



Azure Monitor

Gain visibility into your apps
with Azure Application Insights

Randy Pagels

Sr. Customer Success Manager | App Dev

Microsoft US Healthcare & Life Sciences

Review of news

GitHub Universe 2021

<https://www.githubuniverse.com/>

The global developer event!!!

On Demand

Wherever you are on your GitHub journey, our stacked catalog of on demand sessions will help you dive deeper. Register for free access to the full library.

Interactive

Get hands on with the people who write the code that helps you build what you want through demos, Q+As, and roundtables. Register for free to save your spot.

Sessions on demand



Visual Studio 2022

<https://visualstudio.microsoft.com/vs/>



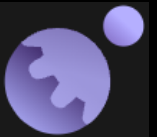
Scalability and reliability of the **64-bit Visual Studio 2022** that scales to the large and complex solutions. Faster and more responsive code editing, solution loading, and branch switching experience.



Use the **most productive edit/debug loop ever** with **Hot Reload**. Get to the code you need with faster code searching and code navigation. Debugging and profiling tools that get you from problem to code faster.

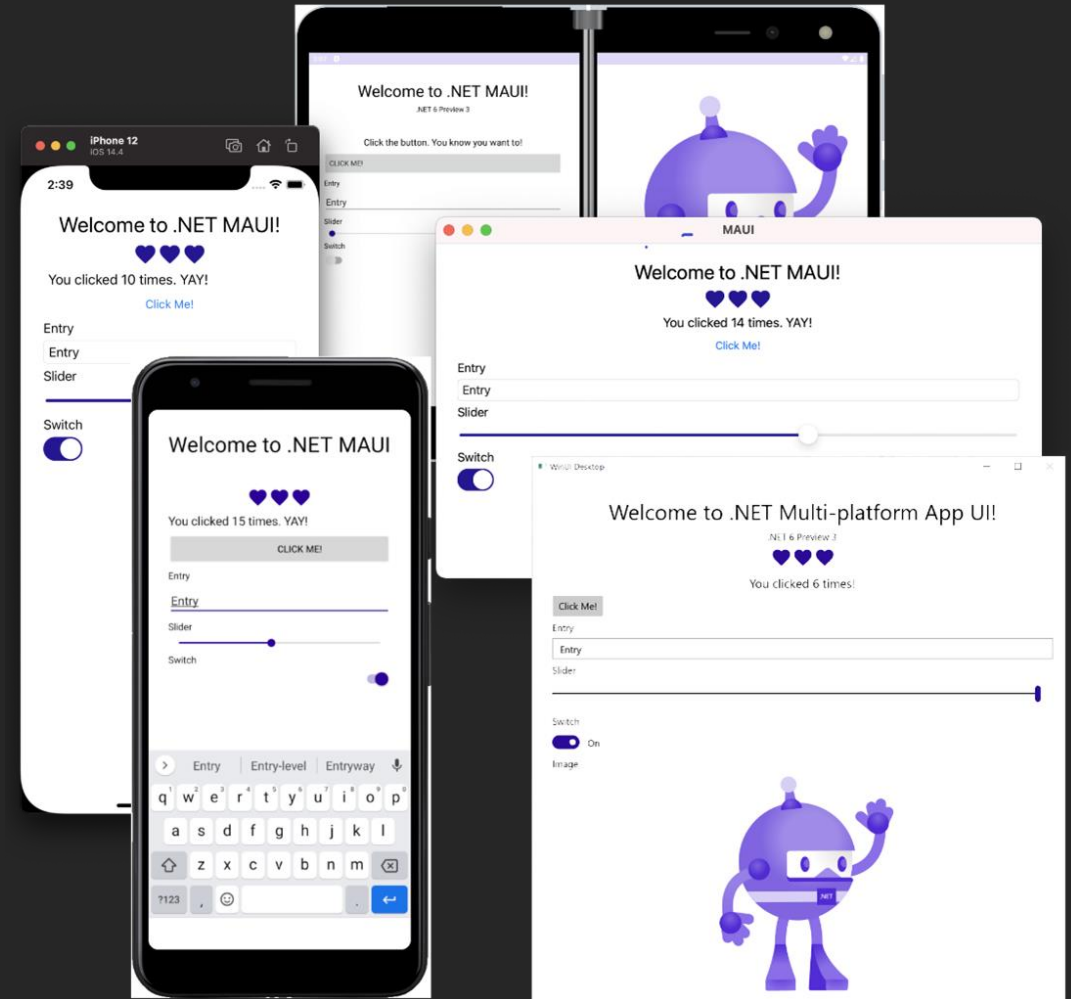


The latest .NET 6 and C++ 20 tooling. Build, debug, and test apps that run anywhere from IoT, containers, cloud, desktop, games and more.



Integrated Git and GitHub Actions workflows. Code with confidence with AI-powered code suggestions from IntelliCode. Realtime coding collaboration with LiveShare.

Available Now!



Try it out today! [VS 2022 download](#)

[Azure Blog VS 2022 Roadmap.](#)

.NET Conference 2021

<https://www.dotnetconf.net/>

The global .NET 6 launch!!!

Day 1

Day one is all about the big news, .NET 6!

Day 2

Day two is where we dive deeper into all the things you can do with .NET.

Day 3

Day three continues our all day and night broadcast with speakers around the world.

Sessions on demand

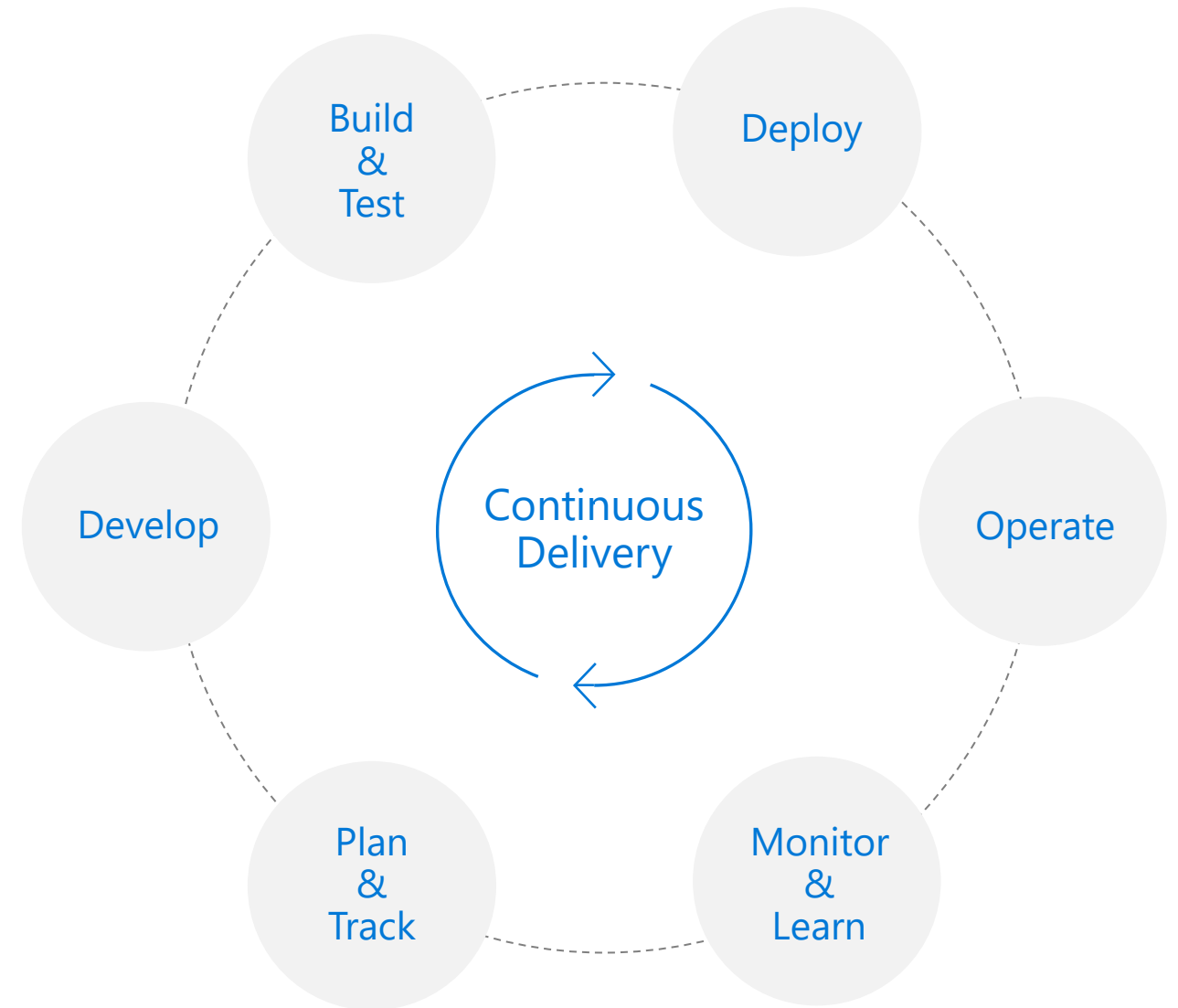


What is DevOps?

