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# Intro to CNAB

Packaging cloud native applications with  
multiple toolchains



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# Chris Crone

Docker  
Engineering

# Agenda



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



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# The why of CNAB

# What is an application?



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

# What is an application actually?



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- 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?

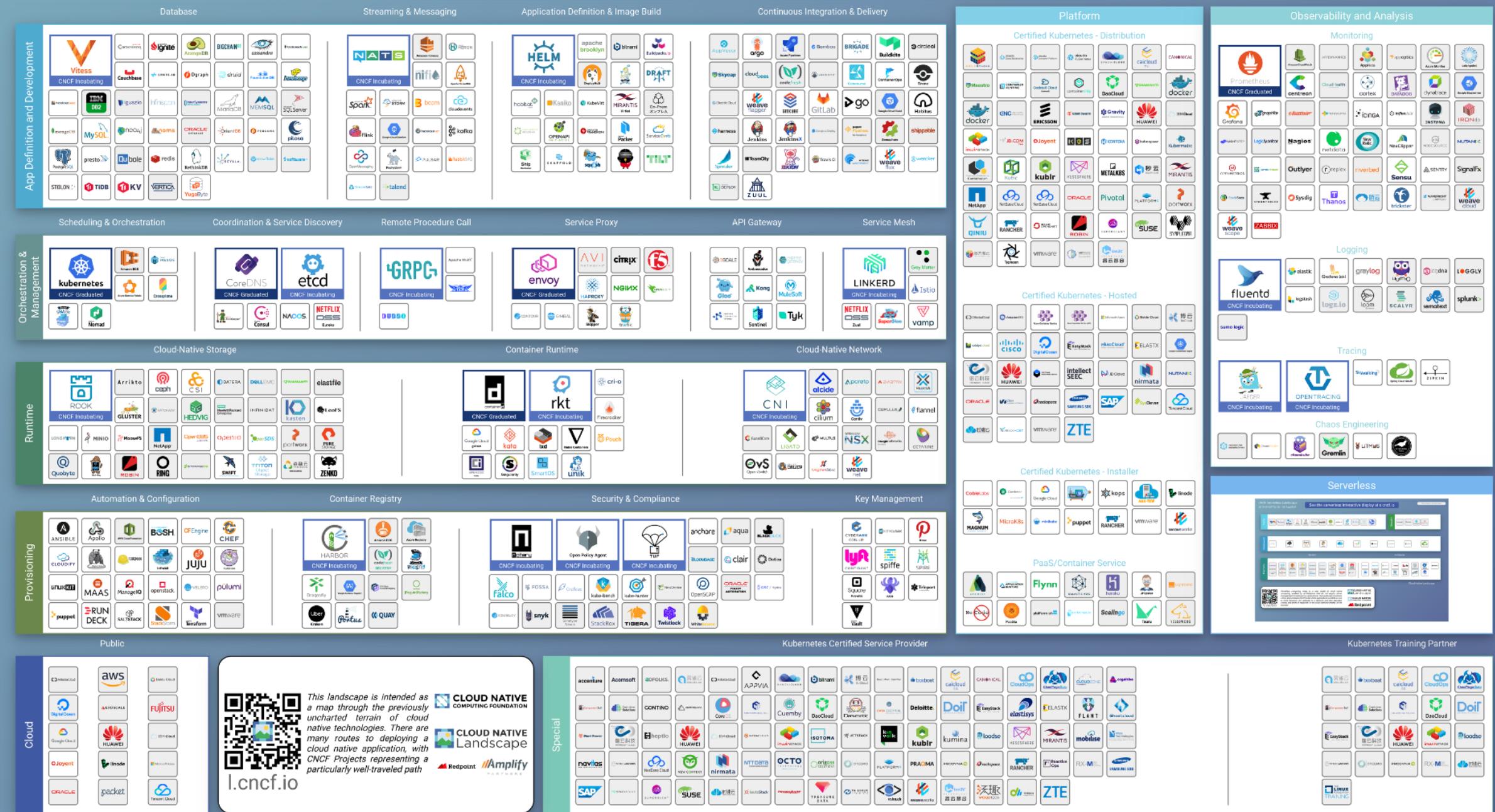


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```
# apt install  
$ terraform apply  
$ helm install  
$ kubectl apply  
$ docker stack deploy  
$ aws
```



# What is CNAB?

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



# What are CNAB's goals?



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



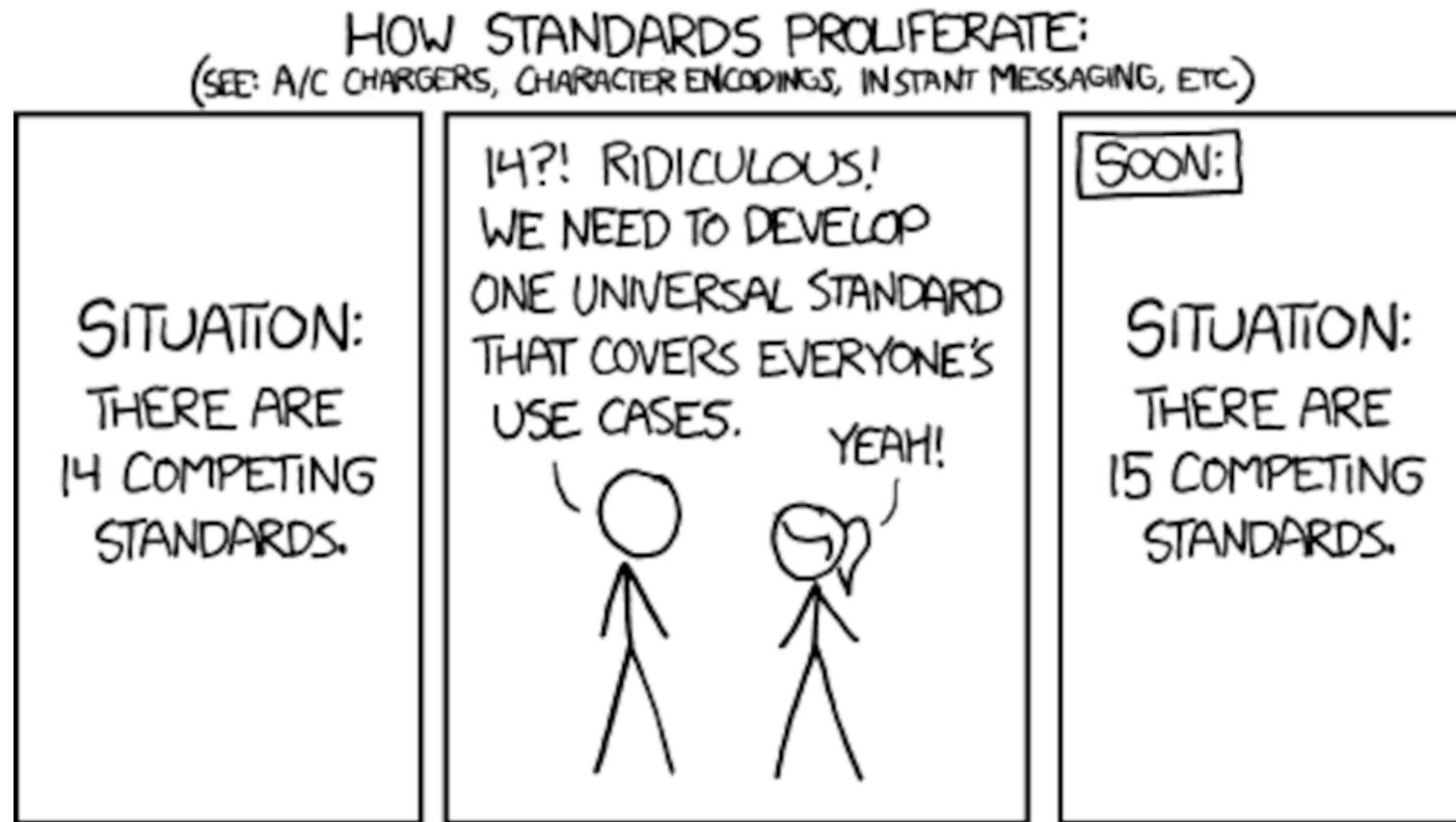


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Pivotal.<sup>®</sup>



# Find commonality

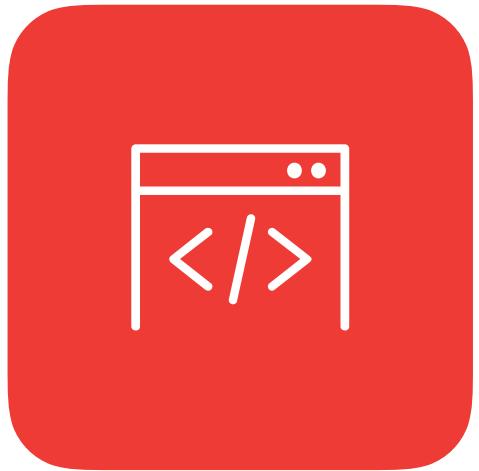


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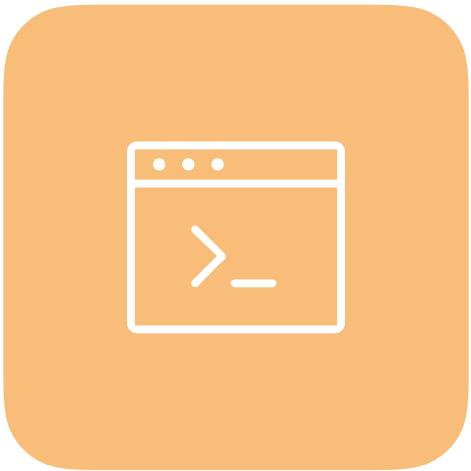


