CISCO *Live!*

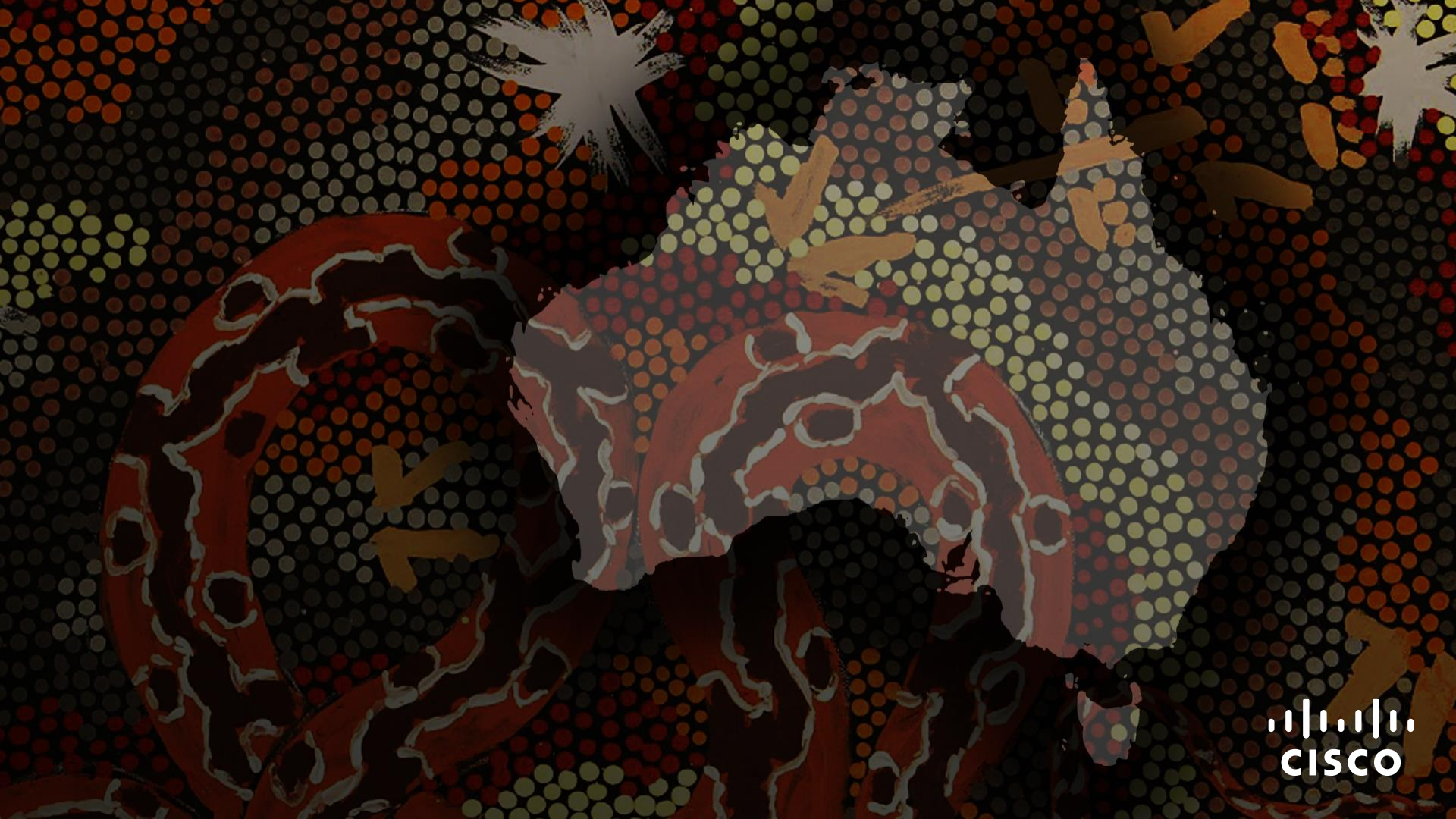
DevNet Zone

The bridge to possible

Kubernetes and You

Josh Ingeniero
Technical Solutions Specialist
DEVNET-2081

cisco Live!
DevNet Zone


CISCO

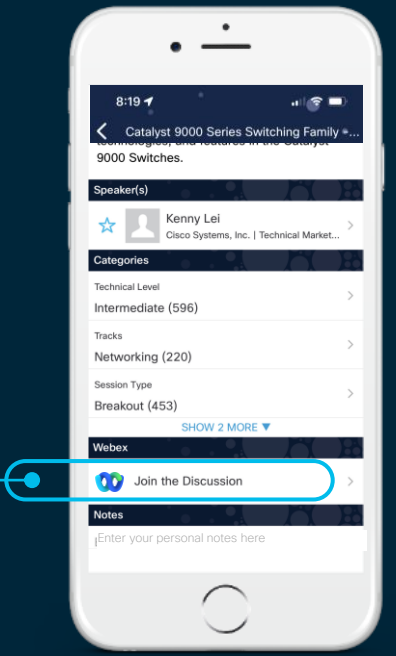
Cisco Webex App

Questions?

Use Cisco Webex App to chat
with the speaker after the session

How

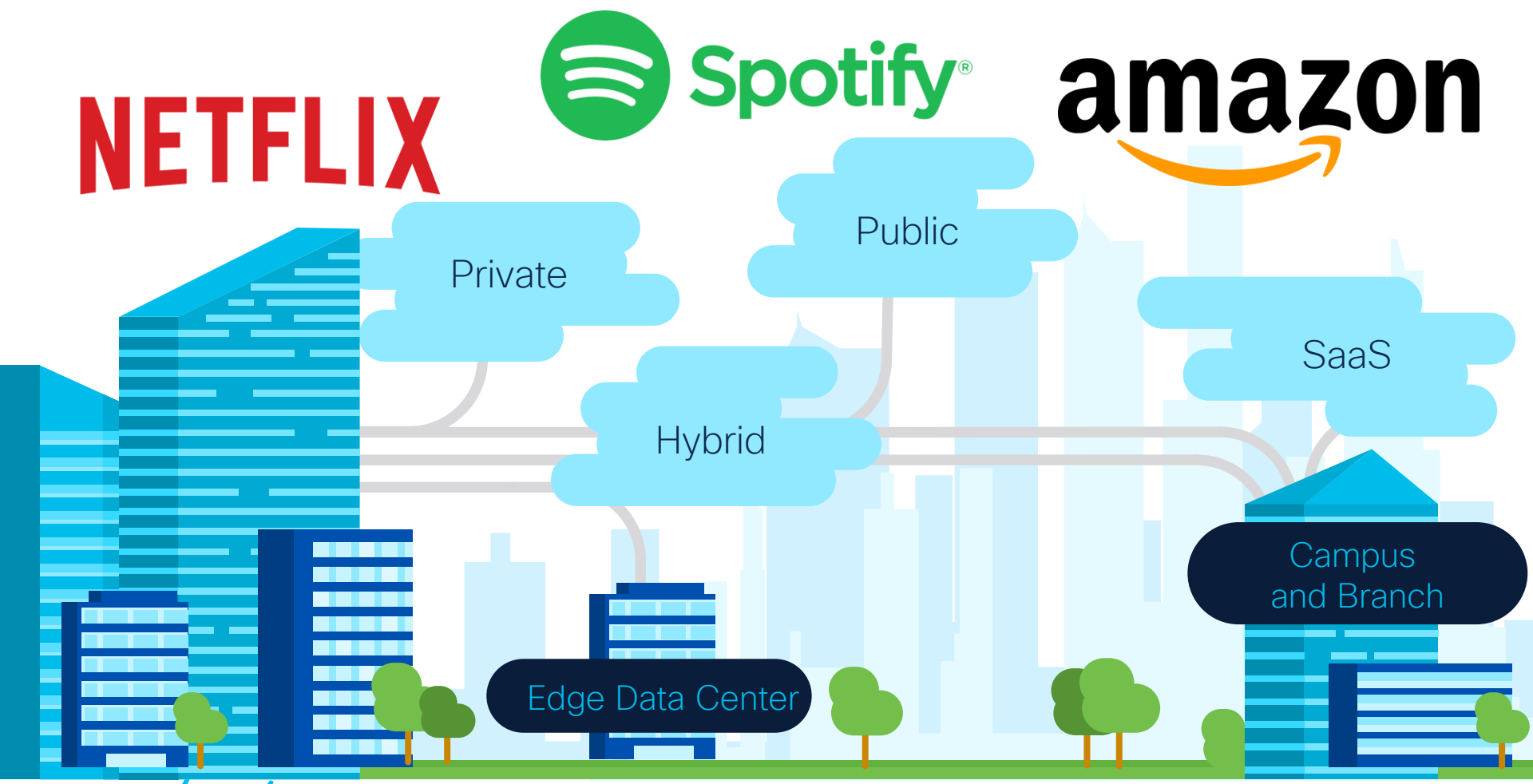
1. Find this session in the Cisco Live Mobile App
2. Click “Join the Discussion”
3. Install the Webex App or go directly to the Webex space
4. Enter messages/questions in the Webex space



https://ciscolive.ciscoevents.com/ciscolivebot/#DEVNET-2081

Webex spaces will be moderated
by the speaker until Thursday 22 December, 2022.

There has been an explosive growth for interest in cloud.



