



Azure Spring Cloud

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Principal PM Architect --- Java on Azure

September 2020

On Kubernetes

You do not have to learn or
manage Kubernetes

Spring – trusted and growing



75%

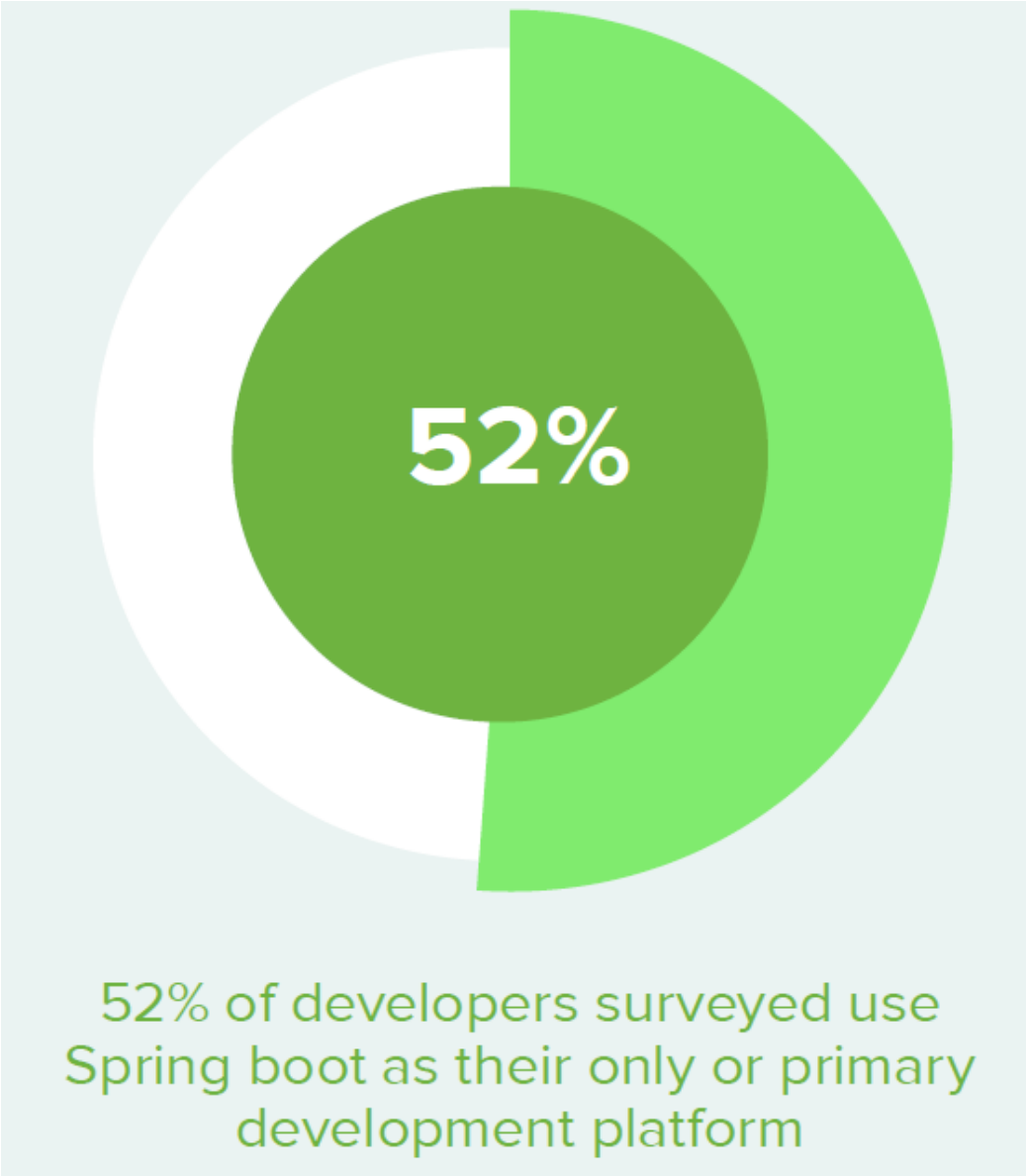
of respondents expect Spring Boot usage to grow over the next 2 years



82%

of respondents say Spring Boot is growing because of new project starts

| Nov 2018 | Nov 2019 |
|---|---|
| 52.5 Million+ Spring Boot downloads per month | 95 Million+ Spring Boot downloads per month |

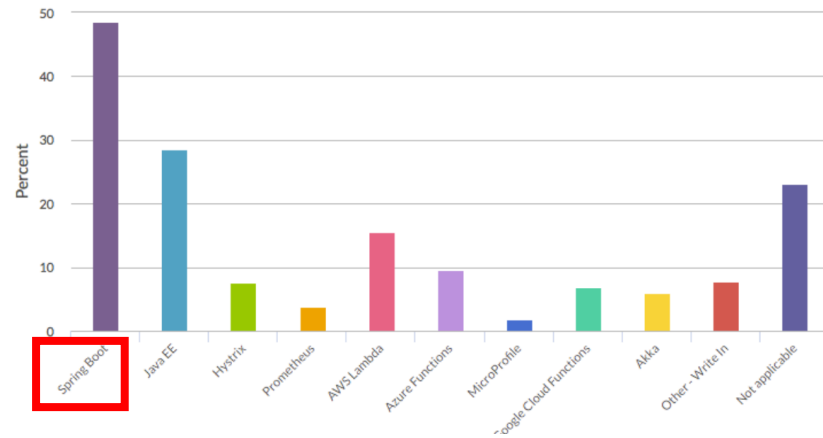


52%

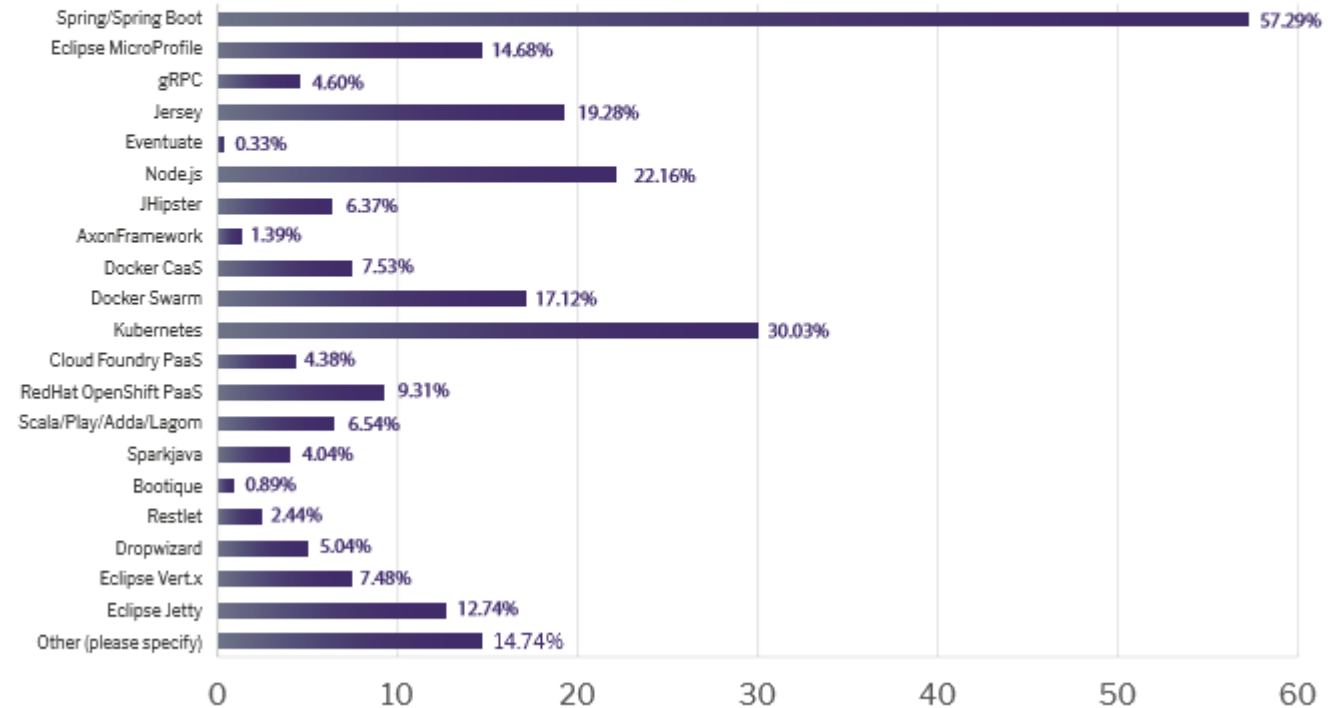
52% of developers surveyed use Spring boot as their only or primary development platform

Why Spring and Spring Cloud Apps

11. What frameworks or tools do you use to build microservices?

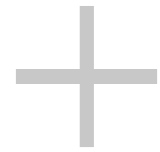


IF YOU ARE BUILDING MICROSERVICES, WHAT FRAMEWORKS ARE YOU EMPLOYING? SELECT ALL THAT APPLY.



