Building a Blockchain Network with Perper, a Serverless Computation Framework for Apache Ignite

BY: **BRANIMIR ANGELOV**
Co-founder and CTO of Kubo;
Software Consultant in Obecto

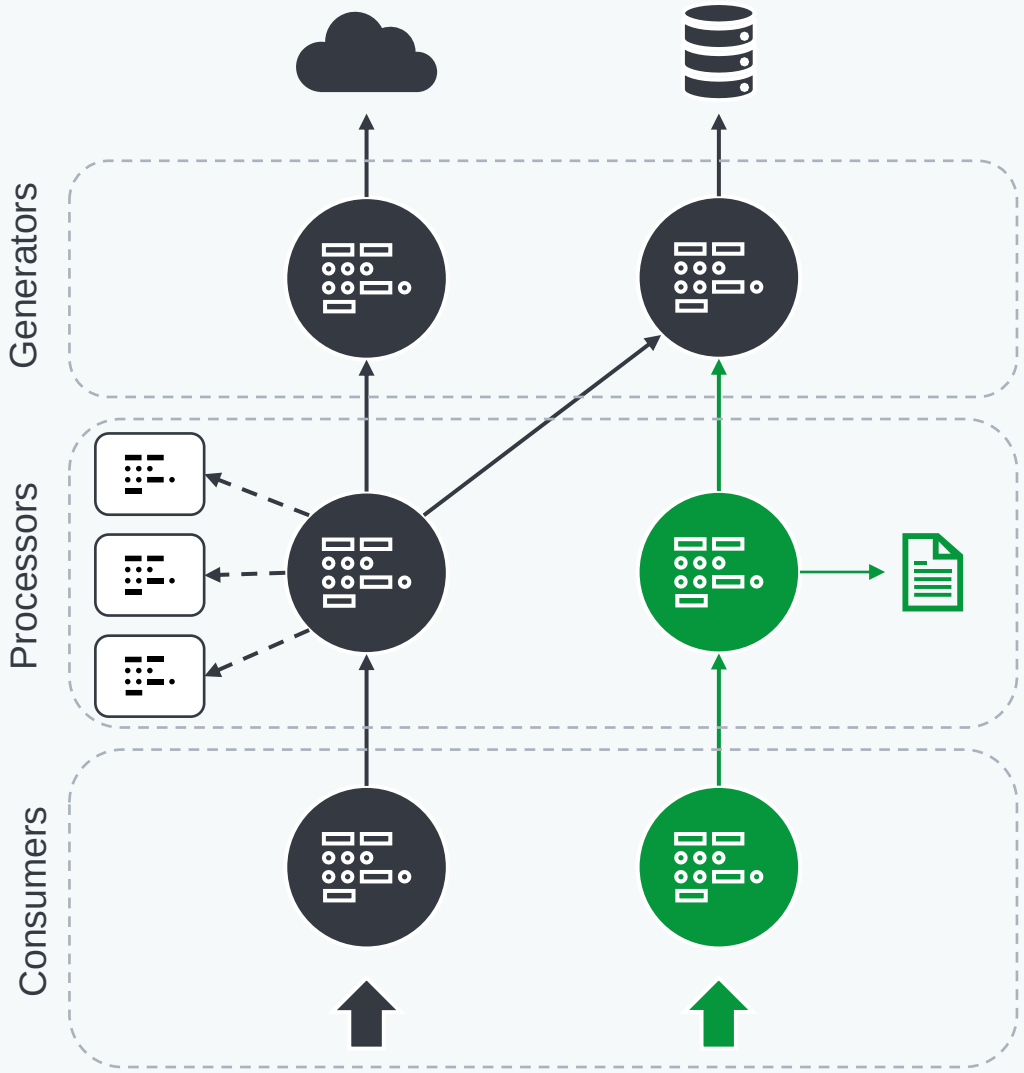
Introduction

BRANIMIR ANGELOV
Hands-on software architect with experience in delivering products and critical projects in software and hardware industries. Fluent in various programming languages, technologies and algorithmic techniques.

