



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

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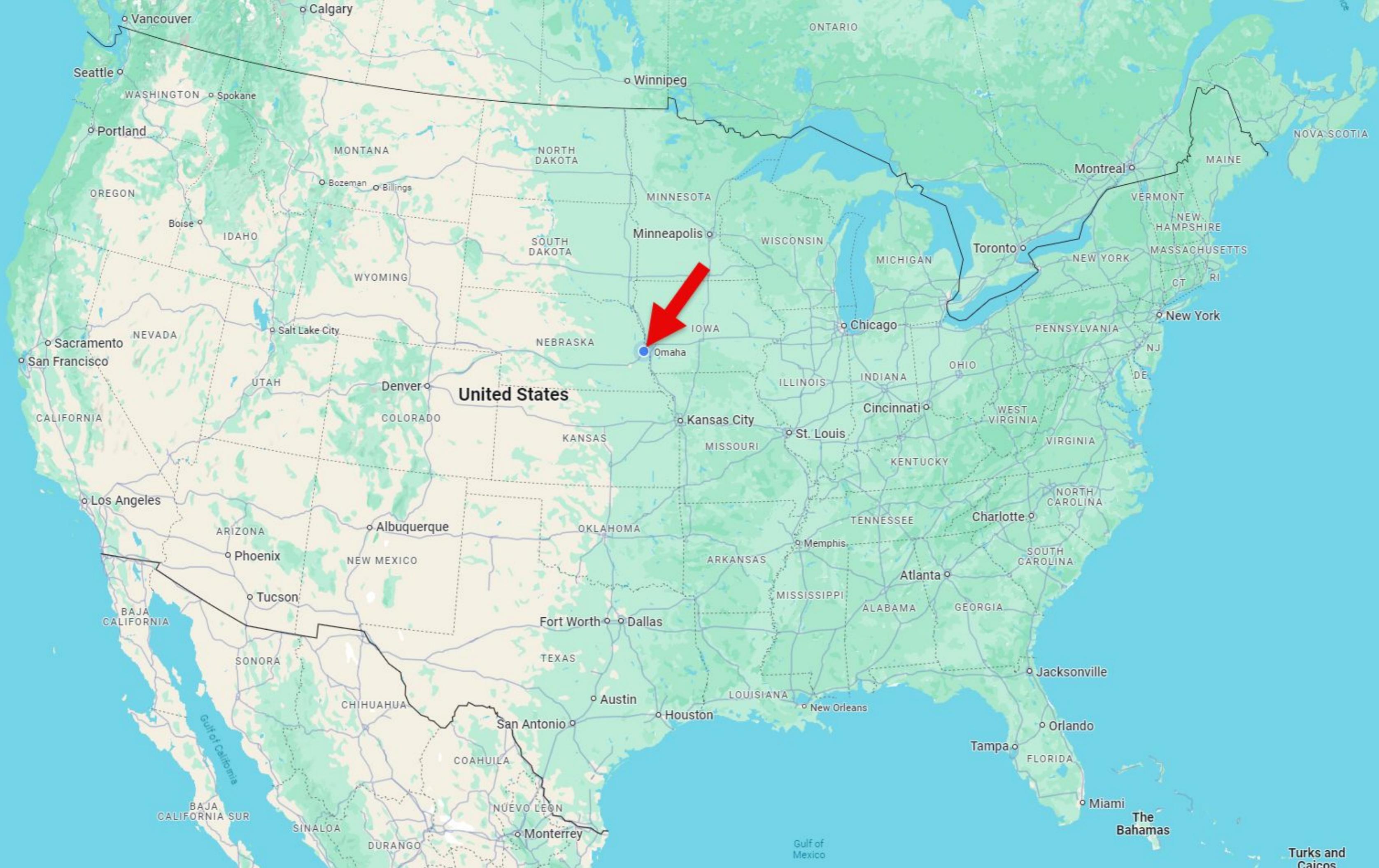
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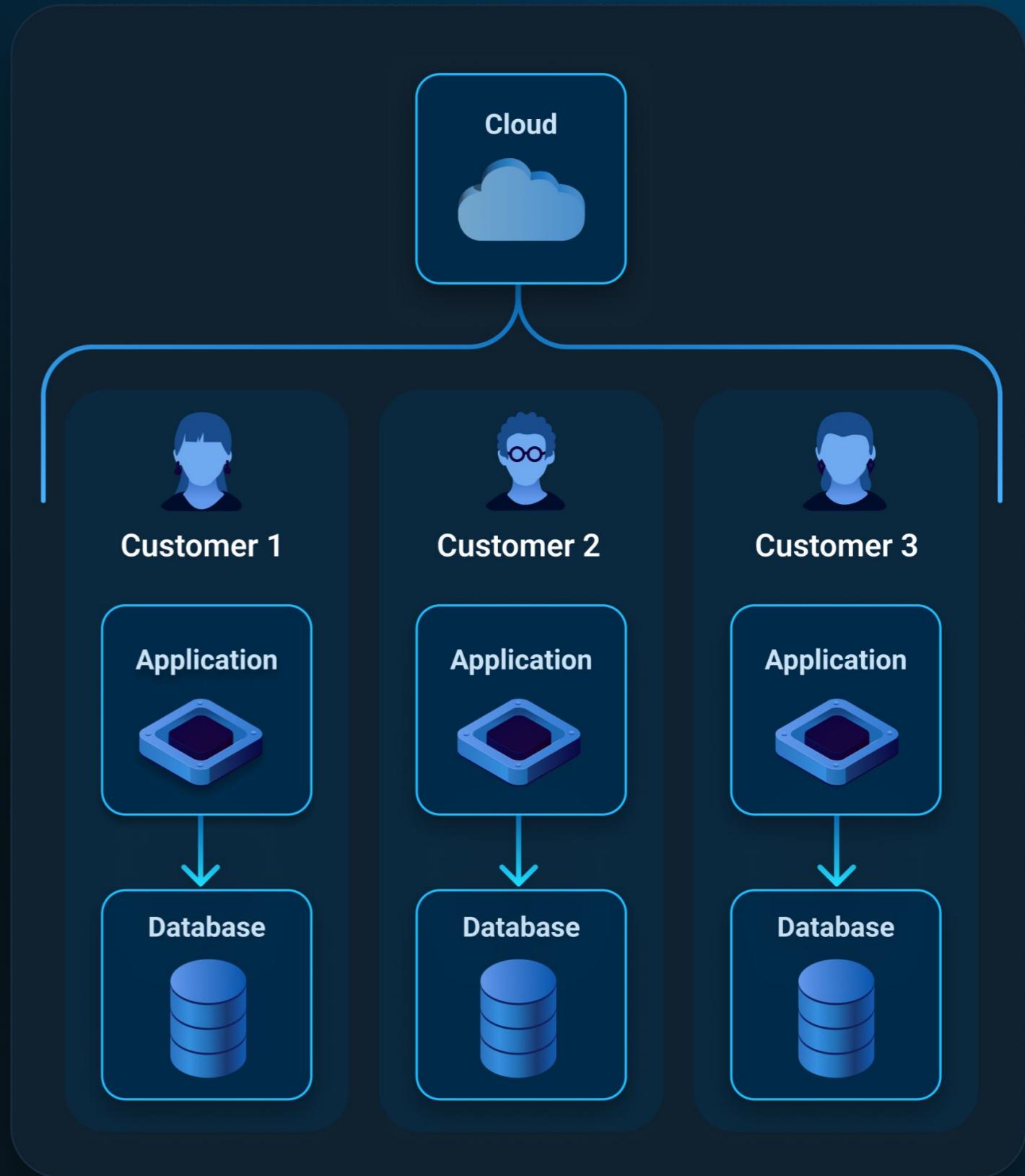


