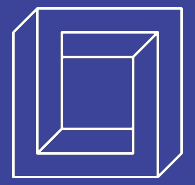
Deploying and managing Hyperledger Sawtooth

Duncan Johnston-Watt & Kai Davenport
Blockchain Technology Partners

Agenda



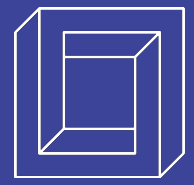
- BTP Introduction
- Hyperledger Sawtooth
- Demo

HYPERLEDGER

THE LINUX FOUNDATION

CLOUD NATIVE COMPUTING FOUNDATION

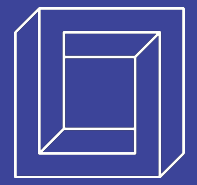
Value



“BTP has a clear value proposition — bringing the benefits of blockchain to business — and its leadership team has the necessary expertise to bring together the components to deliver”

Csilla Zsigri & William Fellows, 451 Research Impact Report

Focus

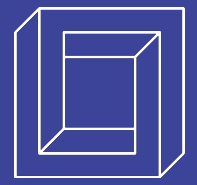


- We provide our customers with a blockchain management platform that leverages world class open source components *Hyperledger Sawtooth* and *Kubernetes* (CNCF) backed by the Linux Foundation

- We work with our customers to co-create blockchain-based solutions that differentiate their business from their competitors

- We support our customers and in collaboration with them create an operational model that meets their needs now and in the future

Platform



- BTP Sextant
  - Hyperledger Sawtooth distribution
  - Leveraging cloud native Kubernetes
  - Fully curated and hardened platform
  - Providing unified user experience
- BTP Sextant Editions
  - Standard
  - Professional
  - Enterprise
- AWS Marketplace (Q4 18)
  - Standard & Professional Editions
  - Easy to fire up and get started
  - Industry standard PAYG pricing
  - With upgrade option to subscription
- Future Targets
  - Google Cloud Platform Marketplace
  - Azure Marketplace
  - Alibaba Cloud Marketplace

HYPERLEDGER

BLOCKCHAIN TECHNOLOGIES FOR BUSINESS

Sawtooth v1.0

Dan Middleton
Hyperledger Sawtooth Maintainer

February 2018

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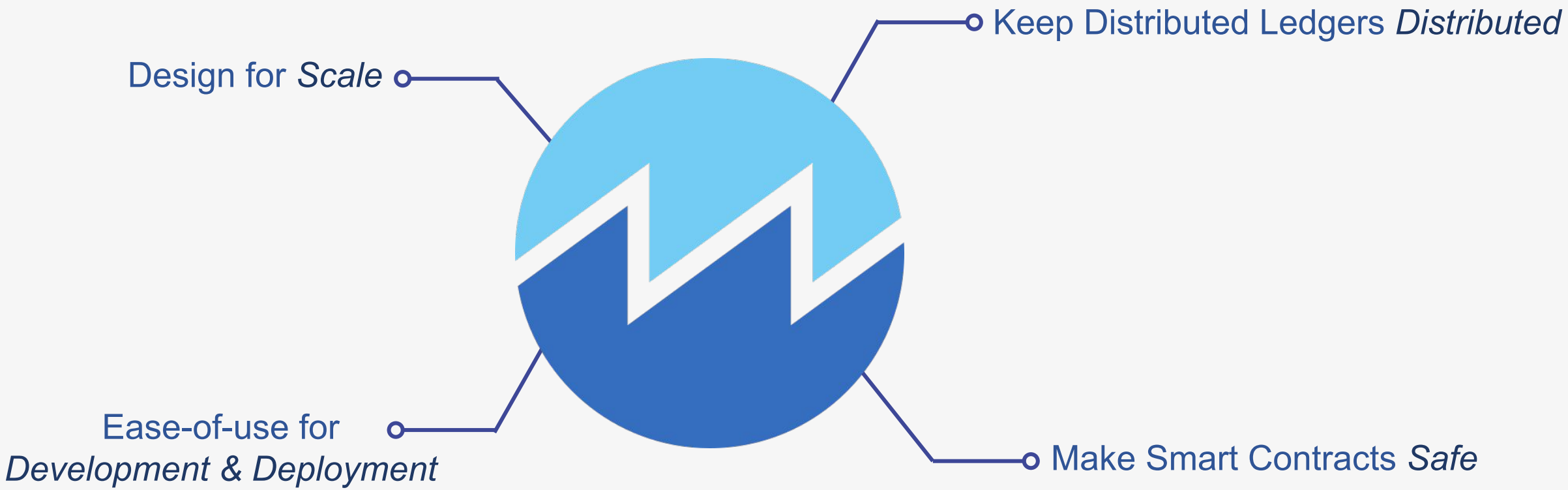
Sawtooth Design Philosophy

