



Bring DevOps to the Swiss Alps

Wolfgang Ofner



Wolfgang Ofner

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Focus on Azure, Kubernetes, DevOps and .NET

<https://programmingwithwolfgang.com>

<https://www.linkedin.com/in/wolfgangofner>

https://twitter.com/wolfgang_ofner



Agenda



Project "Autonomous Ropeway System"



Challenges in the project



Azure Arc integration



Further Azure Arc features



Project “Autonomous Ropeway System”

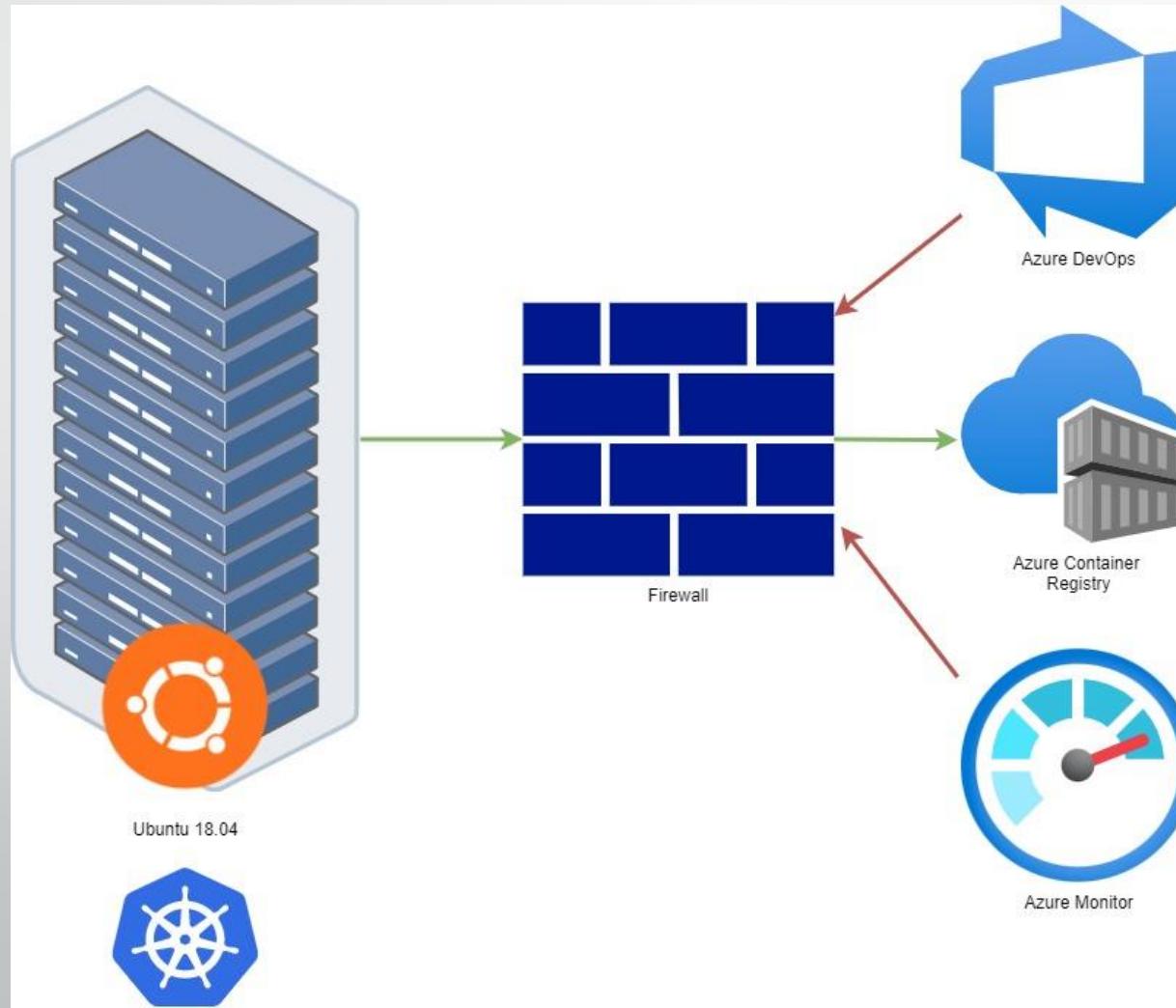
- Ropeway vehicle comes out of the garage automatically
- Routing possible → ropeway vehicle can find its way
- Saves costs due to better usage of resources and less wear and tear
- Running 24/7 with minimum human interaction



Challenges

- Use existing hardware
- No inbound traffic allowed
 - No connection from Azure DevOps
 - No possibility to use cloud services like Azure Monitor
 - How to collect logs from the Kubernetes cluster?
 - No VPN or ExpressRoute allowed

Network Overview





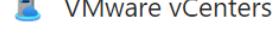
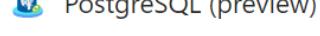
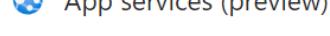
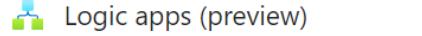
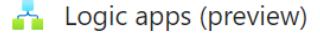




Azure Arc

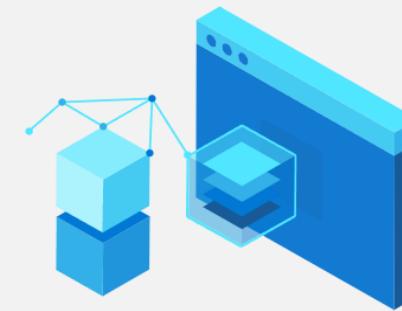
Azure Arc Overview

- Project infrastructure running outside of Azure into Azure
 - Linux and Windows VMs and bare metal servers
 - Any CNCF certified Kubernetes distribution
 - MS SQL Server

[Get started](#)[Infrastructure](#)[Services](#)[Learn more](#)[Machines
\(preview\)](#)[Azure Arc virtual machines
\(preview\)](#)[Azure Stack HCI](#)[Kubernetes clusters](#)[VMware vCenters](#)[SCVMM management servers](#)**Data services**[SQL Server instances](#)[PostgreSQL \(preview\)](#)[SQL managed instances](#)**Application Services**[API management \(preview\)](#)[App services \(preview\)](#)[Event Grid topics \(preview\)](#)[Functions \(preview\)](#)[Azure IoT Operations \(preview\)](#)[Logic apps \(preview\)](#)

See and manage all your on-prem infrastructure, anywhere. It's free to get started.