Agenda

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

Stakeholders

Customer

Developers

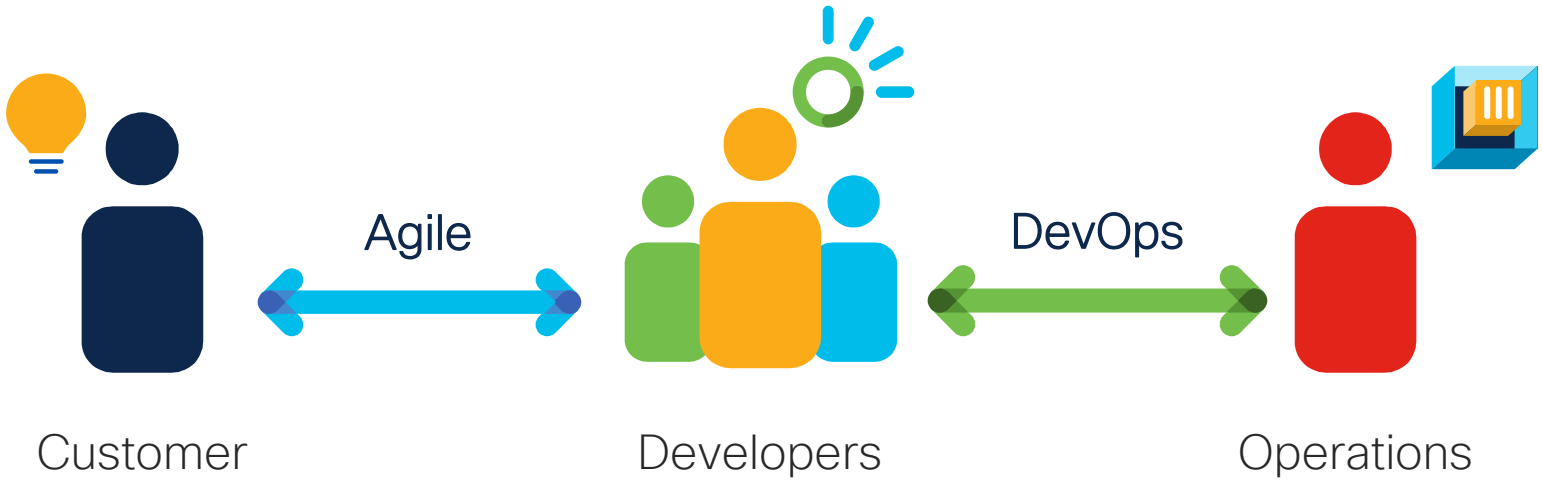
Operations

Stakeholders

Customer Developers Operations

Stakeholders

Stakeholders



Modern Software Development

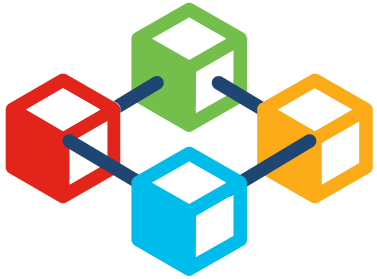
cisco Live!