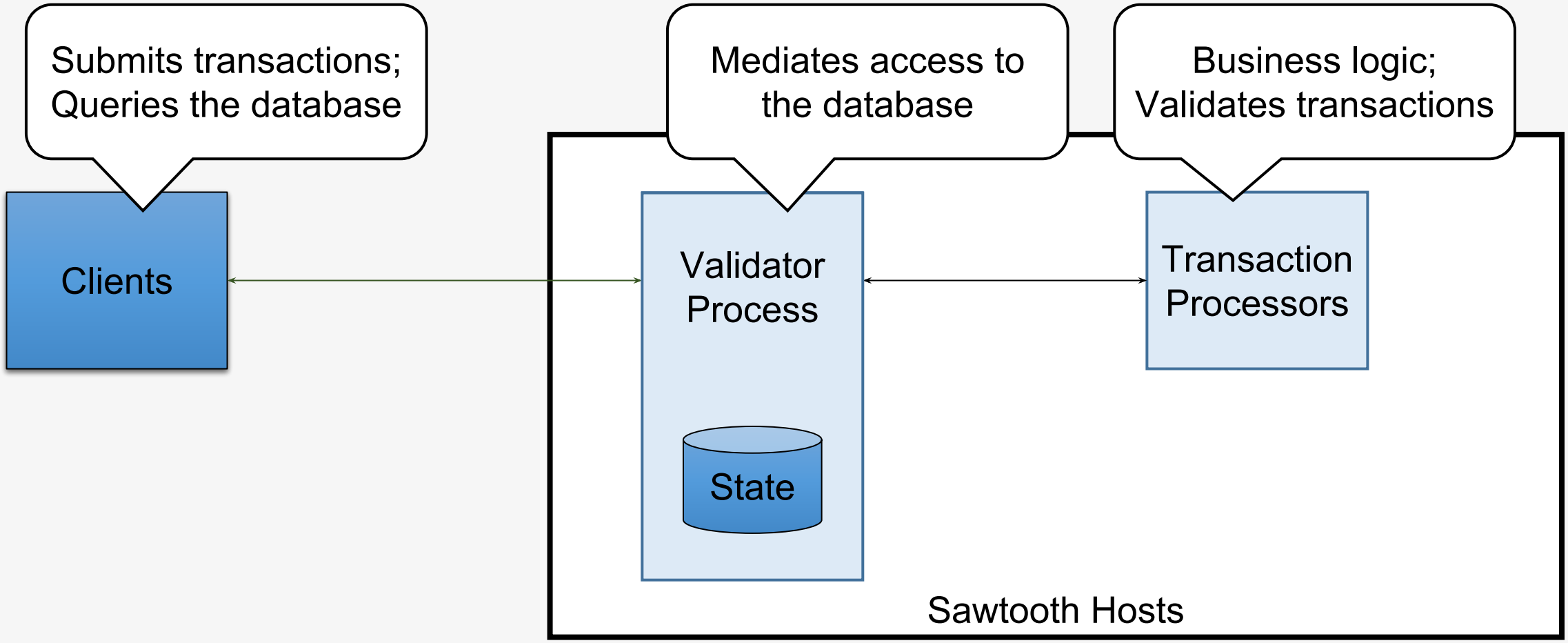


HYPERLEDGER
BLOCKCHAIN TECHNOLOGIES FOR BUSINESS

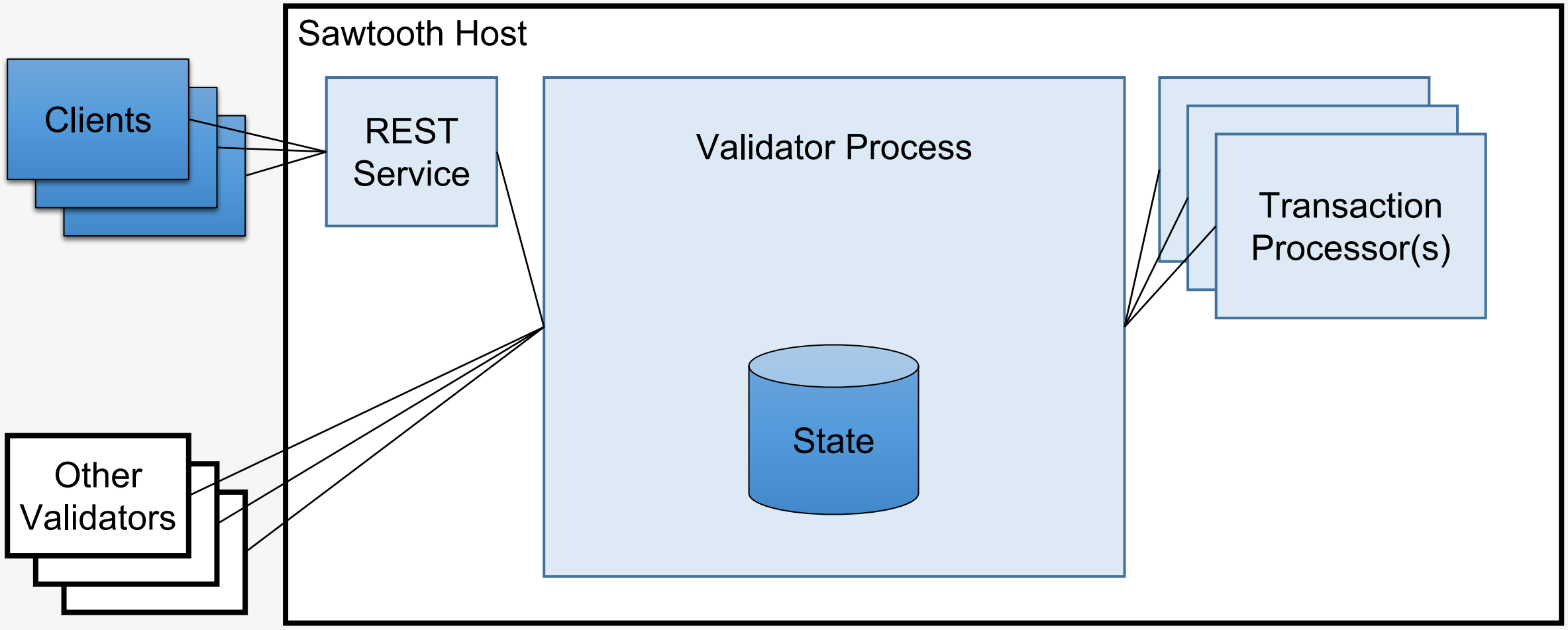
Hyperledger Sawtooth 1.0 Architecture & Features

