The bridge to possible

Kubernetes and You!

Josh Ingeniero, Technical Solutions Specialist

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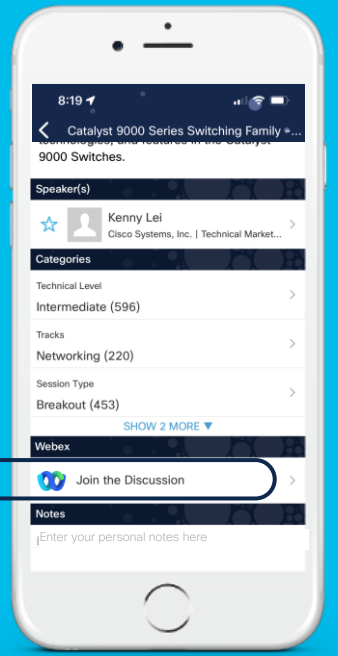


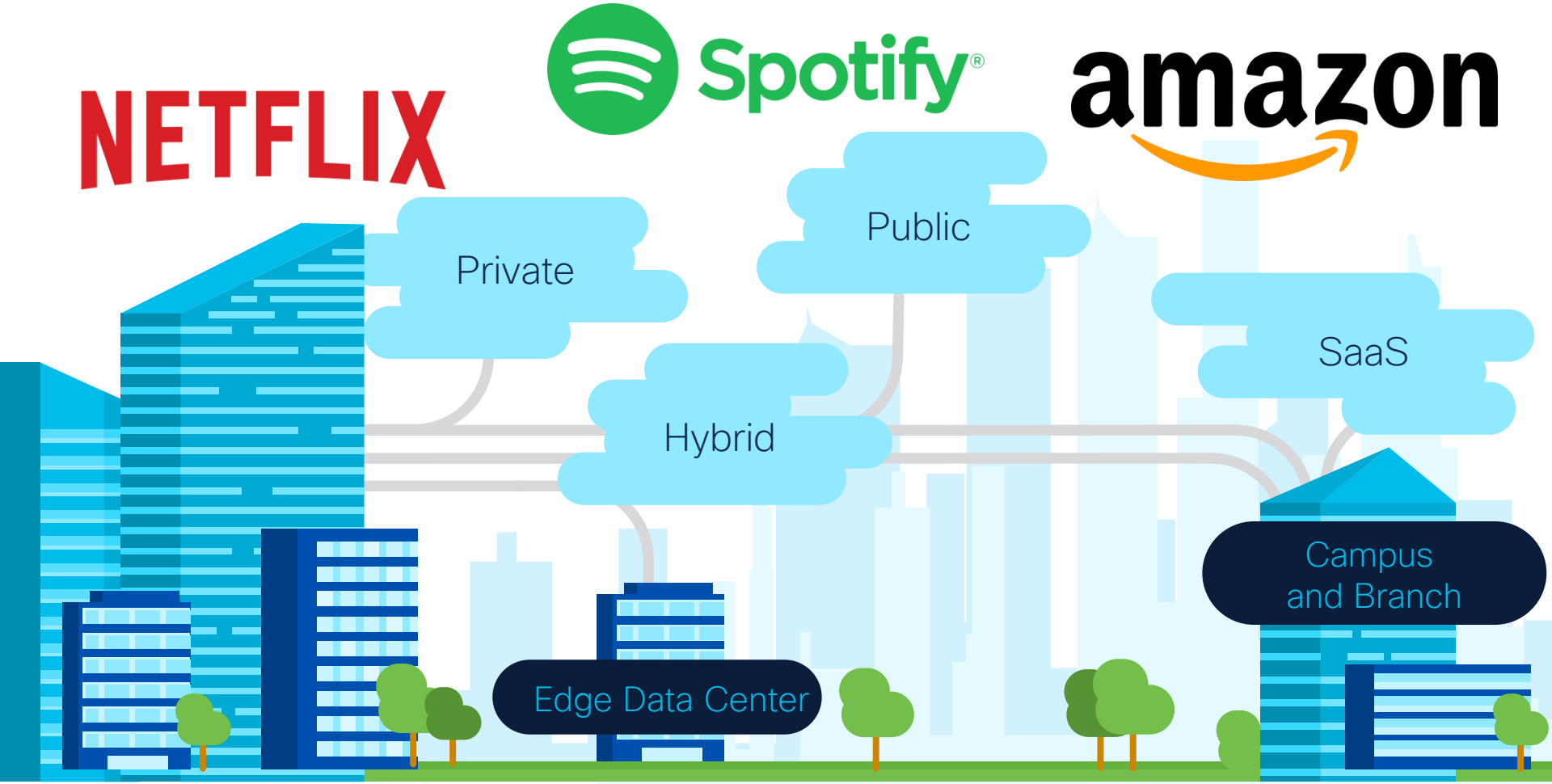
Josh Ingeniero

- Technical Solutions Specialist, Cisco
- Cross-architecture Programmability and Automation
- Containerisation advocate
- CCNP, DevNet Professional, KCNA

github.com/joshingeniero

linkedin.com/in/joshingeniero

There has been an explosive growth for interest in cloud.



Agenda

- Introduction
- Software Stakeholders
- Modern Software Development
- Cloud-native Applications
- Demo