KUBO
Kubo is European company committed to accelerate cloud native technologies adoption in our region.

OBECTO
Obecto is boutique software company with 12 years of history. **Perper** framework originated as internal infrastructure project for crypto asset algo-trading platform.

COMRADE COOPERATIVE
Non-profit democratic organization of software developers and innovation builders. Key projects are Wetonomy (DAO) and Scynet (Decentralized AutoML). Using Perper and Apocryph to delivery this promises to the general public.



Introduction

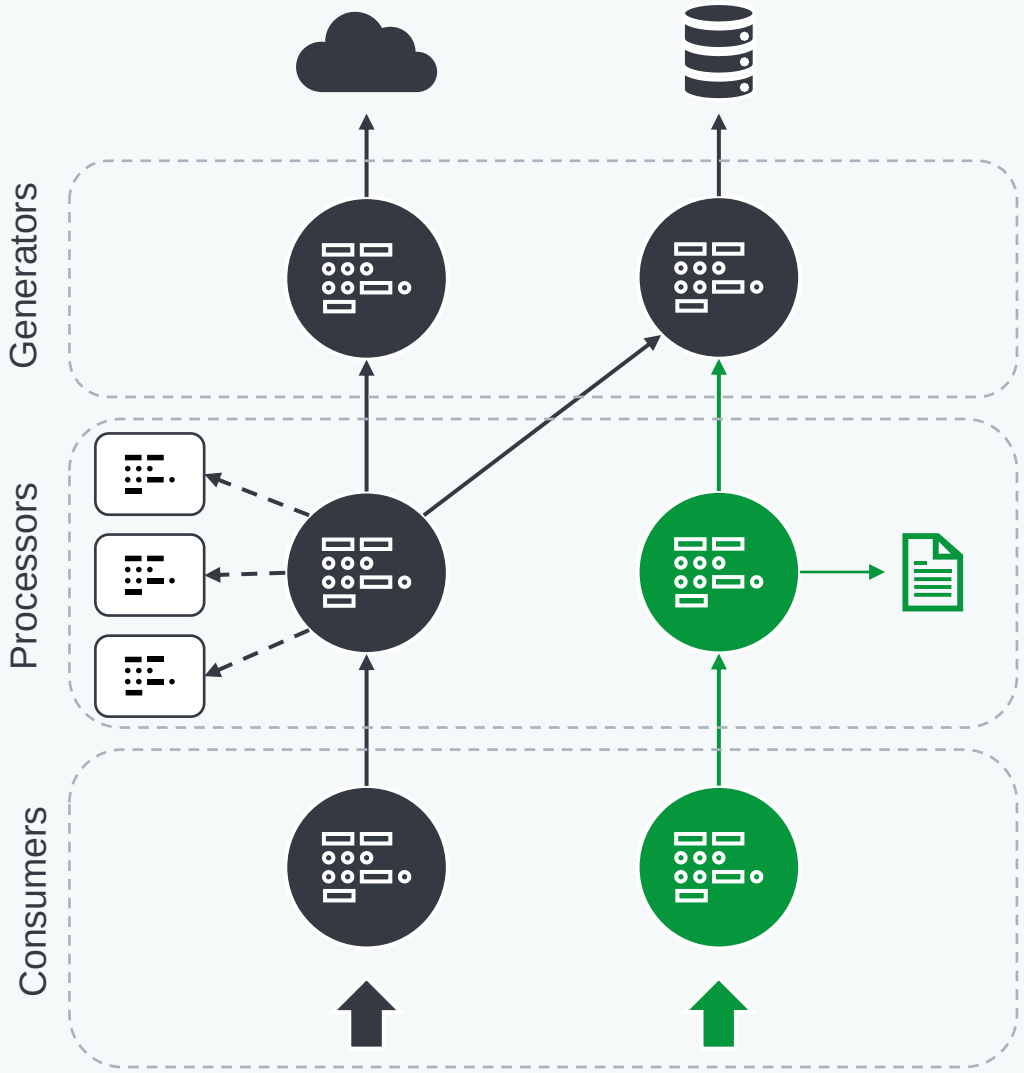
Reactive Programming

Reactive programming is simply to program using, and relying on, events instead of the order of lines in the code.