1.0 Released January 2018

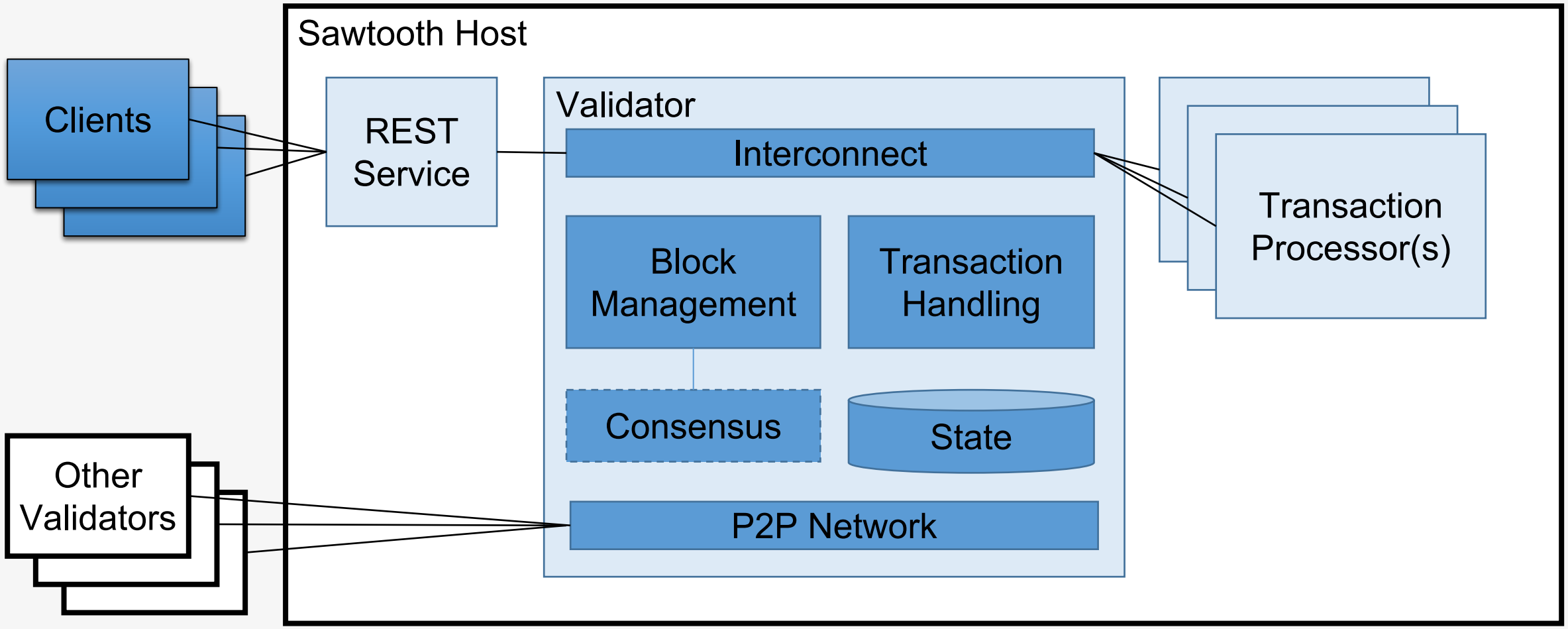
Basic Concept



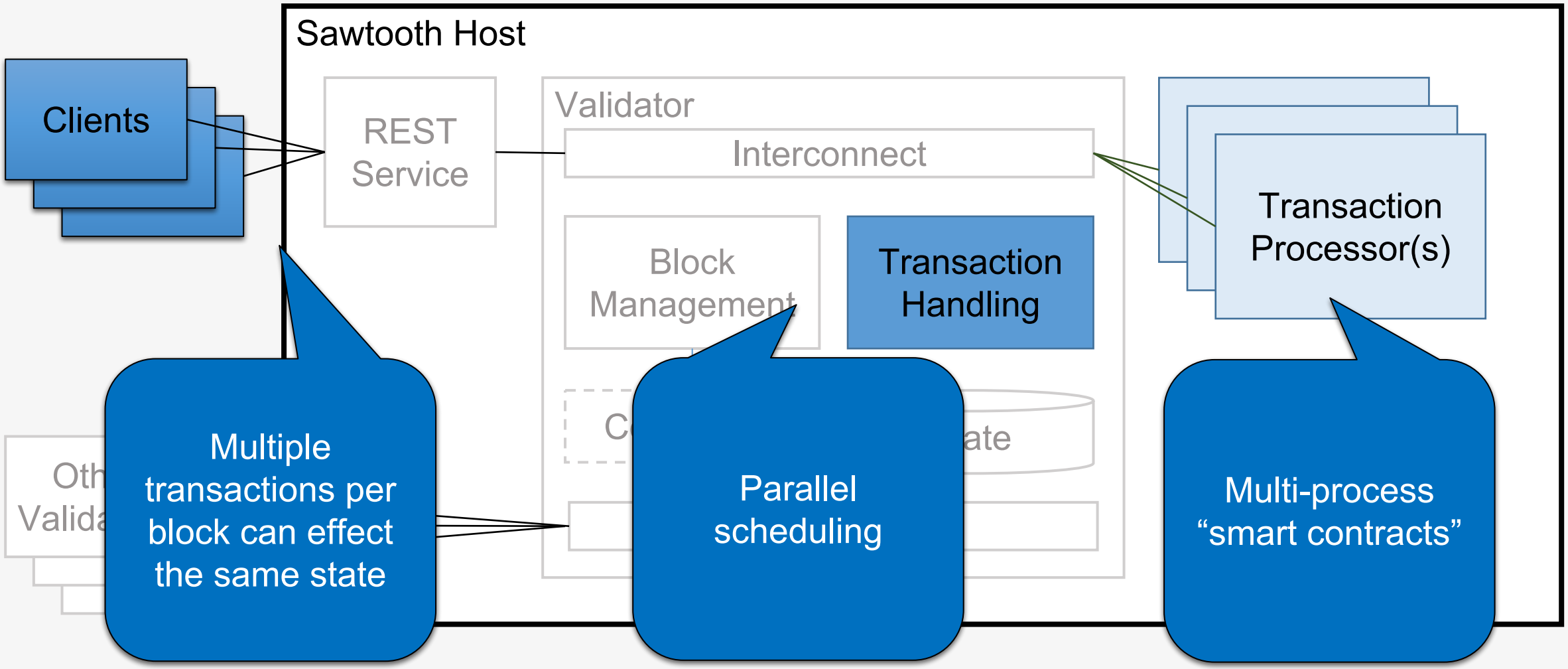
A Couple More Pieces



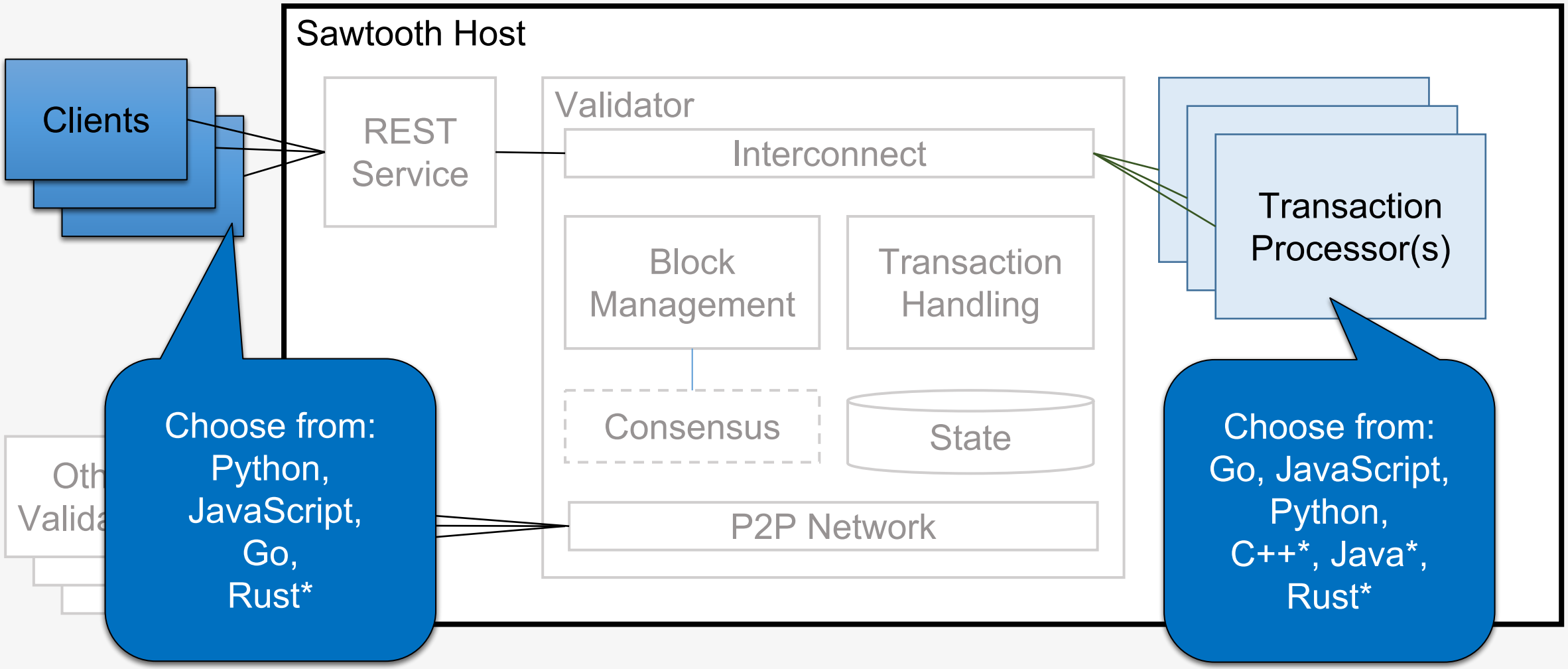
High-level Sawtooth Architecture



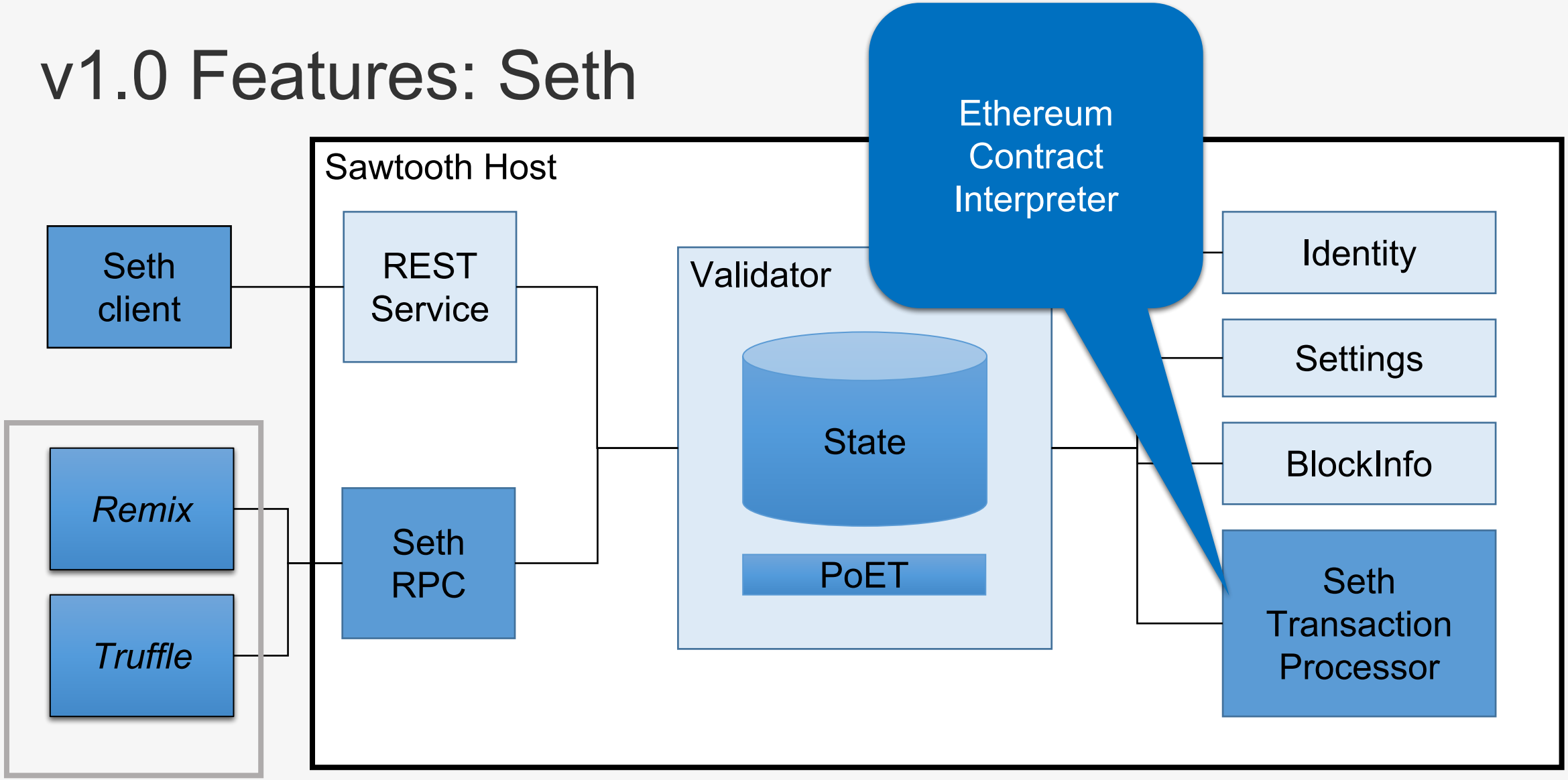
v1.0 Features: Parallel Execution



v1.0 Features: Multi-Language Support



