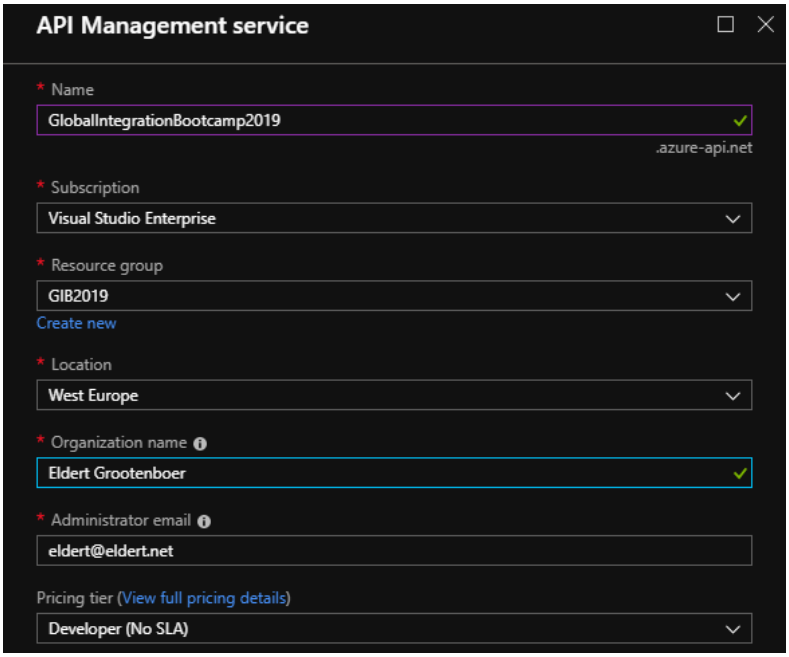
Create API Management instance

Next, we will create an API management instance which will be used to expose our blob storage to our consumer.

1. Go to the Azure Portal: https://portal.azure.com/
2. Login into the Azure portal with your account.
3. In the Market Place enter api management and select it from the list as shown below.



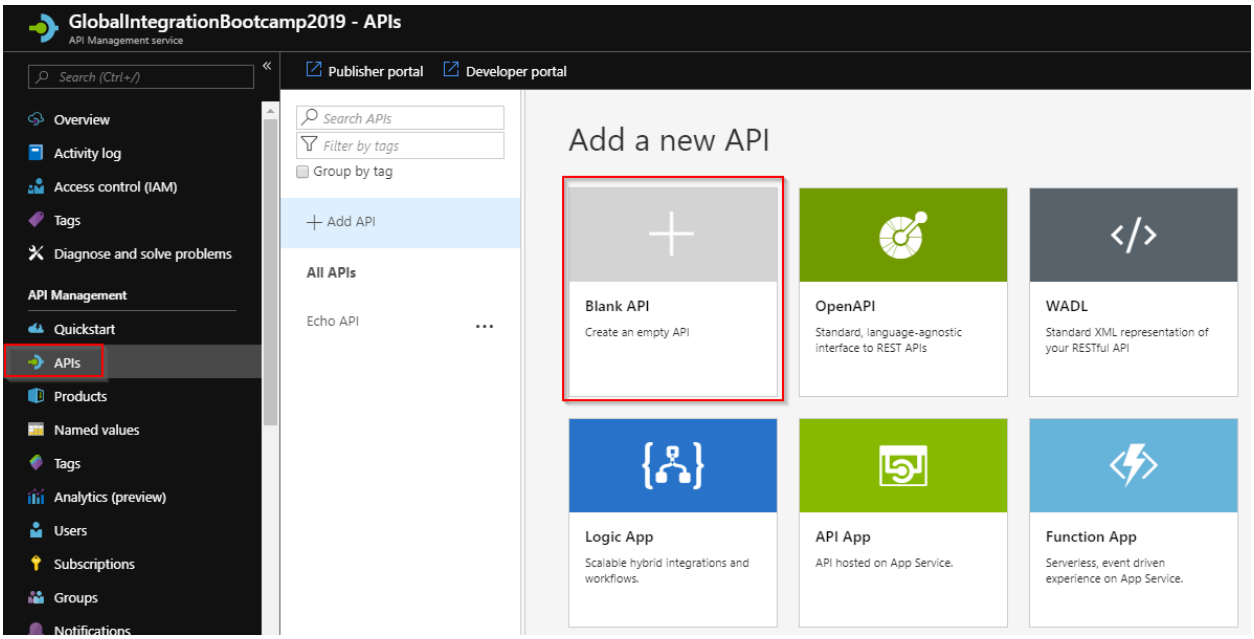
6. Click Create.
7. Specify a name, a Resource Group (you can create a new one here or use the resource group we created in the previous steps) and a location. Subsequently, click on Create.