Reactive Systems are systems that are **Responsive**, **Resilient**, **Elastic** and **Message Driven**.

Reactive Streams are the building block of reactive systems.

- Asynchronous stream processing
- Non-blocking backpressure
- ***Data locality***

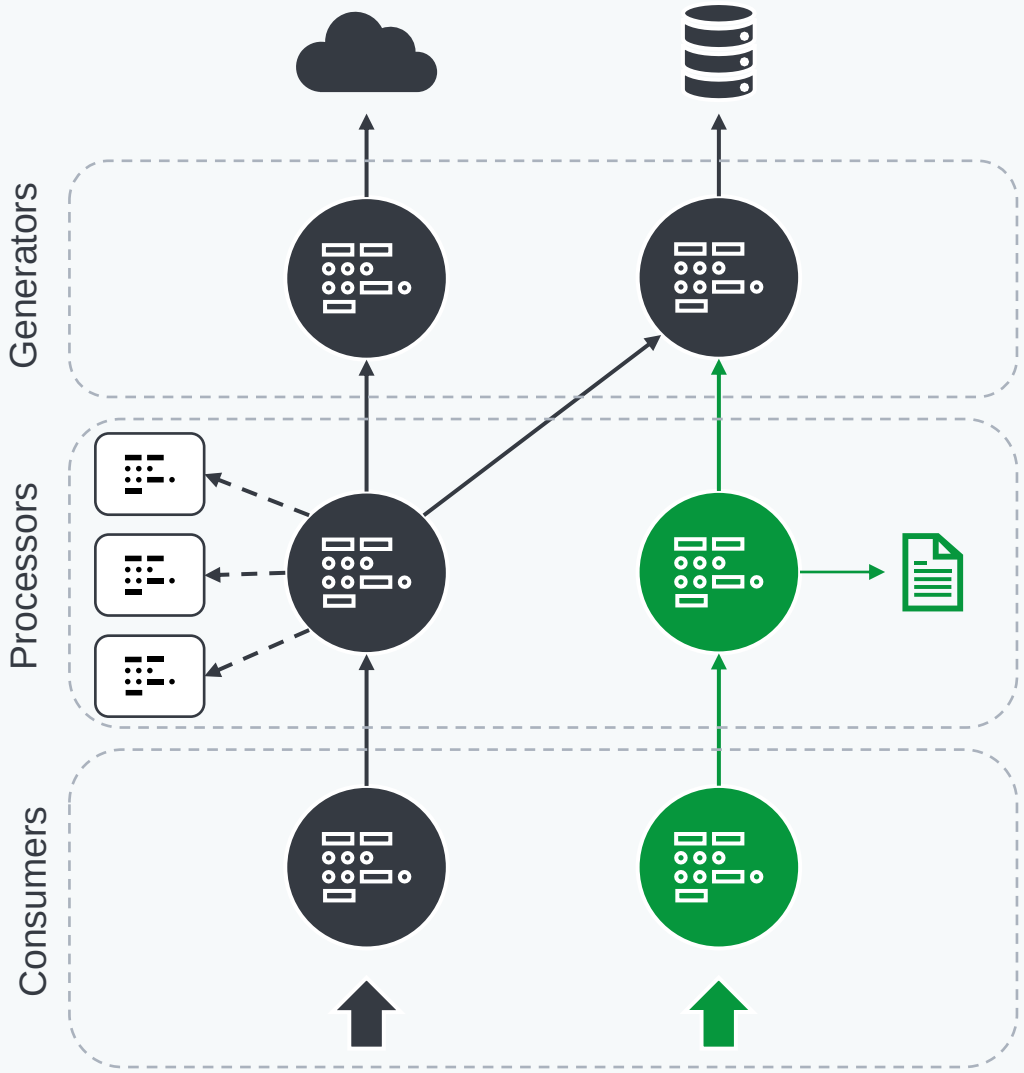


Introduction

Serverless Computing

Serverless computing is a cloud computing execution model in which the cloud provider runs the server, and dynamically manages the allocation of machine resources.