v1.0 Features: Seth



v1.0 Features: On-chain Governance

Control the blockchain on the blockchain

Settings Transaction Family enables participants to agree on network policies

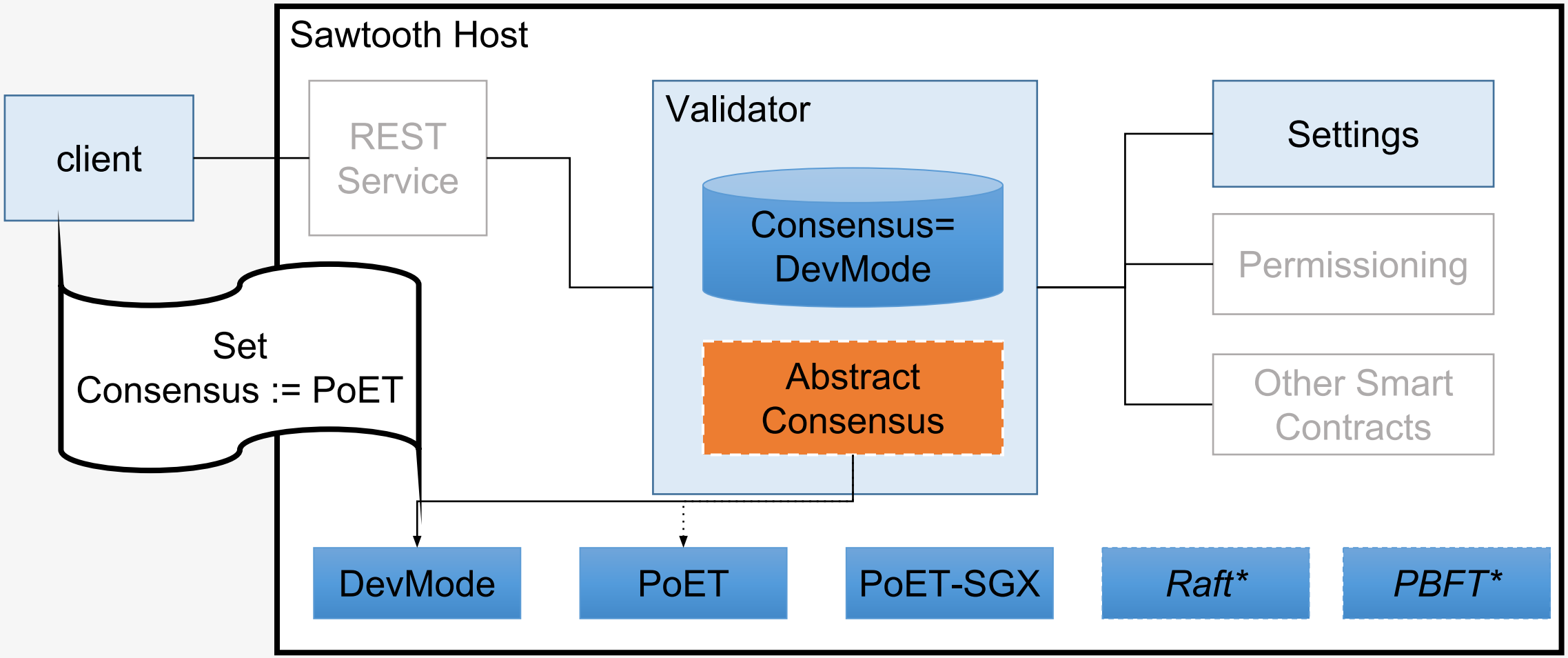
For example, vote on changing consensus parameters using registered public keys of consortia members.