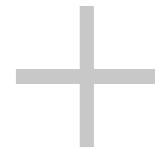
“The Spring and Spring/Boot frameworks (57%) dominate today when it comes to building microservices ” – Jakarta EE Developer Survey

Jakarta EE Developer Survey





Microsoft



vmware[®]

The world's leading brands run on Azure











Azure



Spring on Azure

cloud.spring.io/spring-cloud-azure/

| | | | |
|---|---|--|---|
|  Spring Cloud |  Spring Data |  Spring Security |  Spring Resource |
| App Configuration Event Hubs Service Bus Storage Redis Functions | SQL Database MySQL PostgreSQL Maria DB Cosmos DB <ul style="list-style-type: none">• SQL• MongoDB• Cassandra• Gremlin | Active Directory (AAD) AAD B2C | Storage |
|  R2DBC | |  Spring Cache |  Spring Messaging |
| SQL Database PostgreSQL MySQL | | Redis Cache | Service Bus |
| | |  Micrometer | Monitor (includes Log Analytics) |

Spring-based Microservices

Spring Boot

Build anything

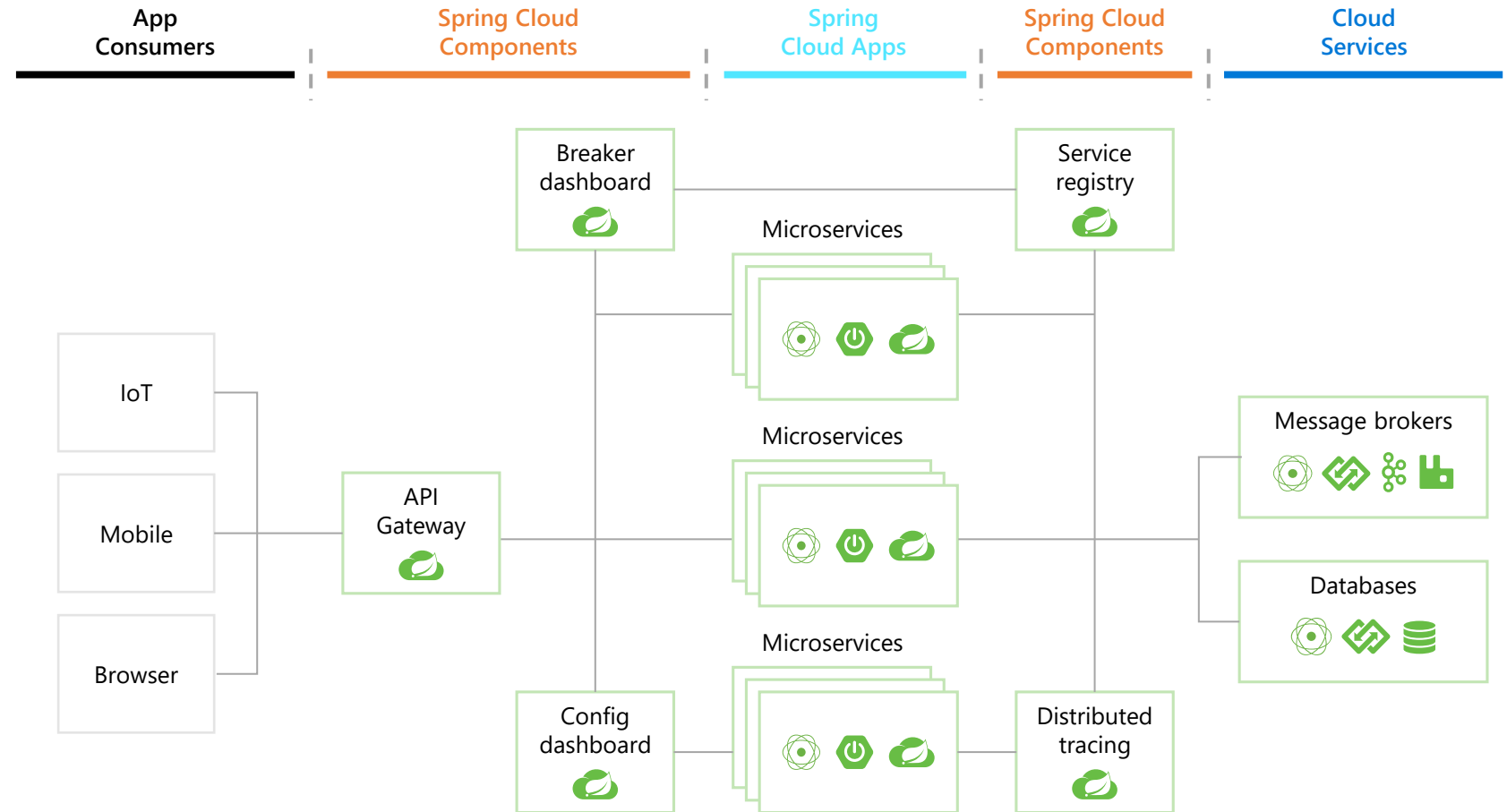
designed to get you
up and running as
quickly as possible,
with minimal upfront
configuration of
Spring