With Azure Arc, you can manage your infrastructure in all your environments, including on-premises, other public clouds, and edge devices. There's no charge to start, just add your infrastructure and enjoy the views. [Learn more](#)



Get hands-on with ArcBox

Use ArcBox to deploy an Azure Arc sandbox in less than an hour. [Learn more](#)

[Try ArcBox](#)

Add your infrastructure for free

See all your infrastructure in Azure. There's no charge to add and view your existing resources. [Learn more](#)

[Add](#)

Deploy Azure services

Use Azure Arc to deploy Azure services on your infrastructure. [Learn more](#)

[Deploy](#)

Azure Arc | Kubernetes clusters



Microsoft

Search



Add



Manage view



Refresh



Export to CSV



Open query



Assign tags

Infrastructure

Machines

Azure Arc virtual machines (preview)

Azure Stack HCI

Kubernetes clusters

VMware vCenters

SCVMM management servers

Data services

SQL Server instances

PostgreSQL (preview)

SQL managed instances

Application Services

API management (preview)

Filter for any field...

Subscription equals **all**Type equals **all**Resource group equals **all**

X Add filter

Showing 1 to 2 of 2 records.

No grouping

<input type="checkbox"/> Name ↑↓	Type ↑↓	Resource group ↑↓	Kubernetes version ↑↓	Location ↑↓
dev-cluster-arc	Kubernetes - Azure Arc	ArcDemo	1.27.7	West Europe
k3s-Arc	Kubernetes - Azure Arc	ArcDemo	1.27.7	West Europe

Azure Arc Overview

- Project infrastructure running outside of Azure into Azure
 - Linux and Windows VMs and bare metal servers
 - Any CNCF certified Kubernetes distribution
 - SQL Server
- Manage infrastructure as it was running in Azure
 - Update Management
 - Configuration Management
 - Microsoft Cloud Defender

Azure Arc-enabled Kubernetes

- Install Azure Arc extensions to manage the cluster
 - Azure Monitor
 - GitOps with Flux
 - Azure Policy
 - Azure Key Vault Secrets Provider
- Securely access cluster without opening inbound ports

Proof of Concept

Proof of Concept

- K3s
- Lightweight, open-source CNCF certified Kubernetes
- Developed and maintained by Rancher
- `curl -sfL https://get.k3s.io | sh -`

Azure Arc Installation Prerequisites

- Azure CLI
- Azure CLI Arc extension

Azure Arc Installation

- Install with Azure CLI on Master node of k3s cluster

```
root@Office:/home/wolfgang# az connectedk8s connect --name k3s-arc --resource-group ArcDemo  
This operation might take a while...
```

Azure Arc Installation

- Install with Azure CLI on Master node of k3s cluster

```
root@Office:/home/wolfgang# az connectedk8s list --resource-group ArcDemo --output table
Name      Location     ResourceGroup
-----  -----
k3s-arc    westeurope   ArcDemo
```

Azure Arc Installation

- Install with Azure CLI on Master node of k3s cluster
- Applications are installed in the azure-arc namespace

Azure Arc Applications

```
PS C:\Users\Wolfgang> kubectl get pods -n azure-arc
```

NAME	READY	STATUS	RESTARTS	AGE
cluster-metadata-operator-5dcbb5d97b-k2pwb	2/2	Running	0	14m
clusterconnect-agent-5776f946d9-jchl4	3/3	Running	0	14m
clusteridentityoperator-bf596c845-h8s7s	2/2	Running	0	14m
config-agent-6cd59d5896-d4tvx	2/2	Running	0	14m
controller-manager-59bcd87698-m8jj9	2/2	Running	0	14m
extension-events-collector-55c95b8c4d-m8l5d	2/2	Running	0	14m
extension-manager-75d47f499f-62twm	3/3	Running	0	14m
flux-logs-agent-7d7dc6754f-l24tq	1/1	Running	0	14m
kube-aad-proxy-775476dd6d-bpdld	2/2	Running	0	14m
metrics-agent-595bcfdc9-4jpkg	2/2	Running	0	14m
resource-sync-agent-c9559b855-bggcp	2/2	Running	0	14m

Azure Arc in the Azure Portal

- “Single pane of glass”
- Manage outside infrastructure within Azure

Azure Arc | Kubernetes clusters



Microsoft

Search



Add



Manage view



Refresh



Export to CSV



Open query



Assign tags

Infrastructure

Machines

Azure Arc virtual machines (preview)

Azure Stack HCI

Kubernetes clusters

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k3s-Arc	Kubernetes - Azure Arc	ArcDemo	1.27.7	West Europe

k3s-Arc | Namespaces



Kubernetes - Azure Arc



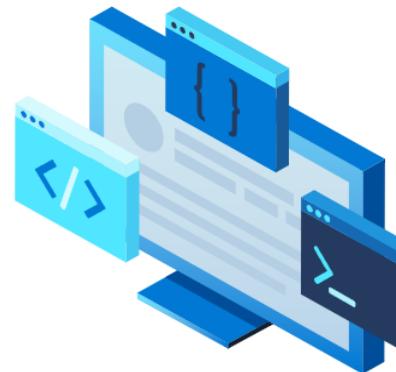
Search



Kubernetes resources (preview)



Settings



Sign in to view your Kubernetes resources.

A service account bearer token is required to view the Kubernetes resources on this cluster. This can be created using kubectl while connected to your cluster via CLI. [Learn how to create a service account bearer token](#)

Service account bearer token * ⓘ

Sign in

Securely Access Cluster through Azure Arc

- Use K8s RBAC or Azure RBAC
- Generate access token
- Use token in Azure Portal
- Create proxy with token on developers machine

Access Cluster using K8s RBAC

- Create a new service account

```
root@Office:/home/wolfgang × + ▾  
root@Office:/home/wolfgang# kubectl create serviceaccount admin-user  
serviceaccount/admin-user created
```

Access Cluster using K8s RBAC

- Create a new service account
- Add desired role for the user

```
root@Office:/home/wolfgang × + ▾
root@Office:/home/wolfgang# kubectl create clusterrolebinding admin-user-binding \
>   --clusterrole cluster-admin \
>   --serviceaccount default:admin-user
clusterrolebinding.rbac.authorization.k8s.io/admin-user-binding created
```

Access Cluster using K8s RBAC

- Create a new service account
- Add desired role for the user
- Create access token

