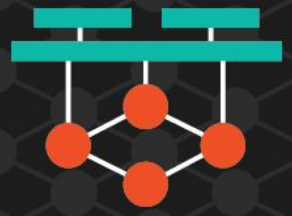
ons
EUROPE
OPEN NETWORKING //
Integrate, Automate, Accelerate

September 25 - 27, 2018
Amsterdam, The Netherlands

Automating Your Network Starts with A Continuous Deployment Pipeline

Wenjing Chu
Futurewei Technologies, Inc.
@wenjing

Junaid Ali
Waterford Institute of Technology



ons
EUROPE
OPEN NETWORKING //
Integrate, Automate, Accelerate

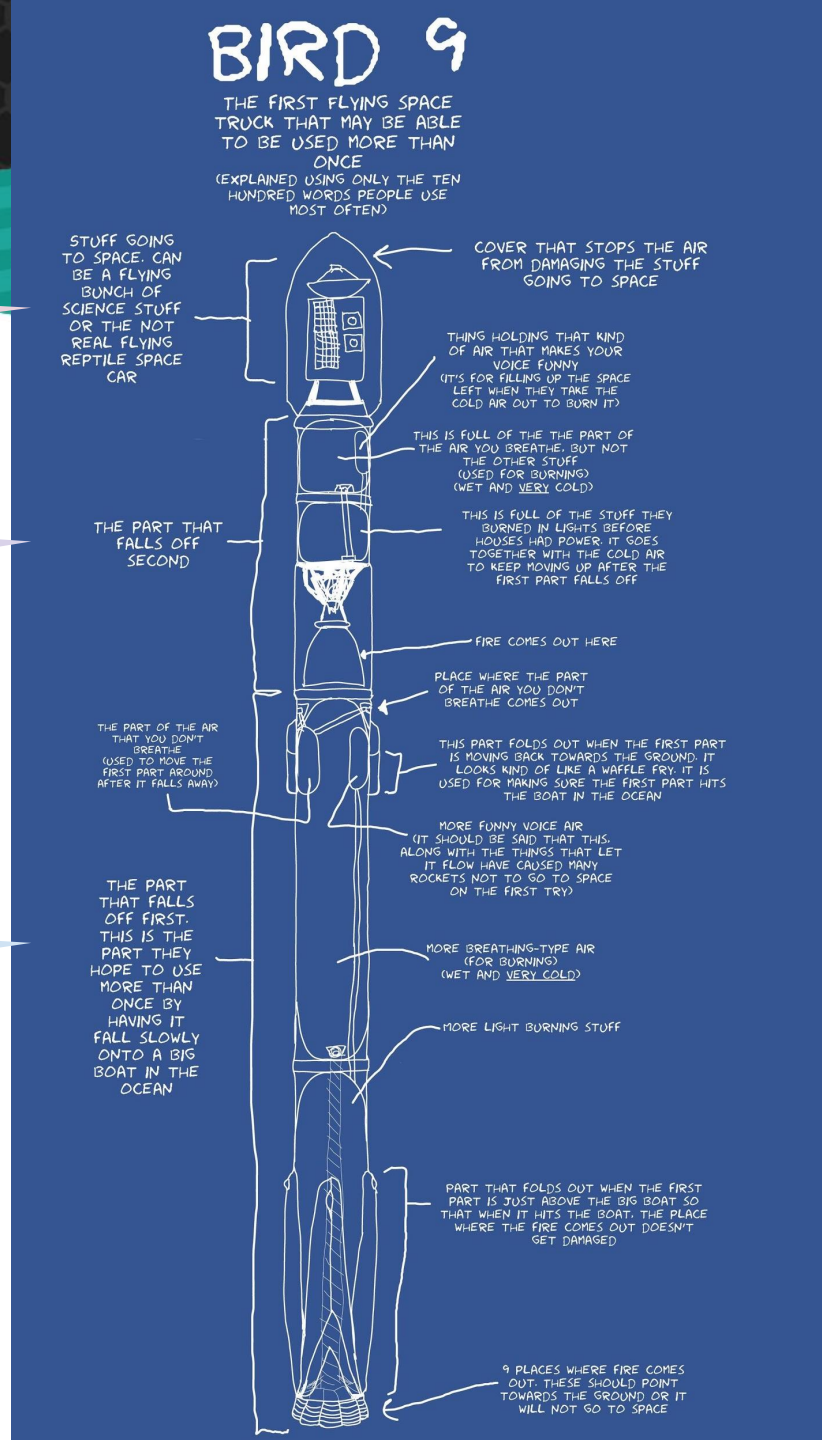
An Analogy

Automating a complex interconnected network bears some similarity to colonizing Mars, you begin first with a **delivery vehicle** that you can *Launch, Land, Repeat reliably and cheaply.*

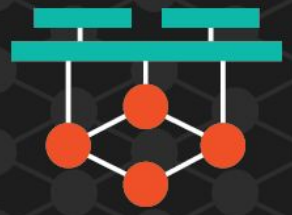
Payload: containerized software package.