Stakeholders

Customer

Developers

Operations

Stakeholders

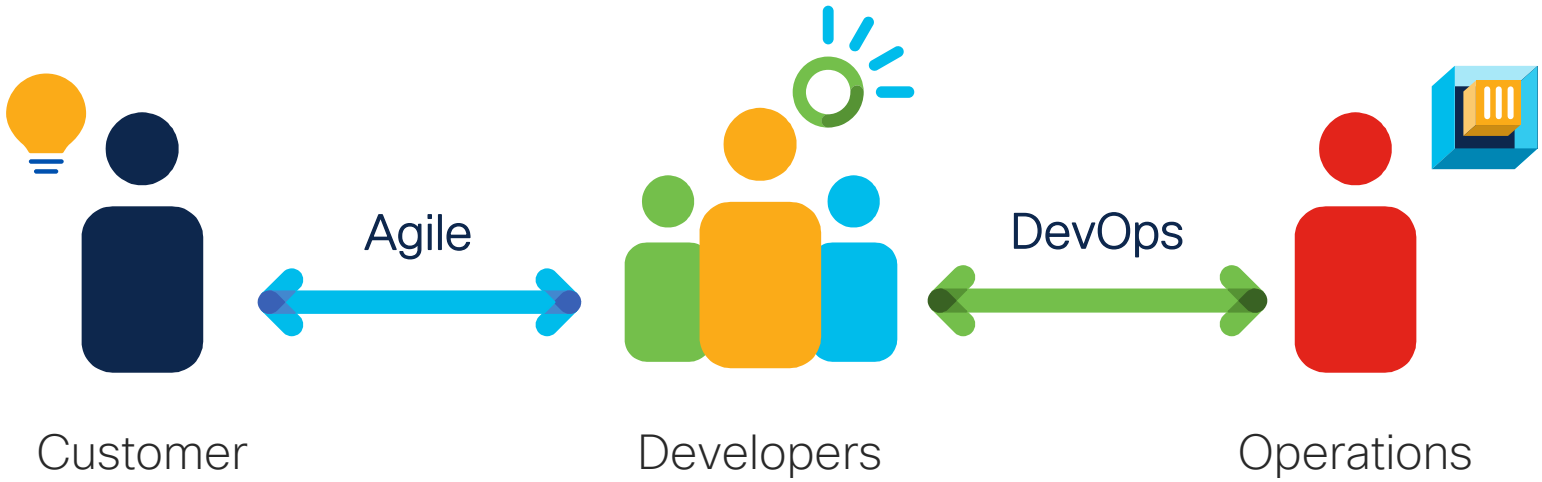
Customer

Developers

Operations

Stakeholders

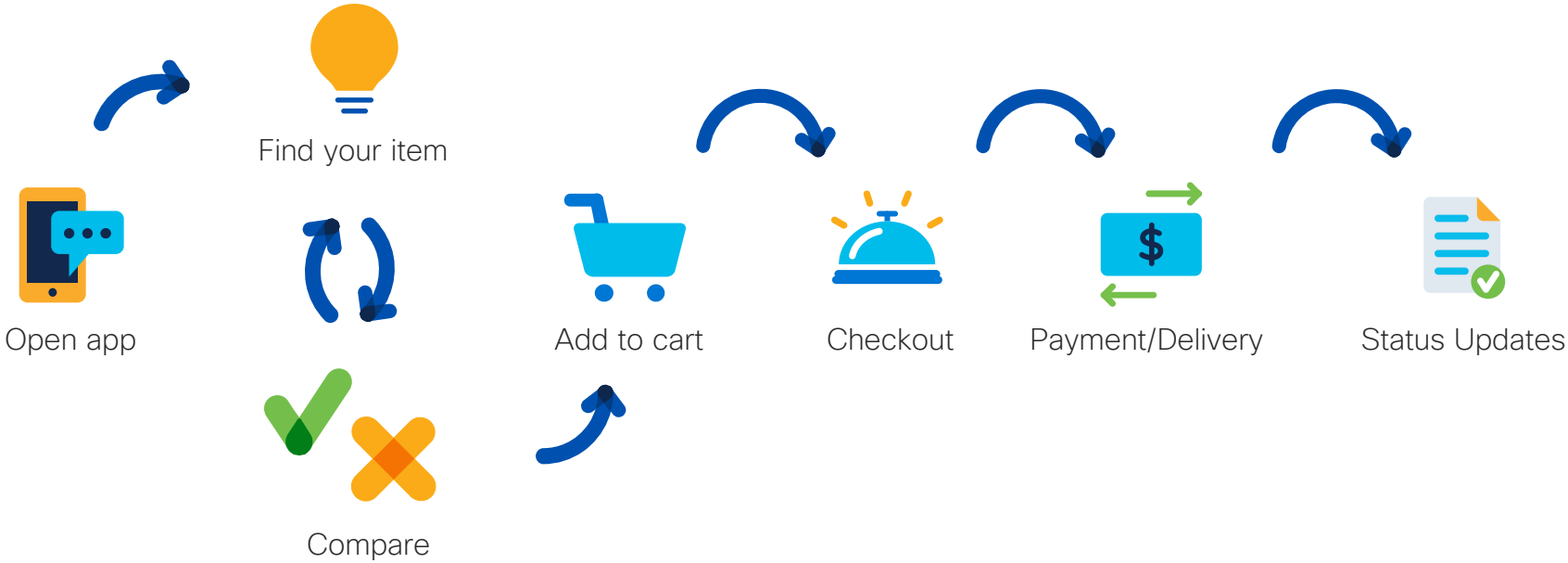
Stakeholders



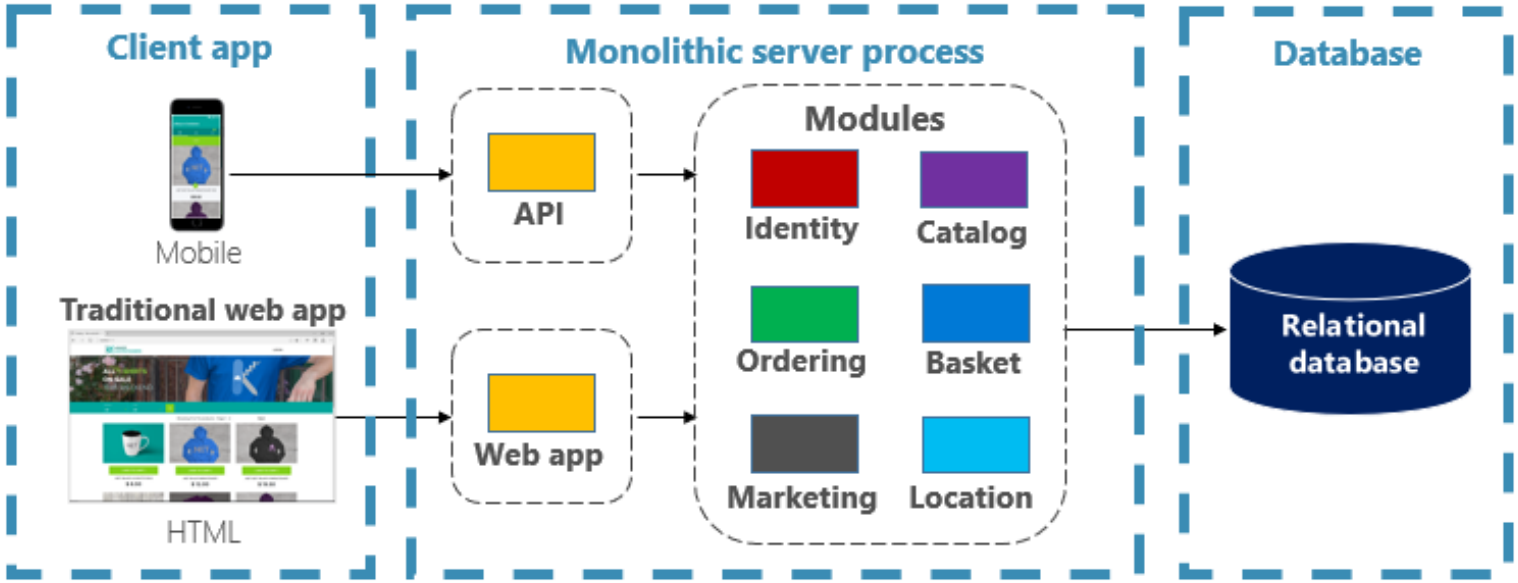
Modern Software Development

Modern Software Development

Customer Journey



Traditional Software Development



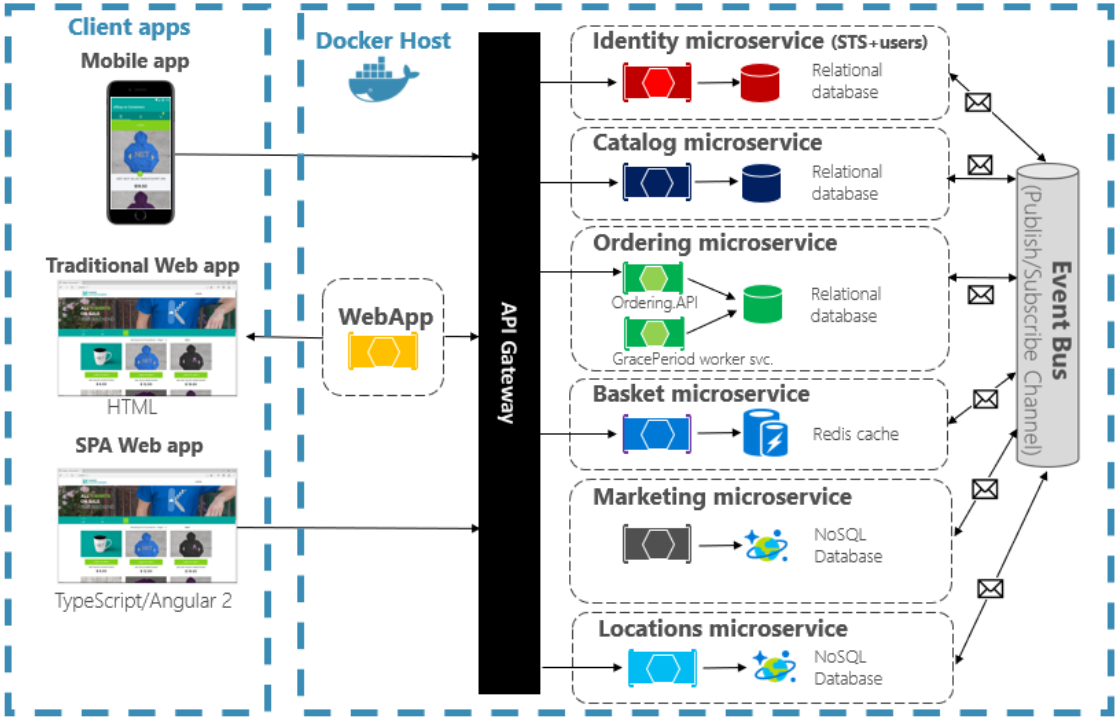
Monolithic Software Design

Modern Software Development

NETFLIX

amazon

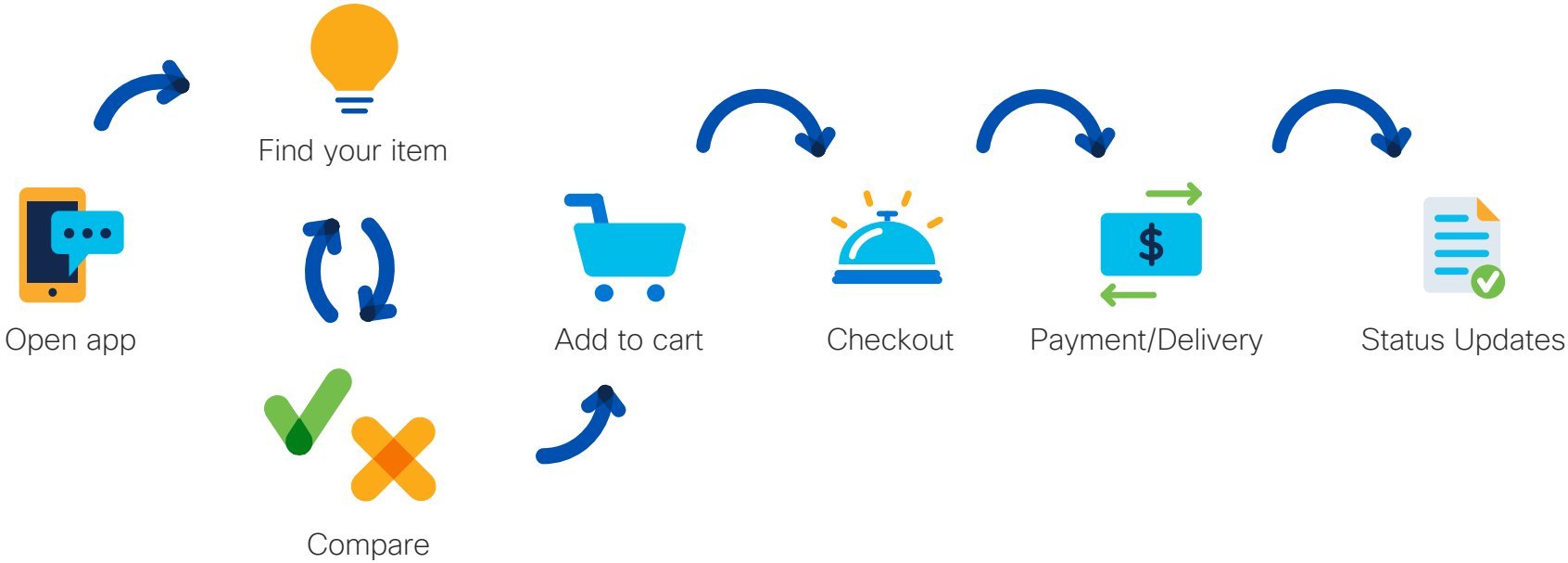
Spotify



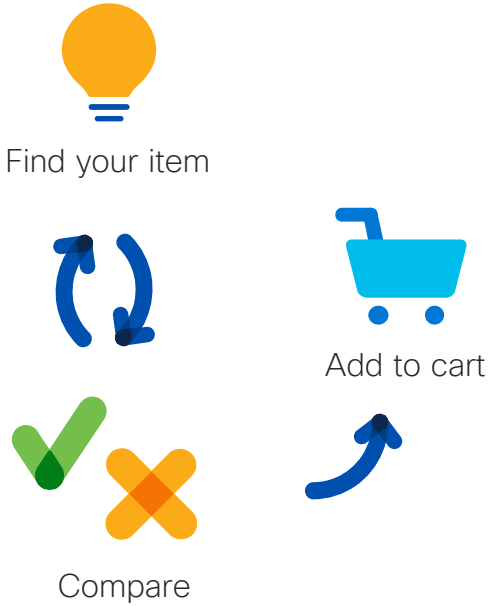
Cloud-native (Microservices) Software Design