Access Cluster using K8s RBAC

```
root@Office:/home/wolfgang ~ + -> root@Office:/home/wolfgang# kubectl create token admin-user  
eyJhbGciOiJSUzI1NiIsImtpZCI6Ik0YTZlaVETQjZOZlhjc0hNV1hxdF8xZG  
aHR0cHM6Ly9taWNyb3NlcnZpY2UtYWtzLWRucy1mMzViYzVmZi5oY3Aud2VzdG  
jZS1ha3MtZG5zLWYzNWJjNWZmLmhjcC53ZXN0ZXVyb3BLmF6bWs4cy5pb1wiI  
E3Njc0LCJpc3MiOiJodHRwczovL21pY3Jvc2VydmljZS1ha3MtZG5zLWYzNWJj  
mt1YmVybmV0ZXMuaw8iOnsibmFtZXNwYWNLlIjoizGVmYXVsdcIsInNlcnZpY2V  
dwlkIjoimTNlMjZmNjUtMmI3My00Y2JjLTliYmMtZDZjOTYyNzI3NWUwIn19L  
zZXJ2aNlYWNjb3VudDpkZWZhdx0OmFkbWluLXVzZXIfQ.AsCbdMl0yFtPtQ  
zAu_xjxowyqzEZ_BdWQBZSoIT9liiG39i6mq1nAzc4Re42iwDlJh3X0sHbabud  
xHrwL2p-aGS06-jCphhgGKa1-nyvkp0JtnSJ6edq08Fxg-Aa92tKUgpYOSiLXg  
bEv2IrYAF_fPT3eCMNAH5Joh0qDjC_Pka4X4GV0gUUvXQUWxcAFcjU7LvLLYNQ  
mGzWzYTIYcDwiOBpGcNHTbGHhlQLsfDGUMR-nuQce6V04ibfEz_My6zdyX7ToB  
T7hjIvLe2wuwBM3A7inUPFvy00DCTdwMZvApFBKItcpt_6MWhzmypshN0hrP0  
M076cPmUYgZijWPLEB3Lgwg9hojDTA39gbyYkg3pIOSLY4oWdbv7NvWuAe8cgm  
sf9RIssCwYw
```

Search



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

Kubernetes resources (preview)

- Namespaces
- Workloads
- Services and ingresses
- Storage
- Configuration

Settings

- Extensions
- Open Service Mesh
- GitOps
- Policies
- Properties
- Locks



Sign in to view your Kubernetes resources.

A service account bearer token is required to view the Kubernetes resources on this cluster. This can be created using kubectl while connected to your cluster via CLI. [Learn how to create a service account bearer token](#)

Service account bearer token * i

```
kiOdK/RA-w-xqoNuMDA2tWHMzB1KDt8W-
Z6D7M4k5yknroHRuMN7MLCr66on9pO6Xul19MlbZDo8KskUD4
GCWOriMTAnMbq5rfpr9Pv1g_tvHocHrmUwH-
m3K4Pes4M_DRQFCOYhURRULsdEeHsJz9KSv7MucEhWAV31L3S
cfxzNpmzvmGS0tana-
rTGWFIr3mC2KamA2gELhcWyoayKJdfr4TG264Wx1Ce50pyO-
t0xuQU1hoBYB0RoiqXWsEZidFgWvoWVue5qpUKpy5DRImcDCG
YpqvKK7qTCE6m_I9SGnxxNF9mVRIebuFumfTHmeVlf940TInJ5i6
BNq_yj1kpaaL3zpa9MuT6F9Ccg7IInq9JdZEIbafJBbo-
vh56sifkq2YOygiSjDBDcumDBOpYIQI9ZG96pdQK5bEMrGCs2E
e9b9zIBb0rTXrxil2piA9LpaVBMpsJjkKWTfi1l5Pfy92262alOwo
ZVJvreM5cU6hPedvSffHfq-TK4JCSaq3ZEzo8
```

Sign in

DemoArc | Workloads

Kubernetes - Azure Arc

 Add
 Delete
 Refresh
 Show labels
 Give feedback

Overview

Activity log

Access control (IAM)

Tags

Diagnose and solve problems

Security (preview)

Kubernetes resources (preview)

Namespaces

Workloads

Services and ingresses

Storage

Configuration

Settings

Extensions

GitOps (preview)

Policies

Properties

Locks

Monitoring

Insights

Alerts

Metrics

Logs

Workbooks

Automation

Tasks (preview)

[Deployments](#)
[Pods](#)
[Replica sets](#)
[Stateful sets](#)
[Daemon sets](#)
[Jobs](#)
[Cron jobs](#)

Filter by deployment name

Enter the full deployment name

Filter by label selector ⓘ

foo=bar,key!=value

Filter by namespace

All namespaces

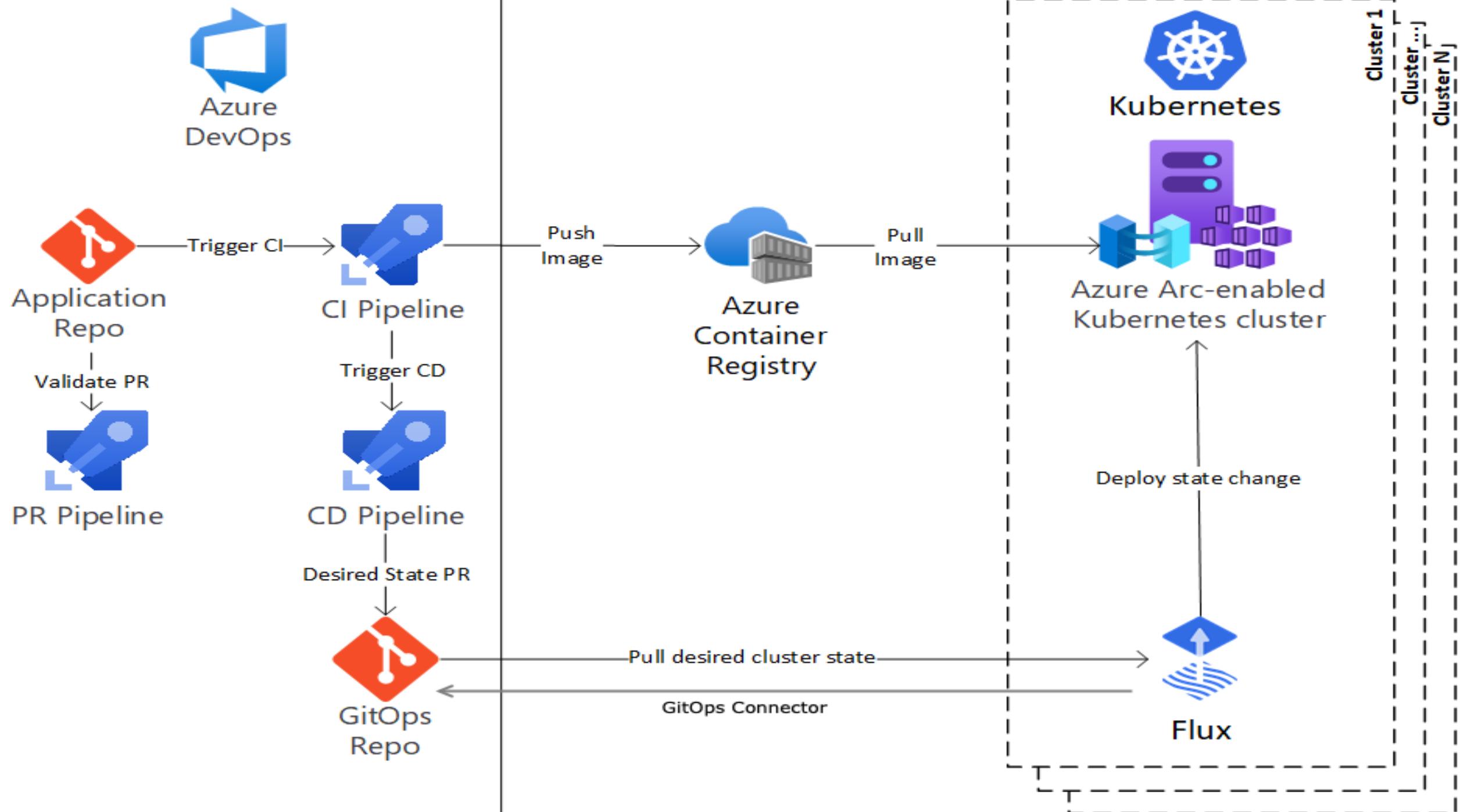
<input type="checkbox"/>	Name	Namespace	Ready	Up-to-date	Available	Age ↓
<input type="checkbox"/>	coredns	kube-system	1/1	1	1	54 minutes
<input type="checkbox"/>	local-path-provisioner	kube-system	1/1	1	1	54 minutes
<input type="checkbox"/>	metrics-server	kube-system	1/1	1	1	54 minutes
<input type="checkbox"/>	traefik	kube-system	1/1	1	1	54 minutes
<input type="checkbox"/>	clusterconnect-agent	azure-arc	1/1	1	1	46 minutes
<input type="checkbox"/>	flux-logs-agent	azure-arc	1/1	1	1	46 minutes
<input type="checkbox"/>	config-agent	azure-arc	1/1	1	1	46 minutes
<input type="checkbox"/>	controller-manager	azure-arc	1/1	1	1	46 minutes
<input type="checkbox"/>	extension-manager	azure-arc	1/1	1	1	46 minutes
<input type="checkbox"/>	resource-sync-agent	azure-arc	1/1	1	1	46 minutes
<input type="checkbox"/>	clusteridentityoperator	azure-arc	1/1	1	1	46 minutes
<input type="checkbox"/>	metrics-agent	azure-arc	1/1	1	1	46 minutes
<input type="checkbox"/>	cluster-metadata-operator	azure-arc	1/1	1	1	46 minutes
<input type="checkbox"/>	kube-aad-proxy	azure-arc	1/1	1	1	46 minutes
<input type="checkbox"/>	omsagent-rs	kube-system	1/1	1	1	20 minutes
<input type="checkbox"/>	mqtt	myapps	1/1	1	1	15 minutes
<input type="checkbox"/>	kedademoapi	myapps	1/1	1	1	12 minutes
<input type="checkbox"/>	customerapi	myapps	1/1	1	1	12 minutes
<input type="checkbox"/>	orderapi	myapps	1/1	1	1	12 minutes
<input type="checkbox"/>	kubernetesdeploymentdemo	myapps	1/1	1	1	10 minutes