Create Order API

Once the instance has been created, you can click on it to navigate to your API Management.

1. Open APIs tab.
2. Click on Add API – Blank API

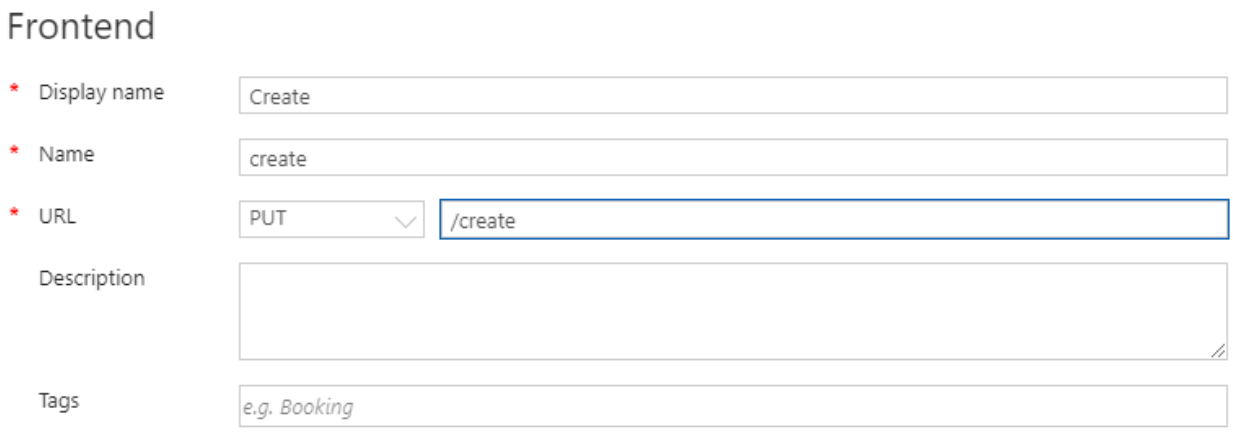


3. Give the API a name, suffix and add it to the Unlimited product, and click Create. We won't need to set the web service URL, as we will be defining this from our custom policy.

Add operation

Navigate to the API we just created.

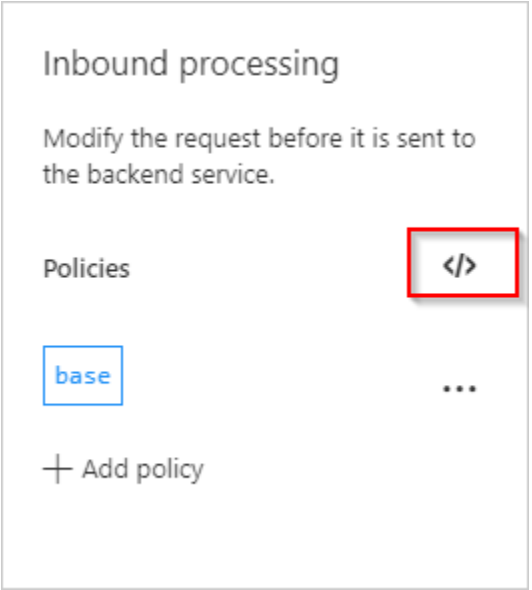
1. Click on Add operation.
2. Provide a display name and name for the operation.
3. Set the method to Put and provide the suffix.
4. Click on Save.



Set policy

Navigate to the operation we just added.

1. Open the Inbound processing policy for the operation which was just created.



2. We will start by creating some variables in the inbound policy section. These variables will be used to calculate the SAS key authorization header, which is needed when communicating with Azure Blob Storage through the REST API. Everything we do in the following steps need to be inside the <inbound> section, right after the <base /> statement.
   a. Add a variable for the current date and time.
      <set-variable name="UTCNow" value="@(DateTime.UtcNow.ToString("R"))" />
   b. Get the name of the blob which we will be placing in the container from the incoming request headers.
      <set-variable name="BlobName"
      value="@(context.Request.Headers.GetValueOrDefault("Blob"))" />
3. Now we will add the headers needed by the Azure Blob Storage API. These headers will be sent to the backend service to do the authentication.
   a. Add the x-ms-date header.
      <set-header name="x-ms-date" exists-action="override">
      <value>@(context.Variables.GetValueOrDefault<string>("UTCNow"))</value>
      </set-header>
   b. Add the x-ms-version header.
      <set-header name="x-ms-version" exists-action="override">
      <value>2018-03-28</value>
      </set-header>
   c. Add the x-ms-blob-type header.
      <set-header name="x-ms-blob-type" exists-action="override">

```
            <value>BlockBlob</value>
        </set-header>
```