DevNet Zone

Modern Software Development

Responsibility

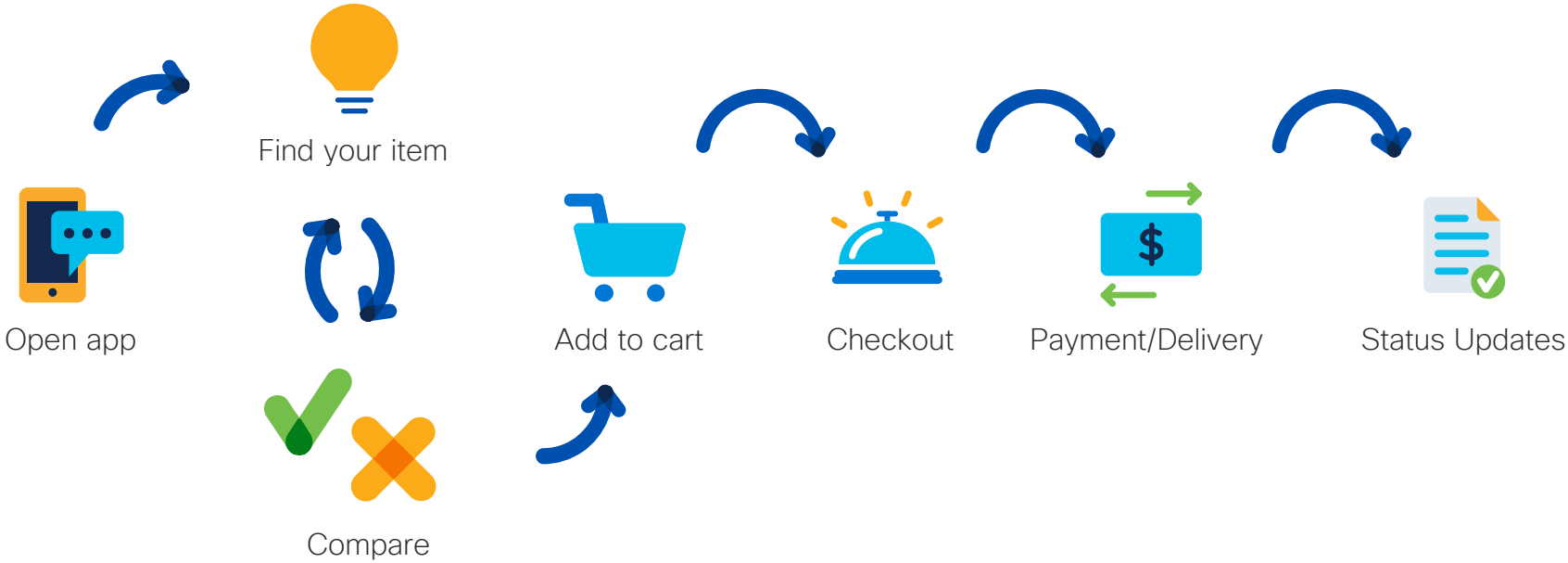
Autonomy



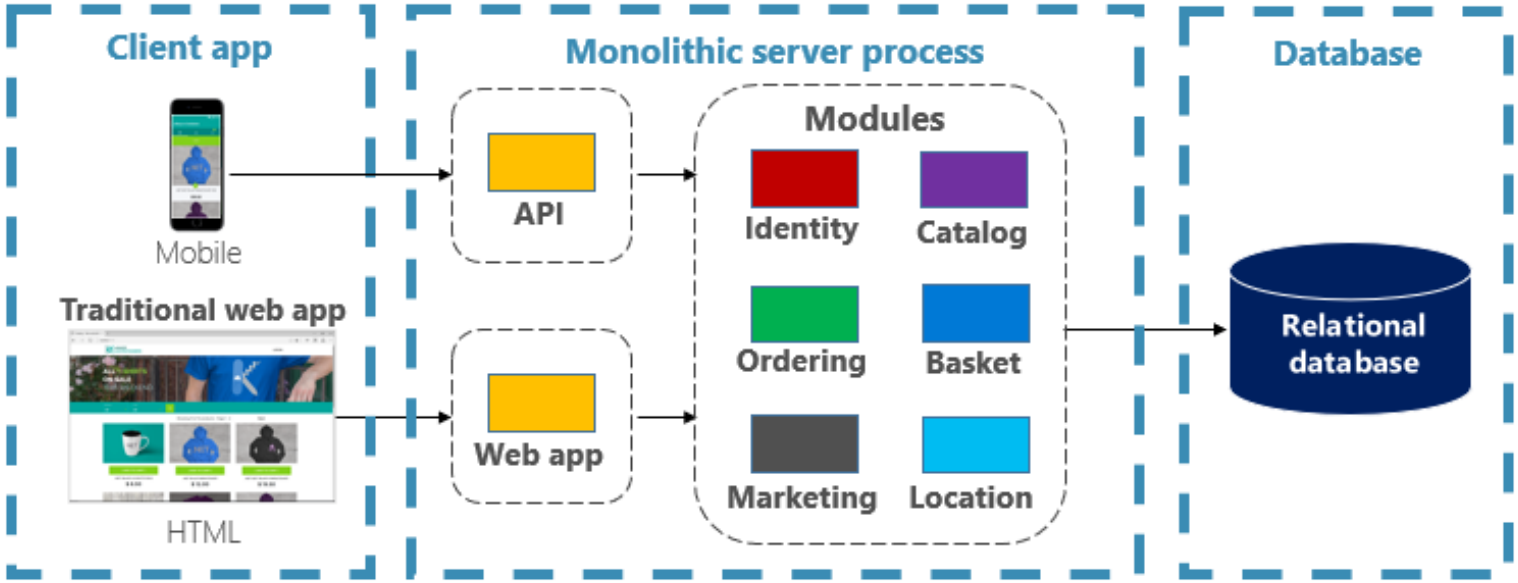
Automation

Collaboration

Customer Journey



Traditional Software Development



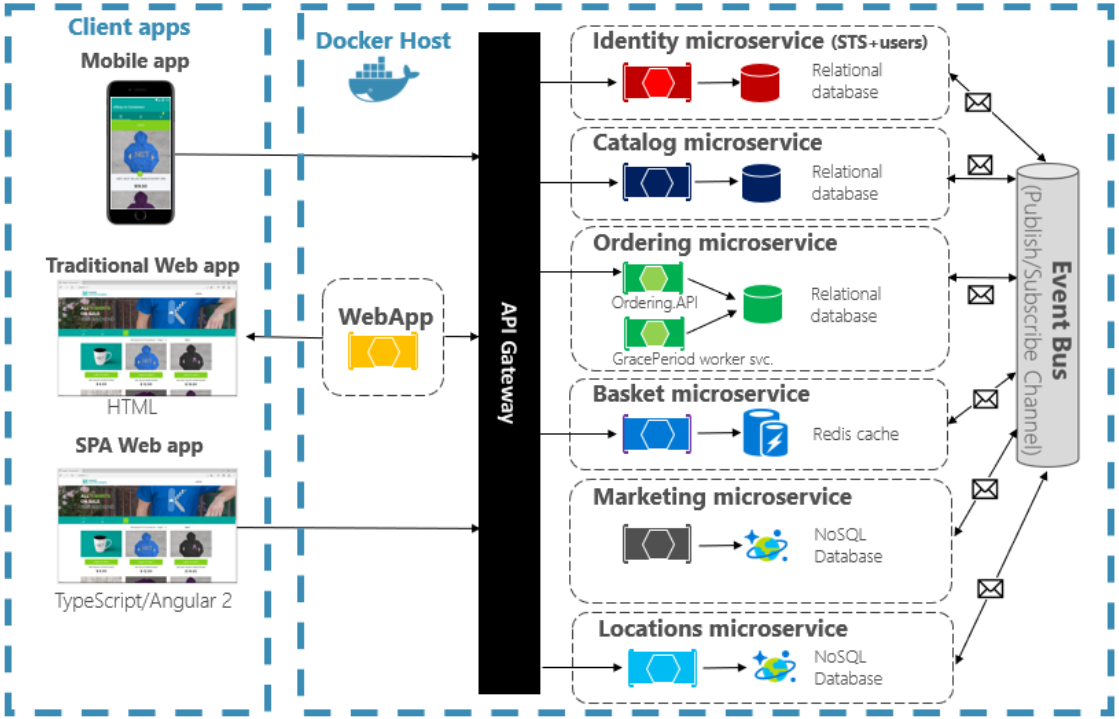
Monolithic Software Design

Modern Software Development

NETFLIX

amazon

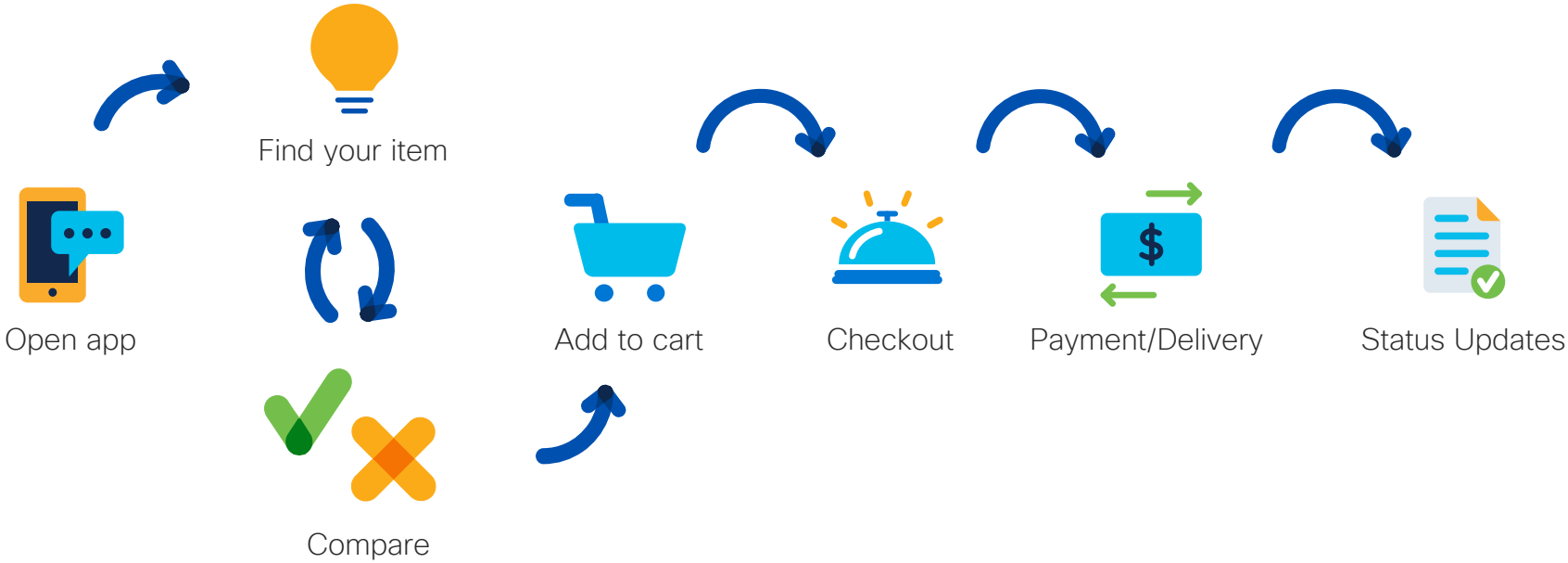
Spotify



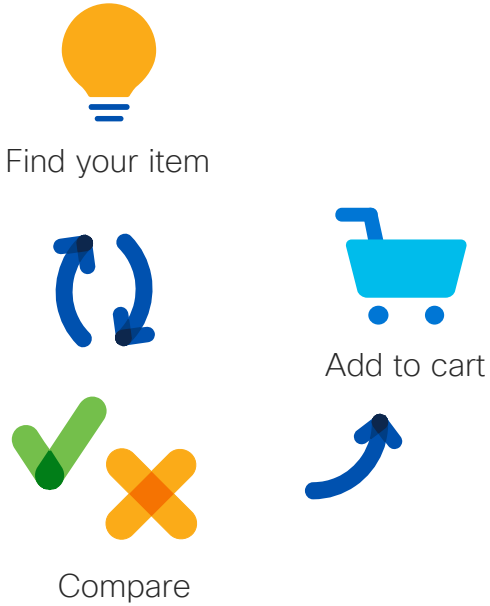
Cloud-native (Microservices) Software Design

