



From EC2 to **Kubernetes**: Takeaways from a brownfield migration

Bob Walker | Field CTO | Octopus Deploy

@bobjwalker

bob.walker@octopus.com

@bobjwalker

bobjwalker.octopus.app





Bob Walker

Field CTO

Octonaut since 2018

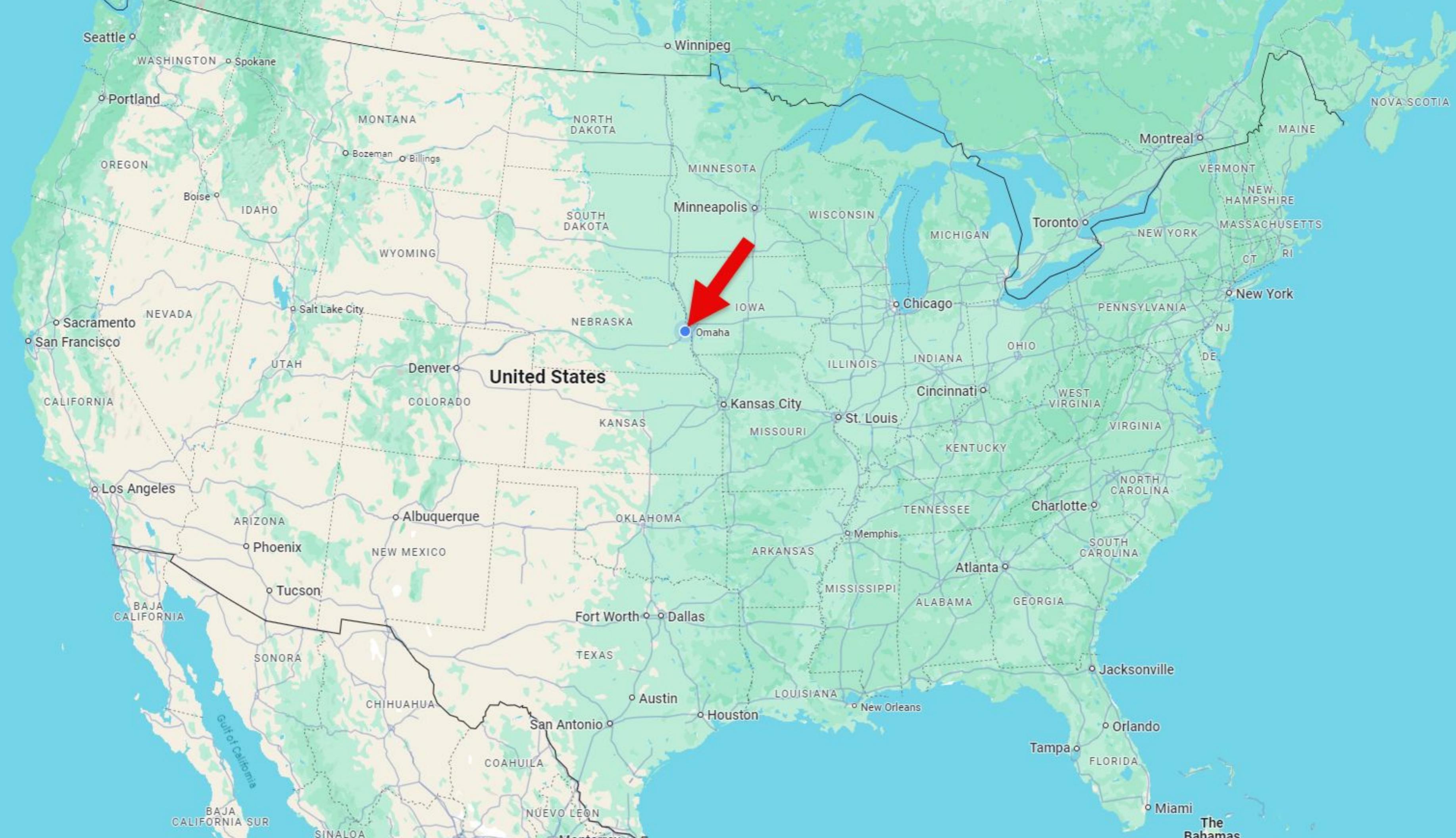
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 bob.walker@octopus.com

 @bobjwalker

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Farm Credit Services
of America



Sandhills Global.



Octopus Deploy

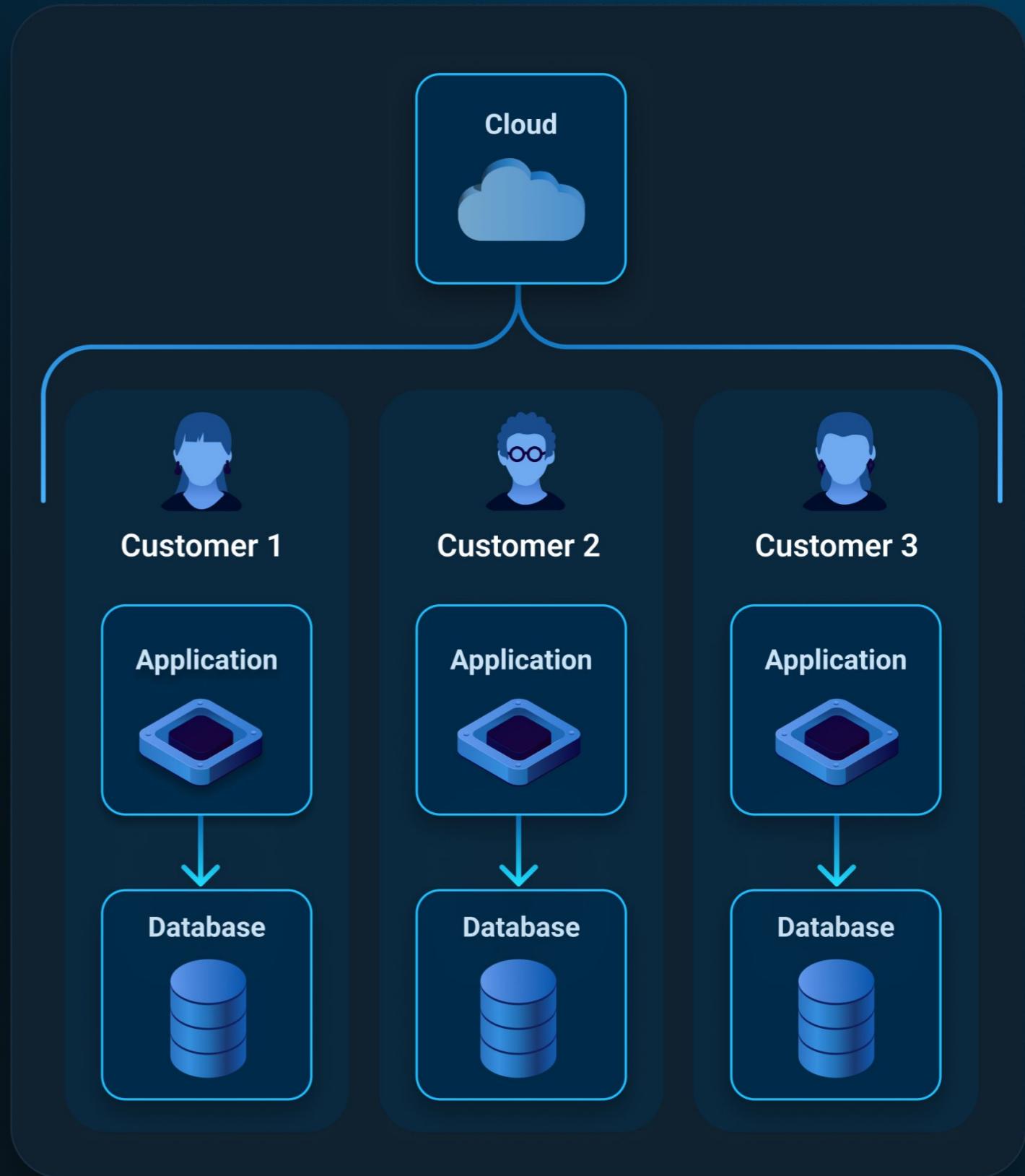


Brownfield Migration

Cloud v1: 100s of customer running Octopus on a dedicated Windows EC2 Instance

Cloud v2: 1000s of customers running Octopus via a dedicated container on one of 8 K8s clusters