Brownfield Migration

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



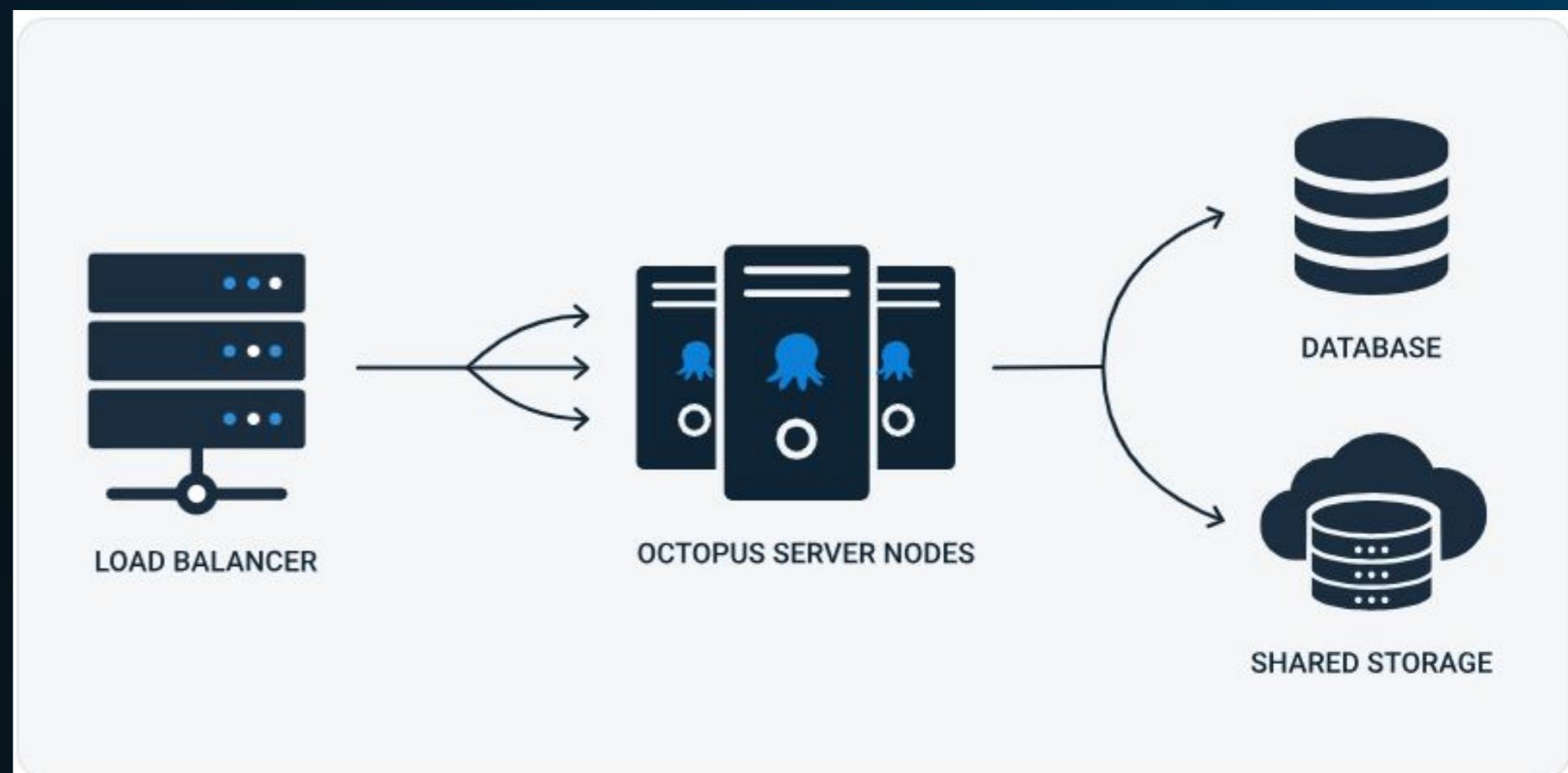
Four Key Components

Octopus Deploy .NET Application

SQL Server

File Storage

Networking/Load Balancer



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

Cost shouldn't be the sole deciding factor when moving to Kubernetes

