# PlanB
# Best-Practices Agenda für Kubernetes Workshop (1 Tag)

# Inhalt

# Agenda

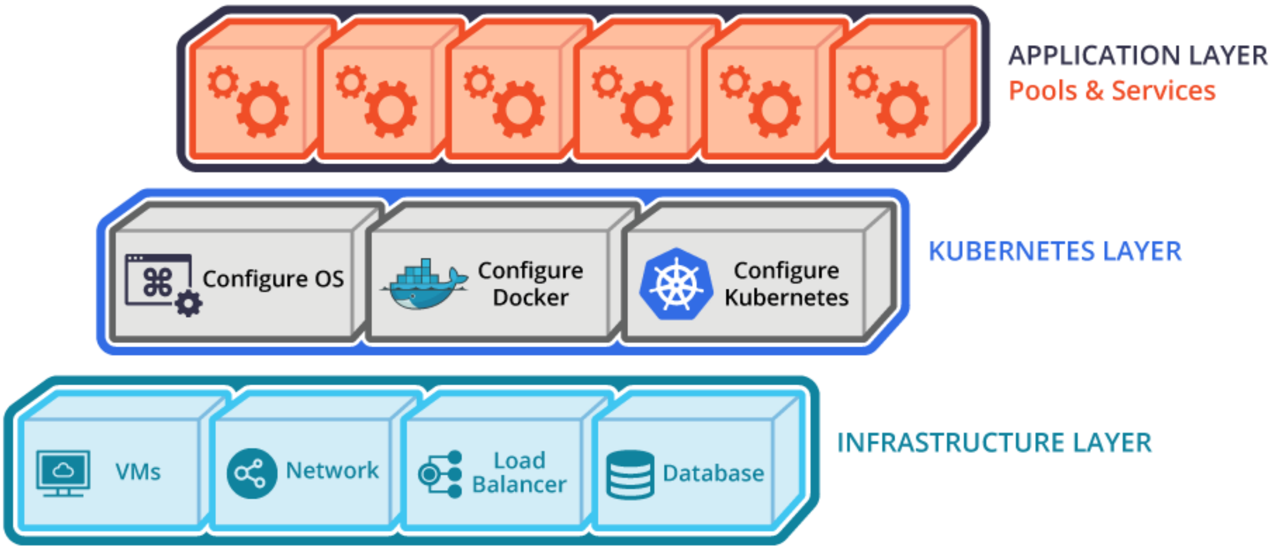
Best-Practices Agenda für Kubernetes (1 Tag)

| Zeit | Topic | Outcome |
|---|---|---|
| 1,5h | Architectur | High level overview |
| 3h | Namespaces (Hands On) | Basic concepts |
| 2h | Deplyoment (Hands On) | Config as Code, developer velocity |
| 1h | Mesh | How to manage complexity? |
| | | |

# Architecture

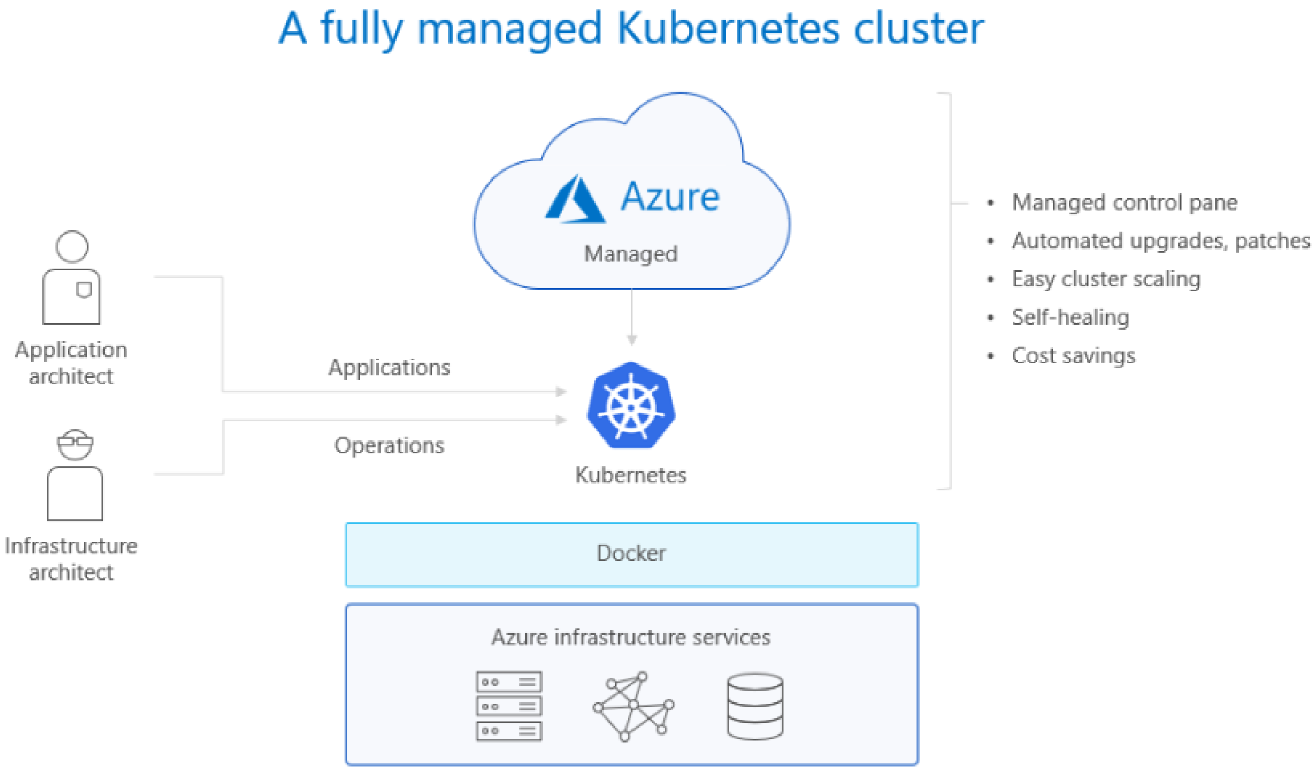
## 1. Layers

1) Infrastructure Plattform (Azure)
2) Container Orchestration (Kubernetes, Service Fabric, Rancher, Docker Swarm, Mesos)
3) Application

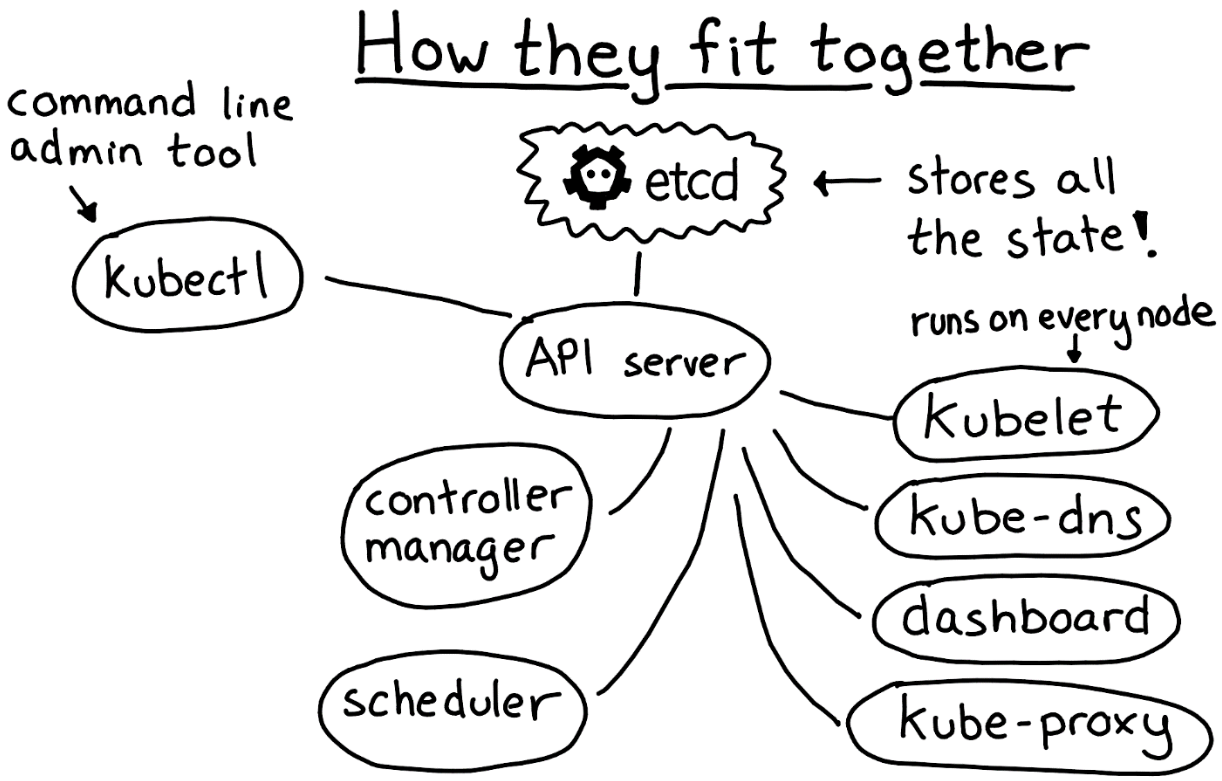


# 2. Management

- Developer Workflows (Deployment)
- Visualisation & Dashboards
- Monitoring & Metrics & Alerting
- Cloud Storage, Databases and Volumes
- Securing the Environment (KeyVault, AAD, RBAC)
- Scaling Applications and Cluster



# 3. Beginners Guide



Source:
https://www.weave.works/blog/kubernetes-beginners-guide/

# Namespaces

## 4. Namespaces

What are namespaces? How to use them? When to create a new namespace?
How many Namespaces to create? For what purpose to create a Namespace? What exactly are manageable chunks?
When does it make sense to create a separate cluster?

**Namespace:**

- think of a Namespace as a virtual cluster inside your Kubernetes cluster.
- “hidden” from each other, but they are not fully isolated by default.

**kube namespace:**
kube-system
kube-public
=> keep the kube namespaces alone (usually managed by Google, AWS, Azure)

**default namespace:**
getting started namespace, but it is better to define your own namespaces and segment your services into manageable chunks

**tools:**
https://github.com/ahmetb/kubectx

**Namespace strategy (segmentation):**

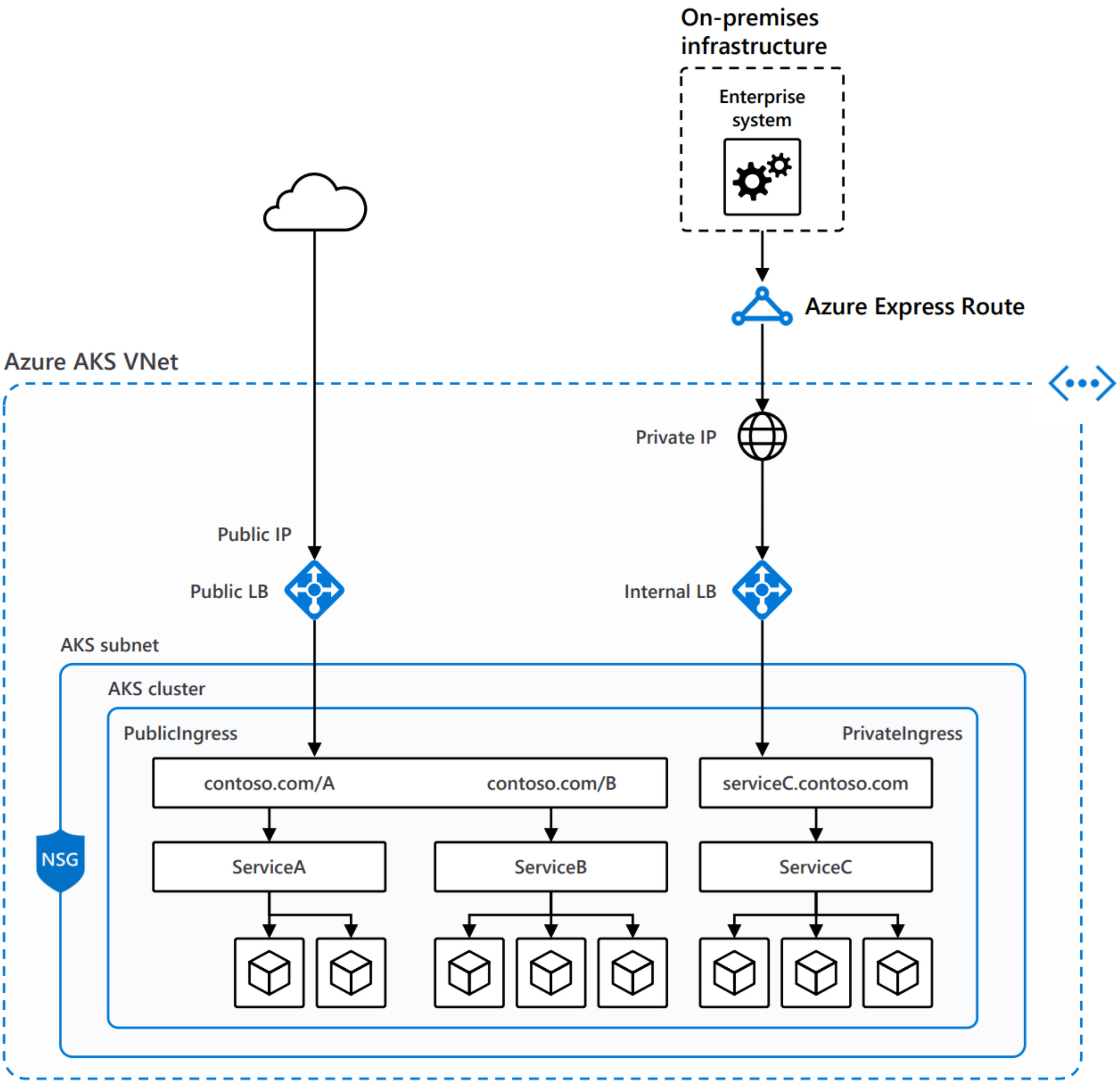
- The small team
- Rapidly growing team(s)
- The large company
- Enterprise

**theory:**
organizational structure - conveys law
evolution in nature - metasystem transformation

source:
https://cloud.google.com/blog/products/gcp/kubernetes-best-practices-organizing-with-namespaces

