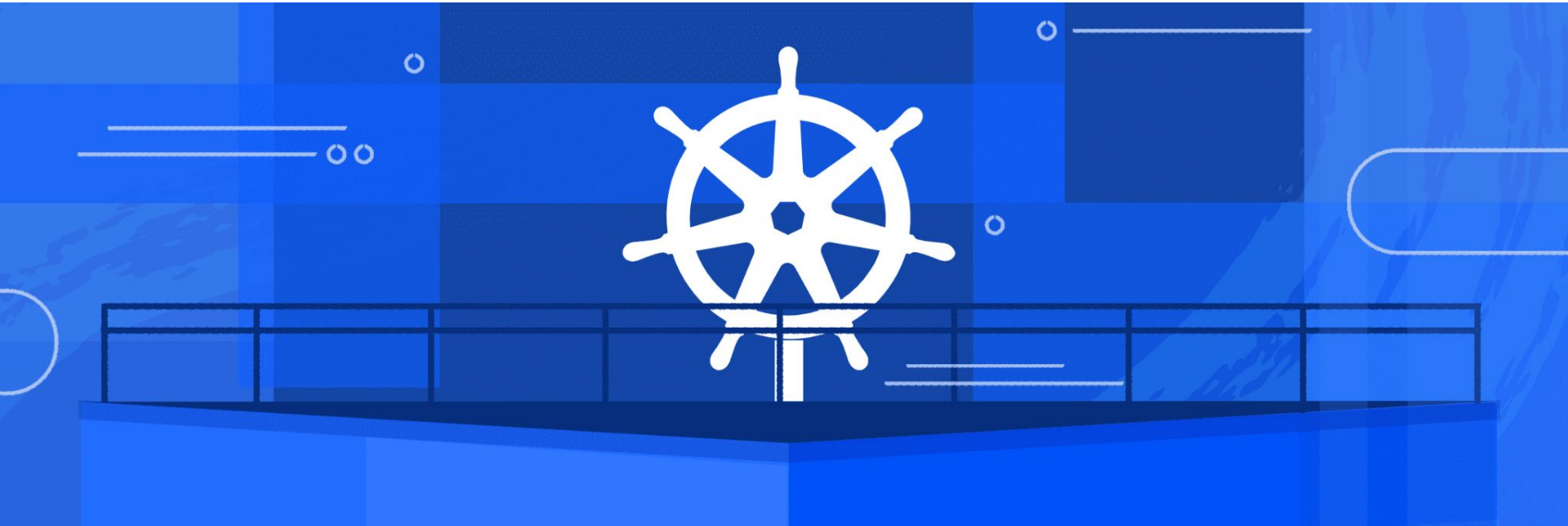
KUBERNETES



A PERSON WHO STEERS A SHIP OR BOAT

KUBERNETES

κυβερνήτης

HELMSMAN

OVERVIEW

- Open-source project
- Serves to organize containers in microservice implementations
- Usually works with remote containers, but can be configured to work locally
- Application optimization tool