Cloud-native Applications

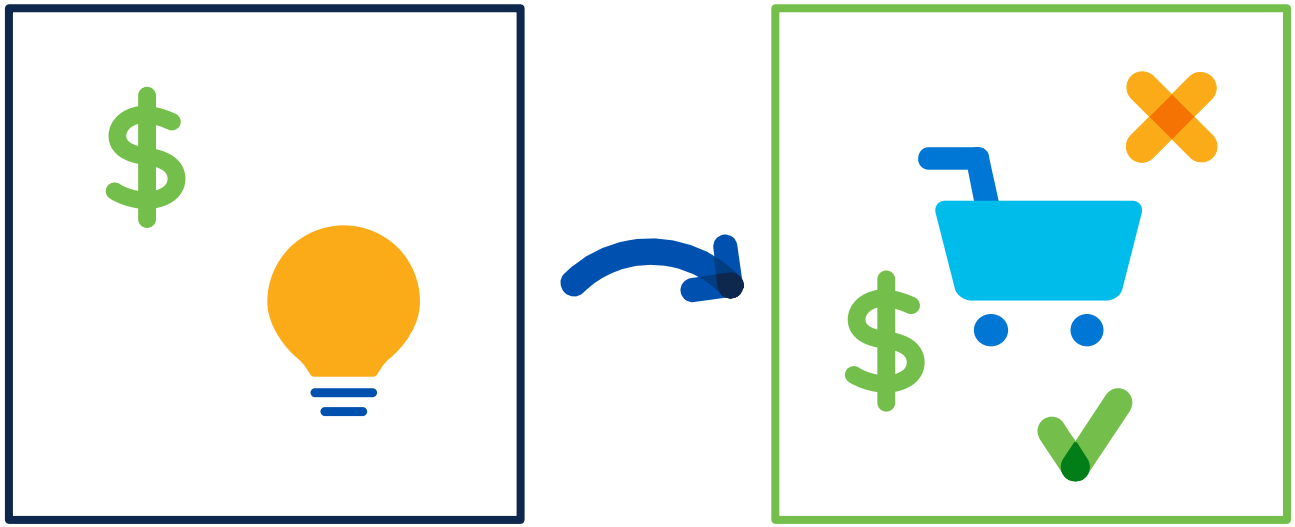
Microservices



Microservices



Microservices



Catalog Microservice

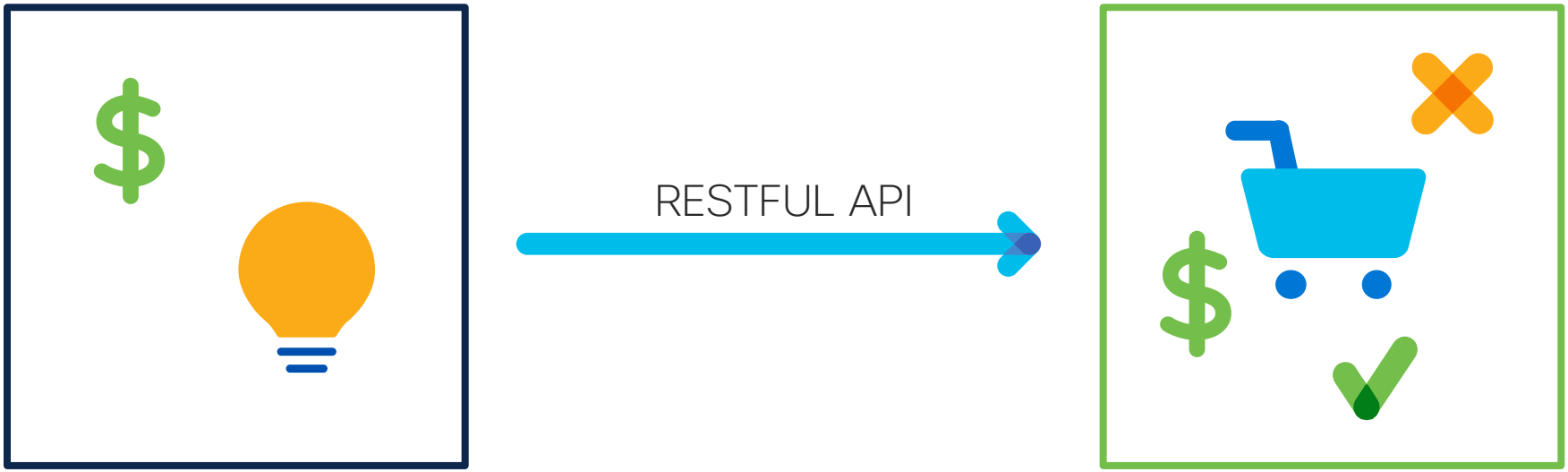
Cart Microservice

API's and Communication

Catalog Microservice

Cart Microservice

API's and Communication



Catalog Microservice

Cart Microservice

API's and Communication

Catalog Microservice

RESTFUL API

POST
Customer ID
Item ID
Quantity
Type
- Colour
- Size

Cart Microservice

API's and Communication

Catalog Microservice

RESTFUL API

POST
Customer ID
Item ID
Quantity
Type
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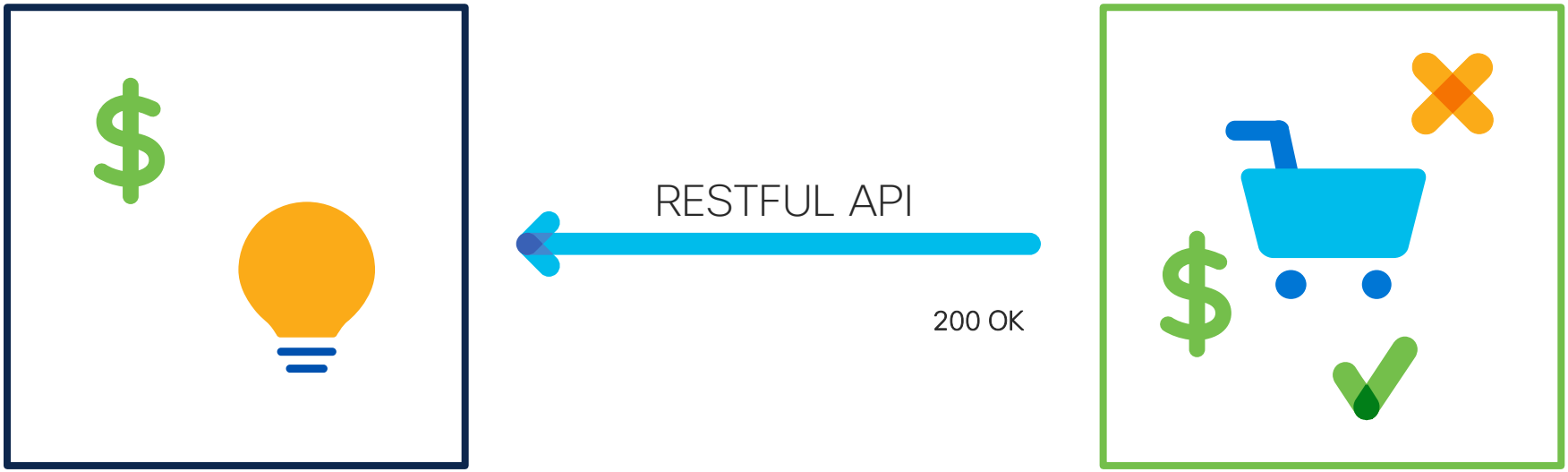
- Size

