Building cloud native apps with Containers, Functions and Managed Services

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About me

Microsoft

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1994-2005
Software Engineer
accenture

2005-2019
Developer Relations
Google
vmware
Microsoft
docker

AOL
Sun
Microsoft
Microsoft

Microsoft
Agenda

• Developer experience
• Application packaging
• Making your application scale
Microsoft’s mission

“Our mission is to empower every person and every organization on the planet to achieve more.”

https://www.microsoft.com/en-us/about
3 abstractions

• Containers
• Functions, triggered by Events
• Managed Cloud Services
Portable Serverless Platforms on top of Kubernetes

- Fn
- Nuclio
- OpenFaaS
- Galactic Fog
- OpenWhisk

- KNative
- Keda
Azure Functions is an open-source project

Functions runtime and all extensions are fully open source

https://github.com/Azure/Azure-Functions
Capabilities

1. Use **Azure Dev Spaces** to iteratively develop, test, and debug microservices targeted for AKS clusters.

2. **Azure DevOps** has native integration with Helm and helps simplifying continuous integration/continuous delivery (CI/CD).

3. **Virtual node**—a Virtual Kubelet implementation—allows fast scaling of services for unpredictable traffic.

4. **Azure Monitor** provides a single pane of glass for monitoring over app telemetry, cluster-to-container level health analytics.
Developer experience
Developer experience

**Diagram:**

- Client-side tooling
- Controller
  - Ingress
    - default label: azds.io/space=true
  - Existing Namespace
  - Existing Namespace
- AKS
- Webhook admission server

**Text:**

- Azure
- Developer experience
- Client-side tooling
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Developer experience
Developer experience

http://dev.webfrontend...azds.io

webfrontend

mywebapi

Service-C

http://scott.s.dev.webfrontend...azds.io

mywebap (Scott’s version)
VS Code Live Share: you just need VS Code locally.

- Code and all setup on your collaborator’s machine
- Code together without setting anything up
- Access services on remote machine from localhost
- Access terminal on remote machine from VS Code
- Works with Azure Dev Spaces on machine sharing the session: double jump to AKS
VS Code Remote Extension for Containers

Local OS

VS Code
- Theme/UI Extension

Remote OS

VS Code Server
- Workspace Extension

Source Code
- Terminal Processes
- Running Application
- Debugger
Other projects to look at

- Telepresence
- squash
- KSYNC
- TILT
Application packaging
CNAB is a specification for building apps

- CNAB is not a platform-specific tool
- *Standard packaging format* for multi-component distributed applications
- Is agnostic to the cloud or runtime
- Uses tools and code you already have

https://cnab.io
Microsoft’s implementation of the spec Porter

- Porter abstracts the complexity of resources via mixins
- Porter uses yaml to define the bundles
- Uses containers for the invocation image
- Mixin’s can be written for any resources
- Supports Kubernetes, Helm, exec and Terraform

https://porter.sh
Scaling your application

Virtual Kubelet
Scaling your application

https://github.com/virtual-kubelet/virtual-kubelet
Scaling your application

KEDA allows for fine grained autoscaling (including to/from zero) for event driven Kubernetes workloads. KEDA serves as a Kubernetes Metrics Server and allows users to define autoscaling rules using a dedicated Kubernetes custom resource definition.

https://github.com/kedacore/keda
Scaling your application

KEDA can run on both the cloud and the edge, integrates natively with Kubernetes components such as the Horizontal Pod Autoscaler, and has no external dependencies.

https://github.com/kedacore/keda
Scaling your application

Kubernetes cluster

CLI

Kubernetes store

Register + trigger and scaling definition

KEDA

Horizontal pod autoscaler

Metrics adapter
Controller
Scaler

Any events?

External trigger source

1->n or n->1

0->1 or 1->0

Pods

<-->
Demo time

THIS is FINE
Scaling your application

We are going to use RabbitMQ

```
helm install --name rabbitmq --set rabbitmq.username=user,rabbitmq.password=PASSWORD stable/rabbitmq
```
Scaling your application

apiVersion: apps/v1
kind: Deployment
metadata:
  name: rabbitmq-consumer
  namespace: default
  labels:
    app: rabbitmq-consumer
spec:
  selector:
    matchLabels:
      app: rabbitmq-consumer
  template:
    metadata:
      labels:
        app: rabbitmq-consumer
    spec:
      containers:
      - name: rabbitmq-consumer
        image: jeffhollan/rabbitmq-client:dev
        imagePullPolicy: Always
        command:
          - receive
        args:
          - 'amqplib://user:PASSWORDB@rabbitmq.default.svc.cluster.local:5672'
        dnsPolicy: ClusterFirst
      nodeSelector:
        kubernetes.io/role: agent
        beta.kubernetes.io/os: linux
      type: virtual-kubelet
      tolerations:
      - key: virtual-kubelet.io/provider
        operator: Exists
        effect: NoSchedule
apiVersion: keda.k8s.io/v1alpha1
class: keda

name: rabbitmq-consumer

spec:
  scaleTargetRef:
    deploymentName: rabbitmq-consumer
  pollingInterval: 5 # Optional. Default: 30 seconds
  cooldownPeriod: 30 # Optional. Default: 300 seconds
  maxReplicaCount: 30 # Optional. Default: 100
  triggers:
  - type: rabbitmq
    metadata:
      queueName: hello
      host: 'amqp://user:PASSWORD@rabbitmq.default.svc.cluster.local:5672'
      queueLength: '5'
Scaling your application

```yaml
apiVersion: batch/v1
kind: Job
metadata:
  name: rabbitmq-publish
spec:
  template:
    spec:
      containers:
      - name: rabbitmq-client
        image: jeffhollan/rabbitmq-client:dev
        imagePullPolicy: Always
        command: ["send", "amqp://user:PASSWORD@rabbitmq.default.svc.cluster.local:5672", "300"]
        restartPolicy: Never
      backoffLimit: 4
```
Resources

https://github.com/scotty-c/kubecon-china

Free Azure Account https://aka.ms/pat/account
Containers https://aka.ms/pat/container
Functions https://aka.ms/pat/functions
Azure Dev Spaces https://aka.ms/pat/ds
VS Code Live Share https://aka.ms/pat/ls
We’re hiring https://aka.ms/awesomejobs
Questions