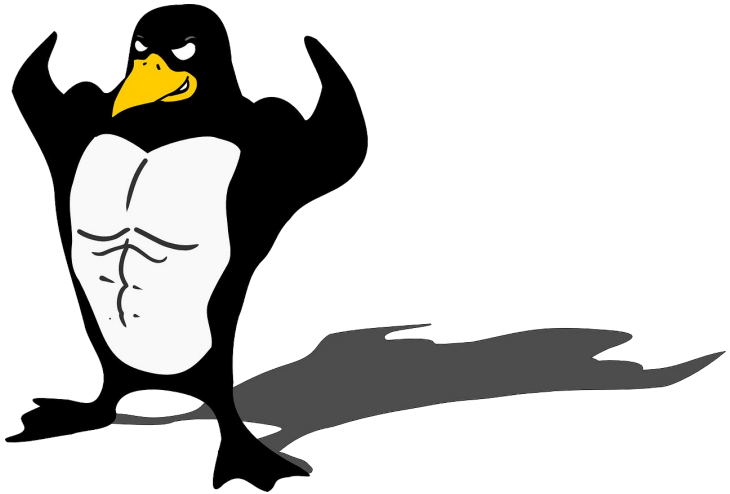
kubernetes

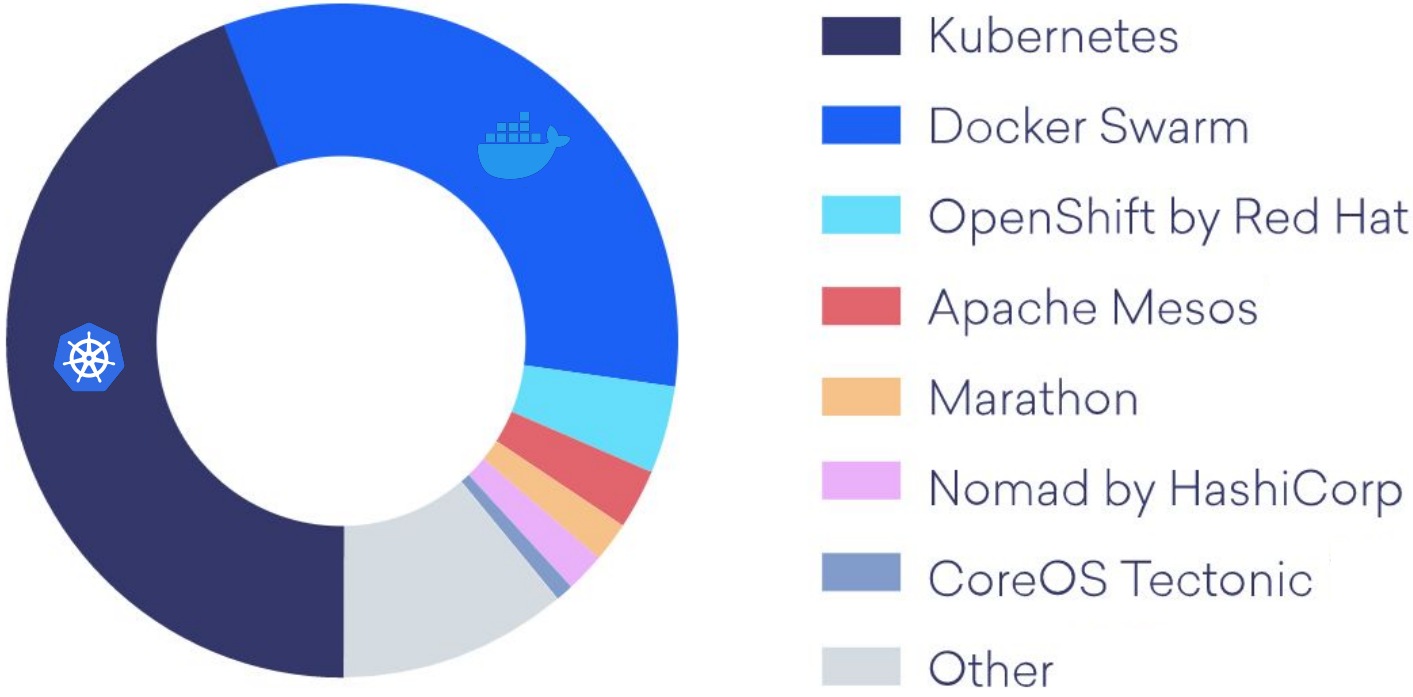
BRIEF HISTORY

- Google project
  - Genesis in 2014, first release in 2015
  - Brendan Burns, Villie Aikas, Joe Beda, Craig McLuckie
- Inspired by Borg
  - Older cluster organizer
  - Directly influenced development
- Handed over to CNCF
  - Cloud Native Computing Foundation
  - Google and Linux Foundation
- Project 7
  - Seven of Nine
  - Ex-Borg

BEST IN CLASS

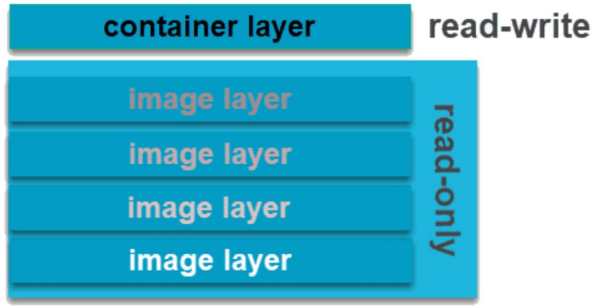
- 21 releases to date
  - N-3 support
- GitHub star
  - 9th place in total commits
  - 2nd place in author and issue count
  - Behind only the Linux kernel
- Holds the majority of users for a microservice implementation
- Big things
  - Brendan Burns - Microsoft Azure
  - Joe Beda, Craig McLuckie - VMware