Fuel: the non-reusable cost of each deployment.

Vehicle: the Continuous Deployment system.



"The Falcon 9 explained using the 1000 words people use most regularly"
Image credit: https://imgur.com/nCqs3EQ

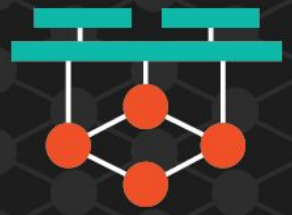


ons
EUROPE
OPEN NETWORKING //
Integrate, Automate, Accelerate

The Comparison between CI and CD

- CI focuses primarily on automating the development process
- It manages code, test cases, bugs etc.
- At the end of CI pipeline, you get a package ready for deployment (Delivery)

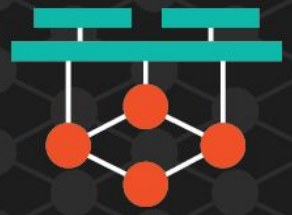
- CD focuses primarily on automating the operation process of maintaining services
- It manages services, resources, upgrades, data etc.
- CI and CD are closely related



ons
EUROPE
OPEN NETWORKING //
Integrate, Automate, Accelerate

Continuous Deployment is a Strategic Capability

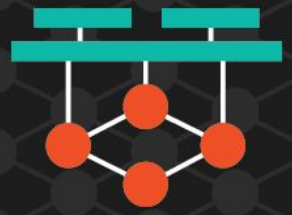
- CD is the modern link between a Service Provider's services, operational processes, and resources (networks), with Vendors' software products (outputs of CIs).
- As the rocket analogy suggests, it is a lever that can result in sustained competitive advantage.



ons
EUROPE
OPEN NETWORKING //
Integrate, Automate, Accelerate

A Few Quick Words about Clover

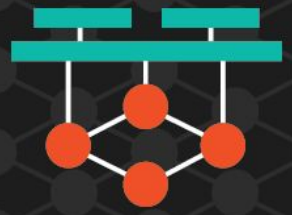
- Clover is a Cloud Native for Networking open source project
  - under Linux Foundation Networking's OPNFV
- Clover focuses on software stack that help Networking to adopt Micro-services via Service Mesh, achieve Visibility, Operability, and Continuous Deployment
- For further interests:
  - Wiki: https://wiki.opnfv.org/display/CLOV
  - Slack: #clover-project, or follow the join link in the above wiki page.



ons
EUROPE
OPEN NETWORKING //
Integrate, Automate, Accelerate

Core Capabilities to Look For in a CD tool

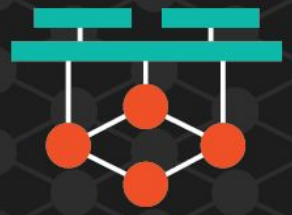
- Take Deployment as the first priority
- Focus squarely on Services, and Frequent Updates as Normal Operations
- Support Multi-Cloud as a principle
- Can easily integrate into the rest of your operation process
- Support best practices such as A/B, Green/Blue, Canary, by default
- Reproducibility: Pipeline as code
- *In Clover, we have adopted Spinnaker for helping implement CD*



ons
EUROPE
OPEN NETWORKING //
Integrate, Automate, Accelerate

The CD Pipeline is Much More than a Toolchain

- The software needs be architected with Cloud Native methodology (See also ONS EU Tutorial on Tuesday morning)
- Automated test tools can sufficiently validate a live system
- Real time data points can be collected, analyzed, to reach statistically valid conclusions
- Software and services are designed in a way that if we make a mistake, damage is controlled and can be reversed automatically
- … *you see the point*



… But if We Do Accomplish the Feat,

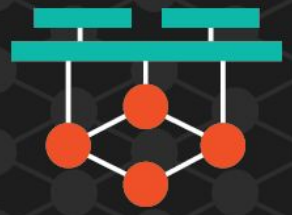
We get Zero Touch, the real deal.

Or

Low Touch, and a known path to reduce the degree of Touch further and further iteratively.

Some Experiences from Communities

- OPNFV
  - Initially, CI has long time lag, deploy (by installers) is day-1 only and very complicated and slow
  - XCI (cross project CI) helps to address the source lag problem
  - Clover-CD, together with CNWG, is to help address the deployment problem
  - Many testing projects can be containerized and used for automated validation in the CD pipeline.
- ONAP
  - ONAP has a large number of containers covering orchestration and management.
  - Targets Kubernetes and packaged with Helm charts
  - CD is a great fit for ONAP
    - Easier system test
    - Upgradability of individual parts
    - Multi-cloud, multi-provider
    - Focus on operation and zero touch
  - Had several discussions - we hope to report more in the future.