- Scale down to zero
- External state management
- Event-driven computation model



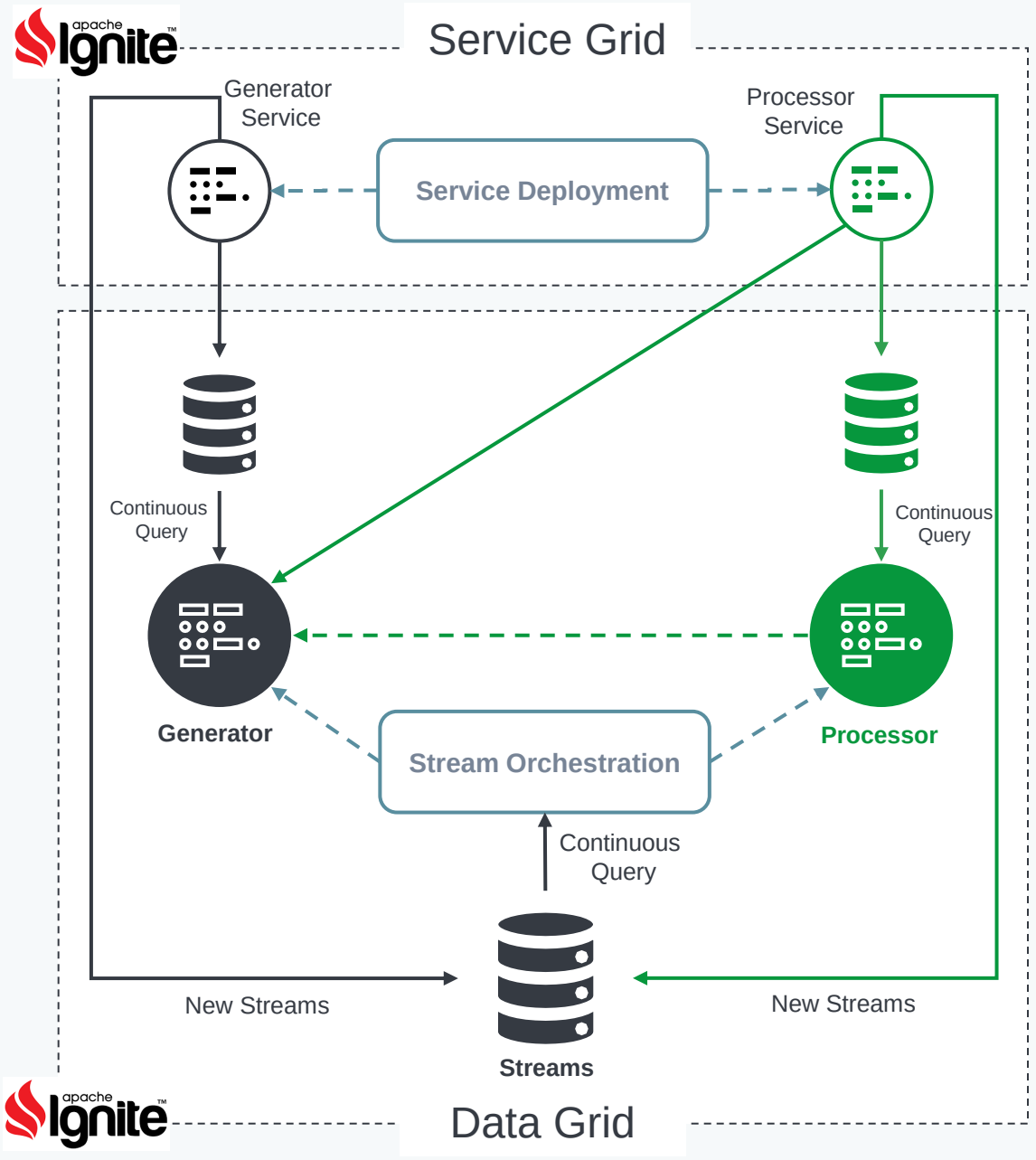
Introduction

Serverless Computing with Reactive Streams

Serverless computing and reactive streams naturally fit together due to their event-driven, loosely coupled nature. They can be used in variety of architecture patterns – ETL pipelines, Virtual Actor systems and others.