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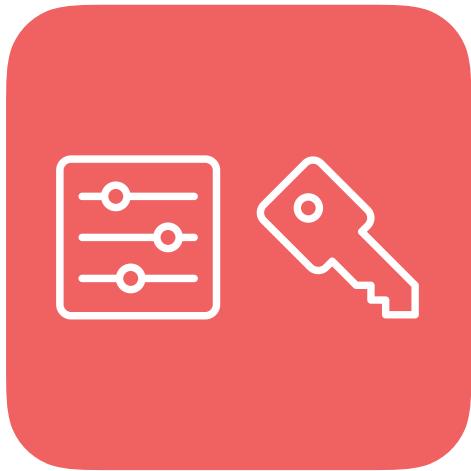
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**Definition**



**Tooling**



**Parameters  
&  
Credentials**

# Reuse what we have



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



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# The CNAB specification

# CNAB specification



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

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



# Bundle definition



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



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```
{  
  "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, ...}  
  },  
  ...  
}
```



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  "parameters": {  
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  ...  
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```



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      "imageType": "docker"  
    }  
  ],  
  "credentials": {  
    "kubeconfig": {"path": "/home/user/.kube/config"}  
  },  
  "parameters": {  
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  ...  
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```



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  },  
  "parameters": {  
    "port": {"type": "integer", "default": 80, ...}  
  },  
  ...  
}
```

# Invocation image



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- Application installer
- 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



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

# Claim store



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



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# Demo

Creating a CNAB from scratch



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# The CNAB ecosystem

# Tools that implement CNAB



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- **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

- [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



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## OCI index



## OCI image



## Blobs



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



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# Demo

Deploying a complex application

# What's to come?



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

# Get involved!

 cnab.io

 cnab\_spec

 deislabs/cnab-spec

 Community meetings

Every second Wednesday, 9 am US Pacific Time

Demos: <https://github.com/chris-crone/kubecon-eu-19>