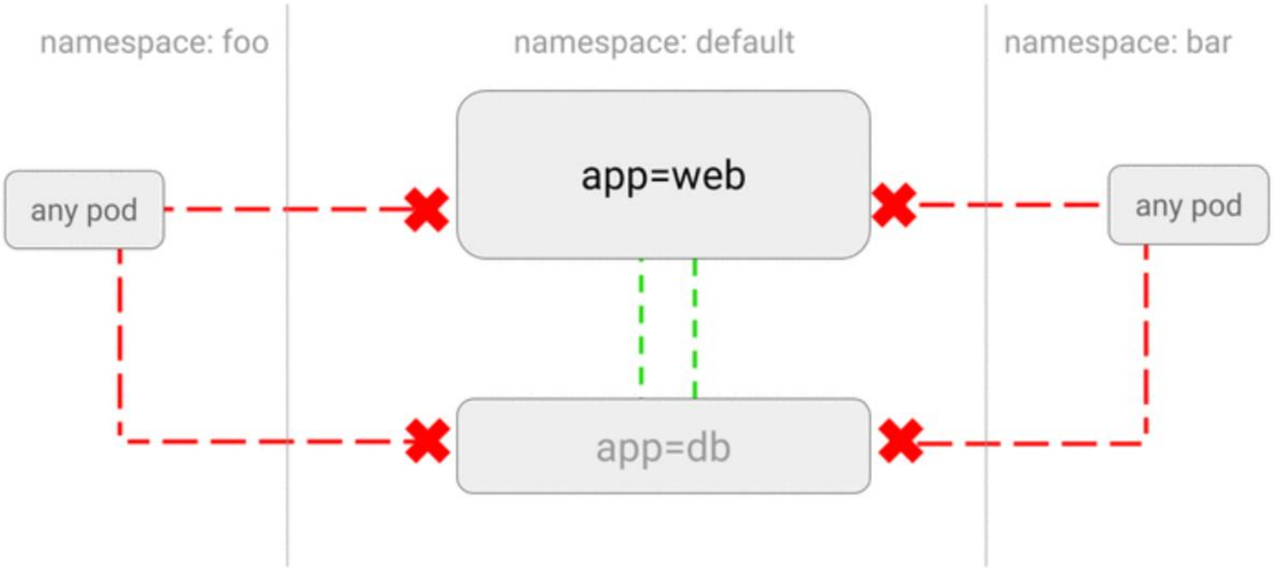
# 5. Networking

- Public Services & Private Services (VNet, on Premise)
- LoadBalancers
- DNS Servic Discovery
    - address the service using the service name
    - access a service in another namespace
    - External Services (create a service with the type ExternalName)



## 6. Network Policies

- Ingress - to pods, Egress - from pods
- whitelist, blacklist, ip block (subnet), ports
- namespaceSelector, podSelector

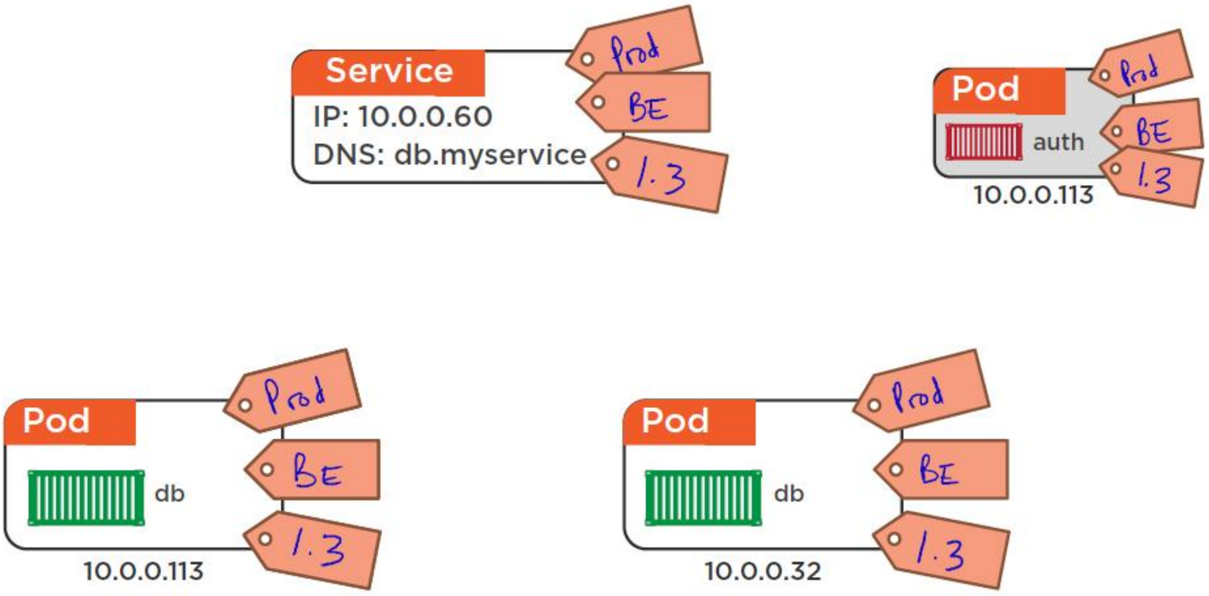


(Deny traffic from all other namespaces)

source:
https://ahmet.im/blog/kubernetes-network-policy

# 7. Labeling

- easier to operate on Kubernetes objects in bulk
- good labeling conventions will also make teams more productive in the long run



Source:
https://www.replex.io/blog/9-best-practices-and-examples-for-working-with-kubernetes-labels

# 8. Security by Design

What is the difference between declarative configuration? What is imperative management?

**Regulations:**

- DE: Datenschutz-Grundverordnung (DSGVO)
- EU: General Data Protection Regulation (GDPR)

**Principles:**

- Confidentiality – only allow access to data for which the user is permitted
- Integrity – ensure data is not tampered or altered by unauthorized users
- Availability – ensure systems and data are available to authorized users when they need it

**Best Practices 1:**

- All config is declarative and everything can be described and observed
- Config can be mutable even if images are not
- We can unbundle configuration from build, and update it independently
- We move from “config as code” to “ops as config”.

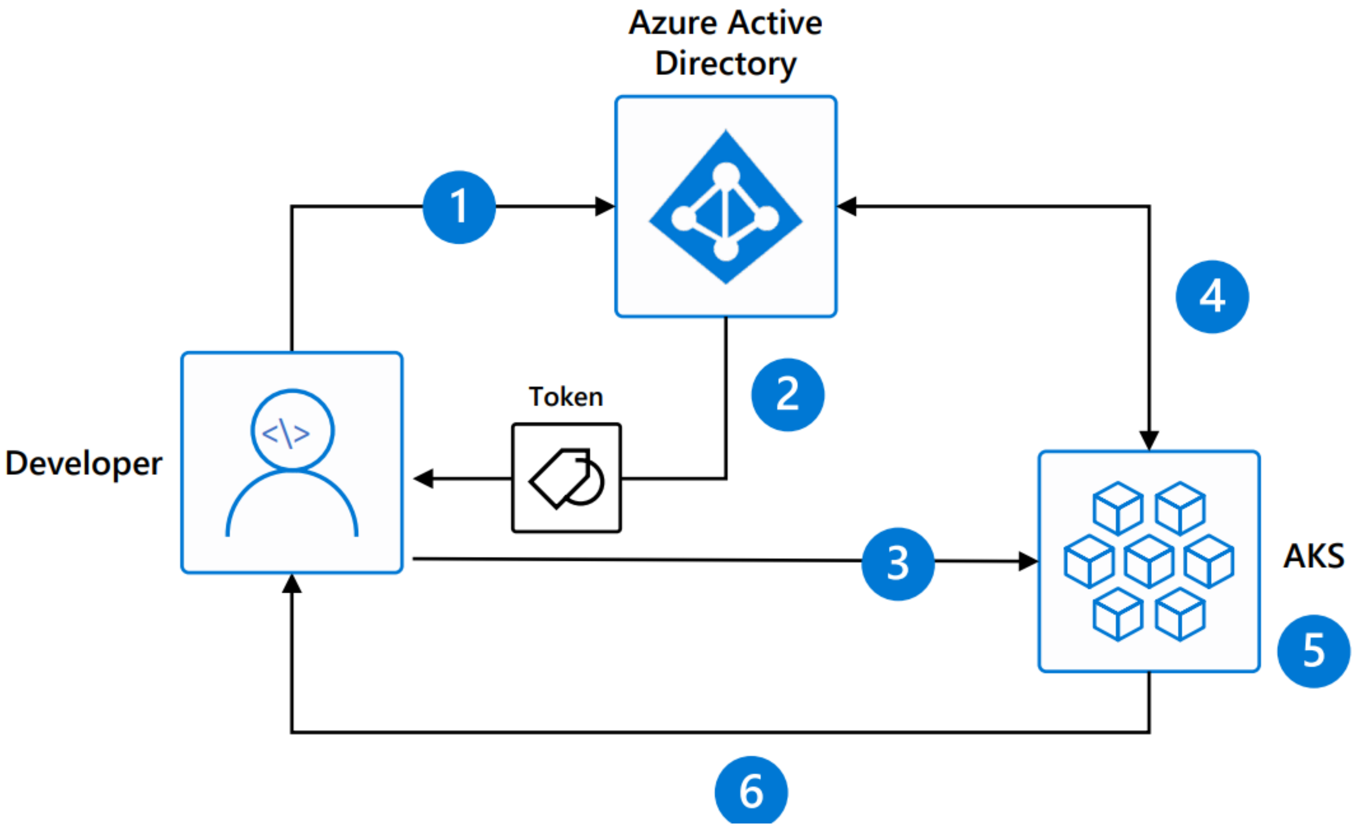
**Best Practices 2:**

- Keep a record in Git
- Avoid unnecessary rebuilds if you can use config instead
- Use pull based deployment

Source:
https://www.owasp.org/index.php/Security_by_Design_Principles

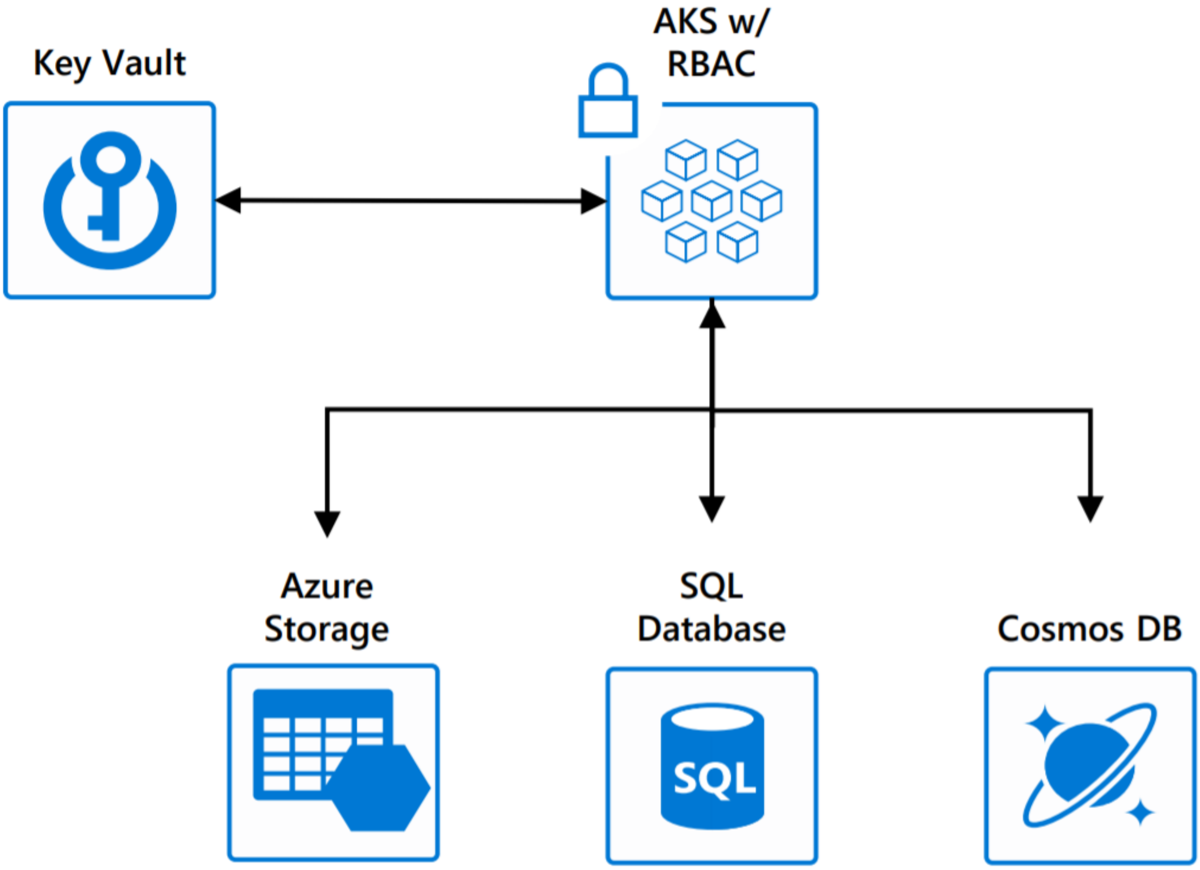
# 9. Security

- Cluster Level
  - Ensuring authentication and authorization (AAD + RBAC)
  - Setting up & keeping least privileged access for common tasks
  - Regular maintenance, security and cleanup tasks
- Container Level
  - Regularly scan Images and Containers & apply security updates
  - Avoid root privileges
- Pod Level
  - Pod Security Context
  - Pod Security Policies



# 10. Access and identity

- Kubernetes service accounts
- Azure Active Directory integration (AAD)
- Role-based access controls (RBAC)
- Roles and ClusterRoles
- RoleBindings and ClusterRoleBindings



