Monitor services that are deployed to Azure

Microsoft Azure user interface

Given the dynamic nature of Microsoft cloud tools, you might experience Azure UI changes that occur after the development of this training content. As a result, the lab instructions and lab steps might not align correctly.

Microsoft updates this training course when the community alerts us to needed changes. However, cloud updates occur frequently, so you might encounter UI changes before this training content updates. **If this occurs, adapt to the changes, and then work through them in the labs as needed.**

Instructions

Before you start

Sign in to the lab environment

> **Note**: Your instructor will provide instructions to connect to the virtual lab environment.

Review the installed applications

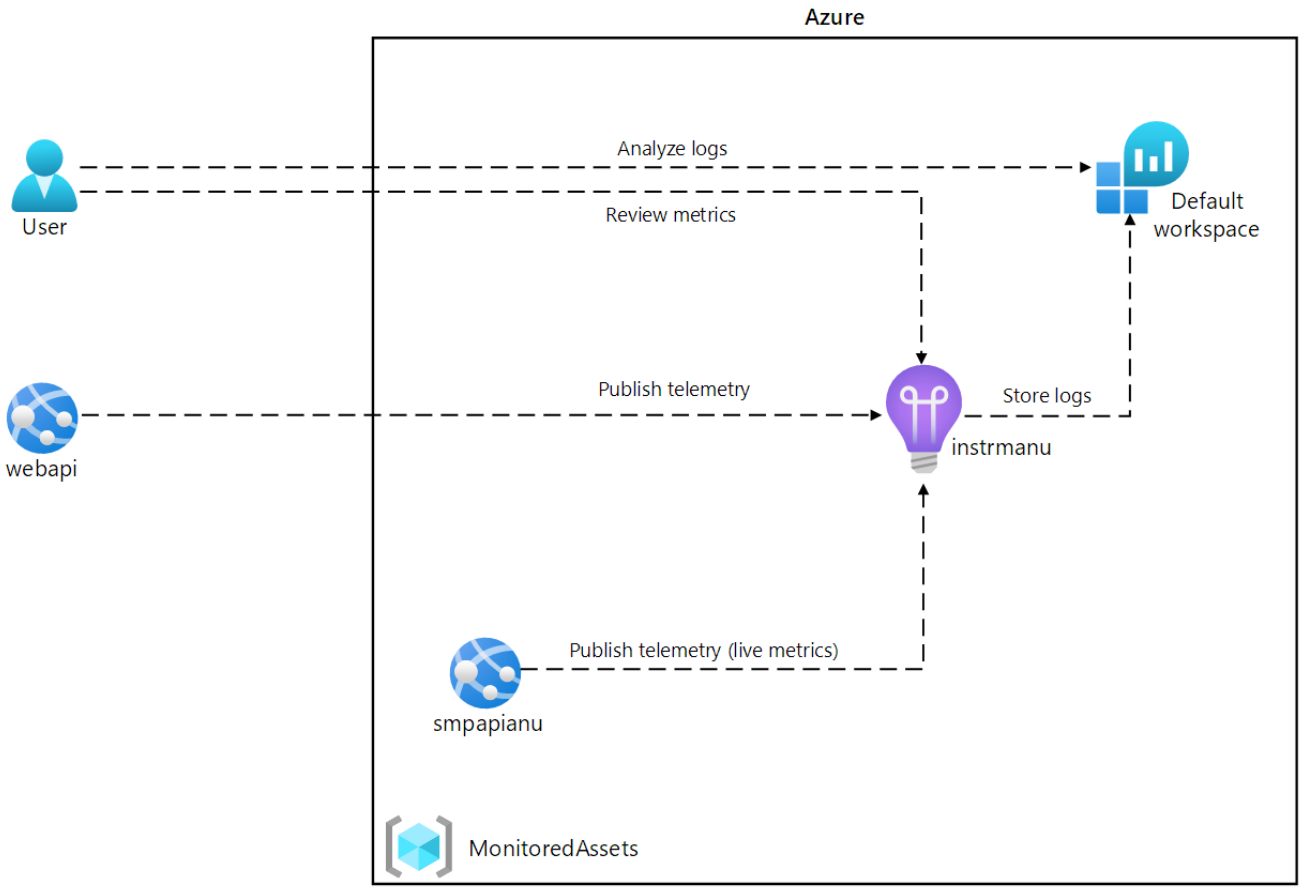
applications that you'll use in this lab, including:

- Microsoft Edge
- File Explorer
- Visual Studio Code
- Azure PowerShell

Lab Scenario

In this lab, you will create an Application Insights resource in Azure that will be used to monitor and log application insight data for later review. The API will be set to automatically scale if demand increases to a certain threshold and logging the data will help determine how the service is being utilized.

Architecture diagram



Exercise 1: Create and configure Azure resources

Task 1: Open the Azure portal

1. On the taskbar, select the **Microsoft Edge** icon.
2. In the browser window, browse to the Azure portal at `https://portal.azure.com`, and then sign in with the account you'll be using for this lab.

> **Note**: If this is your first time signing in to the Azure portal, you'll be offered a tour of the portal. Select **Get Started** to skip the tour and begin using the portal.

