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# RKE 2 & Longhorn

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# RKE 2

## origin & features

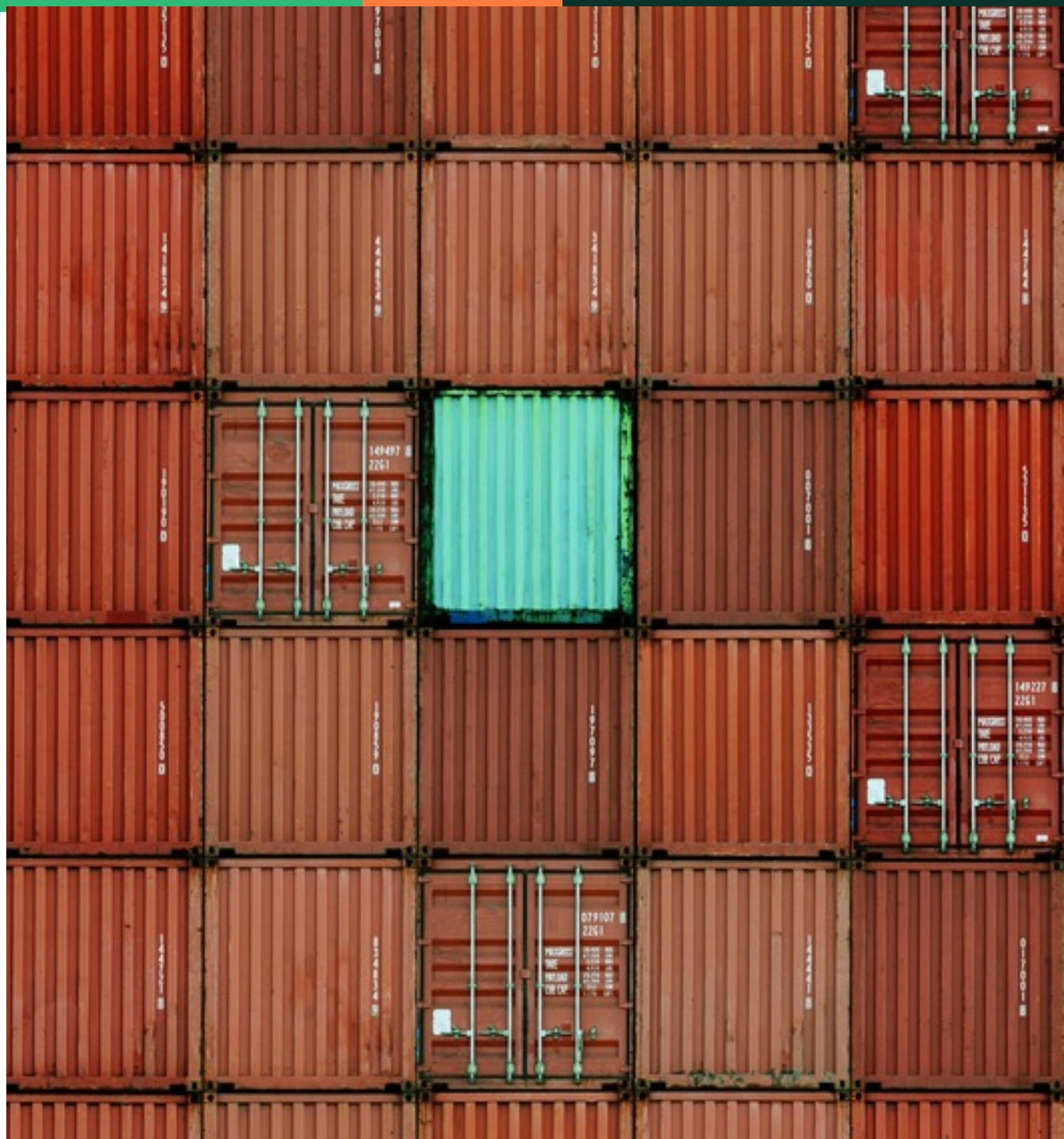


# RKE2 origins

- Rancher Government Solutions (RGS) was born to address the unique needs of the U.S. Government and military as it relates to application modernization, containers and Kubernetes.
  - Security oriented
  - Easy to operate
  - Close to upstream Kubernetes
  - Single binary deployment