Spring Cloud

Coordinate anything

provides a set of
tools that makes
communication
between
microservices
easier

Spring-based Microservices

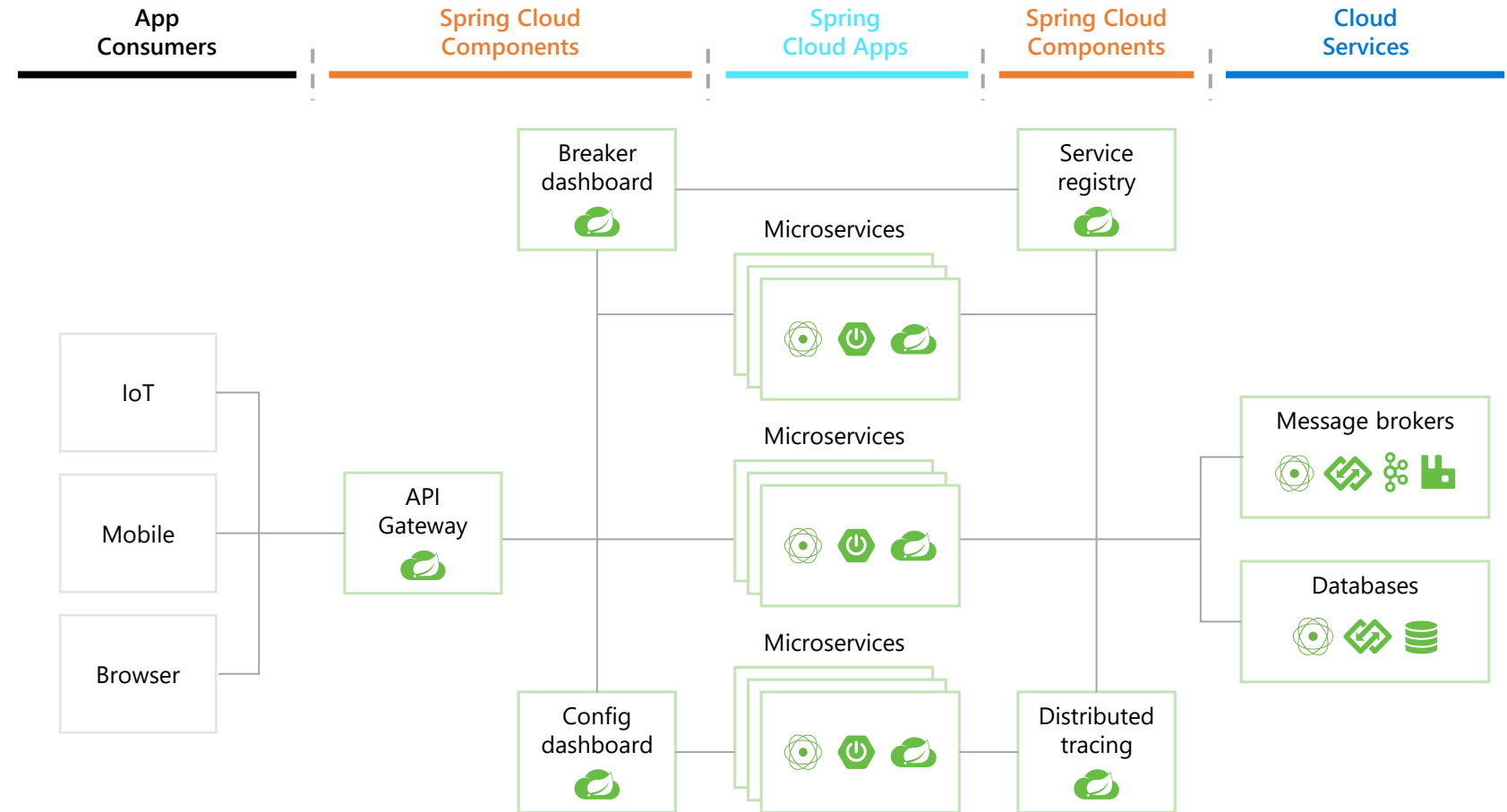


Common Impediments

High effort required to manage cloud infrastructure for Spring boot applications

Application lifecycle is difficult to manage

Painful to troubleshoot application issues



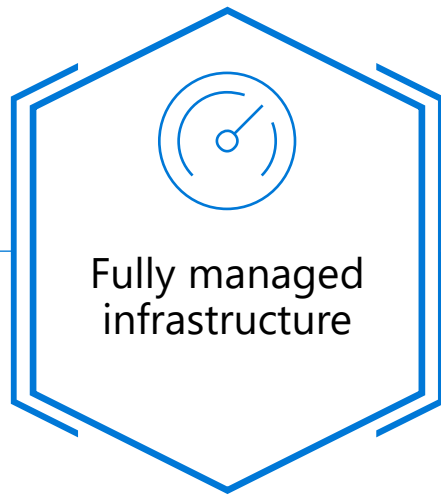
Azure Spring
Cloud



Azure Spring Cloud

A fully managed service for Spring Boot microservices

More choices and full integration into Azure's ecosystem and services



Enterprise ready

Azure Spring Cloud

**Jointly developed,
operated, and supported**



Managed service



Tanzu Build Service

Zero code changes



**Out-of-the-box
monitoring and tracing**



New Relic

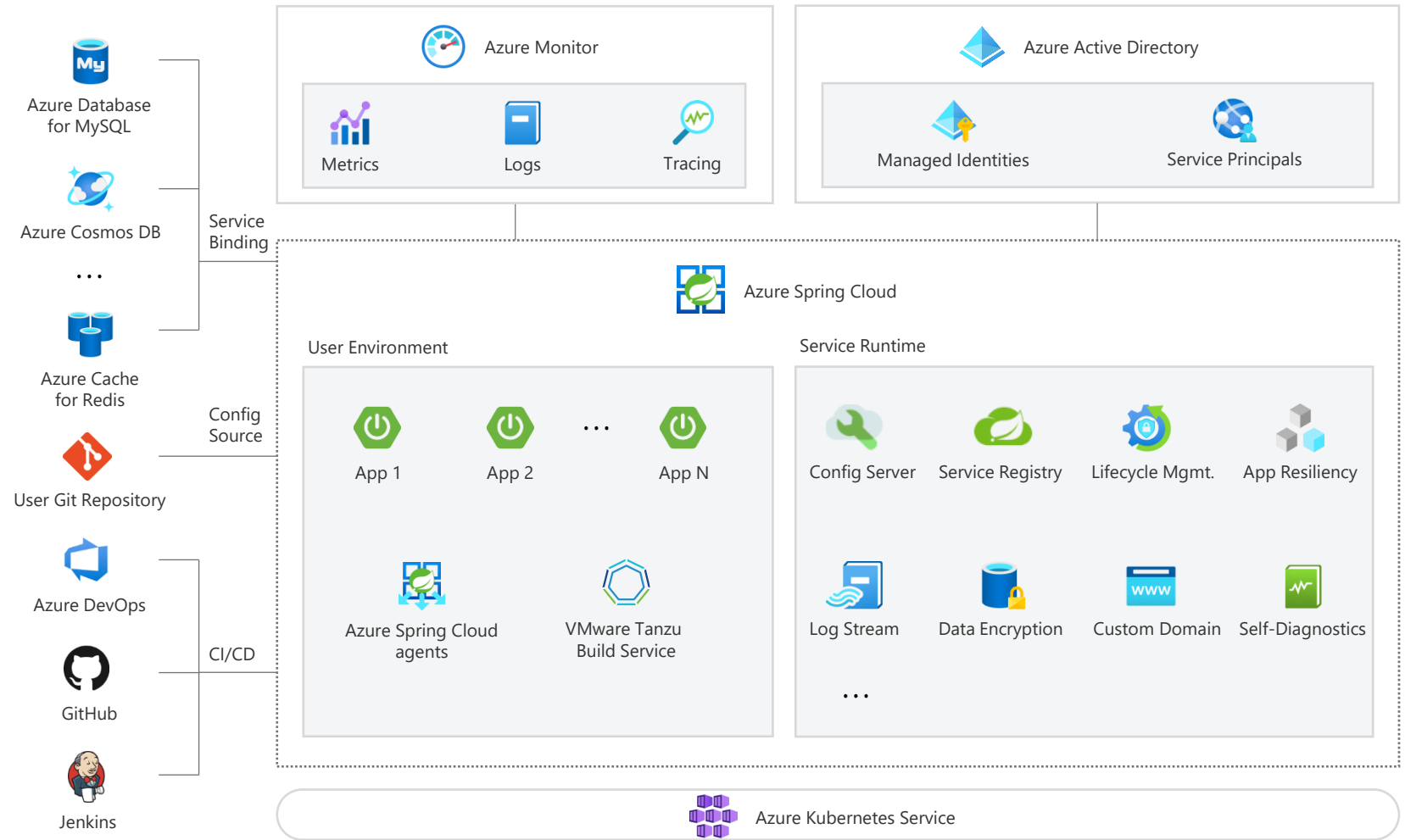


On Kubernetes

















You do not have to learn or
manage Kubernetes




Fully Managed Infrastructure – Azure Spring Cloud

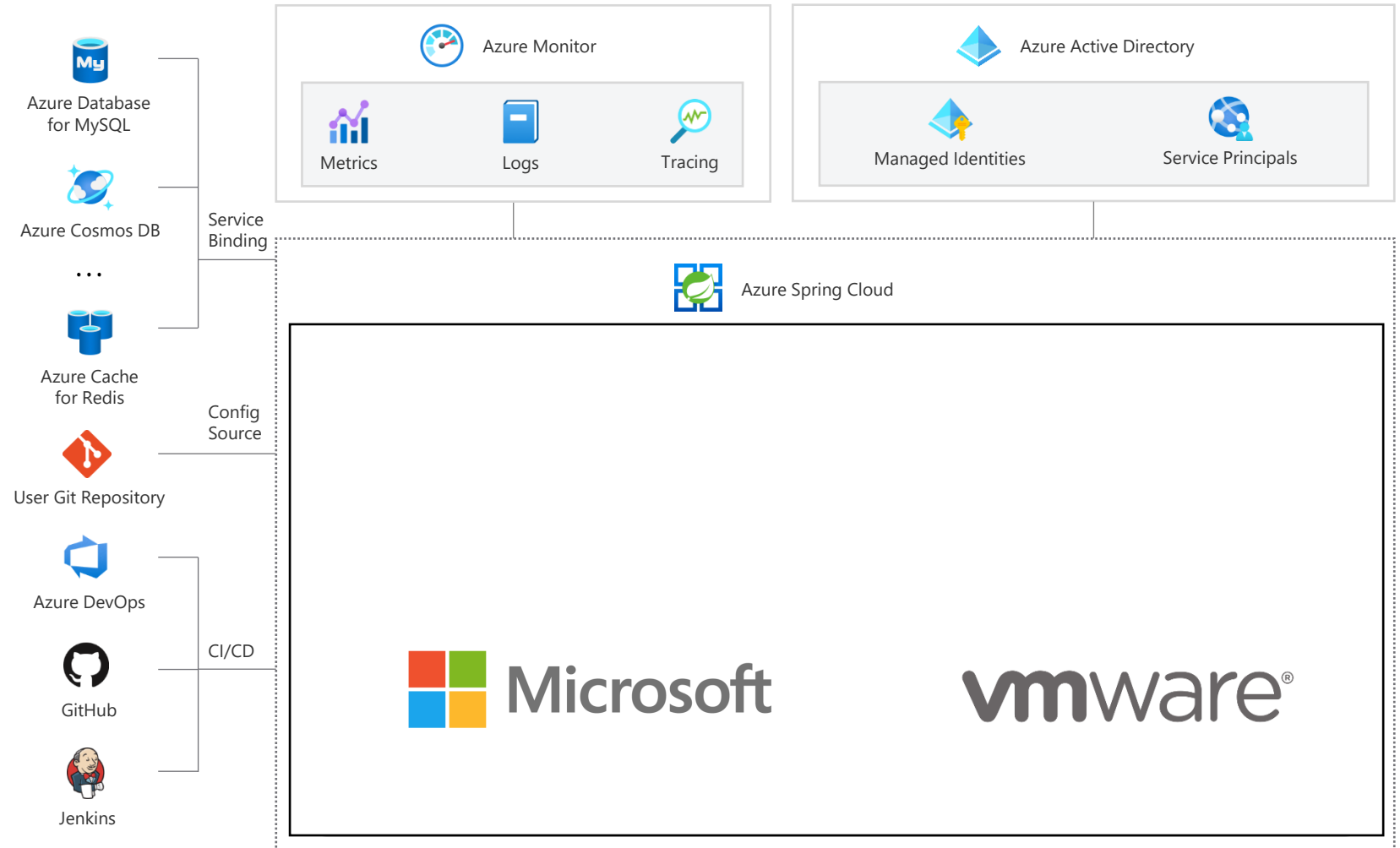
- Built-in native Spring Cloud components
 - Config Server
 - Service Registry
 - Distributed Tracing
 - Circuit Breaker (upcoming)
- Blue/Green for zero downtime
- Auto Horizontal Scale based on metrics or schedule
- VNET (private network) to secure your app and traffic



Simplify your cloud development for Spring applications

| Responsibilities | DIY with Spring Boot | Azure Spring Cloud Service |
|----------------------------------|---|---|
| Application iteration, debugging |  |  |
| CI/CD |  |  |
| Build and manage Clusters |  |  |
| Host Spring Cloud Middleware |  |  |
| Monitoring and logging |  |  |
| Scaling |  |  |
| Patching |  |  |
| Support |  |  |