4. Now we will add our custom policy which will calculate the authorization header and adds it to our request headers. This policy uses the input from our variables and request to calculate the HMACSHA256 which is then hashed. The values for the storageAccount, storageKey and containerName come from the previous steps in this lab.

```
<set-header name="Authorization" exists-action="override">
    <value>@{
        string storageAccount = "yourStorageAccountName";
        string containerName = "yourContainerName";
        string storageKey = "yourStorageAccountKey";
        string blobName = context.Variables.GetValueOrDefault<string>("BlobName");
        string contentLength = context.Request.Headers.GetValueOrDefault("Content-
Length");
        string ContentType = context.Request.Headers.GetValueOrDefault("Content-Type");
        string dateToSign = context.Variables.GetValueOrDefault<string>("UTCNow");
        var stringToSign = $"PUT\n\n\n{contentLength}\n\n{ContentType}\n\n\n\n\n\nx-
ms-blob-type:BlockBlob\nx-ms-date:{dateToSign}\nx-ms-version:2018-03-
28\n/{storageAccount}/{containerName}/{blobName}";
        HMACSHA256 hmac = new HMACSHA256(Convert.FromBase64String(storageKey));
        string signature =
Convert.ToBase64String(hmac.ComputeHash(Encoding.UTF8.GetBytes(stringToSign)));
        string authorizationHeader = String.Format("{0} {1}:{2}", "SharedKey",
storageAccount, signature);
        return authorizationHeader;
      }</value>
  </set-header>
```

5. And finally, we will set the URL of the Blob Storage API as our backend service, which will be called from API Management.

```
<set-backend-service base-url="https://yourStorageAccountName.blob.core.windows.net/" />
<rewrite-uri template="@{
    string containerName = "yourContainerName";
    string blobName = context.Variables.GetValueOrDefault<string>("BlobName");
    return String.Format("/{0}/{1}", containerName, blobName);
  }" />
```