Azure Arc extensions

- Bring Azure Services to your Kubernetes cluster
 - GitOps for deployments
 - Azure Monitor
 - Azure Key Vault Secrets Provider

Azure Arc-enabled Kubernetes GitOps

- Flux GitOps Agent runs inside the cluster
- Can be installed via Azure CLI or Azure Portal
- Agent pulls changes from a configured repository and applies them
 - YAML files
 - Helm charts
- Securely access private Git repositories
No inbound connection needed



Create Personal Access Token

Create a new personal access token

X

Name

AzureArcGitOps

Organization

ProgrammingWithWolfgang

Expiration (UTC)

30 days

2/15/2024

...

Scopes

Authorize the scope of access associated with this token

Scopes Full access

Custom defined

Work Items

Work items, queries, backlogs, plans, and metadata

Read

Read & write

Read, write, & manage

Code

Source code, repositories, pull requests, and notifications

Read

Read & write

Read, write, & manage

Full

Status

Build

Artifacts, definitions, requests, queue a build, and update build properties

Read

Read & execute

Show all scopes (29 more)

Create

Cancel

Create Personal Access Token

Success!

X

You have successfully added a new personal access token. Copy the token now!

AzureArcGitOps token

7ubfok7viuepij24pymxblse



Warning - Make sure you copy the above token now.
We don't store it and you will not be able to see it again.

Git Ops Extension Installation

- Single Azure CLI command to configure and install GitOps operator

Git Ops Extension Installation

```
PS C:\Users\Wolfgang> az k8s-configuration flux create `>> --cluster-name k3s-Arc `>> --resource-group ArcDemo `>> --name arcdemo-gitops `>> --namespace azurearcdemo `>> --cluster-type connectedClusters `>> --scope cluster `>> --https-user wolfgang@programmingwithwolfgang.com `>> --https-key 7ubfok7viuepij24pymxbsekhyjcdjxbsqgcczyplsuo6sv3x5a `>> --url https://dev.azure.com/ProgrammingWithWolfgang/AzureArcDemo/_git/AzureArcDemoGitOps `>> --branch master `>> --kustomization name=app path=./AzureArcDemo prune=trueD:\a\_work\1\s\build_scripts\windows\artifacts\cli\Lib\site-packages\cryptography\hazmat/backends/openssl/backend.py:27: UserWarning: You are using cryptography on a 32-bit Python on a 64-bit Windows Operating System. Cryptography will be significantly faster if you switch to using a 64-bit Python.'Microsoft.Flux' extension not found on the cluster, installing it now. This may take a few minutes...
```

Git Ops Extension Installation

Home > k3s-Arc

 k3s-Arc | GitOps ☆ ...

Kubernetes - Azure Arc

Search « + Create Delete Refresh

Flux configurations can now be monitored across clusters, subscriptions, resource groups, etc. [Learn more](#)

	Configuration	Compliance	Namespace	Scope	State	Source last updated
<input type="checkbox"/>	arcdemo-gitops	Compliant	azurearcdemo	cluster	Succeeded	Wed Jan 17 2024 03:25:58 GMT-0500 (Eastern Standard Time)

Settings

- Extensions
- Open Service Mesh
- GitOps**
- Policies
- Properties

Git Ops Extension Installation

Home > k3s-Arc | GitOps >

 **k3s-Arc/arcdemo-gitops** ⚡ ⭐ ... X

GitOps configuration

Delete Refresh Give feedback

Overview Configuration objects Source Kustomizations

Status		Source	
Compliance state	✓ Compliant	Source kind	GitRepository
Configuration objects	3 objects	Repository URL	https://dev.azure.com/ProgrammingWithWolfgang/Az...
Installation status	Succeeded	Repository reference type	Branch
Source last sync commit	master@sha1:4ad385bd016dc352ecc0839505f22794c2...	Branch	master
Source last updated	2024-01-17, 3:25:58 a.m.	Repository public key	---
Status last updated	2024-01-17, 3:47:01 a.m.	Sync interval	1 mins
		Sync timeout	1 mins
Properties			
Namespace	azurearcdemo	Type	Flux v2
Scope	cluster	Kustomizations	1 Kustomizations

