

Building cloud native apps with Containers, Functions and Managed Services

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About me



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Microsoft



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About me



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@chanezon

1994-2005

Software Engineer

accenture



AOL



2005-2019

Developer Relations



Microsoft

Agenda

- Developer experience
- Application packaging
- Making your application scale



Microsoft's mission



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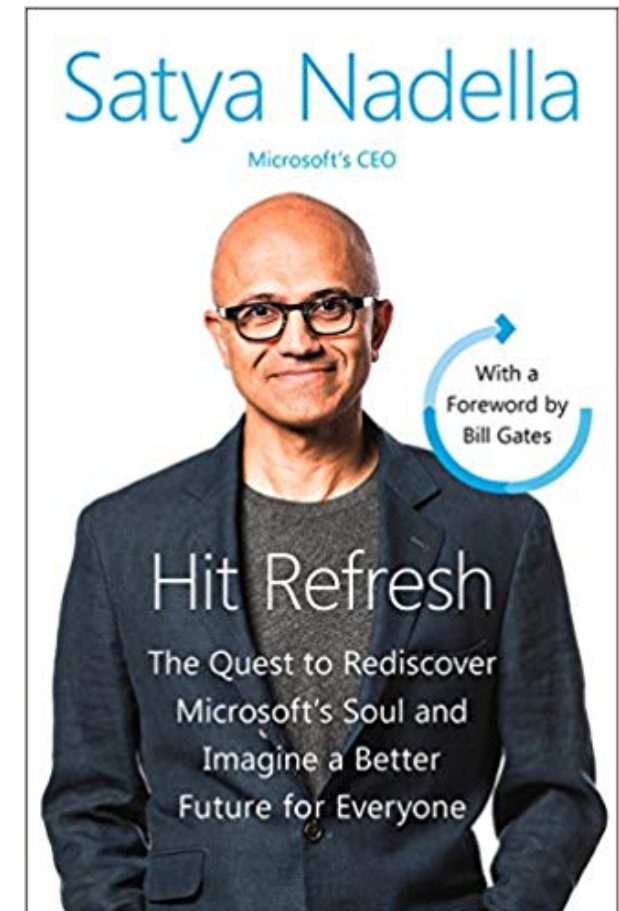


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“Our mission is to empower every person and every organization on the planet to achieve more.”

<https://www.microsoft.com/en-us/about>



3 abstractions

- Containers
- Functions, triggered by Events
- Managed Cloud Services

Portable Serverless Platforms on top of Kubernetes



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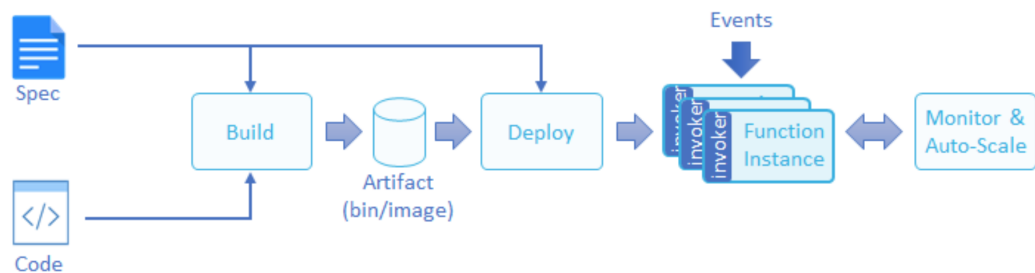
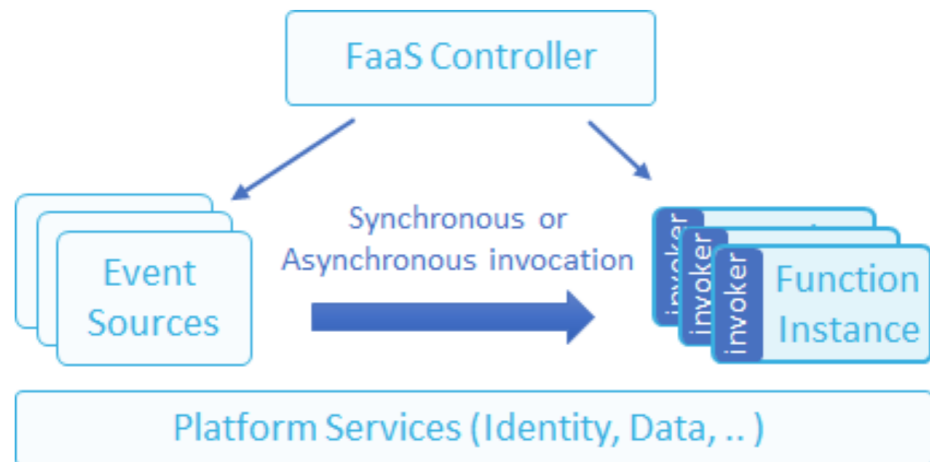