Cloud-native Applications

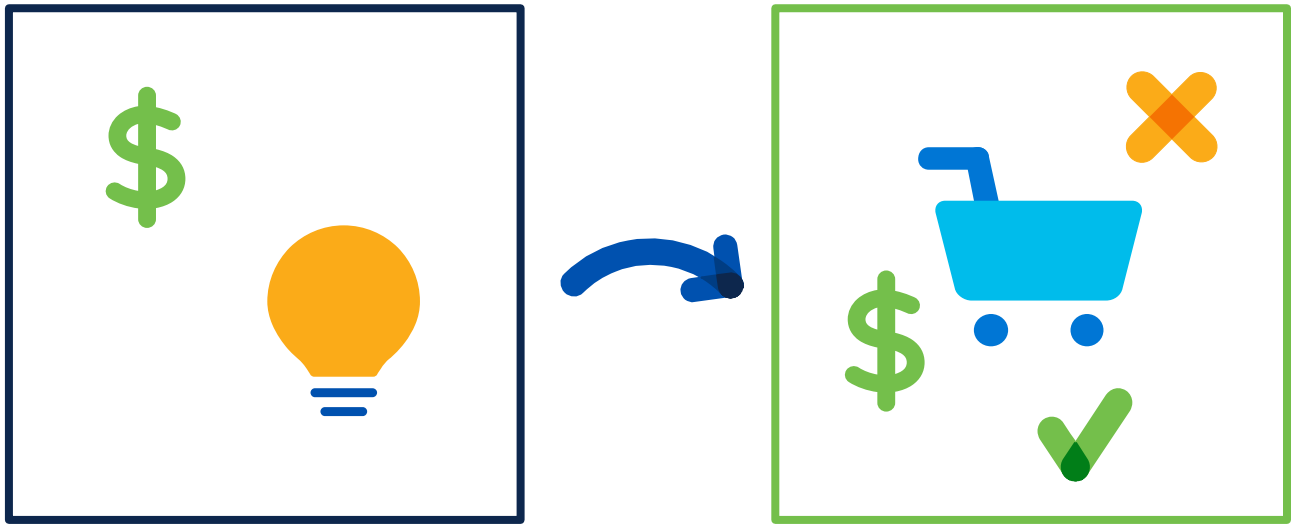
Microservices



Microservices



Microservices



Catalog Microservice

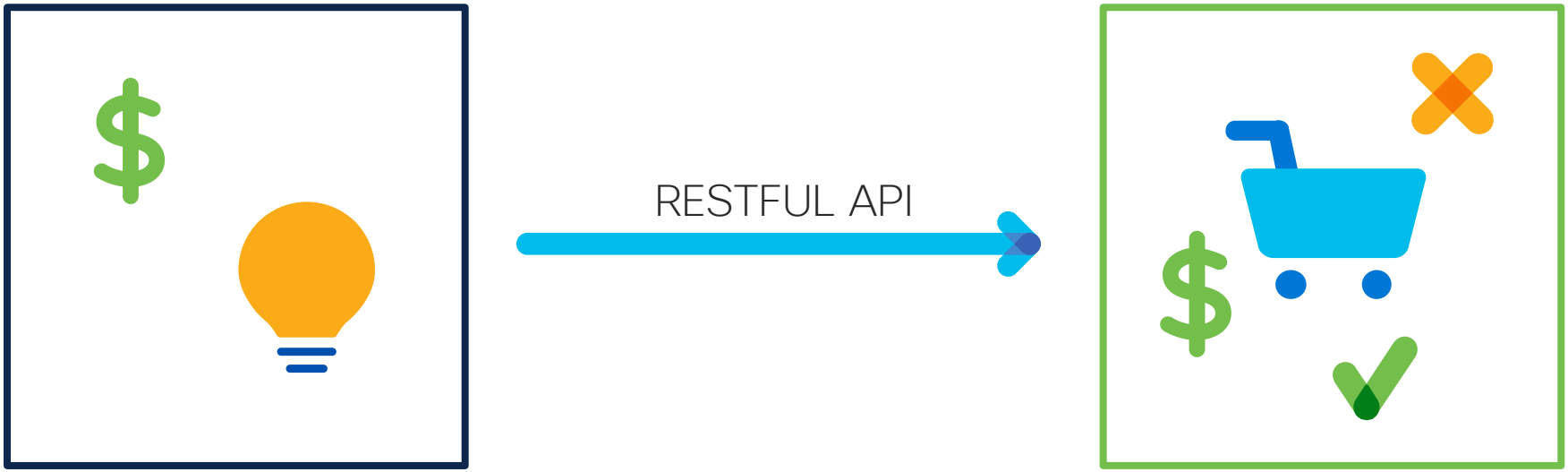
Cart Microservice

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

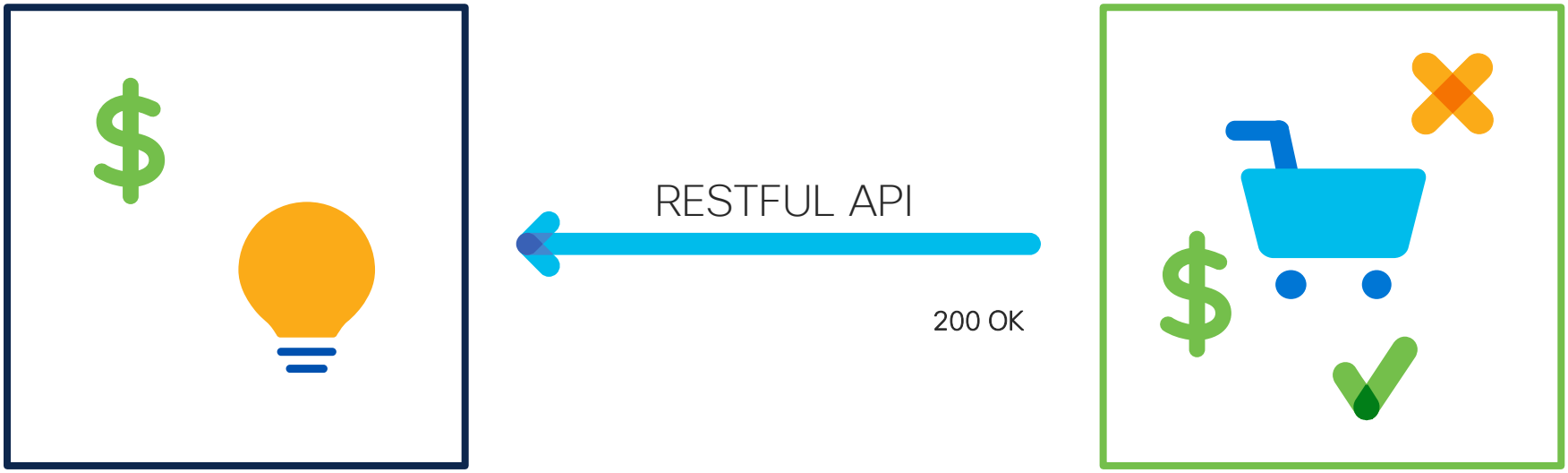
Catalog Microservice

RESTFUL API

POST
Customer ID
Item ID
Quantity
Type
- Colour
- Size

Cart Microservice

API's and Communication



Catalog Microservice

Cart Microservice

