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CloudNativeCon

Europe 2019

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

App Definition and Development

Database

Streaming & Messaging

Application Definition & Image Build

Continuous Integration & Delivery

Platform

Certified Kubernetes - Distribution

Observability and Analysis

Monitoring

Orchestration & Management

Scheduling & Orchestration

Coordination & Service Discovery

Remote Procedure Call

Service Proxy

API Gateway

Service Mesh

Platform

Certified Kubernetes - Hosted

Observability and Analysis

Logging

Runtime

Cloud-Native Storage

Container Runtime

Cloud-Native Network

Platform

Certified Kubernetes - Installer

Observability and Analysis

Tracing

Provisioning

Automation & Configuration

Container Registry

Security & Compliance

Key Management

Platform

PaaS/Container Service

Serverless

Cloud

Public

Cloud Native Computing Foundation

Cloud Native Landscape

Special

Kubernetes Certified Service Provider

Kubernetes Certified Service Provider

Kubernetes Training Partner

What is CNAB?



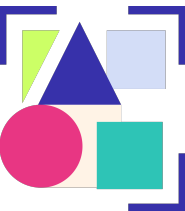
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- Cloud Native Application Bundle
- Packaging format for distributed applications
- Specification



What are CNAB's goals?



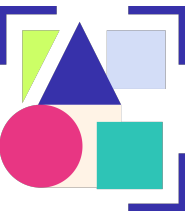
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- Deploy complex applications easily
- Cloud agnostic
- Secure
- Handle a spread of use cases





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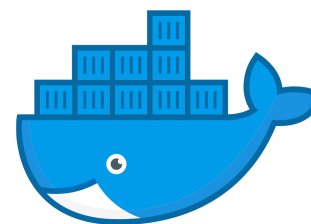


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HOW STANDARDS PROLIFERATE: (SEE: A/C CHARGERS, CHARACTER ENCODINGS, INSTANT MESSAGING, ETC.)





docker



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Pivotal®



Find commonality

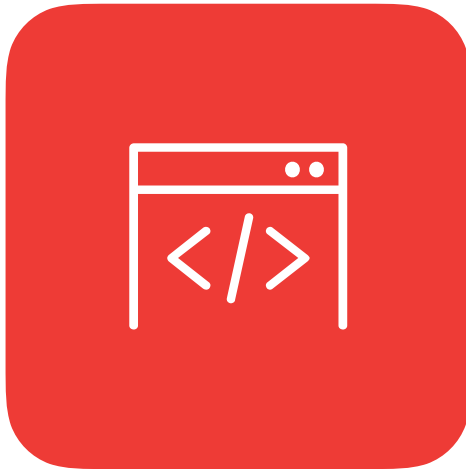


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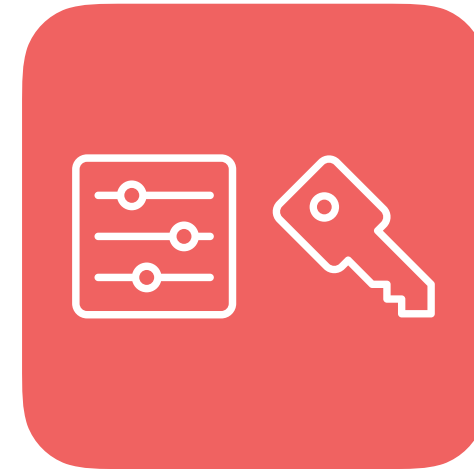
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Definition



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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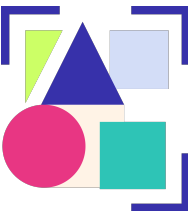


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- Bundle definition
- Invocation image
- Runtime
- Claim store (WIP)
- Signing (WIP)
- Distribution (WIP)

<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 executable images
- List of parameters
- List of credentials



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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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  ...
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```



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  },
  ...
}
```

Invocation image



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



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




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



- 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



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- 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



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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



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

CNAB to OCI



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- 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

CNAB to OCI



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- 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
- Dependencies?
- Outputs?

Get involved!







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-  cnab.io
-  [cnab_spec](https://twitter.com/cnab_spec)
-  [deislabs/cnab-spec](https://github.com/deislabs/cnab-spec)
-  Community meetings

Every second Wednesday, 9 am US Pacific Time