6. Save the policy.

7. As a result, the complete policy which we have just set is as following.

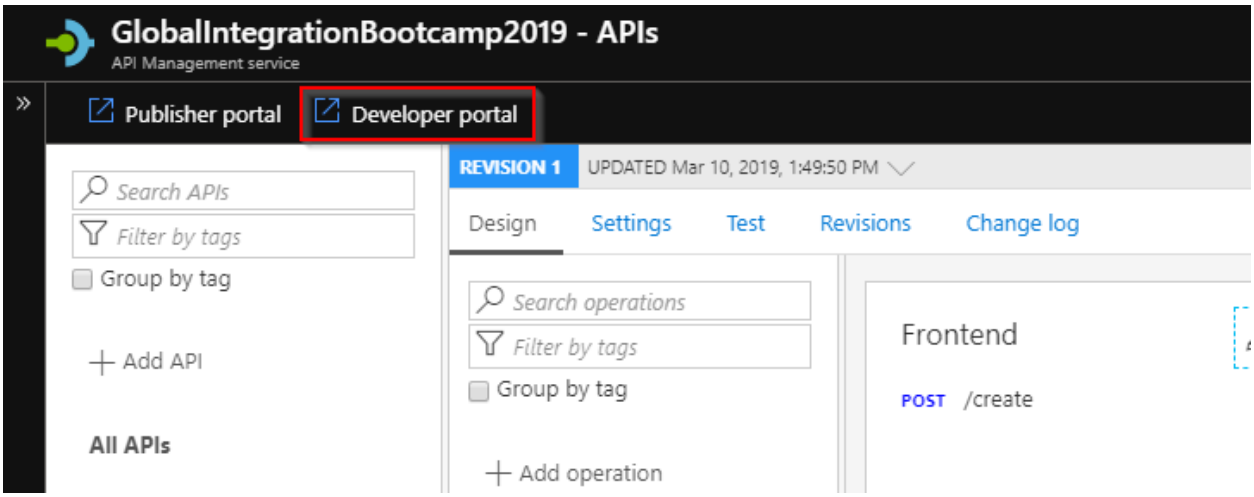
```
<policies>
  <inbound>
    <base />
    <set-variable name="UTCNow" value="@(DateTime.UtcNow.ToString("R"))" />
    <set-variable name="BlobName" value="@(context.Request.Headers.GetValueOrDefault("Blob"))" />
    <set-header name="x-ms-date" exists-action="override">
      <value>@(context.Variables.GetValueOrDefault<string>("UTCNow"))</value>
    </set-header>
    <set-header name="x-ms-version" exists-action="override">
      <value>2018-03-28</value>
    </set-header>
    <set-header name="x-ms-blob-type" exists-action="override">
      <value>BlockBlob</value>
    </set-header>
    <set-header name="Authorization" exists-action="override">
      <value>@{
            string storageAccount = "yourStorageAccountName";
            string containerName = "yourContainerName";
            string storageKey = "yourStorageAccountKey";
            string blobName = context.Variables.GetValueOrDefault<string>("BlobName");
            string contentLength = context.Request.Headers.GetValueOrDefault("Content-Length");
            string ContentType = context.Request.Headers.GetValueOrDefault("Content-Type");
            string dateToSign = context.Variables.GetValueOrDefault<string>("UTCNow");
            var stringToSign = $"PUT\n\n\n{contentLength}\n\n{ContentType}\n\n\n\n\n\nx-ms-blob-type:BlockBlob\nx-ms-
date:{dateToSign}\nx-ms-version:2018-03-28\n/{storageAccount}/{containerName}/{blobName}";
            HMACSHA256 hmac = new HMACSHA256(Convert.FromBase64String(storageKey));
            string signature = Convert.ToBase64String(hmac.ComputeHash(Encoding.UTF8.GetBytes(stringToSign)));
            string authorizationHeader = String.Format("{0} {1}:{2}", "SharedKey", storageAccount, signature);
            return authorizationHeader;
          }</value>
    </set-header>
    <set-backend-service base-url="https://yourStorageAccountName.blob.core.windows.net/" />
    <rewrite-uri template="@{
      string containerName = "yourContainerName ";
      string blobName = context.Variables.GetValueOrDefault<string>("BlobName");
      return String.Format("/{0}/{1}", containerName, blobName);
    }" />
  </inbound>
  <backend>
    <base />
  </backend>
  <outbound>
    <base />
  </outbound>
  <on-error>
    <base />
  </on-error>
```

```
</policies>
```

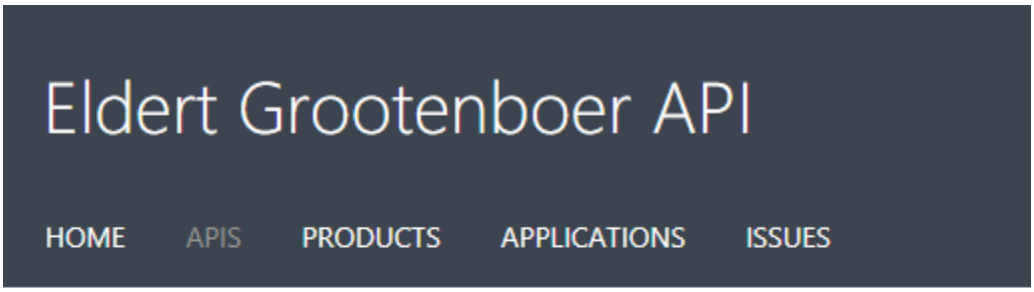
Test

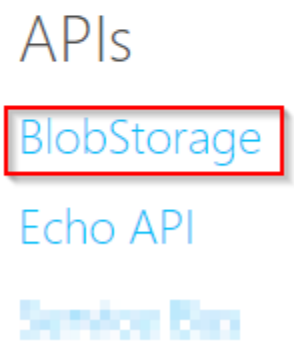
To test the solution, you can use the developer portal of API Management.

