



KubeCon



CloudNativeCon

Europe 2019

Intro to CNAB

Packaging cloud native applications with
multiple toolchains



KubeCon



CloudNativeCon

Europe 2019



Chris Crone

Docker
Engineering

Agenda

- What problem does CNAB try to solve?
- The CNAB specification
- The CNAB ecosystem
- What's next for CNAB?



KubeCon



CloudNativeCon

Europe 2019

The why of CNAB

What is an application?



KubeCon



CloudNativeCon

Europe 2019

"A program or piece of software designed to fulfill a particular purpose" – Oxford English Dictionary

What is an application actually?



KubeCon



CloudNativeCon

Europe 2019

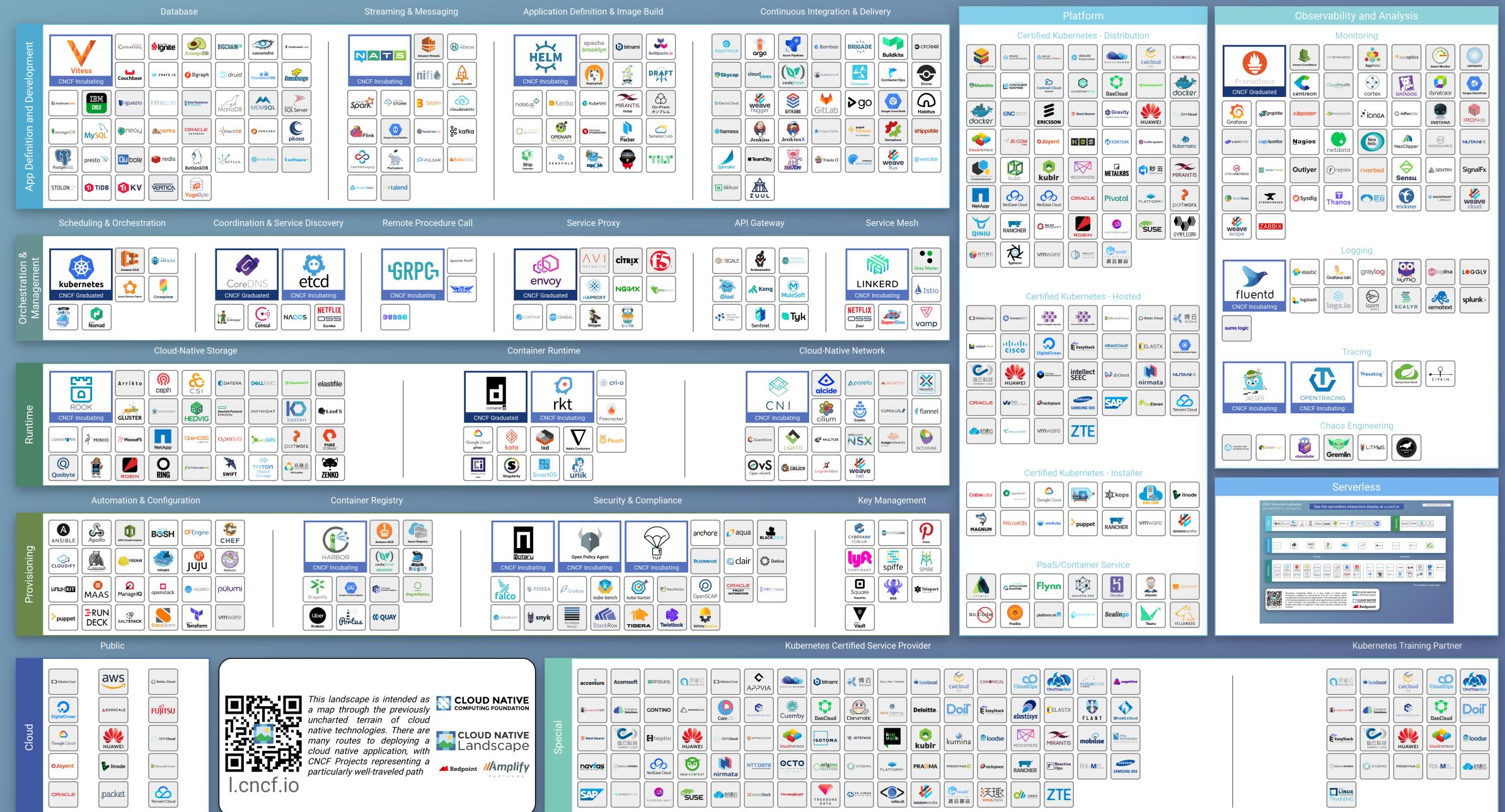
- A. A binary in a virtual machine
 - B. A binary in a container
 - C. Multiple containers orchestrated by Kubernetes
 - D. A hosted database and some lambdas
 - E. Any combination of the above
- (or something completely different!)