GitOps Deployment

```
PS C:\Users\Wolfgang> kubectl get pods -n azurearcdemo
NAME                      READY   STATUS    RESTARTS   AGE
azurearcdemo-64fb7fcfc-4v6qr   1/1     Running   0          28m
```

GitOps Repository

- Kustomize file referencing all release files

GitOps Repository

```
apiVersion: kustomize.config.k8s.io/v1
kind: Kustomization
resources:
- HelmRelease.yaml
```

GitOps Repository

- Kustomize file referencing all release files
- YAML file containing information about the Helm chart

```
apiVersion: helm.toolkit.fluxcd.io/v2beta1
kind: HelmRelease
metadata:
  name: azurearcdemo
  namespace: azurearcdemo
  annotations:
    | clusterconfig.azure.com/use-managed-source: "true"
spec:
  interval: 1m
  releaseName: azurearcdemo
  chart:
    spec:
      | chart: ./AzureArcDemo/charts/azurearcdemo
```

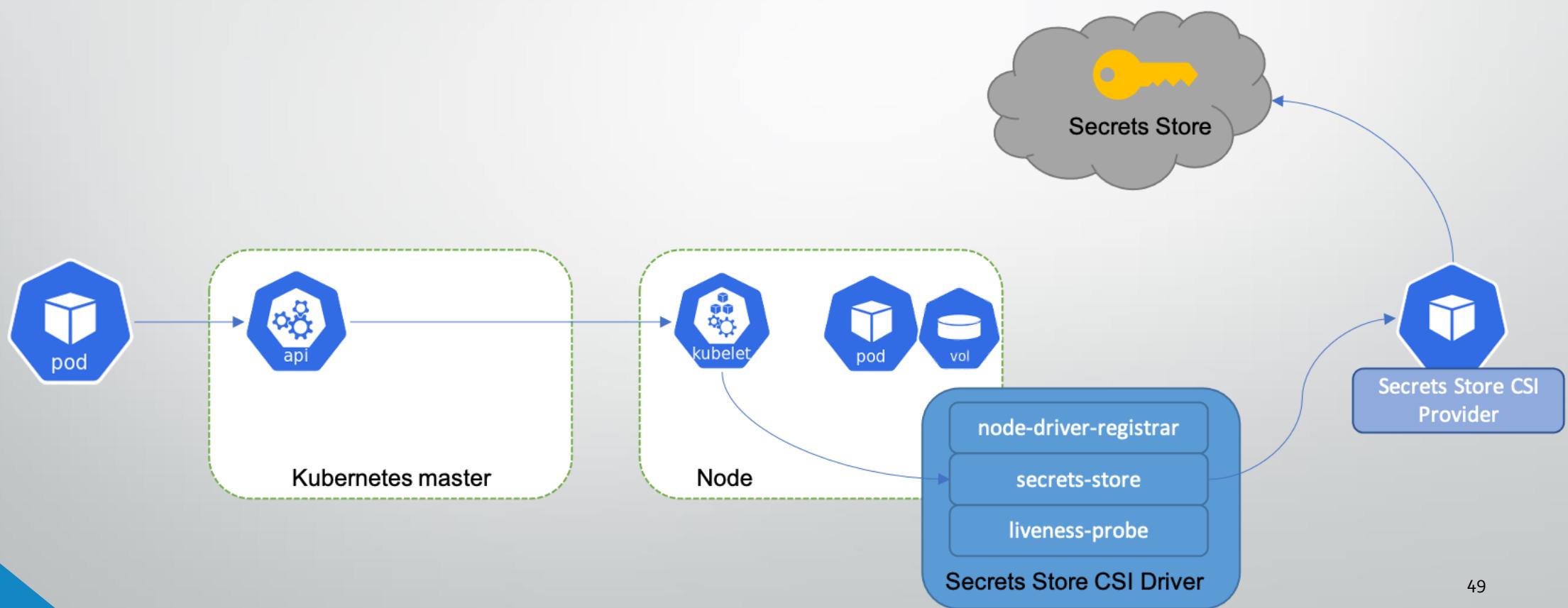
GitOps Pipeline

- CD Pipeline reads newest tag from Azure Container Registry
- Replace tag in values.yaml file
- Commit changes to master branch
- GitOps Agent sees changes and applies them to the k3s cluster

Key Vault Extension

- Mount secrets from Azure Key Vault into Kubernetes
- Secrets are retrieved using gRPC
- Get all advantages from Azure Key Vault
- Use pipeline to write/rotate secrets in Key Vault