 Customer
  VMware
  Microsoft



Demo – Azure Spring Cloud



Demo

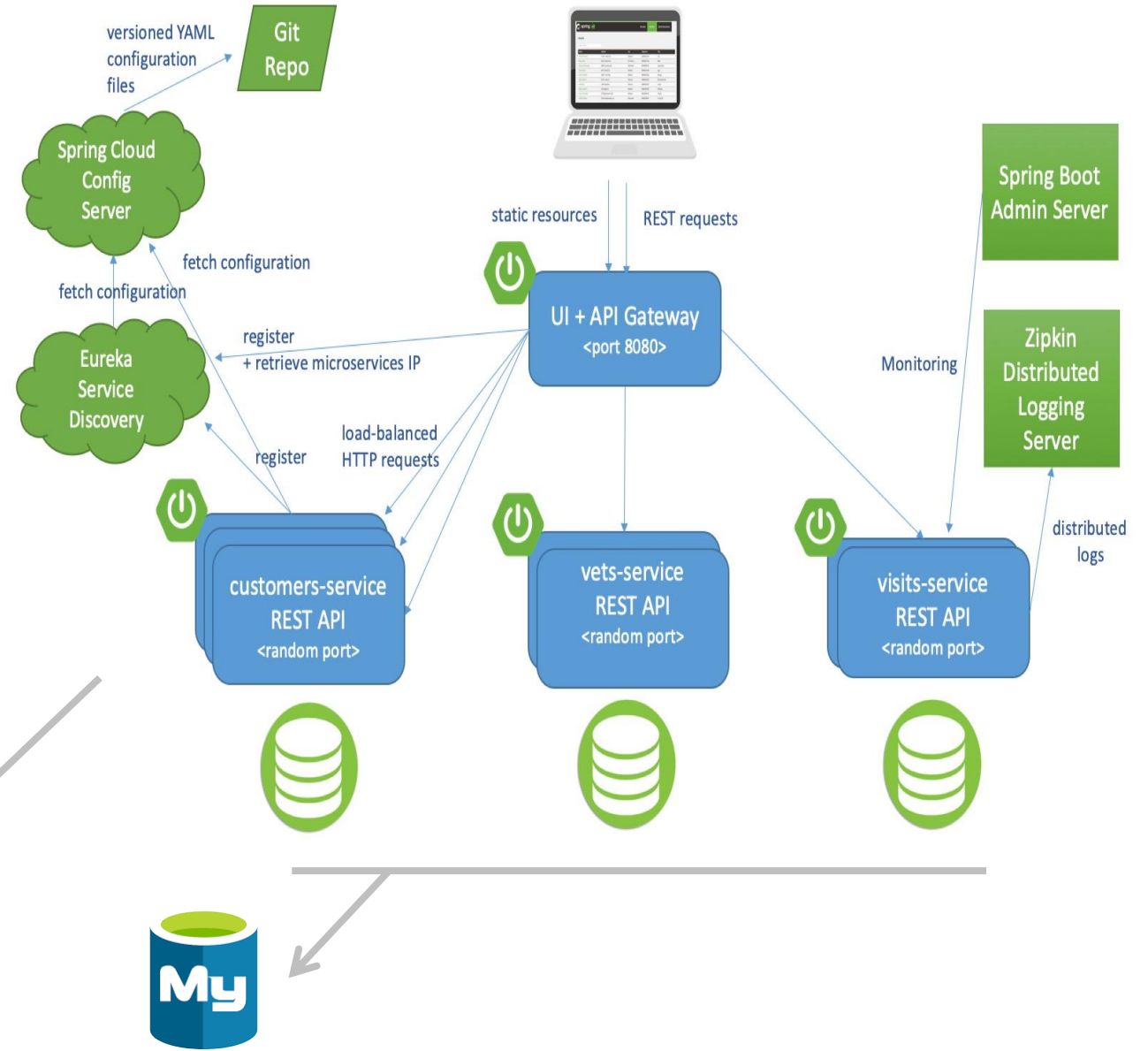
Deploy Spring Cloud apps
to Azure without worrying about:

Infrastructure and scaling

Learning or managing K8s

Spring Cloud middleware – config, registry,
tracing and gateway, or

Monitoring



Deploy and Visualize

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

Home > petclinic-microservices | Apps Azure Spring Cloud Directory: Microsoft

Search (Cmd+/) << + Create App Refresh

Filter by app name

5 items

| Name | Provisioning State | Running Instance | Registered Instance | Persistent Storage |
|-----------------------------------|--------------------|------------------|---------------------|--------------------|
| admin-server | Succeeded | 1/1 | 1/1 | Enabled |
| api-gateway | Succeeded | 2/2 | 1/2 | Enabled |
| customers-service | Succeeded | 3/3 | 3/3 | Enabled |
| vets-service | Succeeded | 2/2 | 2/2 | Enabled |
| visits-service | Succeeded | 2/2 | 2/2 | Enabled |

Automation

- Export template
- Resource explorer

Settings

- Apps
- Config Server

petclinic-microservices | Diagn

ms.portal.azure.com/#@72f988bf-86f1-41af-91ab-2d7cd011db47/resource/subscrip...

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

asirveda@microsoft.com MICROSOFT

Home > petclinic-microservices > spring-microservices >

petclinic-microservices | Diagnostic settings

Azure Spring Cloud | Directory: Microsoft

Search (Cmd+/) Refresh Provide feedback

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

Settings
Apps
Config Server
Deployments
TLS/SSL settings
Test endpoint keys
Properties

Diagnostic settings are used to configure streaming export of platform logs and metrics for a resource to the destination of your choice. You may create up to five different diagnostic settings to send different logs and metrics to independent destinations. [Learn more about diagnostics settings](#)

Diagnostics settings

| Name | Storage account | Event hub | Log Analytics workspace | Edit setting |
|-------------------------------|-----------------|-----------|-------------------------|------------------------------|
| send-logs-and-metrics-to-l... | - | - | petclinic-microservices | Edit setting |

[+ Add diagnostic setting](#)

Click 'Add Diagnostic setting' above to configure the collection of the following data:

- ApplicationConsole
- SystemLogs
- Performance
- Request
- Error
- Session

Setup Diagnostics

Logs - Microsoft Azure

ms.portal.azure.com/#blade/Microsoft_Azure_Monitoring_Logs/LogsBlade/resourceId/%2Fsubscriptions%2F685ba005-af8d-4b04-8f16-a7bf38b2eb...

Microsoft Azure (Preview)

Search resources, services, and docs (G+)

Home > petclinic-microservices > spring-microservices > petclinic-microservices >

Logs

petclinic-microservices

api-gateway... customers-s...

Example queries Query explorer

petclinic-microservices Select scope Run Time range : Last 4 hours Save Copy link New alert rule Export Pin to dashboard Format query

```
where AppName == "api-gateway"
limit 500
order by TimeGenerated asc
project TimeGenerated, Log
```