Challenges of managing 1000s of customers on K8s Clusters



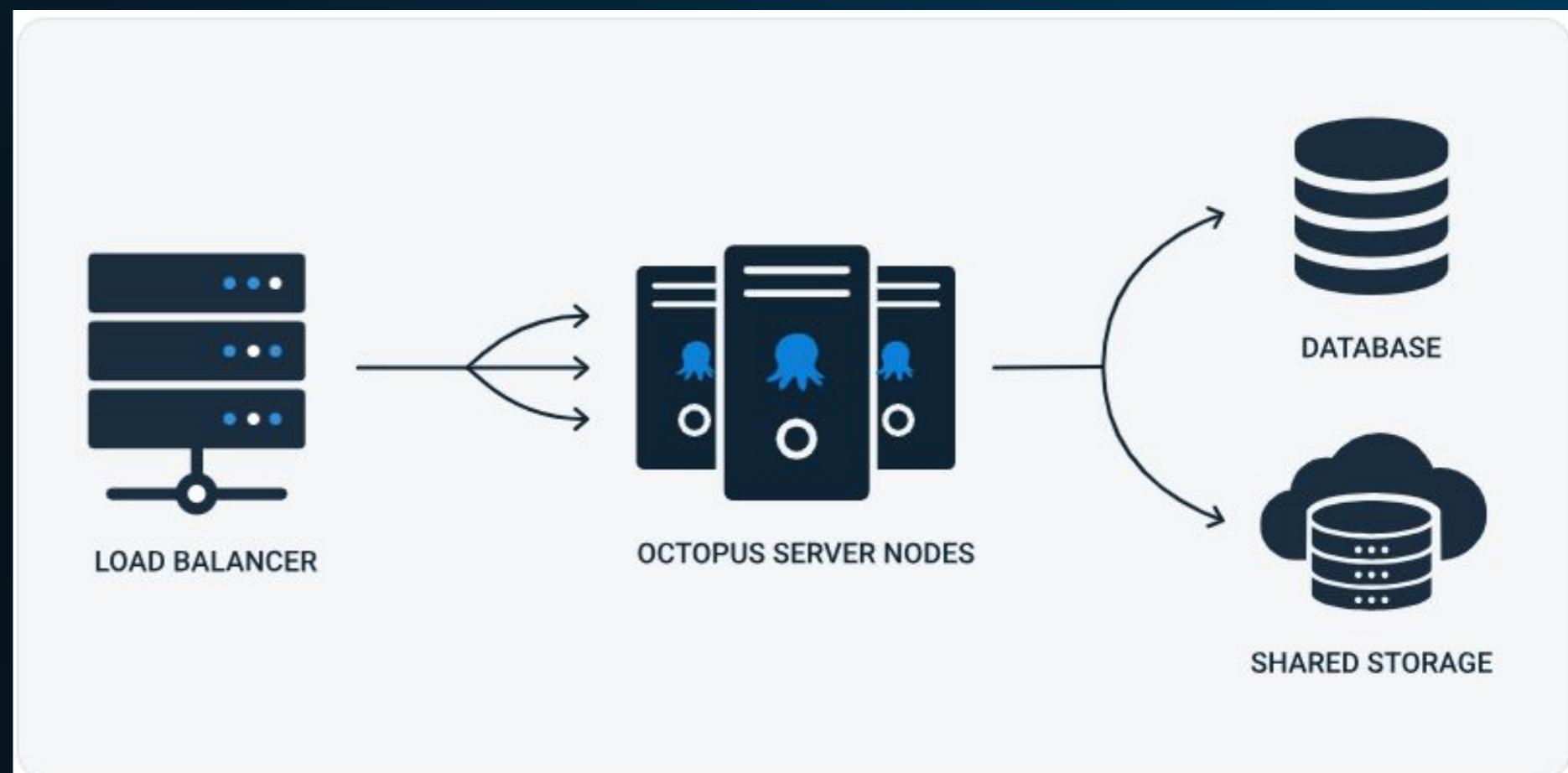
Four Key Components

Octopus Deploy .NET Application

SQL Server

File Storage

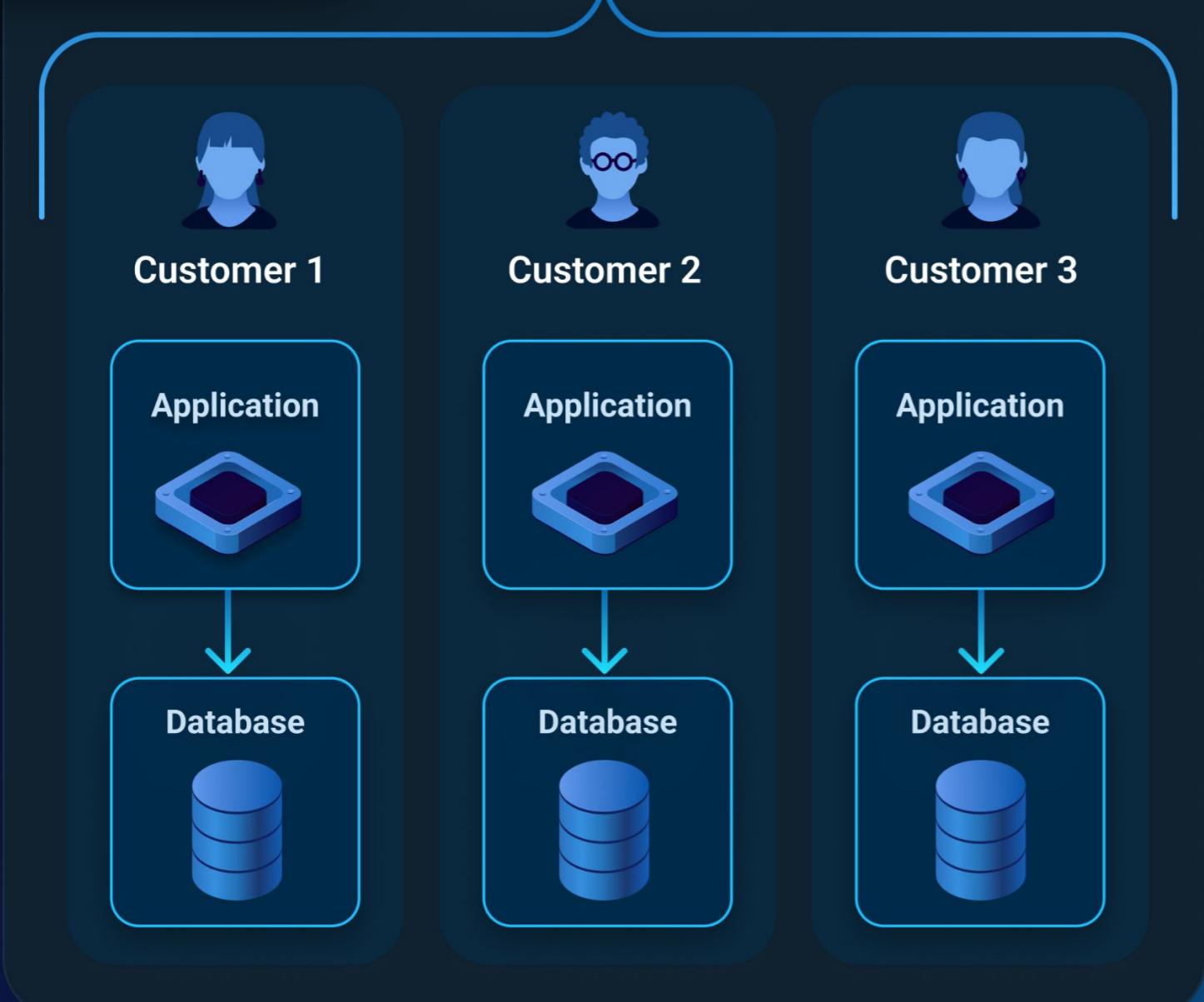
Networking/Load Balancer



Cell-based architecture

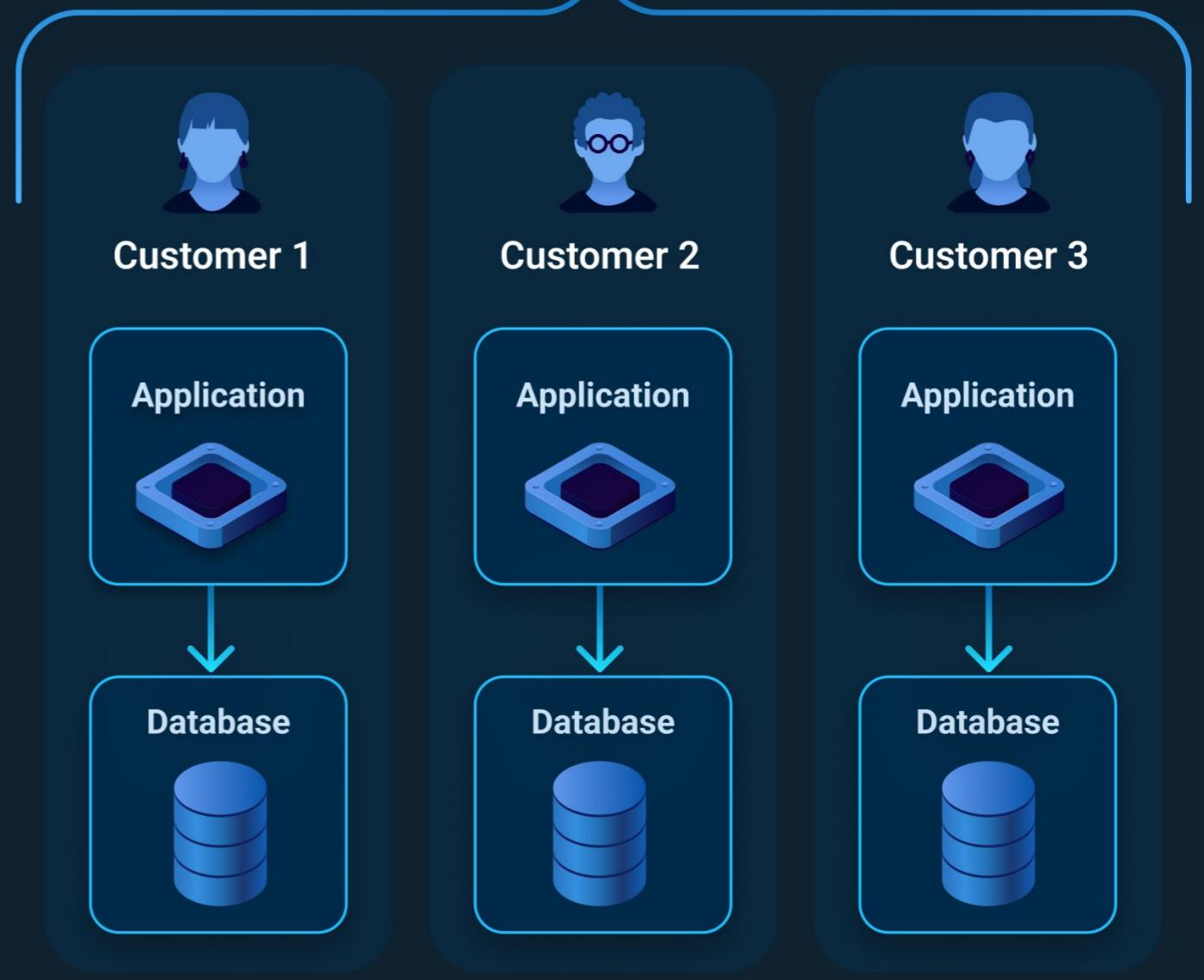
Reef #1

- K8s Cluster
- Azure SQL Server
- Azure Storage



Reef #2

- K8s Cluster
- Azure SQL Server
- Azure Storage



Octopus Cloud v1



Self-hosted -> Cloud

Octopus Cloud

Deployment-as-a-service

START SEPT. 2017



Octopus Server

Octopus on customers' infrastructure

