



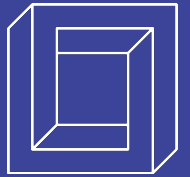
# When Hyperledger met Kubernetes!

Linux Foundation Open Source Leadership Summit  
March 14, 2019

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Duncan Johnston-Watt  
CEO & Co-founder, Blockchain Technology Partners  
@duncanjw

# Introducing Hyperledger







## Join The 2019 Hyperledger Internship Program

Hyperledger is expanding its annual program to allow student developers the opportunity to work with and learn directly from active developers in the community. Hyperledger will sponsor 15 projects this year! Get involved by becoming a mentor or intern.

[LEARN MORE](#)

## Announcing New Project: Hyperledger Grid

We're excited to announce the launch of our 12th project – Hyperledger Grid. Hyperledger Grid is a framework focused on accelerating the adoption of distributed ledger technologies for all types of cross-industry supply chains.

[READ MORE](#)

## How Walmart Brought Unprecedented Transparency To Their Food Supply Chain With Hyperledger Fabric

Walmart embraced Hyperledger Fabric and blockchain technology as a way to quickly identify the cause of foodborne diseases and outbreaks, saving time, money and cutting down on food waste as a result.

[LEARN MORE](#)

**HYPERLEDGER**[Members](#)[Projects](#)[Community](#)[Resources](#)[News & Events](#)[Blog](#)[About](#)

## The Hyperledger Greenhouse

Business Blockchain Frameworks & Tools Hosted by Hyperledger

**HYPERLEDGER**

### Frameworks

**HYPERLEDGER  
BURROW**

Permissionable  
smart contract  
machine (EVM)