Results Chart Columns Display time (UTC+00:00) Group columns

Completed. Showing results from the last 4 hours. 00:00:00.416 500 records

| TimeGenerated [UTC] | Log |
|---------------------------|--|
| 5/31/2020, 9:38:53.389 PM | 2020-05-31 21:38:53.389 INFO [api-gateway,...] 1 --- [trap-executor-0] c.n.d.s.r.aws.ConfigClusterResolver : Resolving eureka endpoints via configuration |
| 5/31/2020, 9:37:12.207 PM | 2020-05-31 21:37:12.207 INFO [api-gateway,d38121536066a207,b073b51762fcc282,false] 1 --- [ndedElastic-168] c.c.c.ConfigServicePropertySourceLocator : Located environment: name=api-gateway, profiles=[mysql], label=null, version=f2720d311330e0... |
| 5/31/2020, 9:37:12.118 PM | 2020-05-31 21:37:12.117 INFO [api-gateway,d38121536066a207,b073b51762fcc282,false] 1 --- [ndedElastic-168] c.c.c.ConfigServicePropertySourceLocator : Fetching config from server at : https://petclinic-microservices.svc.azuremicroservices.io/config |
| 5/31/2020, 9:37:01.479 PM | 2020-05-31 21:37:01.478 ERROR [api-gateway,2653af9cab791070,2653af9cab791070,true] 1 --- [or-http-epoll-1] o.s.w.s.adapter.HttpWebHandlerAdapter : [da7ecc8f] Error [reactor.netty.ReactorNetty\$InternalNettyException: java.nio.channels.ClosedChann... |
| 5/31/2020, 9:36:01.390 PM | 2020-05-31 21:36:01.389 ERROR [api-gateway,ffb3639eeff6735,ffb3639eeff6735,true] 1 --- [or-http-epoll-4] o.s.w.s.adapter.HttpWebHandlerAdapter : [f0fff757] Error [reactor.netty.ReactorNetty\$InternalNettyException: java.nio.channels.ClosedChannelExc... |
| 5/31/2020, 9:36:01.389 PM | 2020-05-31 21:36:01.389 ERROR [api-gateway,478a110e942a9b5b,478a110e942a9b5b,true] 1 --- [or-http-epoll-4] o.s.w.s.adapter.HttpWebHandlerAdapter : [d117d503] Error [reactor.netty.ReactorNetty\$InternalNettyException: java.nio.channels.ClosedCha... |
| 5/31/2020, 9:34:01.285 PM | 2020-05-31 21:34:01.284 ERROR [api-gateway,6f2c6d3f6bfa4154,6f2c6d3f6bfa4154,true] 1 --- [or-http-epoll-4] o.s.w.s.adapter.HttpWebHandlerAdapter : [03cf88ab] Error [reactor.netty.ReactorNetty\$InternalNettyException: java.nio.channels.ClosedChannel... |
| 5/31/2020, 9:34:01.283 PM | 2020-05-31 21:34:01.283 ERROR [api-gateway,99dbe0bd91d2da78,99dbe0bd91d2da78,true] 1 --- [or-http-epoll-4] o.s.w.s.adapter.HttpWebHandlerAdapter : [3a6fca3d] Error [reactor.netty.ReactorNetty\$InternalNettyException: java.nio.channels.ClosedChan... |
| 5/31/2020, 9:33:53.389 PM | 2020-05-31 21:33:53.388 INFO [api-gateway,...] 1 --- [trap-executor-0] c.n.d.s.r.aws.ConfigClusterResolver : Resolving eureka endpoints via configuration |
| 5/31/2020, 9:32:12.224 PM | 2020-05-31 21:32:12.224 INFO [api-gateway,963188963ecc59a3,9201a37c70f5a4e7,false] 1 --- [ndedElastic-165] c.c.c.ConfigServicePropertySourceLocator : Located environment: name=api-gateway, profiles=[mysql], label=null, version=f2720d311330e08... |
| 5/31/2020, 9:32:12.071 PM | 2020-05-31 21:32:12.070 INFO [api-gateway,963188963ecc59a3,9201a37c70f5a4e7,false] 1 --- [ndedElastic-165] c.c.c.ConfigServicePropertySourceLocator : Fetching config from server at : https://petclinic-microservices.svc.azuremicroservices.io/config |
| 5/31/2020, 9:32:01.998 PM | 2020-05-31 21:32:01.998 WARN [api-gateway,...] 1 --- [or-http-epoll-3] reactor.netty.channel.FluxReceive : [id: 0x2d6fa179, L:/10.242.0.100:1025 - R:/10.242.0.47:57690] An exception has been observed post termination, use DEBUG level to see the full sta... |
| 5/31/2020, 9:28:53.386 PM | 2020-05-31 21:28:53.386 INFO [api-gateway,...] 1 --- [trap-executor-0] c.n.d.s.r.aws.ConfigClusterResolver : Resolving eureka endpoints via configuration |
| 5/31/2020, 9:25:01.889 PM | 2020-05-31 21:25:01.889 ERROR [api-gateway,f55868fdbc74871,f55868fdbc74871,true] 1 --- [or-http-epoll-1] o.s.w.s.adapter.HttpWebHandlerAdapter : [46da45d1] Error [reactor.netty.ReactorNetty\$InternalNettyException: java.nio.channels.ClosedChann... |
| 5/31/2020, 9:25:01.888 PM | 2020-05-31 21:25:01.888 ERROR [api-gateway,2f9ff4b9be9a606b,2f9ff4b9be9a606b,true] 1 --- [or-http-epoll-1] o.s.w.s.adapter.HttpWebHandlerAdapter : [6fb53899] Error [reactor.netty.ReactorNetty\$InternalNettyException: java.nio.channels.ClosedChannel... |
| 5/31/2020, 9:25:01.888 PM | 2020-05-31 21:25:01.888 ERROR [api-gateway,4b9d7452edded088,4b9d7452edded088,true] 1 --- [or-http-epoll-1] o.s.w.s.adapter.HttpWebHandlerAdapter : [85b8190c] Error [reactor.netty.ReactorNetty\$InternalNettyException: java.nio.channels.ClosedCha... |
| 5/31/2020, 9:25:01.885 PM | 2020-05-31 21:25:01.884 ERROR [api-gateway,d38f5e99339e026e,d38f5e99339e026e,true] 1 --- [or-http-epoll-2] o.s.w.s.adapter.HttpWebHandlerAdapter : [646dbee8] Error [reactor.netty.ReactorNetty\$InternalNettyException: java.nio.channels.ClosedChan... |
| 5/31/2020, 9:24:02.105 PM | 2020-05-31 21:24:02.104 ERROR [api-gateway,ba6da084b5cd6f64,ba6da084b5cd6f64,true] 1 --- [or-http-epoll-3] o.s.w.s.adapter.HttpWebHandlerAdapter : [84b63c94] Error [reactor.netty.ReactorNetty\$InternalNettyException: java.nio.channels.ClosedChan... |
| 5/31/2020, 9:24:02.104 PM | 2020-05-31 21:24:02.104 ERROR [api-gateway,0febcb1b51919cf68,0febcb1b51919cf68,true] 1 --- [or-http-epoll-3] o.s.w.s.adapter.HttpWebHandlerAdapter : [649cabea] Error [reactor.netty.ReactorNetty\$InternalNettyException: java.nio.channels.ClosedChanne... |
| 5/31/2020, 9:24:02.096 PM | 2020-05-31 21:24:02.096 ERROR [api-gateway,73971f787989654f,73971f787989654f,true] 1 --- [or-http-epoll-3] o.s.w.s.adapter.HttpWebHandlerAdapter : [93c89adf] Error [reactor.netty.ReactorNetty\$InternalNettyException: java.nio.channels.ClosedChanne... |