- High availability, scalability and efficiency
- Configurable data locality
- Modular, declarative programming model

Perper: Serverless Computation Framework for Apache Ignite

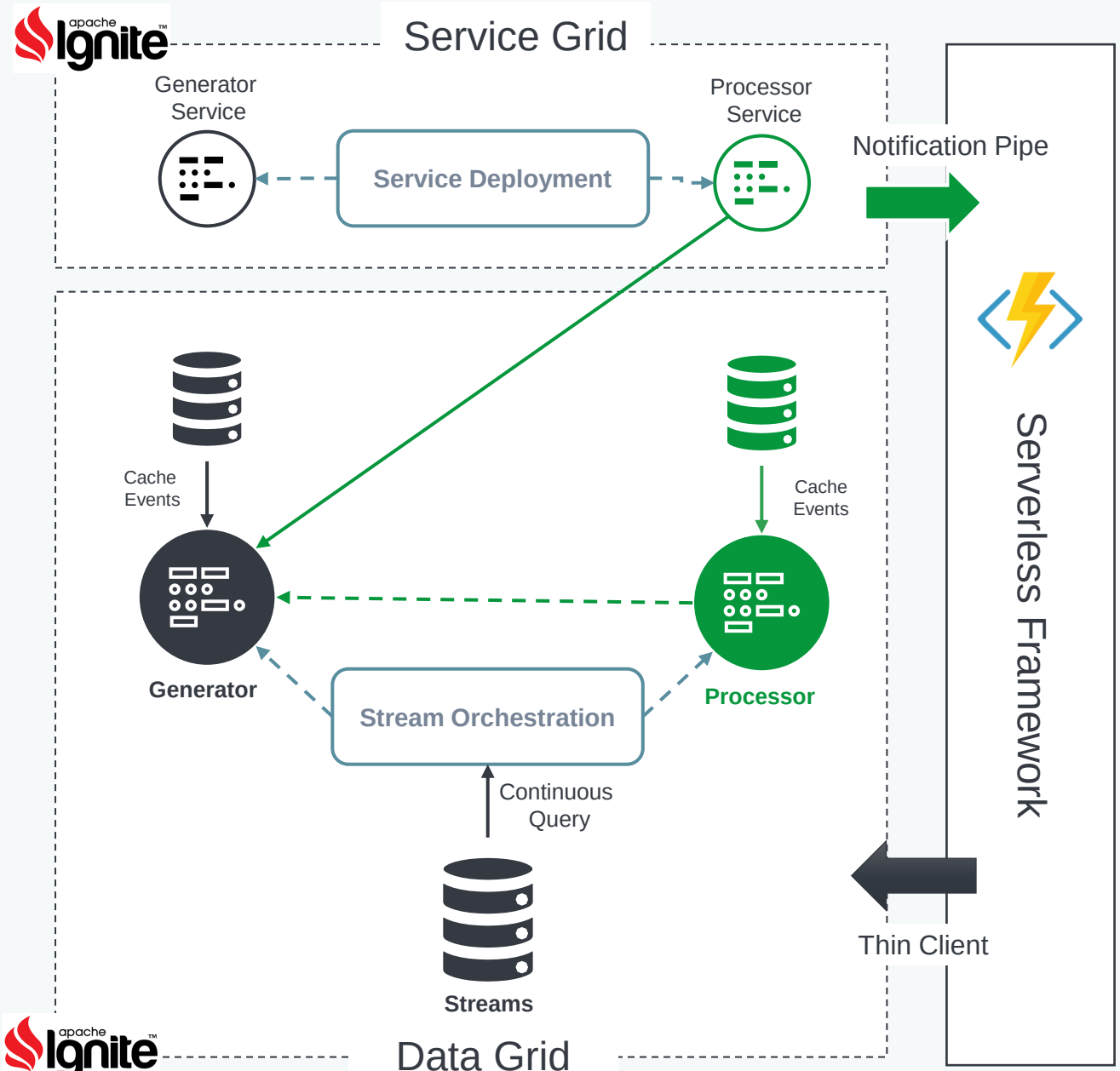


Perper: Serverless Computation Framework for Apache Ignite

Reactive Stream using Apache Ignite

Apache Ignite Service Grid and Data Grid provide all the building blocks required for implementing distributed reactive streams:

