Microsoft Azure

AKS / ACA Deployments

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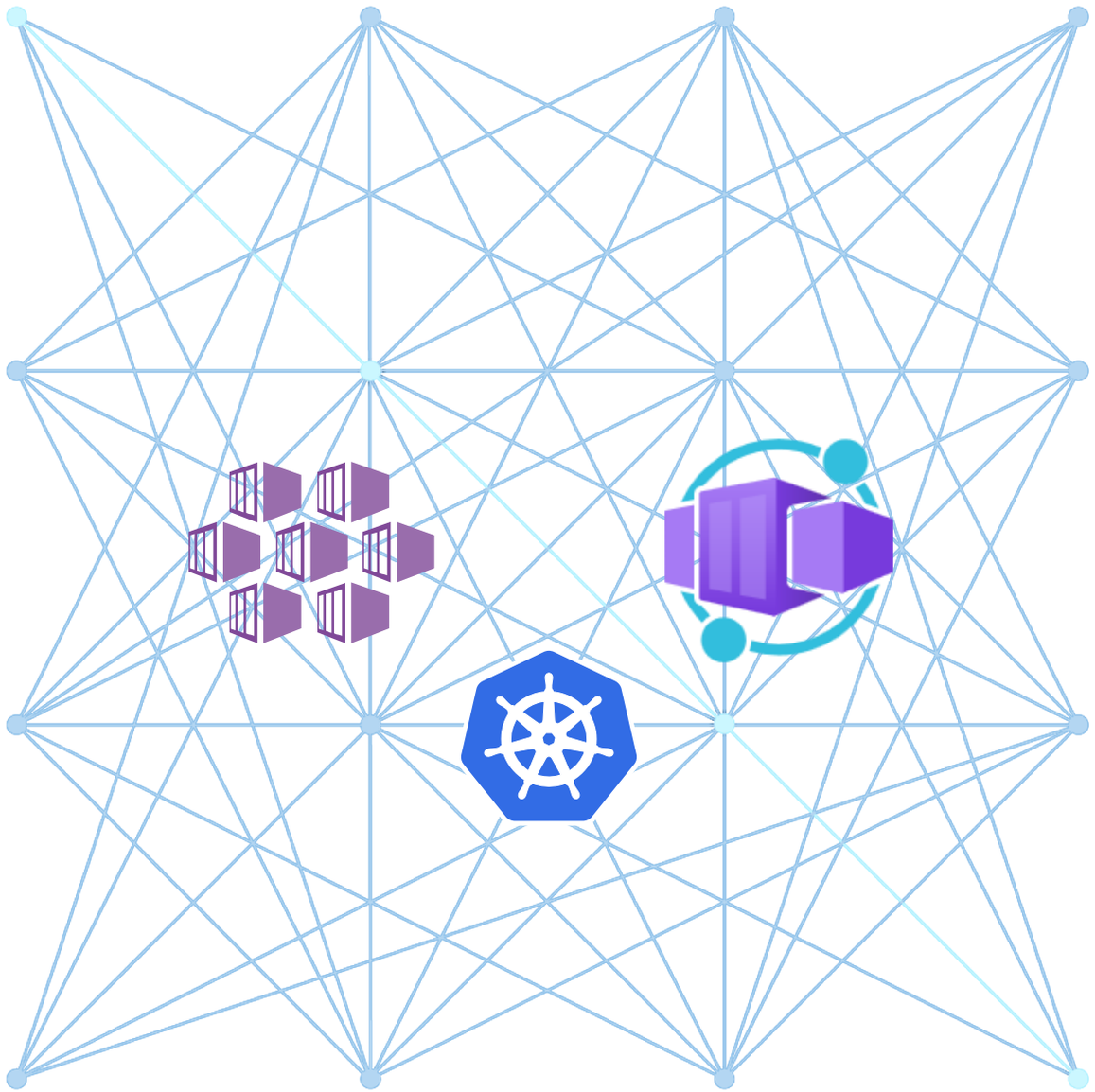
24 Aug 2022



AKS / ACA Deployments – capabilities assessed

1.

Container image management

Public / private image registries

2.