Schema and Filter

Page 1 of 10 50 items per page 1 - 50 of 500 items

Troubleshoot


```
~ — selvasingh@tomcat-vm-01: /tmp — python • az spring-cloud app logs -f -n api-gateway — 157x54
~ — selvasingh@tomcat-vm-01: /tmp — python • az spring-cloud app logs -f -n api-gateway bash
bash-3.2$ pwd
/Users/selvasingh/GitHub/selvasingh/spring-netclinic-microservices
bash-3.2$ az spring-cloud app logs -f -n api-gateway
Command group 'spring-cloud' is in preview and may be changed/removed in a future release.
2020-05-31 21:04:01.496 ERROR [api-gateway,6eb42fd493543e,6eb42fd493543e,true] 1 --- [or-http-epoll-3] o.s.w.s.adapter.HttpWebHandlerAdapter : [2bf6543d] Error [reactor.netty.ReactorNetty$InternalNettyException: java.nio.channels.ClosedChannelException] for HTTP POST "/api/customer/owners/", but ServerHttp Response already committed (201 CREATED)
2020-05-31 21:04:01.576 ERROR [api-gateway,e0fd0cd20c178198,e0fd0cd20c178198,true] 1 --- [or-http-epoll-2] o.s.w.s.adapter.HttpWebHandlerAdapter : [0987fde2] Error [reactor.netty.ReactorNetty$InternalNettyException: java.nio.channels.ClosedChannelException] for HTTP POST "/api/customer/owners/", but ServerHttp Response already committed (201 CREATED)
2020-05-31 21:04:01.592 ERROR [api-gateway,690be9a657730431,690be9a657730431,true] 1 --- [or-http-epoll-3] o.s.w.s.adapter.HttpWebHandlerAdapter : [9766edd8] Error [reactor.netty.ReactorNetty$InternalNettyException: java.nio.channels.ClosedChannelException] for HTTP POST "/api/customer/owners/", but ServerHttp Response already committed (201 CREATED)
2020-05-31 21:04:01.596 WARN [api-gateway,...] 1 --- [or-http-epoll-2] r.netty.http.client.HttpClientConnect : [id: 0x03e71b39, L:/10.242.0.100:37502 ! R: customers-service/10.0.182.24:80] The connection observed an error
reactor.netty.http.client.PrematureCloseException: Connection prematurely closed BEFORE response

2020-05-31 21:04:01.597 ERROR [api-gateway,f5e3c6c5b1465ecd,f5e3c6c5b1465ecd,true] 1 --- [or-http-epoll-2] a.w.r.e.AbstractErrorWebExceptionHandler : [a7cdf58f] 500 Server Error for HTTP GET "/api/customer/petTypes"

reactor.netty.http.client.PrematureCloseException: Connection prematurely closed BEFORE response
Suppressed: reactor.core.publisher.FluxOnAssembly$OnAssemblyException:
Error has been observed at the following site(s):
|_ checkpoint ? org.springframework.cloud.gateway.filter.WeightCalculatorWebFilter [DefaultWebFilterChain]
|_ checkpoint ? org.springframework.cloud.sleuth.instrument.web.TraceWebFilter [DefaultWebFilterChain]
|_ checkpoint ? org.springframework.boot.actuate.metrics.web.reactive.server.MetricsWebFilter [DefaultWebFilterChain]
|_ checkpoint ? HTTP GET "/api/customer/petTypes" [ExceptionHandlerWebHandler]
Stack trace:

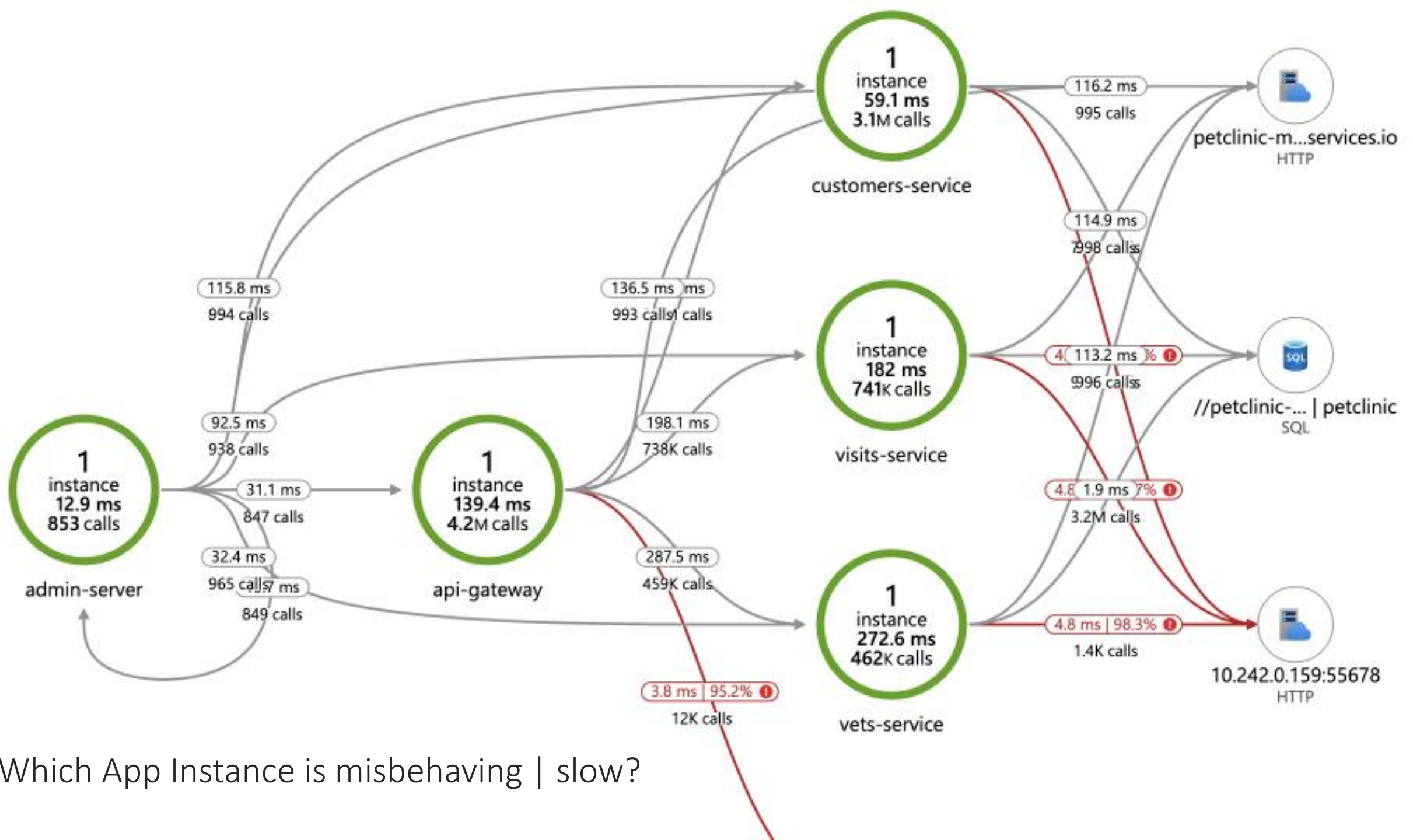
2020-05-31 21:04:01.597 WARN [api-gateway,...] 1 --- [or-http-epoll-1] r.netty.http.client.HttpClientConnect : [id: 0x1754485b, L:/10.242.0.100:37474 ! R: customers-service/10.0.182.24:80] The connection observed an error
reactor.netty.http.client.PrematureCloseException: Connection prematurely closed BEFORE response

2020-05-31 21:04:01.598 ERROR [api-gateway,5c540fbe0ccf04fb,5c540fbe0ccf04fb,true] 1 --- [or-http-epoll-1] a.w.r.e.AbstractErrorWebExceptionHandler : [01da9e41] 500 Server Error for HTTP GET "/api/customer/petTypes"

reactor.netty.http.client.PrematureCloseException: Connection prematurely closed BEFORE response
Suppressed: reactor.core.publisher.FluxOnAssembly$OnAssemblyException:
Error has been observed at the following site(s):
|_ checkpoint ? org.springframework.cloud.gateway.filter.WeightCalculatorWebFilter [DefaultWebFilterChain]
|_ checkpoint ? org.springframework.cloud.sleuth.instrument.web.TraceWebFilter [DefaultWebFilterChain]
|_ checkpoint ? org.springframework.boot.actuate.metrics.web.reactive.server.MetricsWebFilter [DefaultWebFilterChain]
|_ checkpoint ? HTTP GET "/api/customer/petTypes" [ExceptionHandlerWebHandler]
Stack trace:

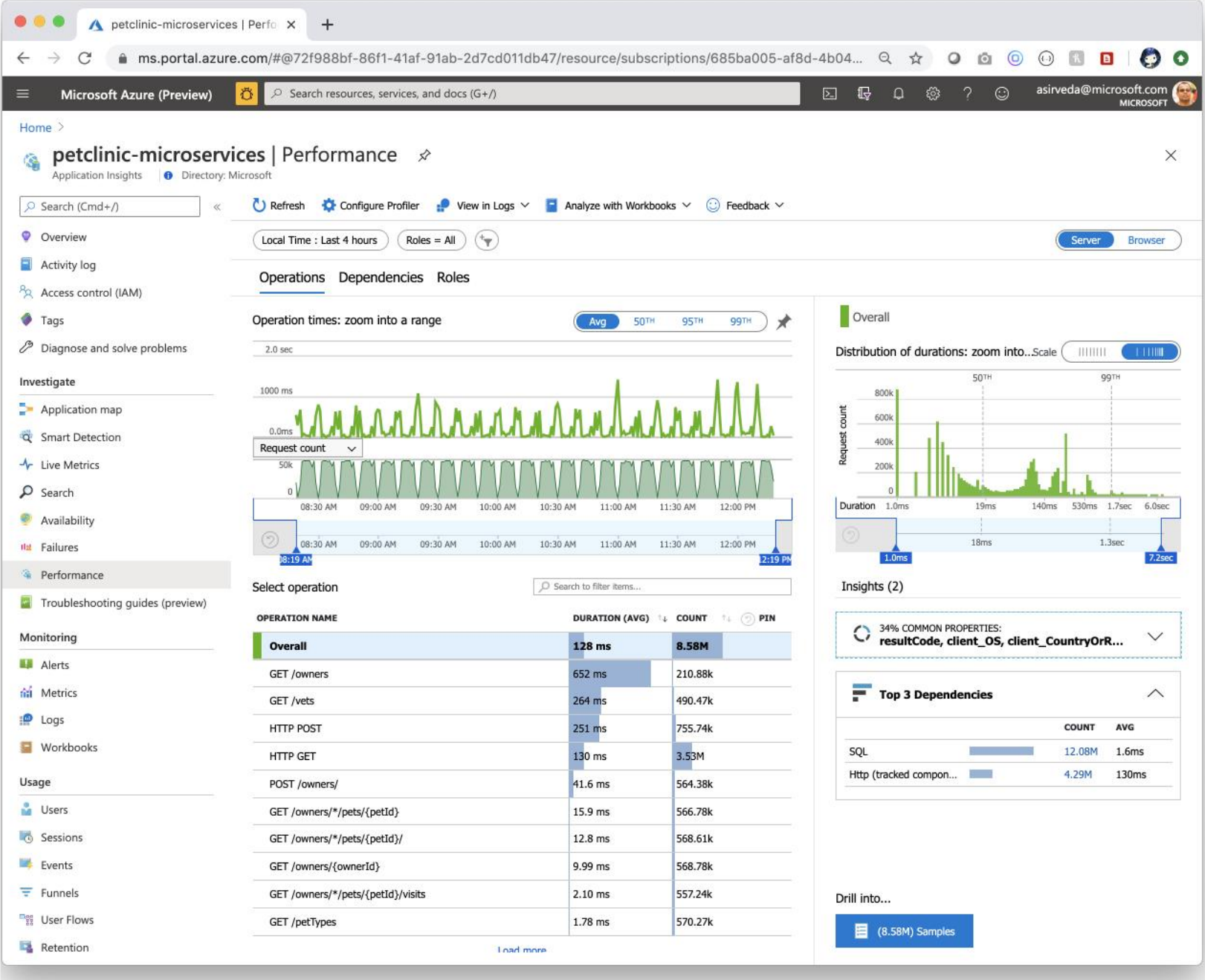
2020-05-31 21:05:01.196 ERROR [api-gateway,965ec24a15551154,965ec24a15551154,true] 1 --- [or-http-epoll-1] o.s.w.s.adapter.HttpWebHandlerAdapter : [4a181701] Error [reactor.netty.ReactorNetty$InternalNettyException: java.nio.channels.ClosedChannelException] for HTTP GET "/api/customer/petTypes", but ServerHttp Response already committed (200 OK)
2020-05-31 21:05:01.197 ERROR [api-gateway,cec33c7967c7d522,cec33c7967c7d522,true] 1 --- [or-http-epoll-1] o.s.w.s.adapter.HttpWebHandlerAdapter : [ced96d7e] Error [reactor.netty.ReactorNetty$InternalNettyException: java.nio.channels.ClosedChannelException] for HTTP GET "/api/customer/petTypes", but ServerHttp Response already committed (200 OK)
2020-05-31 21:05:01.292 ERROR [api-gateway,bf6977536c023c3b,bf6977536c023c3b,true] 1 --- [or-http-epoll-2] o.s.w.s.adapter.HttpWebHandlerAdapter : [d4c1b6
```