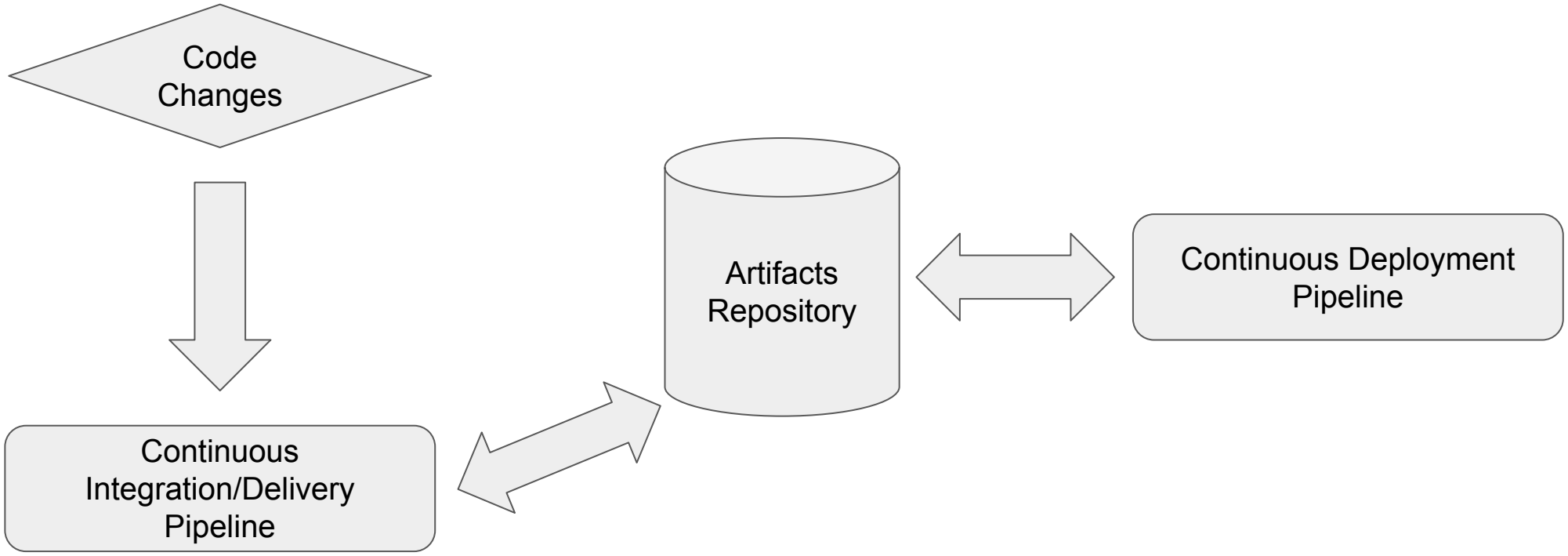


ons
EUROPE
OPEN NETWORKING //
Integrate, Automate, Accelerate

A Demo to Walk Through the Concepts

- We will use an example originated from Kubernetes and adopted by the Clover project for training purposes.
- Clover uses Spinnaker as part of the toolchain to implement CD, and that's what we will show in the demo.