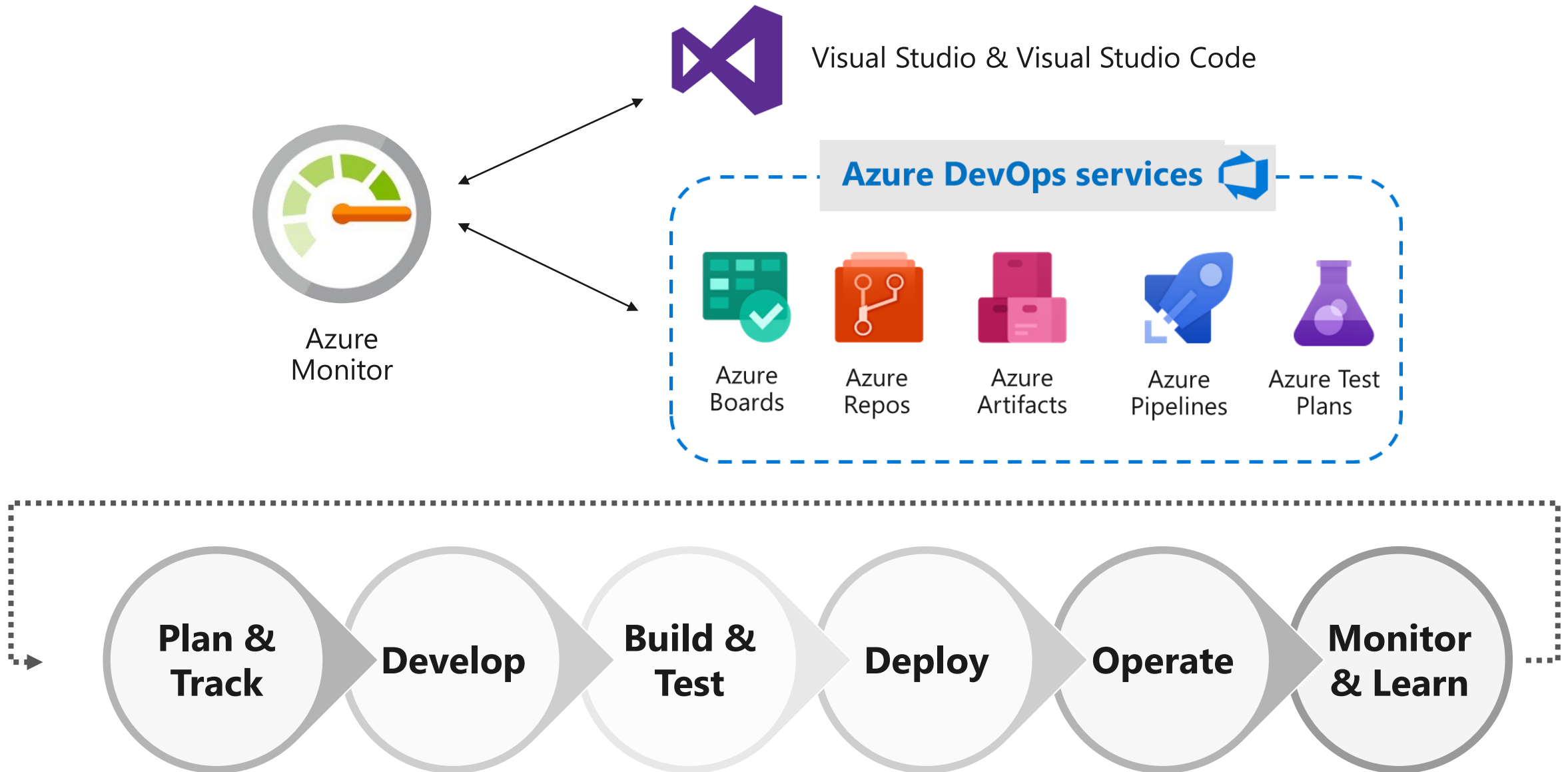
People. Process. Products.



DevOps is the union of **people**, **process**, and **products** to enable continuous delivery of **value** to your end users.



Continuous Monitoring (CM) for Azure DevOps



Azure DevOps

Plan smarter, collaborate better, and ship faster with modern dev services



Azure Boards

Deliver value to your users faster using proven agile tools to plan, track, and discuss work across your teams.



Azure Pipelines

Build, test, and deploy with CI/CD that works with any language, platform, and cloud. Connect to GitHub or any other Git provider and deploy continuously.



Azure Repos

Get unlimited, cloud-hosted private Git repos and collaborate to build better code with pull requests and advanced file management.



Azure Test Plans

Test and ship with confidence using manual and exploratory testing tools.



Azure Artifacts

Create, host, and share packages with your team, and add artifacts to your CI/CD pipelines with a single click.

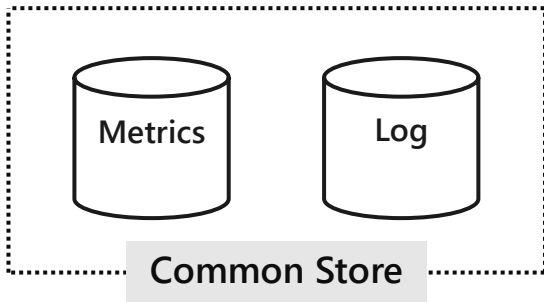


Azure Lab Services

Self-service DevTest Environments

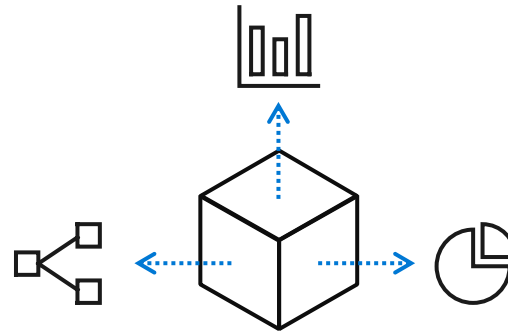
Azure Monitor

Full observability for your infra, app and network



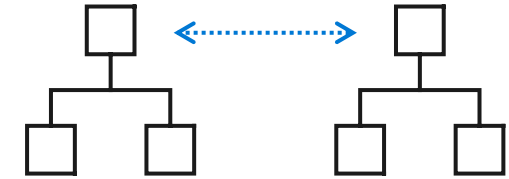
Unified Monitoring

A common platform for all metrics, logs and other monitoring telemetry



Data Driven Insights

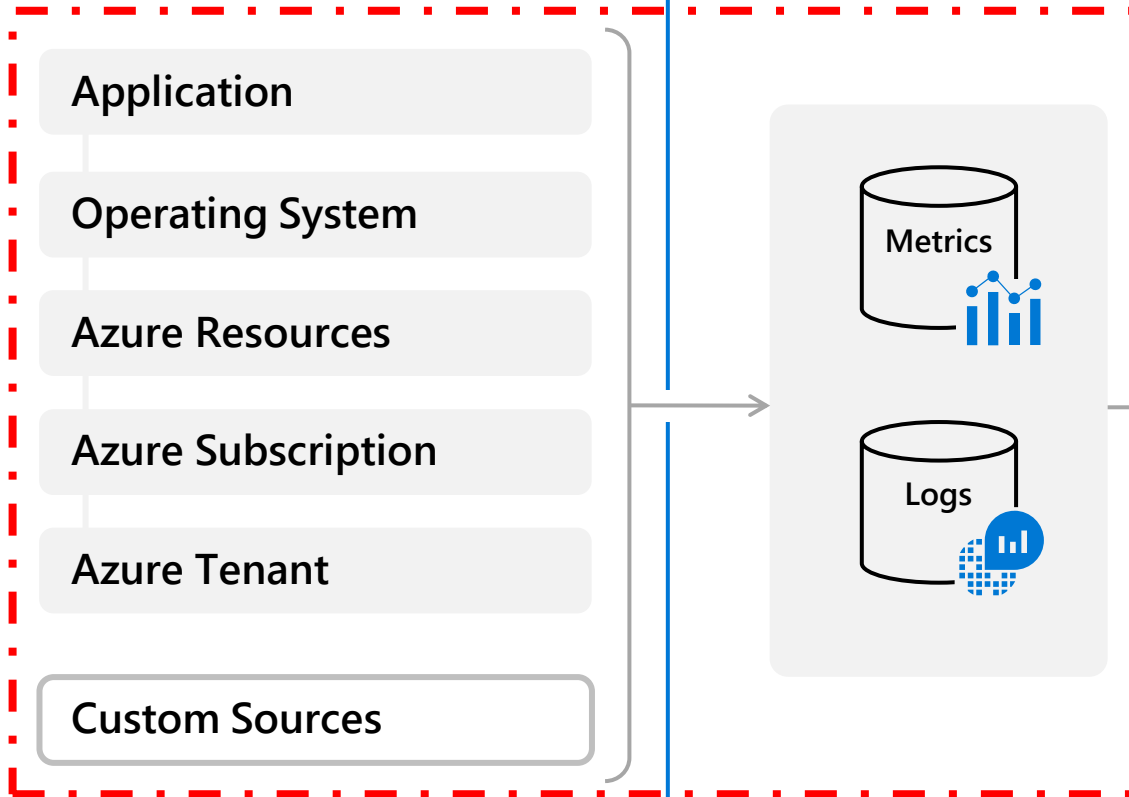
Advanced diagnostics and analytics powered by machine learning capabilities