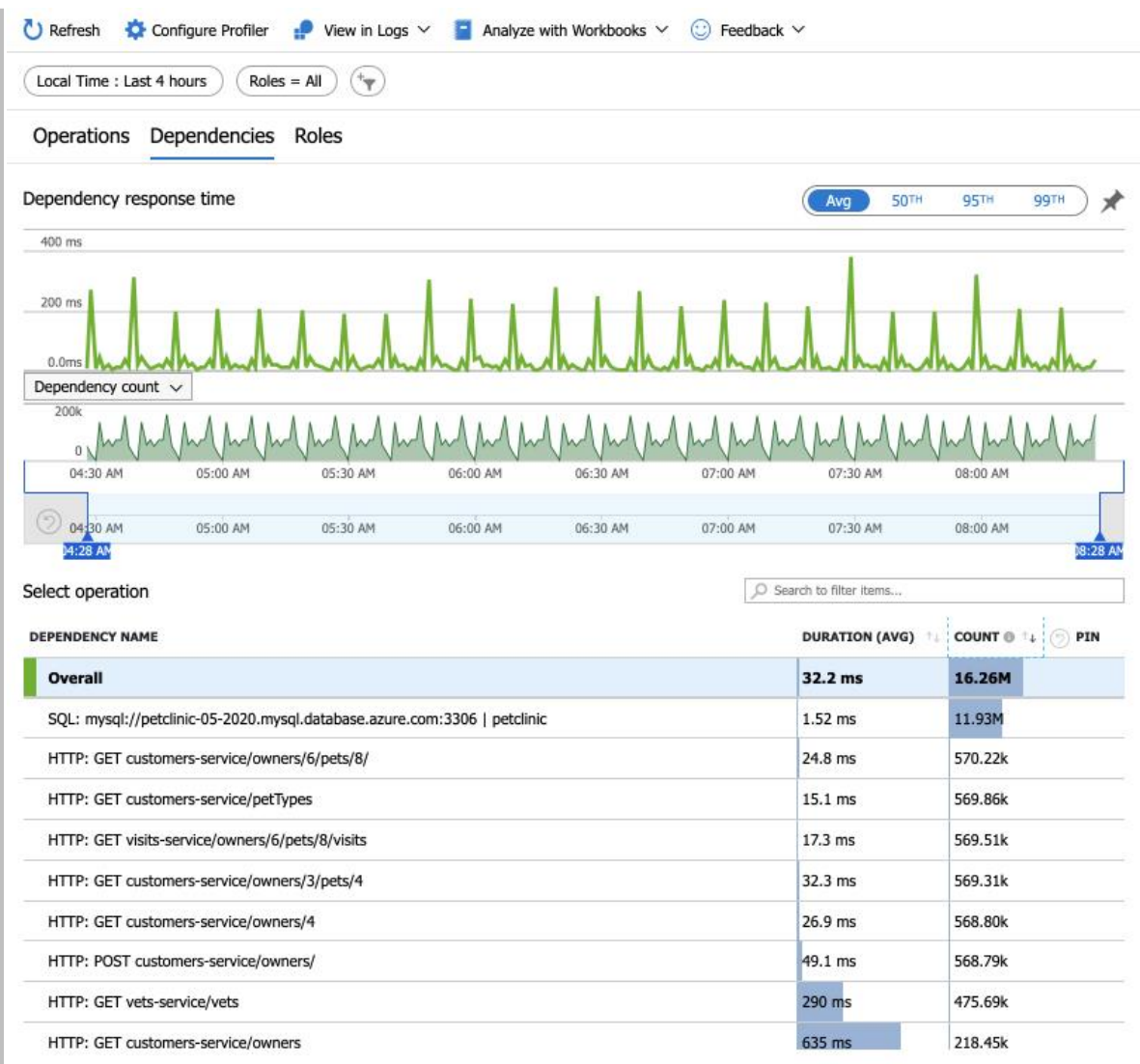
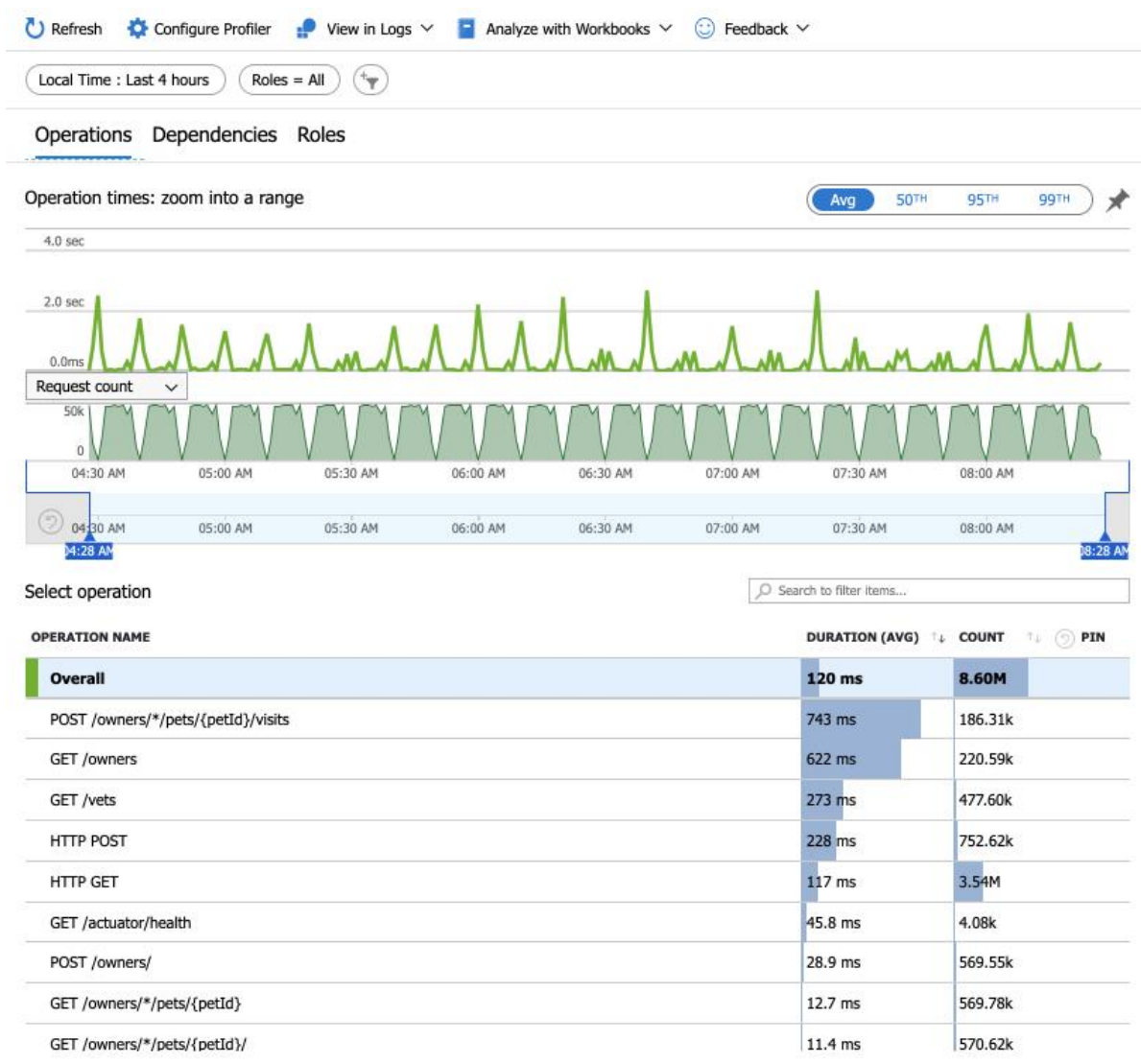
Troubleshoot



Which App Instance is misbehaving | slow?