Application Delivery Pipeline

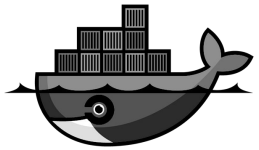


Agents and Resources

Developer

GitHub

Jenkins



DockerHub

Spinnaker

Kubernetes

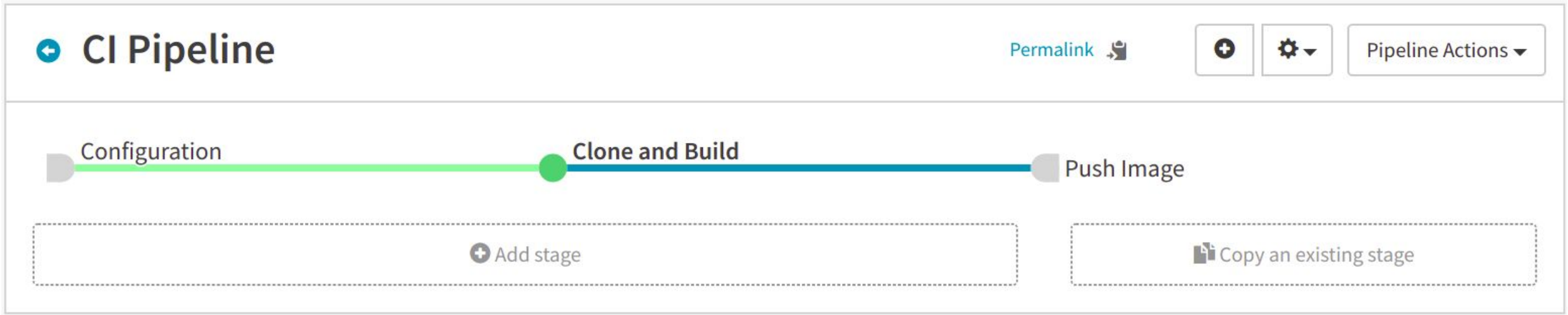
Kubernetes

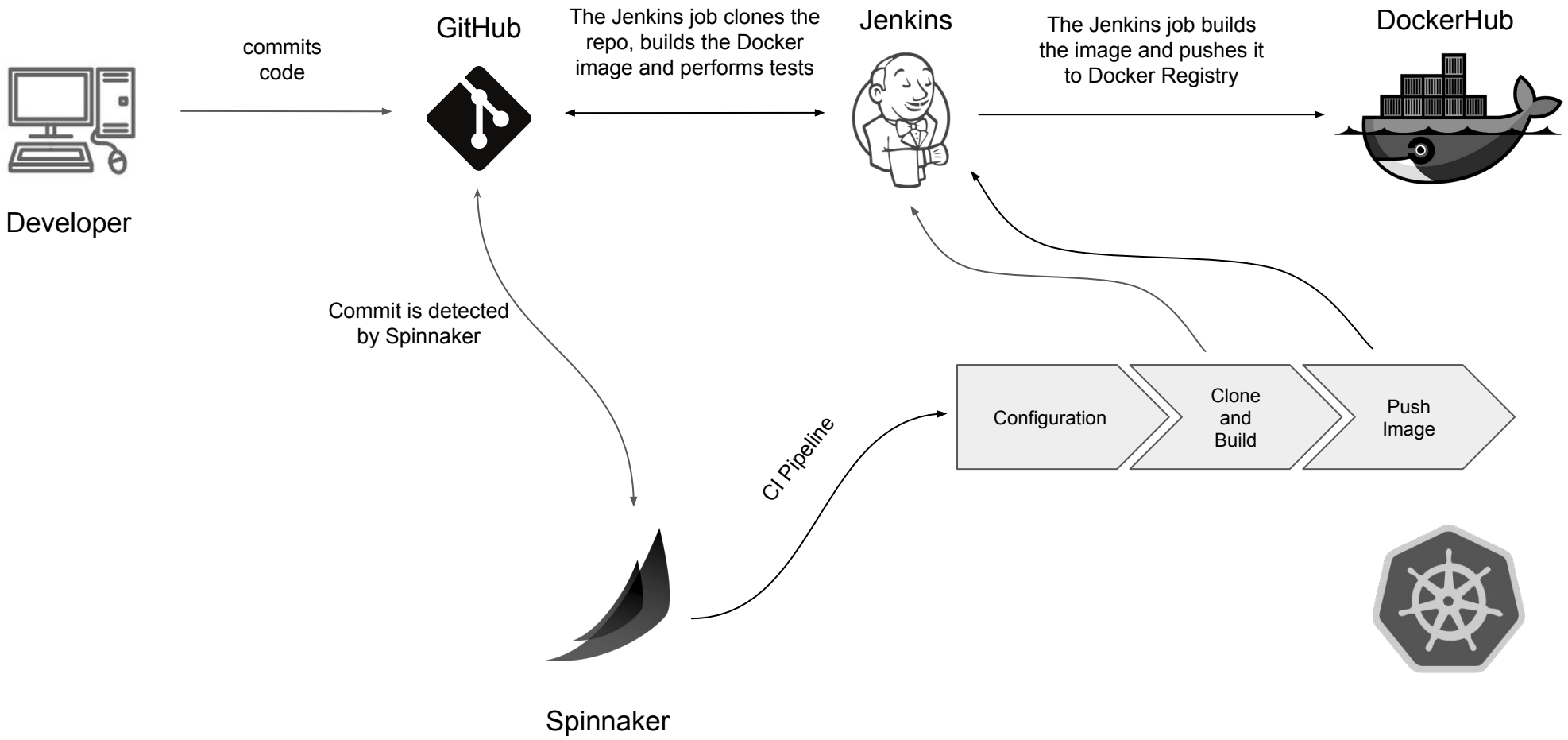
- A GKE cluster provided by Linux Foundation
- 1.10.6

Spinnaker

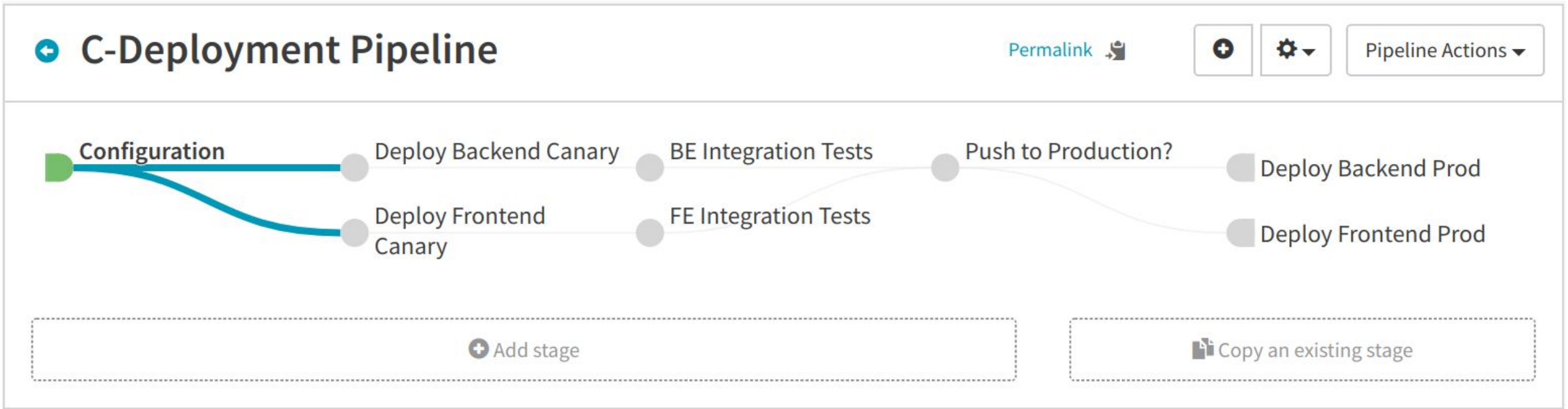
- A high level continuously delivery and release platform
- Deployed via Halyard
- 1.8.6