**HYPERLEDGER  
FABRIC**

Permissioned  
with channel support

**HYPERLEDGER  
GRID**

WebAssembly-based  
project for building  
supply chain solutions

**HYPERLEDGER  
INDY**

Decentralized  
identity

**HYPERLEDGER  
IROHA**

Mobile application  
focus

**HYPERLEDGER  
SAWTOOTH**

Permissioned &  
permissionless support;  
EVM transaction family

### Tools

**HYPERLEDGER  
CALIPER**

Blockchain framework  
benchmark platform

**HYPERLEDGER  
CELLO**

As-a-service  
deployment

**HYPERLEDGER  
COMPOSER**

Model and build  
blockchain networks

**HYPERLEDGER  
EXPLORER**

View and explore data  
on the blockchain

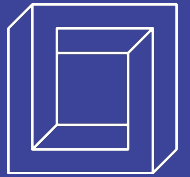
**HYPERLEDGER  
QUILT**

Ledger  
interoperability

**HYPERLEDGER  
URSA**

Shared Cryptographic  
Library

# Introducing CNCF





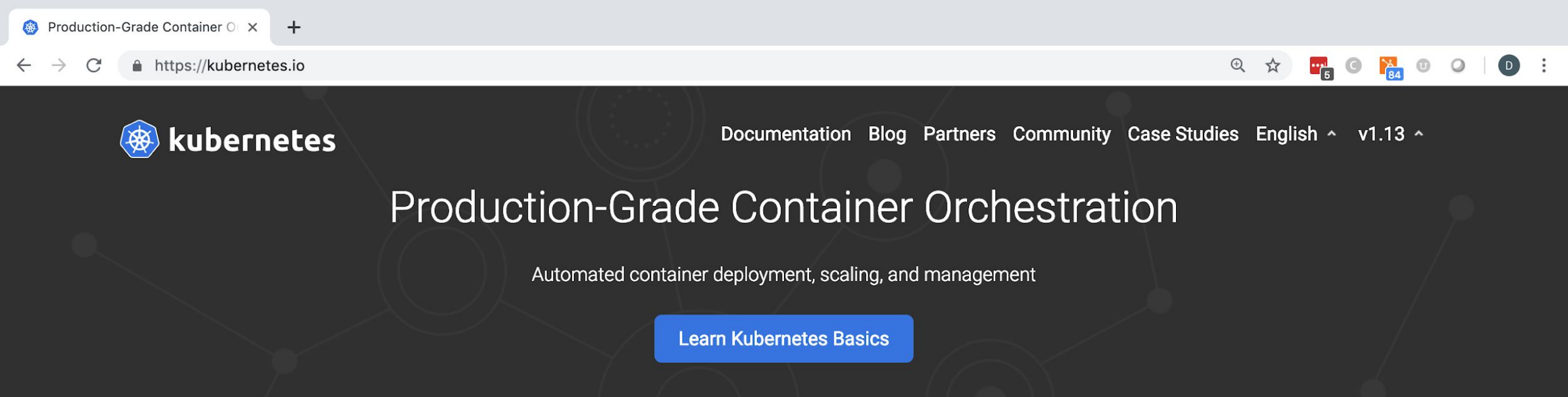


# Sustaining and Integrating Open Source Technologies

The Cloud Native Computing Foundation builds sustainable ecosystems and fosters a community around a constellation of high-quality projects that orchestrate containers as part of a microservices architecture.

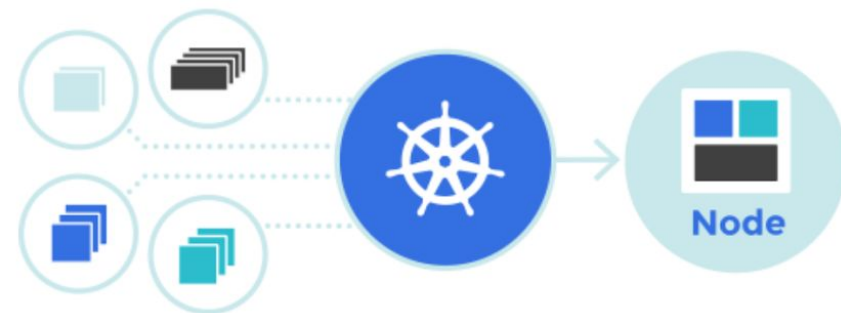


CNCF serves as the vendor-neutral home for many of the fastest-growing projects on GitHub, including Kubernetes, Prometheus and Envoy, fostering collaboration between the industry, open developers and open end users.

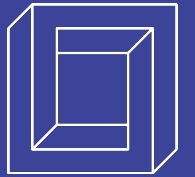


**Kubernetes (k8s)** is an open-source system for automating deployment, scaling, and management of containerized applications.

It groups containers that make up an application into logical units for easy management and discovery. Kubernetes builds upon [15 years of experience of running production workloads at Google](#), combined with best-of-breed ideas and practices from the community.