Settings are extensible – they can be added after genesis.

Setting (Examples)	Value
sawtooth.poet.target_wait_time	5
sawtooth.validator.max_transactions_per_block	100000

sawtooth.validator.transaction_families	[{
	"family": "intkey",
	"version": "1.0"
	},
	{
	"family": "xo",
	"version": "1.0"
	}]

v1.0 Features: Dynamic Consensus



* Available in Sawtooth 1.1

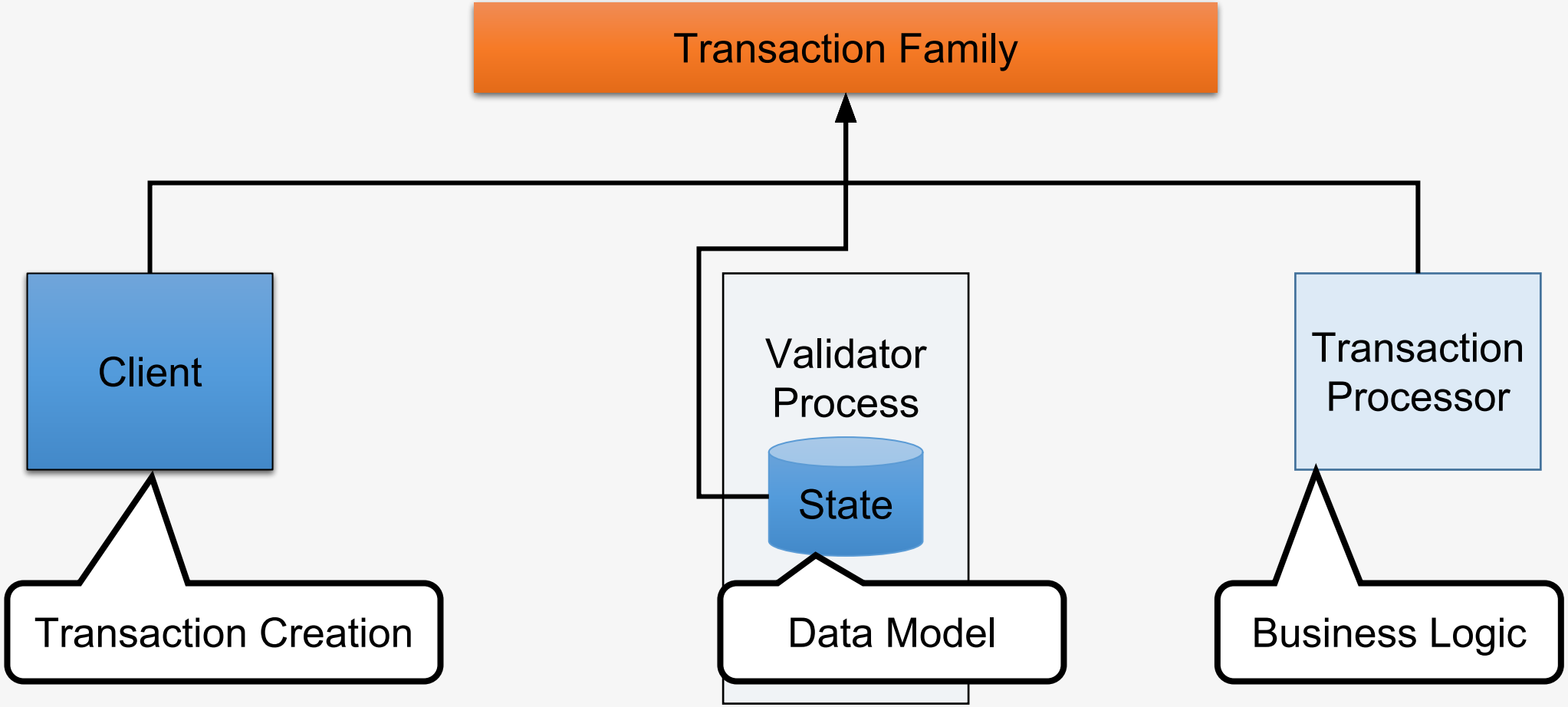
HYPERLEDGER

BLOCKCHAIN TECHNOLOGIES FOR BUSINESS

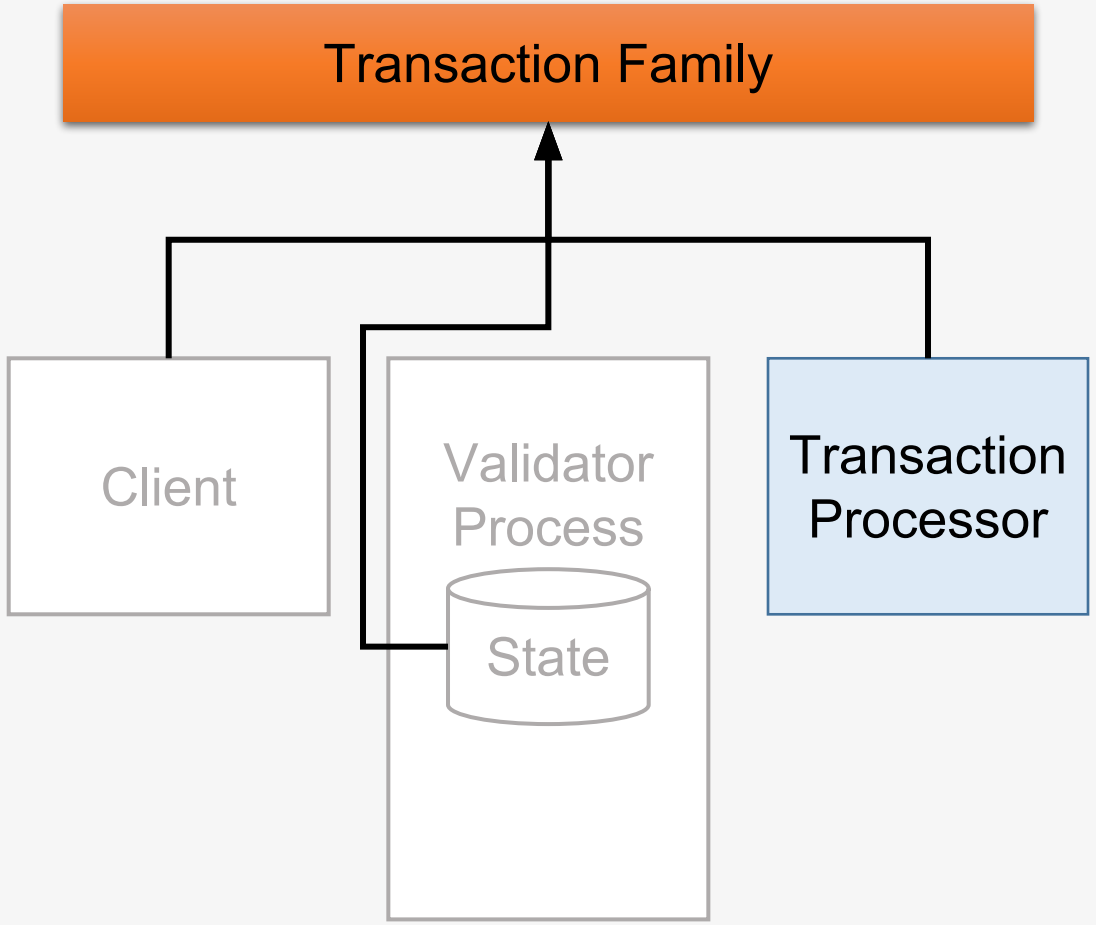
Hyperledger Sawtooth 1.0 Application Development