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Fn

Nuclio

OpenFaaS

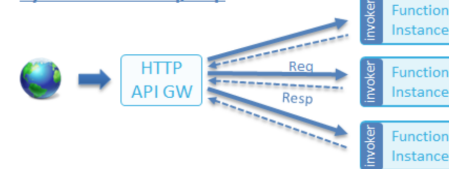
Galactic Fog

OpenWhisk

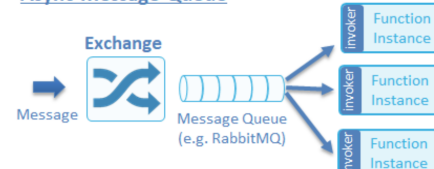
KNative

Keda

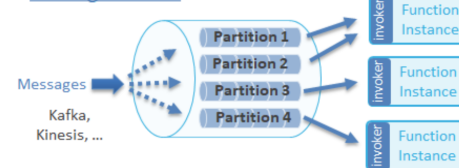
Synchronous Req/Rep



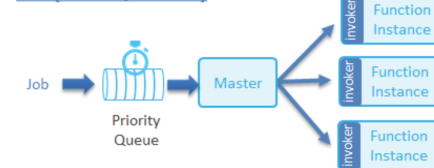
Async Message Queue



Message Stream



Job (Master/Worker)



Azure Functions is an open-source project



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Functions runtime and all extensions
are fully open source



<https://github.com/Azure/Azure-Functions>

Dev experience: Azure Dev Spaces



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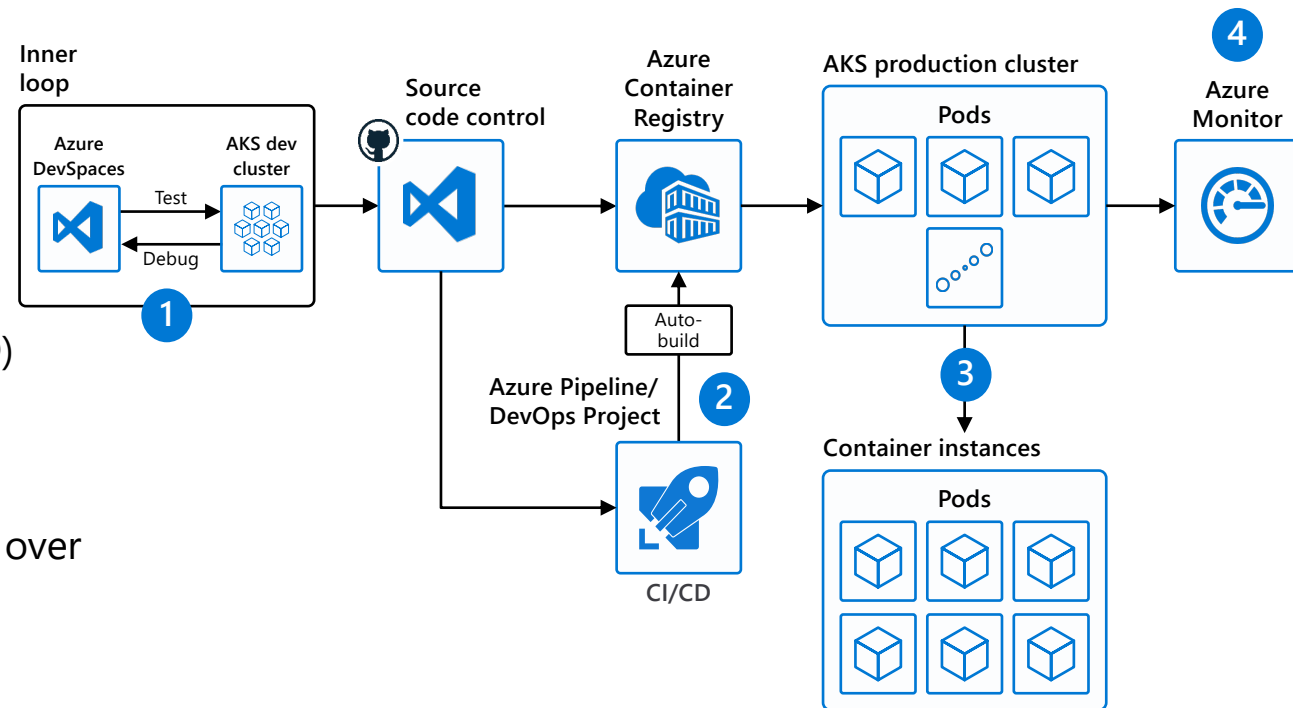