How do you deploy an application?



Europe 2019

```
# apt get install  
$ terraform apply  
$ helm install  
$ kubectl apply  
$ docker stack deploy  
$ aws
```



What is CNAB?



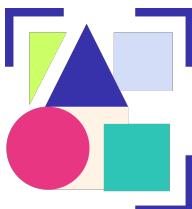
KubeCon



CloudNativeCon

Europe 2019

- Cloud Native Application Bundle
- Packaging format for distributed applications
- Specification



What are CNAB's goals?



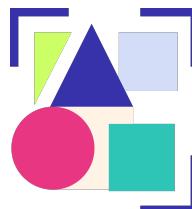
KubeCon

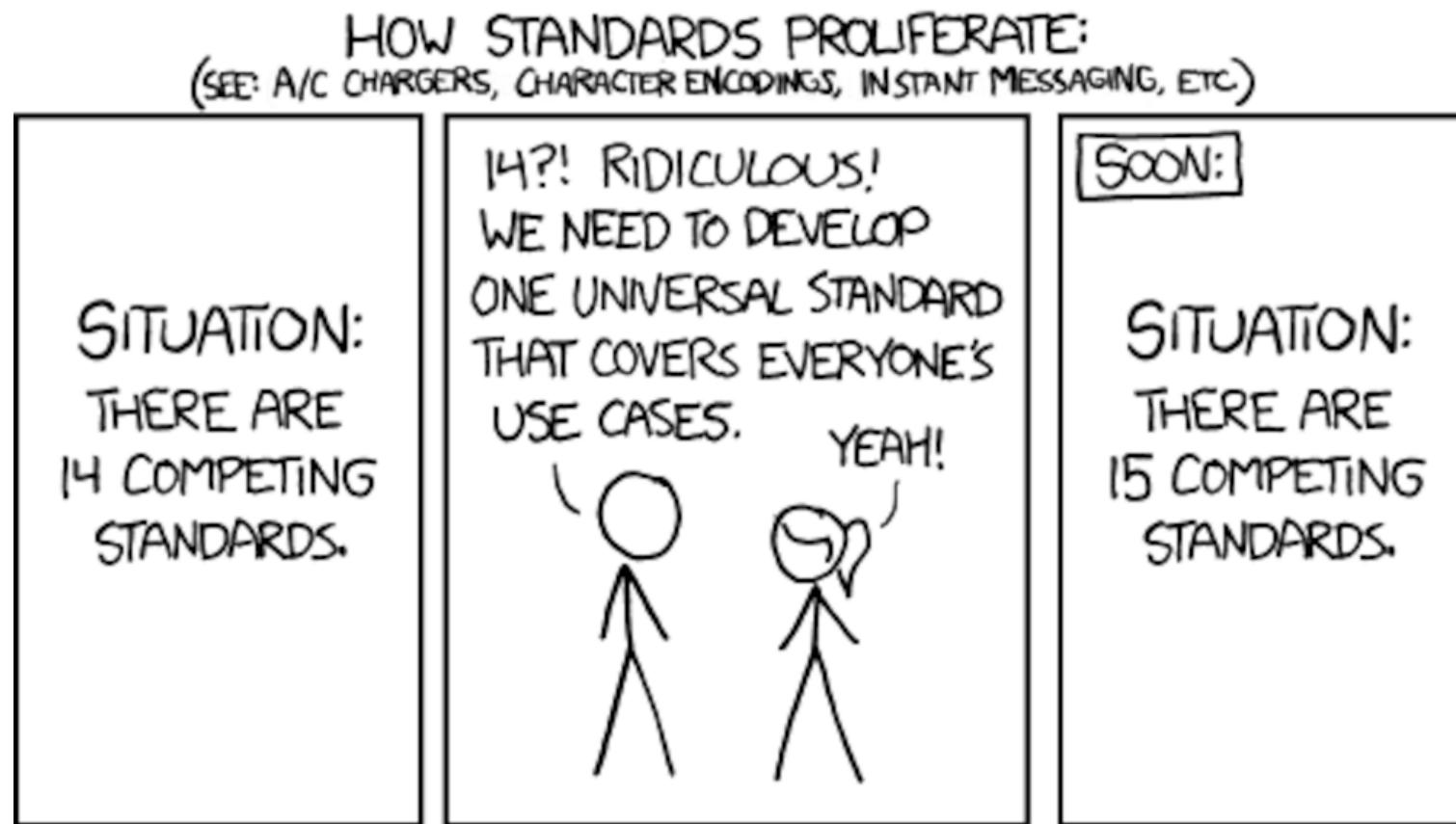


CloudNativeCon

Europe 2019

- Deploy complex applications easily
- Cloud agnostic
- Secure
- Handle a spread of use cases