ons
EUROPE
OPEN NETWORKING //
Integrate, Automate, Accelerate

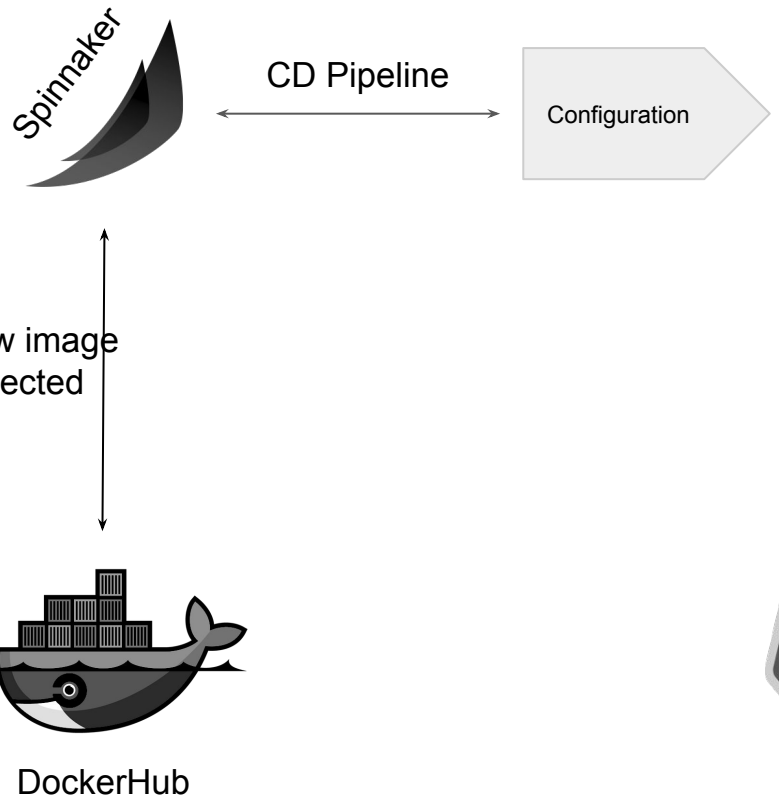

CI Pipeline
Permalink
Pipeline Actions
Configuration
Clone and Build
Push Image
Add stage
Copy an existing stage


Developer
commits
code
GitHub
The Jenkins job clones the
repo, builds the Docker
image and performs tests
Jenkins
The Jenkins job builds
the image and pushes it
to Docker Registry
DockerHub
Commit is detected
by Spinnaker
CI Pipeline
Configuration
Clone
and
Build
Push
Image
Spinnaker