Cart Microservice

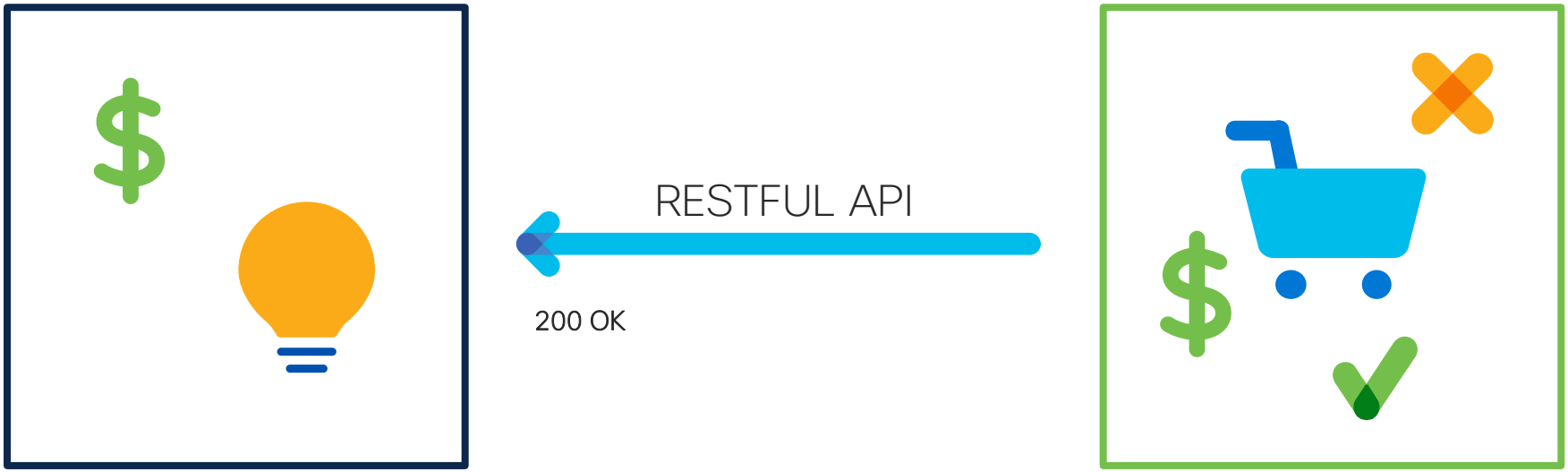
API's and Communication



Catalog Microservice

Cart Microservice

API's and Communication



API's and Communication

Cart Microservice

RESTFUL API

POST
Customer ID
Item ID
Quantity
Type
- Colour
- Size

Database

API's and Communication

Cart Microservice

RESTFUL API

POST
Request = Cart
Customer ID
Item ID
Quantity
Type
- Colour
- Size

Database Microservice

API's and Communication

Cart Microservice

RESTFUL API

POST
Request = Cart
Customer ID
Item ID
Quantity
Type
- Colour
- Size

Database Microservice

API's and Communication

RESTFUL API

200 OK

Cart Microservice

Database Microservice

API's and Communication

RESTFUL API

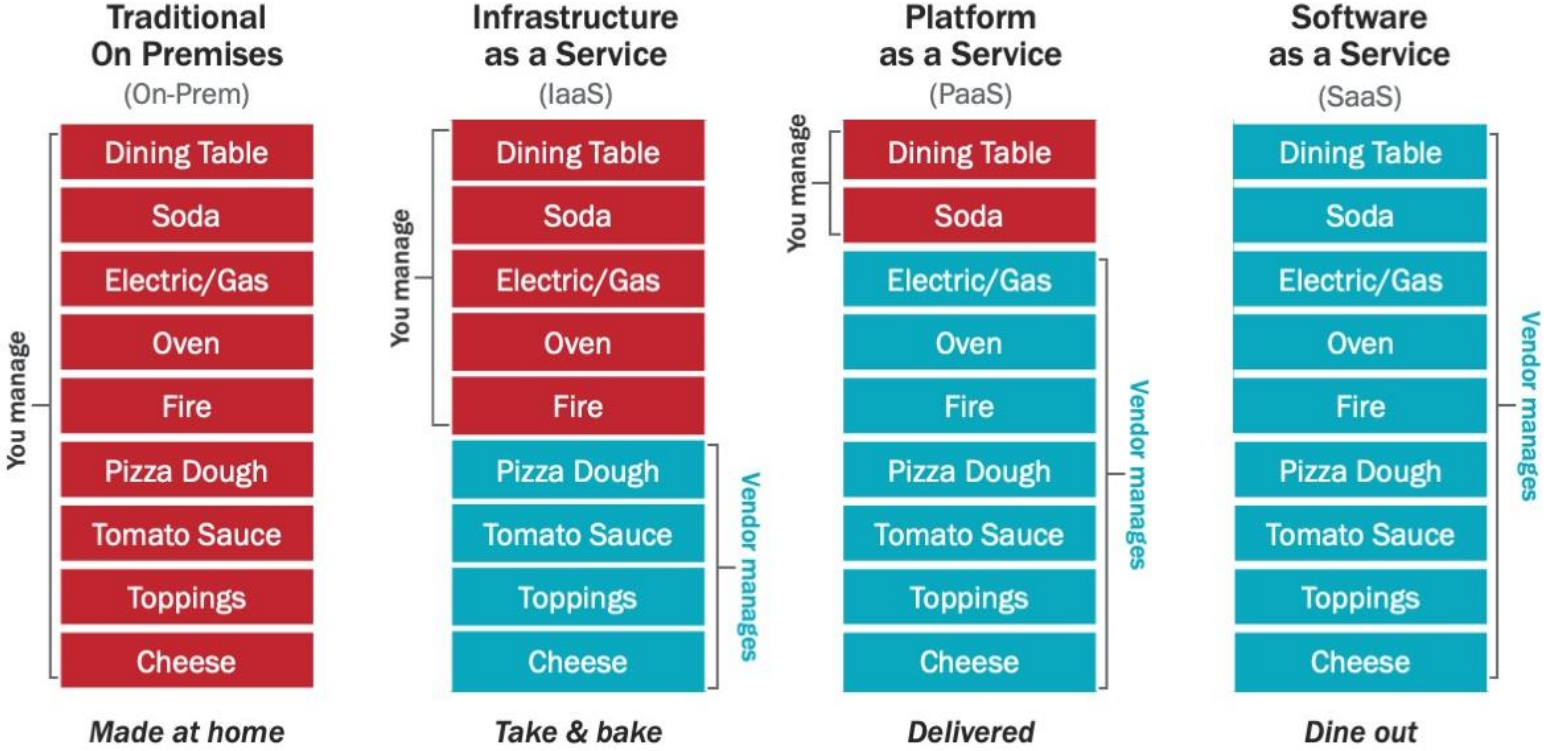
200 OK

Cart Microservice

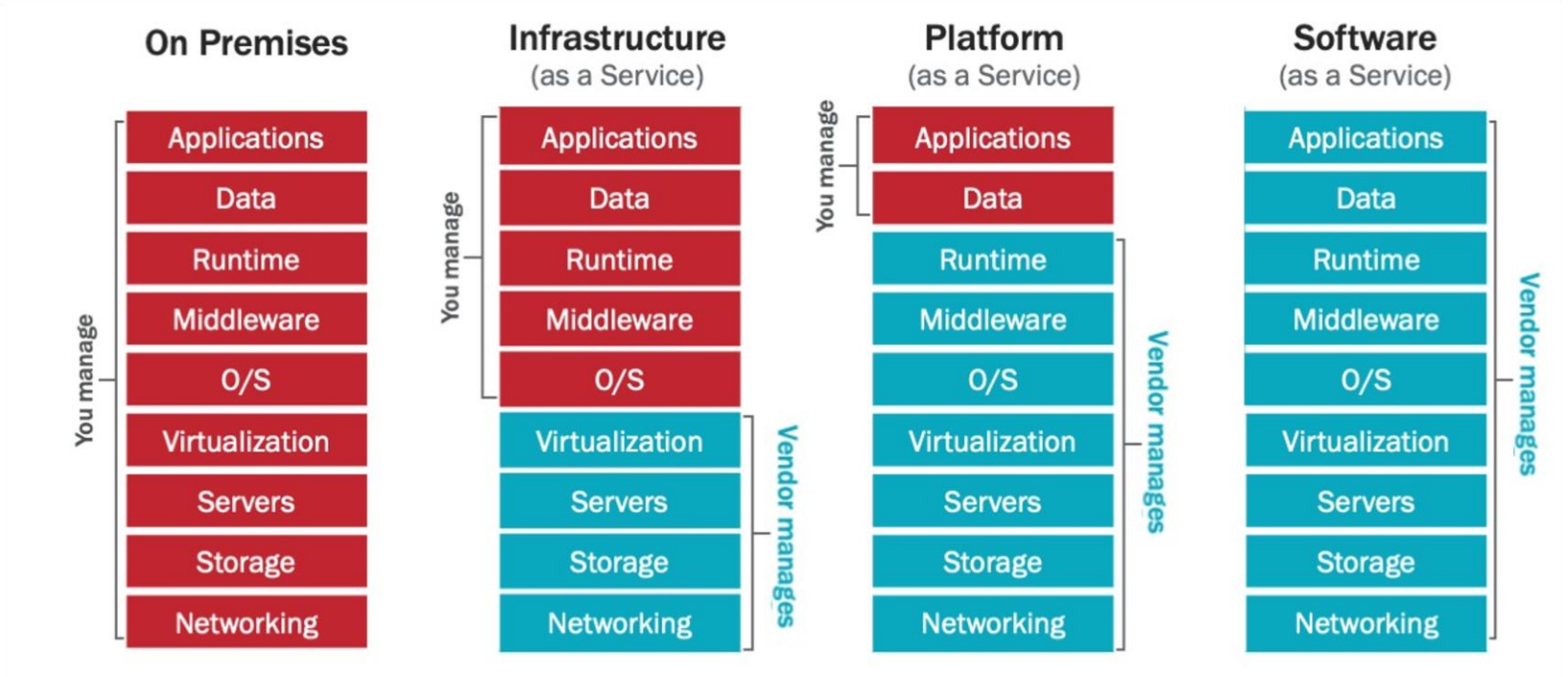
Database Microservice

Deploying Applications

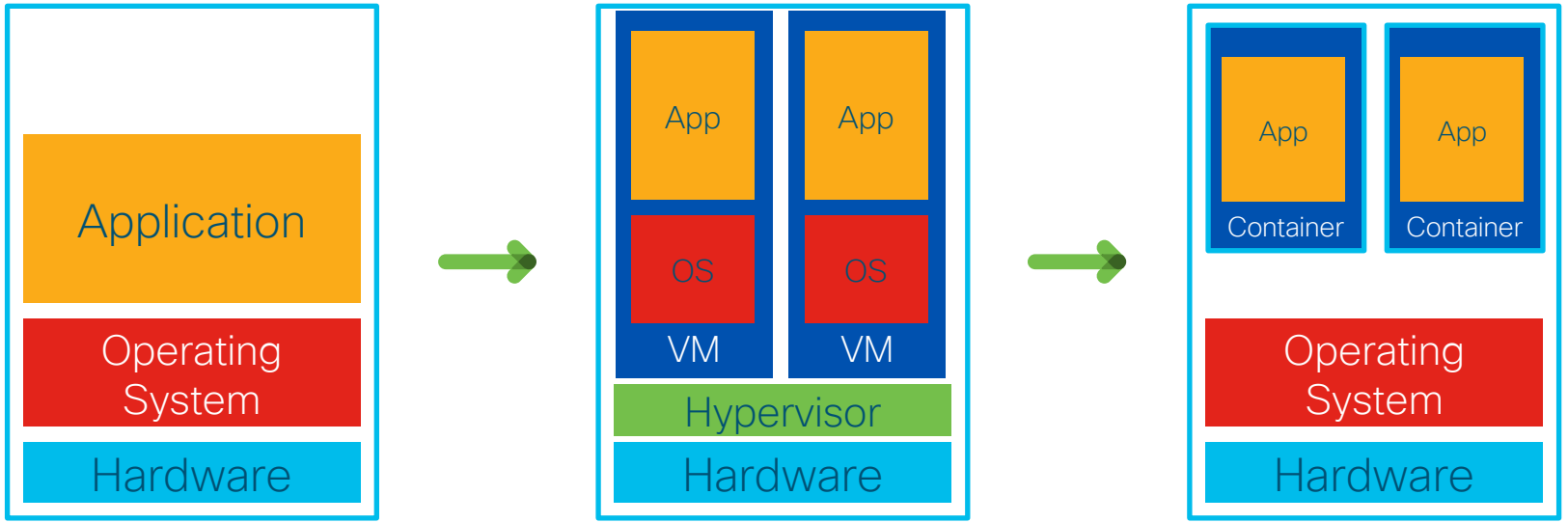
Pizza as a Service



Deployment Models



Deployment Types



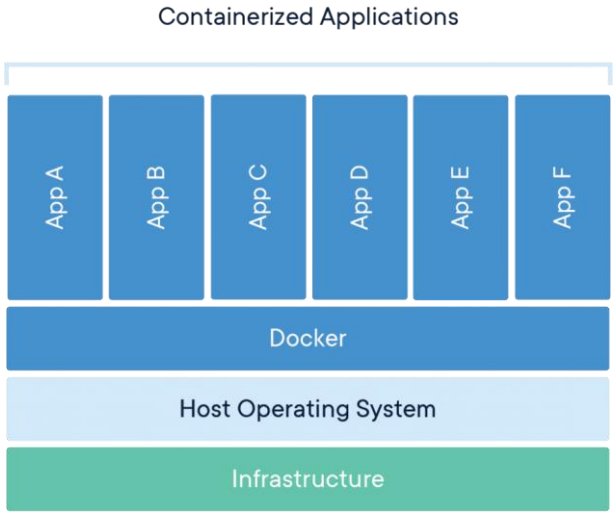
No virtualisation (Bare Metal)

Virtual Machines (VM)

Containers

Containers and Kubernetes

Containers




```
FROM python:3.8.2

RUN mkdir /app
WORKDIR /app
ADD . /app/
RUN pip install -r /app/requirements.txt

EXPOSE 5000
CMD ["python", "/app/app.py"]
```

