



Application Insights

CSCI E-94

Fundamentals of Cloud Computing - Azure

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Agenda

- Overview
 - What is Application Insights?
 - Why do you care?
- Deployment and Configuration
- Customized Logging
- Snapshot Debugging



Overview

What is application insights

- **A**pplication **P**erformance **M**anagement
 - A service for Developers and DevOps
- Provides for
 - Extensible logging
 - With full search and analytics capabilities
 - Failure detection
 - With analysis and enriched telemetry
 - Live monitoring
 - Dependency tracking and information
 - Detection of performance anomalies



Overview

Application Insights Provides for

- Diagnostic tools
 - See: <https://bit.ly/3H9yedP>
 - Multiple tech stacks including
 - C#|VB (.NET)
 - Java
 - JavaScript
 - Node.js
 - Python
 - Multiple platforms
 - Cloud (Any cloud!)
 - On-premises
 - Hybrid



Overview

What does Application Insights Monitor? ...

- Request Rates
 - Response Times
 - Failure Rates
- Dependency rates
 - Response times
 - Failure rates



Overview

What does Application Insights Monitor? ...

- Page views and load performance
- AJAX calls
- User and Session Counts
- Performance Counters
 - Windows & Linux
- Host Diagnostics
 - Docker & Azure



Overview

What does Application Insights Monitor? ...

- Correlated diagnostic trace logs
 - From request into your tech stack
 - End to End correlation
- Custom Events
 - Business events
 - Account creation
 - Assessments taken



Overview

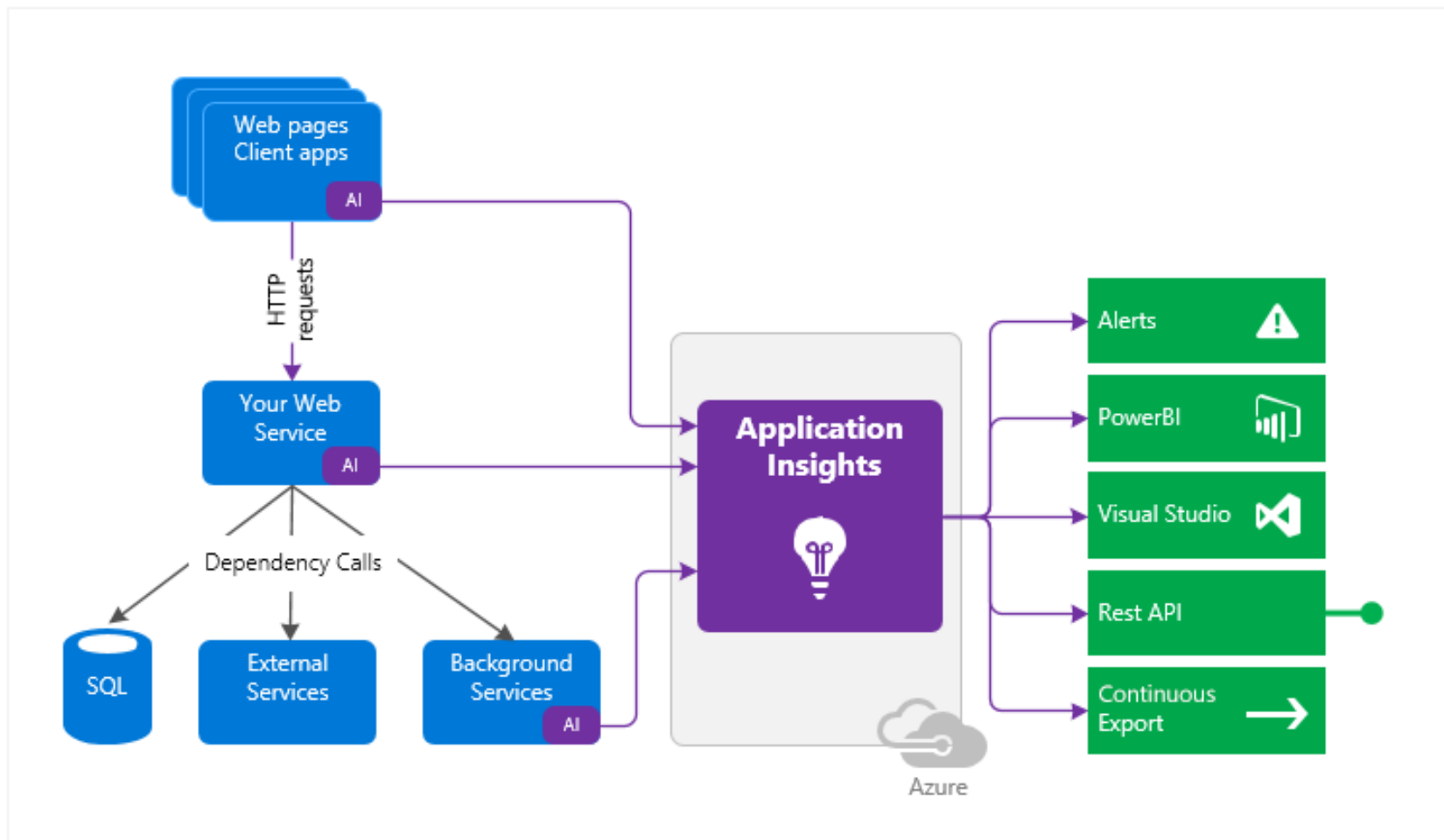
What does Application Insights Monitor? ...