Workflow Integrations

Rich ecosystem of popular DevOps, issue management, SIEM, and ITSM tools

Unified Monitoring



Insights



Application



Container



VM



Monitoring
Solutions

Visualize



Dashboards



Views



Power BI



Workbooks

Analyze



Metrics Explorer



Log Analytics

Respond



Alerts



Autoscale

Integrate



Event Hubs



Logic Apps

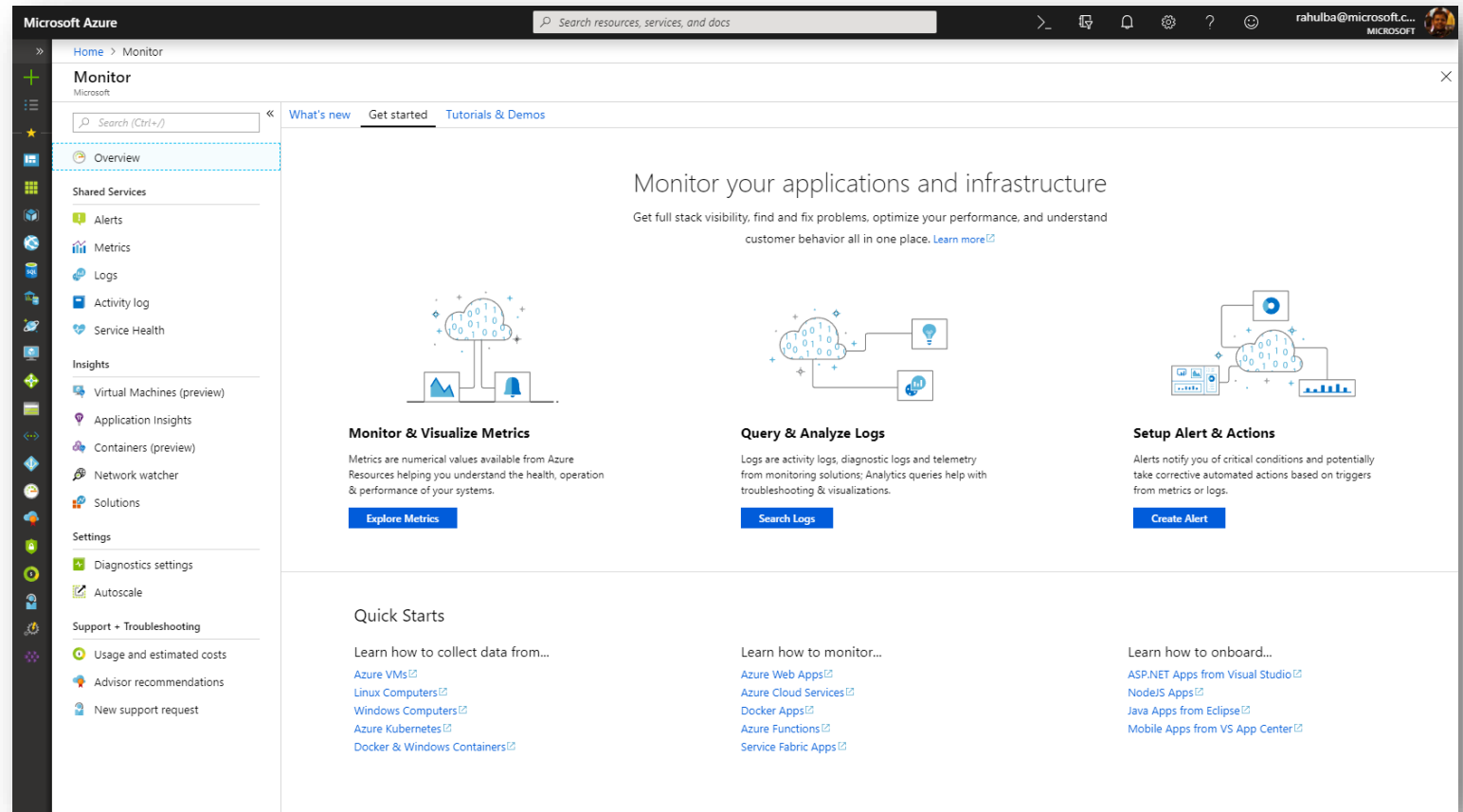


Ingest &
Export APIs

Unified Monitoring



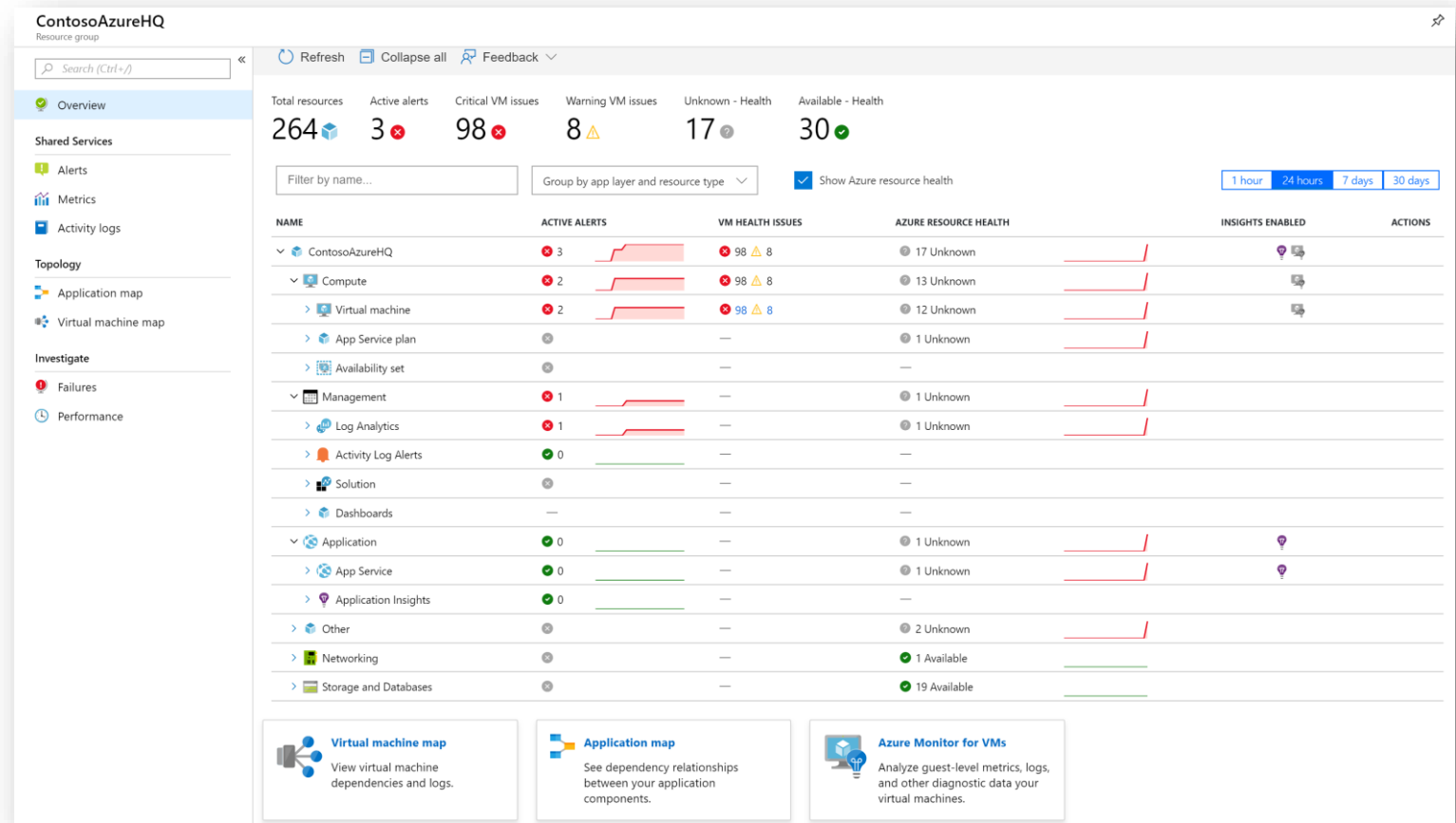
- One Metrics, One Logs, One Alerts across Azure/on-prem resources
- Unified offering with App Insights & Log Analytics as integrated features
- Integration into native Azure resource blades
- Ability to send custom metrics & custom logs



Full Stack Visibility in Resource Groups



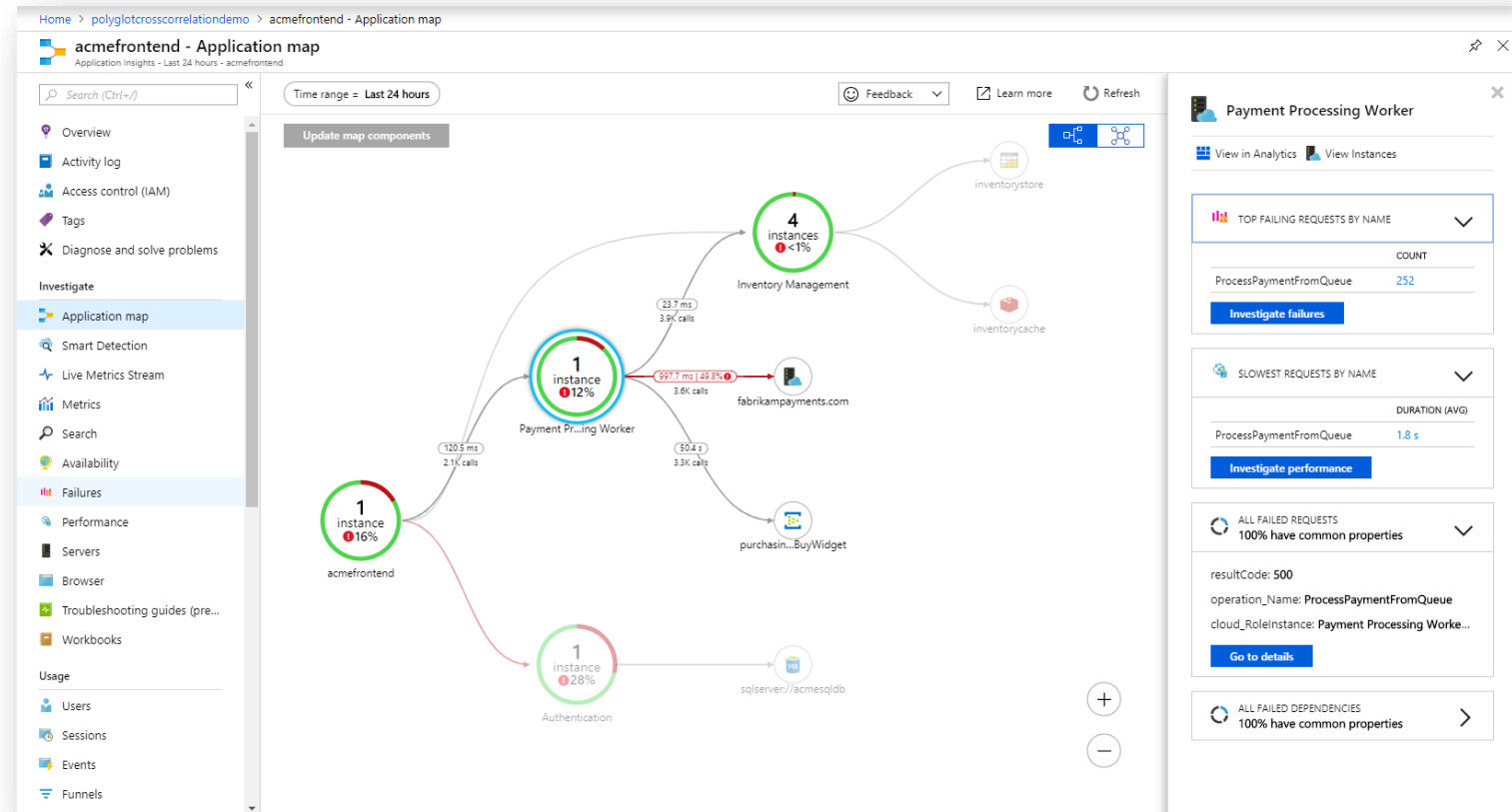
- ➔ Monitor health state of all resources
- ➔ See alerts firing across app & infra
- ➔ Jump to Application Map or VM Map
- ➔ Drill down into failures or perf issues



Diagnose E2E issues with Application Insights



- ➔ Monitor apps in .NET, JS, Java, Node.js or any language with OSS SDKs
- ➔ Visualize server/client connections & dependencies with App Map
- ➔ Track E2E distributed transactions (including for Python & Go)
- ➔ Drill down to code-level with Snapshot Debugging & Profiling
- ➔ Understand end-user cohorts, behavior & engagement for planning