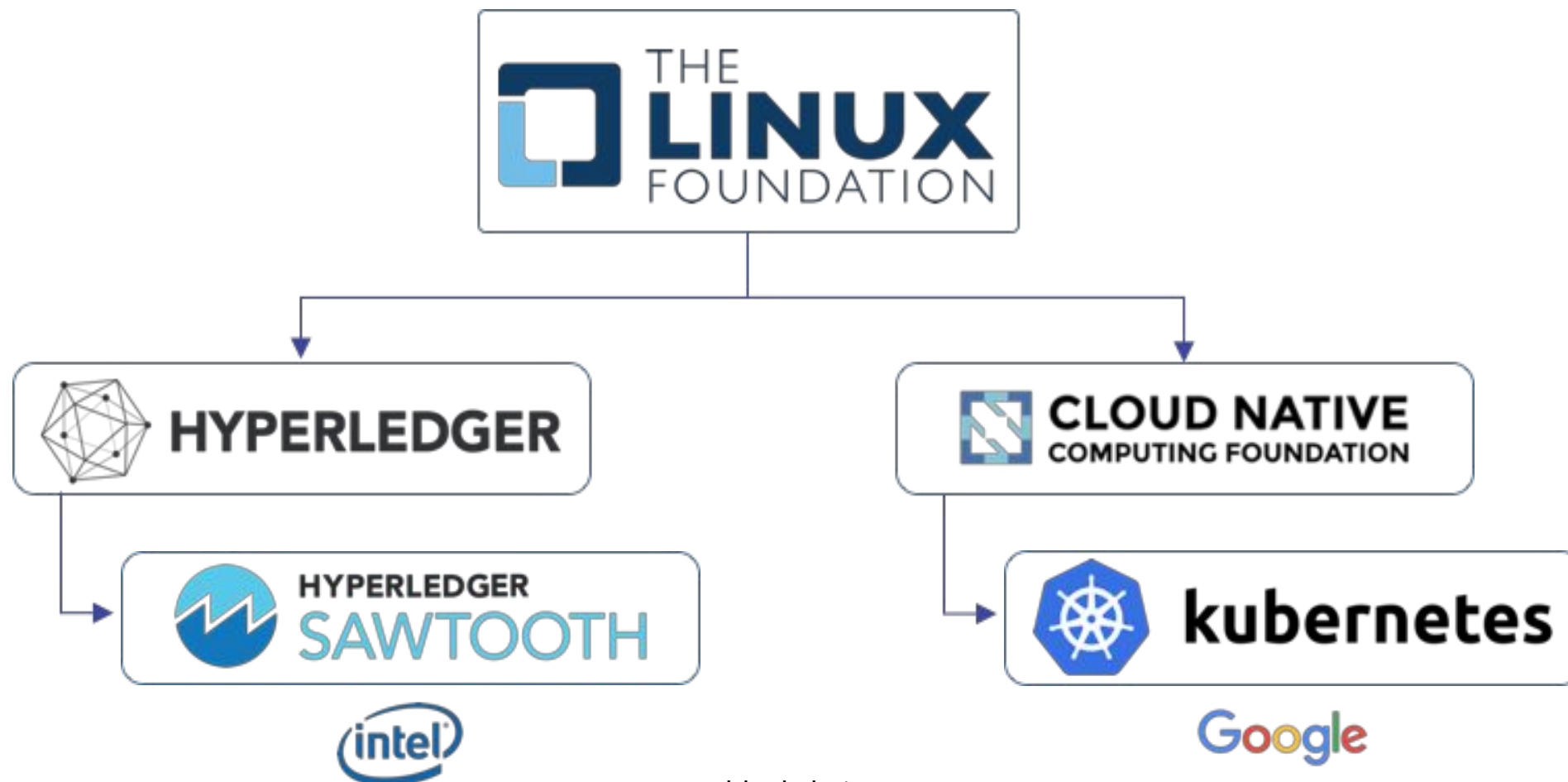
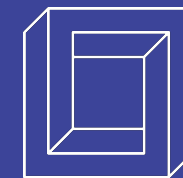