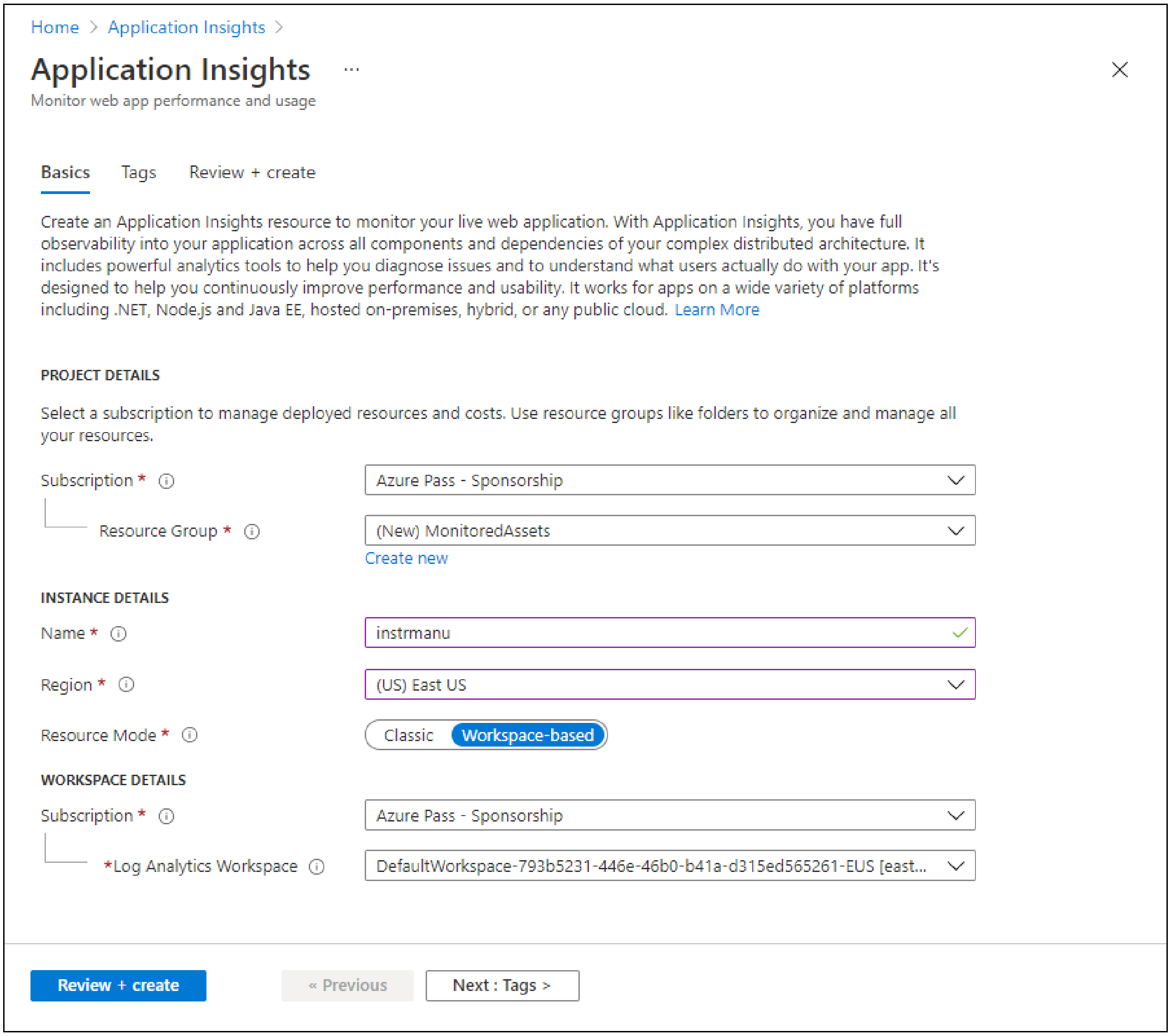
Task 2: Create an Application Insights resource

1. In the Azure portal, use the **Search resources, services, and docs** text box at the top of the page to search for **Application Insights** and then, in the list of results, select **Application Insights**.
2. On the **Application Insights** blade, select **+ Create**.
3. On the **Application Insights** blade, on the **Basics** tab, perform the following actions, and select **Review + create**:

Setting	Action

Setting	Action
Subscription drop-down list	Retain the default value
Resource group section	Select **Create new**, enter **MonitoredAssets**, and then select **OK**
Name text box	**instrm** *[yourname]*
Region drop-down list	Select any Azure region in which you can deploy an Application Insights resource
Resource Mode section	Select the **Workspace-based** option
WORKSPACE DETAILS section	Retain the default values for the **Subscription** and **Log Analytics Workspace** drop-down lists

The following screenshot displays the configured settings on the **Application Insights** blade.


Home > Application Insights >
Application Insights ...
Monitor web app performance and usage
Basics
Tags
Review + create

Create an Application Insights resource to monitor your live web application. With Application Insights, you have full observability into your application across all components and dependencies of your complex distributed architecture. It includes powerful analytics tools to help you diagnose issues and to understand what users actually do with your app. It's designed to help you continuously improve performance and usability. It works for apps on a wide variety of platforms including .NET, Node.js and Java EE, hosted on-premises, hybrid, or any public cloud. Learn More

PROJECT DETAILS

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

Subscription * : Azure Pass - Sponsorship

Resource Group * : (New) MonitoredAssets

Create new

INSTANCE DETAILS

Name * : instrmanu

Region * : (US) East US

Resource Mode * : Classic / Workspace-based

WORKSPACE DETAILS

Subscription * : Azure Pass - Sponsorship

*Log Analytics Workspace : DefaultWorkspace-793b5231-446e-46b0-b41a-d315ed565261-EUS [east...

4. On the **Review + create** tab, review the options that you selected during the previous steps.

5. Select **Create** to create the **Application Insights** instance by using your specified configuration.

> **Note**: Wait for the creation task to complete before you proceed with this lab.

6. On the **Microsoft.AppInsights | Overview** blade, select the **Go to resource** button to navigate to the blade of the newly created **Application Insights** resource.

7. On the **Application Insights** blade, in the **Configure** section, select the **Properties** link.

8. On the **Properties** blade, next to the **Instrumentation Key** entry, select the **Copy to clipboard** button, and then record the copied value. You'll use it later in this lab.

> **Note**: The key is used by client applications to connect to a specific **Application Insights** resource.

Task 3: Create an Azure Web API resource

1. In the Azure portal, use the **Search resources, services, and docs** text box at the top of the page to search for **App Services** and then, in the list of results, select **App Services**.

2. On the **App Services** blade, select **+ Create**, and then select **+ Web App**.

3. On the **Create Web App** blade, on the **Basics** tab, perform the following actions, and then select the **Monitor + secure** tab:

Setting	Action
Subscription drop-down list	Retain the default value
Resource group drop-down list	Select **MonitoredAssets**
Name text box	Enter **smpapi***[yourname]*
Publish section	Select **Code**
Runtime stack drop-down list	Select **.NET 8 (LTS)**
Operating System section	Select **Windows**
Region drop-down list	Select the same region you chose as the location of the **Application Insights** resource
Windows Plan (East US) section	Select **Create new**, in the **Name** text box, enter **MonitoredPlan**, and then select **OK**
Pricing plan section	Retain the default value

4. On the **Monitor + secure** tab, perform the following actions, and then select **Review + create**:

Setting	Action
Enable Application Insights section	Ensure that **Yes** is selected
Application Insights drop-down list	Select the **instrm***[yourname]* Application Insights resource that you created previously in this lab

5. On the **Create Web App** tab, review the options that you selected during the previous steps.

6. Select **Create** to create the web API by using your specified configuration.

> **Note**: Wait for the creation task to complete before you proceed with this lab.

7. On the deployment **Overview** blade, select the **Go to resource** button to navigate to the blade of the newly created Azure web API.

8. On the **App Service** blade, in the **Settings** section, select the **Environment Variables** link.

9. In the **Environment Variables** section, perform the following actions:

    a. On the **App settings** tab, select **Show values** to display secrets associated with your web API.

    b. Note the value representing the **APPLICATIONINSIGHTS_CONNECTION_STRING** key. This value was set automatically when you built the web API resource.