Infra & IaC

Infrastructure & IaC supported features

3.

Application deployments

Options for application deployments

4.

DevOps

Deployment automation options via Azure DevOps and GitHub

5.

Scaling

Manual / automated scaling

6.

Workloads

Supported workload types

AKS / ACA Deployments – capabilities assessed (cont.)

7.

Ecosystem

Tooling, OSS, integration

8.

Networking

Networking support

9.

Security & Identity

Vulnerability scanning, AuthN / AuthZ

10.

Monitoring

Monitor infrastructure & workloads

11.

Development

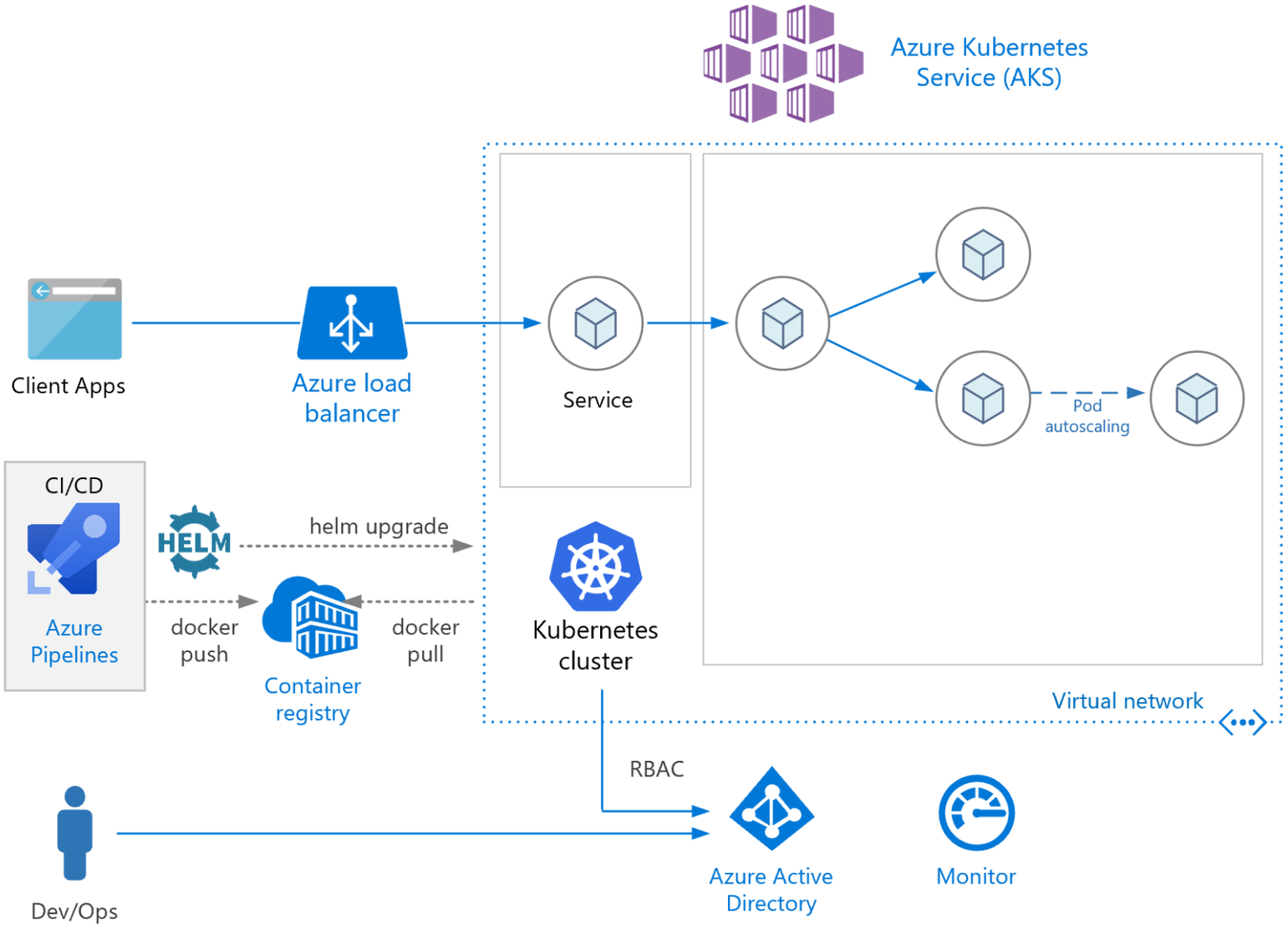
Developer experience, tooling

12.