Integration with Monitoring & SIEM Tools



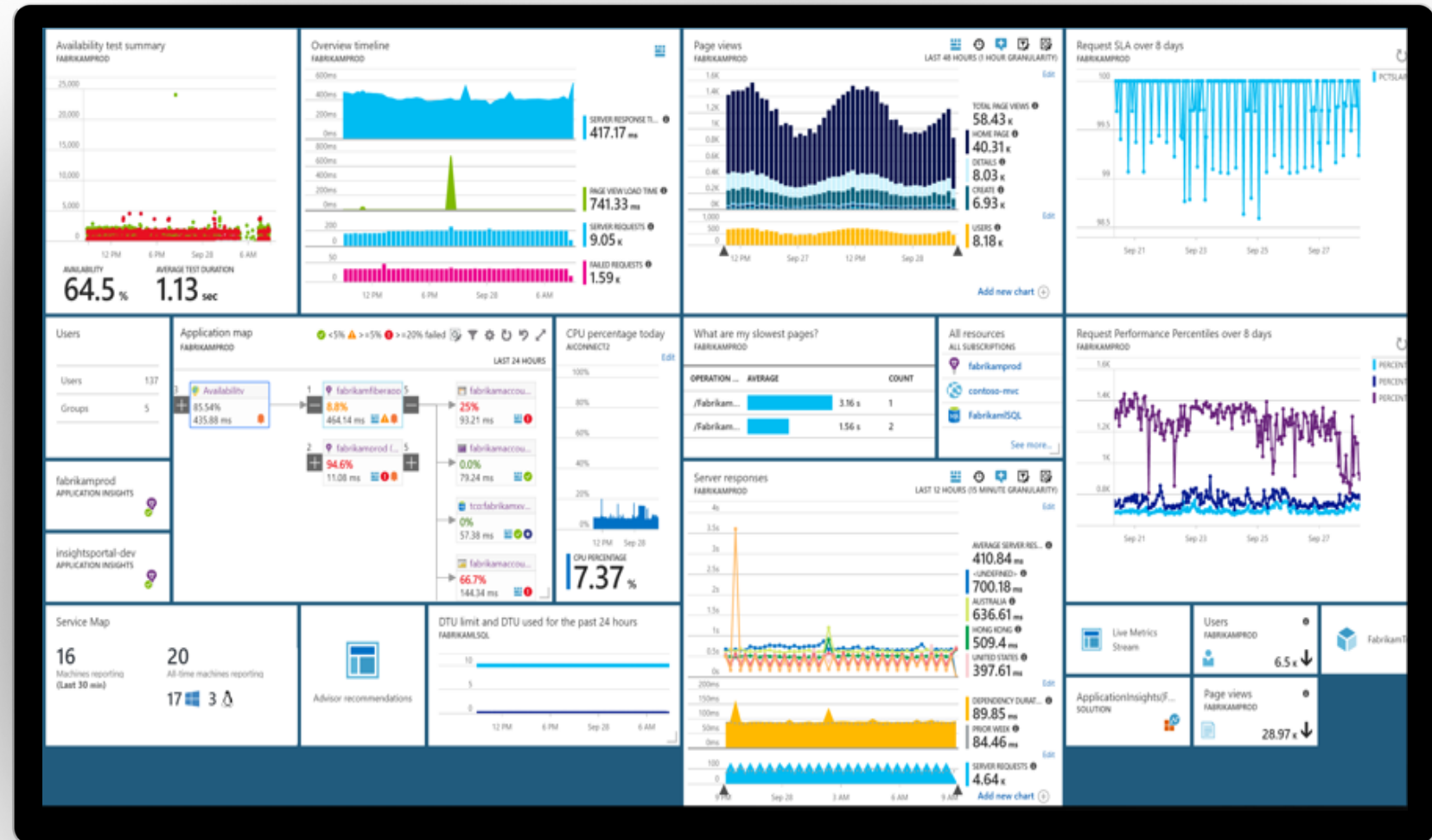
- Azure Monitor is best for Azure, and provides both APM & SIEM capabilities
- Open and extensible to continue using your favorite tools & solutions
- Integrate your existing APM/Monitoring solutions with Azure Monitor
- Route telemetry to your SIEM solutions for analytics & security management



Application Insights

Get actionable insights through application performance management and instant analytics

- ➔ **Visibility** – Get the big picture with monitoring across App & Infra, send alerts & notifications, and visualization & collaboration.
- ➔ **Insights** – Find & fix problems. Detect and diagnose exceptions and application performance issues
- ➔ **Integration** – Seamlessly integrate with your DevOps pipeline using Azure DevOps, GitHub, and our webhooks
- ➔ **Monitor** – Azure websites, including those hosted in containers, websites on-premises and with other cloud providers
- ➔ **Optimization** – Build, measure, learn across performance optimization & profiling. User behavior & customer Insights.
- ➔ Get started from within Visual Studio, or monitor existing apps without redeploying



Application Insights ecosystem

Application Insights SDK and Supported Languages / Loggers

Ingestion



Application Insights

Open Source SDKs
Status Monitor
Azure Extensions



SCOM
MP



VS App
Center

Open
Schema

Exploration



Microsoft Azure Portal

Azure Monitor
Application Map
Live Metrics Stream
Profiler & Debugger



Visual Studio IDE

Analytics Portal

Export & Correlation



OMS Connector



Power BI



Microsoft Flow



Logic Apps



Blob storage



Stream Analytics

Data Access REST APIs



Azure
DevOps

Support (Cloud/On-Premises/Hybrid)

Officially Supported

C#/VB.NET
Java
JavaScript
Node.JS

Community Supported

PHP
Python
Ruby

Platforms & Frameworks

ASP.NET & Core
J2EE
Android & iOS
Azure App & Cloud Services
Azure Functions
Azure Service Fabric
Docker & Kubernetes

CMS

Drupal
Joomla
SharePoint
WordPress
Orchard

Logging Frameworks

Ilooger
Log4Net & NLog
Java, Log4J & Logback
Logstash plugin
System.Diagnostics
Semantic Logging (SLAB)
Azure Monitor

Application Insights ecosystem

Application Insights SDK and Supported Languages / Loggers

Instrumentation for deployed Apps

Azure VM and Azure Virtual machine scale sets
Azure App Service
Azure Functions
Asp.Net for apps already live

Instrumentation through code SDK

Asp.Net
Asp.Net Core
Andriod (App Center)
iOS (App Center)
Java EE
Node.JS

Python
Universal Windows apps (App Center)
Windows Desktop apps, services, and worker roles
React
React Native

Application Insights: Pricing

Data Ingestion: 5 GB/month

\$2.76 GB/month

Data Retention: 31 days

\$0.12 GB/month

Multi-step web tests:

\$10 per test/month

Ping web tests:

Free

Active Sampling

Automatically adjusts the volume of telemetry sent from the SDK in your Asp.Net / Asp.Net Core app and from Azure Functions. This is the default sampling.

Fixed-rate Sampling

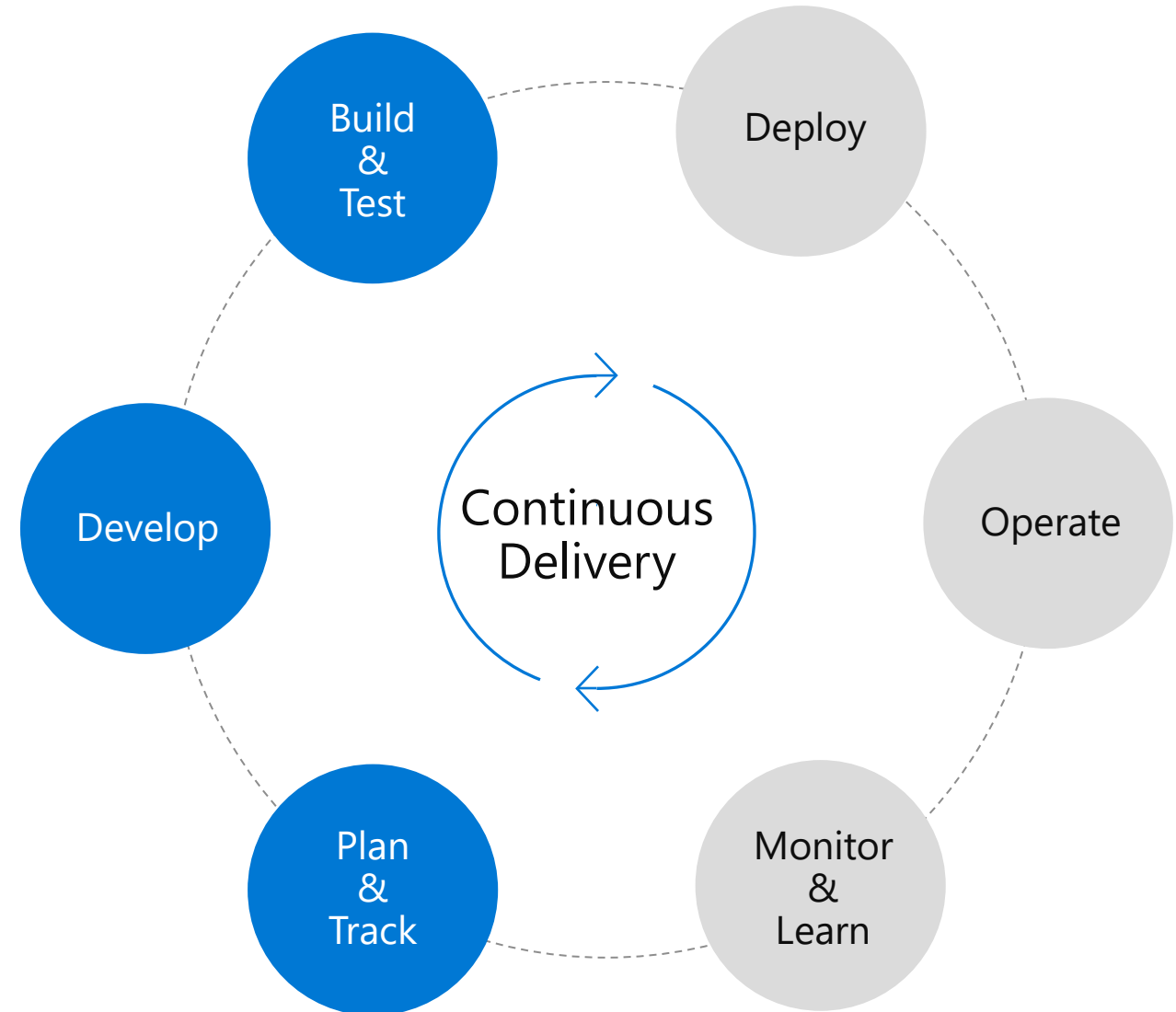
Reduces the volume of telemetry sent from both your Asp.Net or Asp.Net Core or Java server and from browsers. You set the rate.