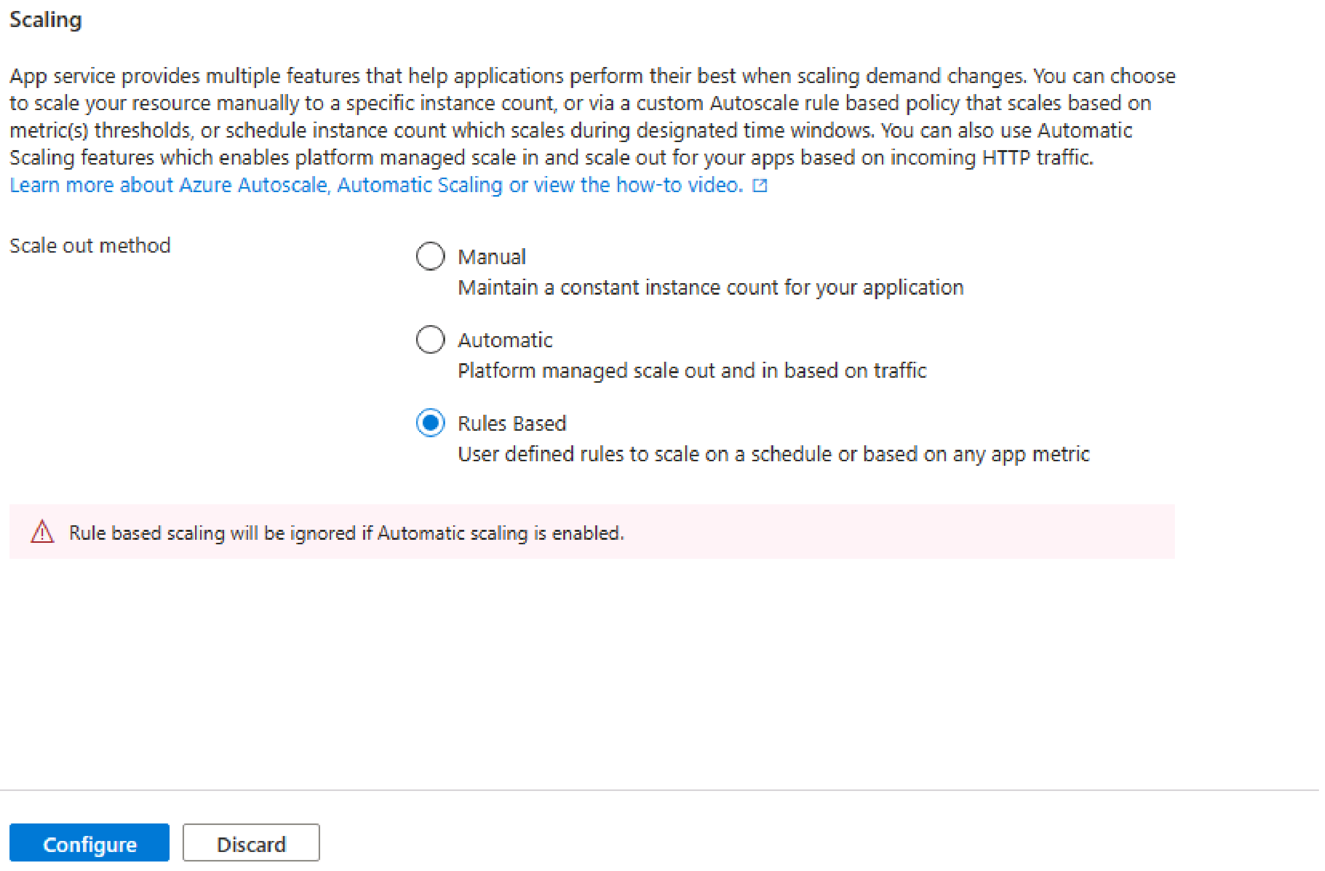
10. On the **App Service** blade, select **Overview** at the top of the service menu.

11. On the **App Service** blade, in the **Essentials** section, record the value of the **Default domain** link. You'll use this value later in the lab to submit requests to the web API.

Task 4: Configure web API autoscale options

1. On the **App Service** blade, in the **Settings** section, select the **Scale out (App Service Plan)** link.

2. Scroll down until you see the **Scale out method**. Select the **Rules Based** option, then select **Configure**.



Scaling

App service provides multiple features that help applications perform their best when scaling demand changes. You can choose to scale your resource manually to a specific instance count, or via a custom Autoscale rule based policy that scales based on metric(s) thresholds, or schedule instance count which scales during designated time windows. You can also use Automatic Scaling features which enables platform managed scale in and scale out for your apps based on incoming HTTP traffic.
Learn more about Azure Autoscale, Automatic Scaling or view the how-to video.

Scale out method

○ Manual
Maintain a constant instance count for your application

○ Automatic
Platform managed scale out and in based on traffic

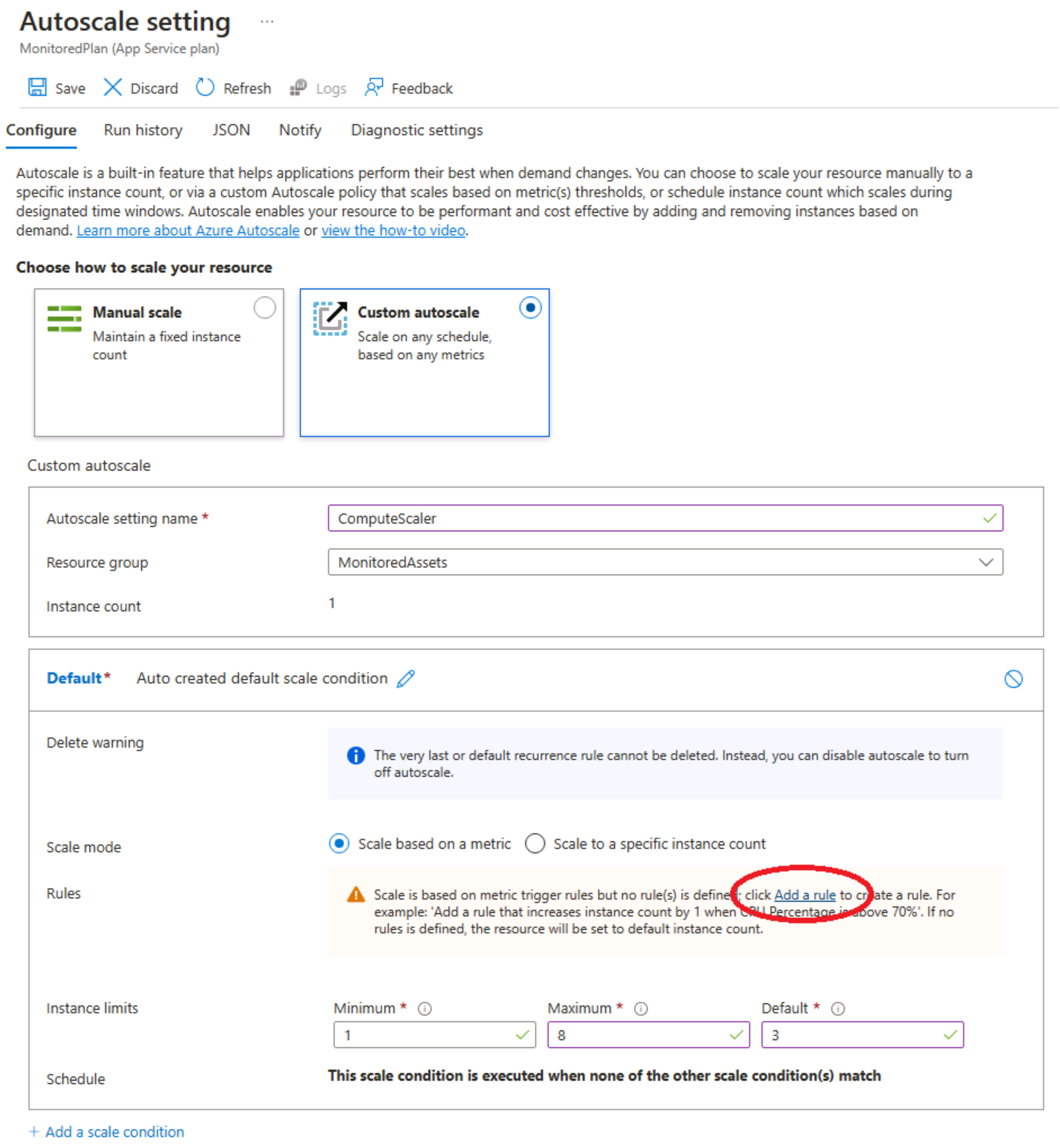
● Rules Based
User defined rules to scale on a schedule or based on any app metric