- Continuous queries as events and asynchronous operations
- Cache locking and configuration for back-pressure (max async concurrent operations)
- Configurable data locality

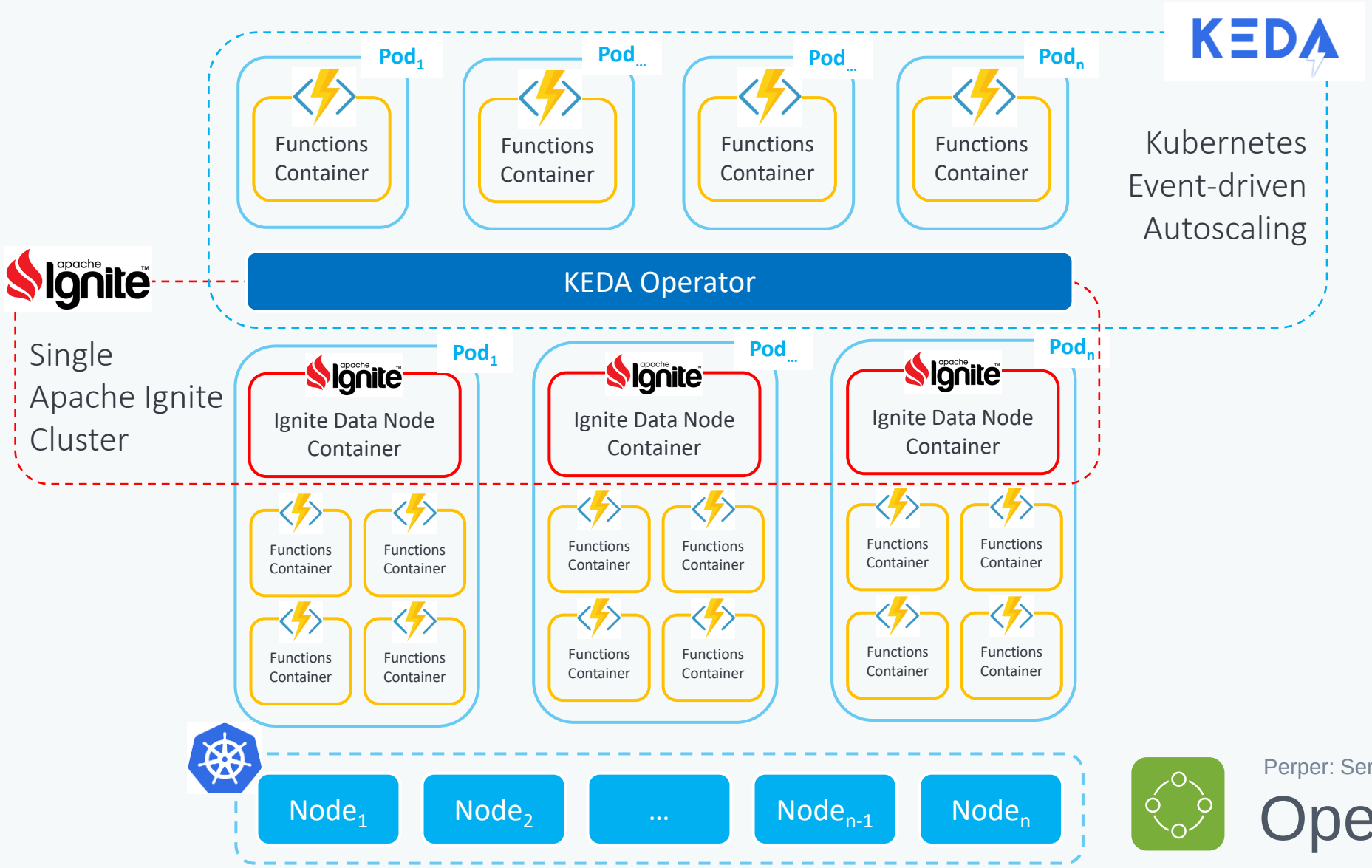


Perper: Serverless Computation Framework for Apache Ignite

Serverless Computing using Apache Ignite

Apache Ignite can be easily extended to support various serverless frameworks by externalizing actual processing logic and using cache events as serverless triggers.

- Thin client for multiple languages / frameworks support using service grid for data locality
- Notification pipe for pushing events to serverless frameworks
- Extended service deployment to support shutting down streams.

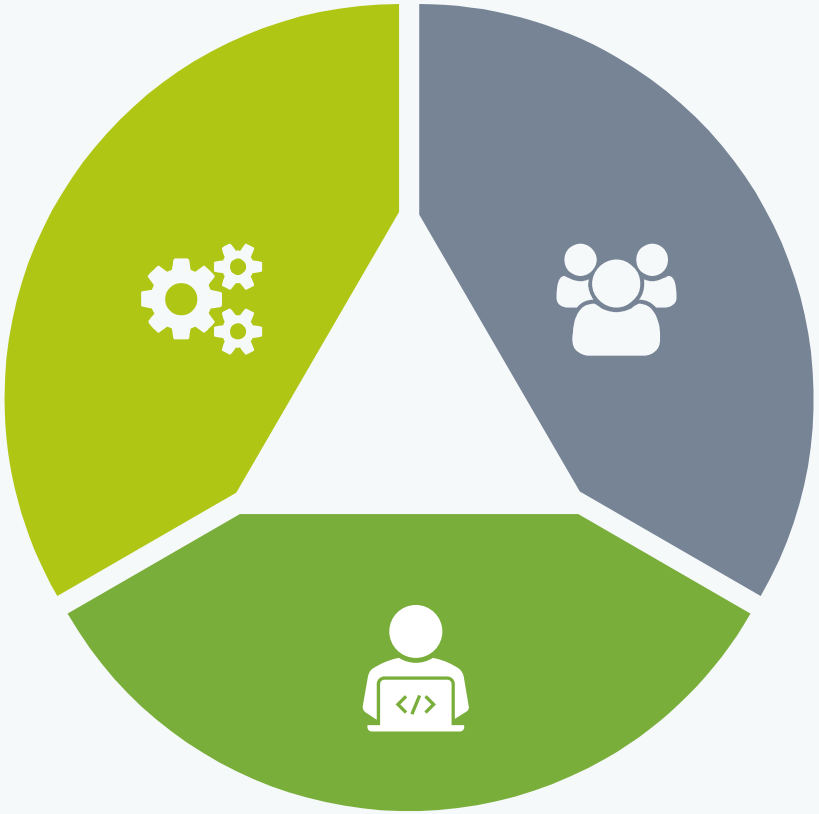


Perper: Serverless Computation Framework for Apache Ignite

Operations

Apocryph: Blockchain for autonomous agents

Blockchain building blocks



Consensus

Fault-tolerant, message-driven mechanism that is used to achieve the necessary agreement on a single state of the network. We use combination of *King of the Hill* and *Snowball*.

Decentralized network

Distributed network of physical nodes (from single machine to cluster of machines) run by community. We use *Kubernetes* and *Perper* for the physical nodes and *IPFS* for the network layer.

Programming model

The framework used for creating blockchain applications. We use *multi-agent system-based* model, support both *passive*, *active* and *cognitive* agents

Why using Perper for building blockchain?