1.0 Released January 2018

Application Development



Transaction Processor ≈ Smart Contracts



Transaction Families **encapsulate business logic** on Sawtooth

A Transaction Family can be as simple as a single transaction format, with associated validity and state update logic…

…or as complex as a VM with opcode accounting and bytecode stored in state -- 'smart contracts'

The *choice* is up to the developer

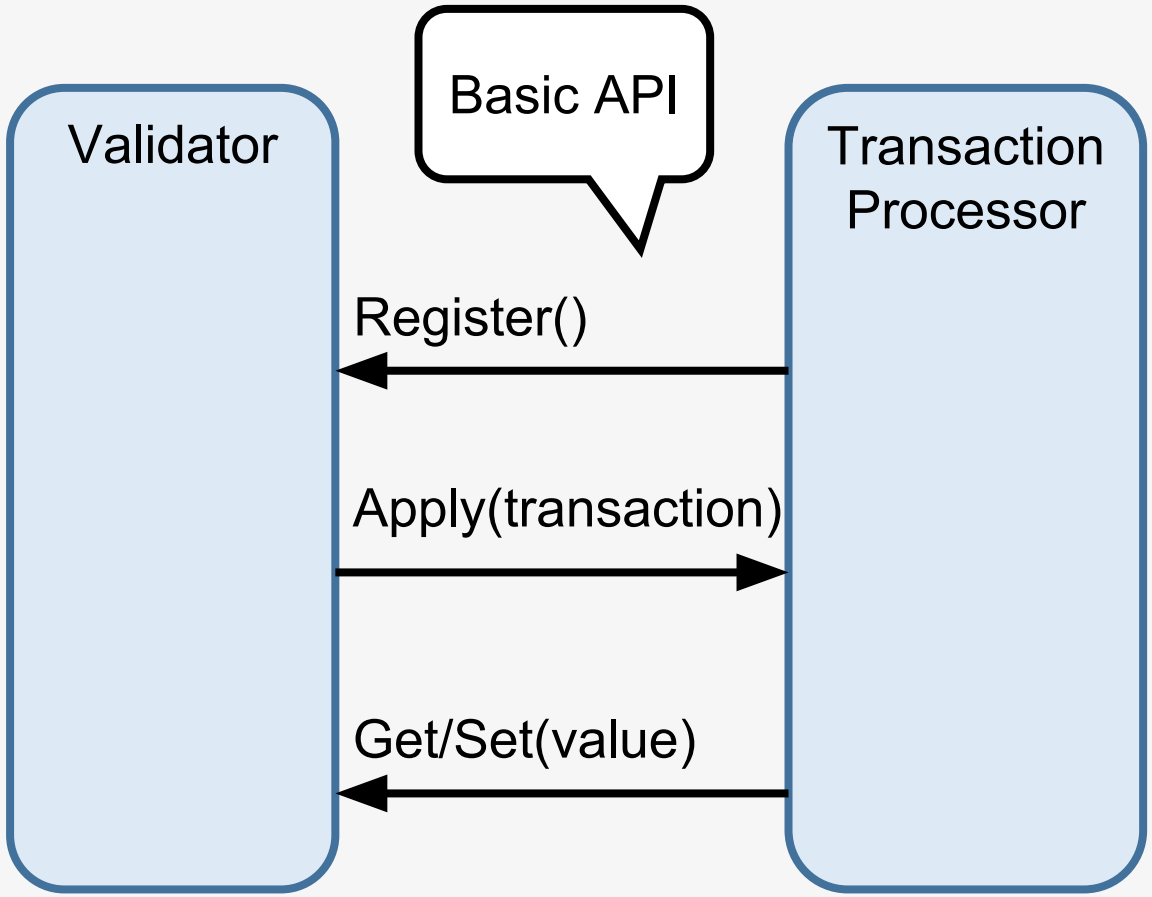
Sawtooth allows these concepts to **coexist** in the same instance of the blockchain -- same blocks, same global state

Transaction Families: The Transaction Processor

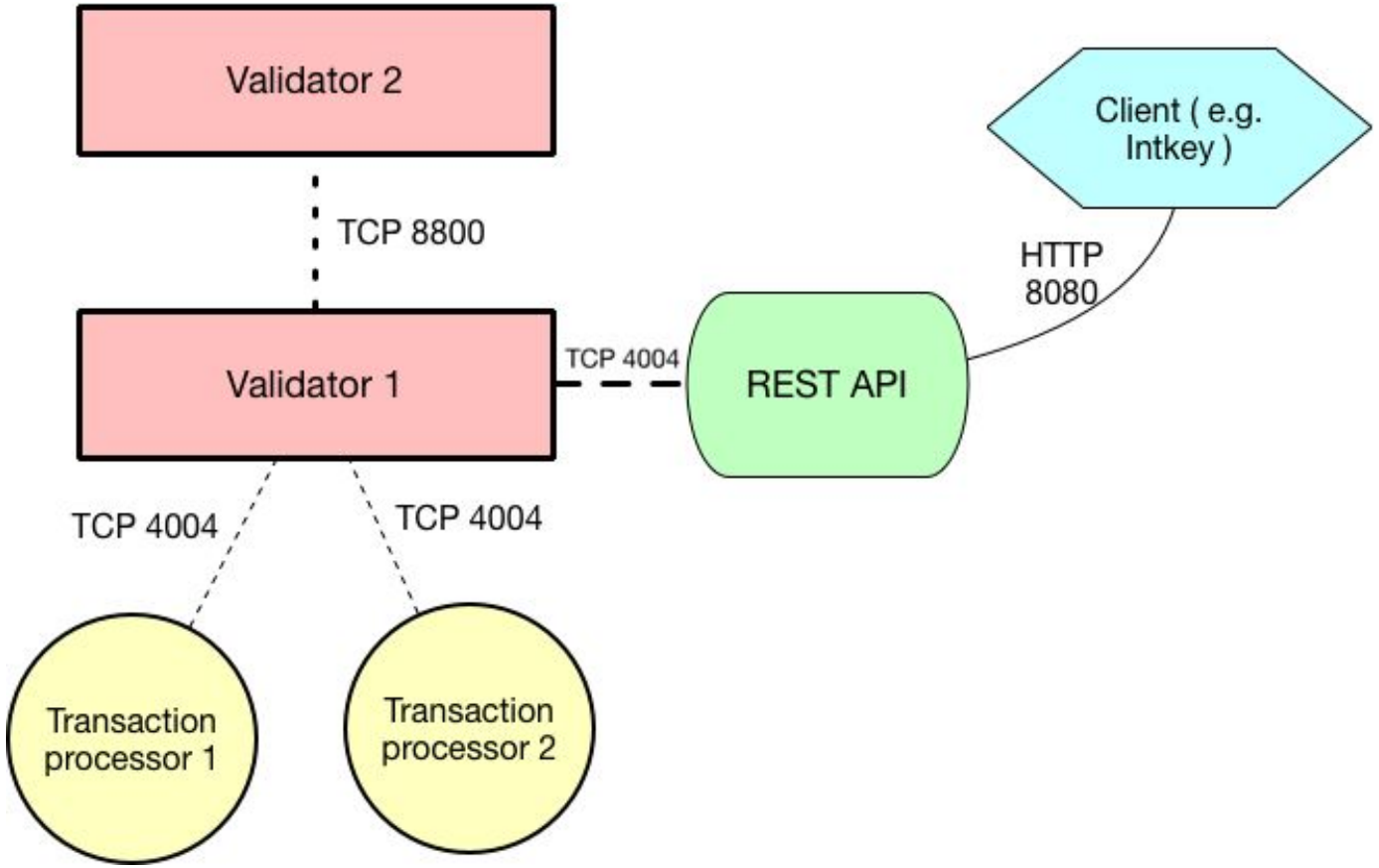
All validators in the network run every authorized transaction processor