Ingestion Sampling

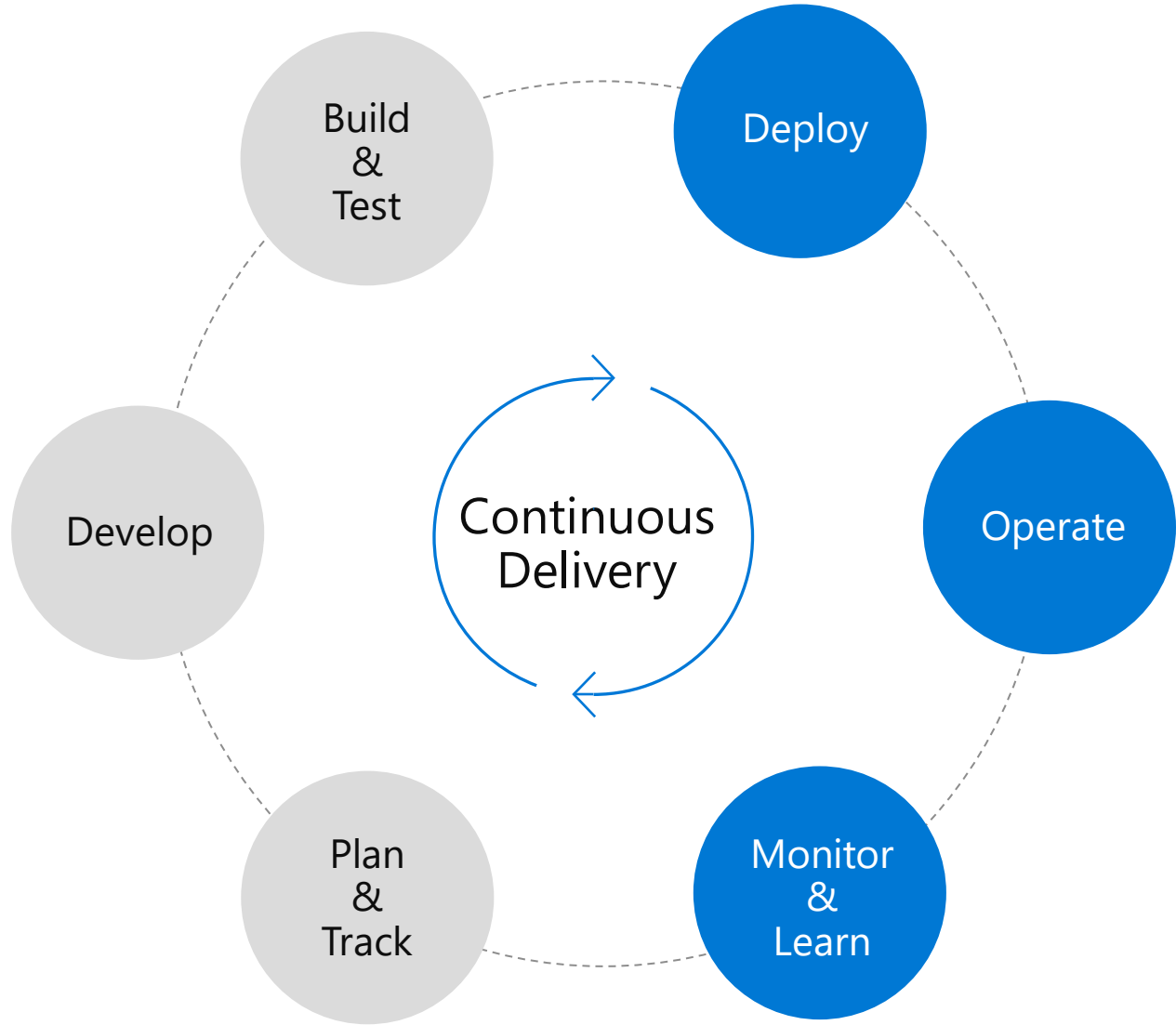
App Service endpoint. Discards some of the telemetry that arrives from your app, at a sampling rate that you set. Does not apply when other types of sampling are in operation.

Continuous Monitoring – Development Phase

- ➔ Onboard through OSS SDKs, Packages or APIs
[Any App | Any Dev | Any Platform](#)
- ➔ Native [IDE integrations](#) in VS (.NET) and VS Code (Node.js)
- ➔ Track [production telemetry](#) in VS through CodeLens integration
- ➔ Local [debug session](#) Diagnostics & Performance Monitoring in VS
- ➔ Run [Load Tests](#) with Azure Load Tests & UI E2E using Playwright Synthetic Monitoring
- ➔ File & track [bugs/work items](#) in Azure Boards from Azure Monitor



Continuous Monitoring – Operations Phase



- ➔ Onboard through Azure Pipelines [CI/CD](#) or [DevOps Projects](#) or GitHub Actions
- ➔ Setup Pre- or Post-Deployment [Quality Gates](#) with Azure Monitor Metrics/Alerts
- ➔ [Monitor & Manage](#) Health, Availability, Reliability & Performance of App & Infra
- ➔ Run [code-level analyses](#) in production with Snapshot Debugging & Profiling
- ➔ Setup Alerts & Notifications with [automated actions & remediations](#)
- ➔ Continuously optimize Perf & Usage metrics with ["Build Measure Learn"](#)

Demo

Continuous Monitoring

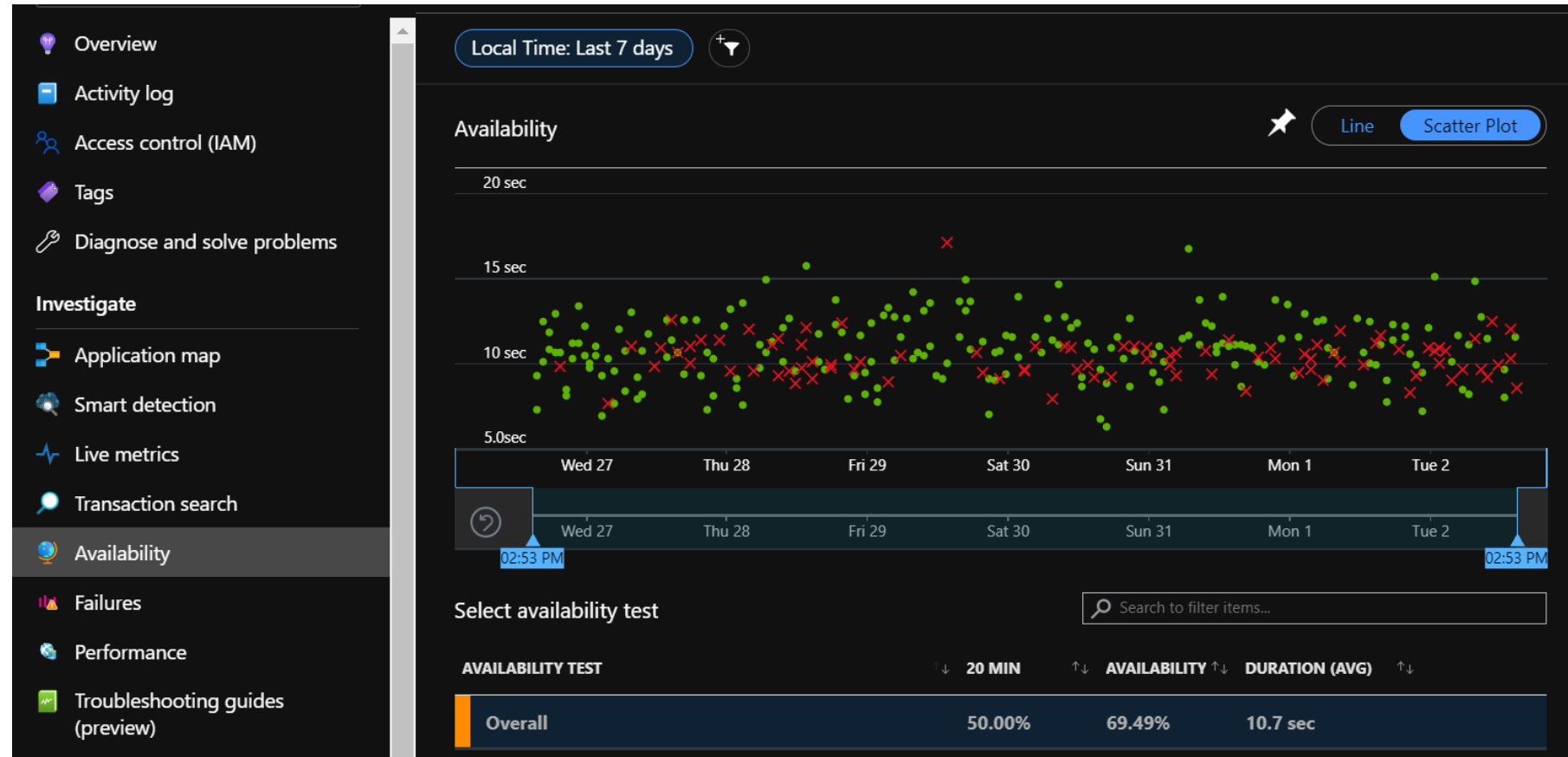
Visual Studio
Azure DevOps
Azure Monitor
Azure Application Insights



Looking ahead

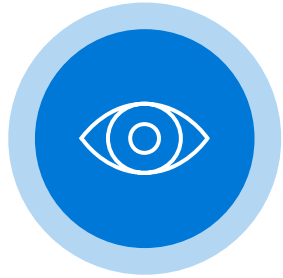
Ceruleoscope

- Ceruleoscope is an open source JavaScript library that facilitates custom web app availability testing by combining Playwright and Application Insights that allow tests to run as a scheduled Azure Function, with minimal effort.
- Playwright + Azure Functions + Application Insights Availability Testing



Learn More: <https://github.com/microsoft/Ceruleoscope>

Application Insights: Recap



Get the big picture

- Azure Metrics & Dashboards
- Alerts & Notifications
- Synthetic Monitoring
- Live Metrics Stream
- Application Map v2
- Workbooks
- Flow/Logic Apps Integration
- Azure DevOps/RM Integration
- Data Access APIs & Export



Find & fix problems

- Smart Detection
- E2E Transaction Tracing
- Failure Diagnostics & Snapshot Debugging
- VS CodeLens Integration
- Advanced Analytics with Machine Learning
- Azure Monitor Auto-scaling



Build, measure, learn

- Performance Monitoring & Profiling
- Custom Instrumentation
- User/Session/Event Monitoring
- Cohorts & Funnels
- Customer Retention
- User Flows
- Impact Correlation

Resources

The MTC Transformation Academy – <https://aka.ms/mtcacademy>

Microsoft Learn - <https://docs.microsoft.com/en-us/learn/>

Download Visual Studio 2022

<https://visualstudio.microsoft.com/vs/>

Learn more about Visual Studio – <https://visualstudio.microsoft.com/>

Learn more about Azure Monitor – <https://aka.ms/AzureMonitor>

Learn more about Azure DevOps – <https://azure.com/DevOps>

Monitoring Documentation – <https://aka.ms/MonitoringDocs>

Thank you!