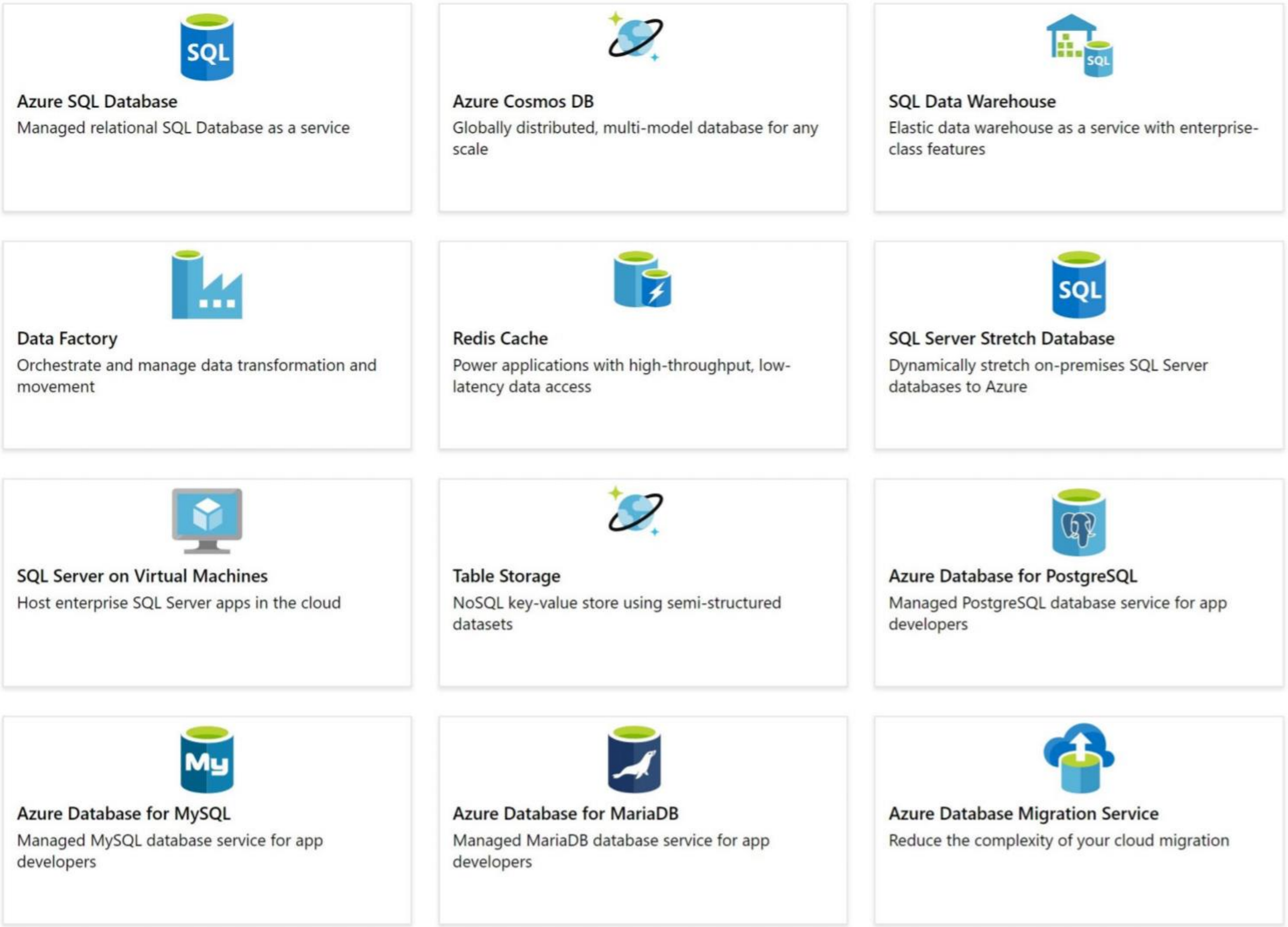
# 11. Managed Services

**Storage:**

- Volumes
- Persistent volumes
- Storage classes
- Persistent volume claims
- Encryption

**Databases:**

- Azure Storage
- CosmosDB
- SQL Database
- …



**Azure SQL Database**
Managed relational SQL Database as a service

**Azure Cosmos DB**
Globally distributed, multi-model database for any scale

**SQL Data Warehouse**
Elastic data warehouse as a service with enterprise-class features

**Data Factory**
Orchestrate and manage data transformation and movement

**Redis Cache**
Power applications with high-throughput, low-latency data access

**SQL Server Stretch Database**
Dynamically stretch on-premises SQL Server databases to Azure

**SQL Server on Virtual Machines**
Host enterprise SQL Server apps in the cloud

**Table Storage**
NoSQL key-value store using semi-structured datasets

**Azure Database for PostgreSQL**
Managed PostgreSQL database service for app developers

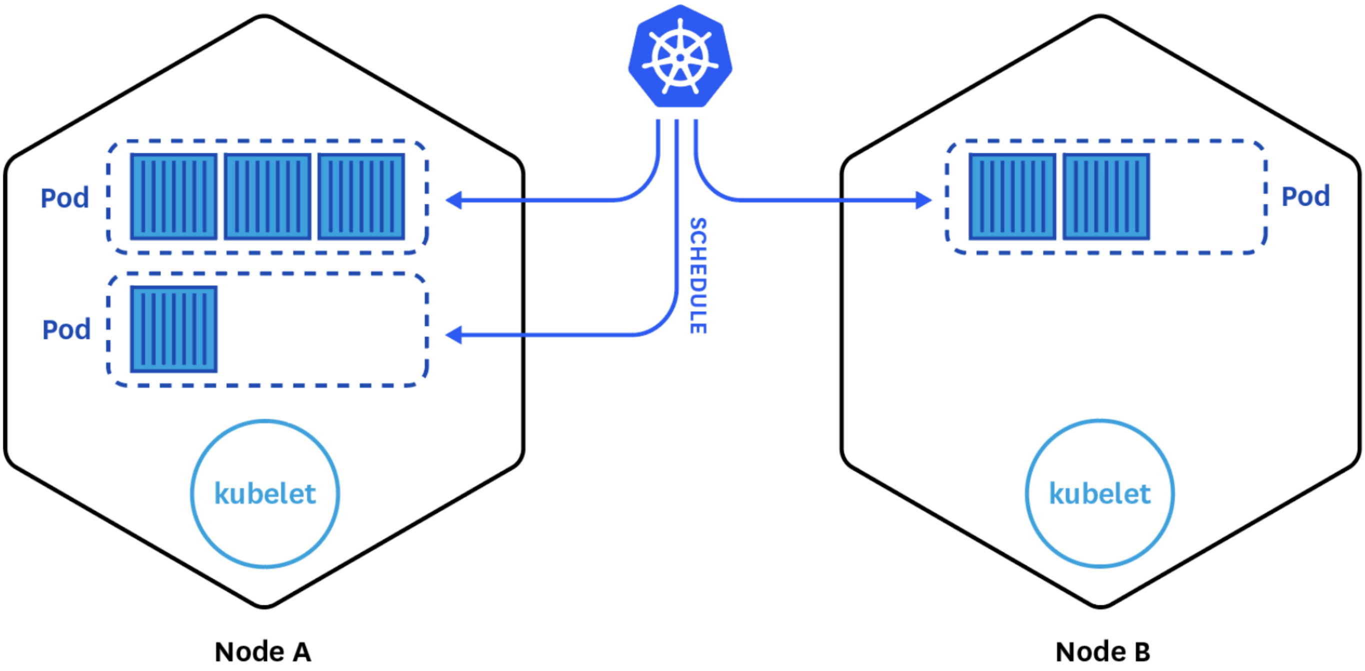
**Azure Database for MySQL**
Managed MySQL database service for app developers

**Azure Database for MariaDB**
Managed MariaDB database service for app developers

**Azure Database Migration Service**
Reduce the complexity of your cloud migration

# 12. Scalling

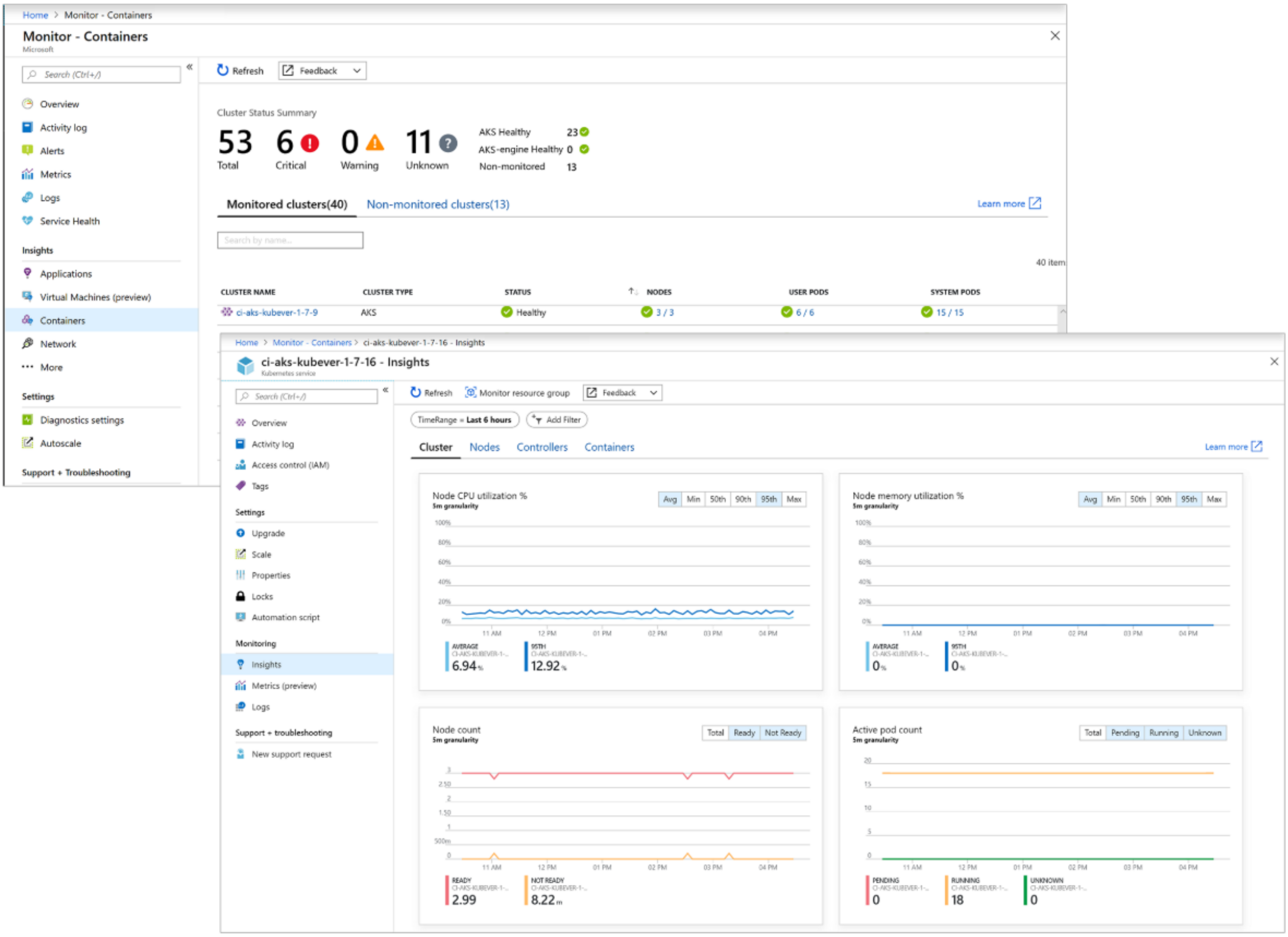
- Pod Autoscaler: increase/decrease number of pods
- Cluster Autoscaler: run an efficient, cost-effective cluster



Source:
https://docs.microsoft.com/en-us/azure/aks/cluster-autoscaler
https://docs.microsoft.com/en-us/azure/aks/tutorial-kubernetes-scale

# 13. Logging and Monitoring

- Visualize
- Alert
- Analyse (query)



Cluster Status Summary

53 Total · 6 Critical · 0 Warning · 11 Unknown

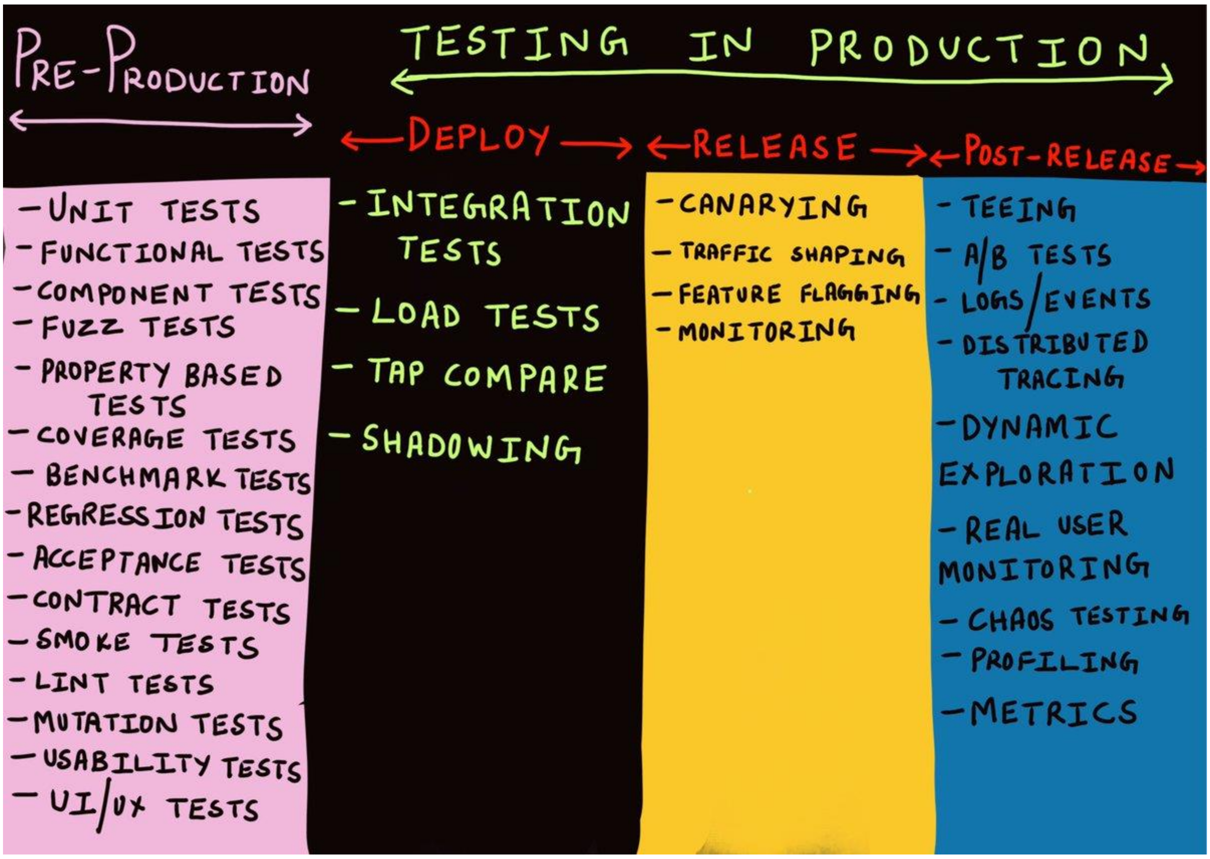
| | |
|---|---|
| AKS Healthy | 23 ✓ |
| AKS-engine Healthy | 0 ✓ |
| Non-monitored | 13 |

| CLUSTER NAME | CLUSTER TYPE | STATUS | NODES | USER PODS | SYSTEM PODS |
|---|---|---|---|---|---|
| ci-aks-kubever-1-7-9 | AKS | ✓ Healthy | ✓ 3 / 3 | ✓ 6 / 6 | ✓ 15 / 15 |