1. Open the developer portal.

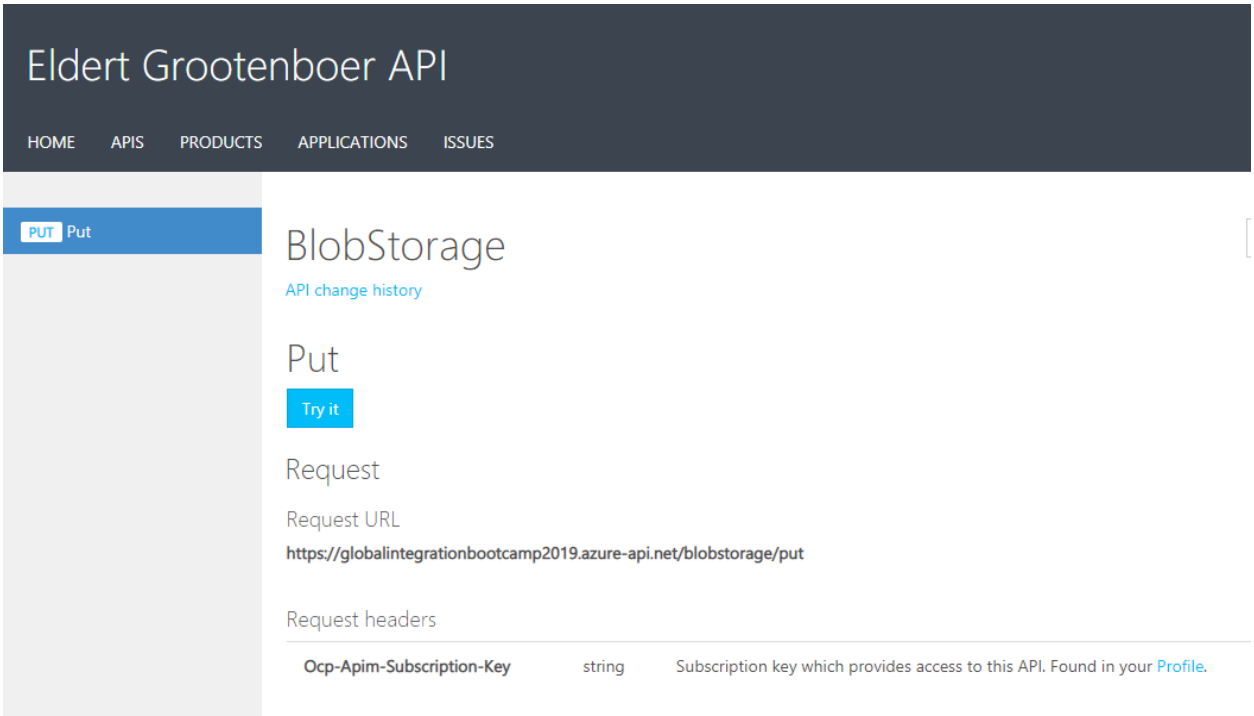


2. Navigate to the API we just created.





3. Click on Try it.



4. Add a header called Blob with a value of Test.json. Use the following message body and click on Send.

```
{
        "name"   : "John Smith",
        "sku"    : "20223",
  "price"  : 23.95,
  "shipTo" : {
        "name" : "Jane Smith",
    "address" : "123 Maple Street",
    "city" : "Pretendville",
    "state" : "NY",
    "zip"   : "12345"
  },
  "billTo" : {
        "name" : "John Smith",
    "address" : "123 Maple Street",
    "city" : "Pretendville",
    "state" : "NY",
    "zip"   : "12345"
  }
}
```

5. You should now get 201 Created response, indicating the message has been delivered to the queue. You can use tooling Azure Storage Explorer to check if the message was indeed delivered in the storage container.

Response | Trace

Response status

201 Created

Response latency

72 ms

Response content

```
x-ms-request-id: 920bed9c-c01e-0099-7f52-d7929b000000
x-ms-version: 2018-03-28
x-ms-request-server-encrypted: true
Ocp-Apim-Trace-Location: https://apimgmtsttgqry0y7kqh4trh.blob.core.windows.net/apiinspectorcontainer/CeBZmDLtT5JYGta-Xb1bSA2-10
1?sv=2017-04-17&sr=b&sig=UwdeXokgYLeHYhq4BbxY8fUWhX7P8nfwRVLuRNwSh4o%3D&se=2019-03-11T15%3A03%3A35Z&sp=r&traceId=8e0eae928212455
6b73578cc1ccd32c2
Date: Sun, 10 Mar 2019 15:03:35 GMT
ETag: "0x8D6A56991FA3A6A"
Content-Length: 0
Content-MD5: uBQxcsp2VB1xhthm3U4dtg==
Last-Modified: Sun, 10 Mar 2019 15:03:35 GMT
```