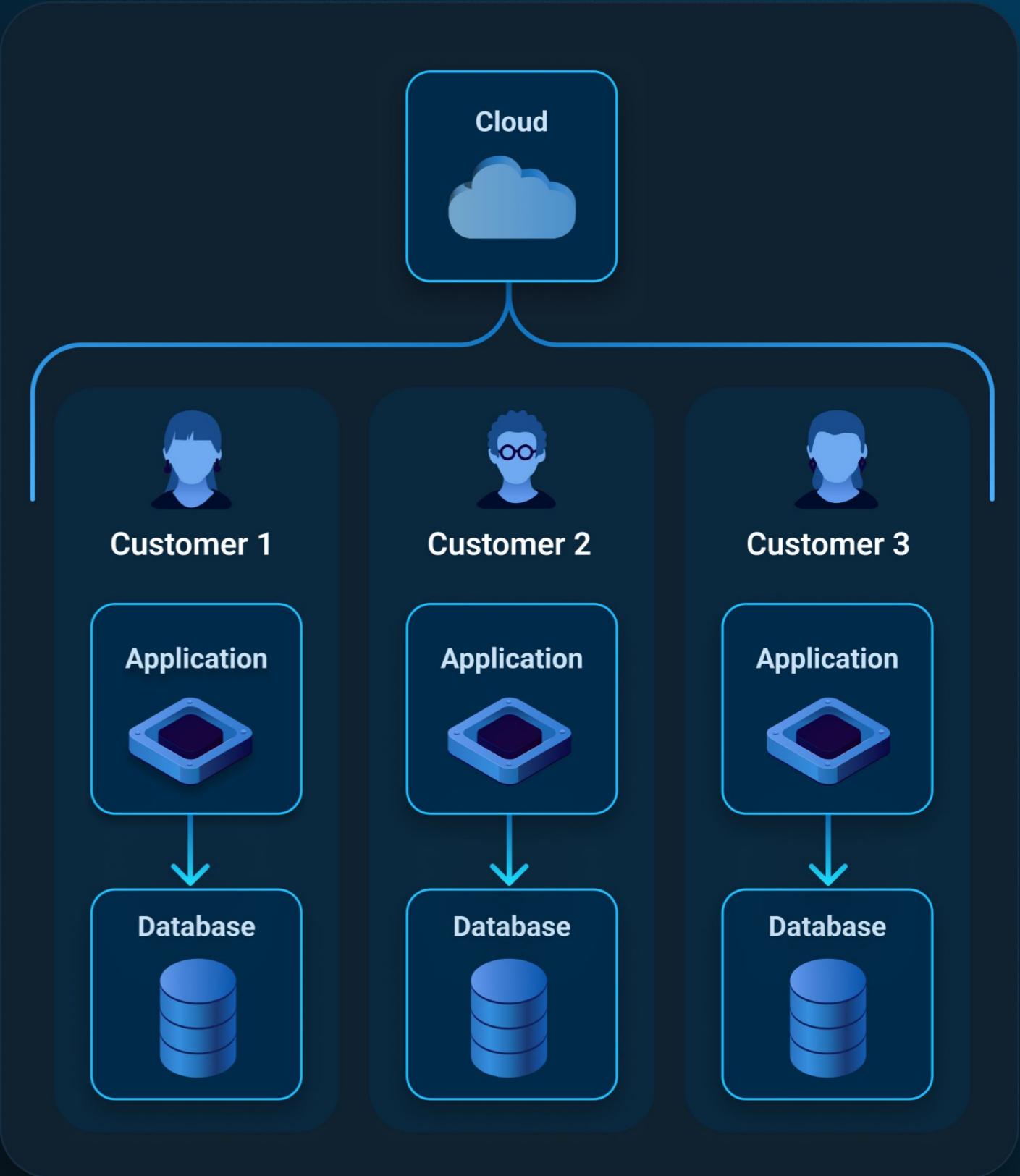


Customer Density

Increase density to reduce costs

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

Another Challenge: Incrementally increasing CPU / RAM resources



Deciding on K8s

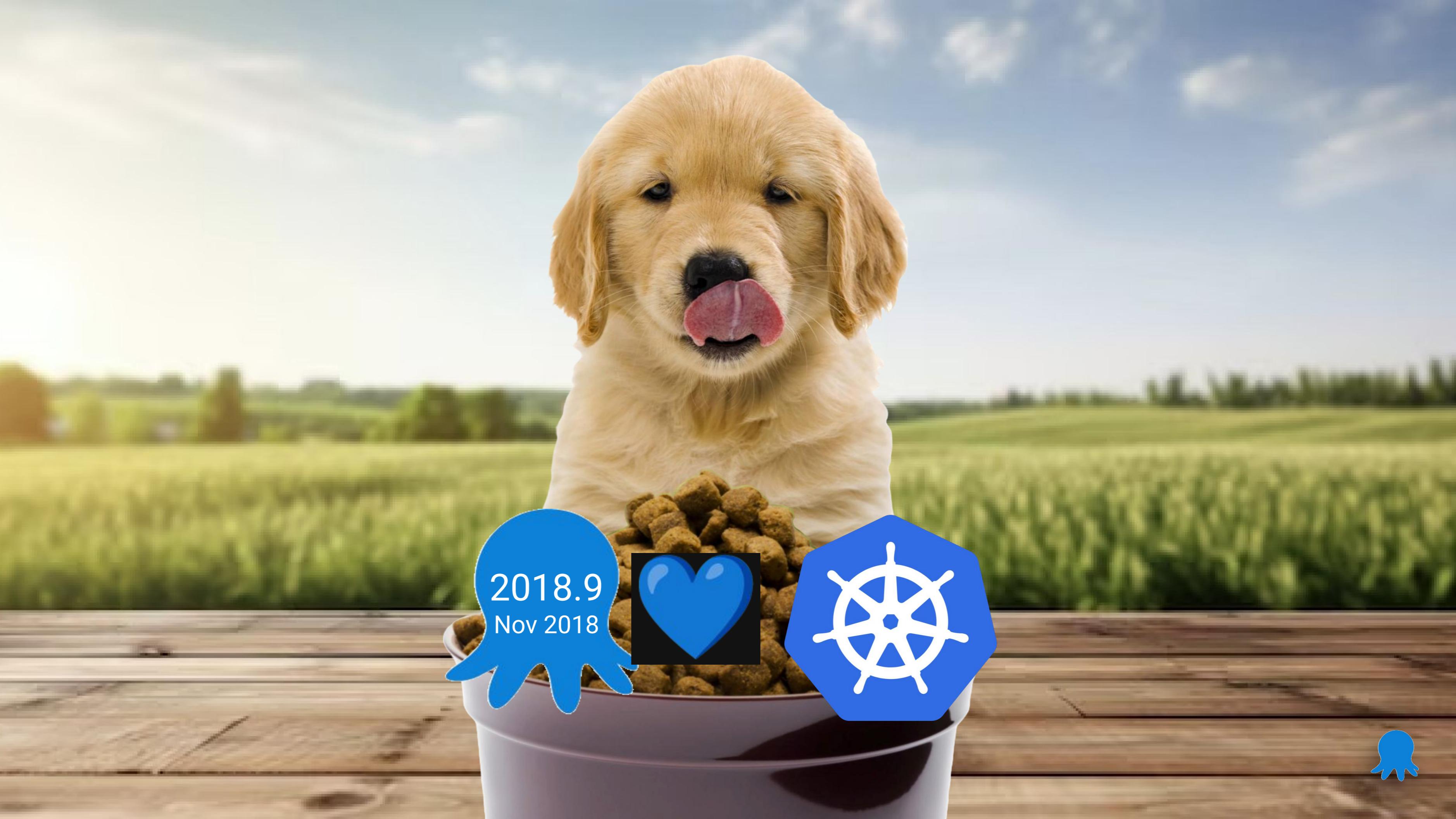
Didn't initially consider K8s

- 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