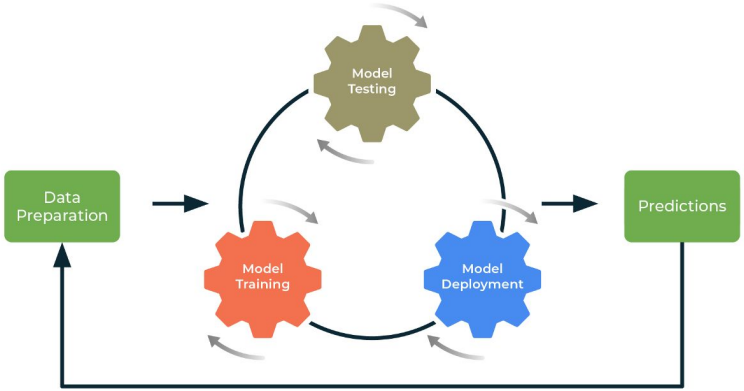


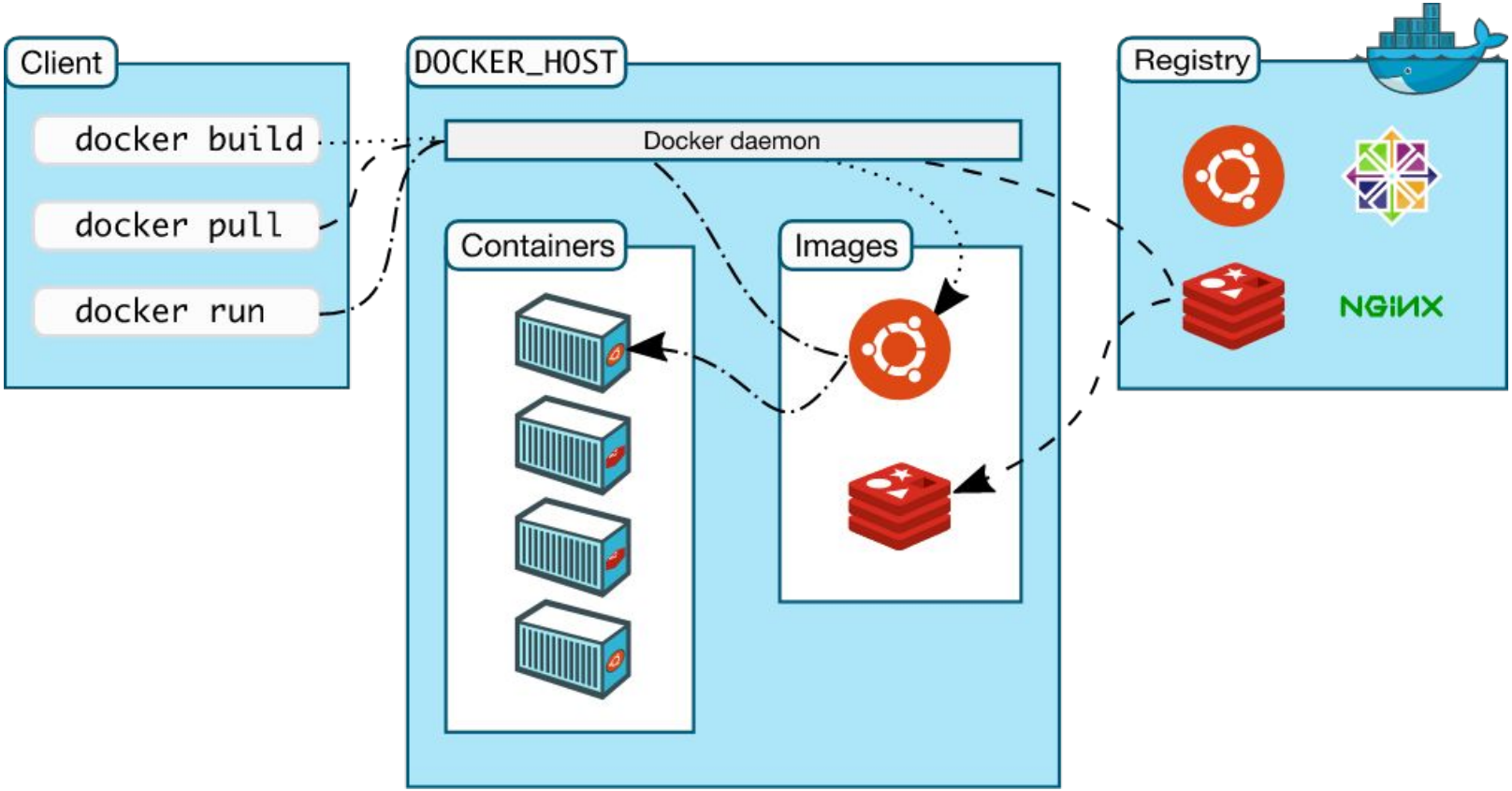

Kubernetes
Docker Swarm
OpenShift by Red Hat
Apache Mesos
Marathon
Nomad by HashiCorp
CoreOS Tectonic
Other

TERMINOLOGY

- Image
  - Instruction file telling containers what to do
- Container
  - Virtual runtime environment
  - Run application with software virtualization