Key Vault Extension



Azure Monitor Extension

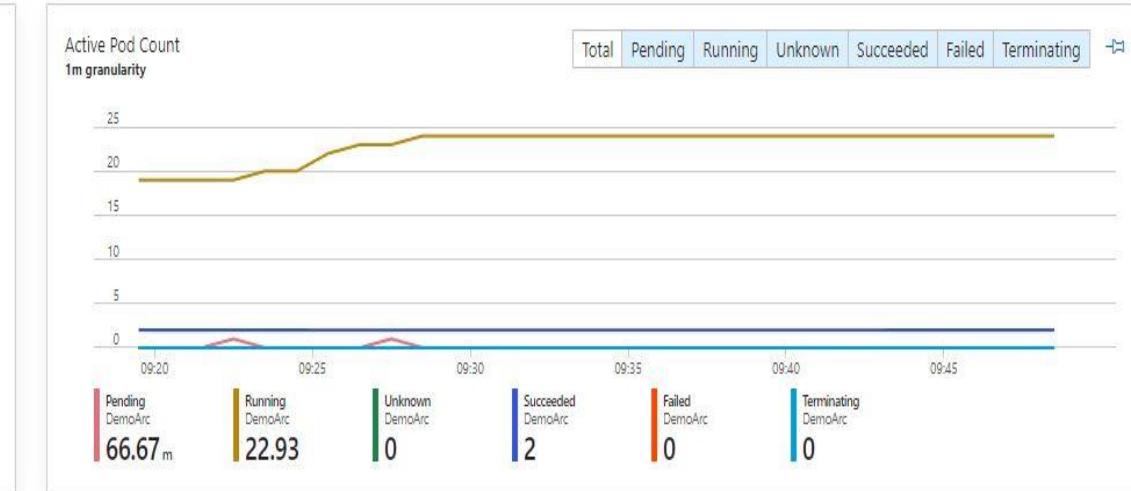
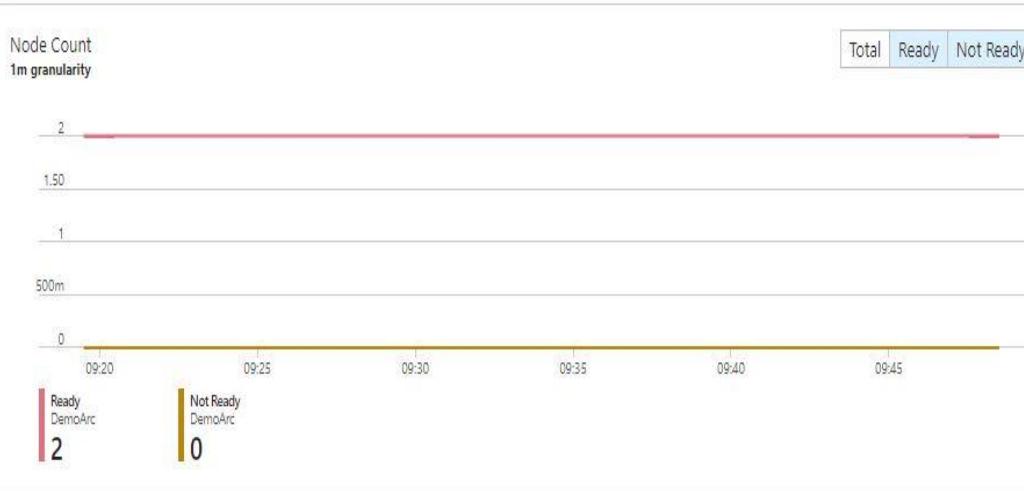
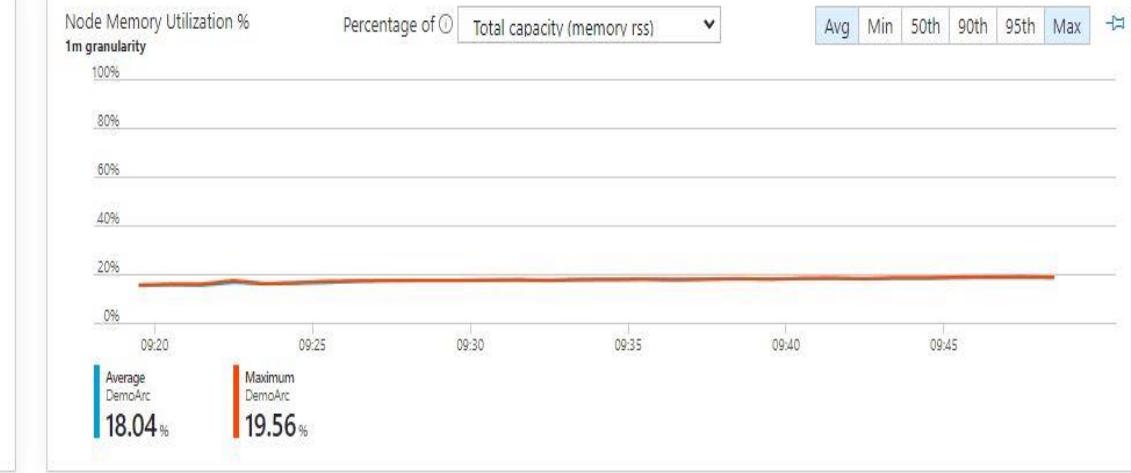
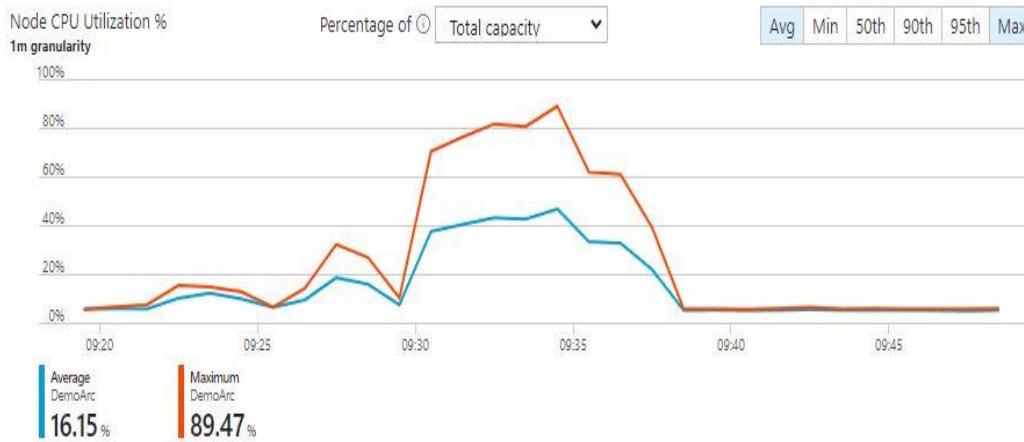
- Azure Monitor agent is installed in its own namespace
- Agent sends information to Log Analytics Workspace
- Azure Monitor:
 - Dashboards
 - Alerting
 - Container Insights

DemoArc | Insights

Kubernetes - Azure Arc

Search (Ctrl+ /)
Refresh
View All Clusters
Recommended alerts (Preview)
View Workbooks
Help
Feedback
Overview