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**RKE**



**K3S**

## The best of two worlds

- From K3s, it inherits the usability, ease-of-operations, and deployment model.
- From RKE1, it inherits close alignment with upstream Kubernetes. In places K3s has diverged from upstream Kubernetes in order to optimize for edge deployments, but RKE1 and RKE2 can stay closely aligned with upstream.
- As a result of its origin, RKE2 is a secure, easy to operate and lightweight distribution that can be used for data centers and at the Edge.





## Requirements & Deployments

- Linux or Windows operative system (control plane always runs Linux)
  - OpenSUSE, SLES, SLE Micro, Ubuntu, CentOS/RHEL, Rocky
  - Windows Server 2019 LTSC, Windows Server 2022 LTSC
- Minimum Hardware
  - 4GB (8GB recommended)
  - 2 CPU (4CPU recommended)
  - RKE2 uses ETCD as Database, SSD disks are recommended
- Deployments
  - Single node
  - Compact Cluster (3 Nodes)
  - HA



# RKE 2

## Main features

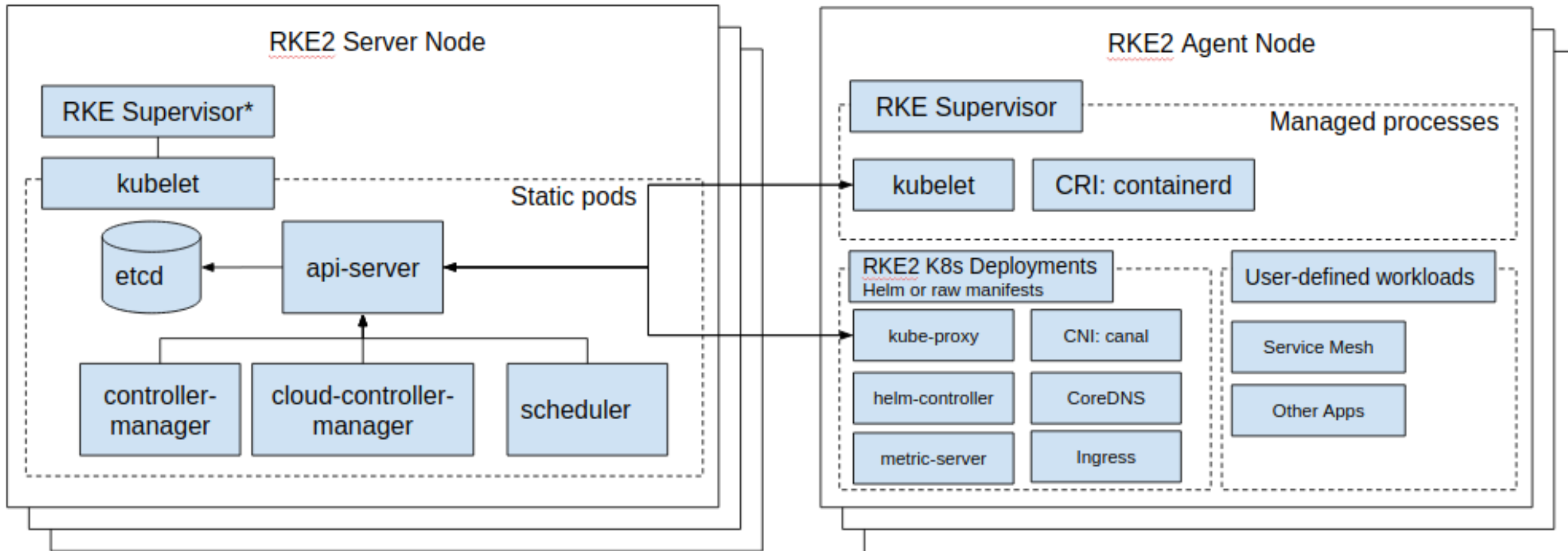
- Provides defaults and configuration options that allow clusters to pass the CIS Kubernetes Benchmark v1.6 or v1.23 with minimal operator intervention
- Enables FIPS 140-2 compliance
- Compatible with AppArmor, SELinux and Multi-Category Security (MCS)
- Scans components for CVEs in the build pipeline.
- Hardened images based on SLE Base Container Image (BCI)
- Fast and simple installation from a single binary. Easy to configure and scale
- Windows Workers
- Full integration with Rancher Manager
- CNI plugins available
  - Canal
  - Calico
  - Cilium
  - Multus/SR-IOV