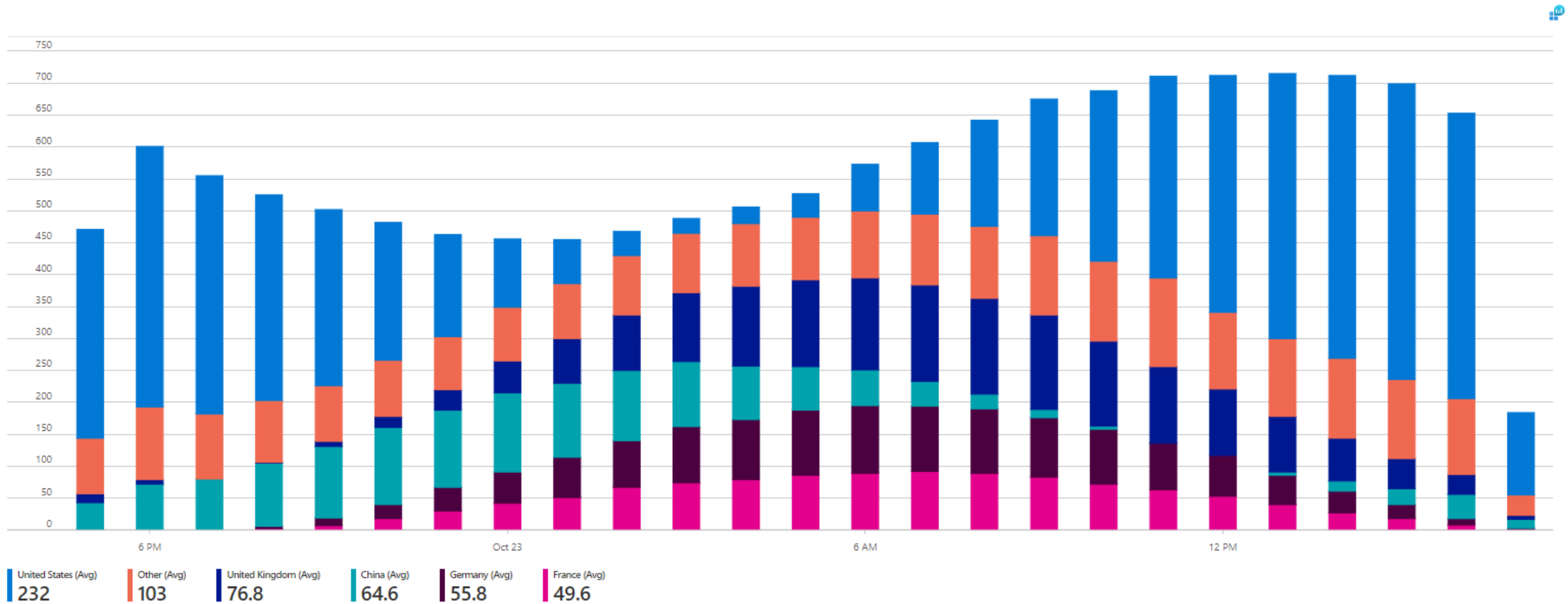
Application Insights – User Flows



Application Insights – Users

6.61k users

Chart Type
Bar chart



Application Insights – Users

PROPERTIES ⓘ

6 selected



Country or region ↑↓ Counts ↑↓

United States	2.62K
United Kingdom	855
China	716
Germany	607
France	515
Other	1.26K

Performance ↑↓ Counts ↑↓

<undefined>	6.51K
1sec-3sec	79
500ms-1sec	10
3sec-7sec	7
7sec-15sec	4
Other	2

Operating system ↑↓ Counts ↑↓

Windows 10	5.38K
Windows 7	2.03K
Mac OS X 10.11	1.46K
<undefined>	2

City ↑↓ Counts ↑↓

Bothell	2.53K
Peterborough	855
Hohhot	715
Villingen-Schwenningen	606
<undefined>	536
Other	1.33K

Browser version ↑↓ Counts ↑↓

Chrome 60.0	4.45K
Safari 9.1	1.46K
Chrome 59.0	1.19K
Firefox 54.0	1.15K
Edge 15.15063	1K
Other	666

Device model ↑↓ Counts ↑↓

Other	6.61K
<undefined>	2

Application Insights – Live Metrics

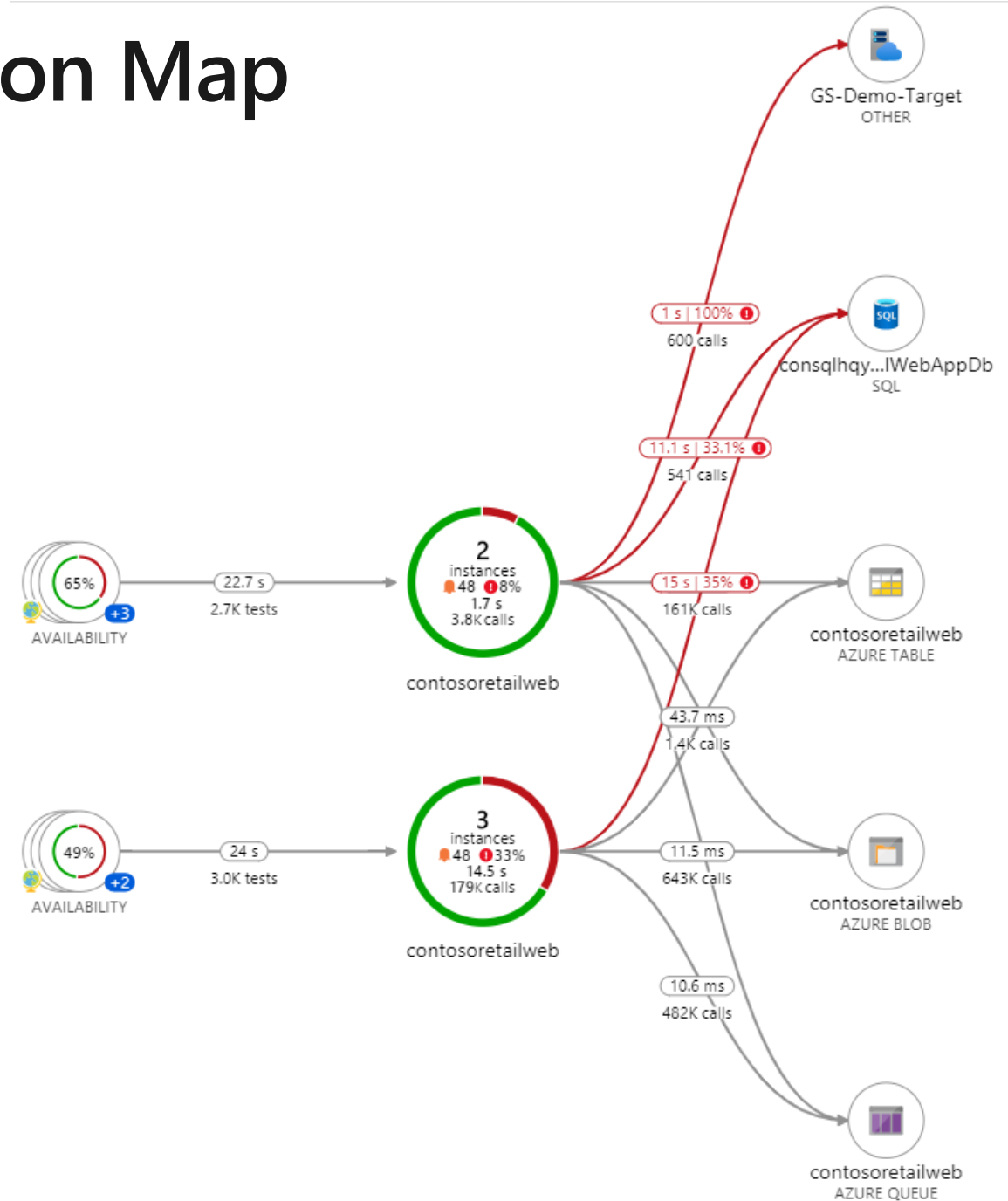
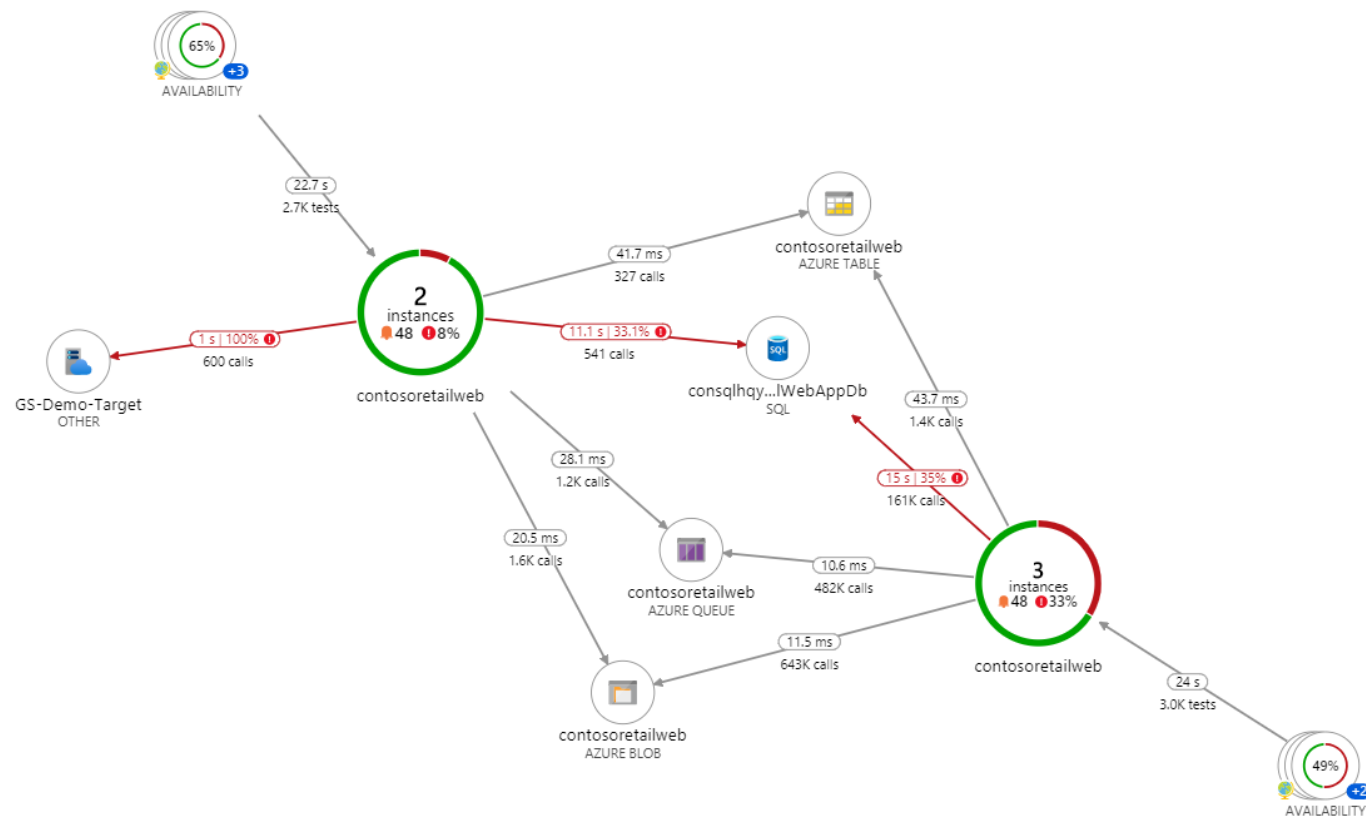