Time range = Last 30 minutes

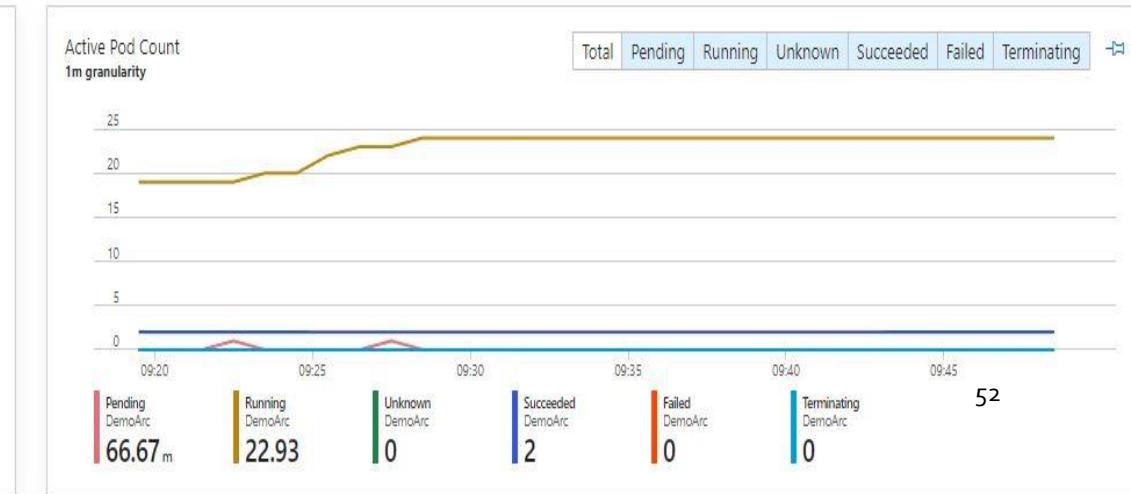
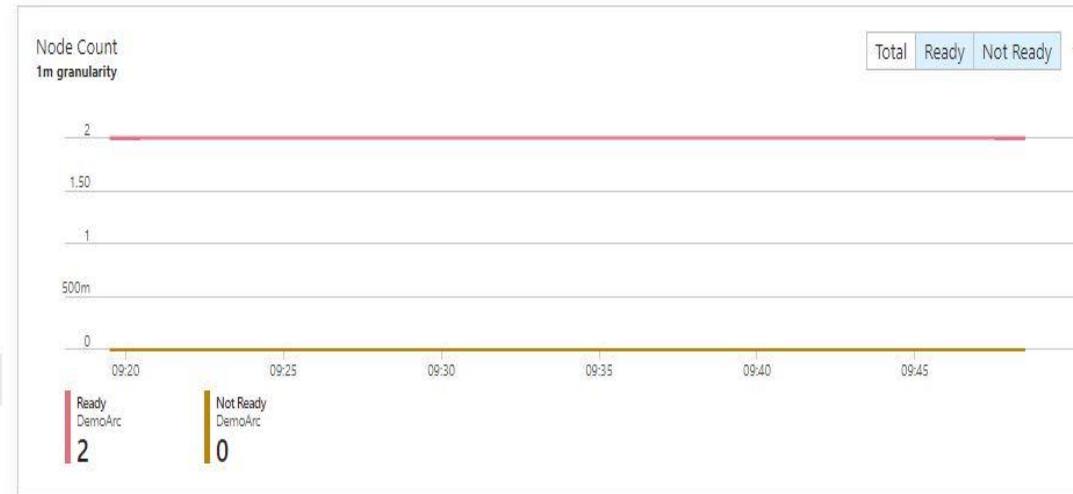
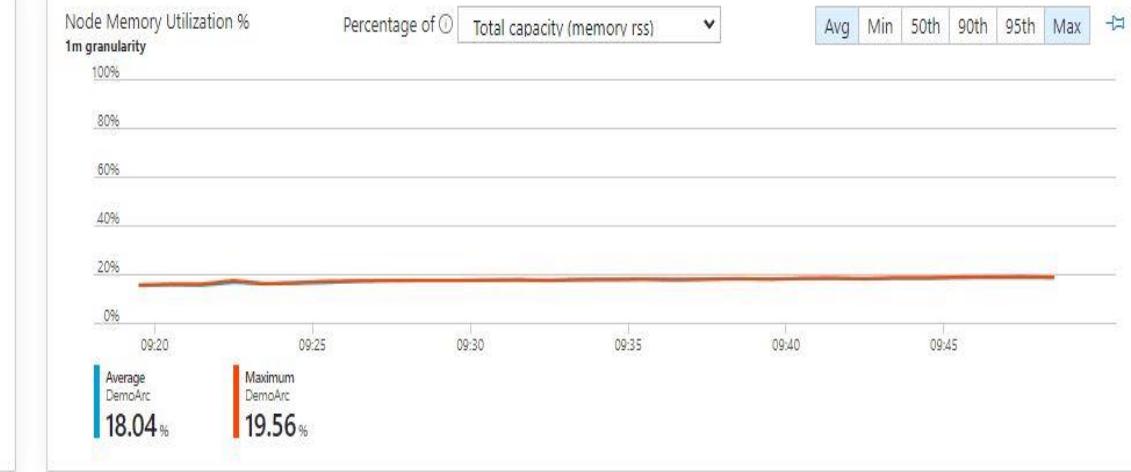
Add Filter
[What's new](#)
[Cluster](#)
[Reports](#)
[Nodes](#)
[Controllers](#)
[Containers](#)
SettingsExtensionsGitOps (preview)PoliciesPropertiesLocksMonitoringInsightsAlertsMetricsLogs

DemoArc | Insights

Kubernetes - Azure Arc

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Time range = Last 30 minutes

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DemoArc | Insights

Kubernetes - Azure Arc


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[Tags](#)
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[Extensions](#)
[GitOps \(preview\)](#)
[Policies](#)
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[Monitoring](#)
[Insights](#)
[Alerts](#)

[Metric:](#)
[CPU Usage \(millicores\)](#)
[Min](#)
[Avg](#)
[50th](#)
[90th](#)
[95th](#)
[Max](#)

	Name	Status	95th %	95th	Pod	Node	Restarts	UpTime	Trend 95th % (1 bar = 1m)
Kubernetes resources (preview)	customerapi	Ok	91%	1810 mc	customerapi-5d5f8d96c5-v8nt7	master	0	25 mins	
	mqtt	Ok	64%	322 mc	mqtt-58b75468c-zcnzx	master	0	27 mins	
	kube-aad-proxy	Ok	17%	17 mc	kube-aad-proxy-8564d4dd5d-qqcqb	worker1	0	54 mins	
	omsagent	Ok	7%	10 mc	omsagent-727fd	worker1	0	31 mins	
	omsagent	Ok	4%	6 mc	omsagent-4pfjt	master	0	32 mins	
	fluent-bit	Ok	4%	0.8 mc	config-agent-69dcdb554d-7swhm	worker1	0	57 mins	
	fluent-bit	Ok	4%	0.8 mc	cluster-metadata-operator-9945b897c-nxcwr	worker1	0	57 mins	
	cluster-metadata-operator	Ok	4%	2 mc	cluster-metadata-operator-9945b897c-nxcwr	worker1	0	58 mins	
	fluent-bit	Ok	3%	0.7 mc	controller-manager-5494575977-rfc6g	worker1	0	57 mins	
	flux-logs-agent	Ok	3%	1 mc	flux-logs-agent-86cf4f7b7d-55fld	worker1	0	58 mins	
	fluent-bit	Ok	3%	0.6 mc	extension-manager-7dc84fb6d7-sfnzl	worker1	0	57 mins	
	resource-sync-agent	Ok	3%	1 mc	resource-sync-agent-56f777f6b6-7zj9n	worker1	0	58 mins	



Azure Arc Services

Azure Arc Services

- Azure Arc-enabled infrastructure
 - Azure Arc-enabled servers
 - Azure Arc-enabled Kubernetes
 - Azure Stack HCI

Azure Arc Services

- Azure Arc-enabled services
 - Azure SQL Managed Instance
 - PostgreSQL Hyperscale
 - Azure Machine Learning

Azure Arc Services

- Azure Arc-enabled services
 - Azure App Service
 - Azure Logic Apps
 - Azure Event Grid
 - Azure Functions
 - Azure API Management

Azure Arc Services

- Azure Arc-enabled services run inside a Kubernetes cluster
- Bring Azure services to your on-prem datacenter
- Developers can continue using their tools