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Capabilities

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



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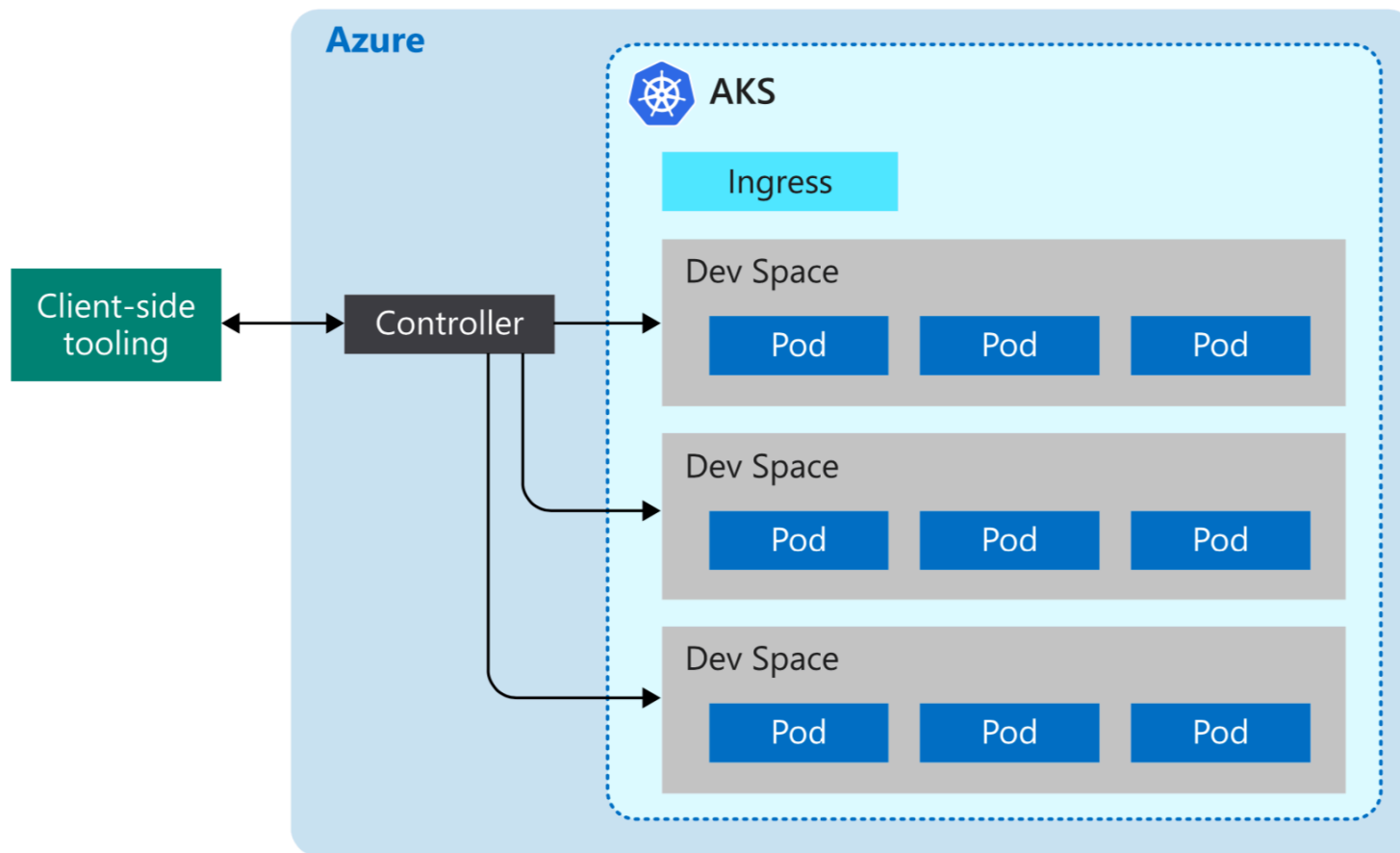


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Developer experience



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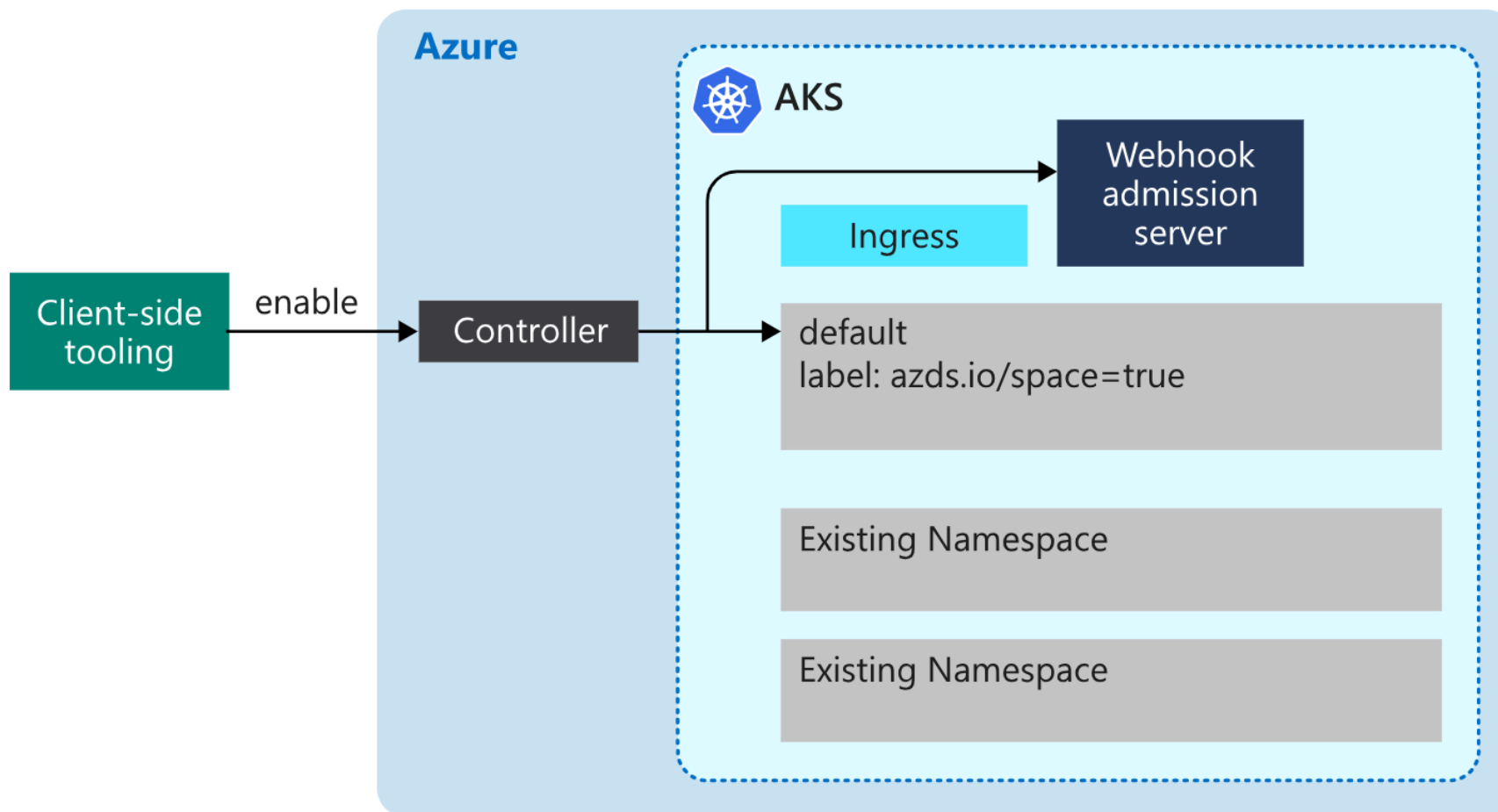