  - More lightweight than virtual machines
- Node
  - Instance of Docker
  - Represents one server
- Cluster
  - Instance of Kubernetes
  - Brains of operation
- Pipeline
  - Automate machine learning process
  - Step-by-step repeated model



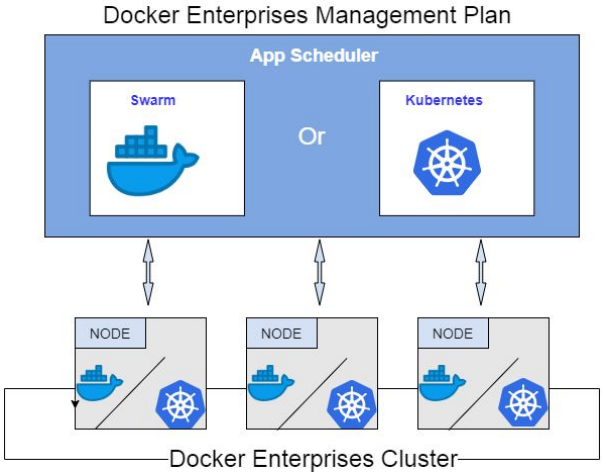



Client
docker build
docker pull
docker run
DOCKER_HOST
Docker daemon
Containers
Images
Registry
NGINX