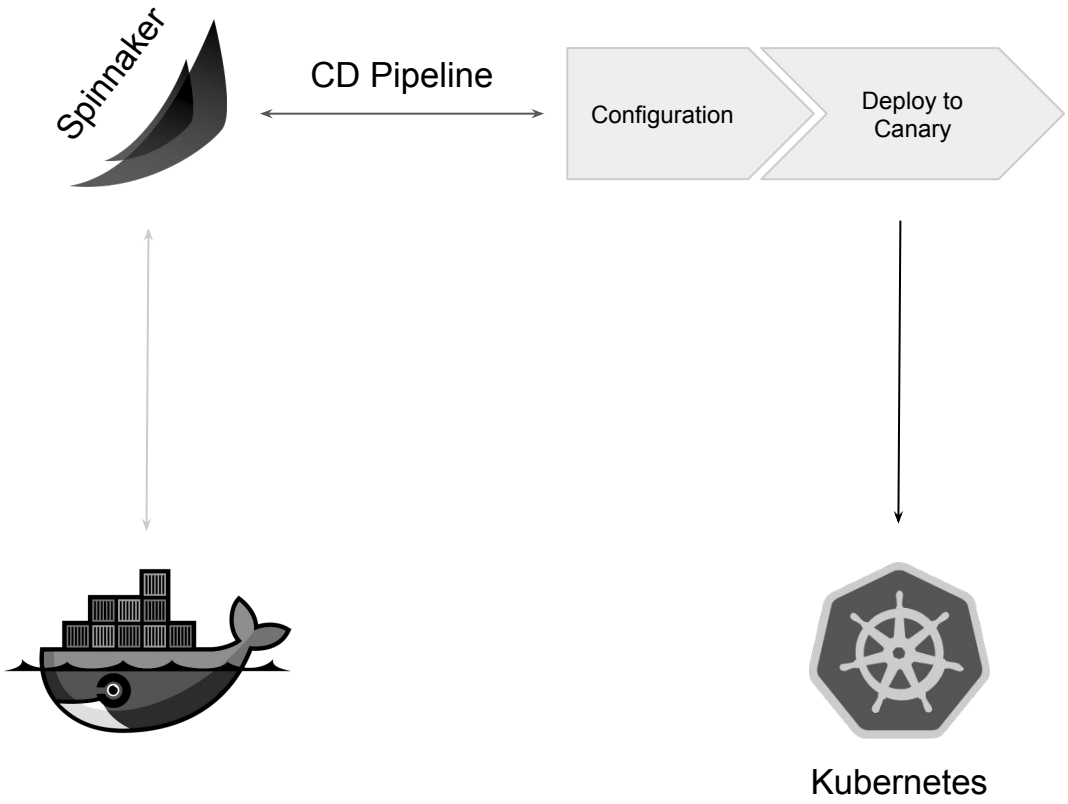

ons
EUROPE
OPEN NETWORKING //
Integrate, Automate, Accelerate


C-Deployment Pipeline
Permalink
Pipeline Actions
Configuration
Deploy Backend Canary
BE Integration Tests
Push to Production?
Deploy Backend Prod
Deploy Frontend Canary
FE Integration Tests
Deploy Frontend Prod
Add stage
Copy an existing stage