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Developer experience



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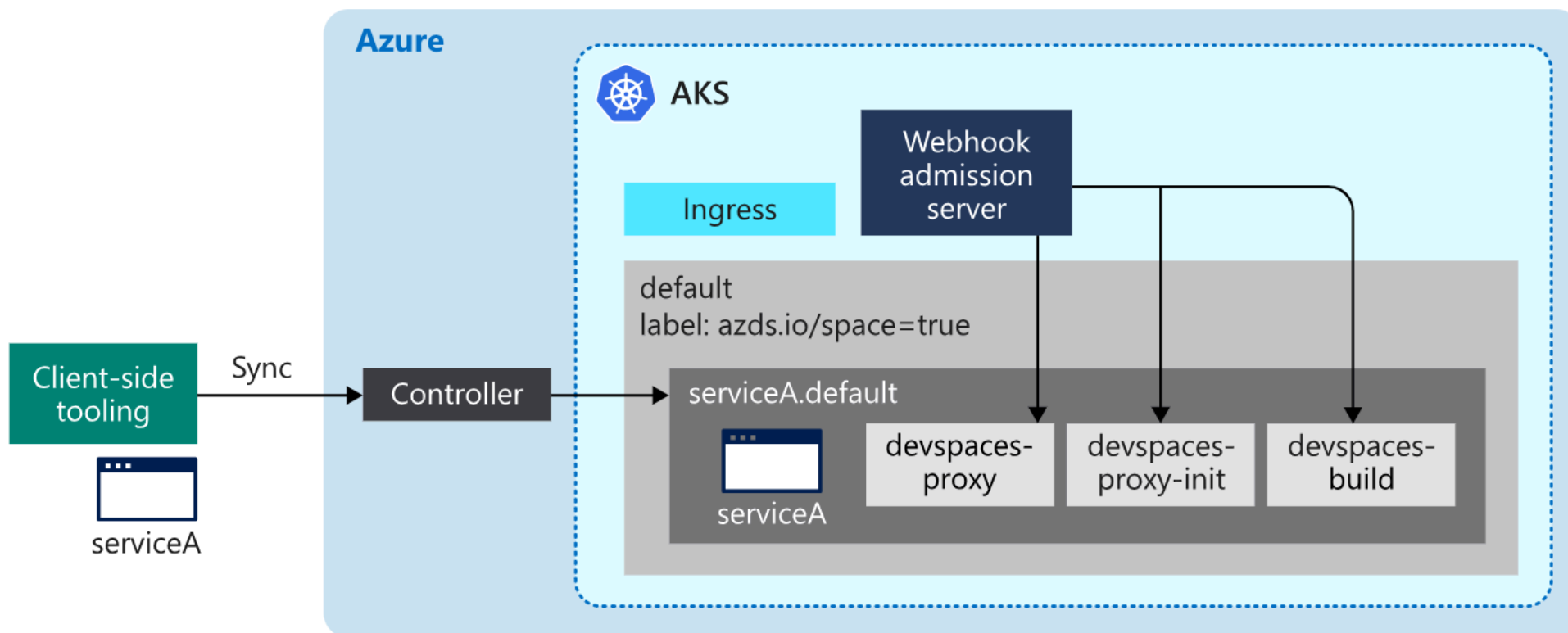