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



Hyperledger Sawtooth



Source: https://sawtooth.hyperledger.org/docs/core/releases/1.0/app_developers_guide/aws.html#overview-of-sawtooth-components

Check it out

Give Sawtooth a try

- Work through the tutorials
- Build your own transaction family to explore use cases

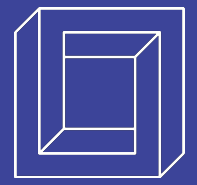
Become a contributor

- Join the community
- Help with docs, code, examples
- Become an expert and help others on chat

Links

- Code: https://github.com/hyperledger/sawtooth-core
- Docs: https://sawtooth.hyperledger.org/docs/
- Chat: https://chat.hyperledger.org/channel/sawtooth

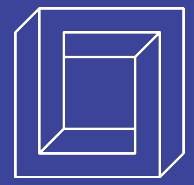
Sextant



- Infrastructure
  - Create a new Kubernetes cluster
  - Join an existing Kubernetes cluster
  - Failover for high availability

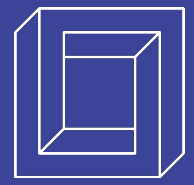
- Sawtooth
  - Deploy managed version of sawtooth
  - Auto configure network and storage
  - Deploy and manage standard or custom transaction processors
  - Monitor deployment

Sextant: Infrastructure



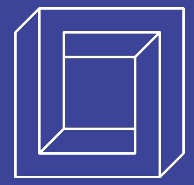
- Provision a new Kubernetes cluster
  - From nothing to running cluster with a button click
  - Automate the setup across popular cloud providers
  - Handles multi-zone for high availability
  - Download “kubeconfig” for CLI “kubectl” access
- Join an existing Kubernetes cluster
  - For bare metal or custom clusters - provide a “kubeconfig” file and sextant can deploy to it

Sextant: Sawtooth



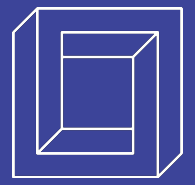
- Deploy managed Sawtooth
  - Configuration of validators
  - Networking between validators
  - Connect to external seeds
  - Persistent storage for validators
- High availability
  - k8s persistent volumes provide HA on node failure
  - k8s ingress provides static external access endpoint

Sextant: Sawtooth



- Standard transaction processors
  - Deploy standard TP's like RBAC with sensible configuration options
  - We can begin to curate a library of commonly used TP's
- Custom transaction processors
  - Deploy custom TP's to the cluster
  - Any Docker image can be consumed
  - Easy network access to the validator (localhost:4004)

Sextant: Sawtooth



- Monitoring
  - InfluxDB powering Grafana dashboards
  - Monitor things like “transactions per second”
  - Fully integrated into Sawtooth validators
- Updates
  - We curate Kubernetes manifests and Docker images
  - The cluster can easily be upgraded in situ

Sawtooth Performance

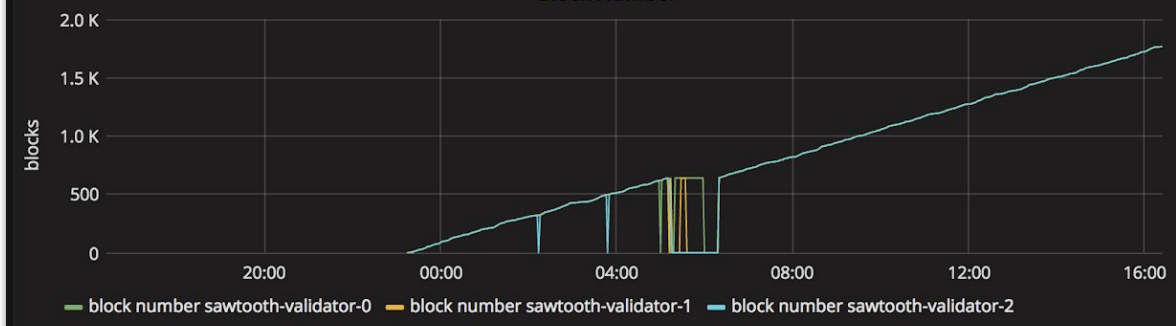
Zoom Out | Last 24 hours | Refresh every 10s

Chain Head

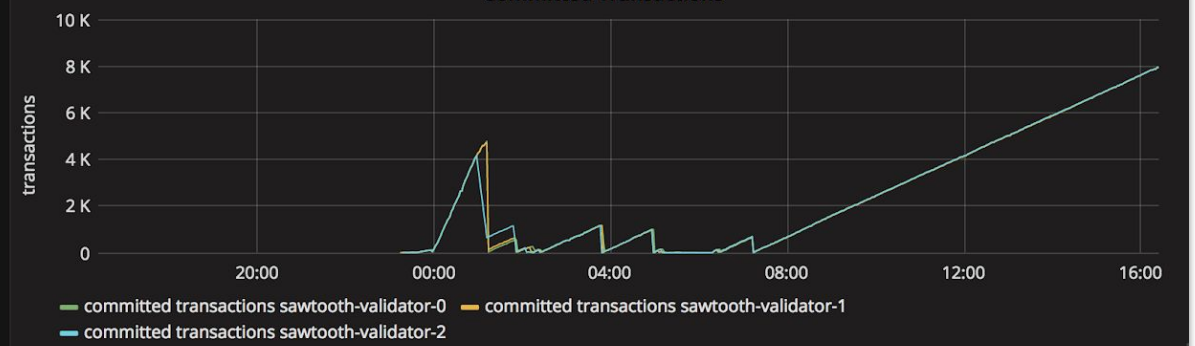
Time	A-series
2018-10-23 16:23:15	1.13
2018-10-23 16:22:15	1.30
2018-10-23 16:21:15	1.34
2018-10-23 16:20:15	1.39
2018-10-23 16:19:15	0.96