Brownfield migration will have post-migration issues



Linux Container Migration

September 2018 -> July 2019

Moving to .NET Core

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

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

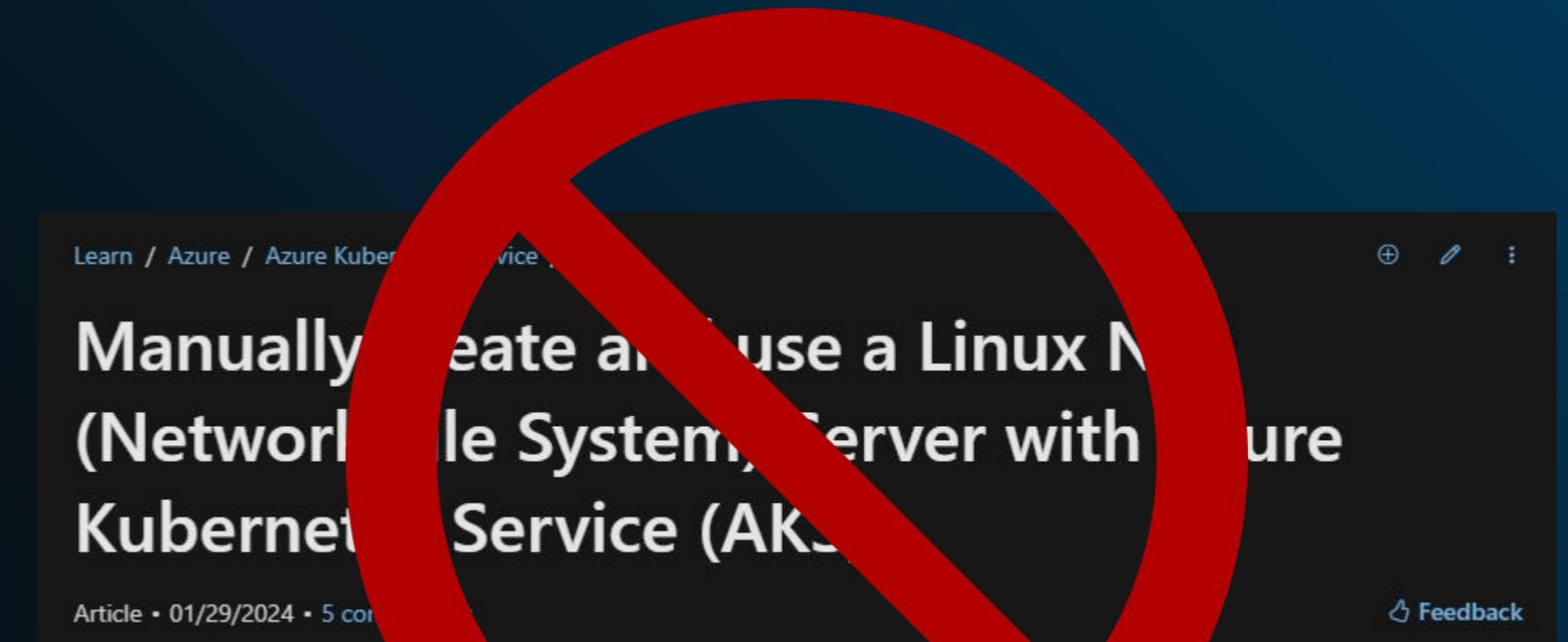
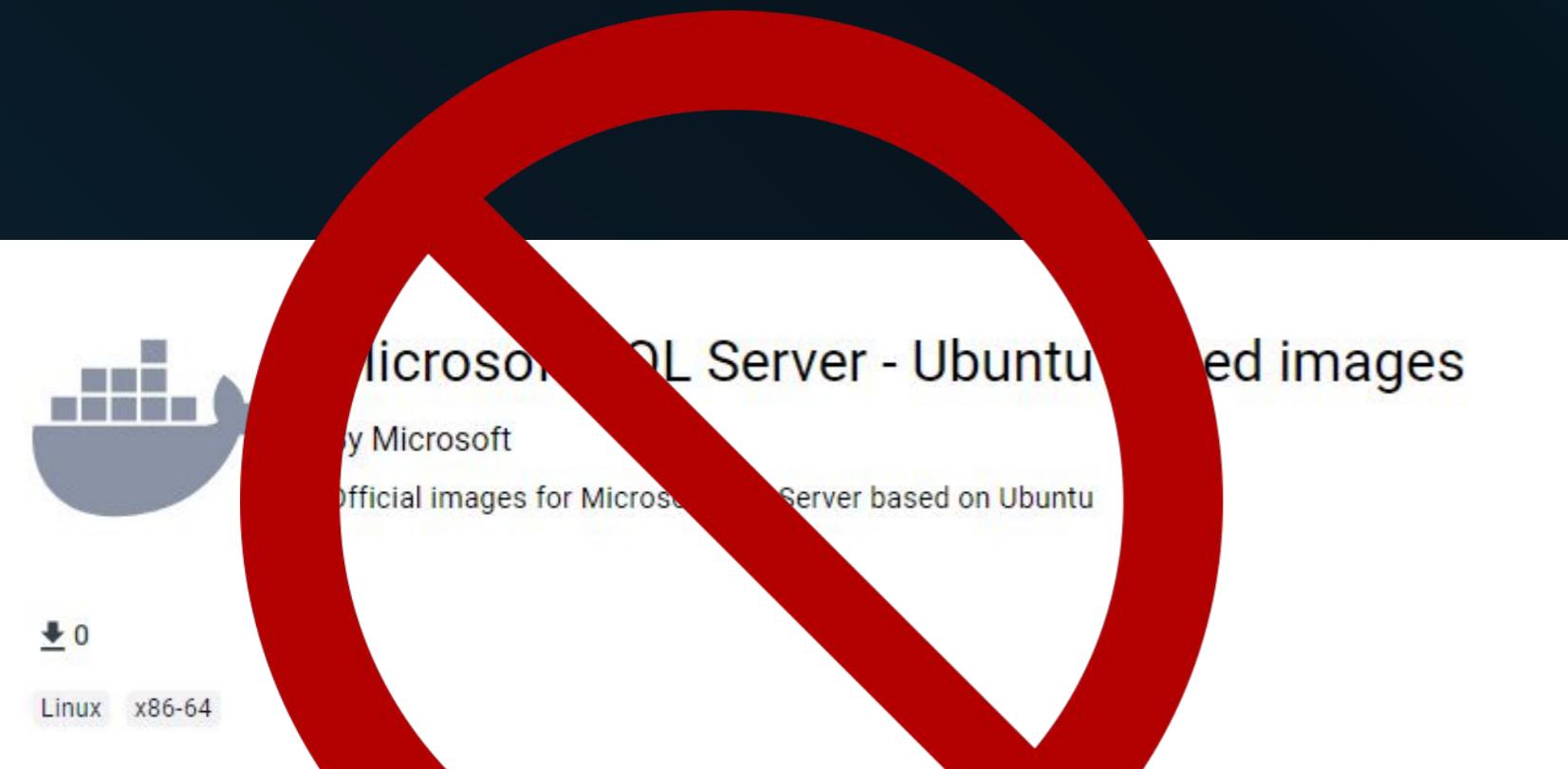