# Deployment & Developer Workflow

## 14. CICD Pipelines

- triggers
- pipeline
- stages
- notifications



PRE-PRODUCTION

- UNIT TESTS
- FUNCTIONAL TESTS
- COMPONENT TESTS
- FUZZ TESTS
- PROPERTY BASED TESTS
- COVERAGE TESTS
- BENCHMARK TESTS
- REGRESSION TESTS
- ACCEPTANCE TESTS
- CONTRACT TESTS
- SMOKE TESTS
- LINT TESTS
- MUTATION TESTS
- USABILITY TESTS
- UI/UX TESTS

TESTING IN PRODUCTION

DEPLOY

- INTEGRATION TESTS
- LOAD TESTS
- TAP COMPARE
- SHADOWING

RELEASE

- CANARYING
- TRAFFIC SHAPING
- FEATURE FLAGGING
- MONITORING

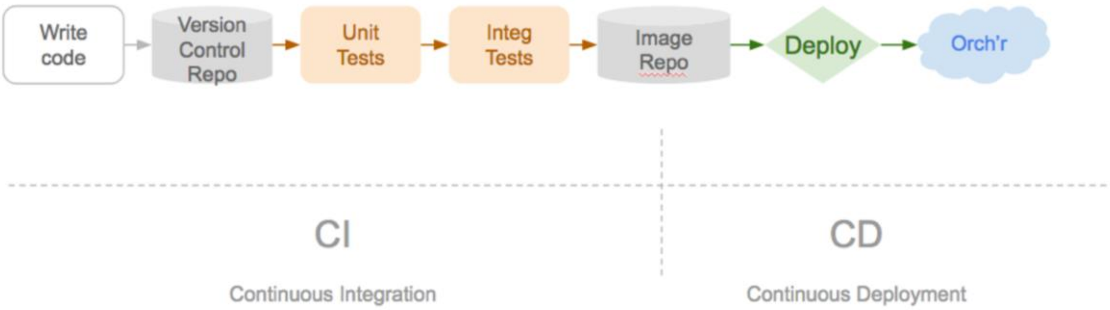
POST-RELEASE

- TEEING
- A/B TESTS
- LOGS/EVENTS
- DISTRIBUTED TRACING
- DYNAMIC EXPLORATION
- REAL USER MONITORING
- CHAOS TESTING
- PROFILING
- METRICS

# 15. Push Deployments (Traditional)

**helm charts, tiller server:**

- difficult to write
- tiller in admin mode & every developer needs to access it; user has to connect with helm to tiller for deploying stuff
- difficult to see changes
- container images not updated automatically



Source:
https://medium.com/@m.k.joerg/gitops-weave-flux-in-detail-77ce36945646

# 16. Pull Deployments (GitOps) – Part 1

**Code changes (continuous integration):**

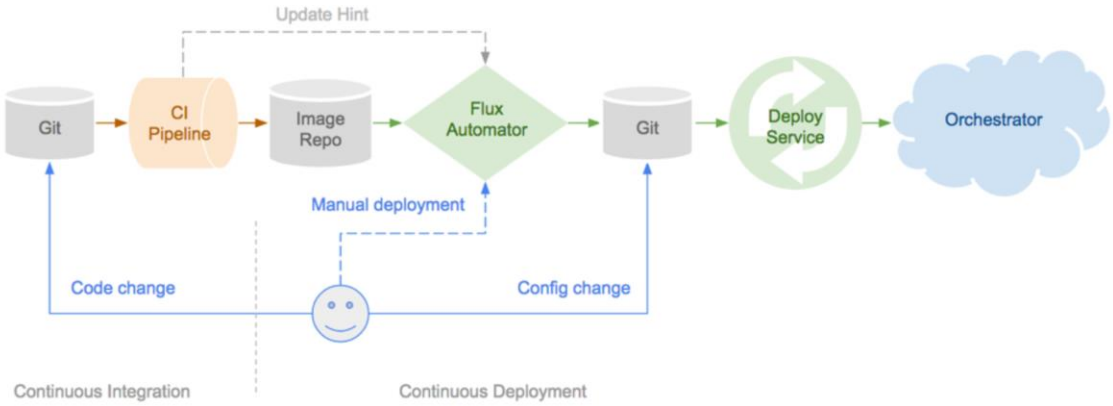
- unit tests, integration tests, build image
- High velocity CICD

**Config changes (operations-by-pull-request):**

- "Anything that does not record changes in version control is harmful"

**Continuous delivery (flux operator):**

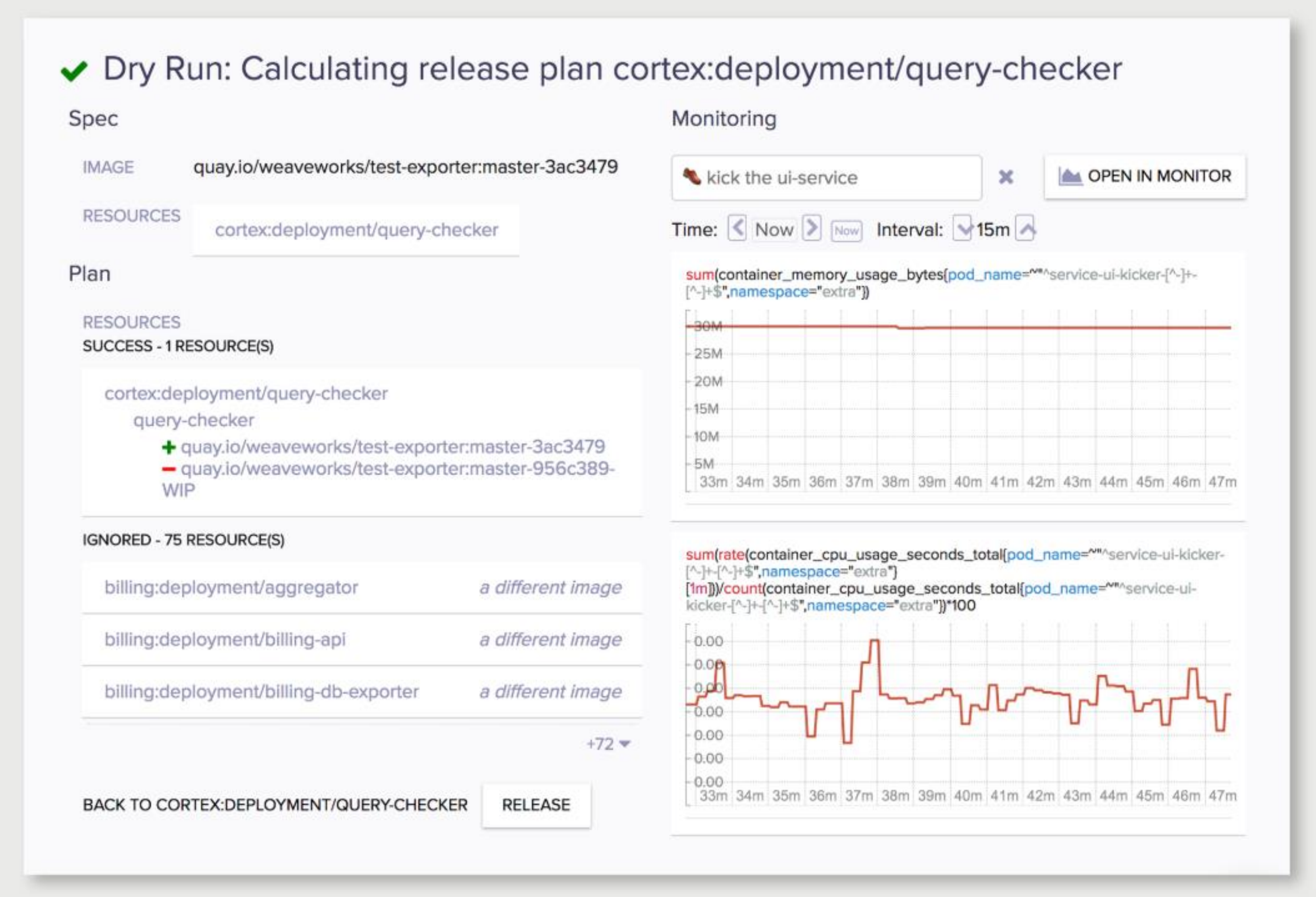
- will get triggerd on config change (git repository)
- Production system pulls changes (images, k8s manifests)



# 17. Pull Deployments (GitOps) – Part 2

**Benefits:**

- deployment dashboard (status, diffs and real-time impact on the app)
- faster rollouts, rollbacks, and upgrades



✓ Dry Run: Calculating release plan cortex:deployment/query-checker

Spec

IMAGE quay.io/weaveworks/test-exporter:master-3ac3479

RESOURCES cortex:deployment/query-checker

Plan

RESOURCES
SUCCESS - 1 RESOURCE(S)

cortex:deployment/query-checker
query-checker
+ quay.io/weaveworks/test-exporter:master-3ac3479
− quay.io/weaveworks/test-exporter:master-956c389-WIP

IGNORED - 75 RESOURCE(S)

| | |
|---|---|
| billing:deployment/aggregator | *a different image* |
| billing:deployment/billing-api | *a different image* |
| billing:deployment/billing-db-exporter | *a different image* |

+72

Monitoring

kick the ui-service

Time: Now Interval: 15m

```
sum(container_memory_usage_bytes{pod_name=~"^service-ui-kicker-[^-]+-[^-]+$",namespace="extra"})
```

```
sum(rate(container_cpu_usage_seconds_total{pod_name=~"^service-ui-kicker-[^-]+-[^-]+$",namespace="extra"}[1m]))/count(container_cpu_usage_seconds_total{pod_name=~"^service-ui-kicker-[^-]+-[^-]+$",namespace="extra"})*100
```

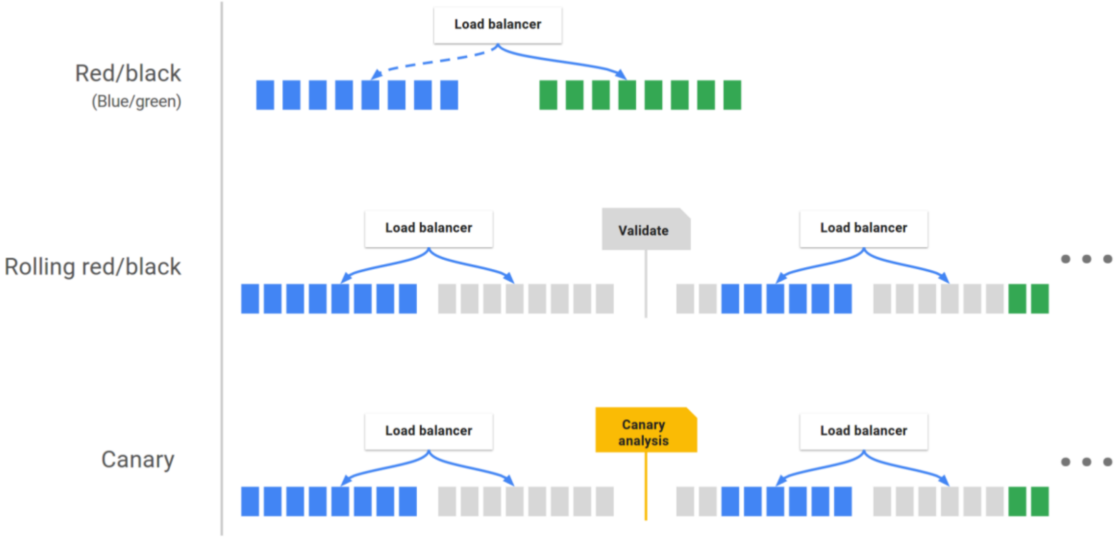
Source:
https://www.weave.works/technologies/gitops
https://www.weave.works/blog/the-gitops-pipeline
https://www.weave.works/blog/gitops-high-velocity-cicd-for-kubernetes
https://discuss.kubernetes.io/t/weave-flux-1-10-0-and-1-10-1-brings-deeper-azure-integration-and-big-other-improvements/4751

# 18. Deployment Strategies

**Blue/Green (Red/Black)**
running two identical production environments called Blue and Green. At any time, only one of the environments is live (loadbalancer), with the live environment serving all production traffic

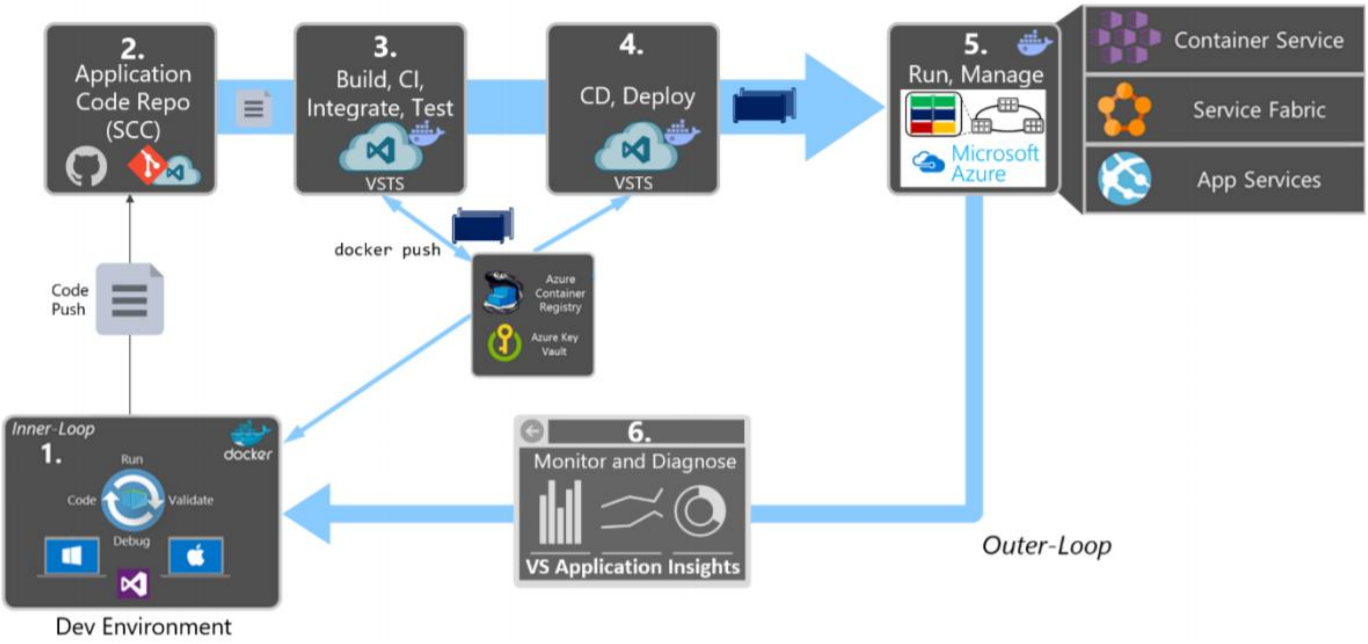
**Rolling**
incrementally updating Pods instances with new ones

**Canary**
release is a technique to reduce the risk of introducing a new software version in production by slowly rolling out the change to a small subset of users