API's and Communication

RESTFUL API

200 OK

Catalog Microservice

Cart Microservice

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

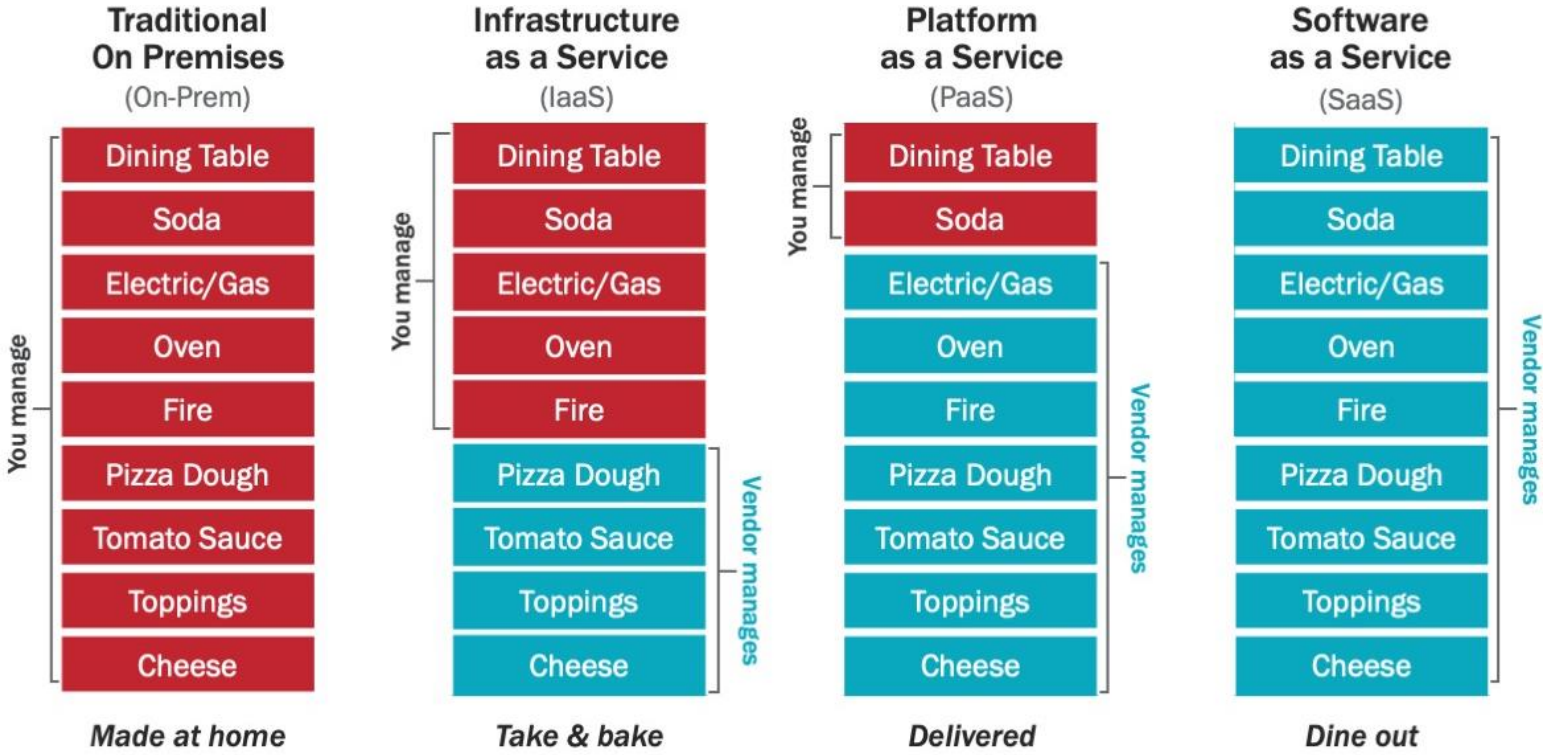
200 OK

Cart Microservice

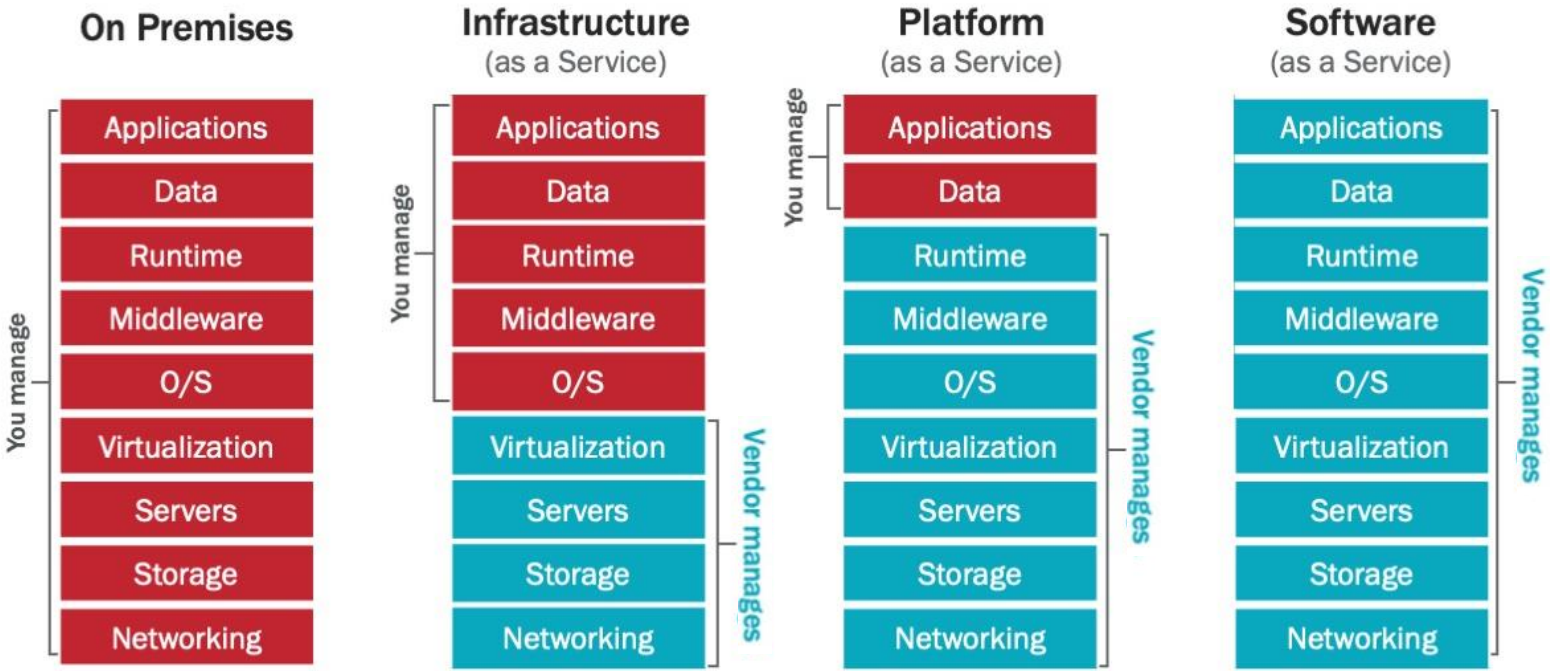
Database Microservice

Deploying Applications

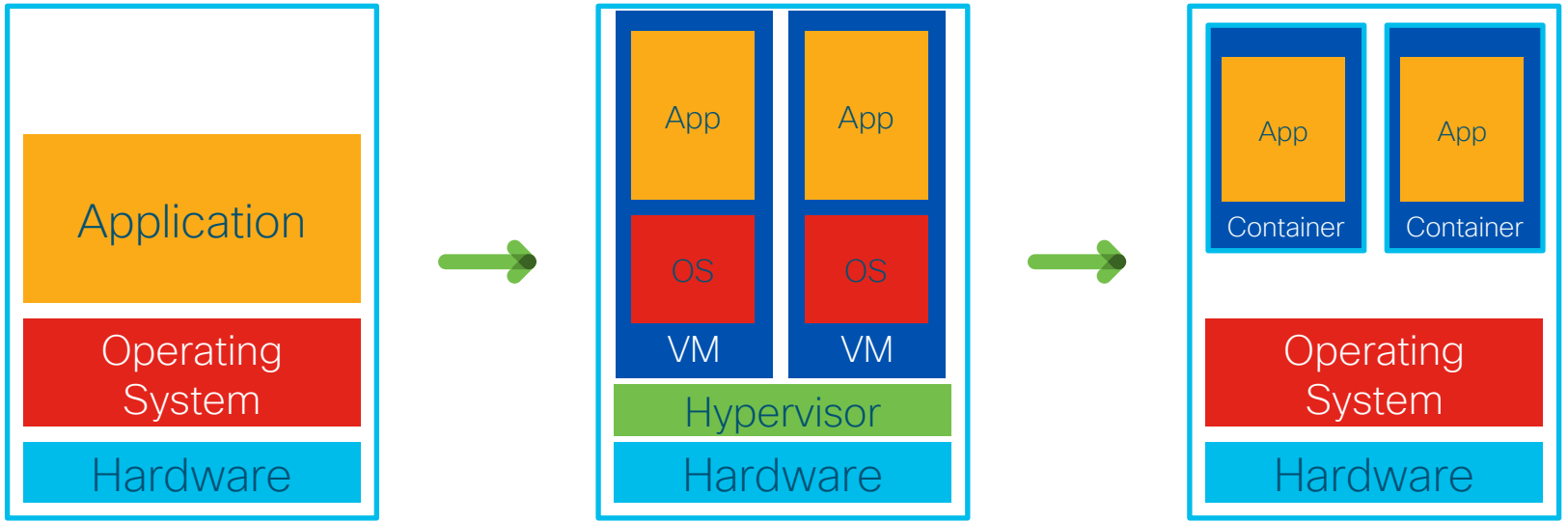
Pizza as a Service



Deployment Models



Deployment Types



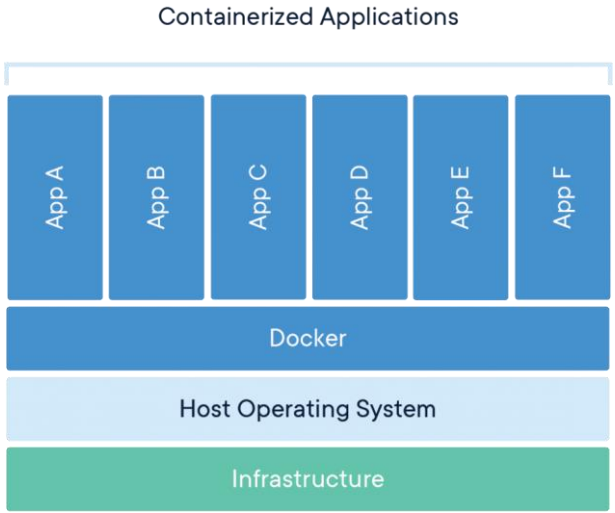
No virtualisation (Bare Metal)