JUNE 2012



Octopus Cloud GA

July 2018



Announcing Octopus Cloud



Jason Brown

July 2, 2018 • 2 mins



First Month's AWS Bill

August 2018



Lesson #1

Have the right reasons for moving to Kubernetes

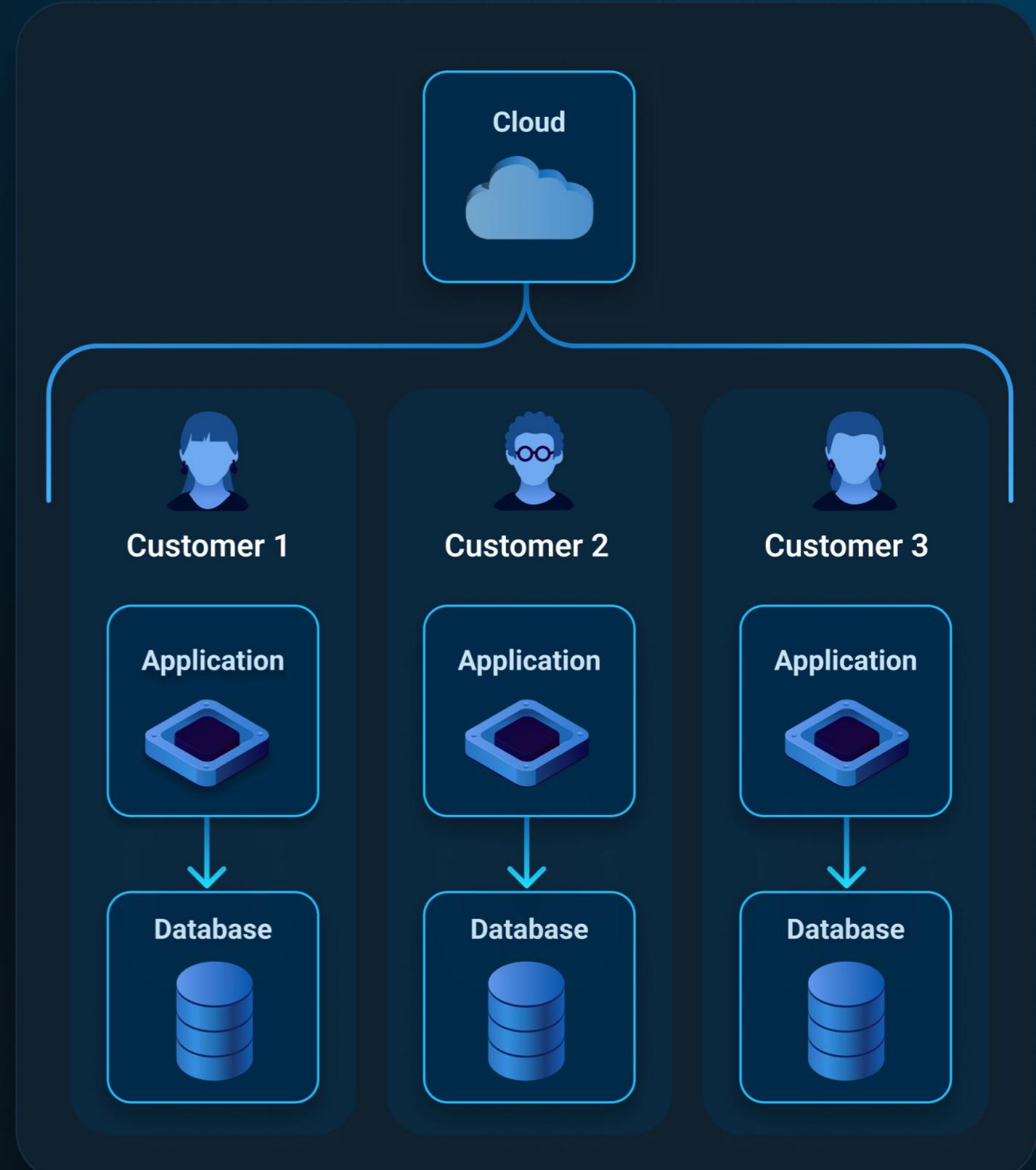


Customer Density

Challenge #1: Increase density to reduce costs

Reason: No instances were at 100% utilization 100% of the time

Challenge #2: Incrementally increasing CPU / RAM resources



Deciding on K8s

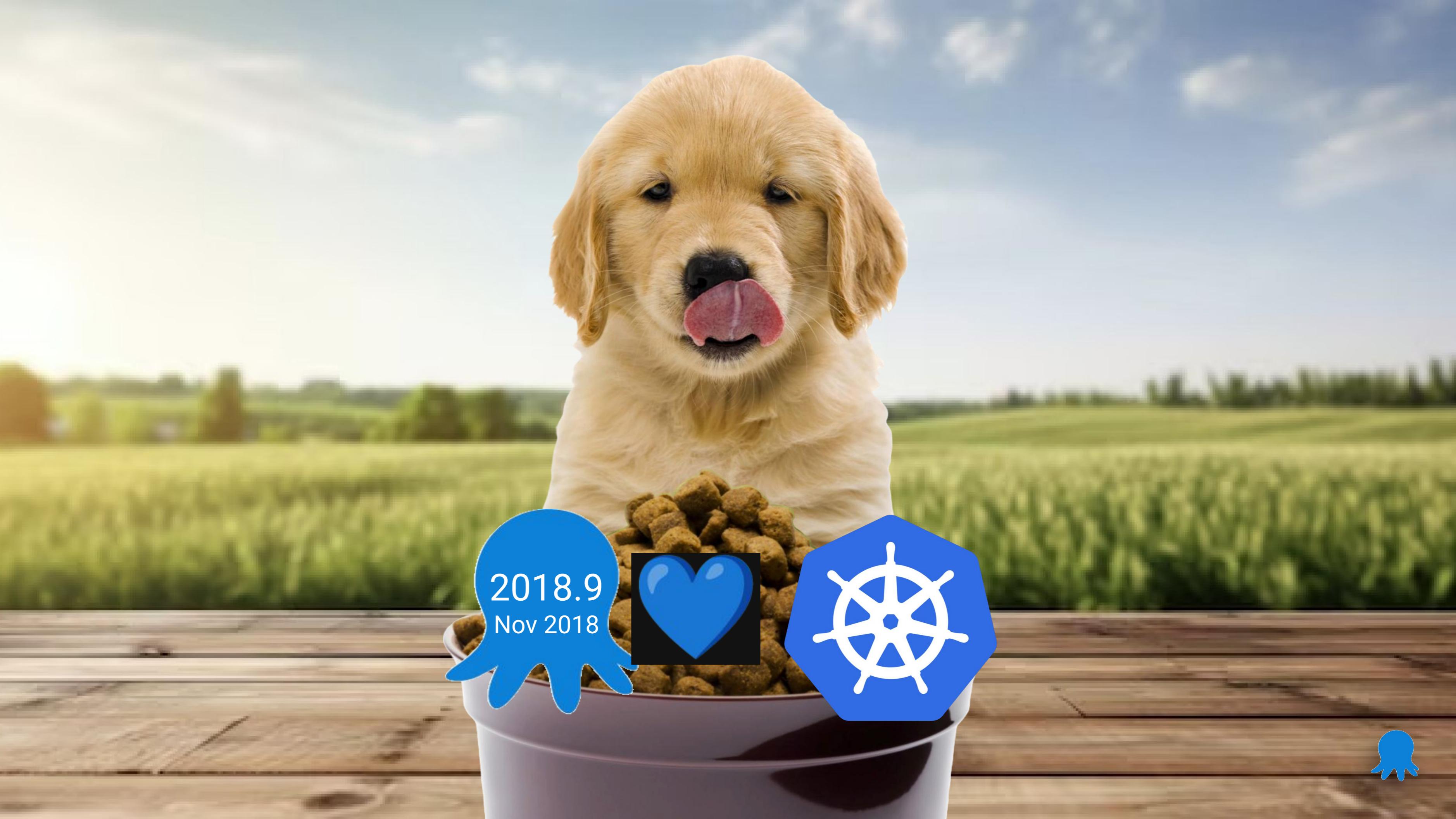
Didn't initially consider K8s

- Multiple Octopus instances per EC2 VM?
- Rewrite to run on Serverless?