- Custom Metrics
 - Internal Ids and User Context
 - Request payload
 - Cosmos DB query costs



Overview

How does Application Insights Work?



Courtesy - Microsoft Documentation:

<https://docs.microsoft.com/en-us/azure/azure-monitor/app/app-insights-overview>



Overview

Why do you care?

- Save time & money
- Proactive instead of reactive
 - Identify issues before the happen
 - Optimize
 - Spend time where it matters
- Root caused analysis
 - Efficiently



Overview





Deployment and Configuration

- Two "levels" of Application Insights
 - Portal configured
 - No change to code necessary
 - Application Insights SDK
 - Enrich telemetry
 - Add your own custom
 - Events
 - Trace log data
 - Metrics



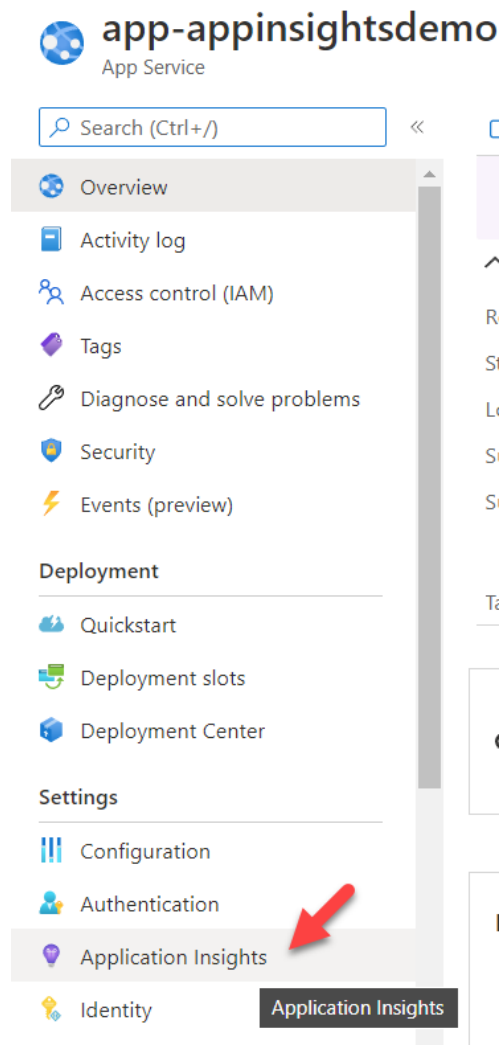
Deployment and Configuration

- Portal Configured requires 5 steps
 1. Go to your app service
 2. Click Application Insights
 3. Turn on Application Insights
 4. Create a new Application Insights resource
 5. Instrument your application
 - Accomplished without code changes!