# 19. Docker DevOps lifecycle workflow with Microsoft Tools

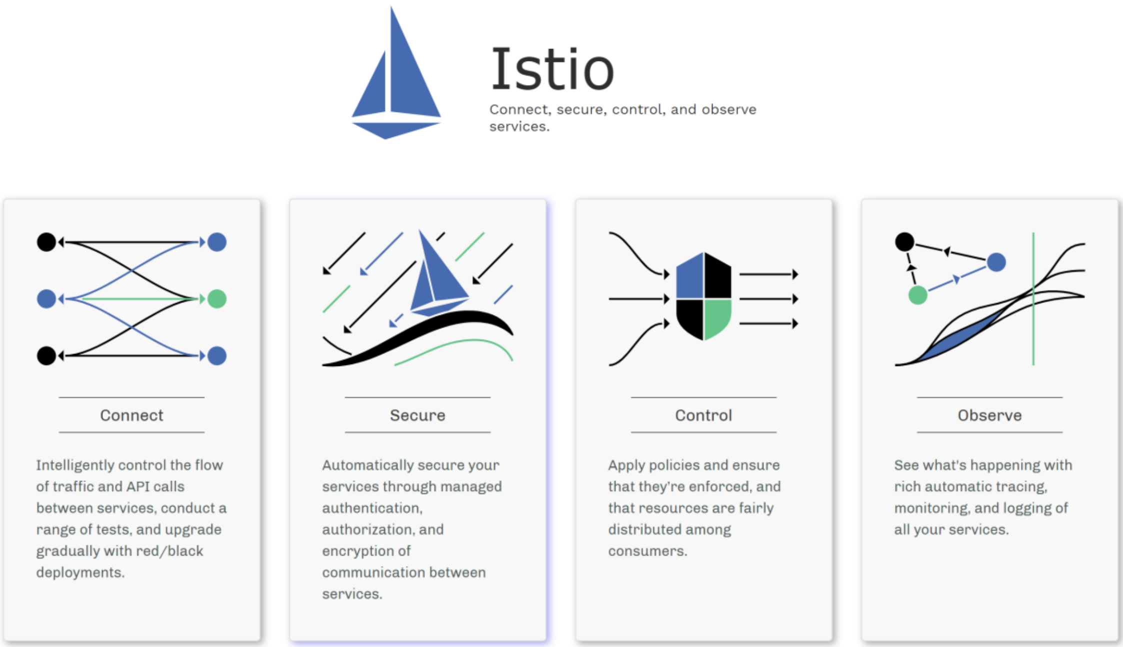
- DevOps - CI/CD
- Container Registry
- KeyVault, Active Directory
- Azure Kubernetes Service (AKS)
- Application Insights



# Advanced: Mesh

## 20. Istio

“The Man in the Middle” – intercept all traffic



Istio

Connect, secure, control, and observe services.

Connect

Intelligently control the flow of traffic and API calls between services, conduct a range of tests, and upgrade gradually with red/black deployments.

Secure

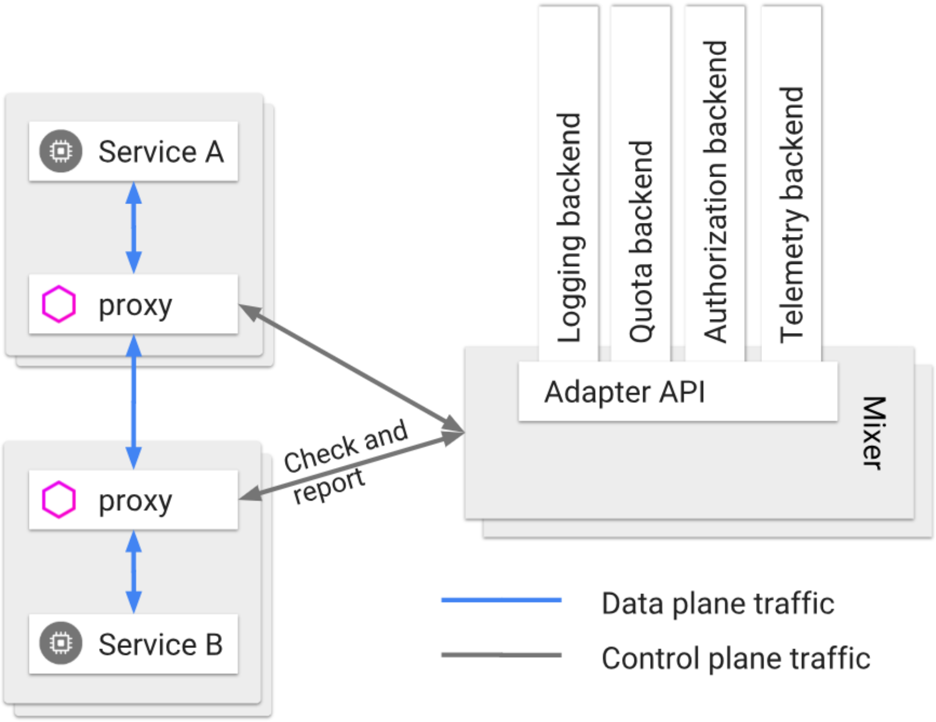
Automatically secure your services through managed authentication, authorization, and encryption of communication between services.

Control

Apply policies and ensure that they're enforced, and that resources are fairly distributed among consumers.

Observe

See what's happening with rich automatic tracing, monitoring, and logging of all your services.

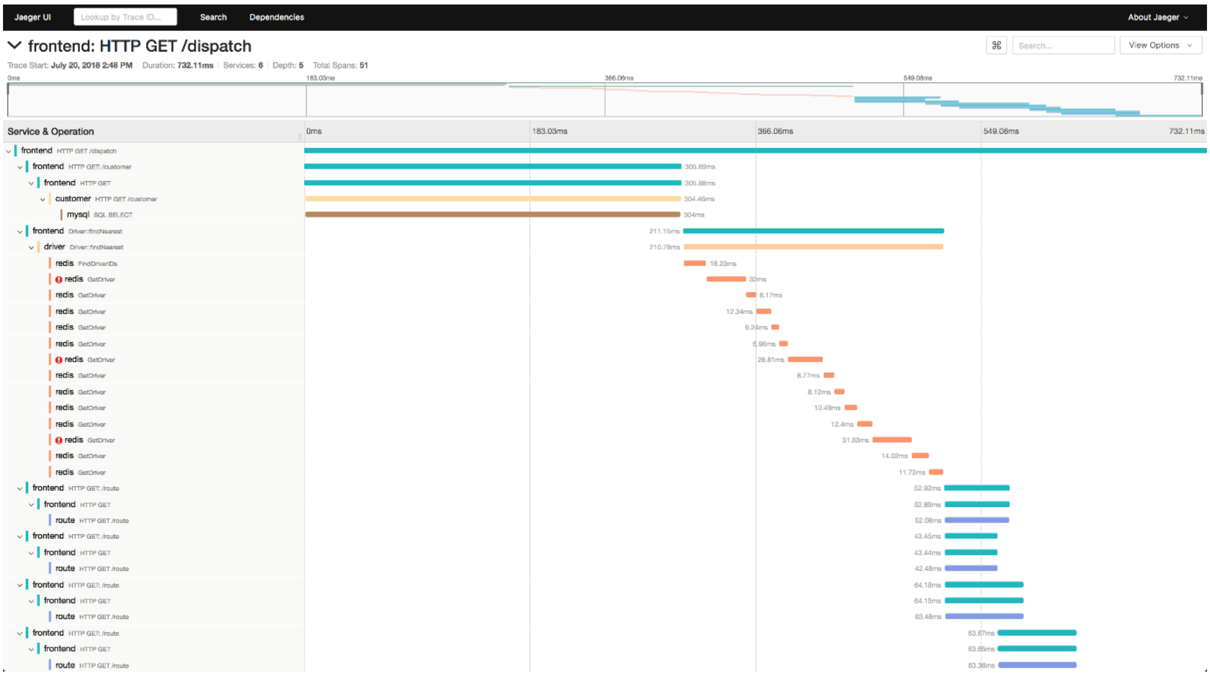


*Mixer Topology*

# 21. Jaeger

**Distributed Tracing:**

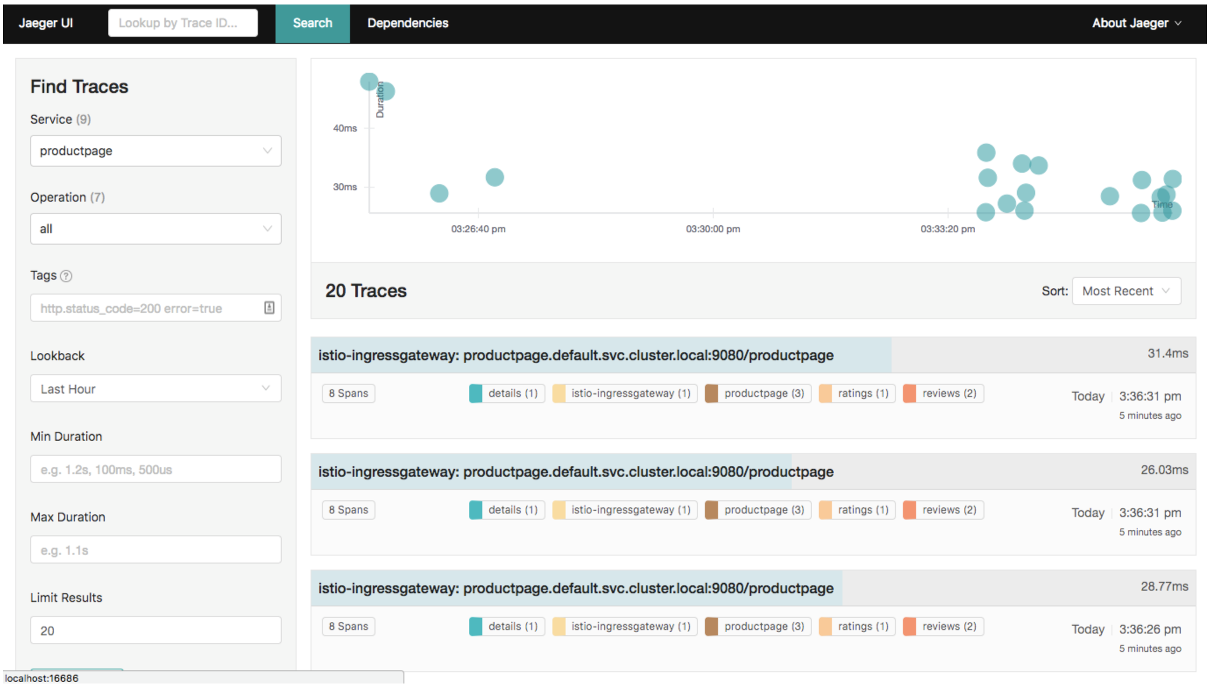
- service dependency analysis
- distributed transaction monitoring
- distributed context propagation
- performance and latency optimization



frontend: HTTP GET /dispatch

Trace Start: **July 20, 2018 2:48 PM** | Duration: **732.11ms** | Services: **6** | Depth: **5** | Total Spans: **51**

| Service & Operation | | |
|---|---|---|
| frontend | HTTP GET /dispatch | |
| frontend | HTTP GET: /customer | 305.89ms |
| frontend | HTTP GET | 305.88ms |
| customer | HTTP GET /customer | 304.46ms |
| mysql | SQL SELECT | 304ms |
| frontend | Driver::findNearest | 211.15ms |
| driver | Driver::findNearest | 210.78ms |
| redis | FindDriverIDs | 18.23ms |
| ❗ redis | GetDriver | 32ms |
| redis | GetDriver | 8.17ms |
| redis | GetDriver | 12.34ms |
| redis | GetDriver | 6.24ms |
| redis | GetDriver | 6.96ms |
| ❗ redis | GetDriver | 28.81ms |
| redis | GetDriver | 8.77ms |
| redis | GetDriver | 8.12ms |
| redis | GetDriver | 10.49ms |
| redis | GetDriver | 12.4ms |
| ❗ redis | GetDriver | 31.63ms |
| redis | GetDriver | 14.02ms |
| redis | GetDriver | 11.72ms |
| frontend | HTTP GET: /route | 52.92ms |
| frontend | HTTP GET | 52.89ms |
| route | HTTP GET /route | 52.08ms |
| frontend | HTTP GET: /route | 43.45ms |
| frontend | HTTP GET | 43.44ms |
| route | HTTP GET /route | 42.48ms |
| frontend | HTTP GET: /route | 64.18ms |
| frontend | HTTP GET | 64.15ms |
| route | HTTP GET /route | 63.48ms |
| frontend | HTTP GET: /route | 63.67ms |
| frontend | HTTP GET | 63.65ms |
| route | HTTP GET /route | 63.36ms |



**Find Traces**

Service (9): productpage

Operation (7): all

Tags ⓘ: http.status_code=200 error=true

Lookback: Last Hour

Min Duration: e.g. 1.2s, 100ms, 500us

Max Duration: e.g. 1.1s

Limit Results: 20

**20 Traces**

Sort: Most Recent

istio-ingressgateway: productpage.default.svc.cluster.local:9080/productpage — 31.4ms
8 Spans | details (1) | istio-ingressgateway (1) | productpage (3) | ratings (1) | reviews (2) | Today | 3:36:31 pm | 5 minutes ago