⚠ Rule based scaling will be ignored if Automatic scaling is enabled.

1. In the **Scale out** section, perform the following actions, and then select **Save**:

Setting	Action
Scale out section	Select **Custom autoscale**
Autoscale setting name text box	Enter **ComputeScaler**
Resource group drop-down list	Select **MonitoredAssets**
Scale mode section	Select **Scale based on a metric**
Minimum text box in the **Instance limits** section	Enter **1**
Maximum text box in the **Instance limits** section	Enter **8**
Default text box in the **Instance limits** section	Enter **3**

The following screenshot displays the configured settings in the **Scale out** section on the **App Service** blade.



Autoscale setting ···

MonitoredPlan (App Service plan)

Autoscale is a built-in feature that helps applications perform their best when demand changes. You can choose to scale your resource manually to a specific instance count, or via a custom Autoscale policy that scales based on metric(s) thresholds, or schedule instance count which scales during designated time windows. Autoscale enables your resource to be performant and cost effective by adding and removing instances based on demand. Learn more about Azure Autoscale or view the how-to video.

Choose how to scale your resource

○ **Manual scale** Maintain a fixed instance count

● **Custom autoscale** Scale on any schedule, based on any metrics

Custom autoscale

Autoscale setting name *	ComputeScaler ✓
Resource group	MonitoredAssets
Instance count	1

Default* Auto created default scale condition

Delete warning: The very last or default recurrence rule cannot be deleted. Instead, you can disable autoscale to turn off autoscale.

Scale mode: ● Scale based on a metric ○ Scale to a specific instance count

Rules: Scale is based on metric trigger rules but no rule(s) is defined; click Add a rule to create a rule. For example: 'Add a rule that increases instance count by 1 when CPU Percentage is above 70%'. If no rules is defined, the resource will be set to default instance count.

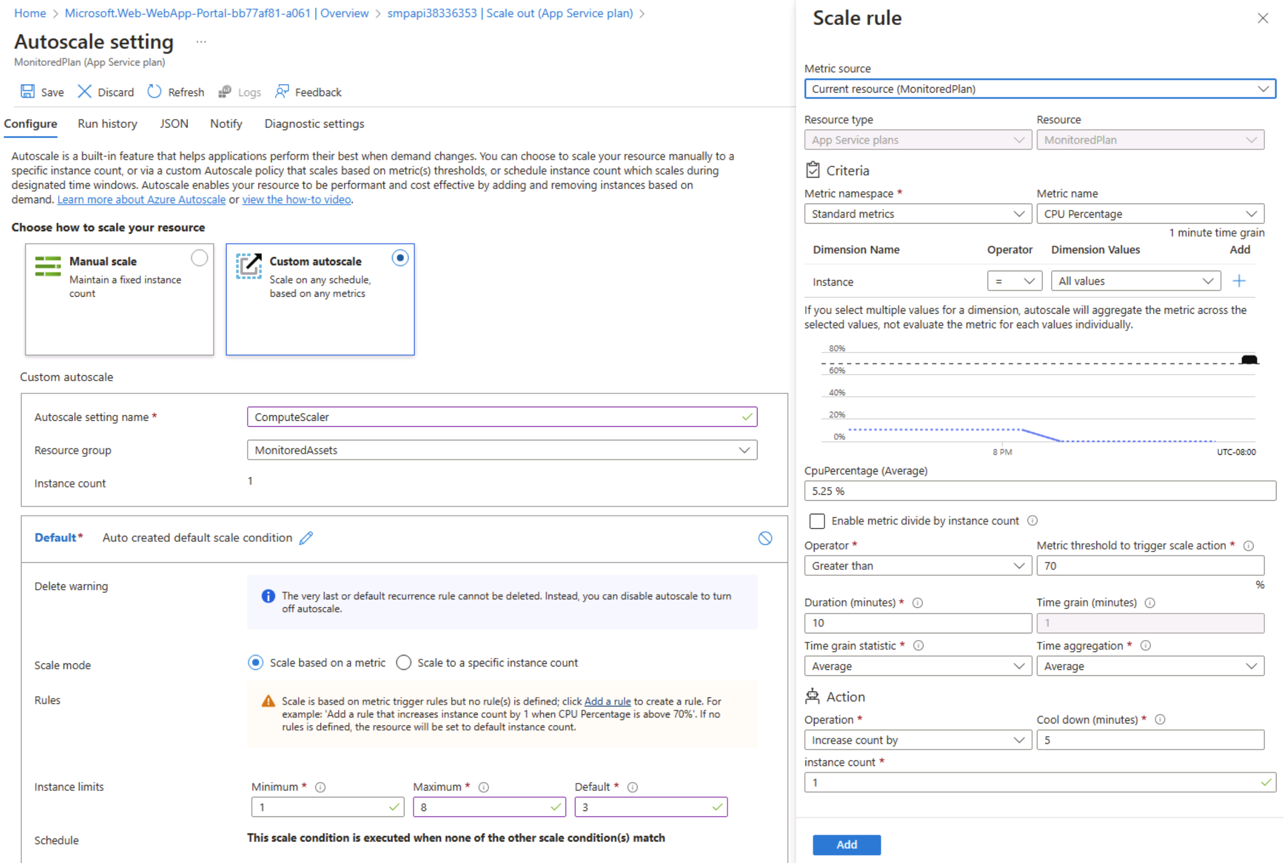
Instance limits: Minimum * 1 ✓ Maximum * 8 ✓ Default * 3 ✓

Schedule: **This scale condition is executed when none of the other scale condition(s) match**

+ Add a scale condition

Setting	Action
Rules section	Select **Add a rule**
Scale rule blade	Retain default values for all settings, and then select **Add**

The following screenshot displays additional settings in the **Scale out** section on the **App Service** blade.