Lesson #3

Kubernetes and containers do not make sense for all use cases



SQL Server and File Storage



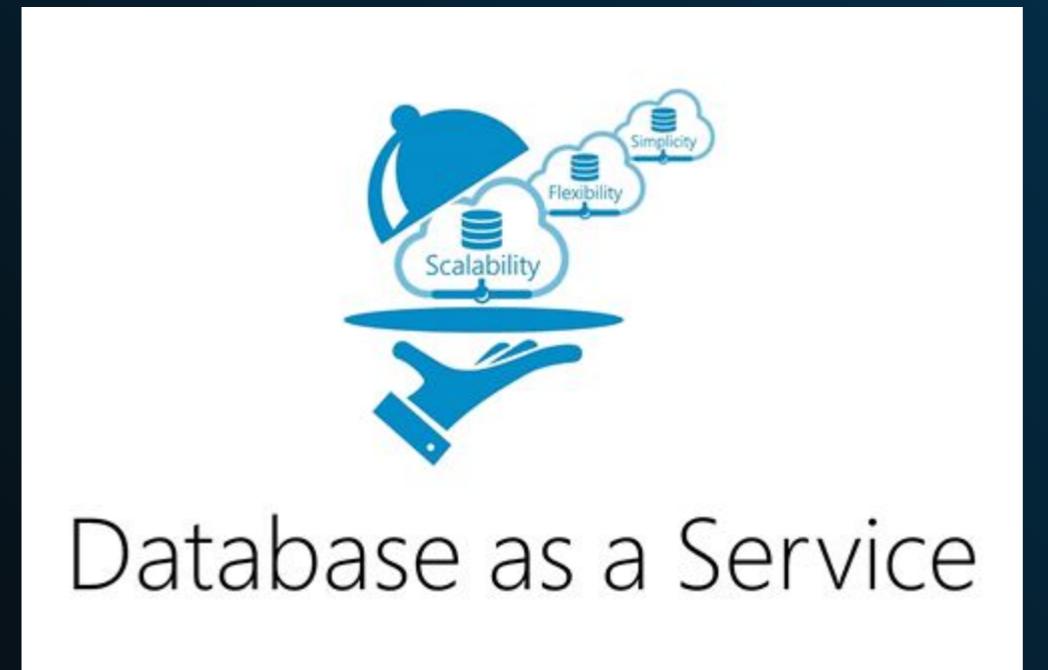
Cloud Managed Services

Leverage their expertise

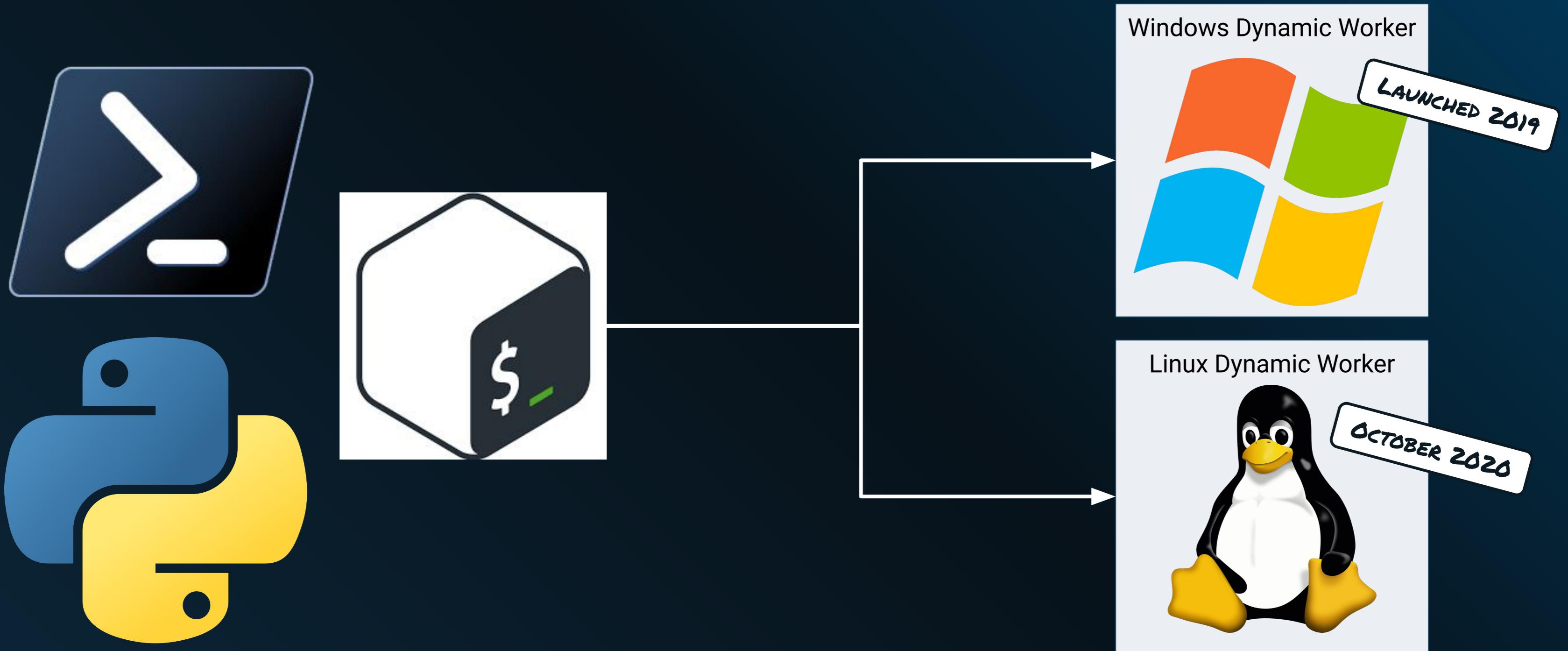
It's already built

It's their focus

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



Move workloads from containers



Lesson #4

Not all managed services are the same



Challenges with AWS

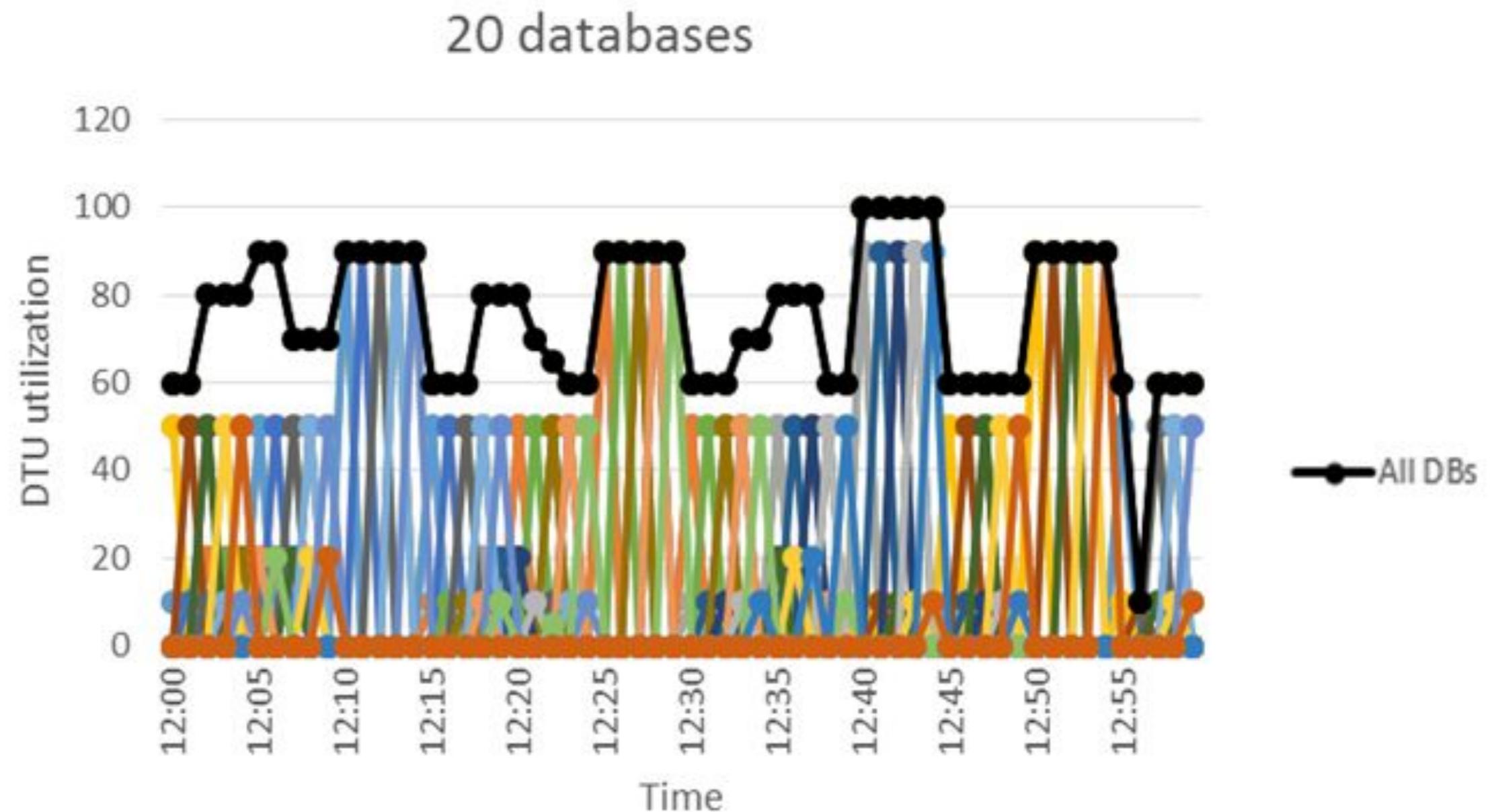
Limitations for Microsoft SQL Server DB instances