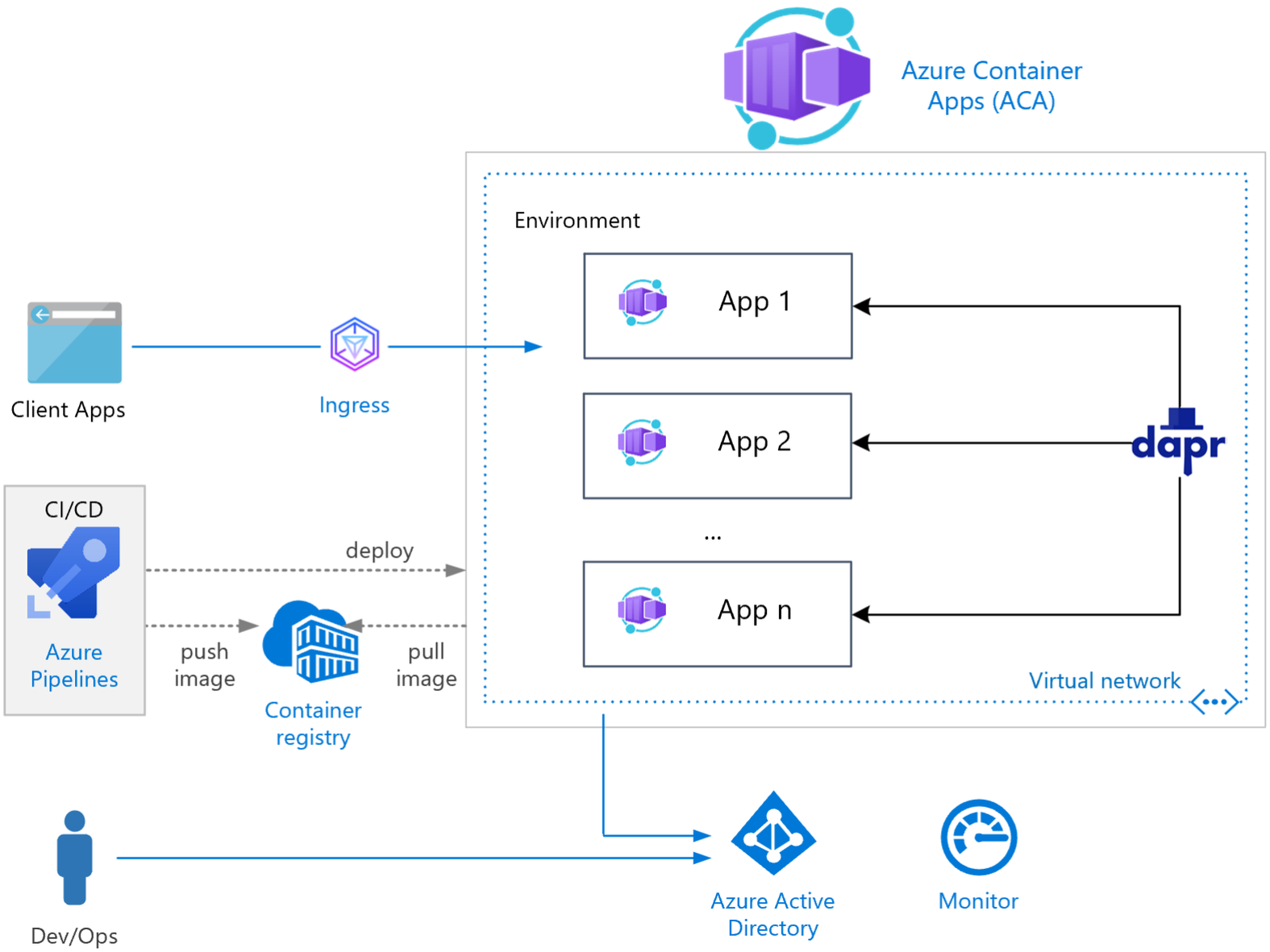
Cost

Cost options

Application Architecture AKS



Application Architecture ACA



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Container image management

Deploy images into Azure Container Registry

Manage repositories, namespaces and tags

Scan images

Both AKS & ACA can use public or private container registries

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Infra & IaC

- Options for VMs or VMSS
- Node pools
- Control plane managed by Azure
- Data plane managed by service consumer
- Linux / Windows container images
- GPU support
- Availability zones supported, K8S resources require config
- ARM, Bicep, Terraform, az CLI, Az PowerShell support

- Serverless (K8S Infrastructure fully abstracted)
- Control / Data plane abstracted from Azure
- No access to API server (NO kubectl)
- Linux only
- No GPU support
- Simplified zone redundancy and abstracted from end user
- ARM, Bicep, az CLI, Az PowerShell

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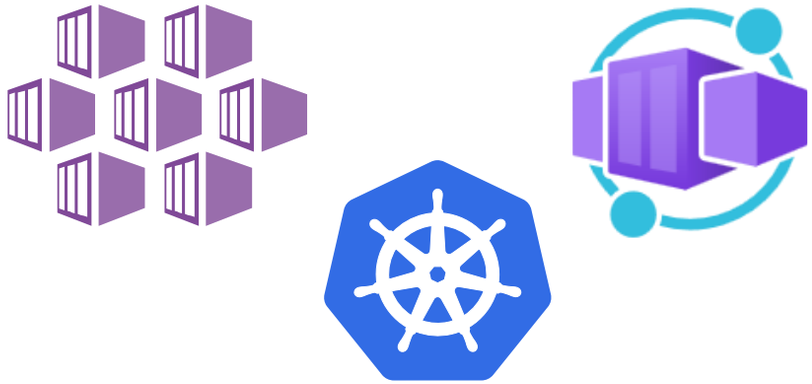
Application deployments



- Applications deployed using K8S manifests – pods, replica sets, deployments
- K8S expertise required