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Developer experience



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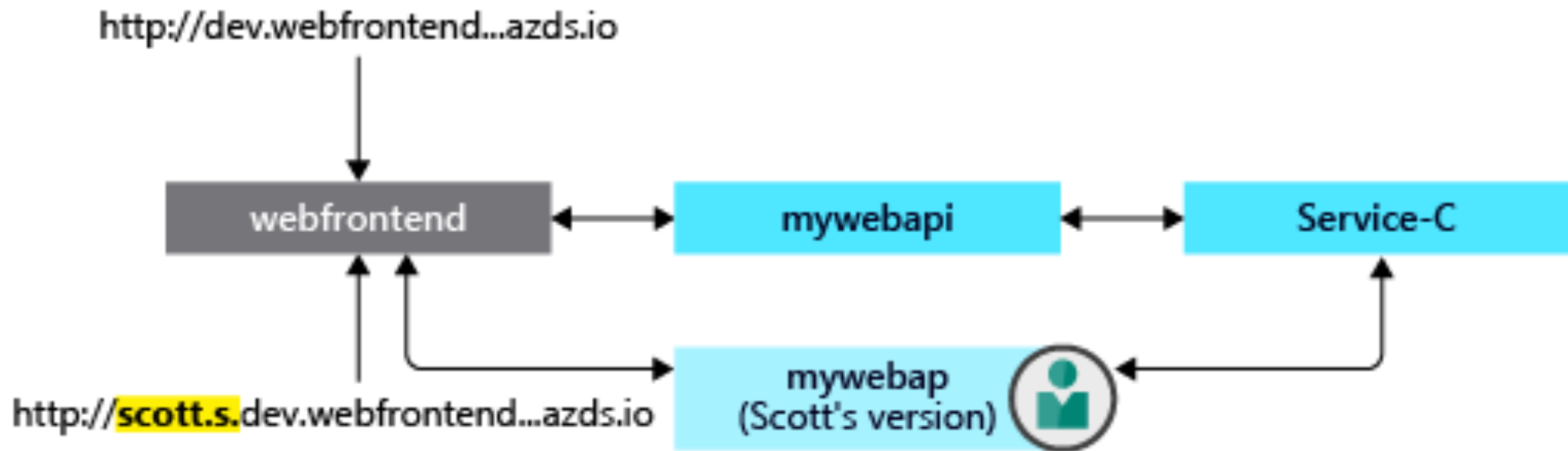


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Developer experience



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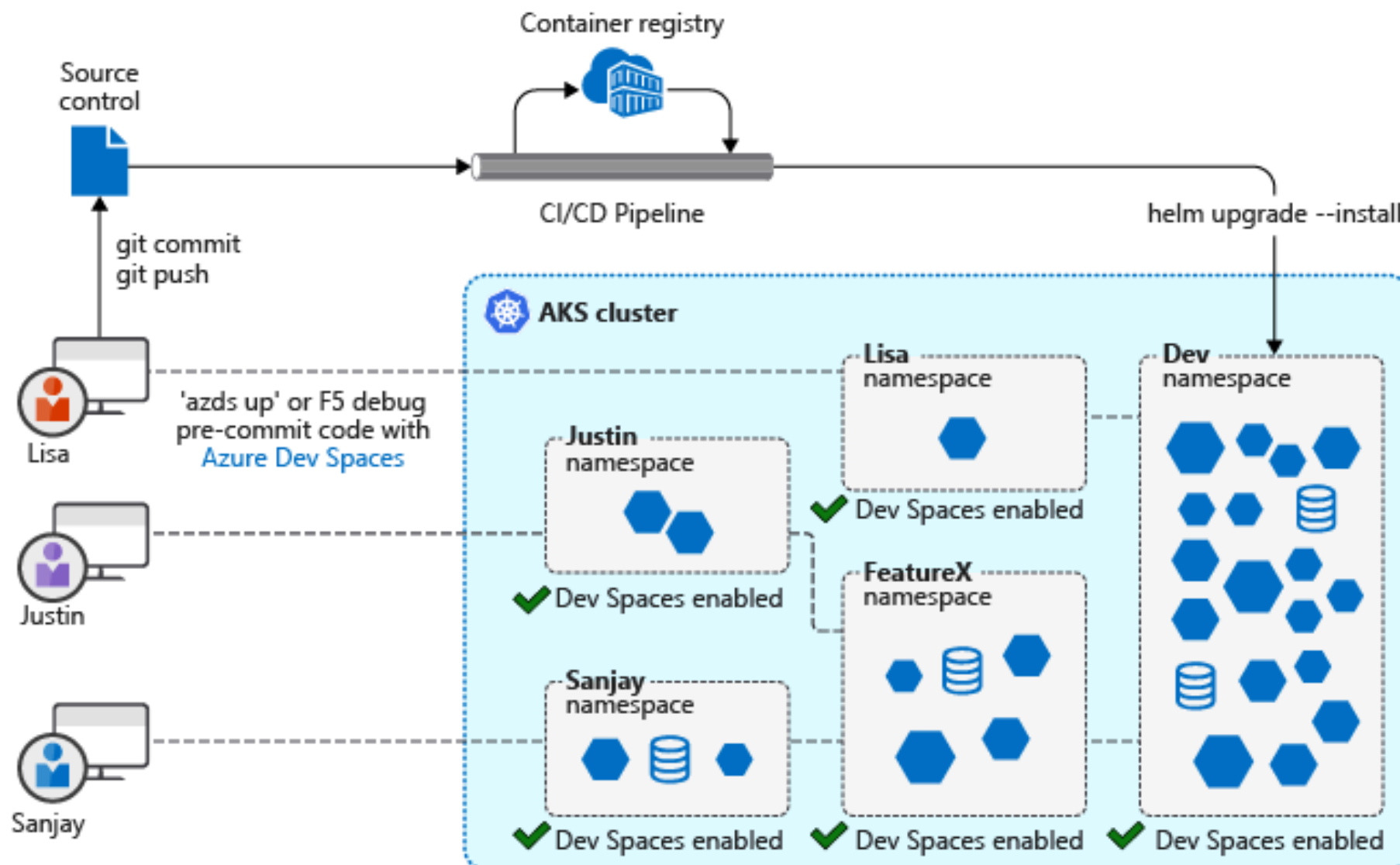