Containers

Agile

CI/CD

DevOps

Observability

Consistency

Portability

Application-Centric Management

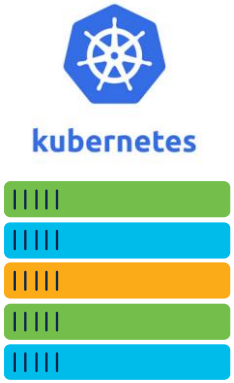
Microservices

Isolation

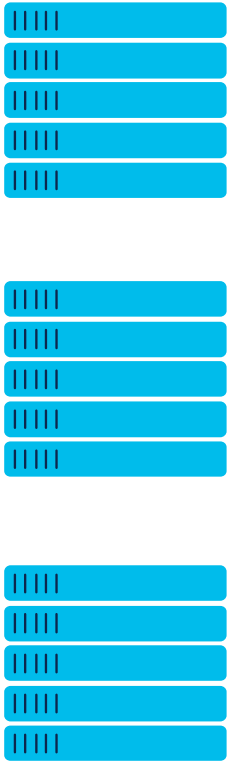
Utilisation

Kubernetes

Deployment.yaml



Master



Workers

Kubernetes

Services

- Exposing containers
- DNS name or IP

Storage

- Automatically mount a storage system of your choice

Rollout and Rollback

- Desired state
- Create, remove, or adopt resources

Bin packing

- CPU
- Memory
- Maximise resources

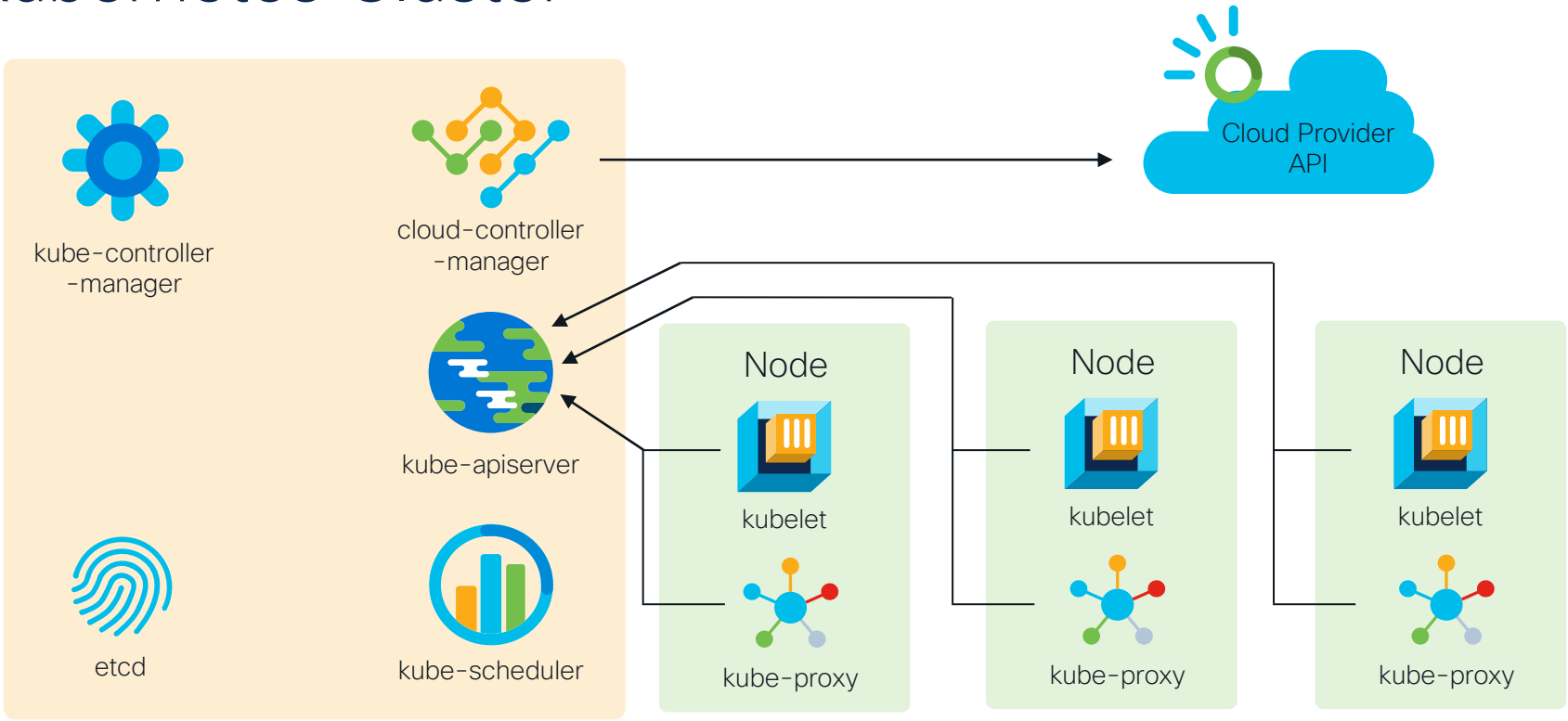
Self-healing

- Restarting failed containers
- Kill non-compliant containers

Secrets

- Store and manage sensitive info
- SSH, passwords, OAuth tokens

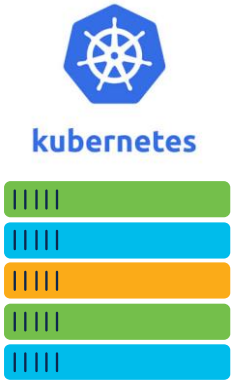
Kubernetes Cluster



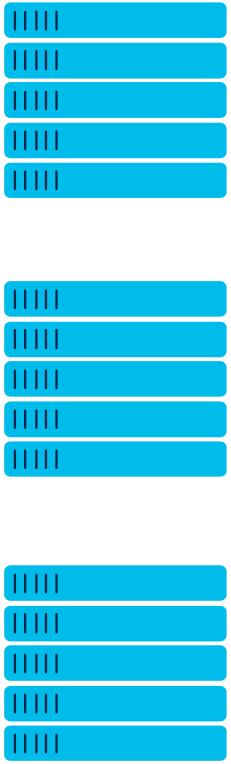
Control Plane

Kubernetes

Deployment.yaml

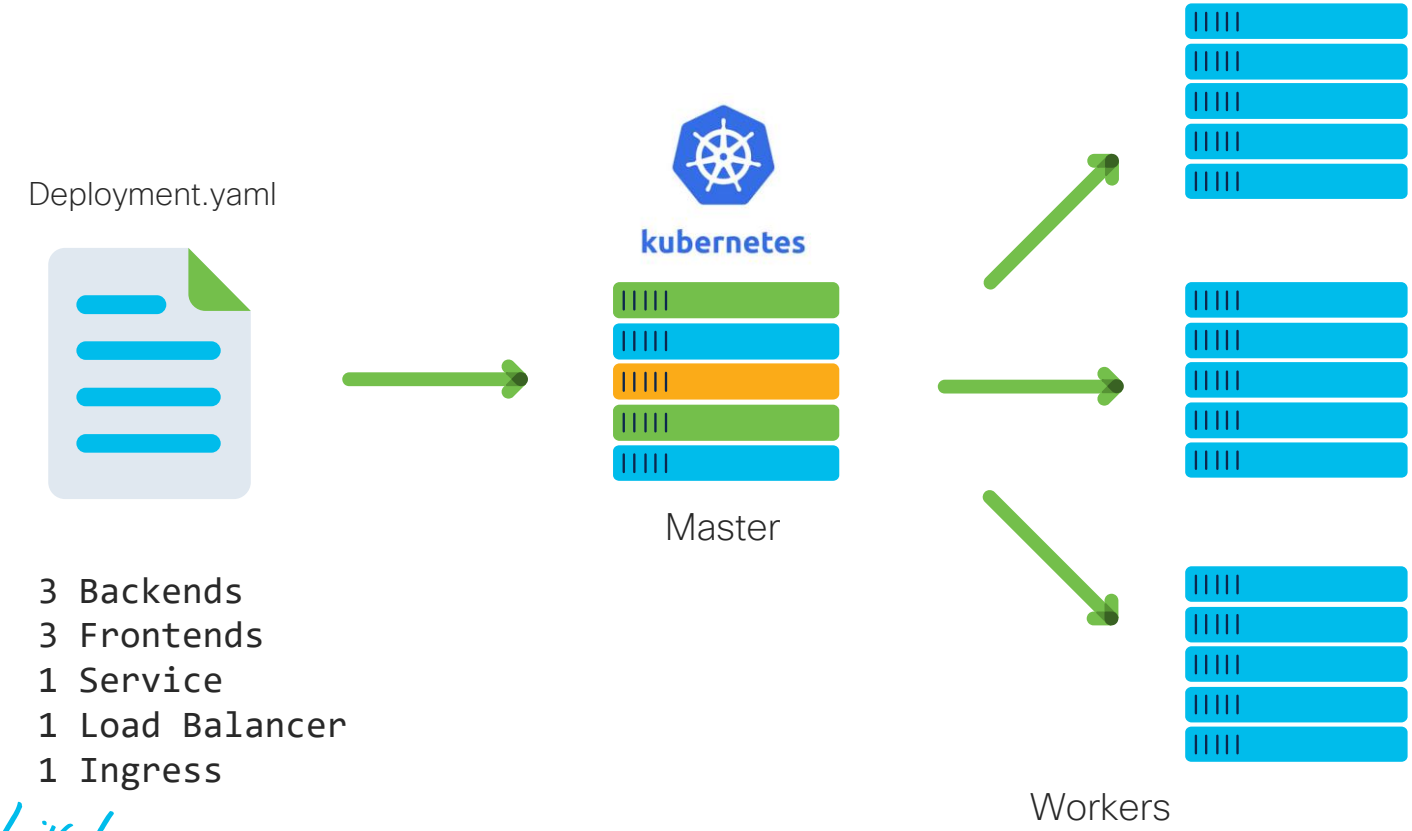


Master



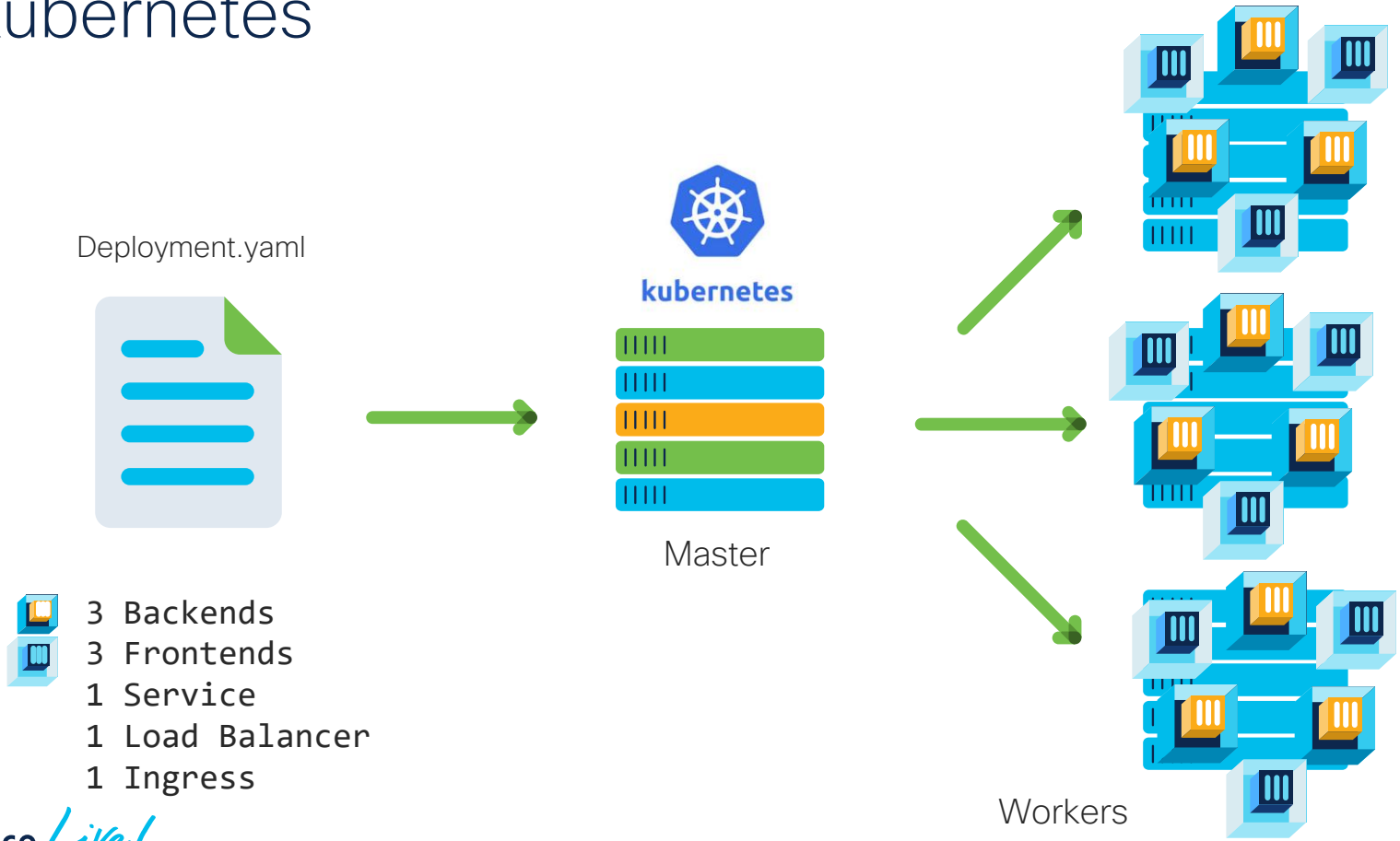
Workers

Kubernetes

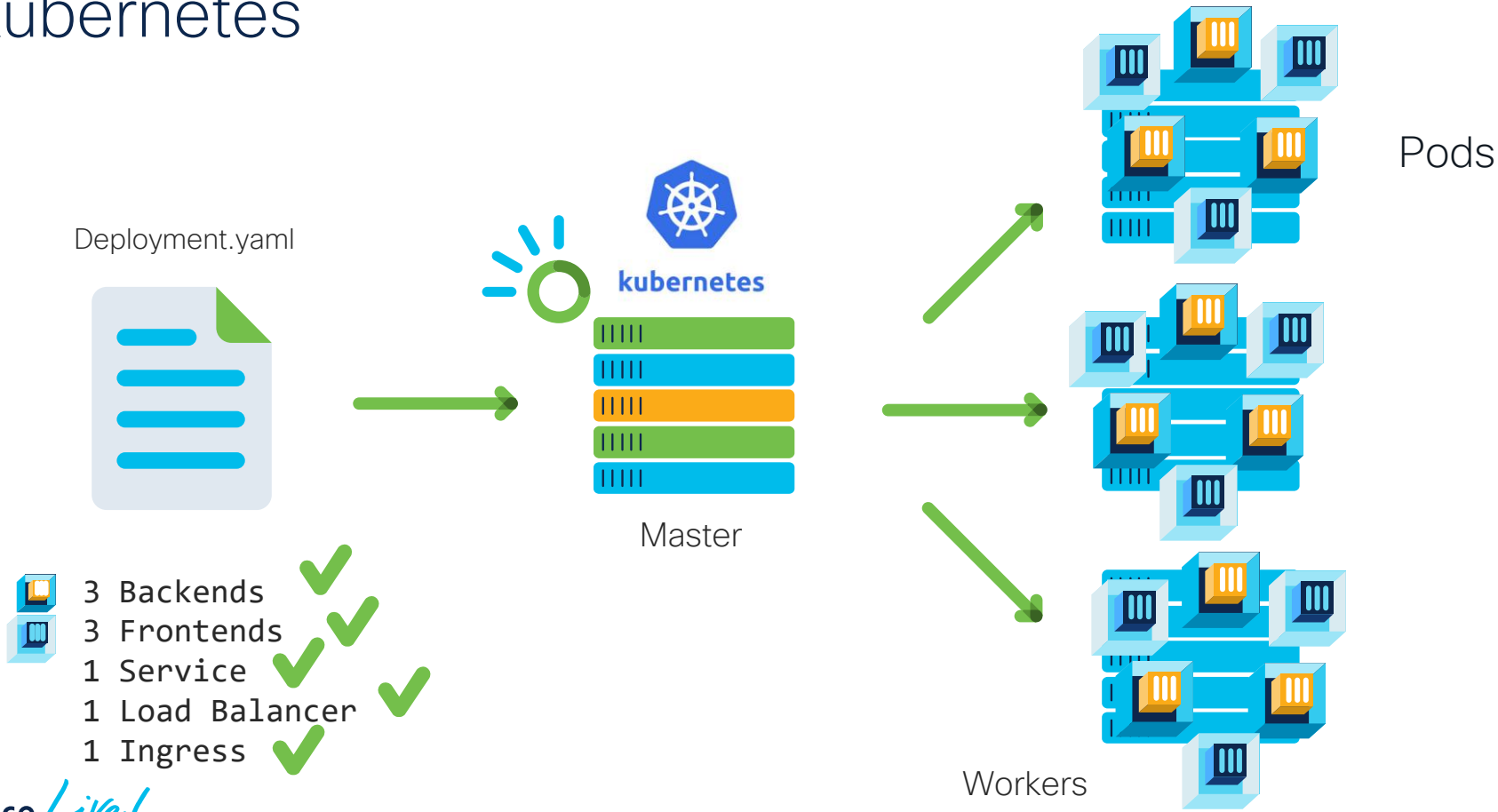



```
3 Backends
3 Frontends
1 Service
1 Load Balancer
1 Ingress
```