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

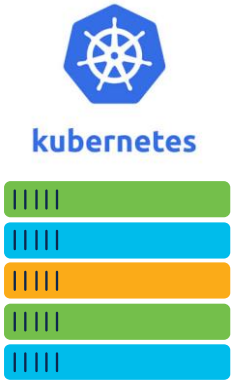
Microservices

Isolation

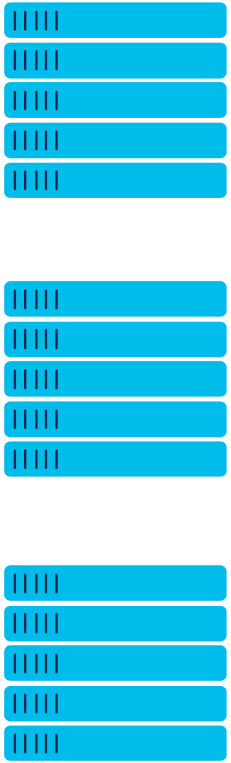
Utilisation

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

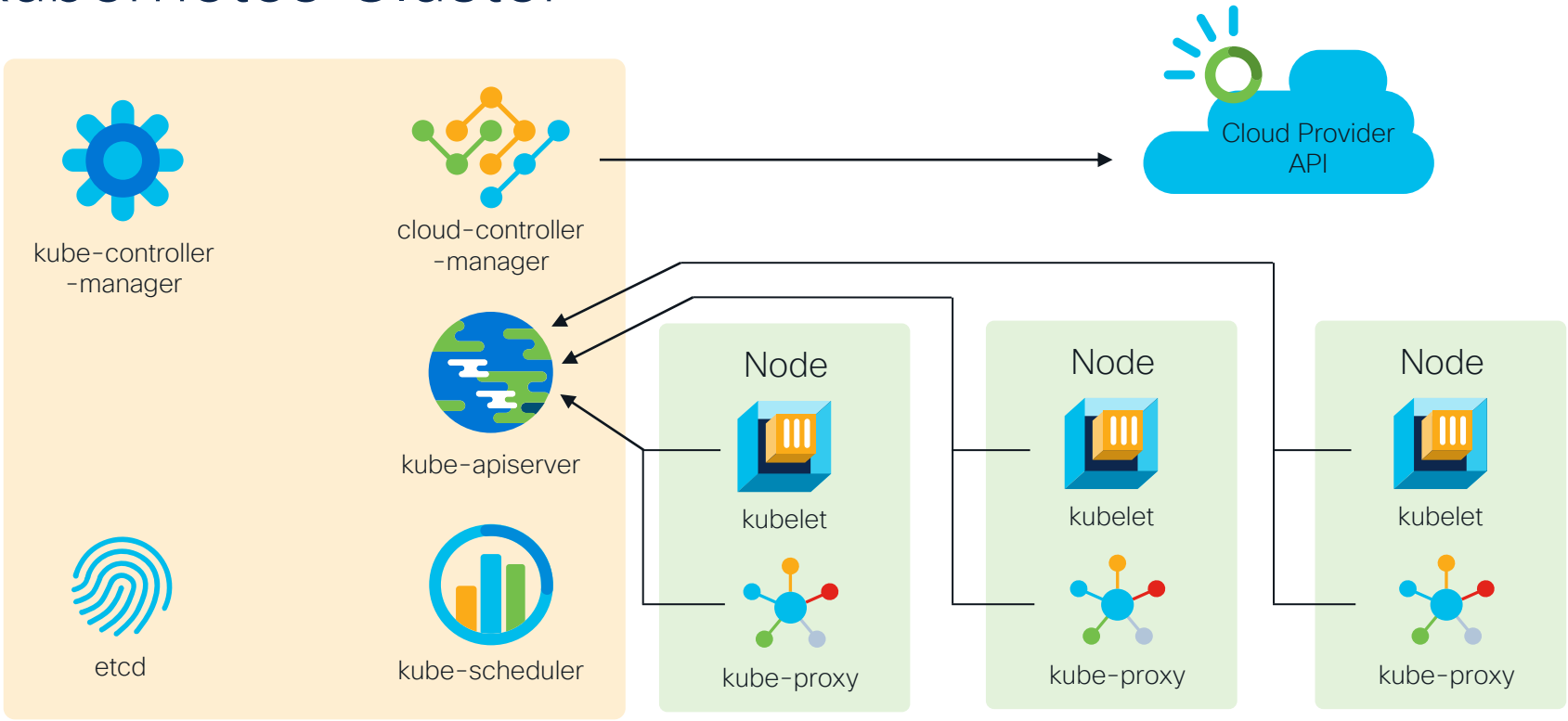
Self-healing

- Restarting failed containers
- Kill non-compliant containers

Secrets

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

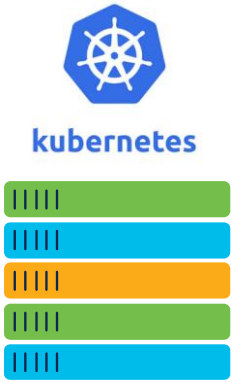
Kubernetes Cluster



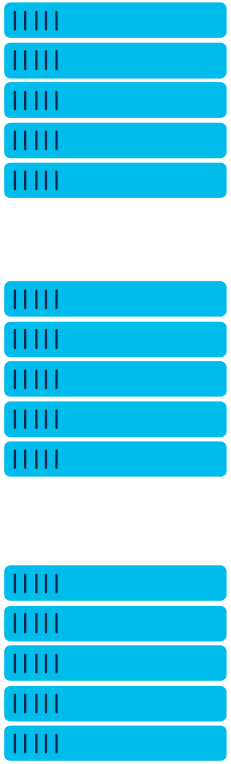
Control Plane

Kubernetes

Deployment.yaml

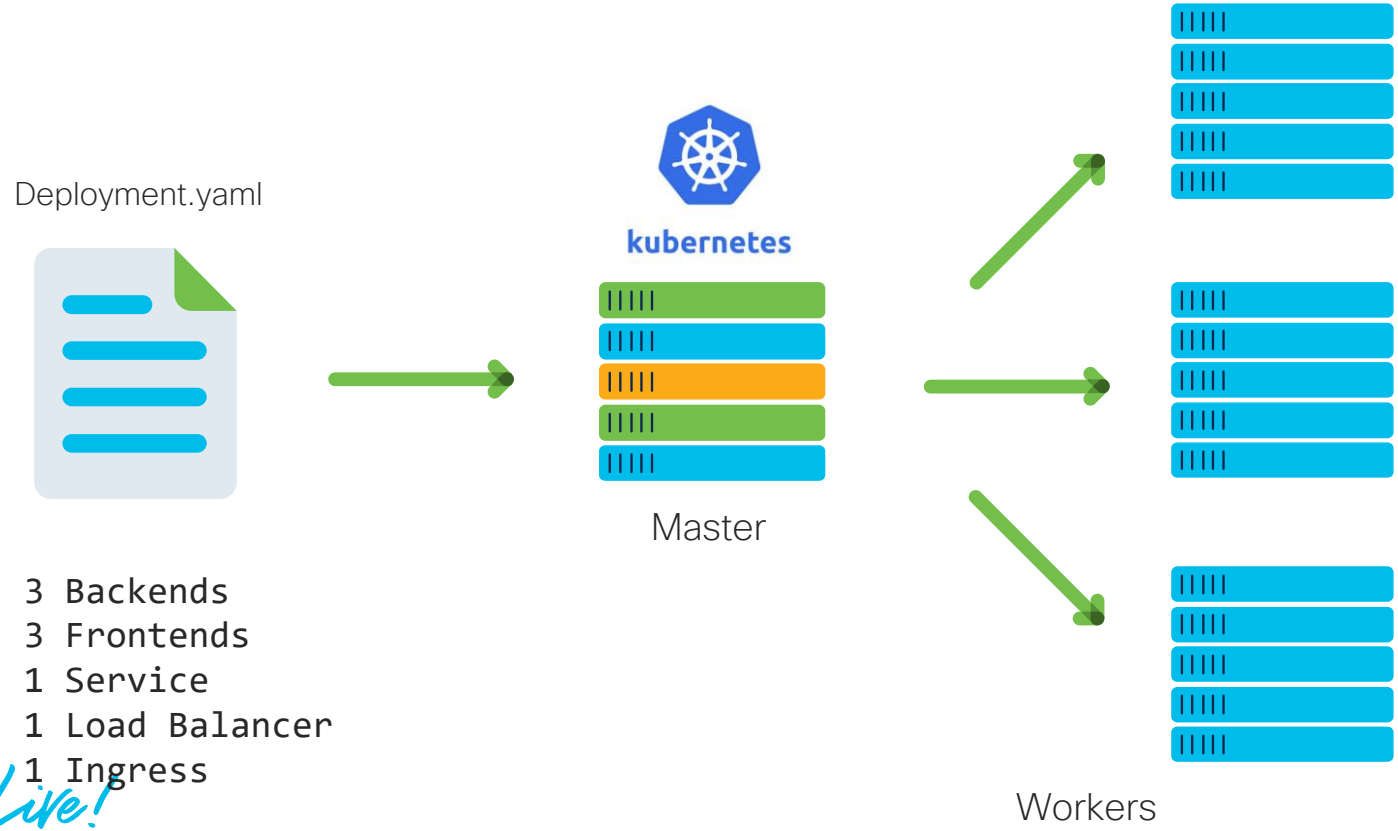


Master



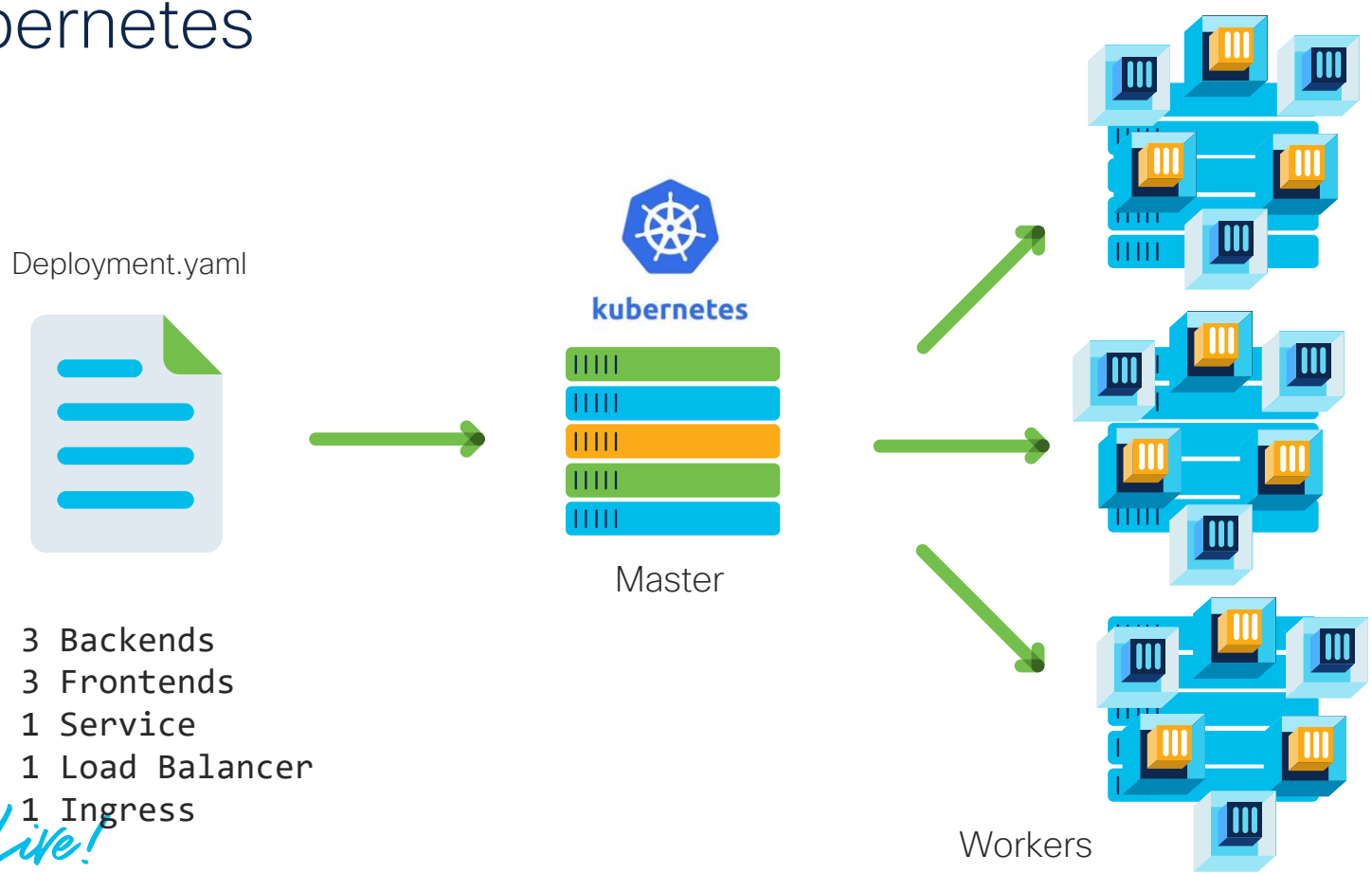
Workers

Kubernetes

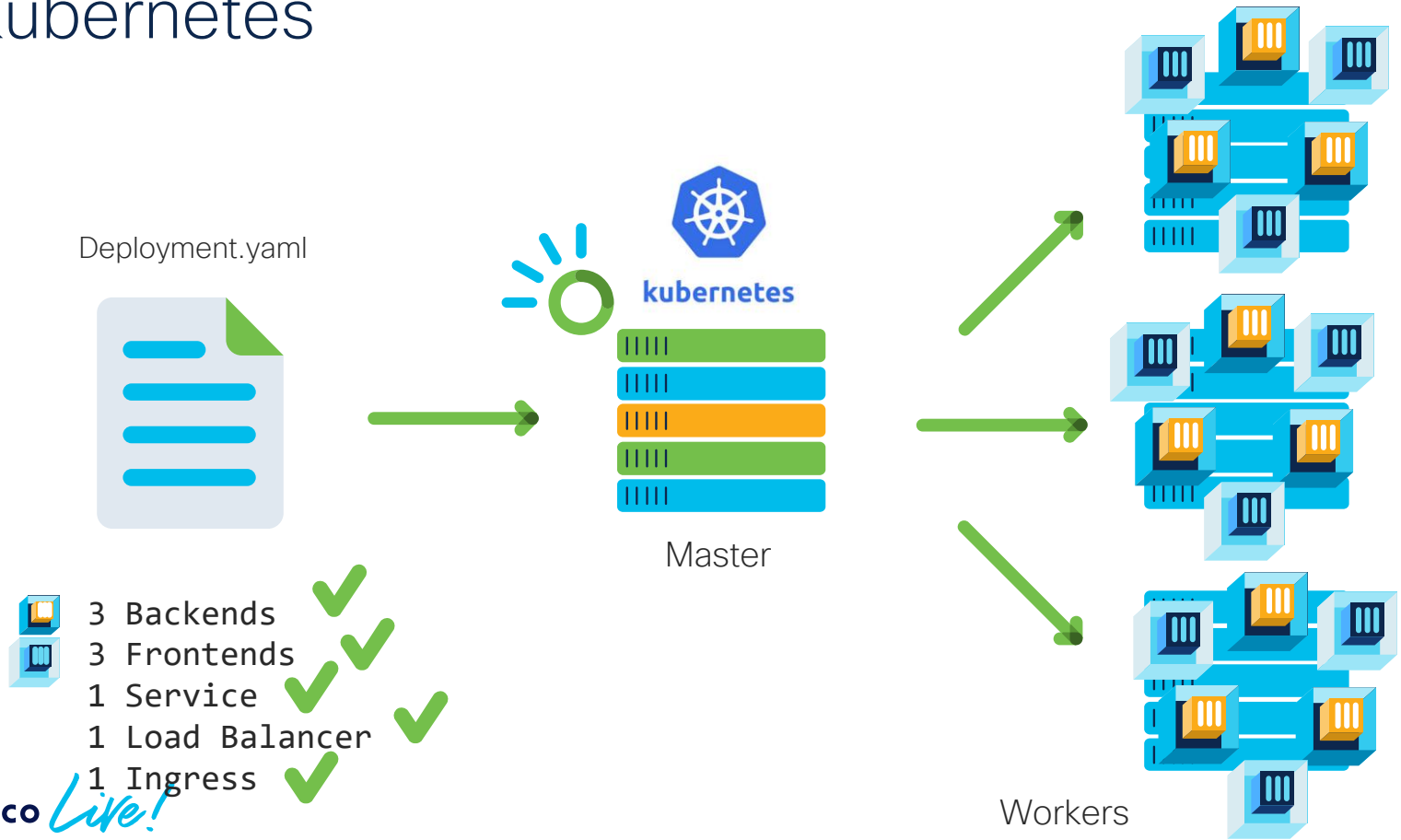



```
3 Backends
3 Frontends
1 Service
1 Load Balancer
1 Ingress
```