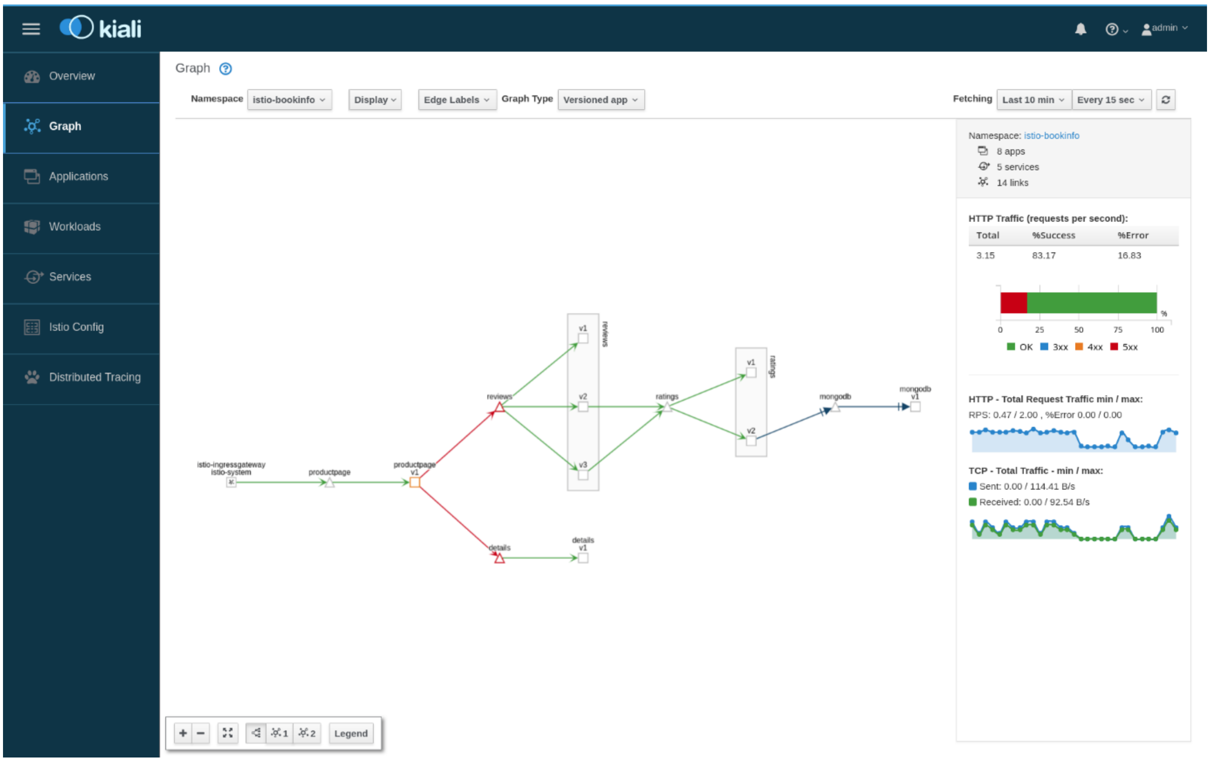
istio-ingressgateway: productpage.default.svc.cluster.local:9080/productpage — 26.03ms
8 Spans | details (1) | istio-ingressgateway (1) | productpage (3) | ratings (1) | reviews (2) | Today | 3:36:31 pm | 5 minutes ago

istio-ingressgateway: productpage.default.svc.cluster.local:9080/productpage — 28.77ms
8 Spans | details (1) | istio-ingressgateway (1) | productpage (3) | ratings (1) | reviews (2) | Today | 3:36:26 pm | 5 minutes ago

# 22. Kiali

**insights at different levels:**

- how are services connected (mesh topology)
- circuit breakers
- request rates
- traffic flow (versioned app)



Namespace: istio-bookinfo

Graph Type: Versioned app

Fetching: Last 10 min, Every 15 sec

Namespace: istio-bookinfo
8 apps
5 services
14 links

HTTP Traffic (requests per second):

| Total | %Success | %Error |
|---|---|---|
| 3.15 | 83.17 | 16.83 |

HTTP - Total Request Traffic min / max:
RPS: 0.47 / 2.00 , %Error 0.00 / 0.00

TCP - Total Traffic - min / max:
🟦 Sent: 0.00 / 114.41 B/s
🟩 Received: 0.00 / 92.54 B/s

# 23. Services Contracts

**In Kubernetes:**

- gRPC - remote procedure calls
- uses HTTP/2 for transport
- Protocol Buffers as the interface description language
- authentication, bidirectional streaming and flow control, blocking or nonblocking bindings, and cancellation and timeouts

**When to use what?**

- REST
- GraphQL
- Webhooks

  gRPC

# Best Practice Guides

**Links:**

https://azureinfohub.azurewebsites.net/Service?serviceTitle=Azure%20Kubernetes%20Service

https://www.weave.works/blog/kubernetes-best-practices

https://rancher.com/blog/2019/2019-01-17-101-more-kubernetes-security-best-practices

https://docs.microsoft.com/en-us/azure/aks/best-practices

https://www.slideshare.net/QAware/best-practices-with-azure-kubernetes-services-123776449

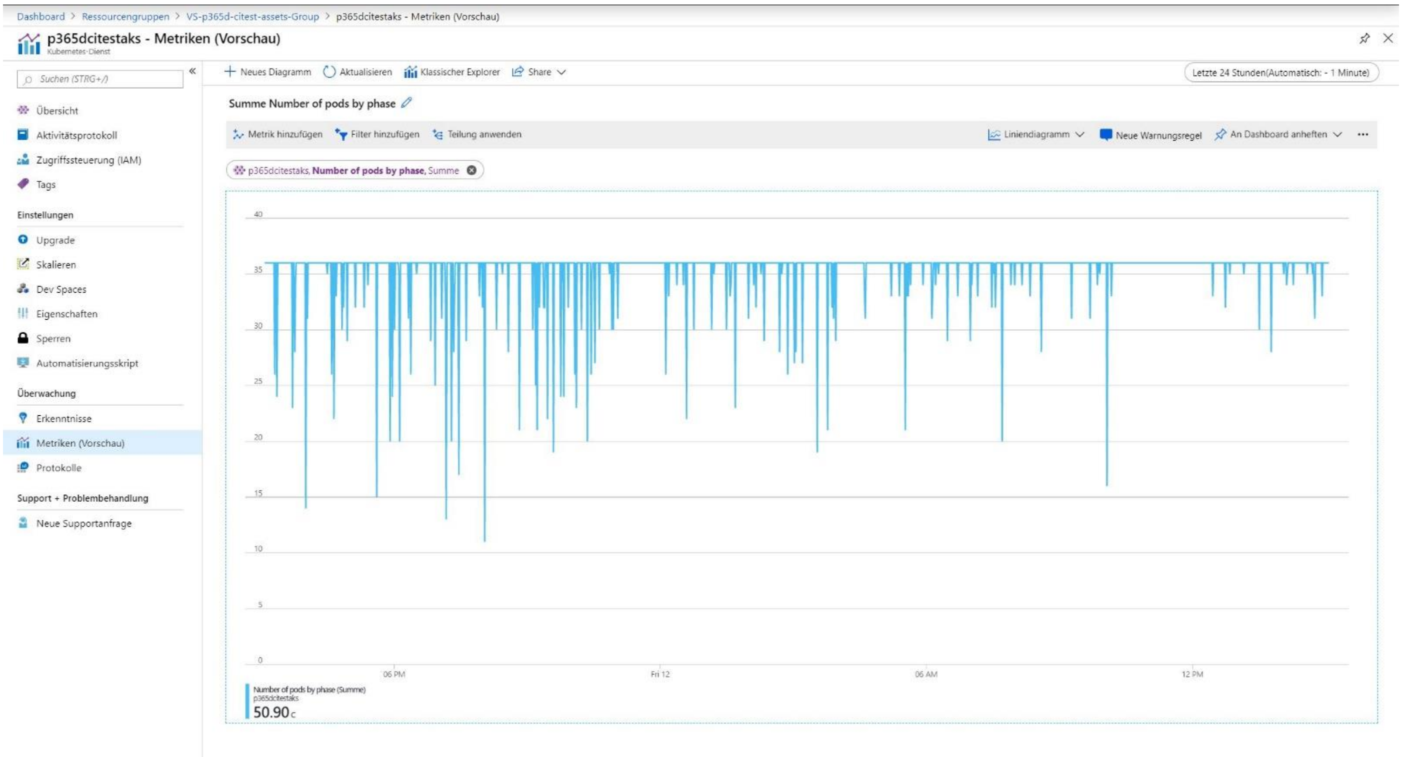
https://azureinfohub.azurewebsites.net/Service?serviceTitle=Azure%20Kubernetes%20Service

https://www.replex.io/blog/9-best-practices-and-examples-for-working-with-kubernetes-labels

https://medium.com/@maarten.goet/securing-kubernetes-on-microsoft-azure-are-your-container-doors-wide-open-bb6e879cec5d

# APPENDIX

## 24. Azure Portal



Dashboard > Ressourcengruppen > VS-p365d-citest-assets-Group > p365dcitestaks - Metriken (Vorschau)

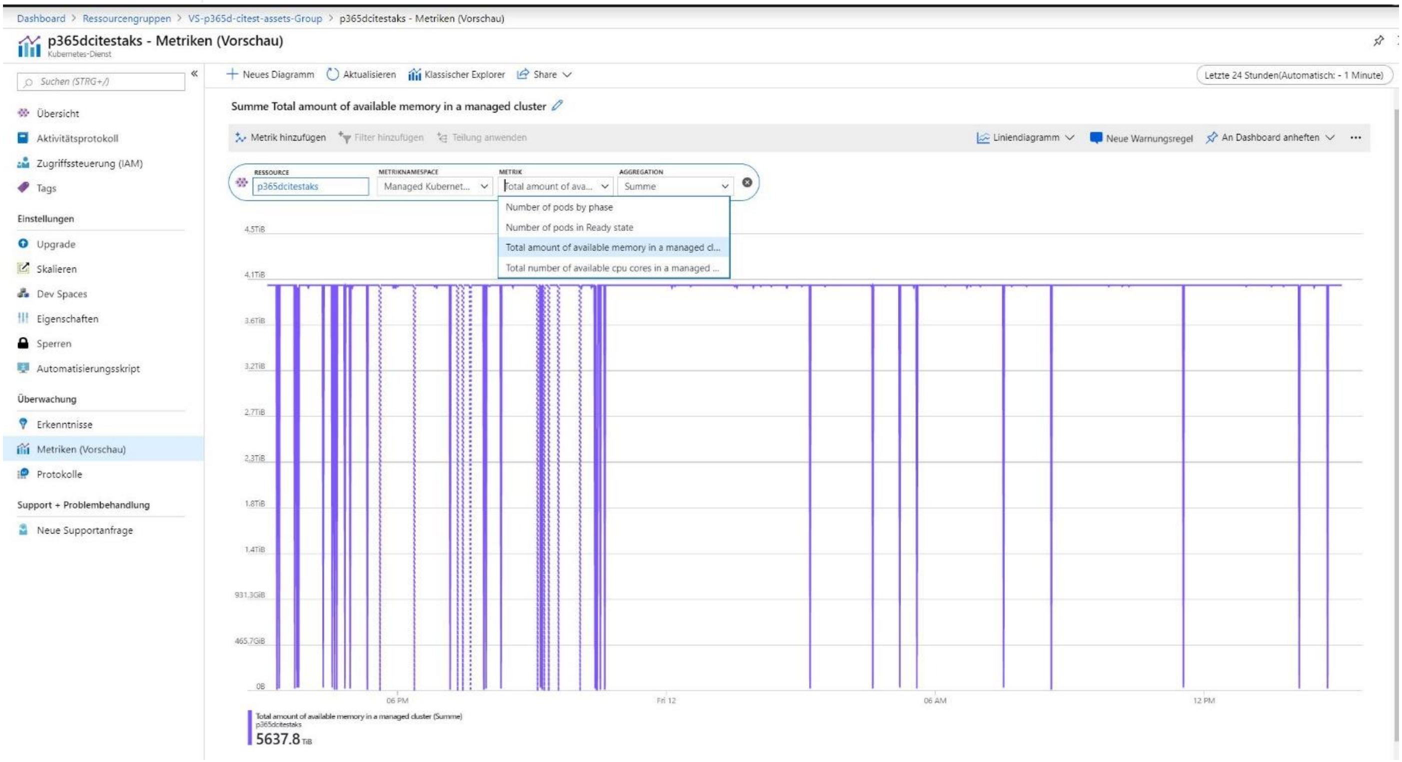
p365dcitestaks - Metriken (Vorschau)

Letzte 24 Stunden(Automatisch: - 1 Minute)

Summe Number of pods by phase

p365dcitestaks, Number of pods by phase, Summe

Number of pods by phase (Summe) p365dcitestaks 50.90 c



Dashboard > Ressourcengruppen > VS-p365d-citest-assets-Group > p365dcitestaks - Metriken (Vorschau)

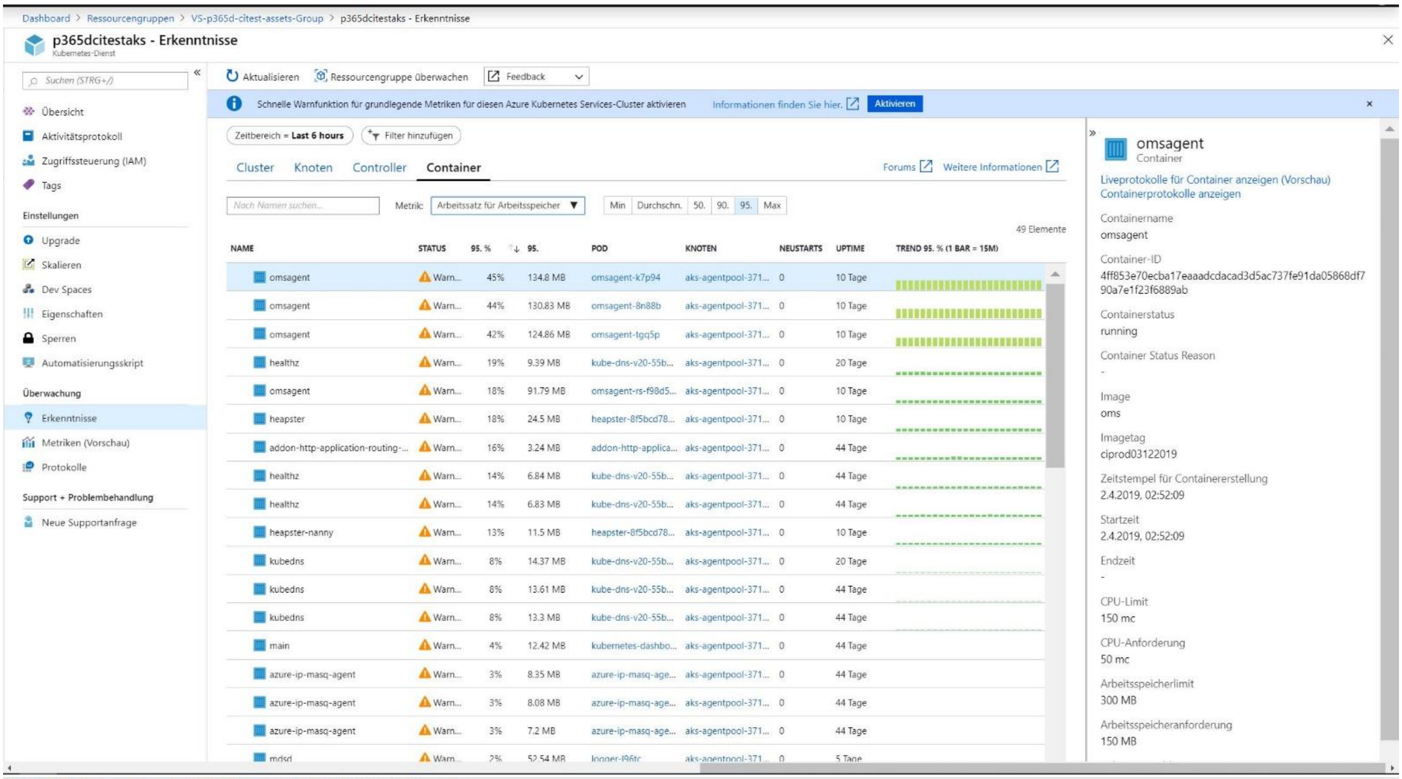
p365dcitestaks - Metriken (Vorschau)