# When Hyperledger met Kubernetes

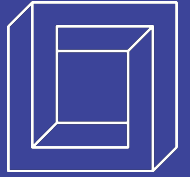




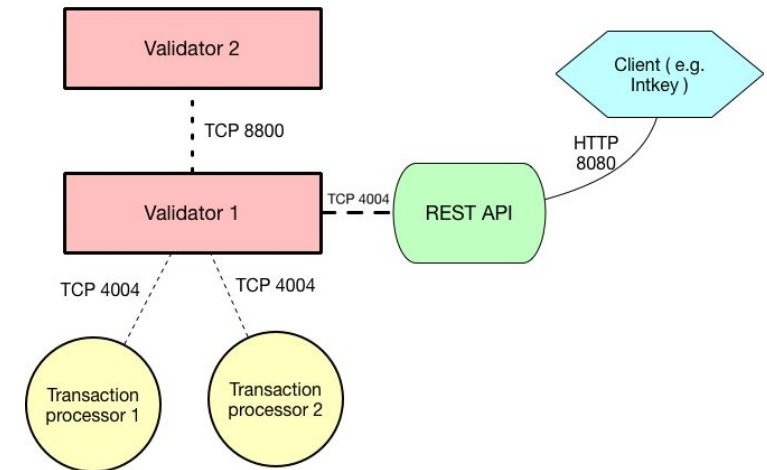
# When Sawtooth met Kubernetes



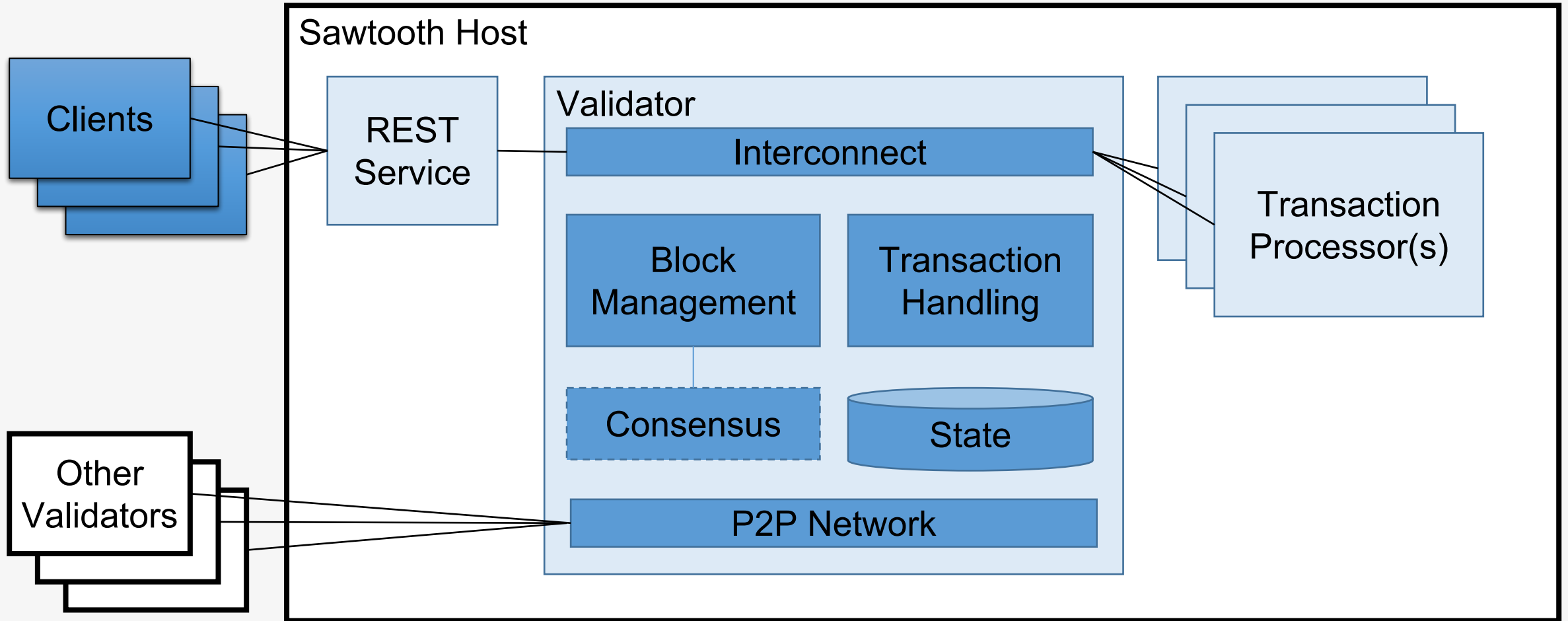
# Why Hyperledger Sawtooth



- Scalable, highly modular architecture
- Clear separation between network/application layers
- Solidity & Web Assembly smart contract compatibility
- Pluggable consensus mechanism
  - RAFT
  - PBFT
  - PoET
  - ...