Home > Microsoft.Web-WebApp-Portal-bb77af81-a061 | Overview > smpapi38336353 | Scale out (App Service plan) >

Autoscale setting ...

MonitoredPlan (App Service plan)

Save | Discard | Refresh | Logs | Feedback

Configure | Run history | JSON | Notify | Diagnostic settings

Autoscale is a built-in feature that helps applications perform their best when demand changes. You can choose to scale your resource manually to a specific instance count, or via a custom Autoscale policy that scales based on metric(s) thresholds, or schedule instance count which scales during designated time windows. Autoscale enables your resource to be performant and cost effective by adding and removing instances based on demand. Learn more about Azure Autoscale or view the how-to video.

Choose how to scale your resource

○ **Manual scale** Maintain a fixed instance count

● **Custom autoscale** Scale on any schedule, based on any metrics

Custom autoscale

Autoscale setting name *	ComputeScaler ✓
Resource group	MonitoredAssets
Instance count	1

Default* Auto created default scale condition

Delete warning: The very last or default recurrence rule cannot be deleted. Instead, you can disable autoscale to turn off autoscale.

Scale mode: ● Scale based on a metric ○ Scale to a specific instance count

Rules: Scale is based on metric trigger rules but no rule(s) is defined; click Add a rule to create a rule. For example: 'Add a rule that increases instance count by 1 when CPU Percentage is above 70%'. If no rules is defined, the resource will be set to default instance count.

Instance limits: Minimum * 1 ✓ | Maximum * 8 ✓ | Default * 3 ✓

Schedule: **This scale condition is executed when none of the other scale condition(s) match**

Scale rule

Metric source: Current resource (MonitoredPlan)

Resource type: App Service plans | Resource: MonitoredPlan

Criteria

Metric namespace *: Standard metrics | Metric name: CPU Percentage

1 minute time grain

Dimension Name	Operator	Dimension Values	Add
Instance	=	All values	+

If you select multiple values for a dimension, autoscale will aggregate the metric across the selected values, not evaluate the metric for each values individually.

CpuPercentage (Average): 5.25 %

□ Enable metric divide by instance count

Operator *: Greater than | Metric threshold to trigger scale action *: 70 %

Duration (minutes) *: 10 | Time grain (minutes): 1

Time grain statistic *: Average | Time aggregation *: Average

Action

Operation *: Increase count by | Cool down (minutes) *: 5

instance count *: 1 ✓

Add

> **Note**: Wait for the save operation to complete before you continue with this lab.

Review

In this exercise, you created the Azure resources that you'll use for the remainder of the lab.

Exercise 2: Monitor a local web API by using Application Insights

Task 1: Build a .NET Web API project

1. From the lab computer, start **Visual Studio Code**.

2. In Visual Studio Code, on the **File** menu, select **Open Folder**.

3. In the **Open Folder** window, browse to **Allfiles (F):\Allfiles\Labs\11\Starter\Api**, and then select **Select Folder**.

4. In the **Visual Studio Code** window, on the Menu Bar, select **Terminal** and then select **New Terminal***.

5. At the terminal prompt, run the following command to create a new .NET Web API application named **SimpleApi** in the current directory:

```
dotnet new webapi --output . --name SimpleApi --framework net8.0
```

6. Run the following command to import version 2.21.0 of **Microsoft.ApplicationInsights** from NuGet to the current project:

```
dotnet add package Microsoft.ApplicationInsights --version 2.21.0
```

> **Note**: The **dotnet add package** command will add the **Microsoft.ApplicationInsights** package from NuGet. For more information, refer to Microsoft.ApplicationInsights.

7. Run the following command to import version 2.21.0 of **Microsoft.ApplicationInsights.AspNetCore** from NuGet:

   ```
   dotnet add package Microsoft.ApplicationInsights.AspNetCore --version 2.21.0
   ```

   > **Note**: The **dotnet add package** command will add the **Microsoft.ApplicationInsights.AspNetCore** package from NuGet. For more information, refer to Microsoft.ApplicationInsights.AspNetCore.

8. At the terminal prompt, run the following command to import version 2.21.0 of **Microsoft.ApplicationInsights.PerfCounterCollector** from NuGet to the current project:

   ```
   dotnet add package Microsoft.ApplicationInsights.PerfCounterCollector --version
   2.21.0
   ```

   > **Note**: The **dotnet add package** command will add the **Microsoft.ApplicationInsights.PerfCounterCollector** package from NuGet. For more information, refer to Microsoft.ApplicationInsights.PerfCounterCollector.

9. At the terminal prompt, run the following command to import version 2.4.0 of **Microsoft.ApplicationInsights.Profiler.AspNetCore** from NuGet to the current project:

   ```
   dotnet add package Microsoft.ApplicationInsights.Profiler.AspNetCore --version 2.4.0
   ```

   > **Note**: The **dotnet add package** command will add the **Microsoft.ApplicationInsights.Profiler.AspNetCore** package from NuGet. For more information, refer to Microsoft.ApplicationInsights.Profiler.AspNetCore.

10. At the terminal prompt, run the following command to build the .NET Web API:

    ```
    dotnet build
    ```

Task 2: Update app code to disable HTTPS and use Application Insights

1. In the **Visual Studio Code** window, on the **Explorer** pane, select the **Program.cs** file to open the file on the **editor** pane.

2. On the **editor** pane, locate and delete the following code in line 17:

   ```
   app.UseHttpsRedirection();
   ```

   > **Note**: This line of code forces the web API to use HTTPS. For this lab, this is unnecessary.

3. In the **Program.cs** file, add the following two lines starting with line 7 to enable Profiler by registering it along with Application Insights into the Service collection:

   ```
   builder.Services.AddApplicationInsightsTelemetry();
   builder.Services.AddServiceProfiler();
   ```

4. Save the changes and close the **Program.cs** file.

5. In the **Visual Studio Code** window, on the **Explorer** pane, select the **appsettings.json** file to open the file on the **editor** pane.