Sample telemetry

5:17:45 PM Trace	@RETAILVM01
Application loaded successfully	
5:17:45 PM Dependency 409 4 ms	@RETAILVM01
PUT diagfabrikam01y37ha6 tracestate=az=cid-v1:326c1b24-cd4d-4cf9-b53a-53c85ec754	
5:17:45 PM Trace	@RETAILVM01
New Request Received	
5:17:39 PM Trace	@dw0sdwk000288
New Request Received	
5:17:30 PM Trace	@RETAILVM01
Application loaded successfully	
5:17:30 PM Trace	@RETAILVM01
Application loaded successfully	
5:17:30 PM Dependency 409 4 ms	@RETAILVM01
PUT diagfabrikam01y37ha6	Container=contoso
5:17:30 PM Trace	@RETAILVM01
New Request Received	
5:17:30 PM Dependency 409 5 ms	@RETAILVM01
PUT diagfabrikam01y37ha6 tracestate=az=cid-v1:326c1b24-cd4d-4cf9-b53a-53c85ec754	
5:17:30 PM Trace	@RETAILVM01
New Request Received	
5:17:28 PM Trace	@RETAILVM01
Application loaded successfully	
5:17:28 PM Dependency 409 4 ms	@RETAILVM01
PUT diagfabrikam01y37ha6	Container=contoso
5:17:28 PM Trace	@RETAILVM01

To view details please select a document from the above list

Application Insights – Application Map

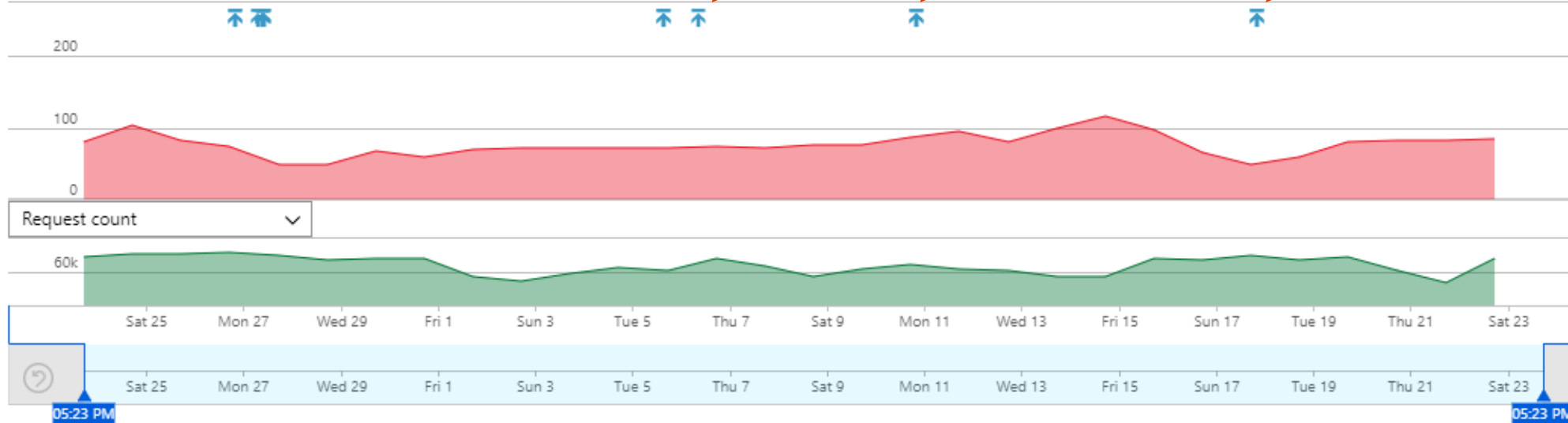


Application Insights – Failures

Operations Dependencies Exceptions Roles

Release annotations

Failed request count



Select operation

Search to filter items...

OPERATION NAME	USERS	↑↓	COUNT (FAILED)	↑↓	COUNT	↑↓	?	PIN
Overall	12		2.35k		1.86M			
UpdateExerciseRecord	-		1.91k		2.16k			
UpdateNutritionRecord	-		353		4.32k			
Playwright-Home	-		29		87.18k			
Playwright-WebAppOffline	-		19		43.57k			
GET Home/Index	11		16		227.47k			

Application Insights – Debug Snapshot

[Download Snapshot](#)

Opens in Visual Studio Enterprise

Call Stack

METHOD

[Managed to Native Transition]

void System.Web.Mvc.Controller.HandleUnknownAction(string actionName)

void System.Web.Mvc.Controller.BeginExecuteCore.AnonymousMethod__152_1(System.IAsyncResult asyncResult, System.Web.Mvc.C...

System.Web.Mvc.Async.AsyncVoid System.Web.Mvc.Async.AsyncResultWrapper.WrappedAsyncVoid<System.Web.Mvc.Controller.Exe...

void System.Web.Mvc.Controller.EndExecuteCore(System.IAsyncResult asyncResult)

System.Web.Mvc.Async.AsyncVoid System.Web.Mvc.Async.AsyncResultWrapper.WrappedAsyncVoid<System.__Canon>.CallEndDeleg...

void System.Web.Mvc.Controller.EndExecute(System.IAsyncResult asyncResult)

void System.Web.Mvc.MvcHandler.BeginProcessRequest.AnonymousMethod__20_1(System.IAsyncResult asyncResult, System.Web.M...

System.Web.Mvc.Async.AsyncVoid System.Web.Mvc.Async.AsyncResultWrapper.WrappedAsyncVoid<System.Web.Mvc.MvcHandler.P...

void System.Web.Mvc.MvcHandler.EndProcessRequest(System.IAsyncResult asyncResult)

void System.Web.HttpApplication.CallHandlerExecutionStep.System.Web.HttpApplication.IExecutionStep.Execute()

Locals

NAME

VALUE

TYPE

Function Arguments

asyncResult	Cannot obtain value of the local variable or ...	System.IAsyncResult
innerState	Cannot obtain value of the local variable or ...	System.Web.Mvc.Controller.ExecuteCoreState

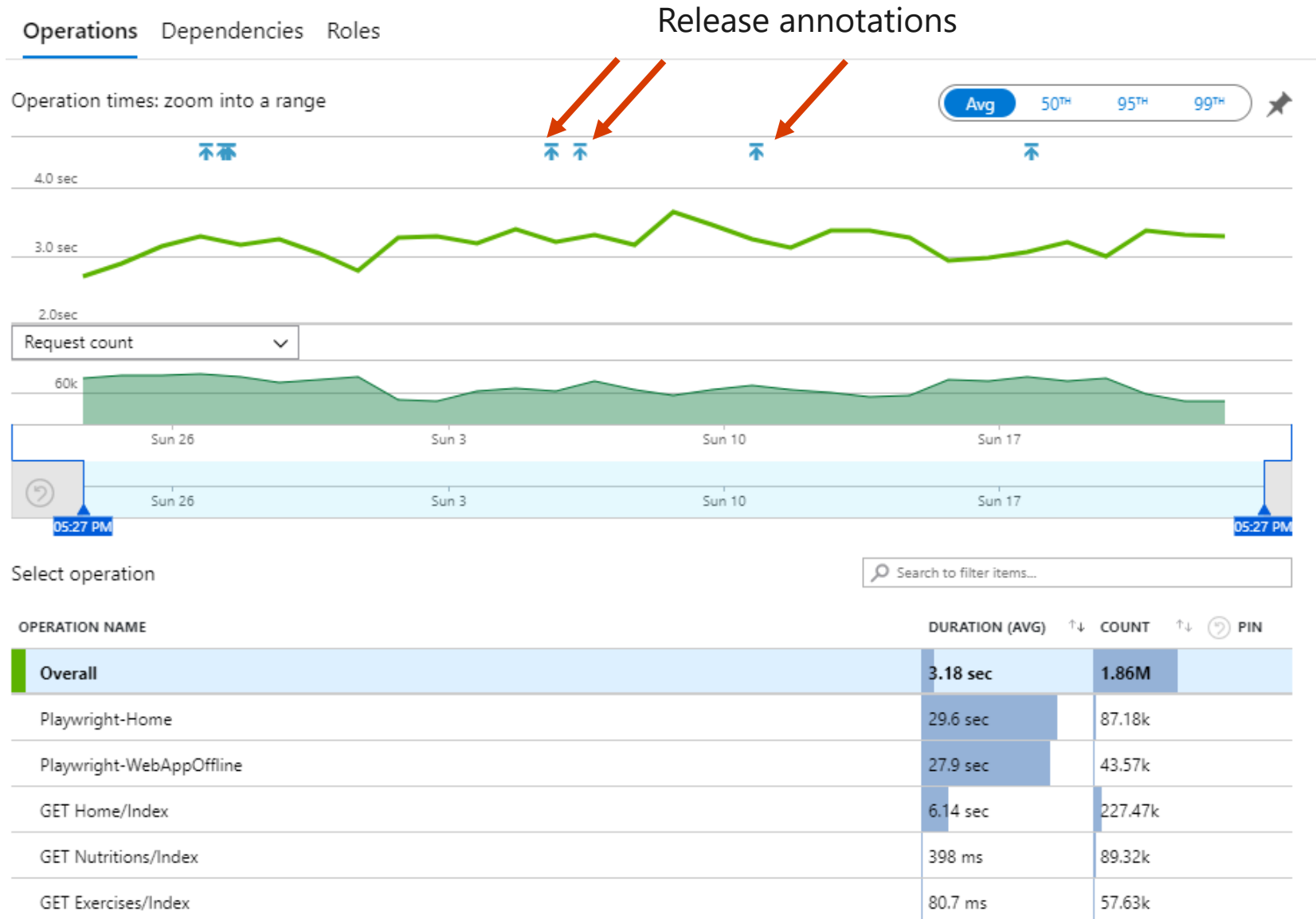
Variables

▲ \$exception	{System.Web.HttpException (0x8000400...	System.Web.HttpException
▶ Data	{System.Collections.ListDictionaryInternal}	System.Collections.IDictionary {System....
ErrorCode	-2147467259	int
ErrorCode	-2147467259	int
HelpLink	null	string
▶ IPForWatsonBuckets	{140730633608423}	System.UIntPtr
InnerException	null	System.Exception
IsTransient	false	bool

Decompiled Code (Preview)

```
        innerState.Controller.HandleUnknownAction(innerState.ActionName);
    }
};
ExecuteCoreState executeCoreState = default(ExecuteCoreState);
executeCoreState.Controller = this;
executeCoreState.AsyncInvoker = asyncActionInvoker;
executeCoreState.ActionName = actionName;
ExecuteCoreState invokeState = executeCoreState;
return AsyncResultWrapper.Begin(callback, state, beginDelegate, endDelegate, invokeState, _executeCoreTag);
}
Action action = delegate
{
    if (!invoker.InvokeAction(base.ControllerContext, actionName))
    {
        HandleUnknownAction(actionName);
    }
};
return AsyncResultWrapper.BeginSynchronous(callback, state, action, _executeCoreTag);
}
catch
{
}
```

Application Insights – Performance



Application Insights – Profiler

Performance Tip:

97.95% of this request was spent in [waiting](#).