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 a restoring 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

E20s_v4 - 20 vCPUs / 160 GB

RAM

300 - 500 Instances per cluster



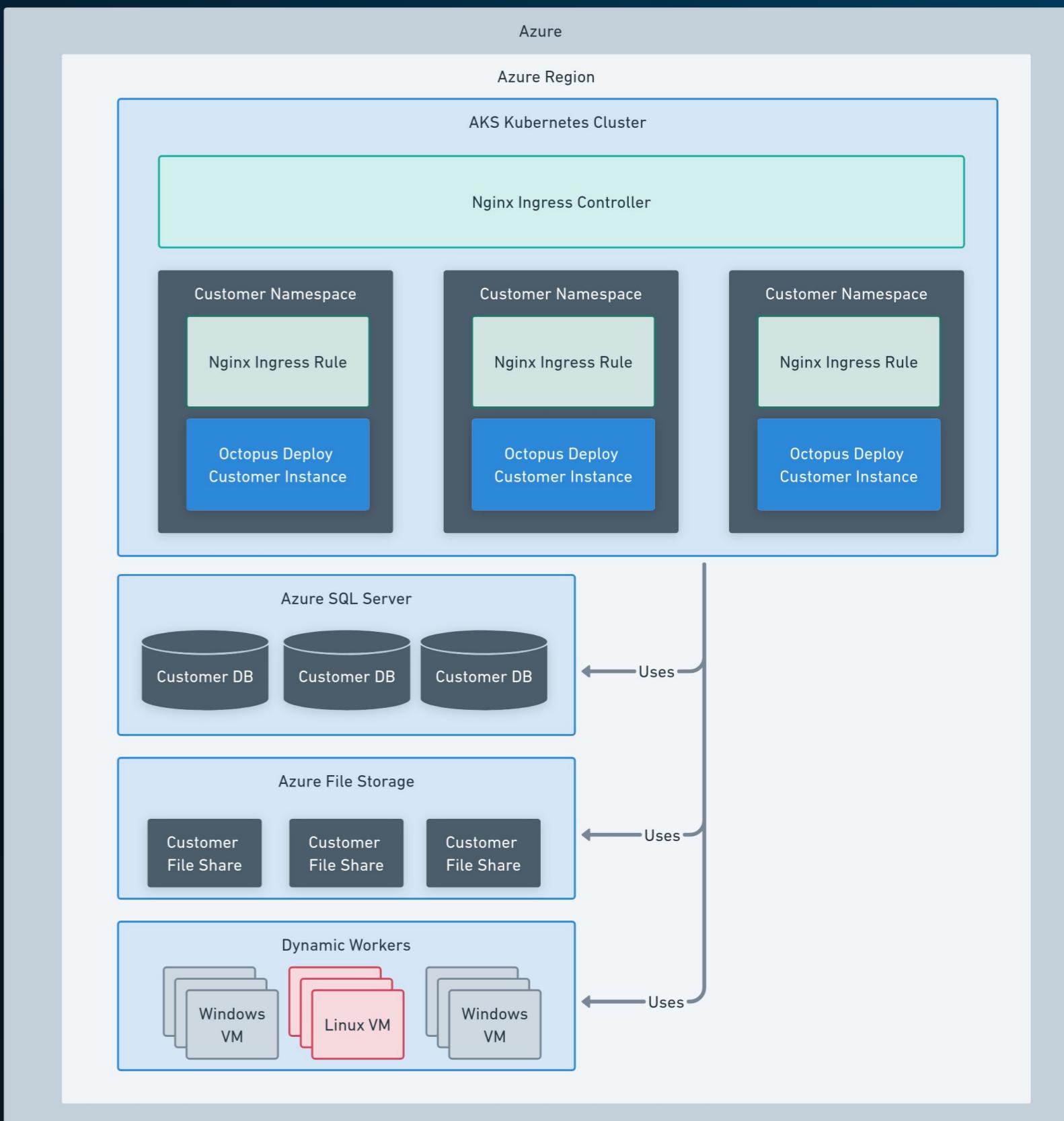
Each Customer Instance

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

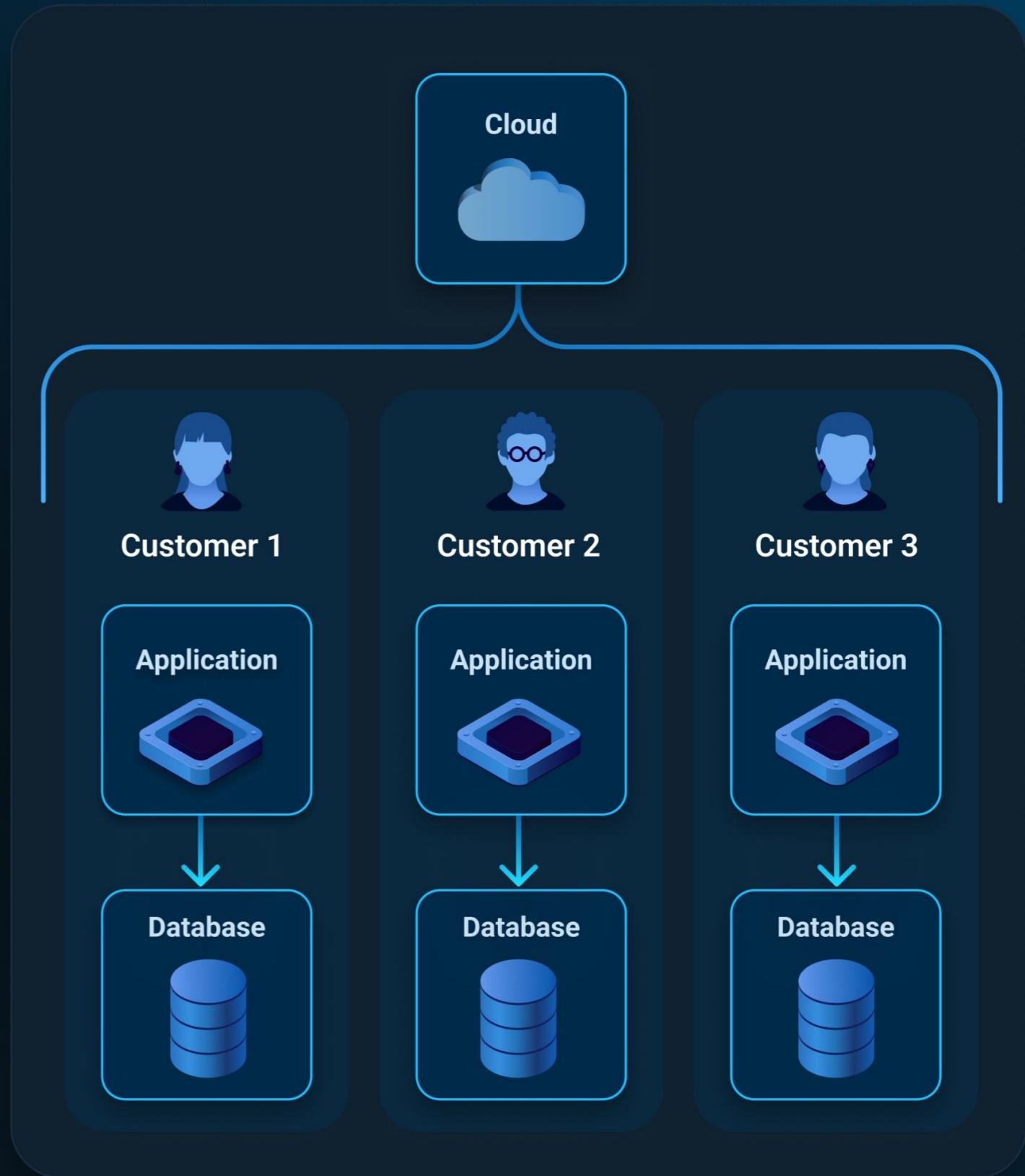
Operations work shouldn't be a part time focus