Deployment and Configuration

2 Click Application Insights





Deployment and Configuration

3 Turn on Application Insights

Dashboard > app-appinsightsdemo



app-appinsightsdemo | Application Insights ...

App Service

Search (Ctrl+/)

Overview

Activity log

Access control (IAM)

Tags



✓ Application Insights is linked through Instrumentation Key in app settings

[View Application Insights data](#) →

Enable Application Insights without redeploying your code

Turn on Application Insights





Deployment and Configuration

4 Create a new Application Insights resource

Collect application monitoring data using Application Insights

Enable Disable ⓘ

Feedback ▾

Link to an Application Insights resource

ⓘ Your app is connected to Application Insights resource: **appi-appinsightsdemo**

ⓘ As part of using Application Insights instrumentation, we collect and send diagnostic data to Microsoft. This data helps us run and improve Application Insights. You have the option to disable non-essential data collection. [Learn more](#)

^ Change your resource

☒ Create new resource

ⓘ Application insights and workspace resources are created in current subscription and resource group scope. If you want to choose a different scope, please create a new AI component by visiting: [Create a new Application Insights resource](#) and then return to this page.

New resource name *

app-appinsightsdemo ✓

Location *

East US ✓

Log Analytics Workspace ⓘ

DefaultWorkspace-08da0306-afdd-48de-8fec-b48554665efe-EUS [East US] ✓

☐ Select existing resource

select a subscription

Staff Labs for jficara.harvard ▾

Search to find more resources

Top 5 relevant resources - Relevance is determined by resource group, location, or in alphabetical order.

ⓘ Only resources with write permission are selectable here.



Deployment and Configuration

5 Instrument your application

Instrument your application

Info .NET .NET Core Node.js Java Python

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 ☐ Disabled

Interop with Application Insights SDK (preview)

Load the extension side-by-side with SDK and use it to send telemetry (disables the Application Insights SDK)

☐ On ☒ Off

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

Show local variables for your application when an exception is thrown.

☒ On ☐ Off

SQL Commands

Enable dependency tracking to show compiled SQL command and local variables in a web request.

☒ On ☐ Off

SDK required for Linux

Profiler requires basic or above



Demo

Portal Configured Application Insights

Azure Portal

app-appinsightssimpledemo-cscie94-win

appi-appinsightssimpledemo-cscie94-win



Customized Logging

- Why do you care?
 - You can write your own
 - Log entries
 - Events
 - You can enhance exceptions
 - Add custom metadata



Customized Logging

- How do you do it?
 - Utilize the **TelemetryClient** instance
 - This is not automatically provided
 - When adding Application insights

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



Customized Logging

How do you do it? ...

Create Web App ...



Basics Database Deployment Networking Monitor + secure Tags Review + create

App Service Web Apps lets you quickly build, deploy, and scale enterprise-grade web, mobile, and API apps running on any platform. Meet rigorous performance, scalability, security and compliance requirements while using a fully managed platform to perform infrastructure maintenance. [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 *

Resource Group * [Create new](#)

Instance Details

Name [.azurewebsites.net](#)

☐ Try a secure unique default hostname. [More about this update](#)

Publish * ☒ Code ☐ Container

Runtime stack *

Operating System * ☒ Linux ☐ Windows

Region *

i Not finding your App Service Plan? Try a different region or select your App Service Environment.

Pricing plans

App Service plan pricing tier determines the location, features, cost and compute resources associated with your app. [Learn more](#)

Linux Plan (East US) * [Create new](#)

Pricing plan **Basic B1** (100 total ACU, 1.75 GB memory, 1 vCPU)

Zone redundancy

An App Service plan can be deployed as a zone redundant service in the regions that support it. This is a deployment time only decision. You can't make an App Service plan zone redundant after it has been deployed. [Learn more](#)

- Zone redundancy
- ☐ **Enabled:** Your App Service plan and the apps in it will be zone redundant. The minimum App Service plan instance count will be three.
 - ☒ **Disabled:** Your App Service Plan and the apps in it will not be zone redundant. The minimum App Service plan instance count will be one.