Single Computation Platform

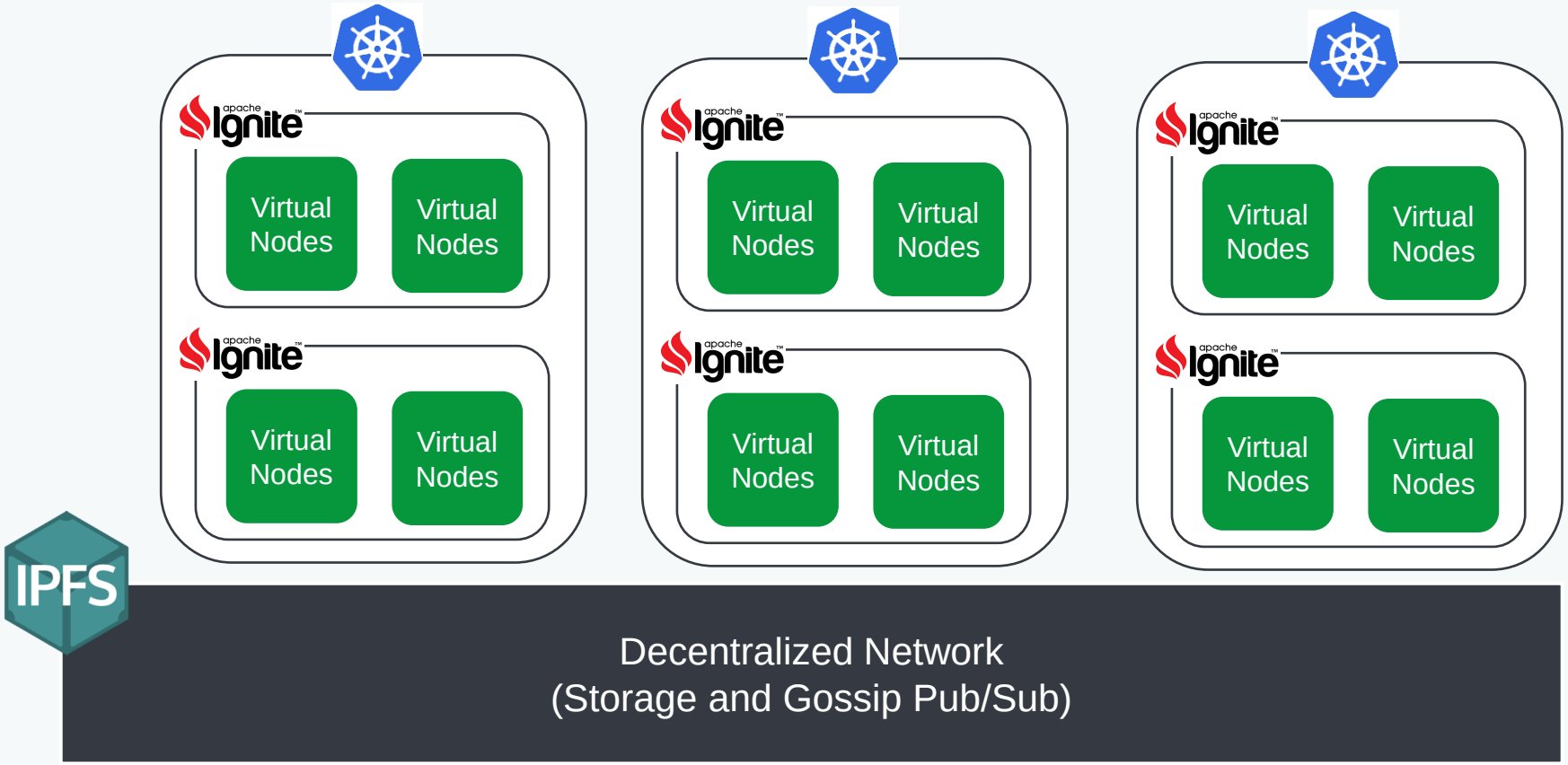
Seamless scaling from single machine to multiple machines.

Reactive System

Multi-agent applications can be easily implemented on top of platform for reactive systems.

Test Harness

Suitable for highly scalable test environment for validating blockchain network properties.



Apocryph: Blockchain for autonomous agents.

Architecture Overview

Questions