# High-level Sawtooth Architecture



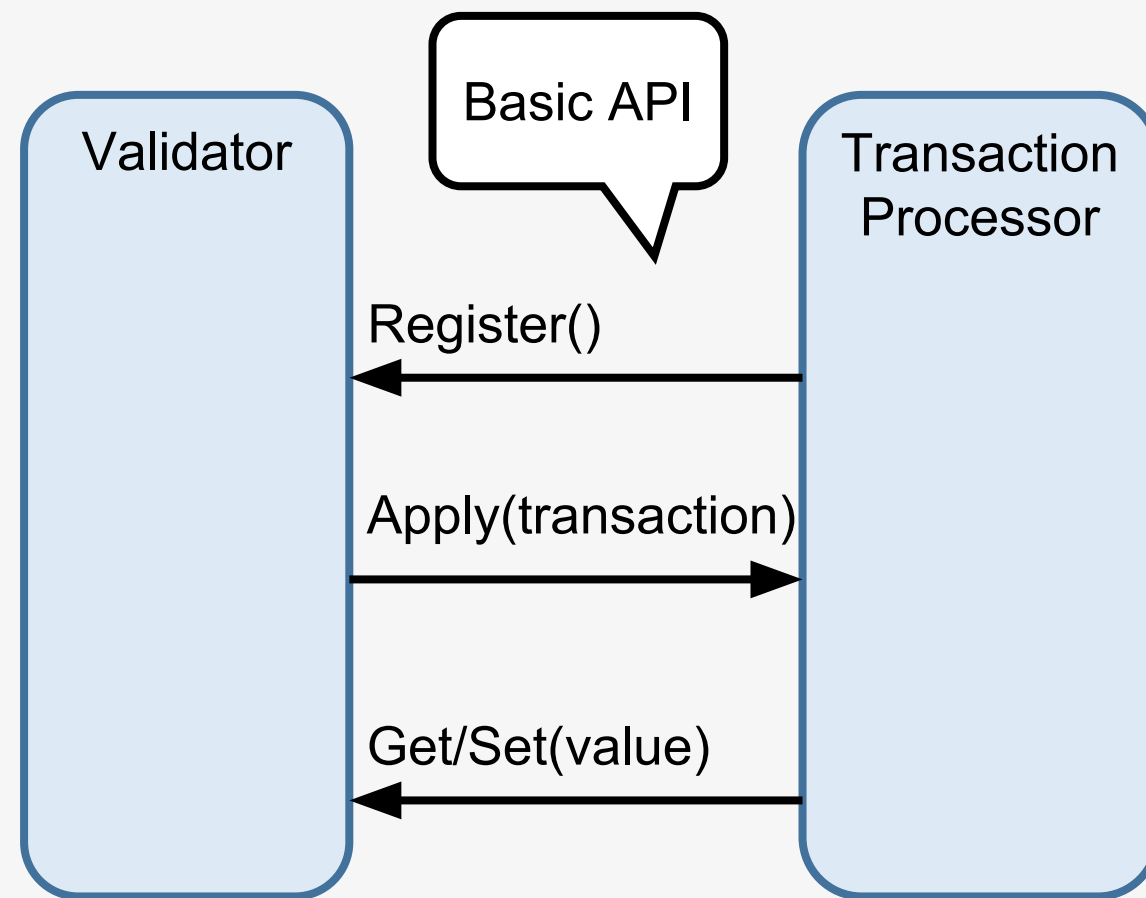


# Transaction Families: The Transaction Processor

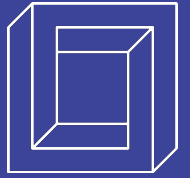
All validators in the network run every authorized transaction processor

On receipt of a transaction the validator will call the TP's Apply() method

Business logic simply goes in Apply() and gets and sets state as needed



# Why Kubernetes



- Kubernetes is a portable, extensible open-source platform for managing containerized workloads and services, that facilitates both declarative configuration and automation
- It has a large, rapidly growing ecosystem. Kubernetes services, support, and tools are widely available
- Cloud-agnostic and available on premises
- De facto standard for container orchestration - Just ask Docker!



Why Docker?

Products

Solutions

Customers

Resources

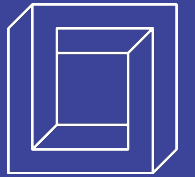
**Get Started**

# Run Swarm and Kubernetes Interchangeably

Your choice of Swarm or Kubernetes for flexible and powerful  
orchestration options



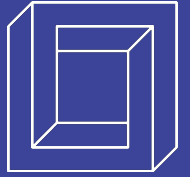
# Blockchain Management



A man with curly brown hair, wearing a green elf hat with a yellow band and a green tunic with a white fur collar, has a wide-eyed, open-mouthed expression of surprise or excitement. His hands are clasped together in front of him. The background is a light blue sky with a large, stylized white snowflake on the left and a bright sun or moon on the right.