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Azure Dev Spaces + VS Code Liveshare



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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



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The screenshot displays the VS Code interface with a remote container extension. The Explorer sidebar on the left shows the file structure of a project named 'test-project' within a 'JAVASCRIPT-NODE-8 [DEV CONTAINER: NODE.J...]' environment. The file list includes 'node_modules', '.eslintrc.json', 'package-lock.json', 'package.json', 'server.js', 'yarn.lock', '.npmignore', and 'README.md'. The Outline sidebar shows the structure of 'server.js', including 'app.get('/') callback', 'app', 'express', 'HOST', and 'PORT'. The main editor area displays the code for 'server.js', which is a simple Express.js application. The terminal at the bottom shows the output of the container extension, including the IP address (172.17.0.2), the extension host agent listening on port 37359, and the Docker command used to run the container. The status bar at the bottom indicates the current environment is 'Dev Container: Node.js 8' and the file is 'master*'.

```
server.js — javascript-node-8 [Dev Container: Node.js 8]
```

EXPLORER

- OPEN EDITORS
 - JS server.js test-project
- JAVASCRIPT-NODE-8 [DEV CONTAINER: NODE.J...]
 - test-project
 - node_modules
 - .eslintrc.json
 - package-lock.json
 - package.json
 - JS server.js
 - yarn.lock
 - .npmignore
 - README.md
- OUTLINE
 - app.get('/') callback
 - app
 - express
 - HOST
 - PORT

JS server.js

```
14 // App
15 const app = express();
16 app.get('/', (req, res) => {
17   res.send('Hello remote world!\n');
18 });
19
20 app.listen(PORT, HOST);
21 console.log(`Running on http://${HOST}:${PORT}`);
```

TERMINAL

1: Dev Containers

```
se
*

IP Address: 172.17.0.2
Extension host agent listening on 37359
Run: docker exec -w /root/.vscode-server-insiders/bin/57b550c559
b945eb9d871dbf2b2e4cb9e31e2551 a7c5712c04929c344192869e968e3cf87
4c204a40885fbcf46020270da3e4603 /bin/sh -c echo 37359 >.devport
==> Received an extension host connection.
==> Using UI language: en
==> Received a management connection
==> Received a management connection
```

Dev Container: Node.js 8 master* 169 ↓ 0 ↑ 0 ⚠ 0 Ln 17, Col 9 Tab Size: 4 UTF-8 LF JavaScript

VS Code Remote Extension for Containers



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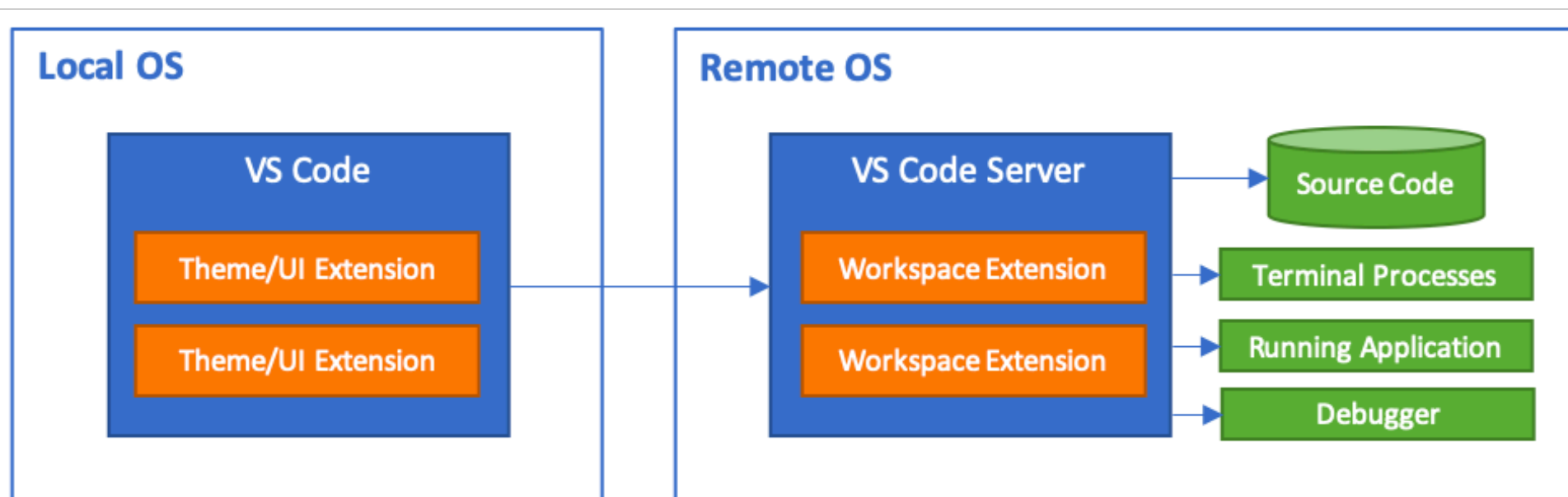