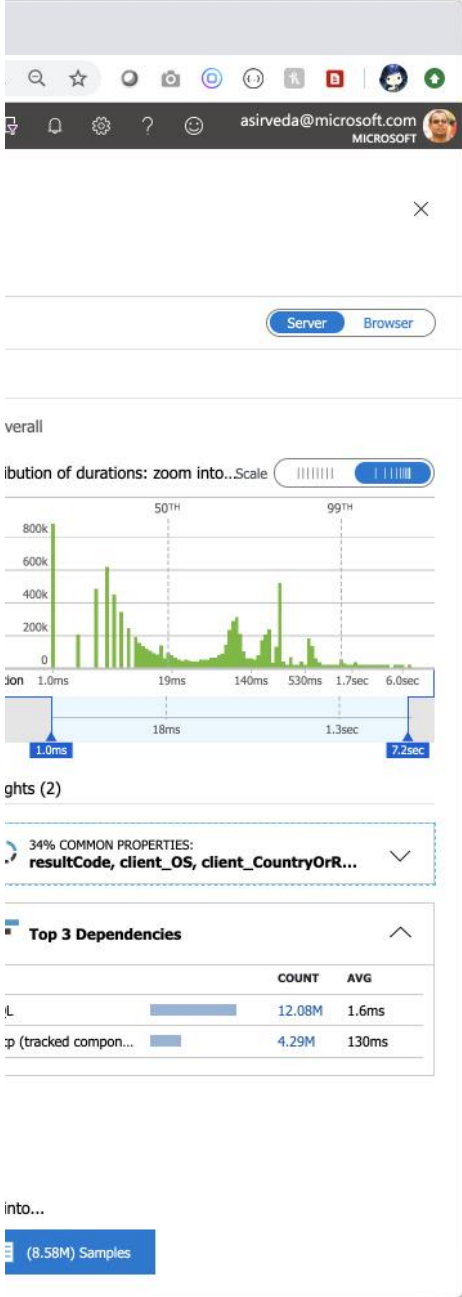
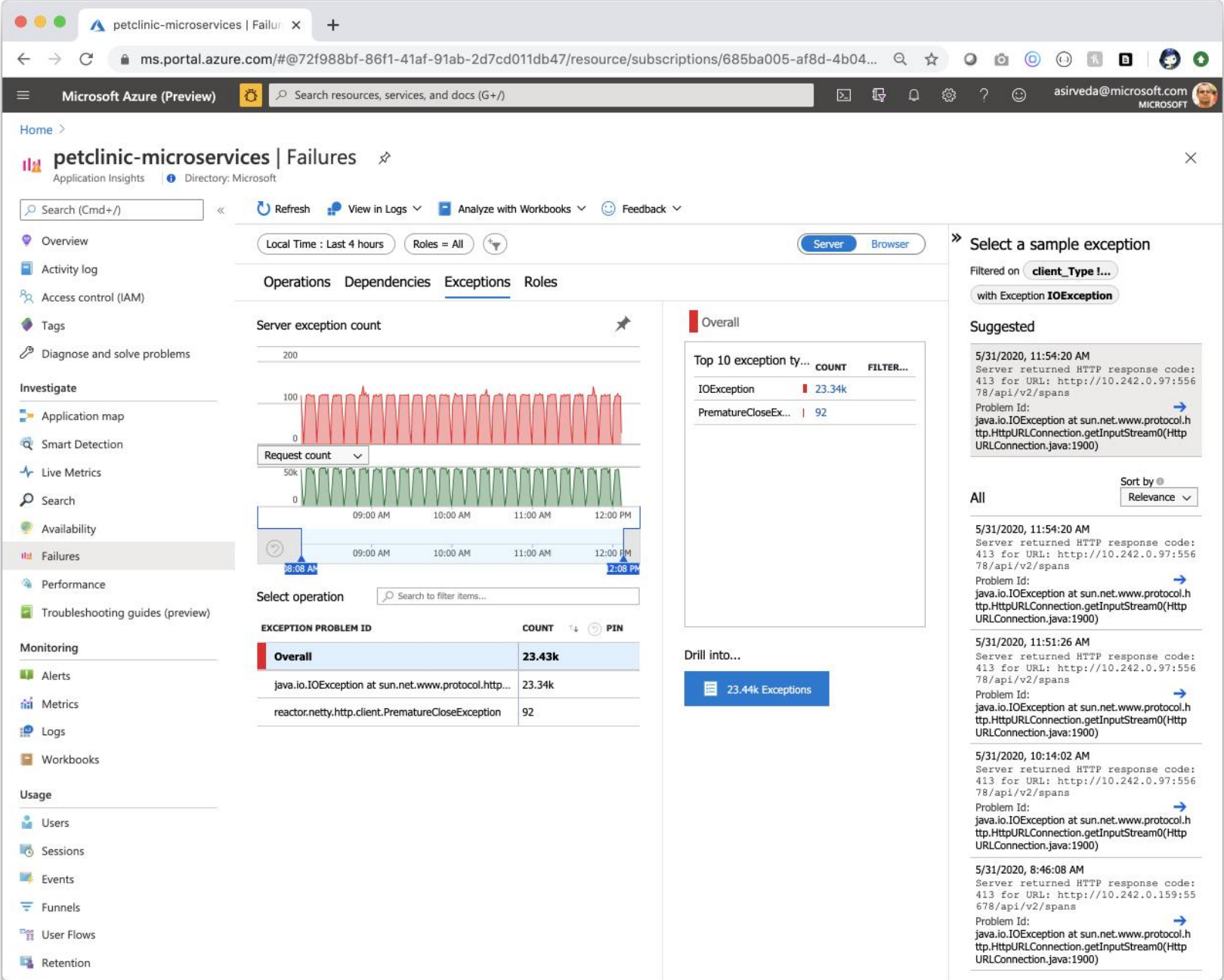
Monitor Performance







Monitor Performance



Monitor Failures



Manage secrets – zero-trust model



 **customers-service** | Configuration 

















Apps



»  Save  Refresh

Environment variables General settings Persistent Storage Temporary storage



Environment variables are encrypted at rest and transmitted over an encrypted channel. The app must be restarted after setting new environment variables.

 Reveal all values  Hide all values

| Key | Value | |
|--------------------------------------|-----------------------|---|
| MYSQL_SERVER_FULL_NAME | <Hidden for security> |   |
| MYSQL_DATABASE_NAME | <Hidden for security> |   |
| MYSQL_SERVER_ADMIN_LOGIN_NAME | <Hidden for security> |   |
| MYSQL_SERVER_ADMIN_PASSWORD | <Hidden for security> |   |
| APPLICATIONINSIGHTS_CONNECTION_ST... | <Hidden for security> |   |
| APPLICATIONINSIGHTS_ROLE_NAME | <Hidden for security> |   |
| NEW_RELIC_LICENSE_KEY | <Hidden for security> |   |
| NEW_RELIC_APP_NAME | <Hidden for security> |   |



 **customers-service** | Configuration 

Apps

»  Save  Refresh

Environment variables General settings Persistent Storage Temporary storage

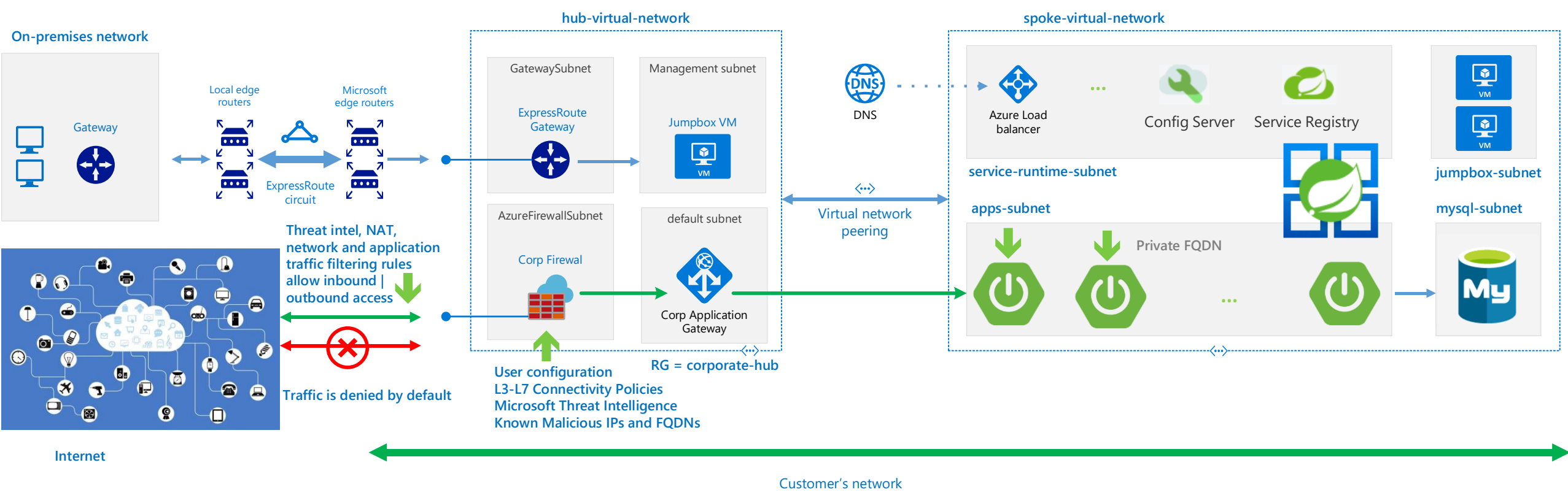
Environment variables are encrypted at rest and transmitted over an encrypted channel. The app must be restarted after setting new environment variables.

 Reveal all values  Hide all values

| Key | Value |
|----------------------|----------------------|
| <input type="text"/> | <input type="text"/> |

Reference Arch – isolate apps and expose apps to Internet

Integrate with Azure Firewall & App Gateway to allow | deny traffic to FQDNs



Demo code repo



<https://github.com/Azure-Samples/spring-petclinic-microservices>



Azure Spring Cloud – Recap

Azure Spring Cloud - Benefits



Simplify infrastructure management



Run your Spring Boot apps



Scalable global infrastructure



Reduce downtime and deployment risk



Built-in application lifecycle management



Spring Cloud components



Deploy source code or build artifacts



Automatically wire your app with Spring Cloud infrastructure



Easily monitor your apps



Easily identify performance bottlenecks



Gain insight into app dependencies using Azure Monitor











Aggregate metrics

On Kubernetes

You do not have to learn or
manage Kubernetes

Spring Azure

cloud.spring.io/spring-cloud-azure/

| | | | |
|---|---|--|---|
|  Spring Cloud |  Spring Data |  Spring Security |  Spring Resource |
| App Configuration Event Hubs Service Bus Storage Redis Functions | SQL Database MySQL PostgreSQL Maria DB Cosmos DB <ul style="list-style-type: none">• SQL• MongoDB• Cassandra• Gremlin | Active Directory (AAD) AAD B2C | Storage |
|  R2DBC | |  Spring Cache |  Spring Messaging |
| SQL Database PostgreSQL MySQL | | Redis Cache | Service Bus |
| | |  Micrometer | Monitor (includes Log Analytics) |

Get specialized assistance building Java apps or migrating them to Azure Spring Cloud

We can

- a) **Guide** your design and plan – thru architecture design session / workshop
- b) Help build representative **proof of concepts** or **pilot**
 - By customer and engineers in Java on Azure team

Nominate yourself ...

Get specialized assistance building Java apps or migrating them to Azure Spring Cloud

Tell us about your scenarios and requirements

Fill out this 2-minute questionnaire



<http://aka.ms/pilot-my-spring-cloud-apps>

Build your cloud-native solutions today!



Get started --

- Deploy Spring apps to Azure Spring Cloud using [quickstart](#)
- Learn using a [self-paced workshop](#) on GitHub
- Deploy [an existing app](#) to Azure Spring Cloud
- Learn [more](#) about implementing solutions on Azure Spring Cloud
- Migrate your [Spring Boot](#), [Spring Cloud](#) and [Tomcat](#) apps to Azure Spring Cloud
- Wire Spring apps to [interact with Azure services](#)