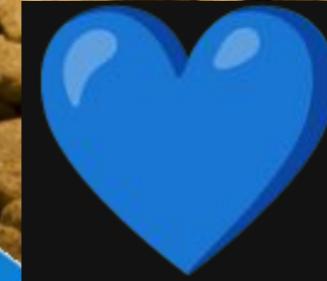
Kubernetes benefits

- Improved hardware efficiency
- Designed for scale
- Incremental resource scaling
- Desired state / immutability





2018.9
Nov 2018



Migration to Kubernetes



Container migration

Start September 2018

[Announcements](#), [Azure Kubernetes Service \(AKS\)](#), [Compute](#), [Containers](#)

Announcing the general availability of Windows Server containers and private clusters for Azure Kubernetes Service

By [Brendan Burns](#) Corporate Vice President, Azure

[AWS News Blog](#)

Amazon EKS Windows Container Support now Generally Available

by [Martin Beeby](#) | on [08 OCT 2019](#) | in [Amazon Elastic Kubernetes Service](#) | [Permalink](#) | [Share](#)

Posted on April 28, 2020
2 min read



Today's application environments are often heterogeneous, composed of both Windows and Linux applications. Using Kubernetes to host containers on both Windows Server and Linux not only saves costs but also reduces operational complexity. Many Azure customers have demonstrated this with their usage of Windows server containers. Their success in our preview makes me thrilled to announce the general availability of Windows Server container support on [Azure Kubernetes Service \(AKS\)](#).



Linux container migration

Start September 2018

TAG	OS/ARCH	Compressed Size ⓘ
2020.2.4		<code>docker pull octopusdeploy/octopusdeploy:2020.2.4</code> Copy
Last pushed 4 years ago by devopsatoc		
Digest		
3e19057a7677	windows/amd64	6.83 GB
c84da891a94e	windows/amd64	3.43 GB
79cbd06e9df0	windows/amd64	3.43 GB
725a1620e115	windows/amd64	3.35 GB
be44145ea3c7	linux/amd64	673.65 MB

Wow!



Lesson #2

Budget time for unplanned post-migration work



Linux Container Migration

September 2018 -> July 2019

Planned Work - migrating to Linux

- Update or replace third-party libraries
- Replace all Registry references
- Verify all File System functionality
- Extensive testing

Unplanned Work - post migration issues

- Active Directory Authentication
- Microsoft SQL Client

Octopus 2019.7

Highlights

Octopus 2019.7 is a significant release even though it doesn't include any user-facing features. It includes technical changes to retarget Octopus Deploy to .NET Framework 4.7.2 and .NET Core 2.2 so Octopus can run natively on Linux and in Linux containers. This change is initially for Octopus Cloud and it will be extended to Octopus self-hosted in the future.

Watch [our blog](#) for some great technical blog posts on what this involved and our lessons learned.

Breaking changes

Most customers can upgrade directly to Octopus Server 2019.7, except those hosting Octopus Server on Windows Server 2008 SP2. [This blog post](#) has more details about who will be affected, and what you can do to upgrade.

Don't worry, the Octopus Server installer will prevent you from accidentally upgrading if your host operating system will not be supported.

Show/hide



Linux Container for self-hosted customers

August 2020



Introducing the Octopus Server Linux Docker image

Matthew Casperson

August 3, 2020 • 7 mins



Build the plane while we were flying it

Feature work, bug fixes, and patching security issues couldn't stop

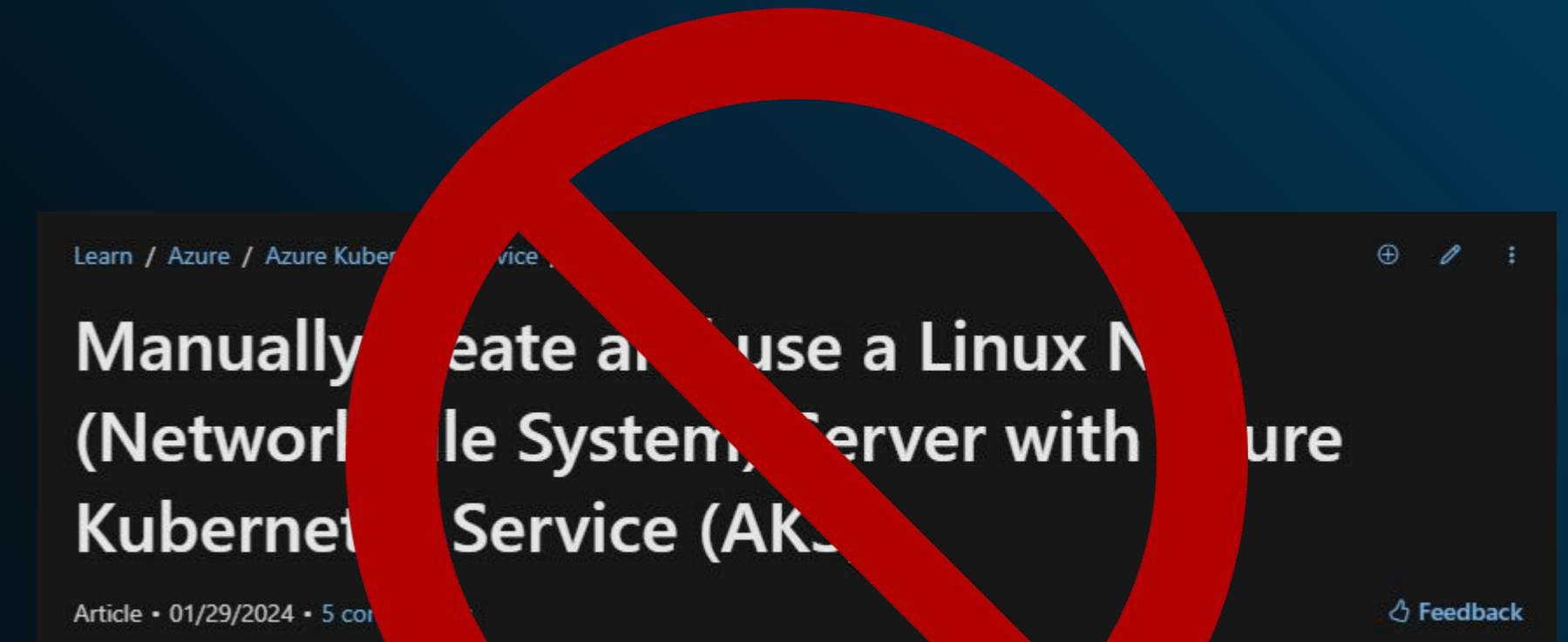
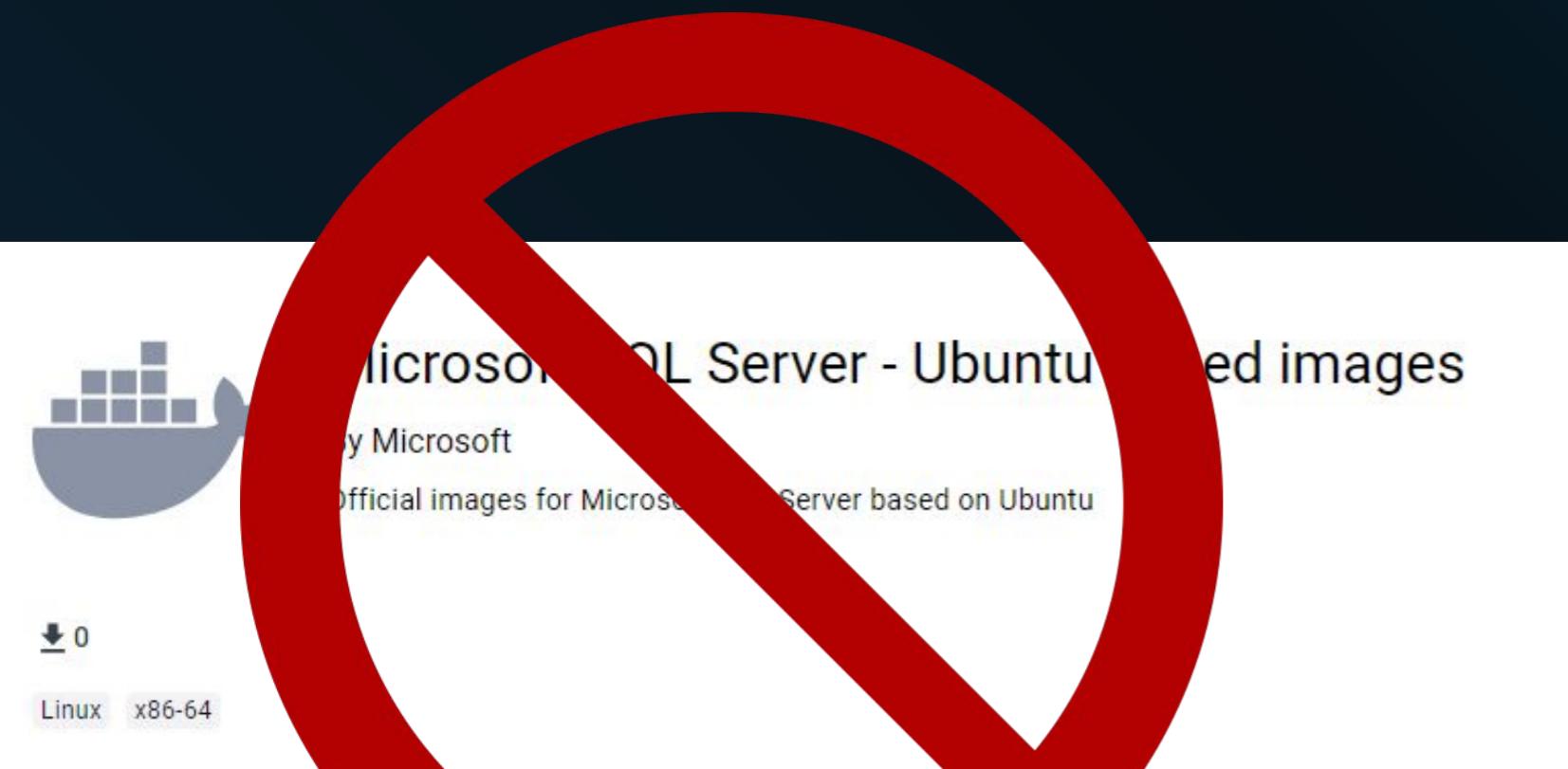