1900

customer instances

1900 containers, databases, file shares, and network configs



Variety of use cases

Serving customers with various deployment needs:

5,000+ tenants

4,000+ deployments in a single day

16,000 targets



Lesson #6

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

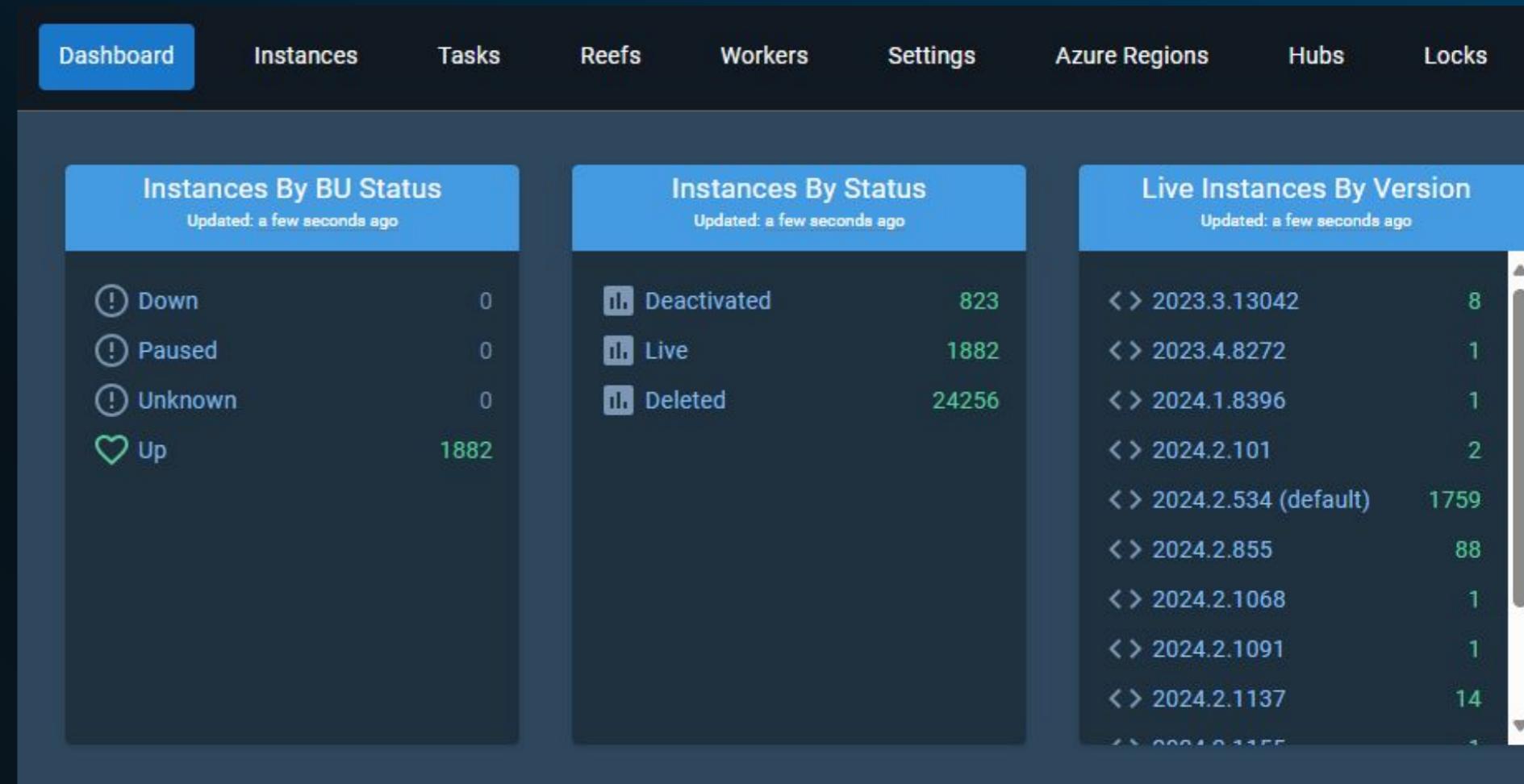


Cloud Portal

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 the following data:

- Instances By BU Status** (Updated: a few seconds ago):

| Status | Count |
|---------|-------|
| Down | 0 |
| Paused | 0 |
| Unknown | 0 |
| Up | 1882 |

- Instances By Status** (Updated: a few seconds ago):

| Status | Count |
|-------------|-------|
| Deactivated | 823 |
| Live | 1882 |
| Deleted | 24256 |

- Live Instances By Version** (Updated: a few seconds ago):

| Version | Count |
|----------------------|-------|
| 2023.3.13042 | 8 |
| 2023.4.8272 | 1 |
| 2024.1.8396 | 1 |
| 2024.2.101 | 2 |
| 2024.2.534 (default) | 1759 |
| 2024.2.855 | 88 |
| 2024.2.1068 | 1 |
| 2024.2.1091 | 1 |
| 2024.2.1137 | 14 |



Day 2 Operations

Customer's preferred maintenance window

Configurable by the customer
(typically their off-hours)