**A Blockchain isn't just for the holidays!**

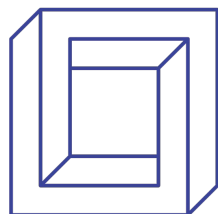
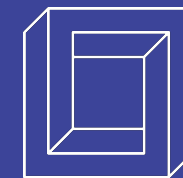
# Our Vision



- Radically **simplify** enterprise adoption of blockchain technologies
- Accelerate innovation by providing the **foundations** that businesses can build upon
- Ensure that enterprises focus on **business application development** not blockchain infrastructure



# When Sawtooth met Kubernetes #2





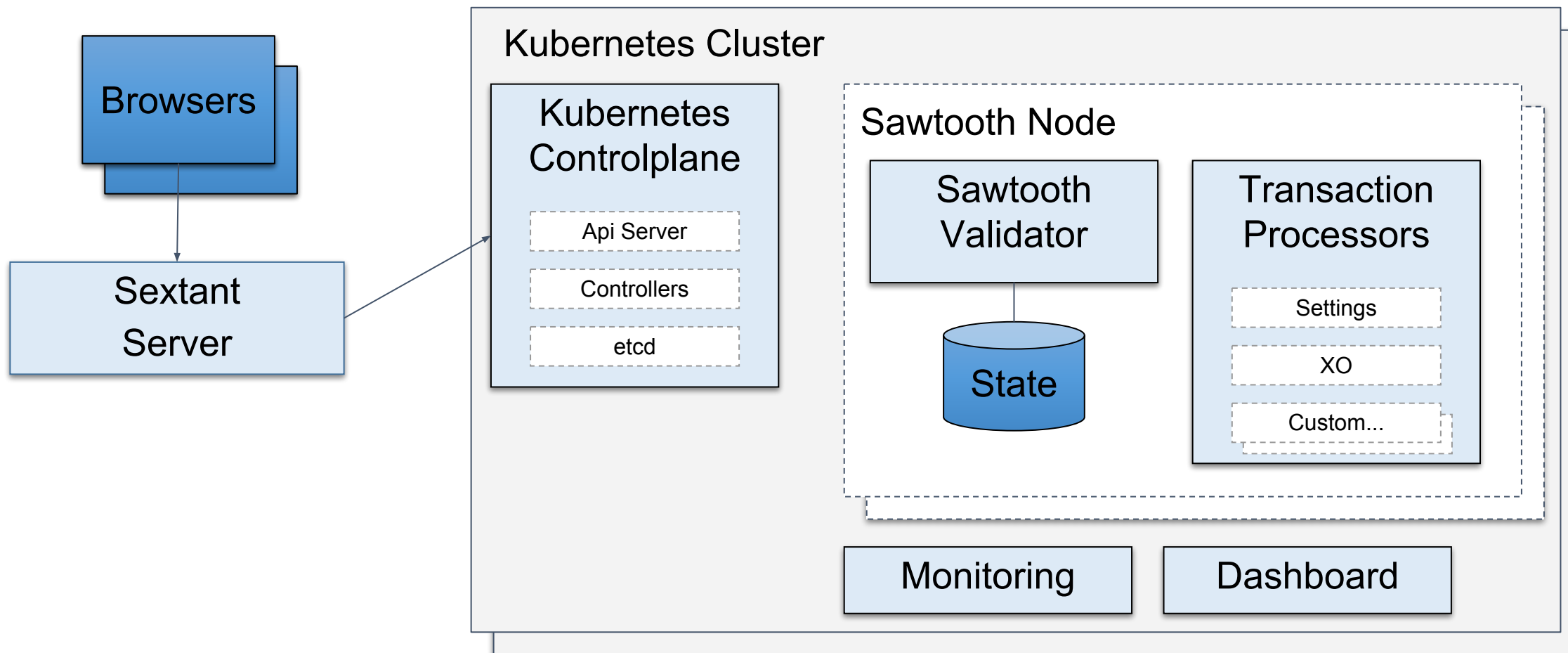
# Introducing Sextant

- Curated Hyperledger Sawtooth distribution
  - Professional open source support model
  - Built, tested and maintained by BTP engineers
  - Hosted in public BTP Docker Hub repository
- Comprehensive blockchain management platform
  - One click deployment of Hyperledger Sawtooth networks
  - Underpinned by cloud native Kubernetes runtime environment
  - Integral component of agile software development lifecycle (SDLC)