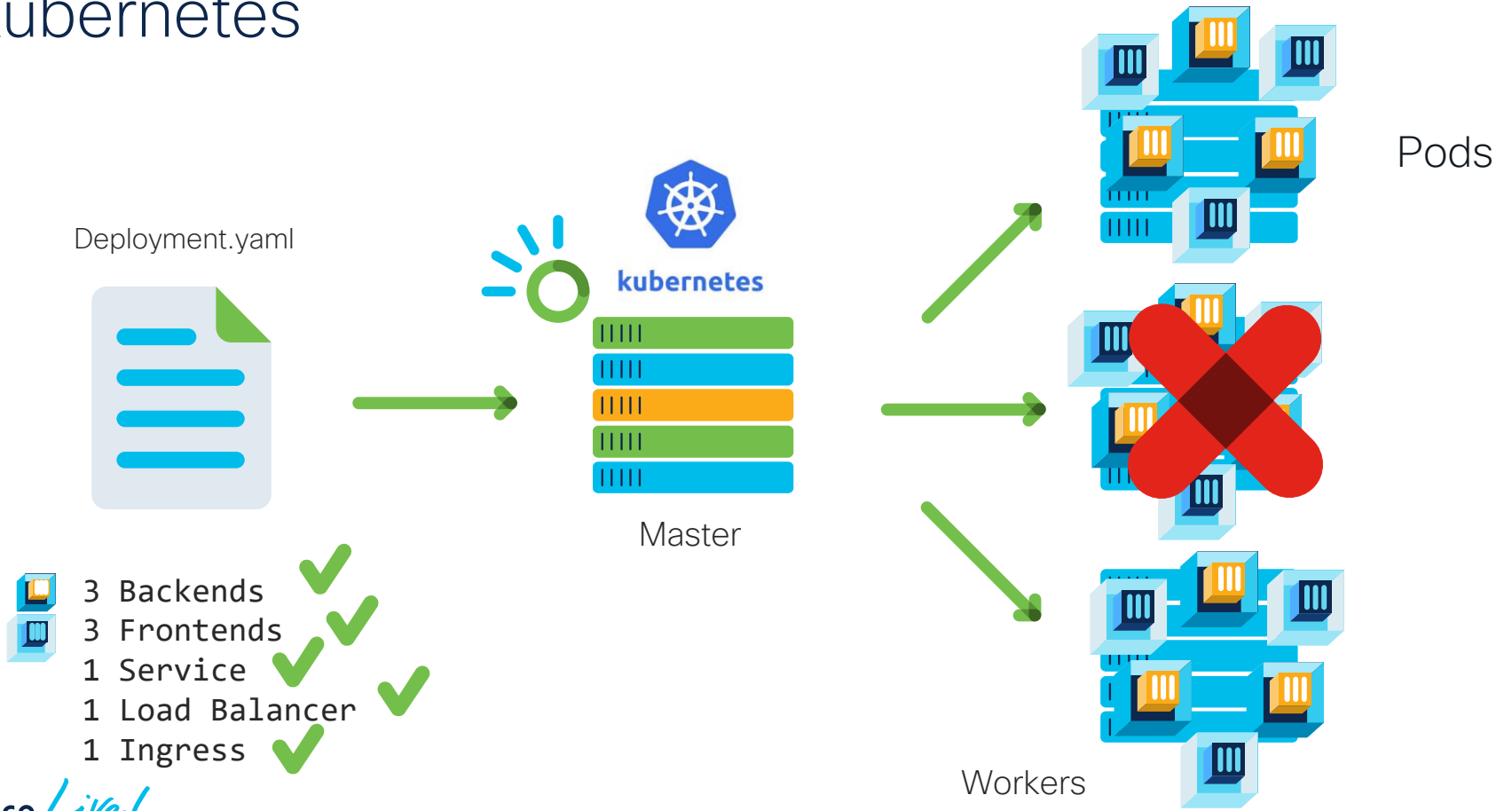
Kubernetes



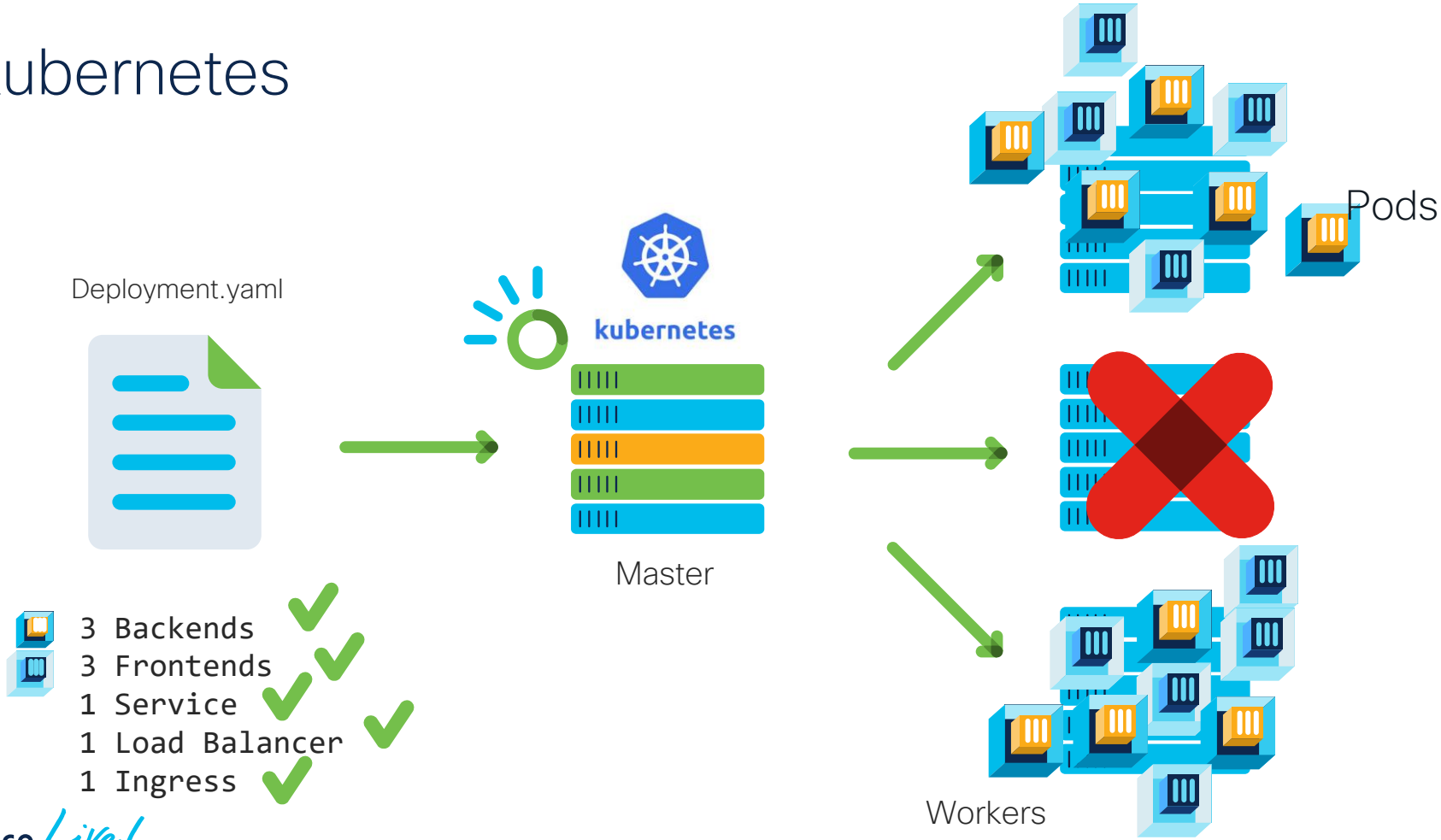
Kubernetes



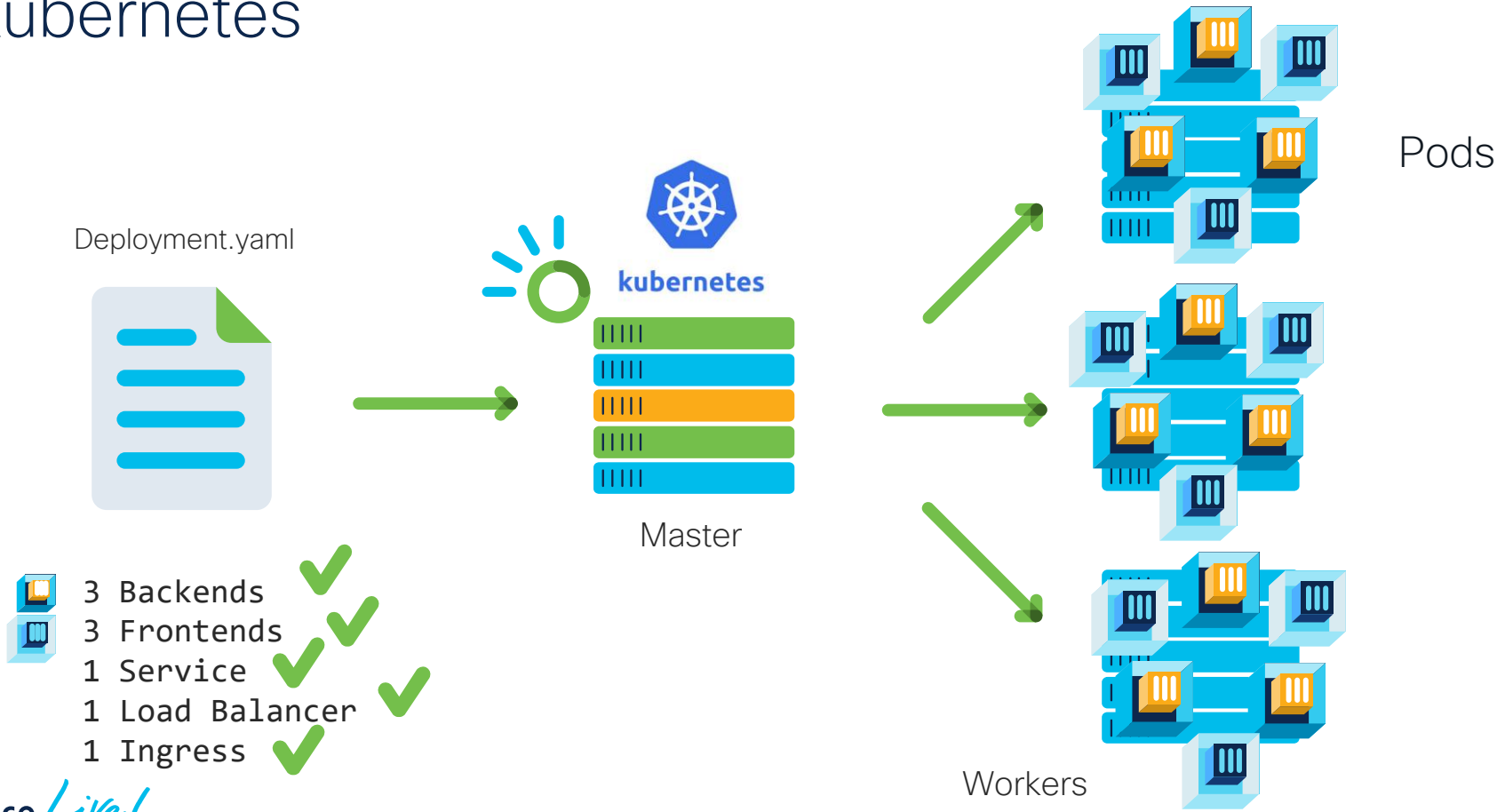
Kubernetes



Kubernetes

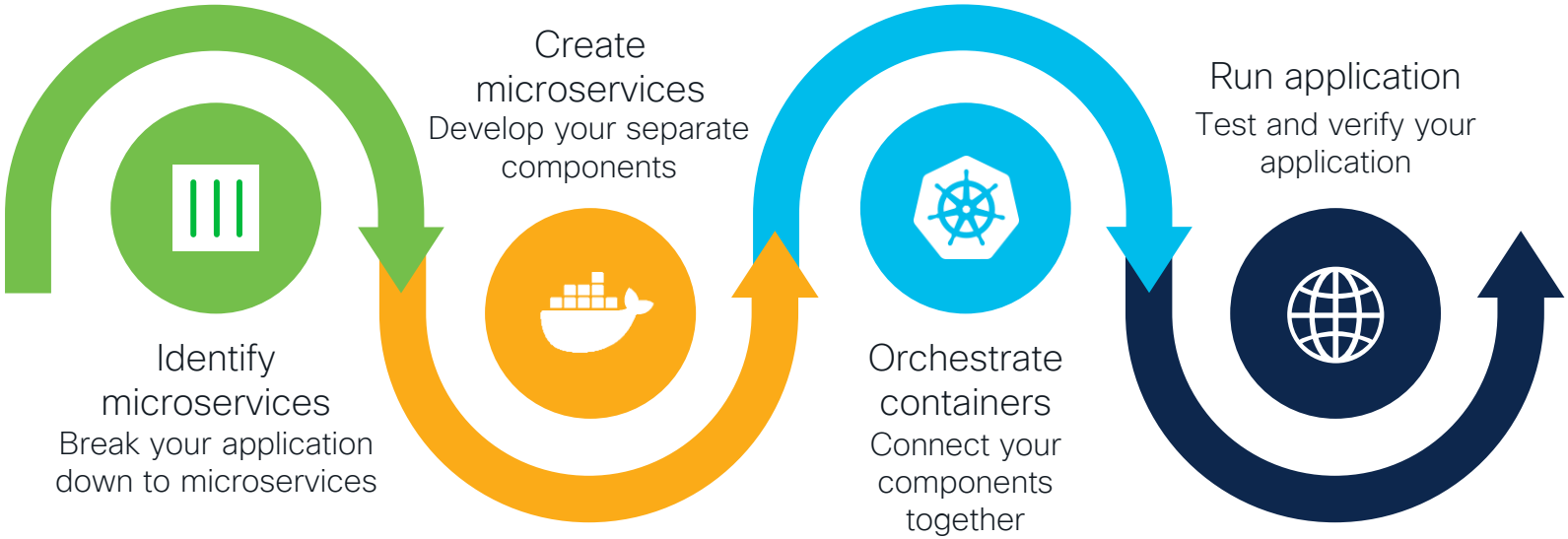


Kubernetes



Basic Setup

microservices-basic



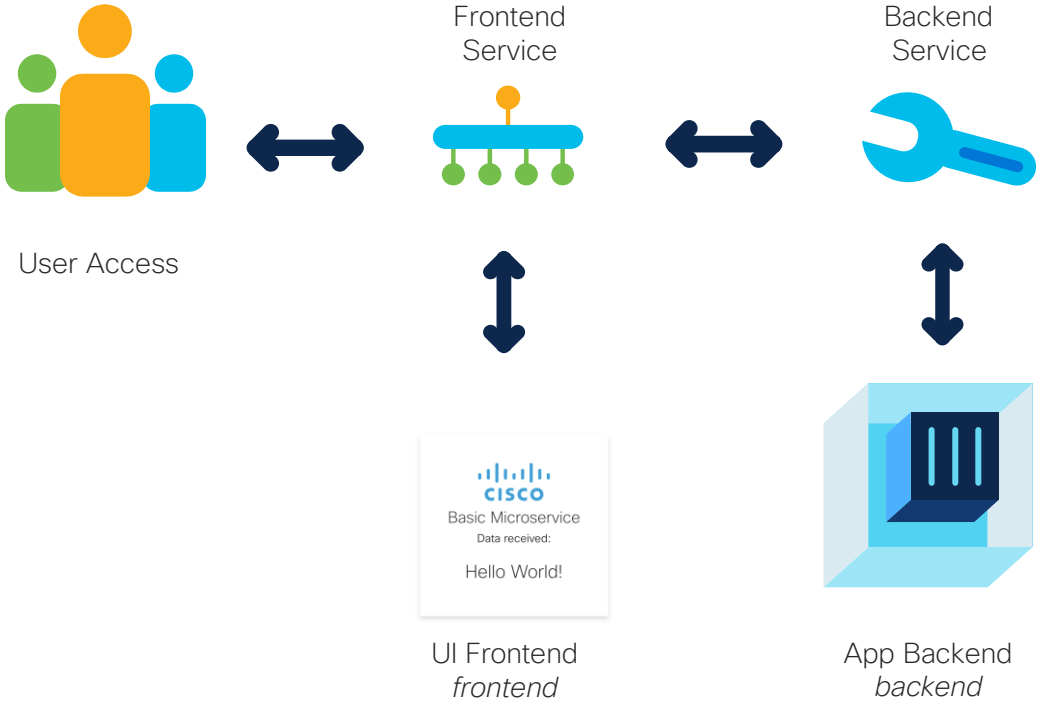
microservices-basic

Backend

Frontend

https://github.com/joshingeniero/microservices-basic

Setup



Deployment (Backend)

```
apiVersion: apps/v1
kind: Deployment
metadata:
  name: backend
spec:
  selector:
    matchLabels:
      app: backend
  replicas: 2
```

```
template:
    metadata:
      labels:
        app: backend
    spec:
      containers:
        - name: backend
          image: backend
          imagePullPolicy: Never
          ports:
            - containerPort: 5002
      imagePullSecrets:
        - name: secret
```

Service (Backend)

```
apiVersion: v1
kind: Service
metadata:
  name: backend-service
spec:
  selector:
    app: backend
  ports:
    - protocol: "TCP"
      port: 6002
      targetPort: 5002
```

Deployment (Frontend)

```
apiVersion: apps/v1
kind: Deployment
metadata:
  name: frontend
spec:
  selector:
    matchLabels:
      app: frontend
  replicas: 2
```

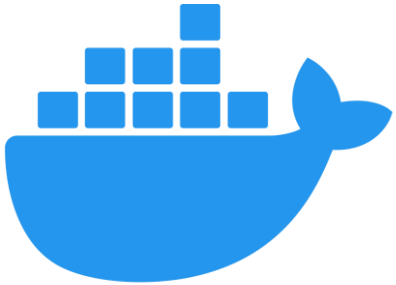
```
template:
  metadata:
    labels:
      app: frontend
  spec:
    containers:
      - name: frontend
        image: frontend
        imagePullPolicy: Never
        ports:
          - containerPort: 5001
    imagePullSecrets:
      - name: secret
```