6. Add to the **appsettings.json** file the following element right after the **Logging** element, replacing the `instrumentation-key` placeholder with the value of the Application Insights resource instrumentation key that you recorded earlier in this lab:

   ```
      "ApplicationInsights":
      {
         "InstrumentationKey": "instrumentation-key"
      },
   ```

   > **Note**: If the section you are adding is the last element of the file, remove the trailing comma.

7. Your appsettings.json file should now look similar in structure to the following:

   ```
   {
       "Logging":{
           "LogLevel": {
               "Default": "Information",
               "Microsoft.AspNetCore": "Warning"
           }
       },
      "ApplicationInsights":
      {
         "InstrumentationKey": "instrumentation-key"
      },
      "AllowedHosts": "*"
   }
   ```

   > **Note** Ensure you have replaced the placeholder with your own instrumentation key that you recorded earlier.

8. Save the changes to the **appsettings.json** file and close it.

9. At the terminal prompt, run the following command to build the .NET Web API.

```
dotnet publish -c Release -r win-x86 --self-contained -p:PublishReadyToRun=true
.\SimpleApi.csproj
```

Task 3: Test an API application locally

1. At the terminal prompt, run the following command to launch the .NET Web API.

   ```
   dotnet run
   ```

2. Review the output of the command and note the HTTP URL that the site is listening on.

3. From the taskbar, open the context menu for the **Microsoft Edge** icon, and then open a new browser window.

4. In the browser window that opens, navigate to the `http://localhost` URL and add the **/weatherforecast** relative path of your web API.

   > **Note**: The full URL is `http://localhost:[port-number]/weatherforecast`, where the `[port-number]` placeholder identifies the port number at which the web app is accessible via the HTTP protocol.

   > **Note**: The page should contain an output in the following format. The actual values **will** be different.

```
[
    {
        "date": "2023-10-29",
        "temperatureC": -8,
        "summary": "Sweltering",
        "temperatureF": 18
    },
    {
        "date": "2023-10-30",
        "temperatureC": -12,
        "summary": "Hot",
        "temperatureF": 11
    },
    {
        "date": "2023-10-31",
        "temperatureC": 50,
        "summary": "Chilly",
        "temperatureF": 121
    },
    {
        "date": "2023-11-01",
        "temperatureC": 51,
        "summary": "Chilly",
        "temperatureF": 123
    },
    {
        "date": "2023-11-02",
        "temperatureC": 29,
        "summary": "Balmy",
        "temperatureF": 84
    }
]
```

5. Refresh the browser page a number of times to simulate some responses.

6. Close the browser window that's displaying the page generated by `http://localhost:[port-number]/weatherforecast`.

7. In Visual Studio Code, select **Kill Terminal** (the **Recycle Bin** icon) to close the **terminal** pane and any associated processes.

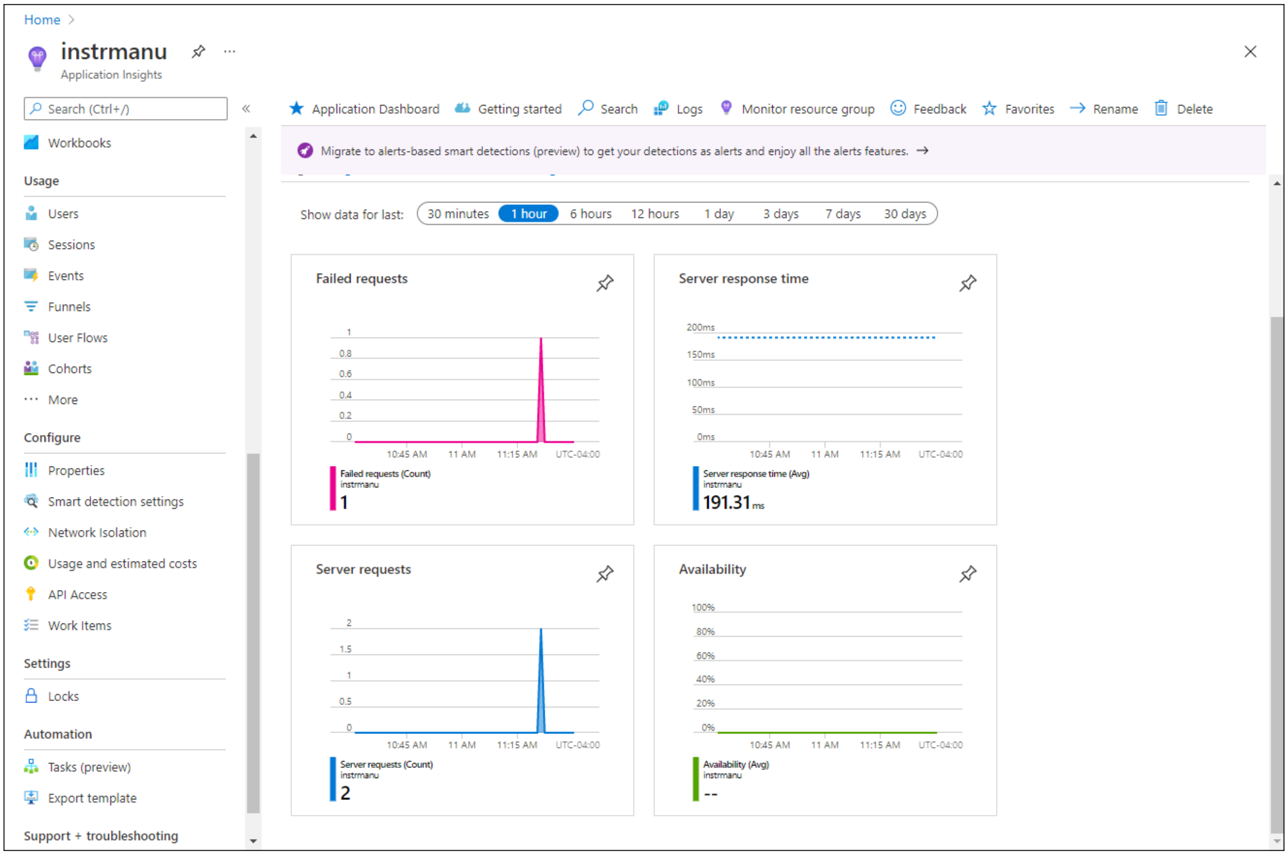
Task 4: Review metrics in Application Insights

1. On your lab computer, switch to the **Microsoft Edge** browser window displaying the Azure portal.

2. In the Azure portal, navigate back to the blade of the **instrm***[yourname]* Application Insights resource you created previously in this lab.

3. On the **Application Insights** blade, in the tiles in the center of the blade, find the displayed metrics. Specifically, find the number of server requests that have occurred and the average server response time.

   The following screenshot displays the **Application Insights** metrics of the local web app.



Migrate to alerts-based smart detections (preview) to get your detections as alerts and enjoy all the alerts features. →

Show data for last: 1 hour

> **Note**: It can take up to five minutes to observe requests in the Application Insights metrics charts.