- Many options: single / multi containers, initContainers, env vars, secrets, volume mapping, health probes (full), CPU / memory requests and limits
- DevOps support
- DAPR full support for K8S (dapr CLI, Helm package, AKS extension)

- Applications deployed via portal or template itself
- No K8S knowledge required
- Limited options: single / multi containers, container image / version, env vars, health probes (no “exec”), CPU / memory requests
- DevOps support
- DAPR OOTB support

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DevOps

- Deploy infrastructure and workloads using Azure Pipelines / GitHub Actions;

- Manage environments – strategy

- Potential separate pipelines for infra / applications
- Dedicated K8S tasks – Azure Pipelines
- Helm package deployment
- Rolling update / Canary / Blue-Green strategies for Deployments
- GitOps using Flux, ArgoCD

- Deploy infrastructure using Azure DevOps pipelines / GitHub Actions (workloads included in template);
- Single environment supports multiple container apps
- No separation required

- No dedicated pipeline task – not needed?
- Blue-Green via ingress traffic split

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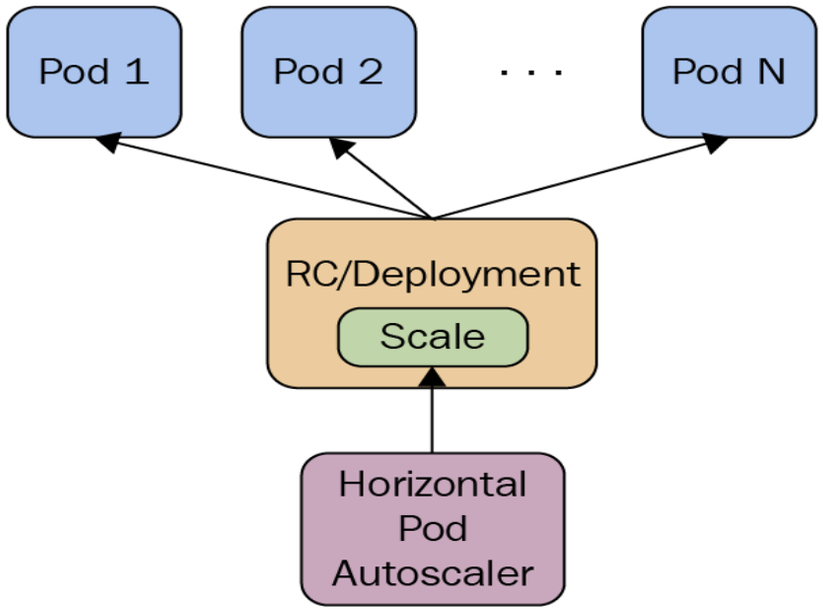
Scaling