KubeCon



CloudNativeCon

Europe 2019



Pivotal.[®]



Find commonality

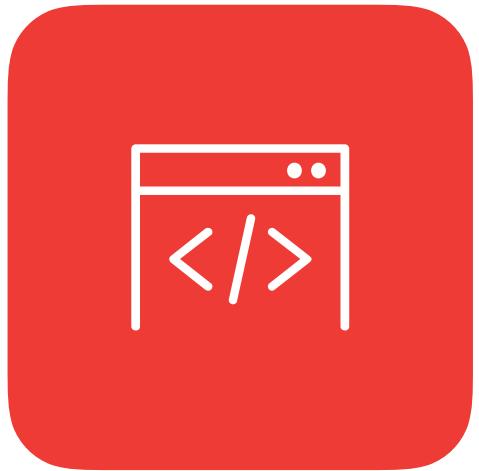


KubeCon



CloudNativeCon

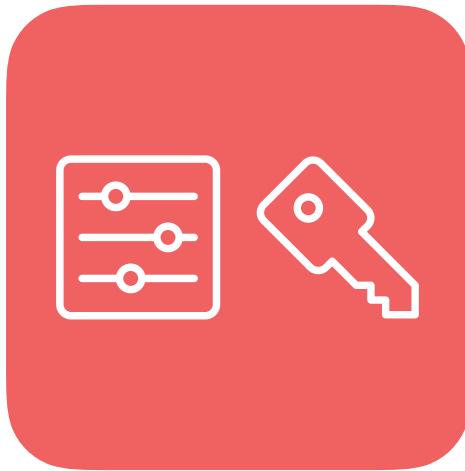
Europe 2019



Definition



Tooling



**Parameters
&
Credentials**

Reuse what we have



KubeCon



CloudNativeCon

Europe 2019

Container Application

	Definition	Artifact	Sharing
Container	Dockerfile	OCI image	OCI registry
Application	?	OCI image?	OCI registry?



KubeCon



CloudNativeCon

Europe 2019

The CNAB specification

CNAB specification



KubeCon

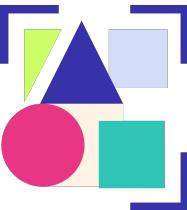


CloudNativeCon

Europe 2019

- Bundle definition
- Invocation image
- Runtime
- Claim store (WIP)
- Signing (WIP)
- Distribution (WIP)

<https://github.com/deislabs/cnab-spec>



Bundle definition



KubeCon



CloudNativeCon

Europe 2019

- Metadata
 - Name, version, description, etc.
- Reference to the *invocation image*
 - The installer
- List of executable images
- List of parameters
- List of credentials



KubeCon



CloudNativeCon

Europe 2019

```
{  
  "name": "myapp", "version": "0.1.0", "description": "...",  
  "invocationImages": [  
    {  
      "digest": "sha256:c0ffee...",  
      "name": "user/app:0.1.0",  
      "imageType": "docker"  
    }  
  ],  
  "credentials": {  
    "kubeconfig": {"path": "/home/.kube/config"}  
  },  
  "parameters": {  
    "port": {"type": "integer", "default": 80, ...}  
  },  
  ...  
}
```



KubeCon



CloudNativeCon

Europe 2019

```
{  
  "name": "myapp", "version": "0.1.0", "description": "...",  
  "invocationImages": [  
    {  
      "digest": "sha256:c0ffee...",  
      "name": "user/app:0.1.0",  
      "imageType": "docker"  
    }  
  ],  
  "credentials": {  
    "kubeconfig": {"path": "/home/.kube/config"}  
  },  
  "parameters": {  
    "port": {"type": "integer", "default": 80, ...}  
  },  
  ...  
}
```