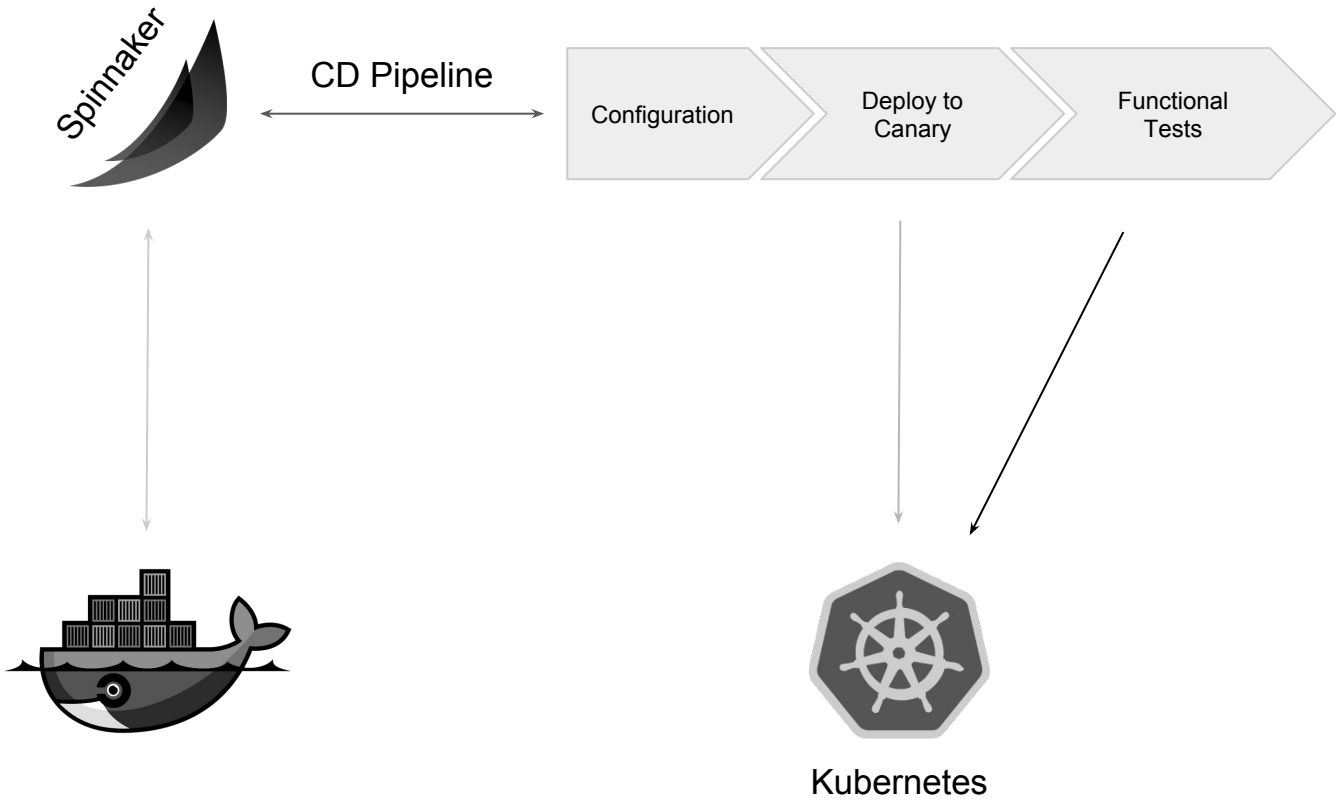

ons
EUROPE
OPEN NETWORKING //
Integrate, Automate, Accelerate


Spinnaker
CD Pipeline
Configuration
The new image
is detected
DockerHub

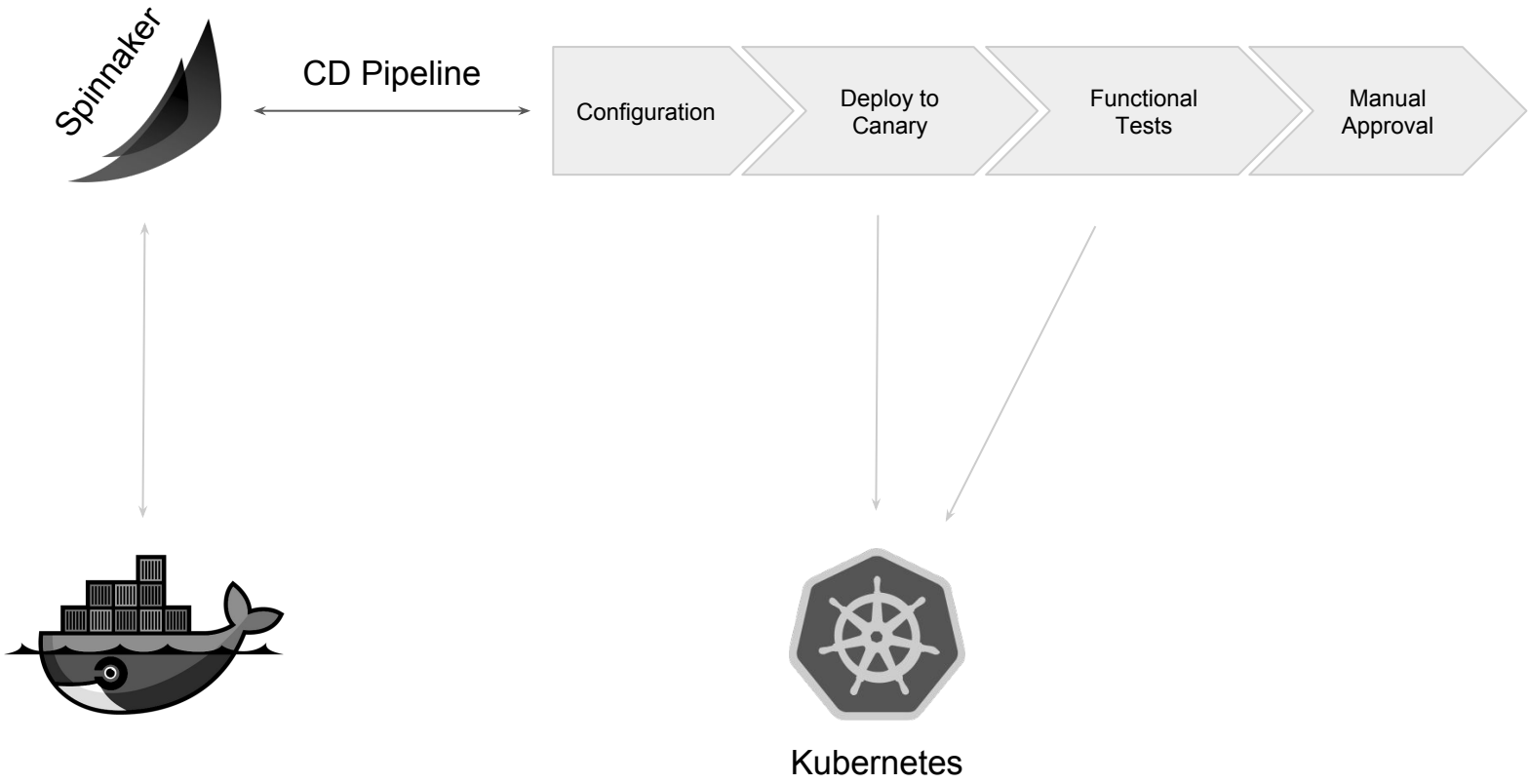

ons
EUROPE
OPEN NETWORKING //
Integrate, Automate, Accelerate


Spinnaker
CD Pipeline
Configuration
Deploy to
Canary
Kubernetes

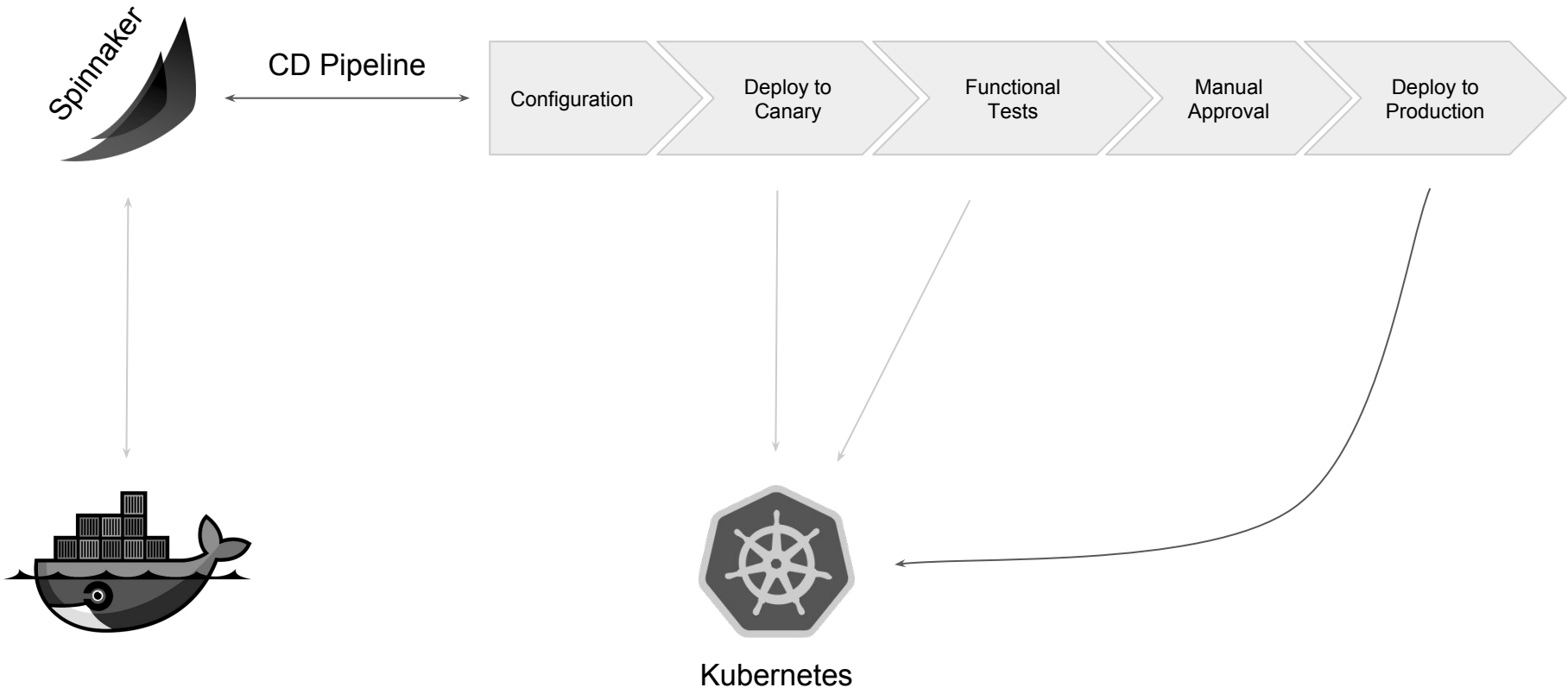

ons
EUROPE
OPEN NETWORKING //
Integrate, Automate, Accelerate

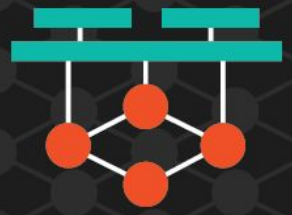

Spinnaker
CD Pipeline
Configuration
Deploy to Canary
Functional Tests
Kubernetes


ons
EUROPE
OPEN NETWORKING //
Integrate, Automate, Accelerate


Spinnaker
CD Pipeline
Configuration
Deploy to Canary
Functional Tests
Manual Approval
Kubernetes


ons
EUROPE
OPEN NETWORKING //
Integrate, Automate, Accelerate

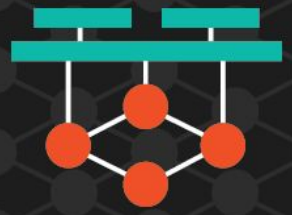

Spinnaker
CD Pipeline
Configuration
Deploy to Canary
Functional Tests
Manual Approval
Deploy to Production
Kubernetes



ons
EUROPE
OPEN NETWORKING //
Integrate, Automate, Accelerate

Key Takeaways

- If you are a service provider
  - Start thinking about Continuous Deployment at the beginning goal setting stage of your network automation initiative
- If you are vendors/developers
  - Think about Continuous Deployment at product definition stage (i.e. with Customers and Product Owners), before designing software
- Find more at Clover: https://wiki.opnfv.org/display/CLOV



ons
EUROPE
OPEN NETWORKING //
Integrate, Automate, Accelerate

Questions?

- Junaid’s work is supported by an Linux Foundation Networking internship in the OPNFV Clover project.

- Clover: https://wiki.opnfv.org/display/CLOV