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Other projects to look at



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squash



Telepresence

TILT

KSYNC

Application packaging



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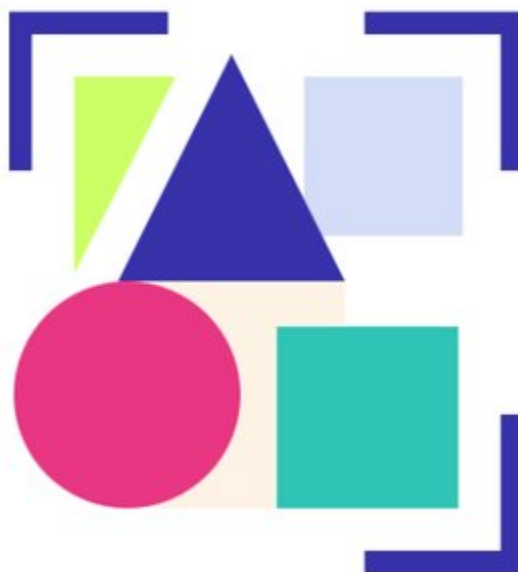


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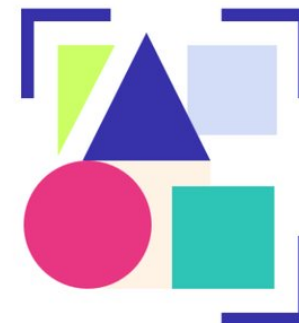


Application packaging

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>



Application packaging



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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



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Virtual
Kubelet

Scaling your application



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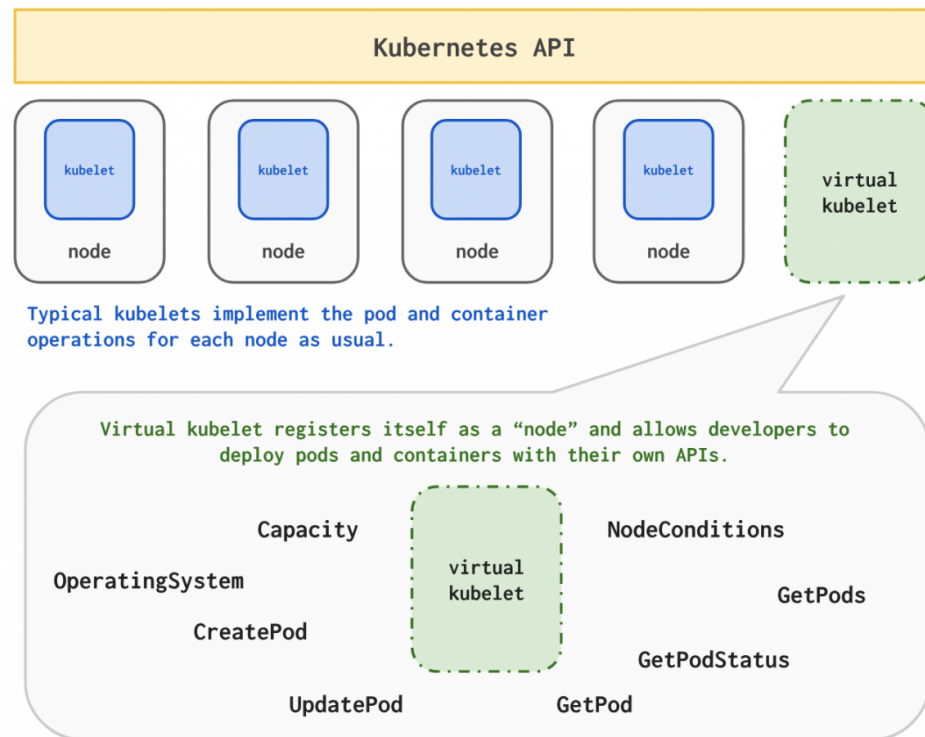


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<https://github.com/virtual-kubelet/virtual-kubelet>

Scaling your application



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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