Lesson #3

Kubernetes and containers do not make sense for all use cases



SQL Server and File Storage



Cloud Managed Services

Leverage their expertise

It's already built

It's their focus

Pre-built features such as zonal
and geo-redundant backups



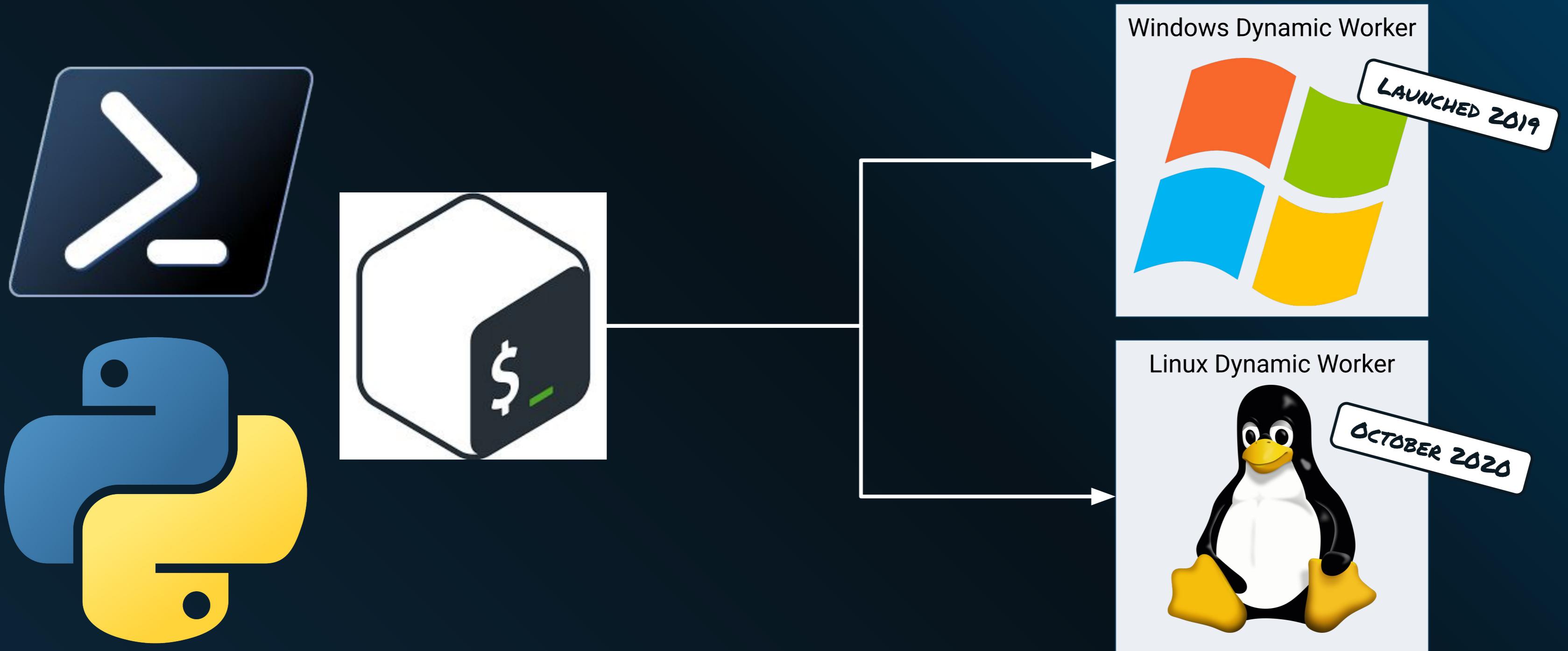
Database as a Service



CLOUD STORAGE



Move workloads from containers



Lesson #4

Not all managed services are the same



Challenges with AWS

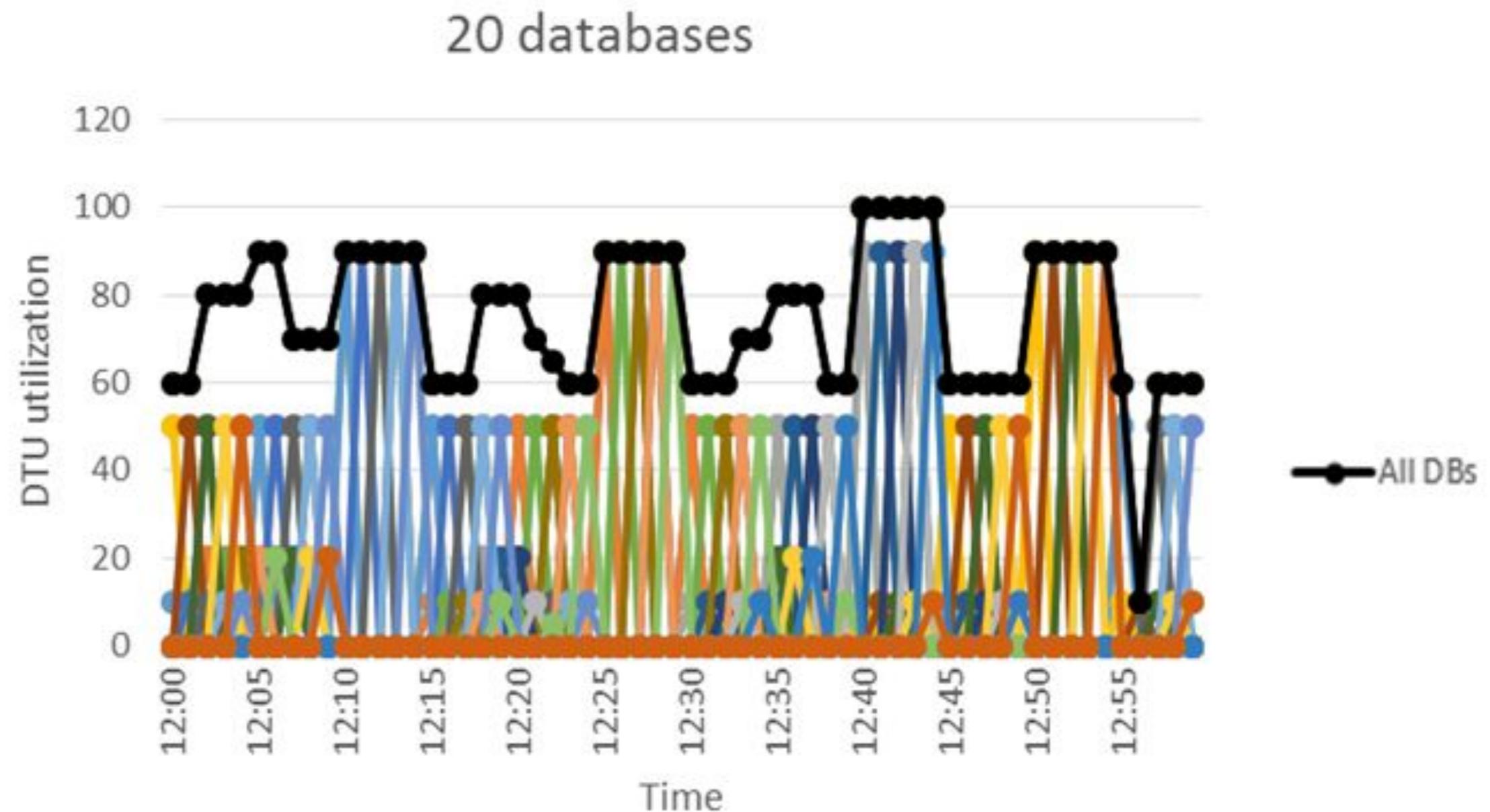
Limitations for Microsoft SQL Server DB instances

The Amazon RDS implementation of Microsoft SQL Server on a DB instance has some limitations that you should be aware of:

- The maximum number of databases supported on a DB instance depends on the instance class type. For example, Multi-AZ Database Mirroring (DBM), or Multi-AZ Availability Groups (AG) are not supported on DB instances that exceed this limit.

The following table shows the maximum number of supported databases for each instance class type. Use this table to help you decide if you can move from one instance class type to another. If the target instance class type has a lower maximum number of databases than the current instance class type, the target instance has more databases than the target instance class type or a database is in the `CREATING` state, see the status of your request in the **Events** pane.