[Home](#) > [Create a resource](#) >

Create Web App ...

Basics Database Deployment Networking **Monitor + secure** Tags Review + create

The following features are optional and billed separately. Microsoft recommends enabling them to ensure the most robust protections and capabilities to monitor and secure your web applications.

Application Insights

Azure Monitor application insights is an Application Performance Management (APM) service for developers and DevOps professionals. Enable it below to automatically monitor your application. It will detect performance anomalies, and includes powerful analytics tools to help you diagnose issues and to understand what users actually do with your app. Your bill is based on amount of data used by Application Insights and your data retention settings. [Learn more](#)

App Insights pricing

Enable Application Insights * ☐ No ☒ Yes **1**

Application Insights * [Create new](#) **2** **5**

Region

Microsoft Defender for Cloud

When you add the Defender for App Service plan to your Azure subscription, you get a cloud-native security solution that monitors logs, requests, VM instance, and more—detecting threats and ongoing attacks to your resources. [More benefits of Defender for App Service](#)

Defender for Cloud pricing

Enable Defender for App Service ☐

6 [Review + create](#) [< Previous](#) [Next : Tags >](#)

Create new Application Insights

Name * **3**

Location

Workspace

4 [OK](#)



Customized Logging

How do you do it? ...

Microsoft Azure Search resources, services, and docs (G+/) Copilot

Home > Create a resource >

Create Web App

Basics Database Deployment Networking Monitor + secure Tags **Review + create**

Summary

Web App
by Microsoft

Basic authentication for this app is currently disabled and may impact deployments. Click to learn more.

Details

Subscription	4ab55d34-0213-4090-a521-48cf35794fff
Resource Group	rg_02-lecture-linux
Name	app-appinsightssimpledemo-cscie94-linux
Publish	Code
Runtime stack	.NET 9 (STS)

App Service Plan

Name	asp-demos
Operating System	Linux
Region	East US
SKU	Basic
Size	Small
ACU	100 total ACU
Memory	1.75 GB memory

Monitor + secure (New)

Application Insights (preview)	Enabled
Name	appi-applicationinsightssimpledemo-cscie94-linux
Region	East US

Deployment

Basic authentication	Disabled
Continuous deployment	Not enabled / Set up after app creation

Create < Previous Next > [Download a template for automation](#)



Customized Logging

How do you do it? ...

- Use the **TelemetryClient**
 - Log via **TrackTrace**
 - Enrich Exceptions via **TrackException**
 - Write Events via **TrackEvent**
 - Track Metrics via **GetMetric(x).TrackValue**
 - Where X
 - is the **string** name of the metric
 - Or **MetricIdentifier** instance
 - Supports namespace and metric id



ILogger

How do you do it?

- ILogger support is now built in but...
 - Requires additional settings
 - A sub object of Logging called
 - **ApplicationInsights**
 - Default behavior only logs
 - Warning
 - Error
 - Critical



Application Insights - ILogger

Settings

```
"Logging": {  
  "LogLevel": {  
    "Default": "Information",  
    "Microsoft": "Warning",  
    "Microsoft.AspNetCore": "Warning",  
    "Microsoft.Hosting.Lifetime": "Information"  
  },  
  "ApplicationInsights": {  
    "LogLevel": {  
      "Default": "Information"  
    }  
  }  
}
```



Configuring Settings In Azure

- Notes: <http://bit.ly/38UjpdR>
 - To set a setting in the Azure Portal
 - Setting name is combination of
 - Section name and property name
 - Windows
 - `<section name>:<property name>`
 - Ex: `CustomerLimits:MaxCustomers`
 - Linux
 - `<section name>__<property name>`
 - Ex: `CustomerLimits__MaxCustomers`
 - The `__` is a double under score



Demo

Customized Logging

`AppInsightsDemoSolution.sln`

`CustomersController.Rest.cs`

Line 92-100 (Setup metrics and custom properties)

Line 150-163 (Custom event with metrics)