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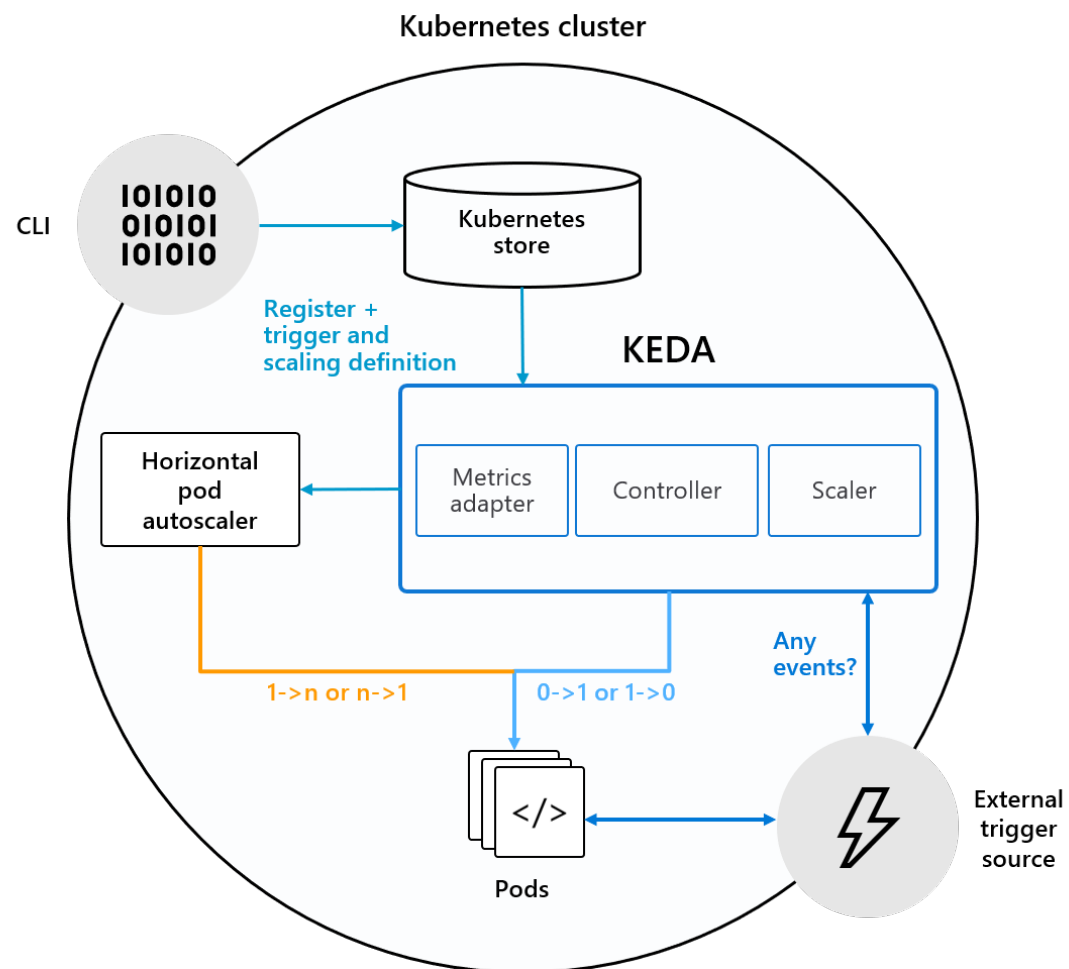


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Demo time



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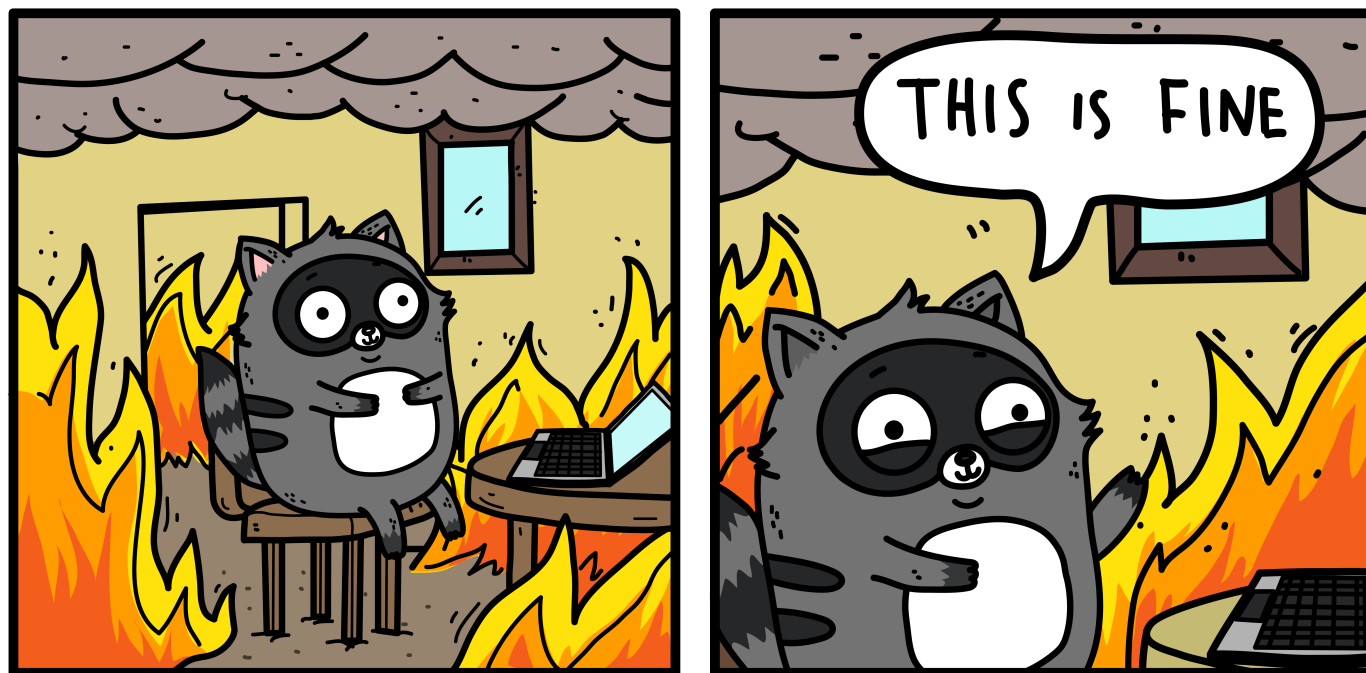


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Scaling your application



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We are going to use RabbitMQ

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

Scaling your application



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```
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:
            - 'amqp://user:PASSWORD@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
        - key: azure.com/aci
          effect: NoSchedule
```

Scaling your application



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```
apiVersion: keda.k8s.io/v1alpha1
kind: ScaledObject
metadata:
  name: rabbitmq-consumer
  namespace: default
  labels:
    deploymentName: 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



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```
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



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<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/lvs>

We're hiring <https://aka.ms/awesomejobs>

Questions



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