- Rich manual and auto-scaling support
- HPA
- Cluster Austoscaler (leverage VMSS)
- CPU / memory rules OOTB
- Other metrics via KEDA

- Transparent HPA OOTB
- Max replicas limited to 30
- Native KEDA integration – variety of metrics

```
$desiredReplicas = ceil($currentReplicas * ($currentMetricValue / $desiredMetricValue))
```

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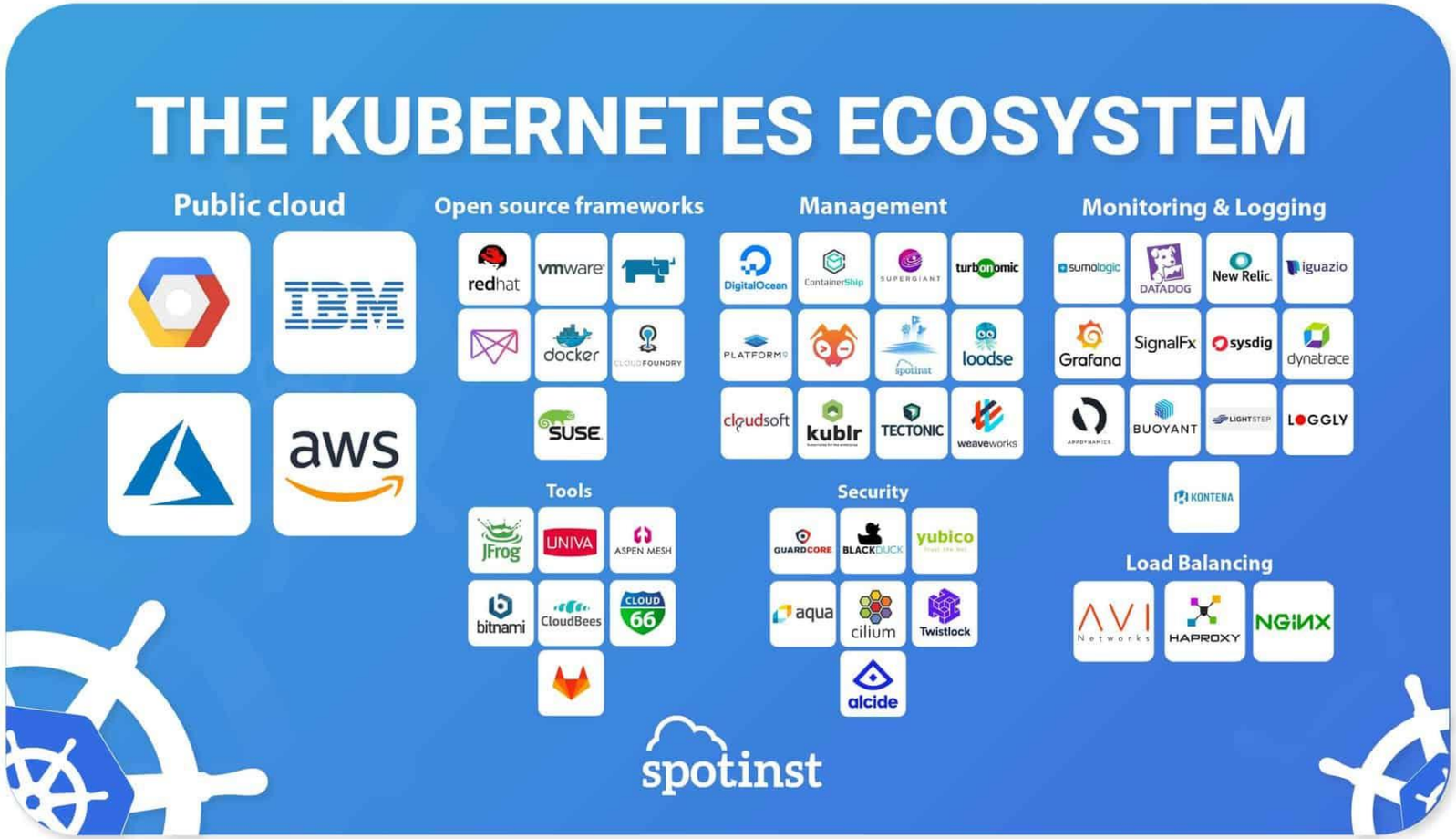
Workloads