KubeCon



CloudNativeCon

Europe 2019

```
{  
  "name": "myapp", "version": "0.1.0", "description": "...",  
  "invocationImages": [  
    {  
      "digest": "sha256:c0ffee...",  
      "name": "user/app:0.1.0",  
      "imageType": "docker"  
    }  
  ],  
  "credentials": {  
    "kubeconfig": {"path": "/home/.kube/config"}  
  },  
  "parameters": {  
    "port": {"type": "integer", "default": 80, ...}  
  },  
  ...  
}
```



KubeCon



CloudNativeCon

Europe 2019

```
{  
  "name": "myapp", "version": "0.1.0", "description": "...",  
  "invocationImages": [  
    {  
      "digest": "sha256:c0ffee...",  
      "name": "user/app:0.1.0",  
      "imageType": "docker"  
    }  
  ],  
  "credentials": {  
    "kubeconfig": {"path": "/home/.kube/config"}  
  },  
  "parameters": {  
    "port": {"type": "integer", "default": 80, ...}  
  },  
  ...  
}
```



KubeCon



CloudNativeCon

Europe 2019

```
{  
  "name": "myapp", "version": "0.1.0", "description": "...",  
  "invocationImages": [  
    {  
      "digest": "sha256:c0ffee...",  
      "name": "user/app:0.1.0",  
      "imageType": "docker"  
    }  
  ],  
  "credentials": {  
    "kubeconfig": {"path": "/home/.kube/config"}  
  },  
  "parameters": {  
    "port": {"type": "integer", "default": 80, ...}  
  },  
  ...  
}
```

Invocation image



Europe 2019

- Container image
- Contains application definition and deployment tooling
- Specific filesystem layout
- Well defined entry point
- Required actions
 - Install, upgrade, uninstall

```
cnab/                                # REQUIRED top-level directory
└── build/
    └── Dockerfile      # OPTIONAL
└── app/
    ├── run             # REQUIRED: Entry point (executable)
    └── kube/
        └── my-app-kube.yml # Example: Kube YAML for deployment
    └── db/
        ├── main.tf        # Example: Terraform for hosted DB
        └── ...
...
```

```
cnab/                                # REQUIRED top-level directory
└── build/
    ┌── Dockerfile      # OPTIONAL
    └── app/
        ├── run           # REQUIRED: Entry point (executable)
        └── kube/
            └── my-app-kube.yml
        └── db/
            ┌── main.tf      # Example: Terraform for hosted DB
            └── ...

```

CNAB runtime



KubeCon



CloudNativeCon

Europe 2019

- Runtime tool reads bundle.json
- Execute invocation image with CNAB action
 - Inject parameters and credentials
 - Wait for invocation image to finish
 - Runtime tool creates/updates claim

Claim store



KubeCon



CloudNativeCon

Europe 2019

- Keep track of installations
- Each install has a unique name
- Records actions on installations
 - Result (action, status, etc.), bundle used, parameters
- Makes subsequent actions on installations easier



KubeCon



CloudNativeCon

Europe 2019

Demo

Creating a CNAB from scratch



KubeCon



CloudNativeCon

Europe 2019

The CNAB ecosystem

Tools that implement CNAB



KubeCon



CloudNativeCon

Europe 2019

- **deislabs/duffle**
 - Reference implementation, CLI tool
- **deislabs/duffle-bag**
 - GUI tool for CNABs
- **deislabs/porter**
 - Define applications that required multiple toolchains
- **docker/app**
 - Packaging for Compose based applications

CNAB libraries



KubeCon



CloudNativeCon

Europe 2019

- [deislabs/cnab-go](#)
 - CNAB library (Go)
- [deislabs/libcnab-rust](#)
 - CNAB library (Rust)
- [garethr/pyncnab](#)
 - CNAB library (Python)
- [docker/cnab-to-oci](#)
 - Library for sharing CNABs using OCI registries

- Can we reuse the infrastructure we have?
 - Don't want to build an application registry from scratch
 - OCI index is designed to describe a list of OCI artifacts
 - CNAB has invocation image plus an image map
 - OCI index does not have a top level type
 - Use well known annotation to indicate type

- Works with existing container registries
- All images are stored in the same repository
- All image digests are fixed
 - It's reproducible



KubeCon



CloudNativeCon

Europe 2019

Demo

Deploying a complex application

What's to come?

- Specification is still a work in progress
 - Claim store
 - Security
 - Distribution
- More tools that support CNAB
- Dependencies?
- Outputs?

Get involved!



Europe 2019

 cnab.io

 cnab_spec

 deislabs/cnab-spec

 Community meetings

Every second Wednesday, 9 am US Pacific Time