Instance class type	Single-AZ	Multi-AZ with DBM or AG
db.*.micro to db.*.medium	30	N/A
db.*.large	30	30
db.*.xlarge to db.*.16xlarge	100	50
db.*.24xlarge	100	50



Octopus Cloud v2



**1900 Customer
instances hosted
across 3 regions**

US

Europe

Australia



Cluster Information

8 Kubernetes Clusters

VMSS - 3 to 6 nodes

D32s_v5 - 32 vCPUs / 128 GB RAM

300 - 500 Instances per cluster



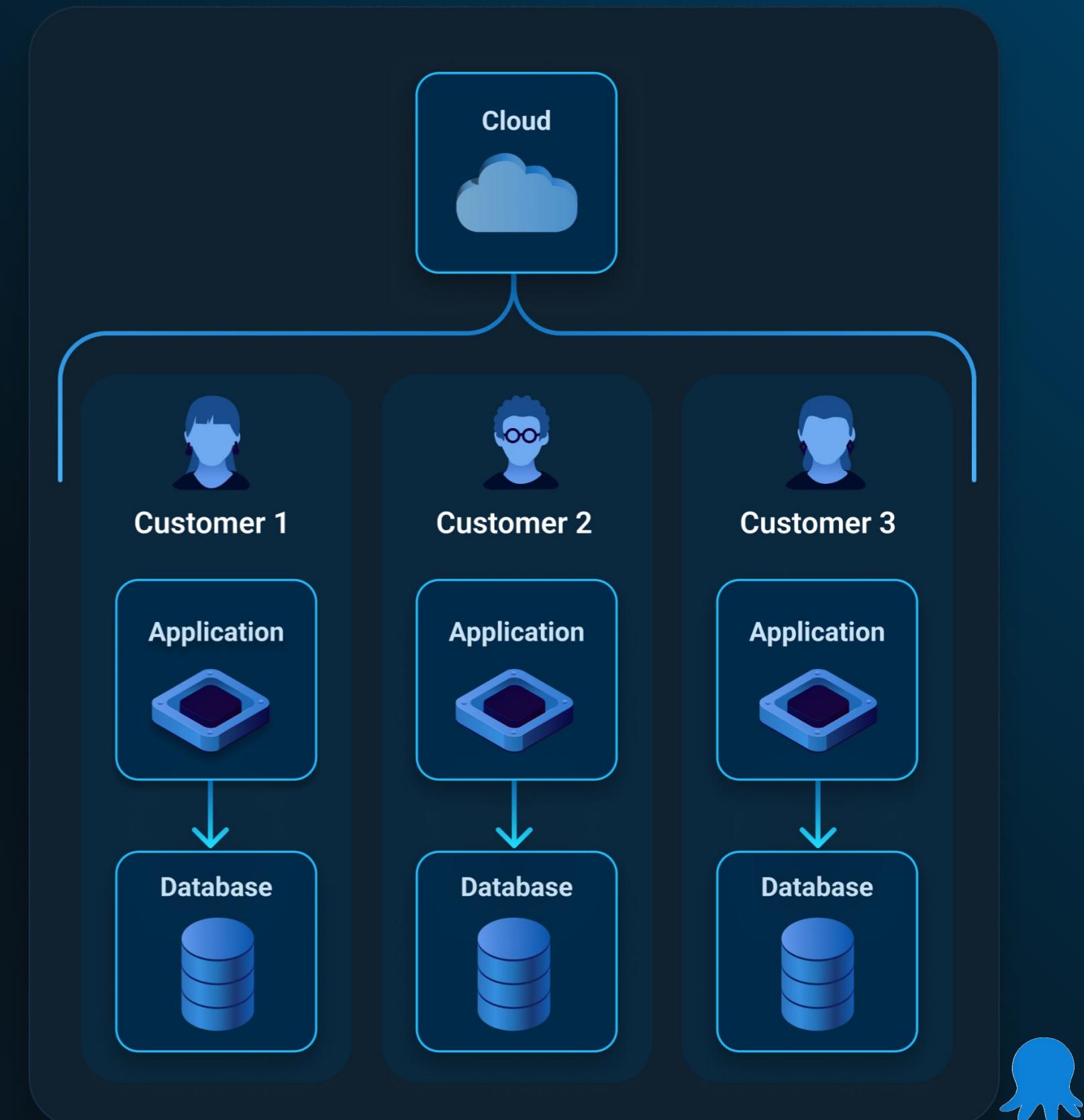
Each Customer Instance

Dedicated container in a separate namespace

Dedicated Azure SQL database

Dedicated Azure File Share

Dynamic workers on demand



Managing K8s Clusters at Scale



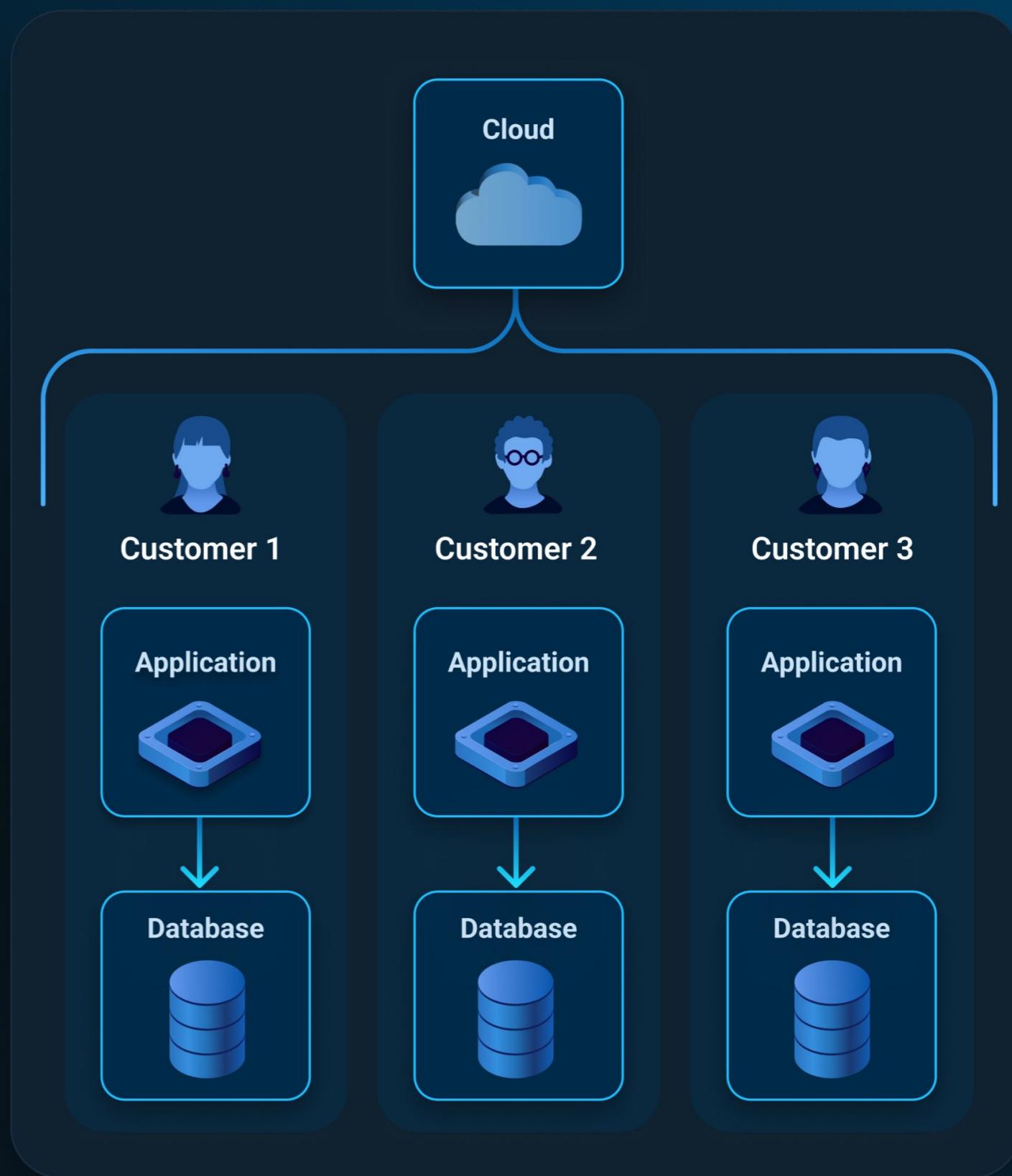
Lesson #5

Operations work shouldn't be a part time focus



1600 customer instances

1600 containers, databases, file shares, and network configs



Variety of use cases

Serving customers with various deployment needs:

5,000+ edge locations

4,000+ deployments in a single day

16,000 targets in multiple data centers



Ongoing Kubernetes Maintenance



Lesson #6

Custom tooling for specific business requirements is preferred over misusing a tool.