Letzte 24 Stunden(Automatisch: - 1 Minute)

Summe Total amount of available memory in a managed cluster

RESSOURCE: p365dcitestaks
METRIKNAMESPACE: Managed Kubernet...
METRIK: Total amount of ava...
AGGREGATION: Summe

Total amount of available memory in a managed cluster (Summe) p365dcitestaks 5637.8 TiB



Schnelle Warnfunktion für grundlegende Metriken für diesen Azure Kubernetes Services-Cluster aktivieren

Zeitbereich = **Last 6 hours**

Metrik: Arbeitssatz für Arbeitsspeicher

49 Elemente

| NAME | STATUS | 95. % | 95. | POD | KNOTEN | NEUSTARTS | UPTIME | TREND 95. % (1 BAR = 15M) |
|---|---|---|---|---|---|---|---|---|
| omsagent | Warn... | 45% | 134.8 MB | omsagent-k7p94 | aks-agentpool-371... | 0 | 10 Tage | |
| omsagent | Warn... | 44% | 130.83 MB | omsagent-8n88b | aks-agentpool-371... | 0 | 10 Tage | |
| omsagent | Warn... | 42% | 124.86 MB | omsagent-tgq5p | aks-agentpool-371... | 0 | 10 Tage | |
| healthz | Warn... | 19% | 9.39 MB | kube-dns-v20-55b... | aks-agentpool-371... | 0 | 20 Tage | |
| omsagent | Warn... | 18% | 91.79 MB | omsagent-rs-f98d5... | aks-agentpool-371... | 0 | 10 Tage | |
| heapster | Warn... | 18% | 24.5 MB | heapster-8f5bcd78... | aks-agentpool-371... | 0 | 10 Tage | |
| addon-http-application-routing-... | Warn... | 16% | 3.24 MB | addon-http-applica... | aks-agentpool-371... | 0 | 44 Tage | |
| healthz | Warn... | 14% | 6.84 MB | kube-dns-v20-55b... | aks-agentpool-371... | 0 | 44 Tage | |
| healthz | Warn... | 14% | 6.83 MB | kube-dns-v20-55b... | aks-agentpool-371... | 0 | 44 Tage | |
| heapster-nanny | Warn... | 13% | 11.5 MB | heapster-8f5bcd78... | aks-agentpool-371... | 0 | 10 Tage | |
| kubedns | Warn... | 8% | 14.37 MB | kube-dns-v20-55b... | aks-agentpool-371... | 0 | 20 Tage | |
| kubedns | Warn... | 8% | 13.61 MB | kube-dns-v20-55b... | aks-agentpool-371... | 0 | 44 Tage | |
| kubedns | Warn... | 8% | 13.3 MB | kube-dns-v20-55b... | aks-agentpool-371... | 0 | 44 Tage | |
| main | Warn... | 4% | 12.42 MB | kubernetes-dashbo... | aks-agentpool-371... | 0 | 44 Tage | |
| azure-ip-masq-agent | Warn... | 3% | 8.35 MB | azure-ip-masq-age... | aks-agentpool-371... | 0 | 44 Tage | |
| azure-ip-masq-agent | Warn... | 3% | 8.08 MB | azure-ip-masq-age... | aks-agentpool-371... | 0 | 44 Tage | |
| azure-ip-masq-agent | Warn... | 3% | 7.2 MB | azure-ip-masq-age... | aks-agentpool-371... | 0 | 44 Tage | |
| mdsd | Warn... | 2% | 52.54 MB | logger-l96tc | aks-agentpool-371... | 0 | 5 Tage | |

omsagent
Container

Liveprotokolle für Container anzeigen (Vorschau)
Containerprotokolle anzeigen

Containername
omsagent

Container-ID
4ff853e70ecba17eaaadcdacad3d5ac737fe91da05868df790a7e1f23f6889ab

Containerstatus
running

Container Status Reason
-

Image
oms

Imagetag
ciprod03122019

Zeitstempel für Containererstellung
2.4.2019, 02:52:09

Startzeit
2.4.2019, 02:52:09

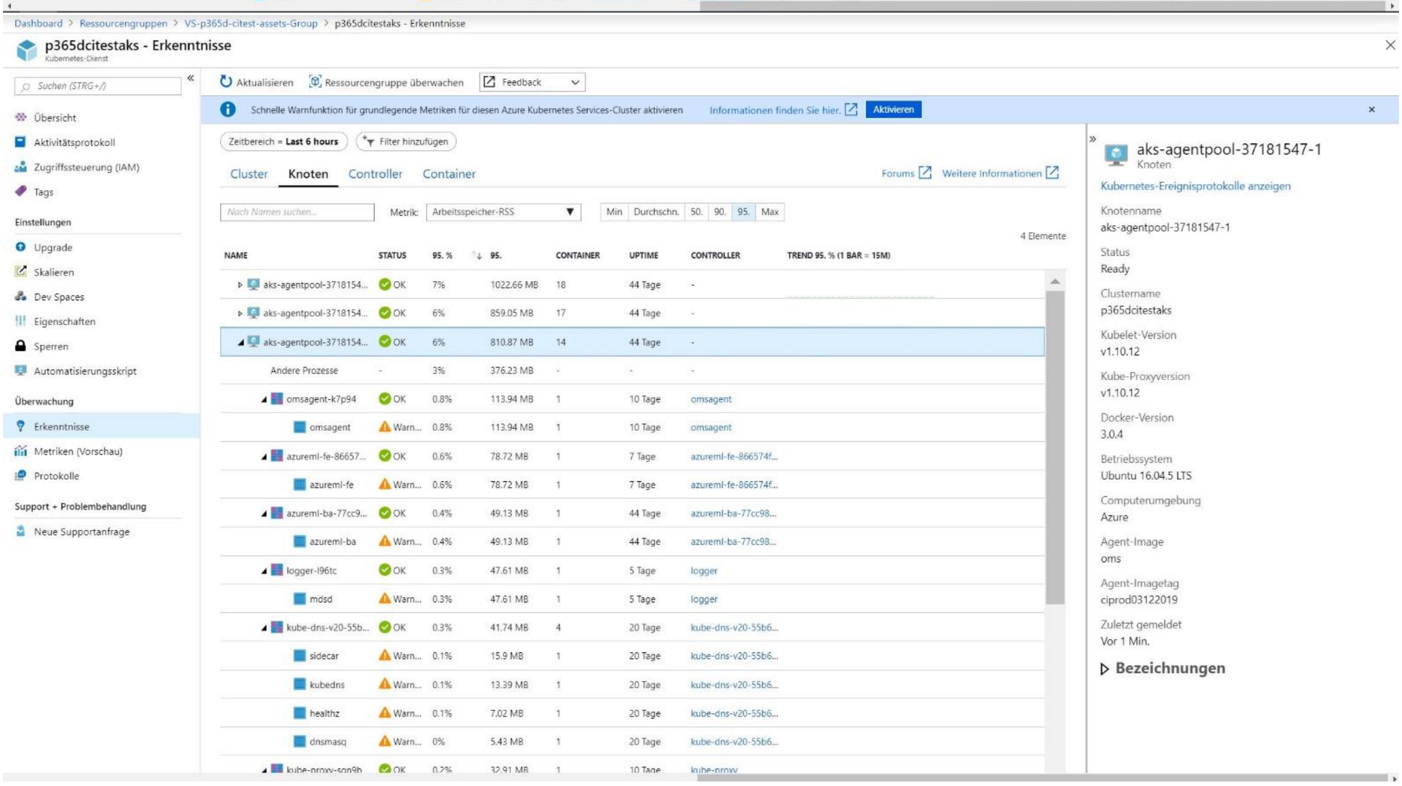
Endzeit
-

CPU-Limit
150 mc

CPU-Anforderung
50 mc

Arbeitsspeicherlimit
300 MB

Arbeitsspeicheranforderung
150 MB



Schnelle Warnfunktion für grundlegende Metriken für diesen Azure Kubernetes Services-Cluster aktivieren

Zeitbereich = **Last 6 hours**

Metrik: Arbeitsspeicher-RSS

4 Elemente

| NAME | STATUS | 95. % | 95. | CONTAINER | UPTIME | CONTROLLER | TREND 95. % (1 BAR = 15M) |
|---|---|---|---|---|---|---|---|
| ▷ aks-agentpool-3718154... | OK | 7% | 1022.66 MB | 18 | 44 Tage | - | |
| ▷ aks-agentpool-3718154... | OK | 6% | 859.05 MB | 17 | 44 Tage | - | |
| ◢ aks-agentpool-3718154... | OK | 6% | 810.87 MB | 14 | 44 Tage | - | |
| Andere Prozesse | - | 3% | 376.23 MB | - | - | - | |
| ◢ omsagent-k7p94 | OK | 0.8% | 113.94 MB | 1 | 10 Tage | omsagent | |
| omsagent | Warn... | 0.8% | 113.94 MB | 1 | 10 Tage | omsagent | |
| ◢ azureml-fe-86657... | OK | 0.6% | 78.72 MB | 1 | 7 Tage | azureml-fe-866574f... | |
| azureml-fe | Warn... | 0.6% | 78.72 MB | 1 | 7 Tage | azureml-fe-866574f... | |
| ◢ azureml-ba-77cc9... | OK | 0.4% | 49.13 MB | 1 | 44 Tage | azureml-ba-77cc98... | |
| azureml-ba | Warn... | 0.4% | 49.13 MB | 1 | 44 Tage | azureml-ba-77cc98... | |
| ◢ logger-l96tc | OK | 0.3% | 47.61 MB | 1 | 5 Tage | logger | |
| mdsd | Warn... | 0.3% | 47.61 MB | 1 | 5 Tage | logger | |
| ◢ kube-dns-v20-55b... | OK | 0.3% | 41.74 MB | 4 | 20 Tage | kube-dns-v20-55b6... | |
| sidecar | Warn... | 0.1% | 15.9 MB | 1 | 20 Tage | kube-dns-v20-55b6... | |
| kubedns | Warn... | 0.1% | 13.39 MB | 1 | 20 Tage | kube-dns-v20-55b6... | |
| healthz | Warn... | 0.1% | 7.02 MB | 1 | 20 Tage | kube-dns-v20-55b6... | |
| dnsmasq | Warn... | 0% | 5.43 MB | 1 | 20 Tage | kube-dns-v20-55b6... | |
| ◢ kube-proxy-sqn9h | OK | 0.2% | 32.91 MB | 1 | 10 Tage | kube-proxy | |

aks-agentpool-37181547-1
Knoten

Kubernetes-Ereignisprotokolle anzeigen

Knotenname
aks-agentpool-37181547-1

Status
Ready

Clustername
p365dcitestaks

Kubelet-Version
v1.10.12

Kube-Proxyversion
v1.10.12

Docker-Version
3.0.4

Betriebssystem
Ubuntu 16.04.5 LTS

Computerumgebung
Azure

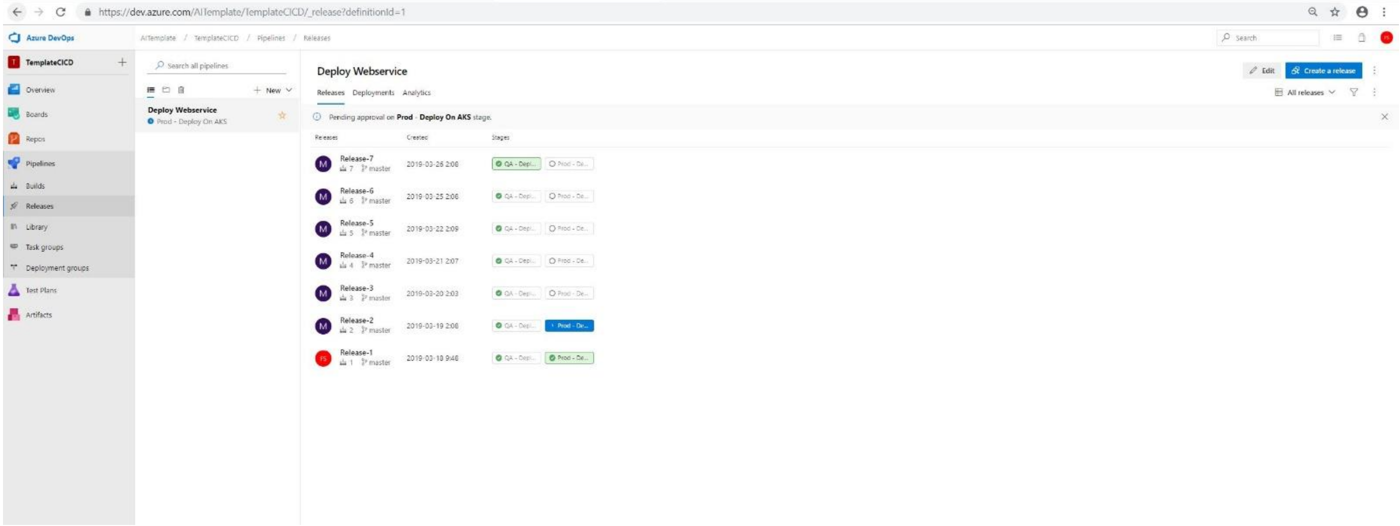
Agent-Image
oms

Agent-Imagetag
ciprod03122019

Zuletzt gemeldet
Vor 1 Min.