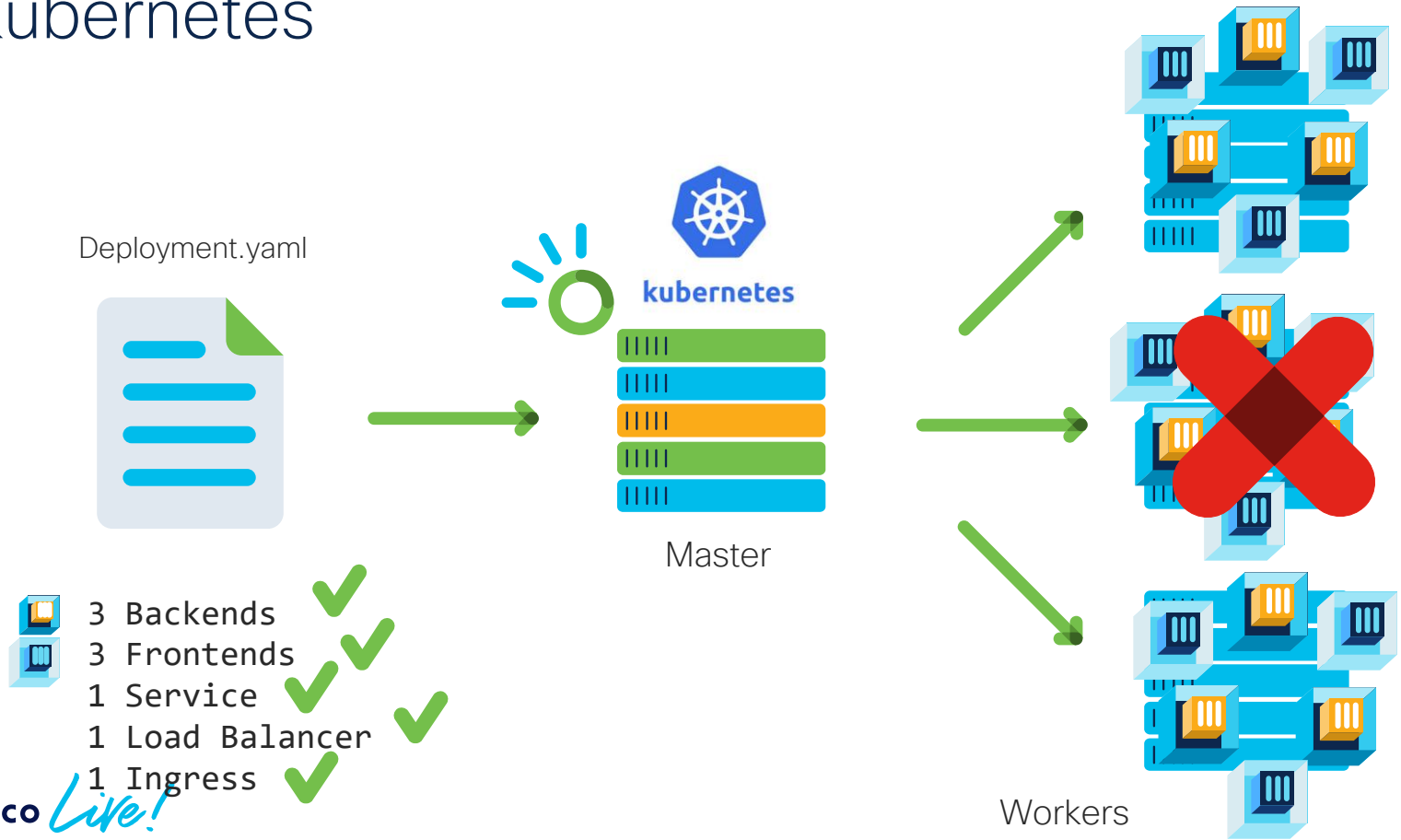
Kubernetes



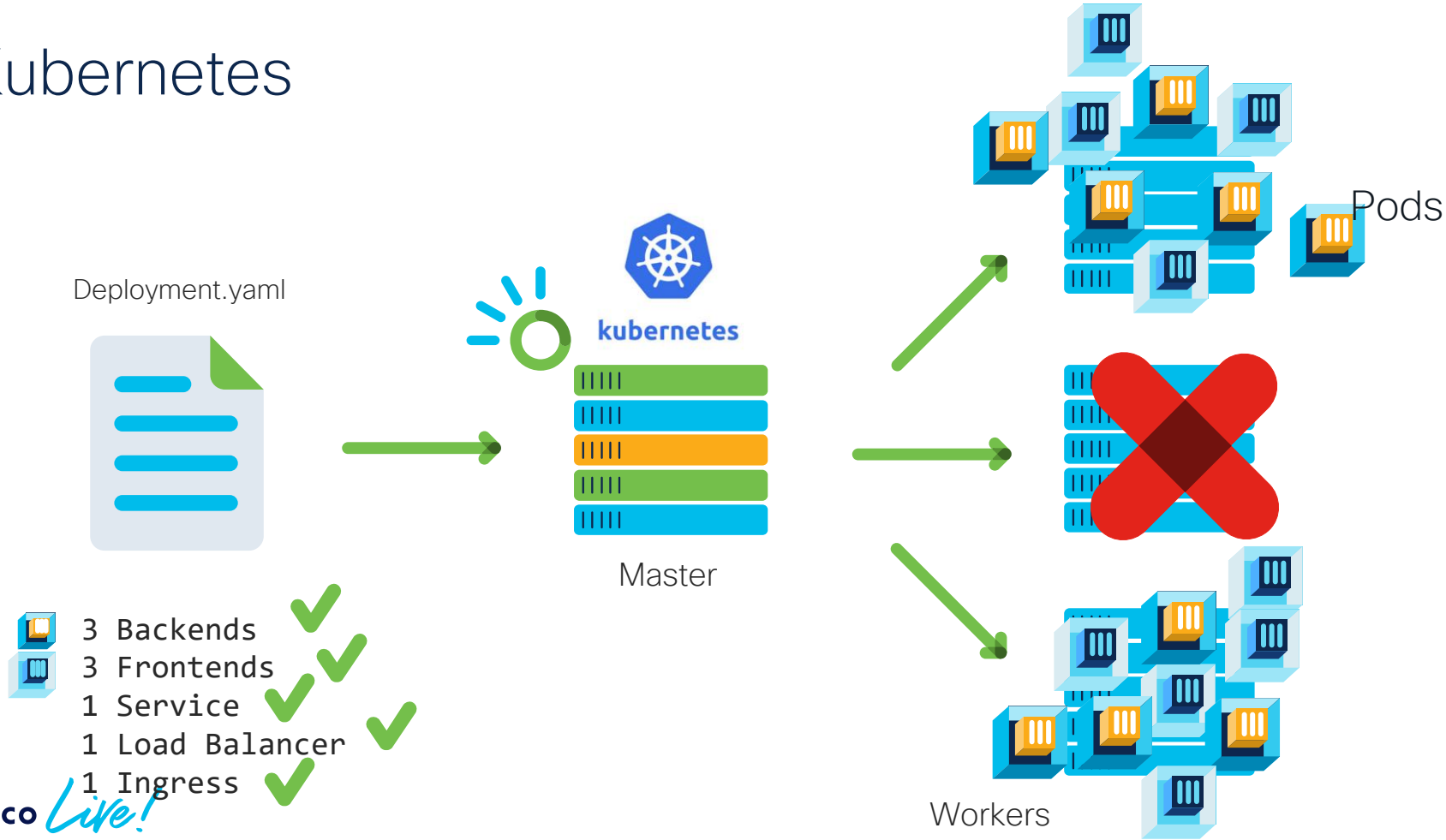
Kubernetes



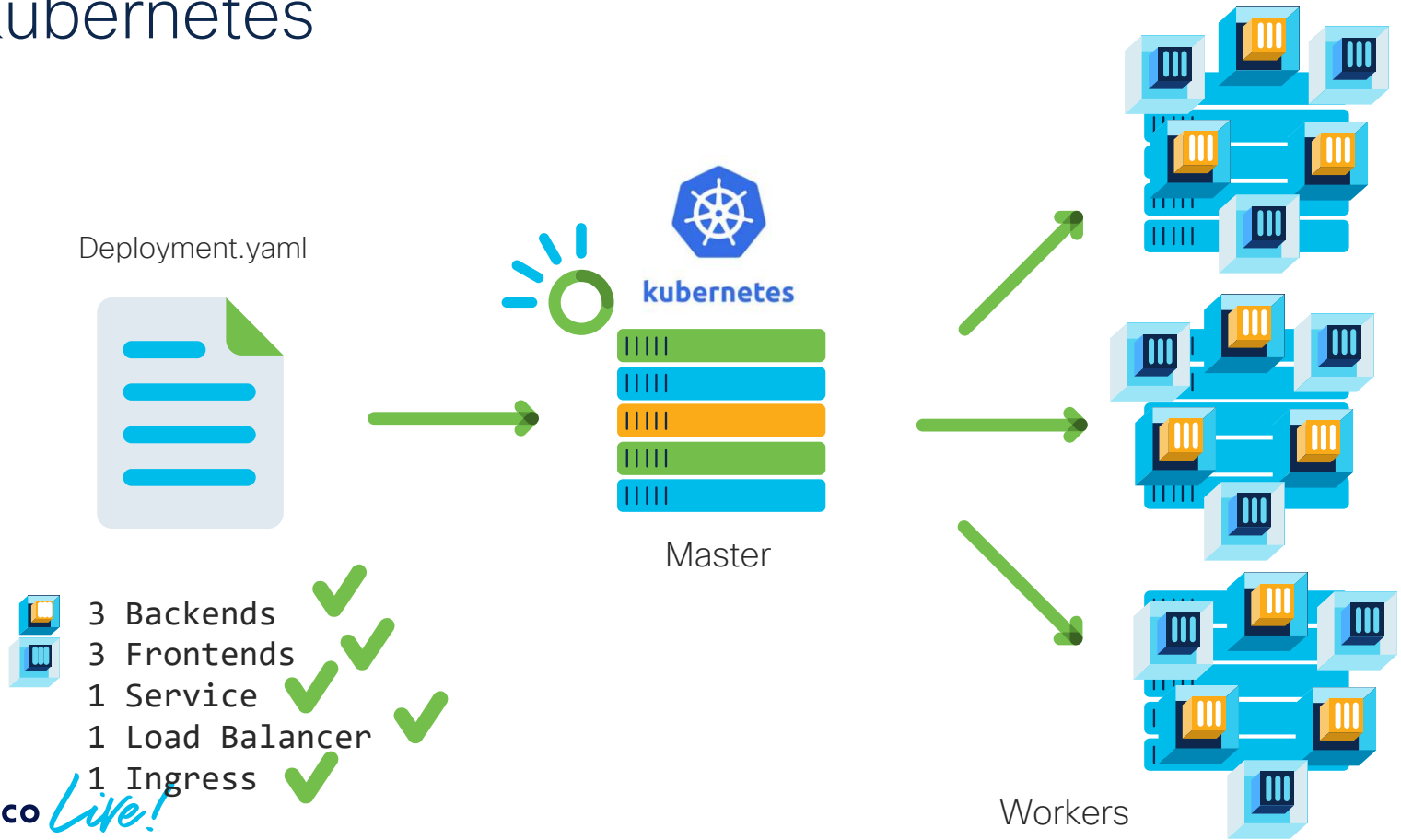
Kubernetes



Kubernetes

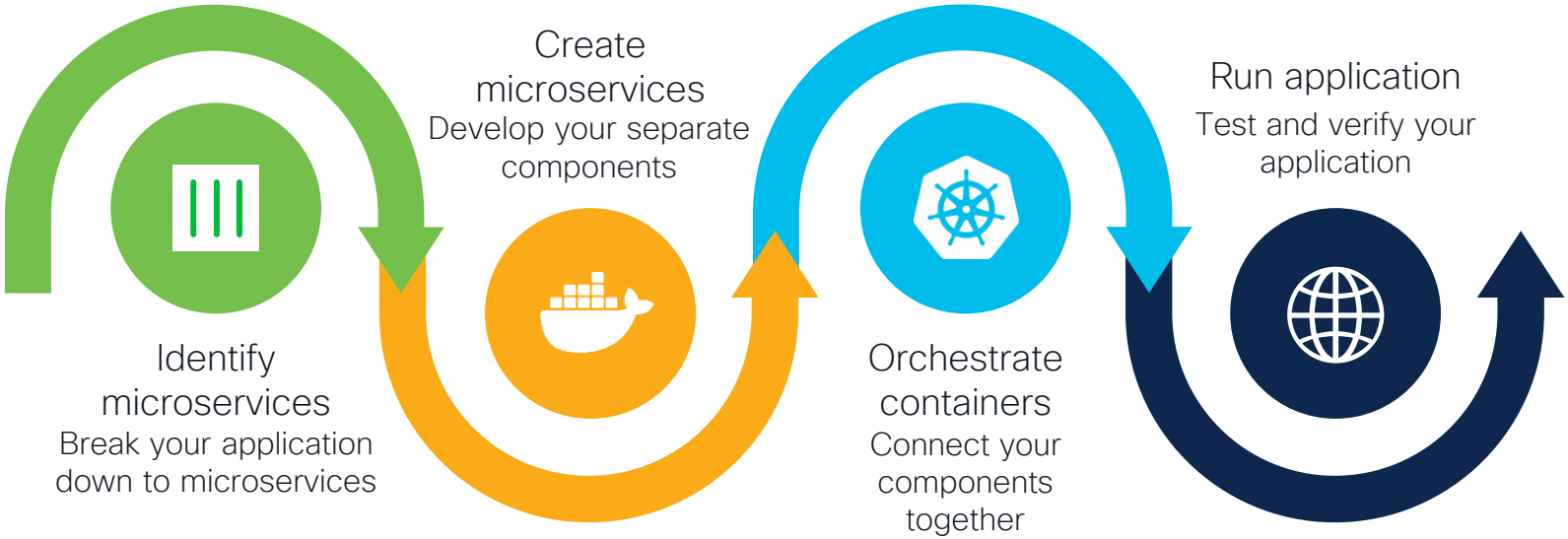


Kubernetes



Basic Setup

microservices-basic



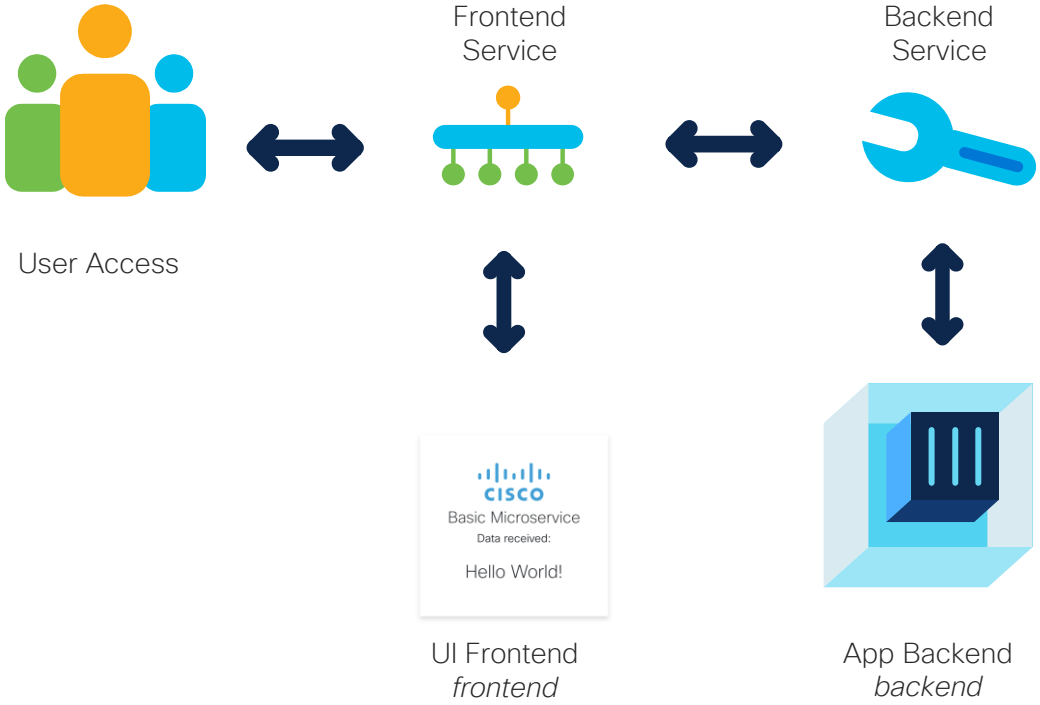
microservices-basic

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
```

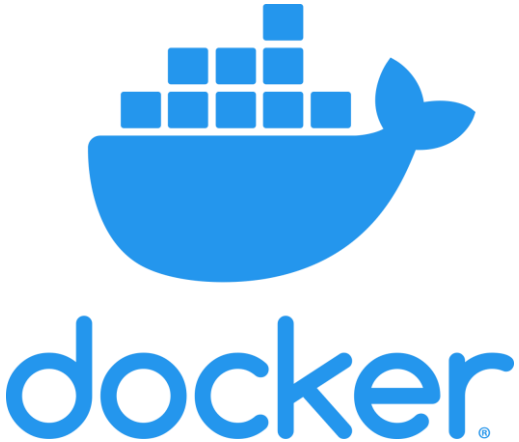
```
template:
  metadata:
    labels:
      app: frontend
  spec:
    containers:
      - name: frontend
        image: frontend
        imagePullPolicy: Never
        ports:
          - containerPort: 5001
    imagePullSecrets:
      - name: secret
```

Service (Frontend)

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

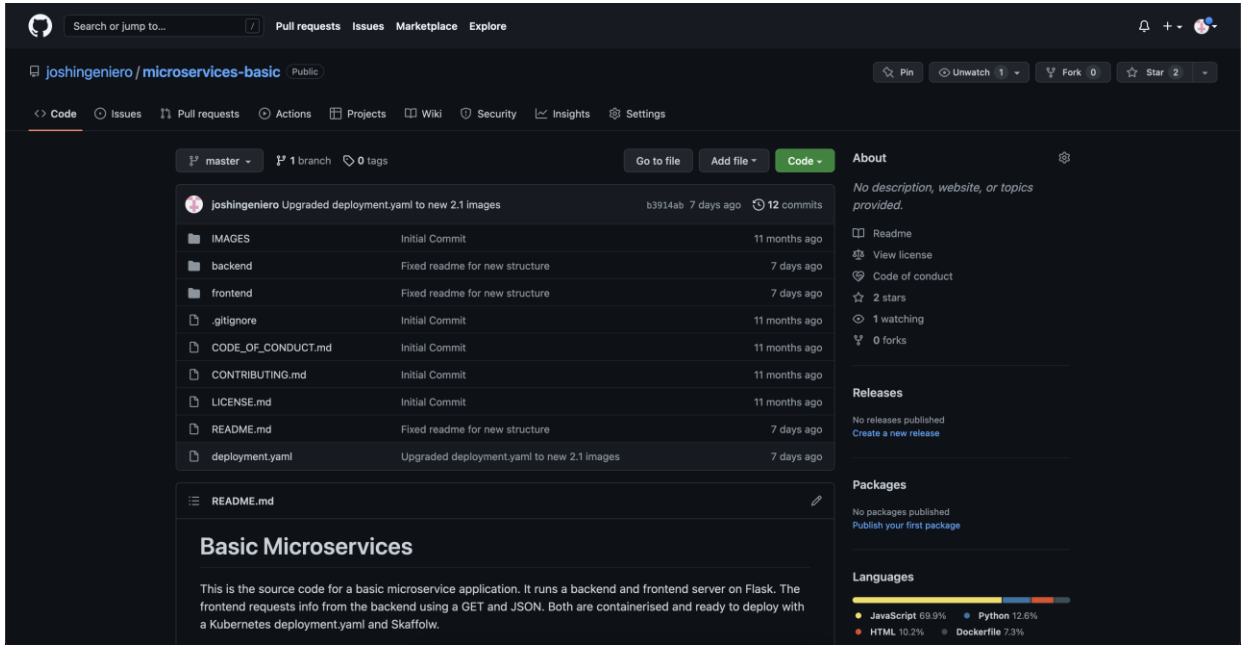
Demo

Setup



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 Las Vegas!",
    "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 great!",
    "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/

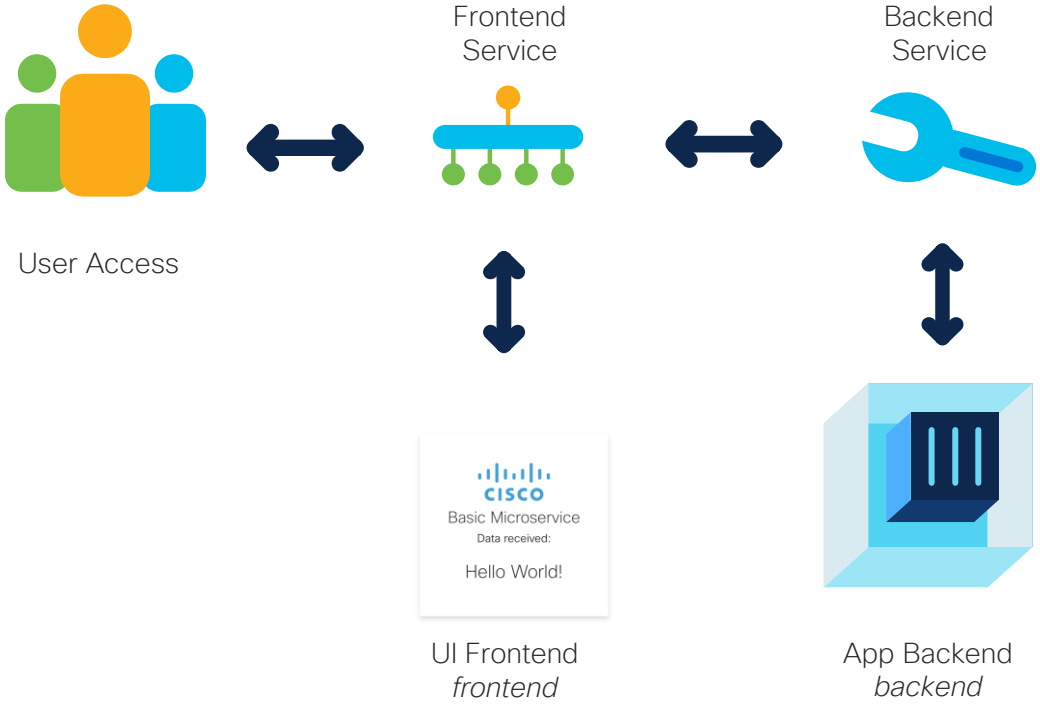
Modifying the application

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

Session Surveys

We would love to know your feedback on this session!

- Complete the session surveys in the Cisco Events mobile app. You'll earn some points in the Cisco Live Game and potentially win a prize.
- Complete a minimum of four session and the overall event surveys to claim a Cisco Live cable bag.

Continue your education

Visit the Cisco Showcase for related demos

Book your one-on-one Meet the Expert meeting