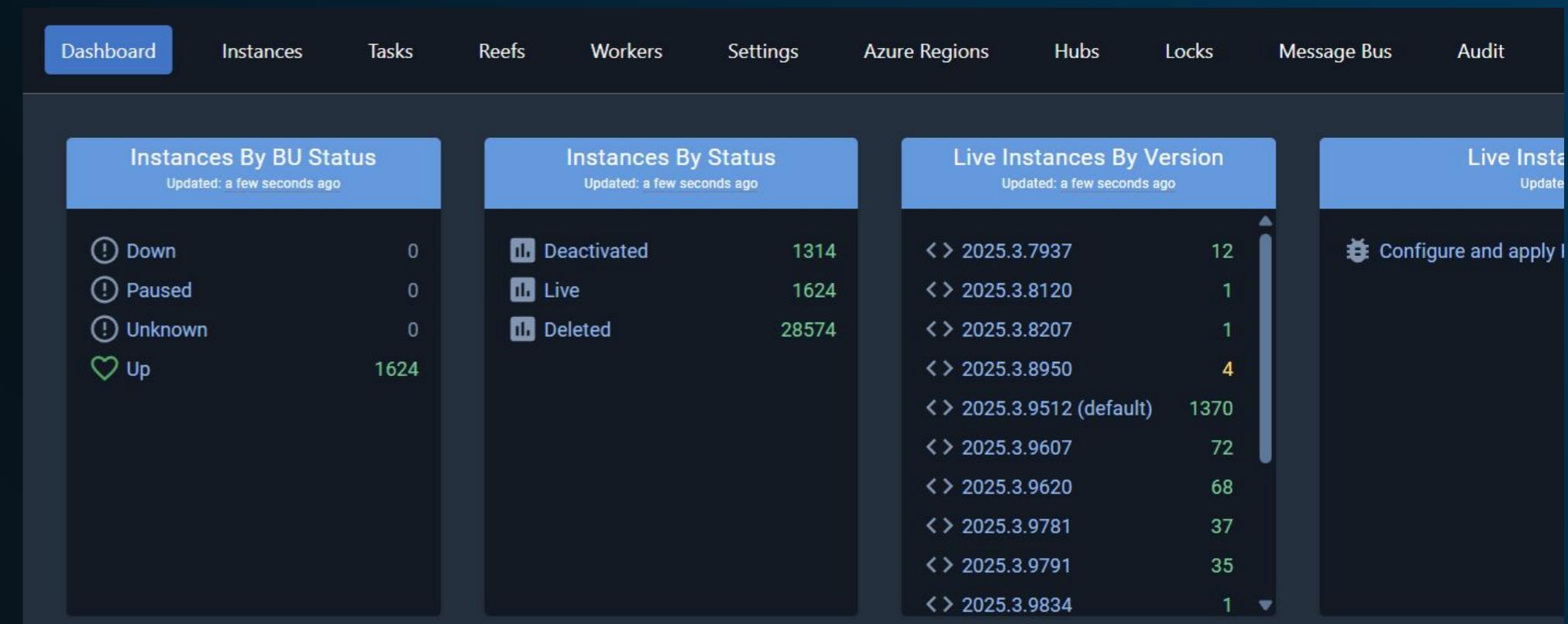


Cloud Portal

Custom built internal tool

One-stop shop for all things
Octopus Cloud Related

Manage Customers' instances at
Scale



The screenshot shows the Cloud Portal dashboard with a dark theme. The top navigation bar includes links for Dashboard, Instances, Tasks, Reefs, Workers, Settings, Azure Regions, Hubs, Locks, Message Bus, and Audit. The Dashboard section displays four main cards: 'Instances By BU Status' (Down: 0, Paused: 0, Unknown: 0, Up: 1624), 'Instances By Status' (Deactivated: 1314, Live: 1624, Deleted: 28574), 'Live Instances By Version' (2025.3.7937: 12, 2025.3.8120: 1, 2025.3.8207: 1, 2025.3.8950: 4, 2025.3.9512 (default): 1370, 2025.3.9607: 72, 2025.3.9620: 68, 2025.3.9781: 37, 2025.3.9791: 35, 2025.3.9834: 1), and a partially visible 'Live Instances' card. A sidebar on the right contains a 'Configure and apply I...' button. The bottom right corner features a blue octopus icon.

BU Status	Count
Down	0
Paused	0
Unknown	0
Up	1624

Status	Count
Deactivated	1314
Live	1624
Deleted	28574

Version	Count
2025.3.7937	12
2025.3.8120	1
2025.3.8207	1
2025.3.8950	4
2025.3.9512 (default)	1370
2025.3.9607	72
2025.3.9620	68
2025.3.9781	37
2025.3.9791	35
2025.3.9834	1

Day 2 Operations

Customer's preferred maintenance window

Configurable by the customer
(typically their off-hours)

Guard Clauses to prevent
unnecessary work



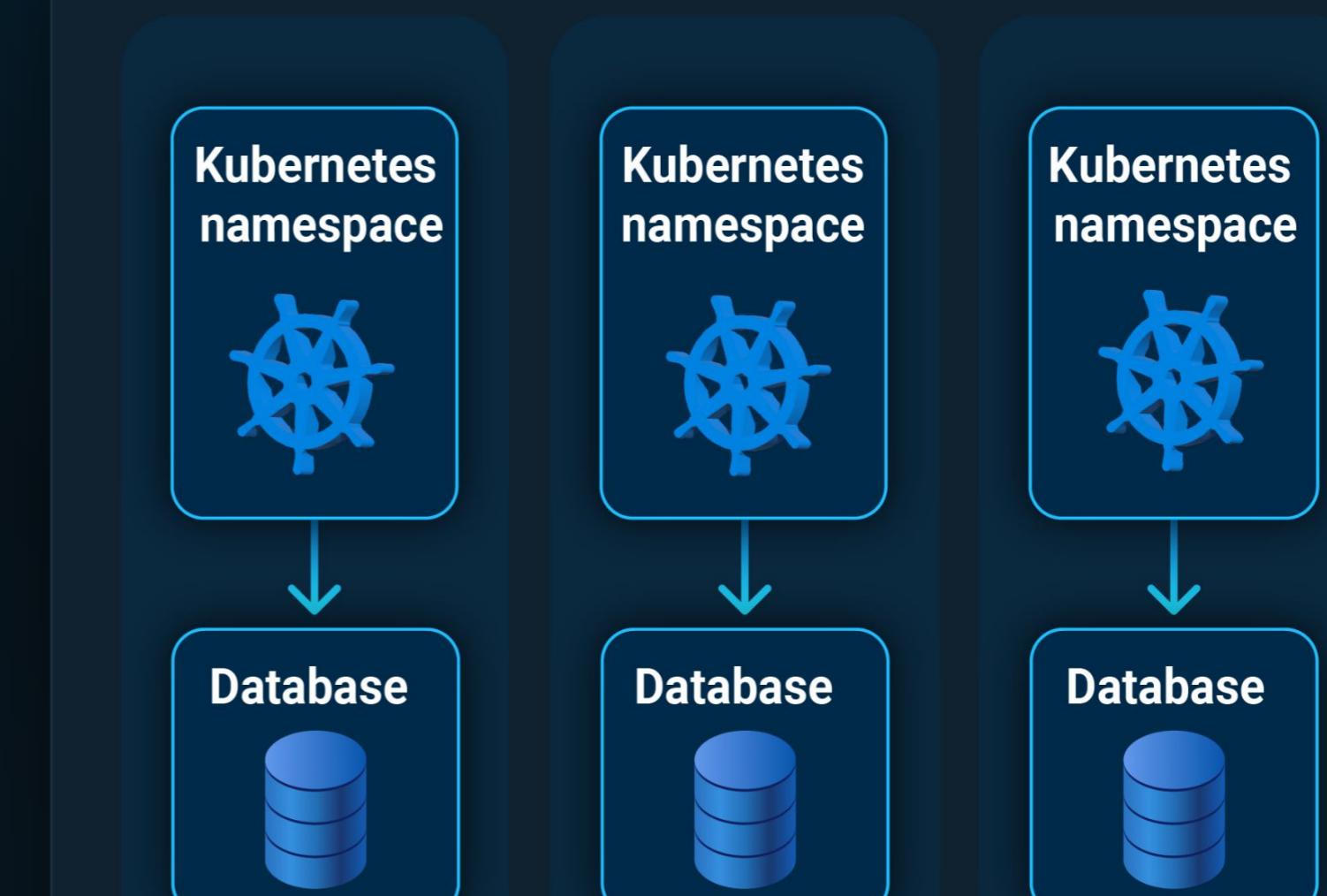
Stop Noisy Neighbors

Set CPU / RAM / Database limits on each instance.

Use Azure CLI and AKS to monitor usage.

Increase or decrease resources limits based on usage.

Isolated Infrastructure



Upgrading Clusters



Billing System Events

Non-payment

Deactivate

Archive and move to cold storage

Delete after 150 days



Lesson #7

Use third-party tooling (both free and paid) whenever feasible



Deployments at Scale

Use Octopus Deploy to deploy Octopus Deploy

One process to deploy to thousands of customers.

Vet Clinic

Tenants

Tenant	Tenant tag	Project	Environment
Companion vets	East US VIP	Vet Clinic	Production
Veterinary	West US 2	Vet Clinic	Production
Pet health	East US Branding	Vet Clinic	Multiple env. ▾
Valley Vet Clinic	East US 2 Alpha	Vet Clinic	Multiple env. ▾
Cat Care Palace	Central US	Vet Clinic	Production
Dog Care Palace	North US Alpha	Vet Clinic	Production