Review

In this exercise, you created an API app by using ASP.NET and configured it to stream application metrics to Application Insights. You then used the Application Insights dashboard to review performance details about your API.

Exercise 3: Monitor a web API using Application Insights

Task 1: Deploy an application to the web API

1. On the lab computer, switch to the Visual Studio Code.

2. In the **Visual Studio Code** window, on the Menu Bar, select **Terminal** and then select **New Terminal**.

3. At the terminal prompt, run the following command to ensure that the current directory is set to the **Allfiles (F):\Allfiles\Labs\11\Starter\Api\bin\Release\net8.0\net8.0\win-x86\publish**, where the deployment files reside:

   ```
   cd F:\Allfiles\Labs\11\Starter\Api\bin\Release\net8.0\win-x86\publish\
   ```

4. Run the following command to create a zip file containing the starter project that you'll deploy next to the Azure web API:

```
Compress-Archive -Path * -DestinationPath api.zip
```

5. At the terminal prompt, run the following command to sign in to your Azure subscription by using Azure PowerShell:

   ```
   Connect-AzAccount
   ```

6. When prompted, authenticate by providing the credentials to access the Azure subscription you are using for this lab.

   > **Note**: Wait for the sign-in process to complete.

7. Run the following command to display the listing of all web apps in the **MonitoredAssets** resource group:

   Get-AzWebApp -ResourceGroupName MonitoredAssets

8. Run the following command to display the list of web apps in the **MonitoredAssets** resource group, which names start with **smpapi***:

   Get-AzWebApp -ResourceGroupName MonitoredAssets | Where-Object {$_.Name -like 'smpapi*'}

9. Run the following commands to display the name of the first of the web apps identified in the previous step and store it in a variable named **$webAppName**:

   Get-AzWebApp -ResourceGroupName MonitoredAssets | Where-Object {$.*Name -like 'smpapi*'} | Select-Object -ExpandProperty Name \(webAppName = (Get-AzWebApp -ResourceGroupName MonitoredAssets | Where-Object {\)*.Name -like 'smpapi*'})[0] | Select-Object -ExpandProperty Name

10. Run the following command to deploy the **api.zip** file you created previously in this task to the web API whose name you identified in the previous step:

    Publish-AzWebApp -ResourceGroupName MonitoredAssets -Name $webAppName -ArchivePath "F:\Allfiles\Labs\11\Starter\Api\bin\Release\net8.0\win-x86\publish\api.zip" -force

    > **Note**: Wait for the deployment to complete before you continue with this lab.

11. On the lab computer, launch another Microsoft Edge browser window.

12. In the browser window, navigate to the Azure Web API app into which you deployed the API app previously in this task by appending to its URL (that you recorded previously in this lab) the suffix **/weatherforecast**.

    > **Note**: For example, if your URL is `https://smpapianu.azurewebsites.net`, the new URL would be `https://smpapianu.azurewebsites.net/weatherforecast`.

13. Verify that the output resembles the one generated when running the API app locally.

> **Note**: The output will include different values but it should have the same format.

Task 2: Configure in-depth metric collection for Web Apps

1. On your lab computer, switch to the **Microsoft Edge** browser window displaying the Azure portal.

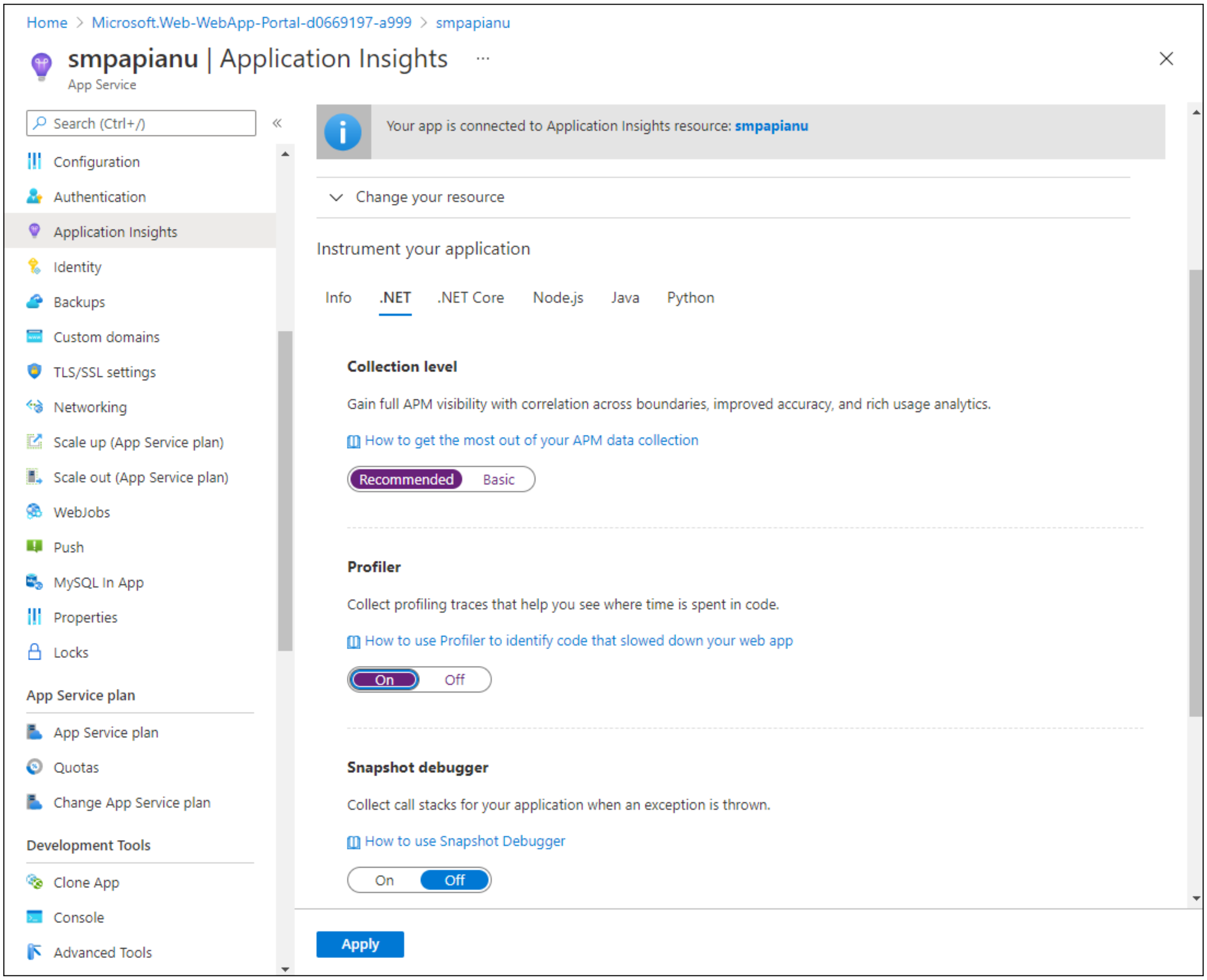
2. In the Azure portal, navigate back to the blade of the **smpapi***[yourname]* web app resource you created previously in this lab.