DEEP DIVE

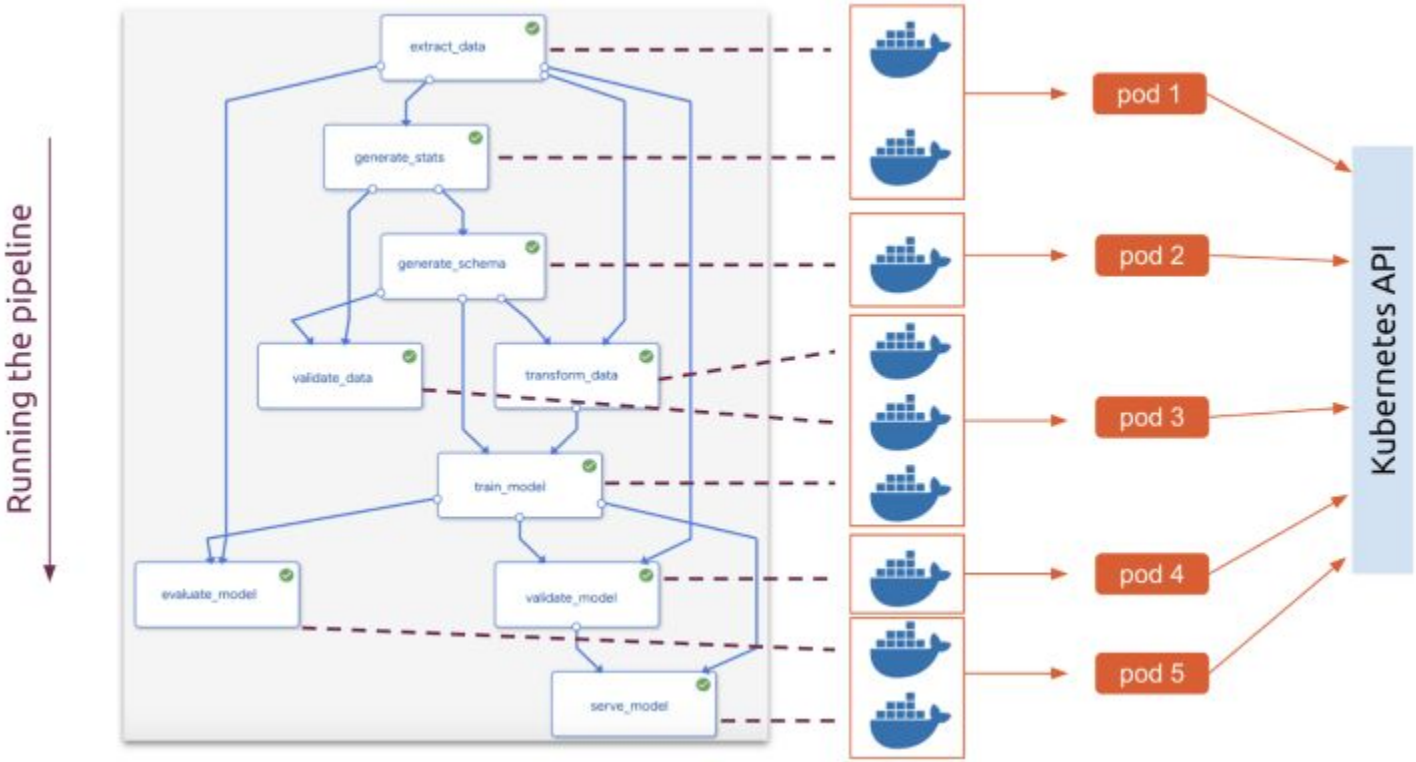
RESURFACE

- Lighter than virtual machines
  - Multiple “instances” on one machine
- Standardize an application
  - Separate instances so they can run distinctly
  - Makes it easier for traffic
  - Replacing nodes is better than replacing the entire virtual machine
- Kubernetes is the conductor
  - Directs traffic
  - Knows which nodes need to be handled