- Pods
- Replica sets / controllers
- Deployments
- Stateful sets
- Daemon sets
- Jobs / Cron jobs
- Services / Ingresses
- Config maps, secrets
- PV, PVC, SC
- CRD

- Container apps – defined by container image
- Ingress OOTB
- DAPR integrated

Ecosystem



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- ACA - new PaaS – not many tools around
- CNCF landscape https://landscape.cncf.io/

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Networking

- Native VNET Integration
- Kubenet or Azure CNI - flexibility in IP address management
- Namespace / Pods level isolation using network policies
- Service types: ClusterIP, NodePort, LoadBalancer
- Ingress controllers – default NGINX, others can be used AGIC, Envoy

- Native VNET Integration
- CNI OOTB abstracted from user
- Isolation achieved via Azure container environment
- Ingress backed by Envoy is simplified

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Security & Identity

- Secret management OOTB, CSI driver integration with AKV, Hashicorp vault
- No OOTB mTLS support in pods
- Managed identity
- RBAC controls with K8S RBAC or Azure AD RBAC
- Microsoft Defender for Containers (Qualys)
- Runtime protection engines can be used such as Aqua Trivy, Claire, Snyk etc.
- Flexibility in exposing ports for pods, isolation via network policies
- Namespace isolation
- Role, ClusterRole, RoleBinding, ClusterRoleBinding, Service Accounts, Users, Groups

- Secret management limited to Key Value pairs
- No native integration to AKV
- OOTB support for mTLS with dapr integration
- Managed identity* (access to ACR still requires admin enabled)
- Azure RBAC for simplified security controls
- No support for runtime protection (defender for container apps in the future)
- HTTPS endpoint by default

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Monitoring

- Native Azure monitor integration
- Many monitoring tools: ELK stack, Prometheus / Grafana
- Logs / Metrics can be shipped to third party tools (Splunk, Sumologic)
- kubectl / API Server

- Native Azure monitor integration
- No support for log / metric shipping capability to third party tools

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Development

- K8S / YAML expertise required for K8S manifests
- Typically, an app requires service / ingress, deployment, persistence objects to work in K8S
- Troubleshooting via kubectl / containers debugging
- Bridge to K8S with VS Code / VS

- K8S / YAML understanding is not required for developing apps in ACA
- ACA requires only container images along with required configurations for env vars, DAPR, KEDA
- Dev focus on what's important

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Cost

- No cost for control plane, only the nodes attached
- Standard Node based costing (including System Node pool)
- For multi-tenant app cost overview 3rd party tools: kubecost, cloudhealth

- Cost based on:
  - Resource consumption (vCPU-seconds, GiB-seconds)
  - HTTP requests
- Concept of idle state, 0 replicas

Resources

Code
https://github.com/ivee-tech/geekready2022
Docker documentation
https://docs.docker.com/
ACR documentation
https://docs.microsoft.com/en-us/azure/container-registry/
AKS documentation
https://docs.microsoft.com/en-us/azure/aks/
K8S documentation
https://kubernetes.io/docs/home/
ACA documentation
https://docs.microsoft.com/en-us/azure/container-apps/

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Thank you.