Line 182 (Enrich an exception)



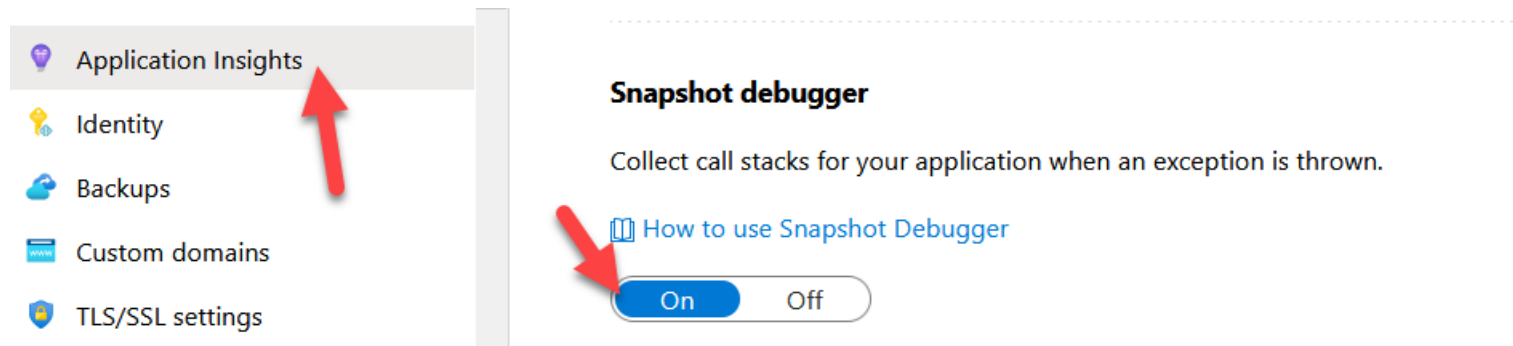
Snapshot Debugging

- What is it?
 - Ability to capture snapshots of your code
 - Local variables
 - Method parameters
 - Stack trace
 - Multiple threads
- Why do you care?
 - Helps diagnosing production issue
 - Faster & Easier



Snapshot Debugging

- How do you do it:
 - Add a nuget package
 - `Microsoft.ApplicationInsights.SnapshotCollector`
 - Turn on snapshot debugging in portal
 - Go to app service and click **Application Insights**





Snapshot Debugging

- Enable snapshot collection in code
 - Configure method in **program.cs** file
 - `builder.Services.AddSnapshotCollector`
 - Bind to settings
 - `SnapshotCollectorConfiguration`
 - Settings definitions
 - See: <http://bit.ly/3uRbARK>



Snapshot Settings

SnapshotCollectorConfiguration in appsettings.json

...

```
// DEMO: Setup snapshot debugging
```

```
builder.Services.AddSnapshotCollector((configuration) =>  
    Configuration.Bind(nameof(SnapshotCollectorConfiguration),  
        configuration));
```



Snapshot Settings

SnapshotCollectorConfiguration in appsettings.json

```
"SnapshotCollectorConfiguration": {  
  "IsEnabledInDeveloperMode": false,  
  "ThresholdForSnapshotting": 1,  
  "MaximumSnapshotsRequired": 3,  
  "MaximumCollectionPlanSize": 50,  
  "ReconnectInterval": "00:15:00",  
  "ProblemCounterResetInterval": "1.00:00:00",  
  "SnapshotsPerTenMinutesLimit": 1,  
  "SnapshotsPerDayLimit": 30,  
  "SnapshotInLowPriorityThread": true,  
  "ProvideAnonymousTelemetry": false,  
  "FailedRequestLimit": 10  
}
```




Snapshot Settings

- ThresholdForSnapshotting = 1
 - Snapshots are taken on **second occurrence**
- IsEnabledInDeveloperMode = false
 - Not collected
 - When debugging in Visual Studio
- See: <http://bit.ly/3uRbARK>