Monitoring and Alerting

- SumoLogic
- SEQ
- Better Uptime
- PagerDuty
- Snowflake

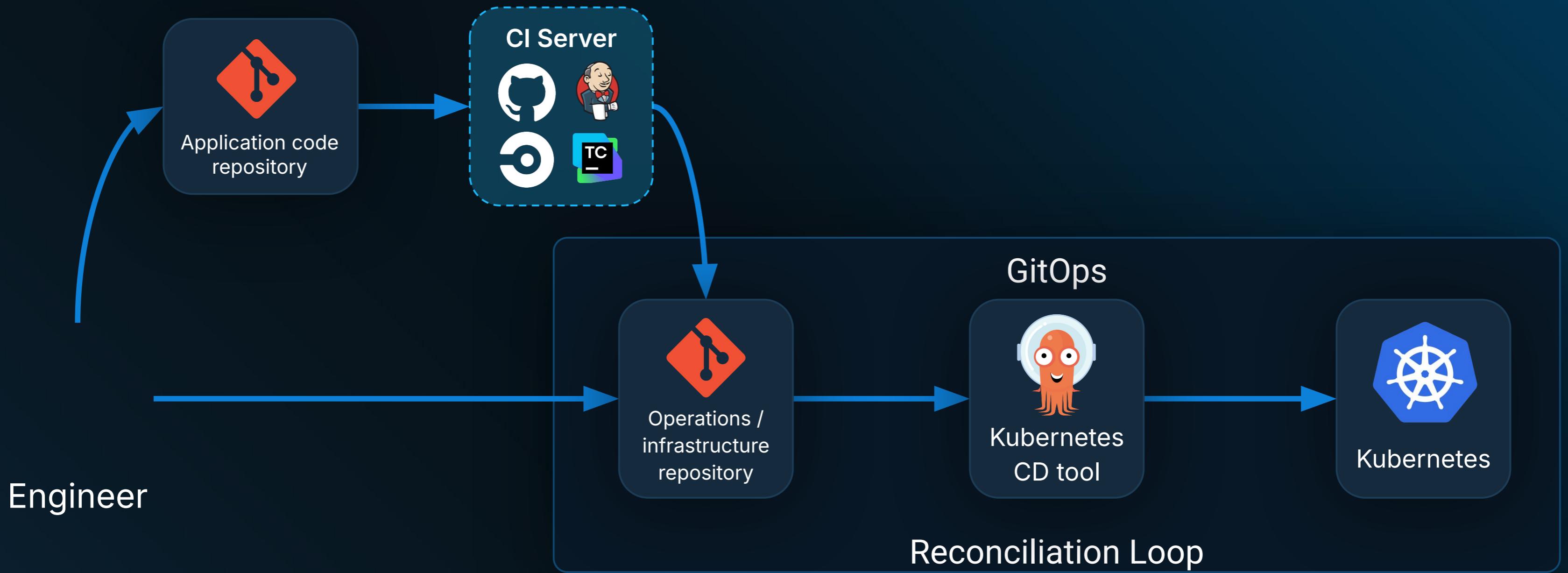


Lesson #8

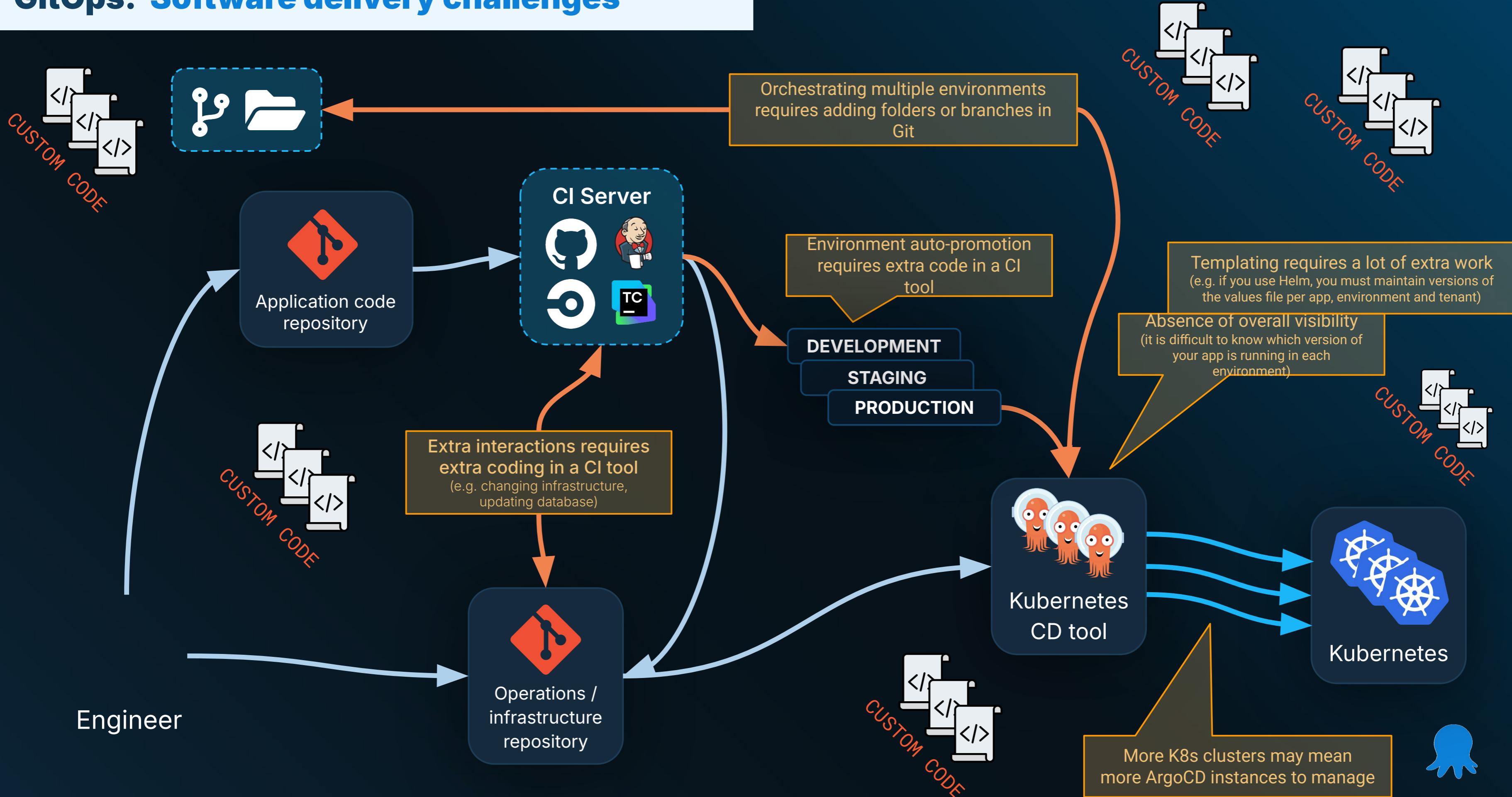
GitOps augments Continuous Delivery - it doesn't replace it



GitOps: A basic workflow

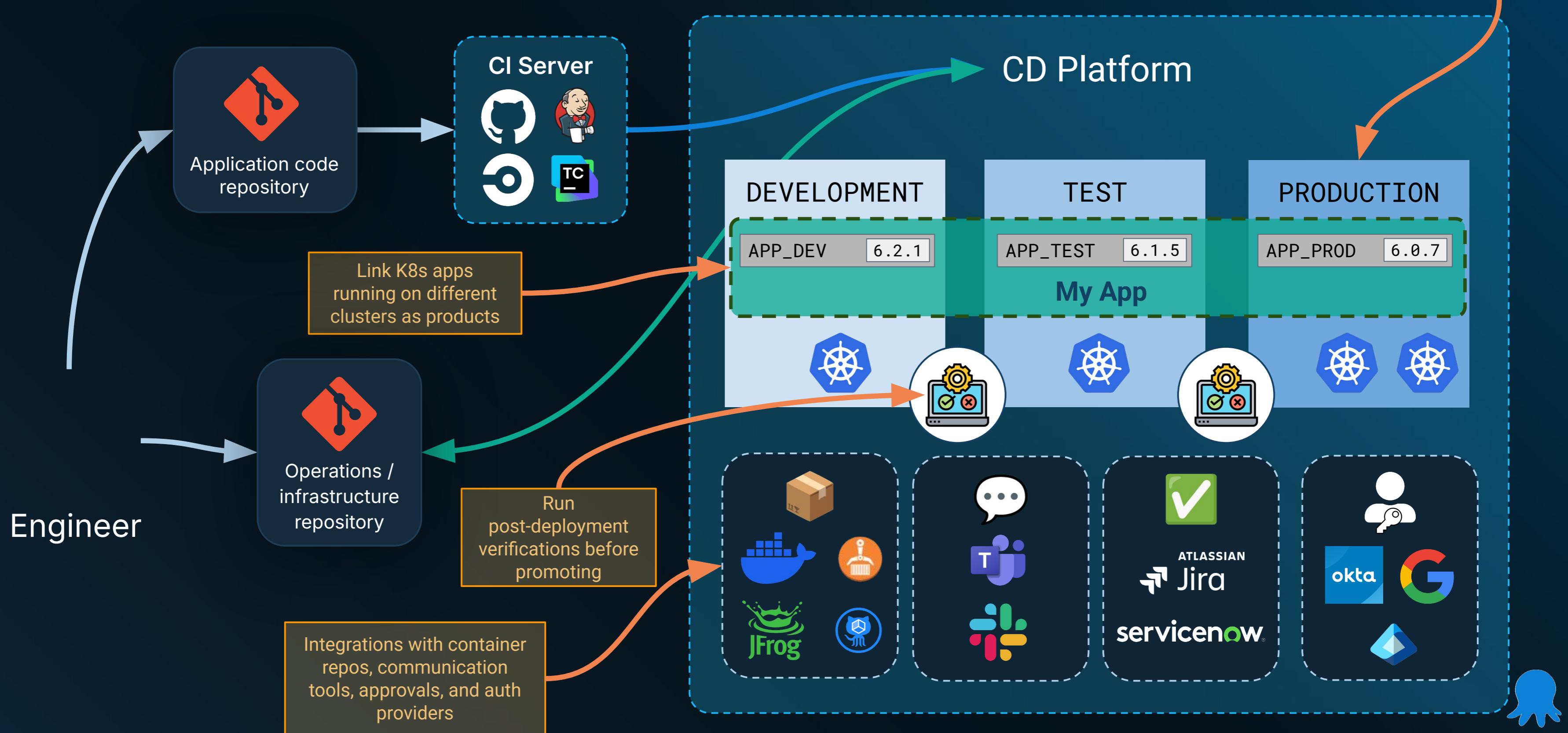


GitOps: Software delivery challenges



GitOps + Continuous Delivery

Environment, versions, and releases are first-class citizens



Summary of Lessons

1. Deciding to move to Kubernetes
 - a. Have the right reasons for moving to Kubernetes
2. Migration
 - a. Budget time for unplanned post-migration work
 - b. Kubernetes and containers do not make sense for all use cases
 - c. Not all managed services are the same
3. Running at scale
 - a. Operations work shouldn't be a part time focus
 - b. Custom tooling might be required for specific business requirements
 - c. Use third-party tooling (both free and paid) whenever feasible
 - d. GitOps augments Continuous Delivery - It doesn't replace it



Thank you



Bob Walker

Field CTO

Octonaut since 2018

 @bobjwalker

 bob.walker@octopus.com

 @bobjwalker

 bobjwalker.octopus.app