Wait for a resource to be available.

[Show me](#)

☒ Hot path 🔥

☐ Framework dependencies

HIDE EVENTS ⓘ

Type in string to hide from the call tree and press ENTER

Add events

[Suggested events](#)

No hidden events.

EVENTS	MODULE	THREAD TIME ↑↓	TIMELINE ↑↓
▼ 🔥.AspNetReq(/)		7809.69 ms	
▼ 🔥.Framework/Library.RtlUserThreadStart	ntdll ⓘ	7691.78 ms	
▼ 🔥.MvcApplication.Application_BeginRequest	fabrikamfiber.web ⓘ	7663.68 ms	
▼ 🔥.Framework/Library.TraceInternal.WriteLine	system ⓘ	7663.68 ms	
🔥.Waiting		7643.93 ms	
▶.TelemetryClient.Flush	microsoft.applicationinsights ⓘ	11.97 ms	
CPU Time		7.64 ms	
▶.ApplicationInsightsTraceListener.Write	microsoft.applicationinsights.tracelistener ⓘ	0.14 ms	
▶.Page_Views_Home_Index_cshtml.Execute	app_web_hse55cmv ⓘ	22.07 ms	
▶.dynamicClass.lambda_method	anonymously hosted dynamicmethods assembly ⓘ	3.64 ms	
CPU Time		1.47 ms	
▶.Page_Views_Shared_Layout_cshtml.Execute	app_web_zbvoxxmx ⓘ	0.62 ms	

Application Insights – Quality Gates

Mercury Health-Release > Release 20190206.2-001

Pipeline Variables History | + Deploy Cancel Approve multiple Refresh Release (old view) Edit release ...

Release

Continuous deployment

for Randy Pagels
2/6/2019, 11:34 AM

Artifacts



MercuryHealth-CI
20190206.2
master

Stages

Dev

✓ Succeeded

2 warnings
on 2/6/2019, 11:36 AM

100%

Staging

✓ Succeeded

4 warnings
on 2/6/2019, 12:05 PM

100%

Load Testing

✓ Succeeded

3 warnings
on 2/6/2019, 12:02 PM

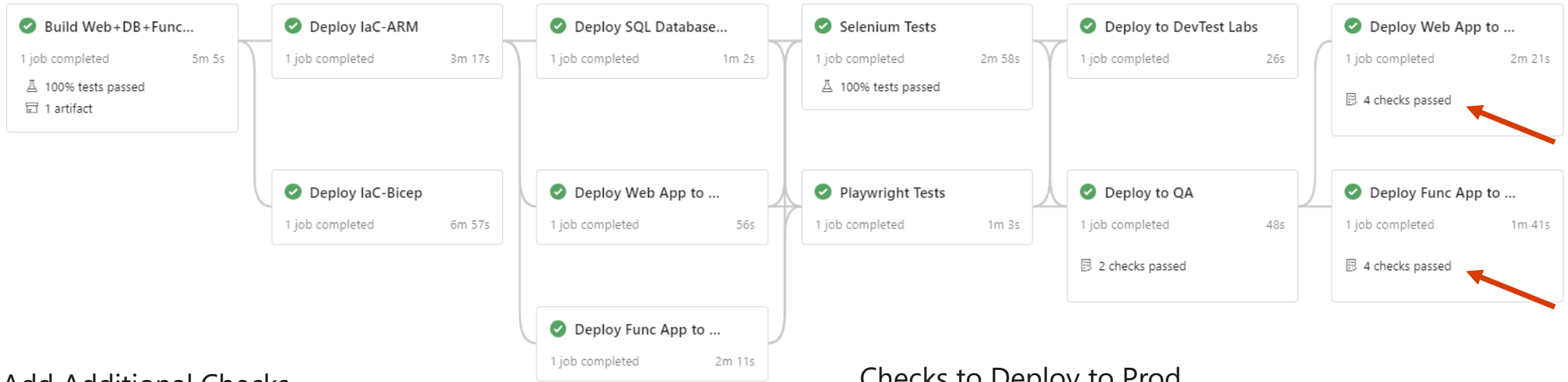
Production

⌚ Pending approval

On Randy Pagels
for 5 days

✓ Approve

Application Insights – CI/CD



Add Additional Checks

- ☒ **Branch control**
Allow deployments based on branches linked to the run
- ☐ **Business Hours**
Ensure the deployment is started in a specific time window
- ☐ **Evaluate artifact (preview)**
Ensure artifacts adhere to custom policies (container images only)
- ☐ **Exclusive Lock**
Limit access to this resource to only a single stage at a time
- ☐ **Invoke Azure Function**
Invoke an Azure Function
- ☐ **Invoke REST API**
Invoke a REST API as a part of your pipeline.
- ☐ **Query Azure Monitor alerts**
Observe the configured Azure Monitor rules for active alerts

Checks to Deploy to Prod

Waiting

RejectApprove

Approval
Waiting **Prod**
Environment

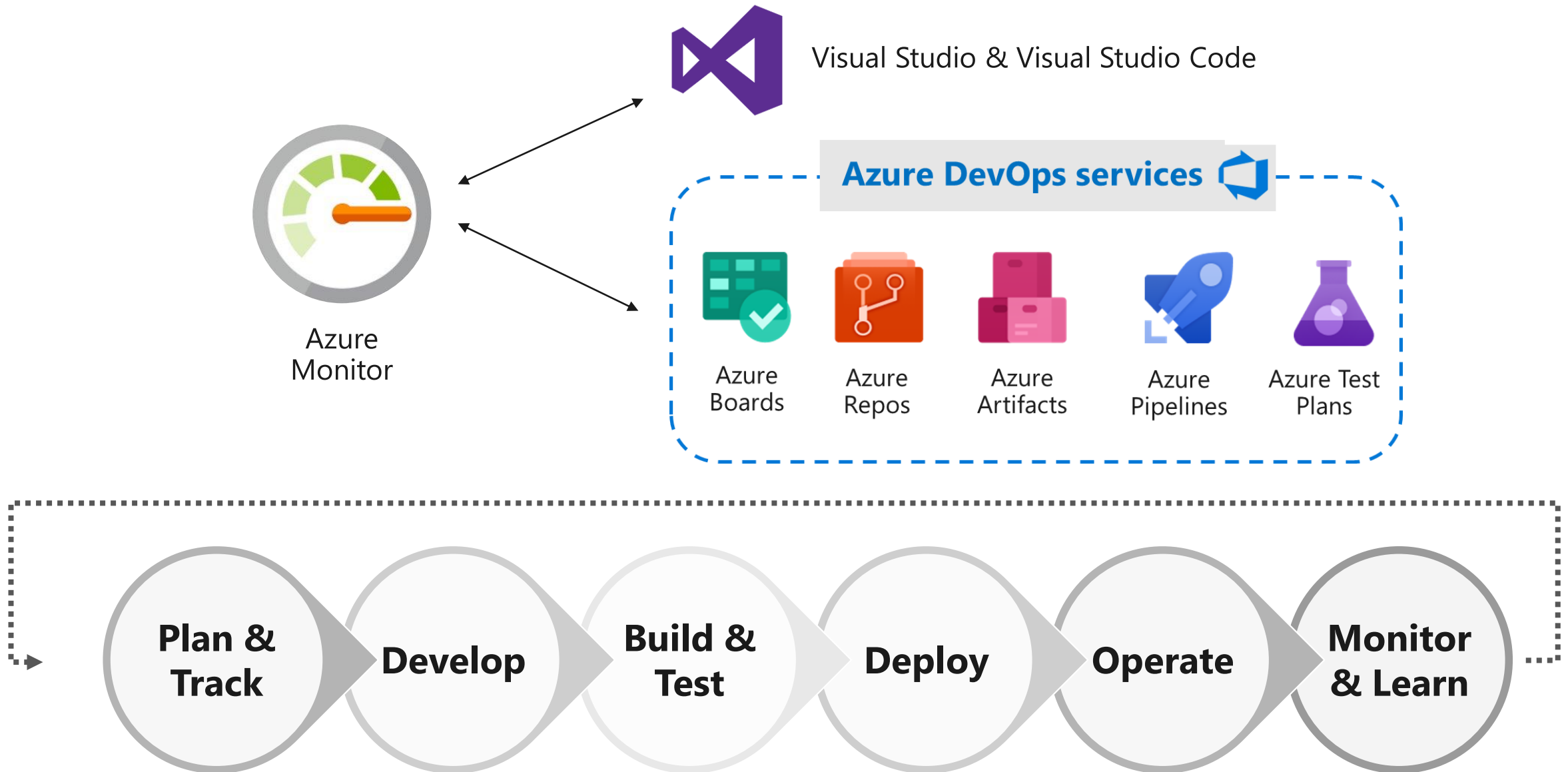
Others

Azure Function: USDA by F...
Passed • Reevaluating in 5m **Prod**
Environment

Azure Function: USDA by I...
In progress • Reevaluating in 5m **Prod**
Environment

Query Azure Monitor alerts
Passed • Reevaluating in 5m **Prod**
Environment

Continuous Monitoring (CM) for Azure DevOps



Better practices

- Ensure apps have monitoring enabled via SDKs, Azure Pipelines, DevOps Projects, or VM Extensions
- Ensure your infrastructure (VMs, Containers, Network) also has monitoring enabled with metrics & diagnostics logs
- Augment your release pipelines with continuous monitoring
- Bucket Azure resources in Resource Groups for full visibility
- Setup actionable alerts with notifications and/or remediations
- Shares dashboards & workbooks with RBAC
- Use 'Infrastructure as Code' to monitor/configure at scale
- Continuously optimize with 'Build Measure Learn'

Learn More: <http://aka.ms/AzMonOverview>