1 2 3 4 5 6 7 8 9

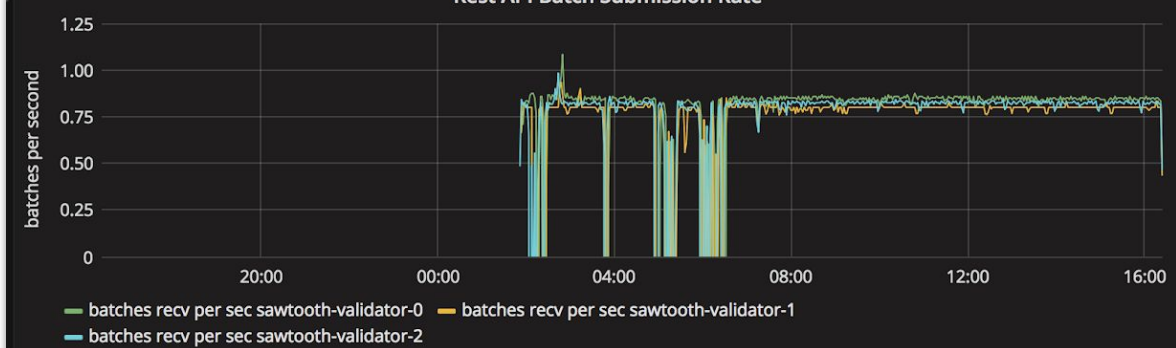
Block Number



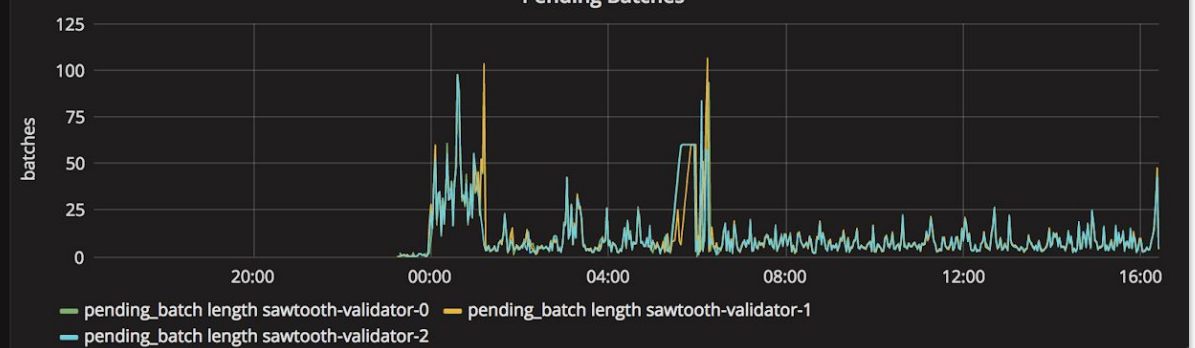
Committed Transactions



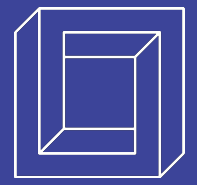
Rest API Batch Submission Rate



Pending Batches

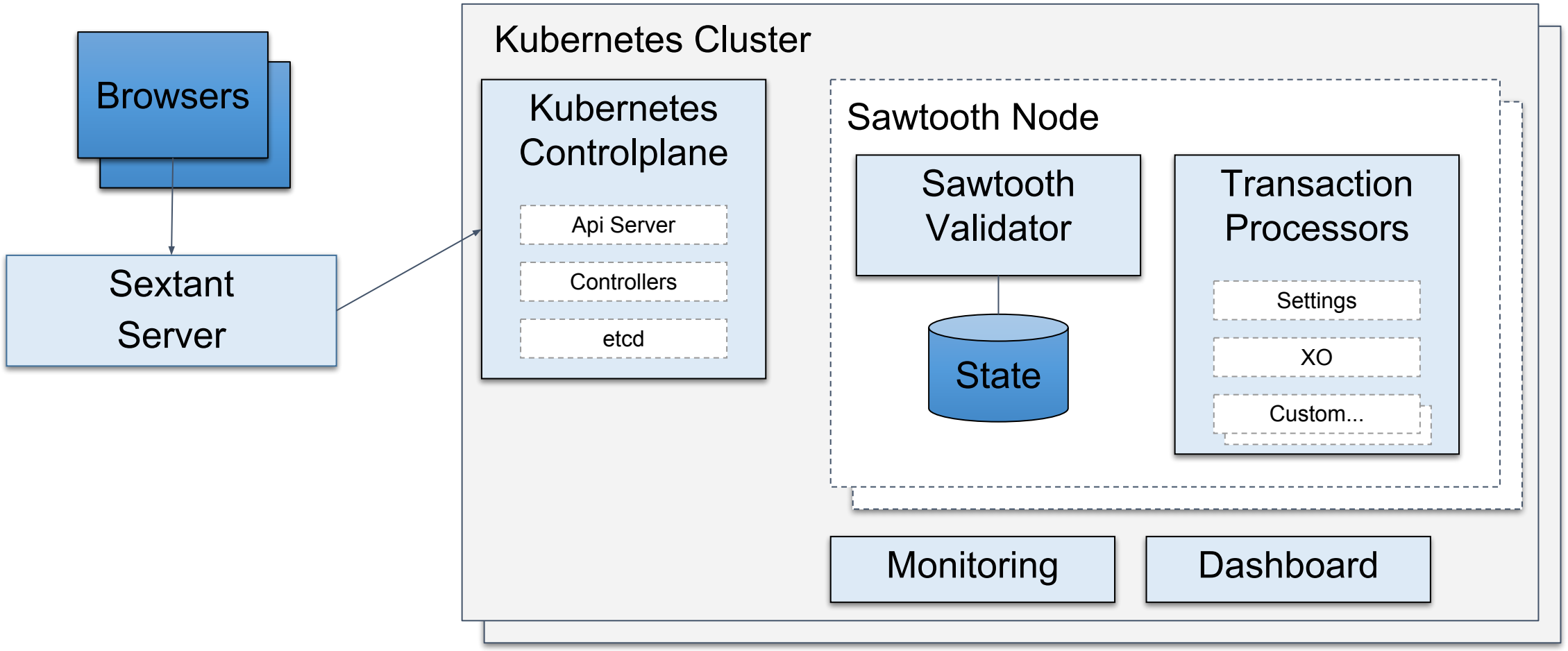


Sextant: Components



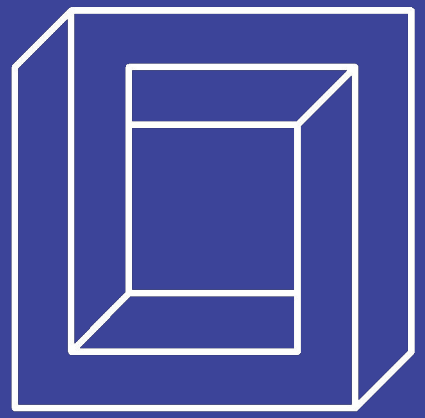
- UI
  - Browser application for easy and intuitive management of clusters
  - Real time view on cluster status
- Management server
  - Connects to cloud providers to provision of new clusters
  - Communicates to k8s api server for running cluster
  - Deploys and manages Sawtooth resources on k8s cluster

Sextant: Architecture



Demo

Let’s deploy sawtooth to AWS!



Blockchain Technology Partners