Snapshot Debugging

- Two options
 - Grant yourself access
 - Go to your Application Insights Instance
 - Can also apply to resource group or subscription
 - Click on Access control (IAM)
 - Click on Role assignments
 - Add yourself to
 - Application Insights Snapshot Debugger
 - Automatic workflow
 - When attempting to look at snapshot details



Snapshot Debugging

Grant yourself access

Dashboard > CSCIE94-AppInsightsDemo

CSCIE94-AppInsightsDemo
Application Insights

Search (Ctrl+ /)

- Overview
- Activity log
- Access control (IAM)**
- Tags
- Diagnose and solve problems

Investigate

Dashboard > CSCIE94-AppInsightsDemo - Access control (IAM)

CSCIE94-AppInsightsDemo - Access control (IAM)
Application Insights

Search (Ctrl+ /)

+ Add Edit columns Refresh

Check access Role assignments Di...

Check access
Review the level of access a user, group, ser... managed identity has to this resource. [Learn](#)

Add role assignment

Role ①
Application Insights Snapshot Debug... ▼

Assign access to ①
Azure AD user, group, or service princi... ▼

Select ①
jficara@

No users, groups, or service principals found.



Snapshot Debugging

Automatic Role Addition

You don't have access

Click the 'Add Application Insights Snapshot Debugger Role' button below.

Add Application Insights Snapshot Debugger Role




If the problem persists, please create a support ticket or send us an email directly. snapshothelp@microsoft.com

[Troubleshooting documentation](#)

For all inquiries please include this correlation id: **w7lqauio**



Snapshot Debugging

- Where are snapshot debug images?
 - Failures -> Exceptions
 - Click the Count look for the Icon 

Dashboard > CSCIE94-AppInsightsDemo - Failures > End-to-end transaction details

End-to-end transaction details

CSCIE94-AppInsightsDemo

Search results

Filtered on timestamp > 2/25/2020, 8:3...

timestamp < 2/25/2020, 9:0...

client_Type != ...

with Exception Exception


Suggested






2/25/2020 8:44:34 PM

<<

 Search results  Learn more  Copy link  Feedback ▾

End-to-end transaction

Operation ID: 7e78bc906108ce4b85d5b464fd135a00 

EVENT		RES.	DURATION	0 2 MS 4	
▼ 	cscie94-appinsightsdemo POST Customers/CreateCustomers	500	9.7 ms		
	 EXCEPTION System.Exception			 	



Snapshot Debugging

- What can you do with it?
 - Look at the information in the portal
 - Download the snapshot
 - Open it in **Visual Studio Enterprise**
 - Use the familiar debugging experience
 - Look at stack traces
 - Variables
 - Etc...



Snapshot Debugging

- Supported Environments
 - Azure App Service
 - Azure Functions
 - Azure Cloud Services
 - Running OS family 4 or later
 - Running Windows Server 2012 R2 or later
 - Azure Service Fabric
 - Azure Virtual Machines
 - On-premises virtual or physical machines
 - Or Windows 8.1 or later



Snapshot Debugging

■ Limitations

- Not supported on Linux
- Interop combined with SDK
 - Looses telemetry and can crash on startup
 - Use codeless snapshot if using interop
 - Use SDK Only
- Consumption Free and Shared Tiers
 - Not supported
- You need Visual Studio Enterprise
 - To view downloaded **diagsession** files



Demo

Snapshot Debugging

`AppInsightsDemoSolution.sln`



Snapshot Debugging





Links & Resources

- Application Insights Overview
 - <http://bit.ly/2SZapib>
- Telemetry Client
 - <http://bit.ly/2wNy38M>
- Custom Events & Metrics
 - <http://bit.ly/2SWVNzV>
- Troubleshooting Snapshot Debugging
 - <http://bit.ly/2VnVNe0>
- Live Monitoring Authentication using AzureAD
 - <http://bit.ly/3HrgsW7>



Links & Resources

- Configuration Settings
 - <http://bit.ly/3uRbARK>
- Custom Metrics
 - <http://bit.ly/2wLbj9j>
- Features
 - <http://bit.ly/3pphWUA>
 - <http://bit.ly/37ZQBzF>