Service (Frontend)

```
apiVersion: v1
kind: Service
metadata:
  name: frontend-service
spec:
  selector:
    app: frontend
  ports:
    - protocol: "TCP"
      port: 6001
      targetPort: 5001
  type: LoadBalancer
```

Demo

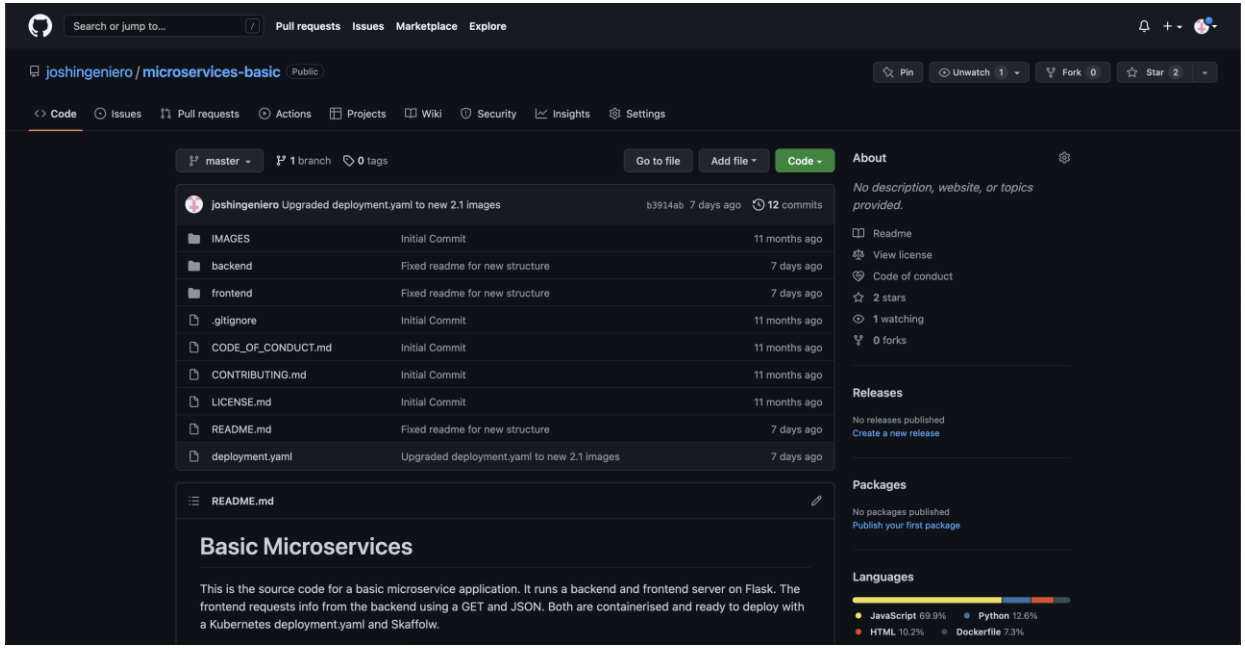
Setup



docker

SKAFFOLD

Clone Code



https://github.com/joshingeniero/microservices-basic

Running the application

- Run the deployment once for testing

```
$ skaffold run
```

- Run the deployment continuously for developing

```
$ skaffold dev
```

Running the application

```
Starting deploy...
 - service/backend-service created
 - deployment.apps/backend created
 - service/frontend-service created
 - deployment.apps/frontend created
 - ingress.networking.k8s.io/dev-ingress created
Waiting for deployments to stabilize...
 - deployment/frontend is ready. [1/2 deployment(s) still pending]
 - deployment/backend is ready.
Deployments stabilized in 3.161 seconds
You can also run [skaffold run --tail] to get the logs
```

Testing the application

http://localhost:6001/

Testing the application

http://localhost:6001/info

Testing the application

http://localhost:6001/cake

Testing the application

```
backend-98bdcf5cc-k8bjr     1/1     Running   0          45s
backend-98bdcf5cc-zrtc9     1/1     Running   0          7m40s
frontend-55bd597b98-hp9km   1/1     Running   0          10m
frontend-55bd597b98-wnm5b   1/1     Running   0          10m

pod "frontend-55bd597b98-hp9km" deleted

NAME                        READY   STATUS    RESTARTS   AGE
backend-98bdcf5cc-k8bjr     1/1     Running   0          90s
backend-98bdcf5cc-zrtc9     1/1     Running   0          8m25s
frontend-55bd597b98-kwgxc   1/1     Running   0          27s
frontend-55bd597b98-wnm5b   1/1     Running   0          11m
```

Deleting a pod

Testing the application

```
{
  "data": {
    "root": "Hello from Melbourne!",
    "info": "Kubernetes is amazing!",
    "maker": "The cake is NOT a lie!"
  }
}
```

backend/database.json

Modifying the application

```
{
  "data": {
    "root": "Hello from Cisco Live!",
    "info": "You are amazing!",
    "maker": "The cake is a lie!"
  }
}
```

backend/database.json

Modifying the application

```
Starting deploy...
 - deployment.apps/backend configured
Waiting for deployments to stabilize...
 - deployment/frontend is ready. [1/2 deployment(s) still pending]
 - deployment/backend is ready.
Deployments stabilized in 3.134 seconds
```

Modifying the application

http://localhost:6001/

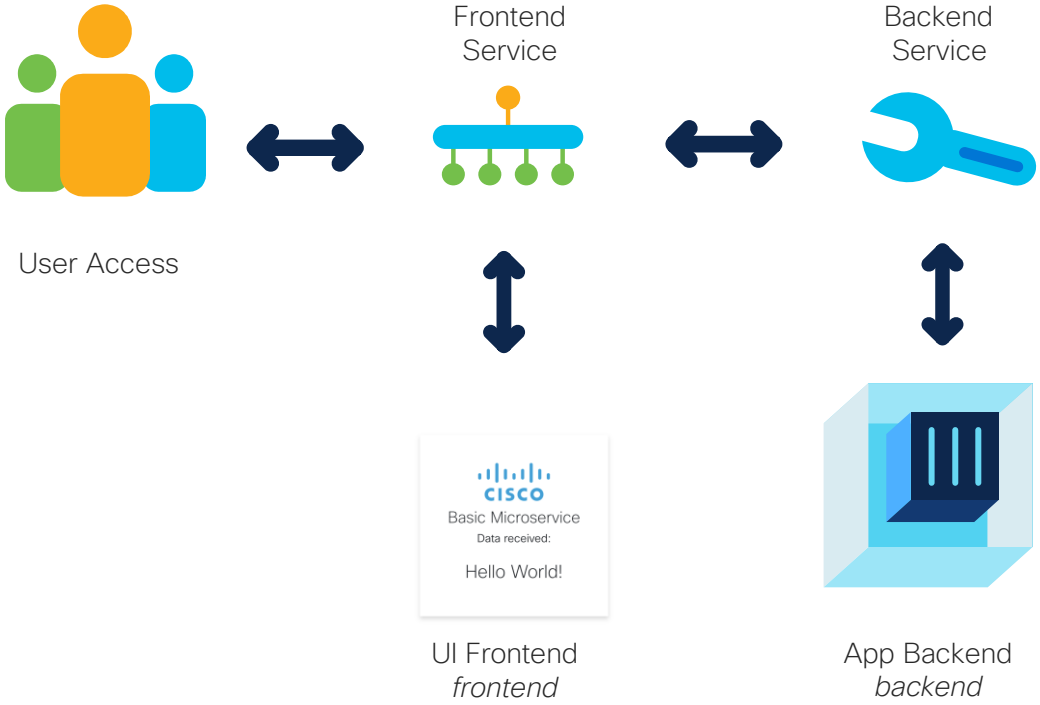
Modifying the application

http://localhost:6001/info

Modifying the application

http://localhost:6001/cake

Your first deployment!



In summary…

- Cloud-native development is a **Journey**
- Containers **enable** the microservice infrastructure
- Kubernetes defines a **state** for your applications and spins up the necessary pods and services
- Cloud-native development can help you develop **agile**, **scalable**, and **unique** applications

Call to Action

- Get your hands on the microservices-basic demo
  - https://github.com/joshingeniero/microservices-basic
- Discover Docker and containers
  - https://www.docker.com/101-tutorial
- Try out Kubernetes
  - https://kubernetes.io/docs/tutorials/
  - https://kubernetes.io/docs/concepts/security/overview/
- Explore Cisco DevNet
  - https://developer.cisco.com/startnow

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API Insights

API Insights is an open source solution, developed by Cisco, that enables developers to identify technical, documentation completeness and quality issues with APIs before production, helping to shift left.

Fork API Insights on GitHub | Get API Insights VS Code Extension ↗

Validates and scores APIs

API Insights validates and scores API definitions against an organization's guidelines. This allows you to track and improve API quality consistently and efficiently.

Built for your CI/CD pipeline

Developers can use API Insights through its own interface or as part of their CI/CD pipeline.

API Lifecycle Management

Provides a trend timeline of API quality, and generates both API changelogs and diff comparisons of API versions to identify breaking changes.

API Insights at a glance

cs.co/API

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Answer a few questions in a short survey to be entered to win a DevNet Hoodie!

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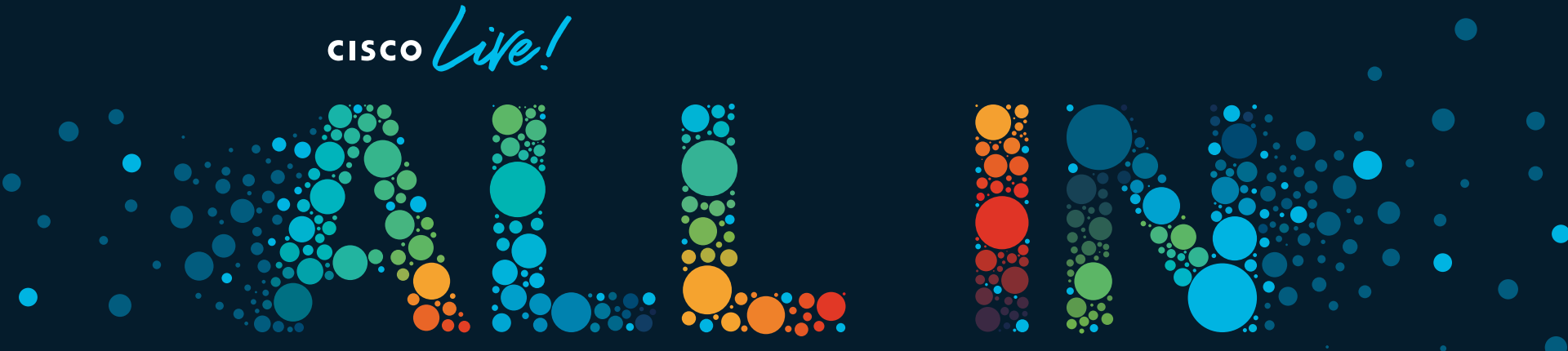
The bridge to possible

Thank you

cisco Live!


CISCO Live!
ALL IN