▷ Bezeichnungen

# 25. Azure DevOps



https://dev.azure.com/AITemplate/TemplateCICD/_release?definitionId=1

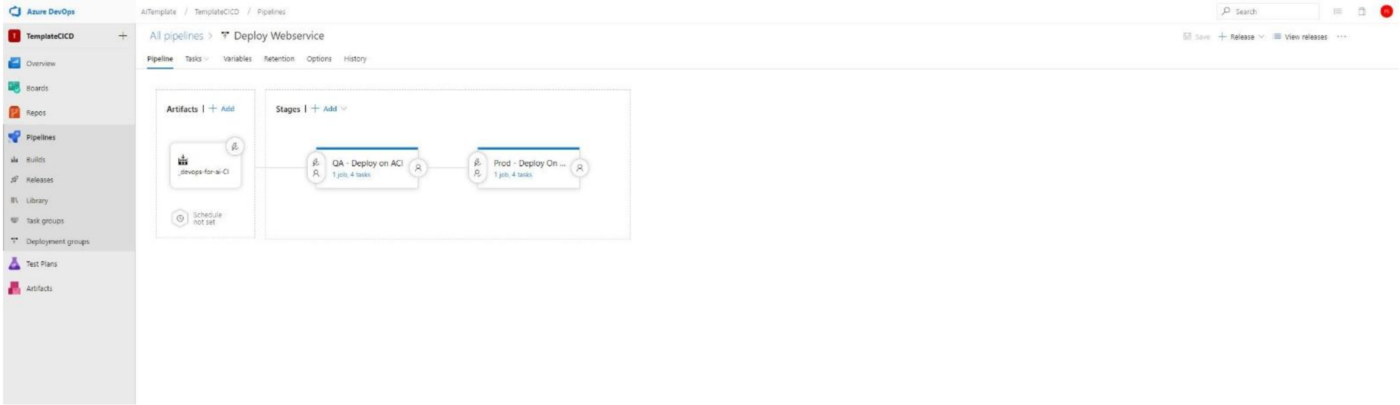
AITemplate / TemplateCICD / Pipelines / Releases

Deploy Webservice

Prod - Deploy On AKS

Pending approval on **Prod - Deploy On AKS** stage.

| Releases | Created | Stages |
|---|---|---|
| Release-7<br>7 master | 2019-03-26 2:08 | QA - Depl... Prod - De... |
| Release-6<br>6 master | 2019-03-25 2:08 | QA - Depl... Prod - De... |
| Release-5<br>5 master | 2019-03-22 2:09 | QA - Depl... Prod - De... |
| Release-4<br>4 master | 2019-03-21 2:07 | QA - Depl... Prod - De... |
| Release-3<br>3 master | 2019-03-20 2:03 | QA - Depl... Prod - De... |
| Release-2<br>2 master | 2019-03-19 2:08 | QA - Depl... Prod - De... |
| Release-1<br>1 master | 2019-03-18 9:48 | QA - Depl... Prod - De... |



AITemplate / TemplateCICD / Pipelines

All pipelines > Deploy Webservice

Artifacts | + Add

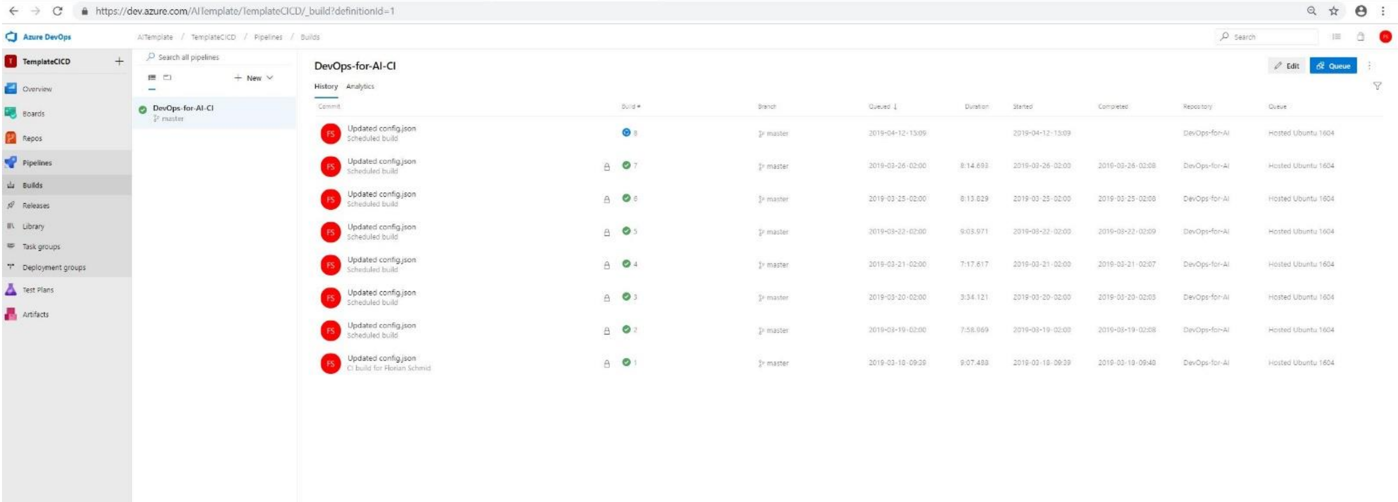
_devops-for-ai-CI

Schedule not set

Stages | + Add

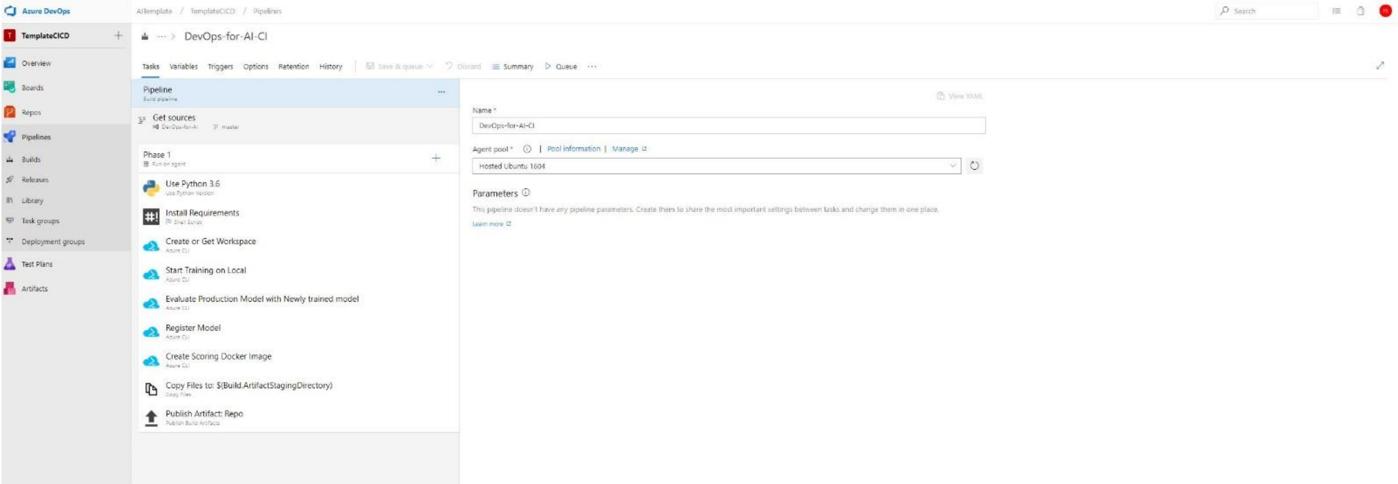
QA - Deploy on ACI
1 job, 4 tasks

Prod - Deploy On ...
1 job, 4 tasks



DevOps-for-AI-CI

| Commit | Build # | Branch | Queued | Duration | Started | Completed | Repository | Queue |
|---|---|---|---|---|---|---|---|---|
| Updated config.json<br>Scheduled build | 8 | master | 2019-04-12-15:09 | | 2019-04-12-15:09 | | DevOps-for-AI | Hosted Ubuntu 1604 |
| Updated config.json<br>Scheduled build | 7 | master | 2019-03-26-02:00 | 8:14.693 | 2019-03-26-02:00 | 2019-03-26-02:08 | DevOps-for-AI | Hosted Ubuntu 1604 |
| Updated config.json<br>Scheduled build | 6 | master | 2019-03-25-02:00 | 8:13.829 | 2019-03-25-02:00 | 2019-03-25-02:08 | DevOps-for-AI | Hosted Ubuntu 1604 |
| Updated config.json<br>Scheduled build | 5 | master | 2019-03-22-02:00 | 9:03.971 | 2019-03-22-02:00 | 2019-03-22-02:09 | DevOps-for-AI | Hosted Ubuntu 1604 |
| Updated config.json<br>Scheduled build | 4 | master | 2019-03-21-02:00 | 7:17.617 | 2019-03-21-02:00 | 2019-03-21-02:07 | DevOps-for-AI | Hosted Ubuntu 1604 |
| Updated config.json<br>Scheduled build | 3 | master | 2019-03-20-02:00 | 3:34.121 | 2019-03-20-02:00 | 2019-03-20-02:03 | DevOps-for-AI | Hosted Ubuntu 1604 |
| Updated config.json<br>Scheduled build | 2 | master | 2019-03-19-02:00 | 7:58.869 | 2019-03-19-02:00 | 2019-03-19-02:08 | DevOps-for-AI | Hosted Ubuntu 1604 |
| Updated config.json<br>CI build for Florian Schmid | 1 | master | 2019-03-18-09:39 | 9:07.488 | 2019-03-18-09:39 | 2019-03-18-09:48 | DevOps-for-AI | Hosted Ubuntu 1604 |



Pipeline
Build pipeline

Get sources
DevOps-for-AI master

Phase 1
Run on agent

- Use Python 3.6 (Use Python Version)
- Install Requirements (Shell Script)
- Create or Get Workspace (Azure CLI)
- Start Training on Local (Azure CLI)
- Evaluate Production Model with Newly trained model (Azure CLI)
- Register Model (Azure CLI)
- Create Scoring Docker Image (Azure CLI)
- Copy Files to: $(Build.ArtifactStagingDirectory) (Copy Files)
- Publish Artifact: Repo (Publish Build Artifacts)

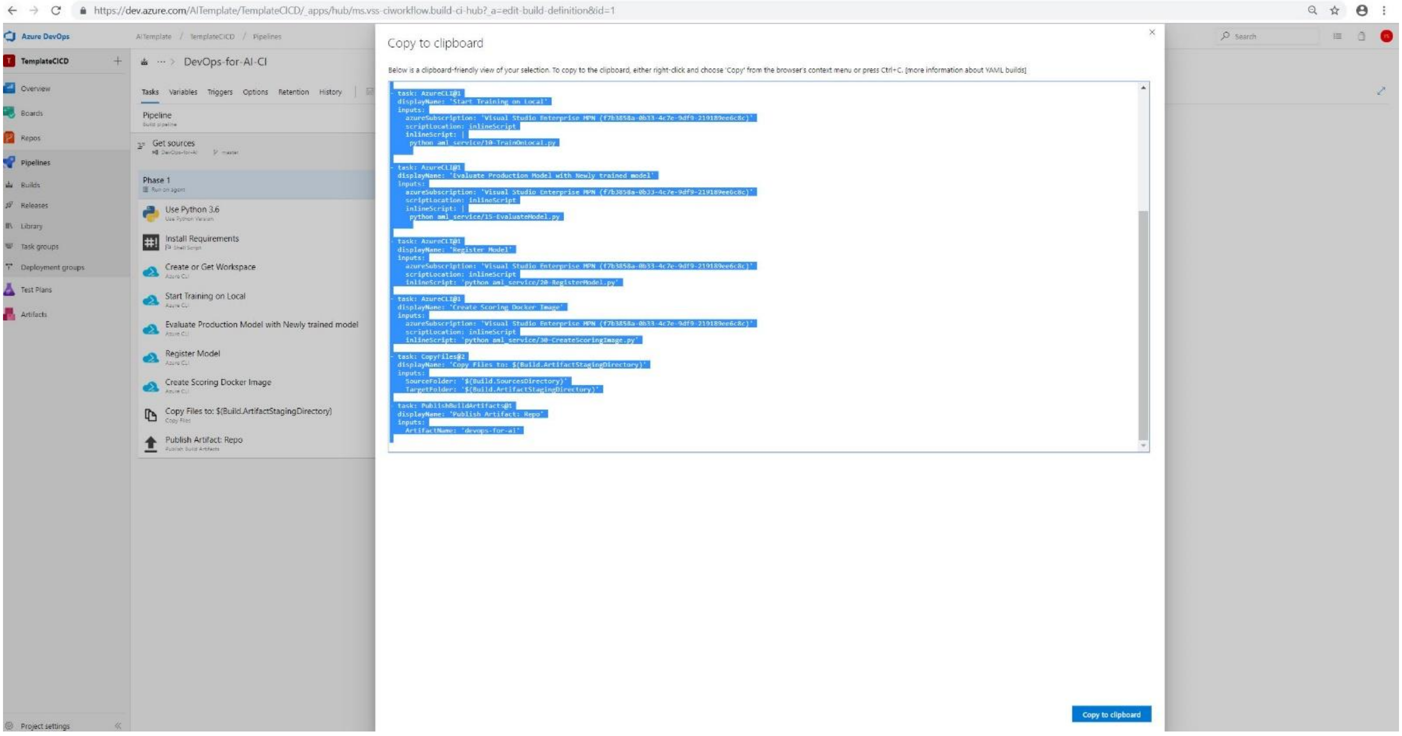
Name *
DevOps-for-AI-CI

Agent pool * | Pool information | Manage
Hosted Ubuntu 1604

Parameters

This pipeline doesn't have any pipeline parameters. Create them to share the most important settings between tasks and change them in one place.

Learn more


https://dev.azure.com/AITemplate/TemplateCICD/_apps/hub/ms.vss-ciworkflow.build-ci-hub?_a=edit-build-definition&id=1
Azure DevOps
AITemplate / TemplateCICD / Pipelines
TemplateCICD
DevOps-for-AI-CI
Project settings
Copy to clipboard

Copy to clipboard

Below is a clipboard-friendly view of your selection. To copy to the clipboard, either right-click and choose 'Copy' from the browser's context menu or press Ctrl+C. [more information about YAML builds]

```
- task: AzureCLI@1
  displayName: 'Start Training on Local'
  inputs:
    azureSubscription: 'Visual Studio Enterprise MPN (f7b3858a-0b33-4c7e-9df9-219189ee6c8c)'
    scriptLocation: inlineScript
    inlineScript: |
     python aml_service/10-TrainOnLocal.py


- task: AzureCLI@1
  displayName: 'Evaluate Production Model with Newly trained model'
  inputs:
    azureSubscription: 'Visual Studio Enterprise MPN (f7b3858a-0b33-4c7e-9df9-219189ee6c8c)'
    scriptLocation: inlineScript
    inlineScript: |
     python aml_service/15-EvaluateModel.py


- task: AzureCLI@1
  displayName: 'Register Model'
  inputs:
    azureSubscription: 'Visual Studio Enterprise MPN (f7b3858a-0b33-4c7e-9df9-219189ee6c8c)'
    scriptLocation: inlineScript
    inlineScript: 'python aml_service/20-RegisterModel.py'

- task: AzureCLI@1
  displayName: 'Create Scoring Docker Image'
  inputs:
    azureSubscription: 'Visual Studio Enterprise MPN (f7b3858a-0b33-4c7e-9df9-219189ee6c8c)'
    scriptLocation: inlineScript
    inlineScript: 'python aml_service/30-CreateScoringImage.py'

- task: CopyFiles@2
  displayName: 'Copy Files to: $(Build.ArtifactStagingDirectory)'
  inputs:
    SourceFolder: '$(Build.SourcesDirectory)'
    TargetFolder: '$(Build.ArtifactStagingDirectory)'

- task: PublishBuildArtifacts@1
  displayName: 'Publish Artifact: Repo'
  inputs:
    ArtifactName: 'devops-for-ai'
```