Guard Clauses to prevent
unnecessary work



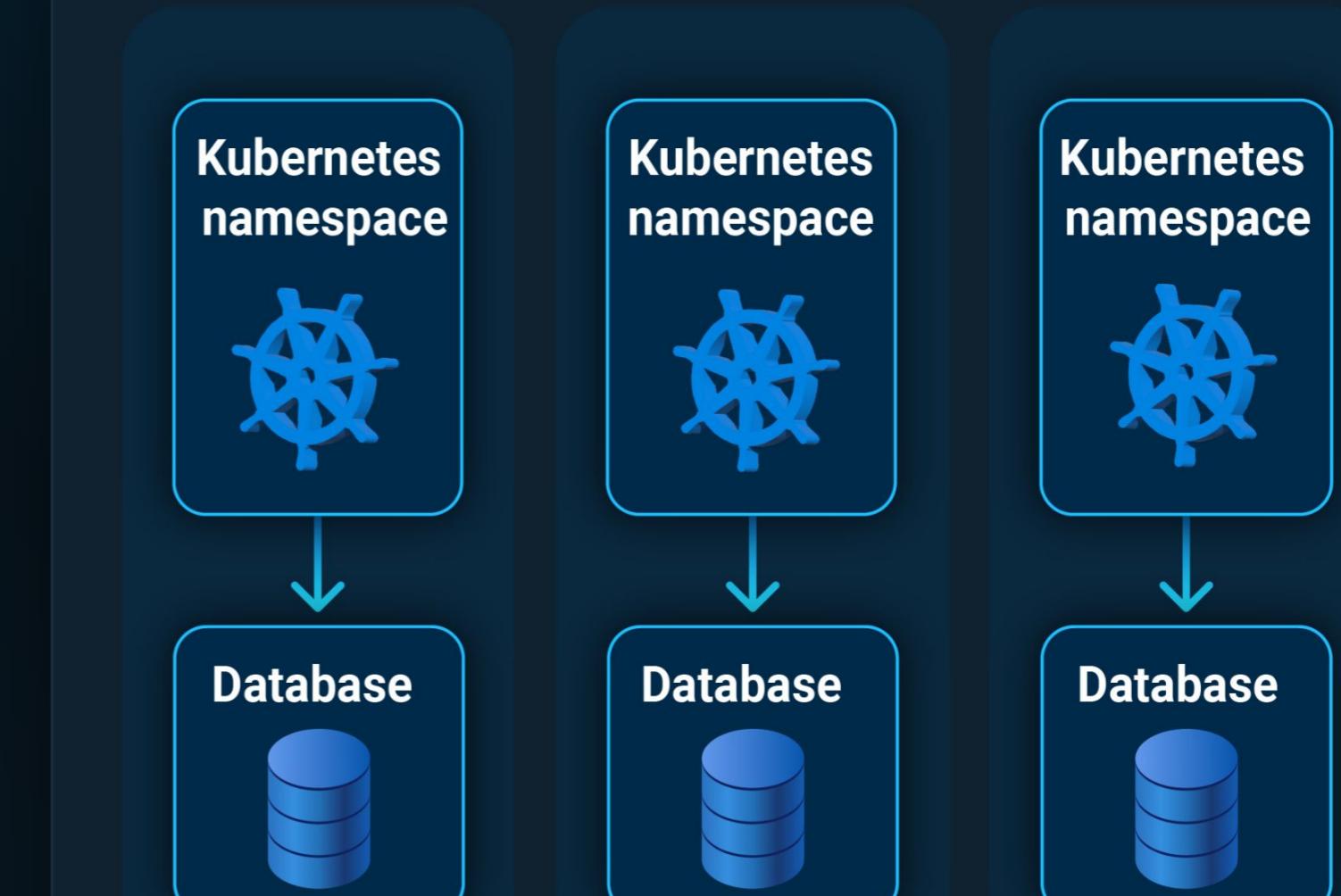
Stop Noisy Neighbors

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

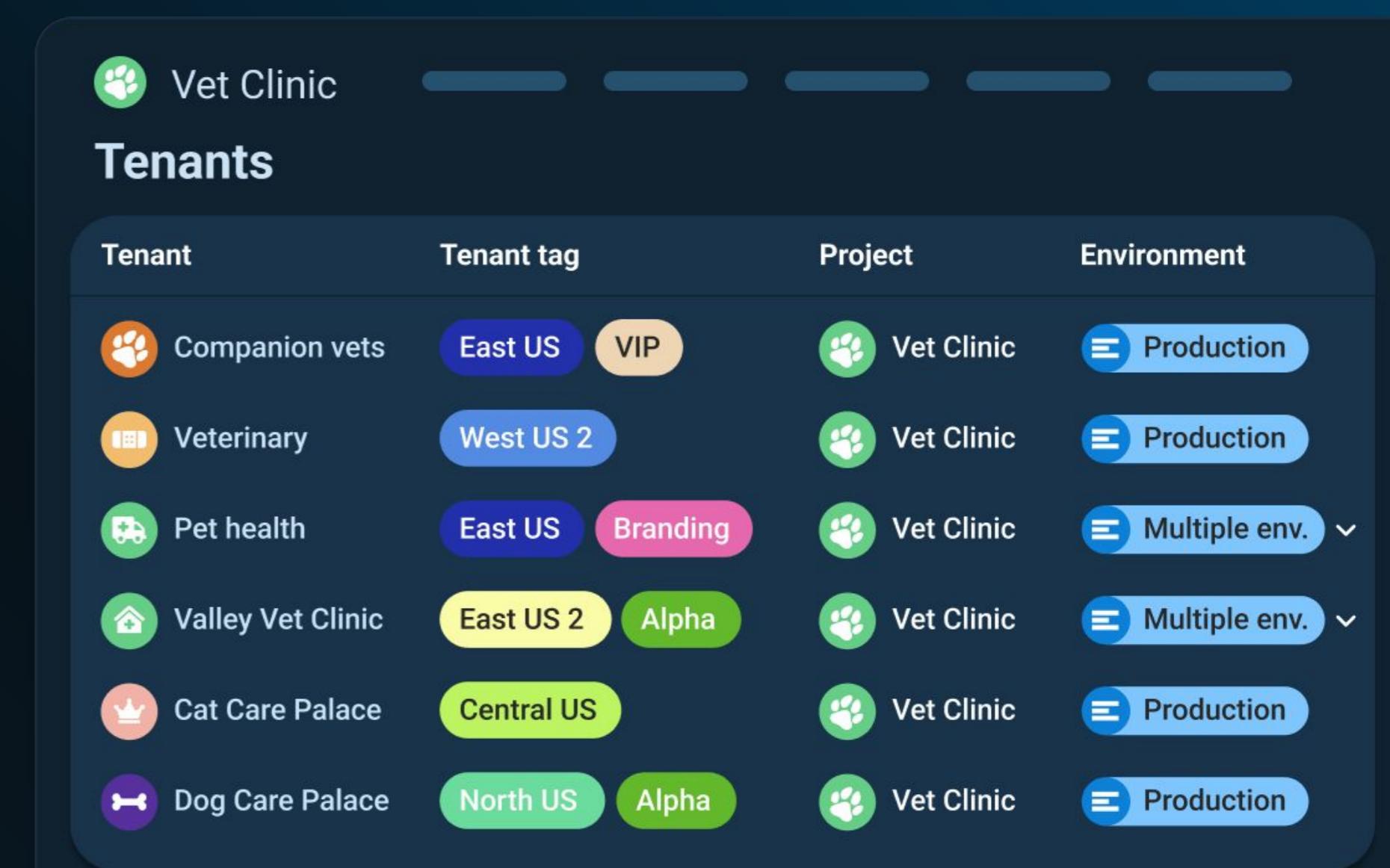
Use third-party tooling (both free and paid) whenever feasible



Deployments at Scale

Use Octopus Deploy to deploy Octopus Deploy

One process to deploy to thousands of customers.



The image shows a screenshot of the Octopus Deploy interface. At the top, there is a header with a paw print icon and the text "Vet Clinic". Below the header, the word "Tenants" is displayed. The main content is a table with four columns: "Tenant", "Tenant tag", "Project", and "Environment". The table lists six tenants, each with a unique icon and name. The "Environment" column for the first five tenants shows a dropdown menu with "Production" and "Multiple env." options. The last tenant, "Dog Care Palace", has a "Production" button. The table has a dark blue header and light blue rows. The "Environment" column for the last two tenants has a small downward arrow icon.

| 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
- Grafana
- Better Uptime
- PagerDuty
- Snowflake



Summary of Lessons

1. Deciding to move to Kubernetes
 - a. Cost shouldn't be the sole deciding factor when moving to Kubernetes
2. Migration
 - a. Brownfield migrations will have post-migration issues
 - 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





Thank you!

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