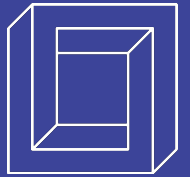


# Sextant Architecture





# Demo





# Demoing Sextant

Sextant

Sextant

https://sextant.dev.catenasys.com/clusters/view/scealiontach

BTP Sextant

Applications

OPEN XO DEMO

Pods

Name	Age	Ready	Status	IP
scealiontach-monitoring-0	18 hours	2/2	Running	100.120.0.1
scealiontach-validator-0	18 hours	10/10	Running	100.116.0.3
scealiontach-validator-1	18 hours	10/10	Running	100.104.0.3
scealiontach-validator-2	18 hours	10/10	Running	100.120.0.2

Services

Name	Age	Type	Ports	ClusterIP	ExternallIP
grafana	18 hours	LoadBalancer	80:3000/TCP	100.69.200.72	<a href="#">ae4446c41eSb211e88fc302cf56ebb93-811380444.us-east-2.elb.amazonaws.com</a>
influxdb	18 hours	ClusterIP	8086/TCP	100.67.240.148	<none>
kubernetes	2 days	ClusterIP	443/TCP	100.64.0.1	<none>
scealiontach-nodeport	18 hours	NodePort	8080/TCP, 3030/TCP, 30800/TCP	100.69.221.60	<none>
scealiontach-rest-api	18 hours	LoadBalancer	8080/TCP, 3030/TCP	100.70.219.186	<a href="#">ae5ea57dbe5b211e88fc302cf56ebb93-1030053694.us-east-2.elb.amazonaws.com</a>
scealiontach-validator	18 hours	ClusterIP	30800/TCP	None	<none>
scealiontach-xo-demo	18 hours	LoadBalancer	80/TCP	100.67.172.72	<a href="#">ae6004338eSb211e88fc302cf56ebb93-1553503340.us-east-2.elb.amazonaws.com</a>

Kubernetes

Deployed

DOWNLOAD KUBE CONFIG

OPEN DASHBOARD

DELETE CLUSTER

Sawtooth

OPEN MONITORING

UNDEPLOY SAWTOOTH

Cluster Settings

Name: scealiontach

Domain: dev.catenasys.com

Region: us-east-2

Topology: public

Masters: 1

Master Type: m4.large

Master Zones: us-east-2a

Nodes: 3

Node Type: m4.large

Node Zones: us-east-2a, us-east-2b, us-east-2c

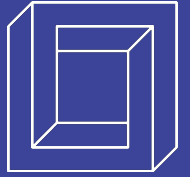
Network CIDR: 172.20.0.0/16

Subnet Mask: 19

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# Links



## Hyperledger Sawtooth

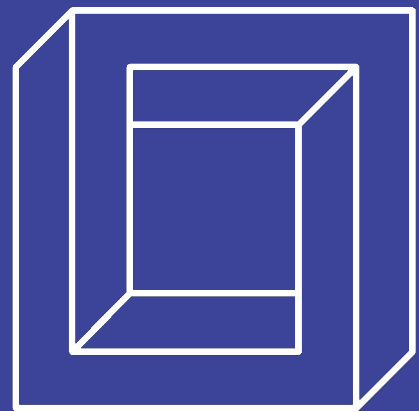
- <https://sawtooth.hyperledger.org/>
- <https://resources.blockchaintp.com/>

## BTP Sextant

- <https://blockchaintp.com/sextant/aws-marketplace/getting-started/>
- <https://aws.amazon.com/marketplace/pp/B07KDRYTY5>

## ▪ Hyperledger Global Forum

- [Running Hyperledger Sawtooth in Production](#)



**Blockchain  
Technology  
Partners**