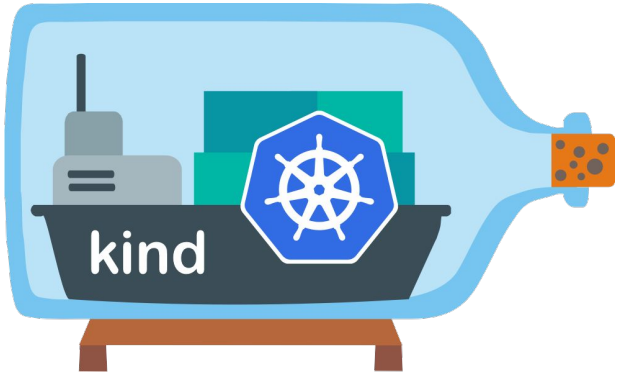
KUBEFLOW PIPELINES

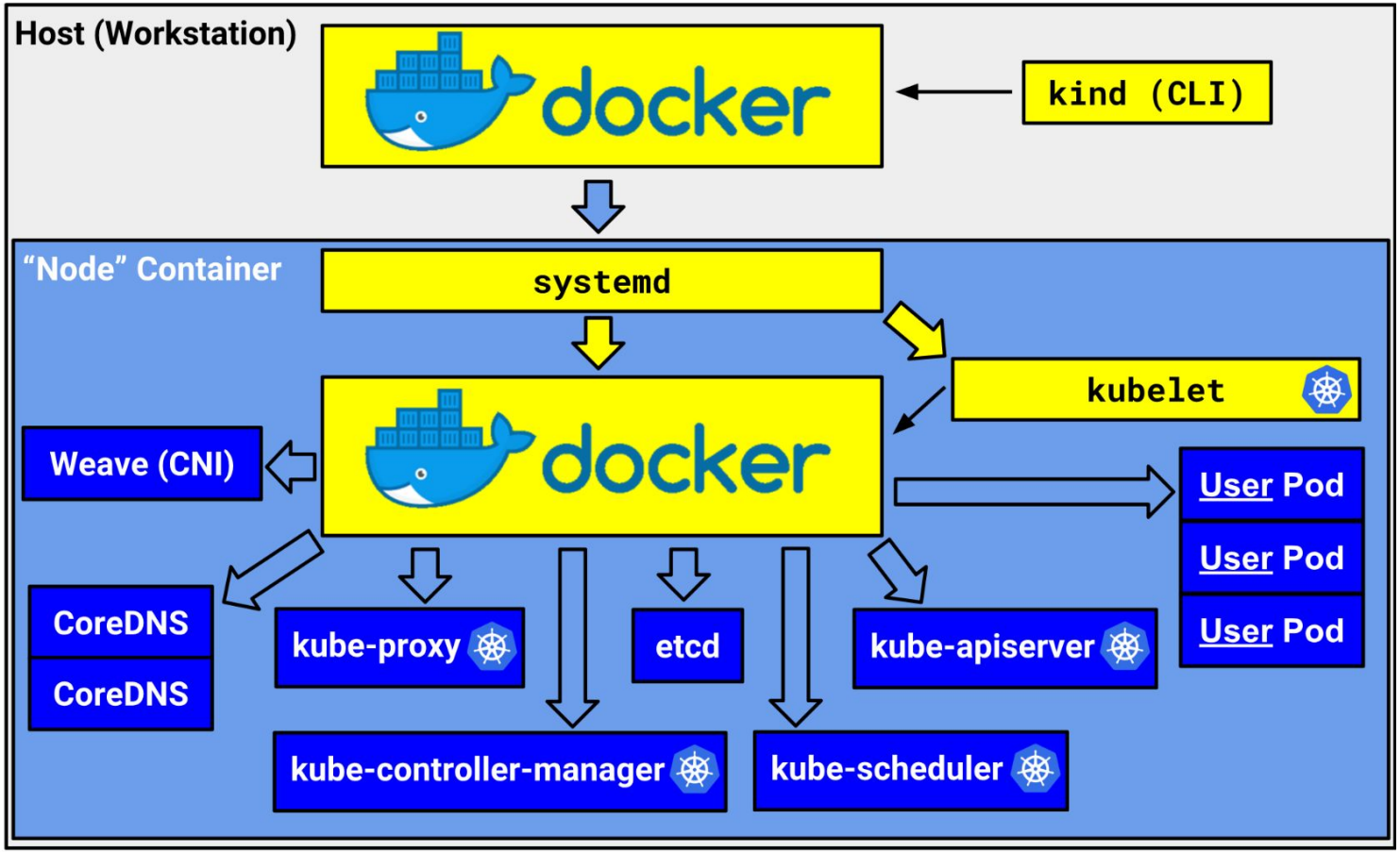
- Pipeline Creation Tool
  - Simple user interface
  - Engine allows for scheduled workflows
- Python Based
- Works with Docker
  - Workloads are intense
  - Inefficient to run locally
- Metadata Storage
  - Debug pipeline
  - View performance data
- **Machine Learning Workflows**


Running the pipeline
extract_data
generate_stats
generate_schema
validate_data
transform_data
train_model
evaluate_model
validate_model
serve_model
pod 1
pod 2
pod 3
pod 4
pod 5
Kubernetes API

KIND

- **K**ubernetes **in** **D**ocker
- Open-source project
  - Maintained by just 5 people
- **Make everything local**
- Sets new requirements
  - Local hardware needs to be strong enough
  - Leave local hardware for extended periods of time
  - Hyper-V containers
- Meant to combine the power of Kubernetes and Docker Desktop




Host (Workstation)
docker
kind (CLI)
"Node" Container
systemd
kubelet
docker
Weave (CNI)
User Pod
User Pod
User Pod
CoreDNS
CoreDNS
kube-proxy
etcd
kube-apiserver
kube-controller-manager
kube-scheduler


HELLO WORLD

KUBERNETES

- Usually works with nodes running remotely
- Easy to use, easy to start
- Convenience comes with cost

KIND

- Runs nodes entirely on local machine
- Bar of entry is more exclusive, need hardware to handle load
- Cut out a cost altogether

SAME PURPOSE

SAME PURPOSE


QUESTIONS?