Attend the interactive education with DevNet, Capture the Flag, and Walk-in Labs

Visit the On-Demand Library for more sessions at www.CiscoLive.com/on-demand

Cisco Learning and Certifications

From technology training and team development to Cisco certifications and learning plans, let us help you empower your business and career. www.cisco.com/go/certs

Pay for Learning with Cisco Learning Credits

(CLCs) are prepaid training vouchers redeemed directly with Cisco.

Learn

Cisco U.
IT learning hub that guides teams and learners toward their goals

Cisco Digital Learning
Subscription-based product, technology, and certification training

Cisco Modeling Labs
Network simulation platform for design, testing, and troubleshooting

Cisco Learning Network
Resource community portal for certifications and learning

Train

Cisco Training Bootcamps
Intensive team & individual automation and technology training programs

Cisco Learning Partner Program
Authorized training partners supporting Cisco technology and career certifications

Cisco Instructor-led and Virtual Instructor-led training
Accelerated curriculum of product, technology, and certification courses

Certify

Cisco Certifications and Specialist Certifications
Award-winning certification program empowers students and IT Professionals to advance their technical careers

Cisco Guided Study Groups
180-day certification prep program with learning and support

Cisco Continuing Education Program
Recertification training options for Cisco certified individuals


The bridge to possible
Thank you
cisco Live!
DevNet Zone
#CiscoLiveAPJC

#CiscoLiveAPJC