Unified operations, management,
compliance, security and governance



Azure resources



Azure Arc-enabled infrastructure resources
(Servers, SQL servers, Kubernetes)



Azure Arc-enabled services resources
(Data services, App services, Machine Learning services)



Azure Resource Manager

Azure Arc

Azure Arc-enabled
infrastructure onboarding

Azure Arc-enabled
services deployment

Azure Arc-enabled
infrastructure onboarding

On-premises IT
infrastructure resources



On-premises Arc-enabled services
(Data services, App services, Machine Learning services)



Multicloud Arc-enabled services
(Data services, App services, Machine Learning services)



Multicloud IT
infrastructure resources



Azure Stack HCI

VMware®

Amazon Web Services

Google Cloud Platform

Azure Managed SQL Instance

- Run Azure Managed SQL Instance in your datacenter:
 - Always up-to-date
 - Automated backups
 - Elastic scale
 - Kibana and Grafana

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Selected fields

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Customized

t file_path

t kubernetes

t kubernetes

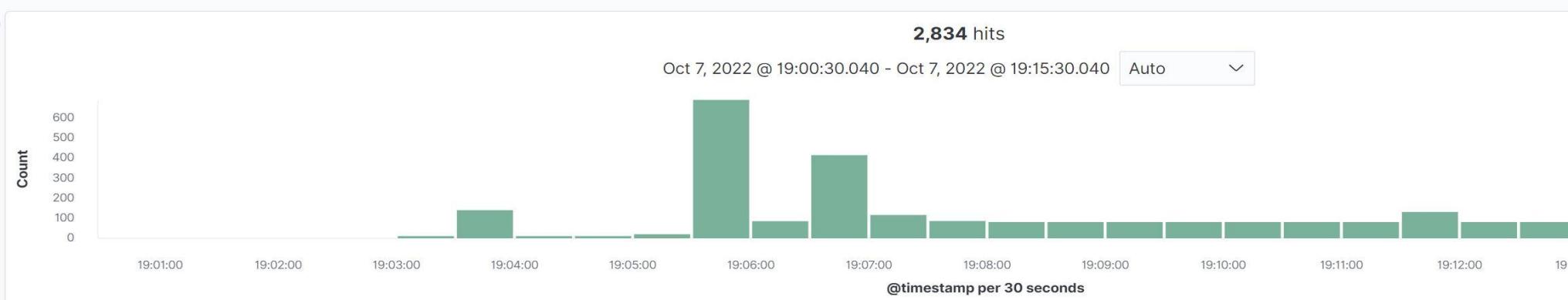
 kubernetes

t kubernetes

message

service name

* time



Time	_source
> Oct 7, 2022 @ 19:15:28.299	custom_resource_name: arc-database @timestamp: Oct 7, 2022 @ 19:15:28.299 message: [heartbeat-arc-database-0] 2022/10/07 11:15:28 Heartbeat received by orchestrator service_name: ha-supervisor file_path: /var/log/arc-ha-orchestrator/ha-supervisor-stdout.log kubernetes_namespace: wolfgang-attic kubernetes_vmss000003 kubernetes_pod_name: arc-database-ha-0 _id: yJoosoMB_YIqz-hETCea _type: _doc _index: logstash-2022.10.07 _score: -
> Oct 7, 2022 @ 19:15:28.299	custom_resource_name: arc-database @timestamp: Oct 7, 2022 @ 19:15:28.299 message: [INFO] 2022/10/07 11:15:28 Handling heartbeat for replica "arc-database" kubernetes_container_name: arc-ha-orchestrator service_name: ha-supervisor file_path: /var/log/arc-ha-orchestrator/ha-supervisor-stdout.log kubernetes_node_name: aks-agentpool-77043942-vmss00003 kubernetes_pod_name: arc-database-ha-0 _id: yZoosoMB_YIqz-hETCea _type: _doc _index: logstash-2022.10.07 _score: -
> Oct 7, 2022 @ 19:15:28.299	custom_resource_name: arc-database @timestamp: Oct 7, 2022 @ 19:15:28.299 message: [INFO] 2022/10/07 11:15:28 healthyTransitioner: verifyPrimary: <nil> kubernetes_container_name: arc-ha-orchestrator service_name: ha-supervisor file_path: /var/log/arc-ha-orchestrator/ha-supervisor-stdout.log kubernetes_node_name: aks-agentpool-77043942-vmss00003 kubernetes_pod_name: arc-database-ha-0 _id: ypoosoMB_YIqz-hETCea _type: _doc _index: logstash-2022.10.07 _score: -
> Oct 7, 2022 @ 19:15:28.299	custom_resource_name: arc-database @timestamp: Oct 7, 2022 @ 19:15:28.299 message: [orchestrator] 2022/10/07 11:15:28 State transition succeeded, new kubernetes_container_name: arc-ha-orchestrator service_name: ha-supervisor file_path: /var/log/arc-ha-orchestrator/ha-supervisor-stdout.log kubernetes_node_name: aks-agentpool-77043942-vmss00003 kubernetes_pod_name: arc-database-ha-0 _id: y5oosoMB_YIqz-hETCea _type: _doc _index: logstash-2022.10.07 _score: -
> Oct 7, 2022 @ 19:15:28.299	custom_resource_name: arc-database @timestamp: Oct 7, 2022 @ 19:15:28.299 message: [orchestrator] 2022/10/07 11:15:28 Starting state transition in state kubernetes_container_name: arc-ha-orchestrator service_name: ha-supervisor file_path: /var/log/arc-ha-orchestrator/ha-supervisor-stdout.log kubernetes_node_name: aks-agentpool-77043942-vmss00003 kubernetes_pod_name: arc-database-ha-0 _id: zJoosoMB_YIqz-hETCea _type: _doc _index: logstash-2022.10.07 _score: -



Azure Managed SQL Instance

- Works on any hardware and Kubernetes distribution
- Service runs in its own namespace
- Install via Azure CLI or Azure Portal

```
root@Office:/home/wolfgang# az sql mi-arc create --name arc-database --dev --k8s-namespace wolfgang-attic --use-k8s
Arc SQL managed instance username:wolfgang
Arc SQL managed instance password:
Confirm Arc SQL managed instance password:
arc-database is Ready
```

Azure Managed SQL Instance

- Works on any hardware and Kubernetes distribution
- Service runs in its own namespace
- Install via Azure CLI or Azure Portal
- Keep your data on-premises
- Only metadata for billing purposes is sent to Azure

Azure Arc Conclusion

- Proof of concept was successful
- Powerful service
- Major focus from Microsoft

- Broad IT-knowledge needed
- Service can be buggy
- Documentation sometimes complicated

Resources

- [Azure Arc Series](#)
- [Azure Arc Youtube Playlist](#)
- [Azure Arc Documentation](#)
- <https://docs.k3s.io>
- <https://fluxcd.io>