3. On the **App Service** blade, select **Application Insights**.

4. On the **Application Insights** blade, perform the following actions, select **Apply**, and then in the confirmation dialog, select **Yes**:

Setting	Action
Application Insights slider	Ensure it is set to **Enable**
Instrument your application section	Select the **.NET** tab
Collection level section	Select **Recommended**
Profiler section	Select **On**
Snapshot debugger section	Select **Off**
SQL Commands section	Select **Off**

The following screenshot displays the **Application Insights** settings of the Azure Web API.



Your app is connected to Application Insights resource: **smpapianu**

Instrument your application

Collection level

Gain full APM visibility with correlation across boundaries, improved accuracy, and rich usage analytics.

How to get the most out of your APM data collection

[✓ Recommended] Basic

Profiler

Collect profiling traces that help you see where time is spent in code.

How to use Profiler to identify code that slowed down your web app

[✓ On] Off

Snapshot debugger

Collect call stacks for your application when an exception is thrown.

How to use Snapshot Debugger

On [✓ Off]

5. Switch to the browser tab you opened in the previous task to display the results of deployment of your API app to the target Azure API app (including the **/weatherforecast** relative path in the target URL) and refresh the browser page several times.

6. Review the JSON-formatted output generated by the API.

7. Record the URL that you used to access the JSON-formatted output.

> **Note**: The URL should be in the format `https://smpapianu.azurewebsites.net/weatherforecast` if **smpapianu** was the site name you created earlier.

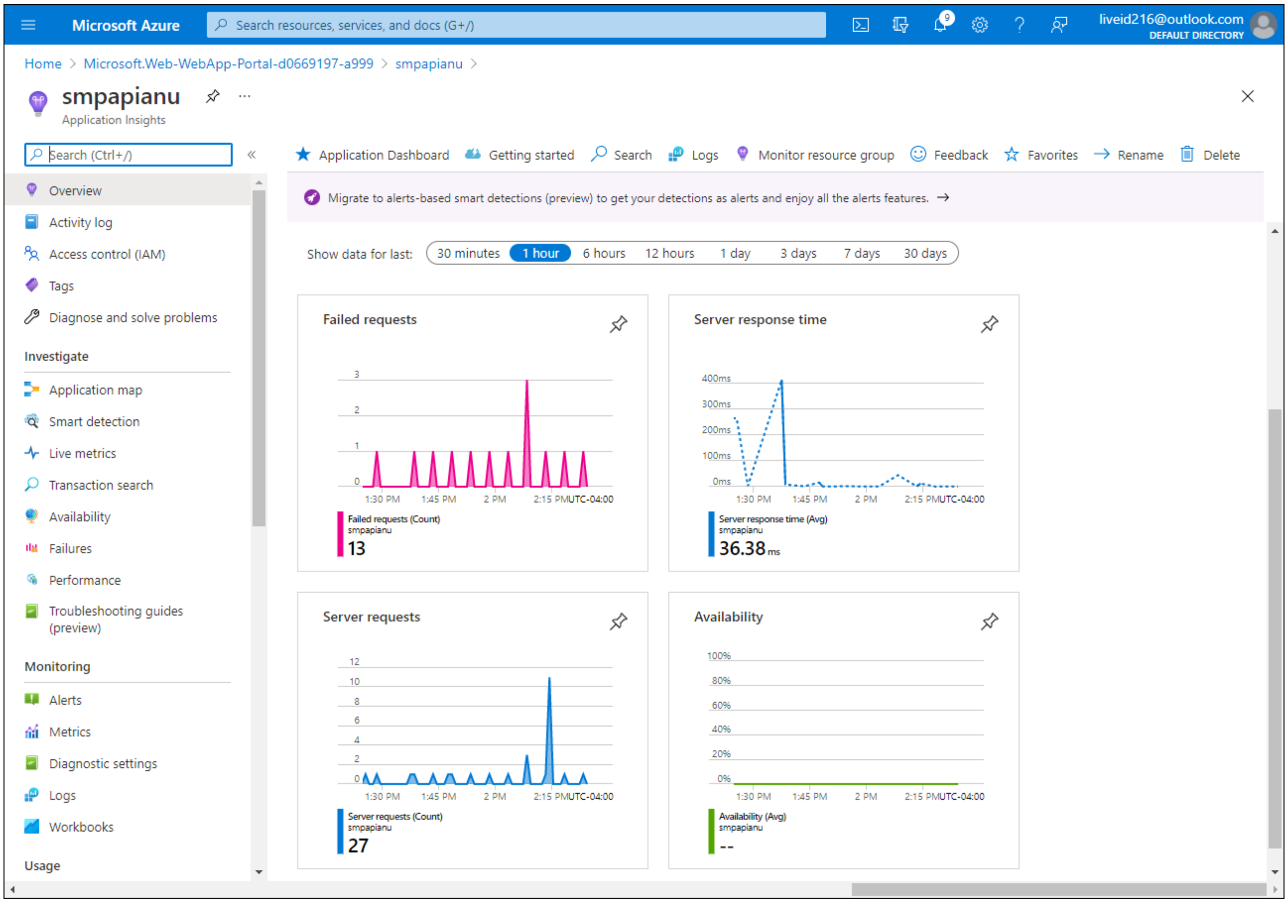
Task 3: Get updated metrics in Application Insights

1. Return to the browser window displaying the Azure web app in the Azure portal.

2. On the **Application Insights** blade of the web app, select the **View Application Insights data** link.

3. On the **Application Insights** blade, review the collected metrics in the tiles in the center of the blade, including the number of server requests that have occurred and the average server response time.

   The following screenshot displays the **Application Insights** metrics of the Azure web app in the Azure portal.



Migrate to alerts-based smart detections (preview) to get your detections as alerts and enjoy all the alerts features. →

> **Note**: It can take up to five minutes for updated metrics to appear in the Application Insights metrics charts.

Task 4: View real-time metrics in Application Insights

1. On the **Application Insights** blade, in the **Investigate** section, select **Live metrics**.

2. Switch back to the browser window displaying the target API app running in the target Azure web app (which targets the **/weatherforecast** relative path in the target URL), and then refresh the browser page several times.

3. Switch to the browser window displaying the **Live metrics** blade and review its content.

> **Note**: The **Incoming Requests** section should update within seconds, showing the requests that you made to the web API.

Review

In this exercise, you configured and tested Application Insights logging of your web API app and viewed live information about the requests being made.