# RKE 2

## Architecture





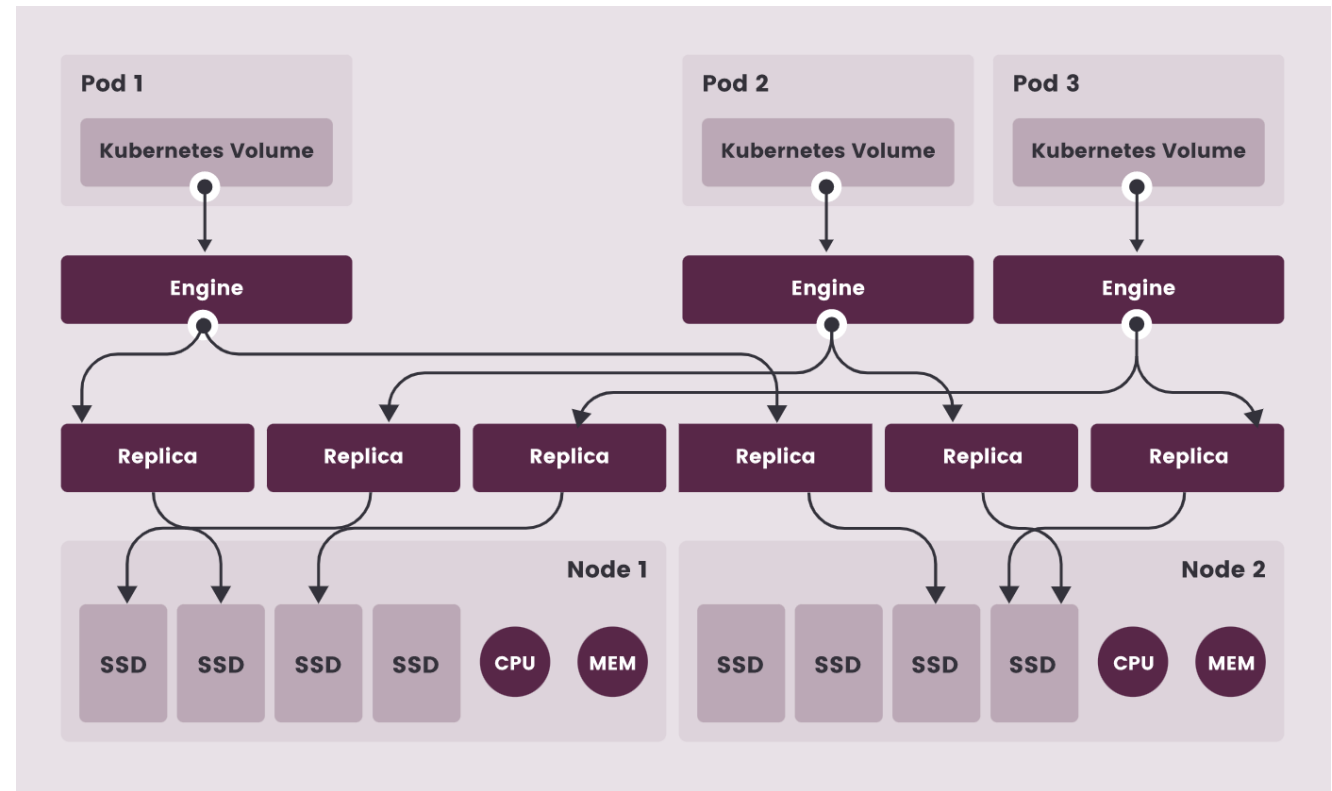
# Longhorn



# What is Longhorn?

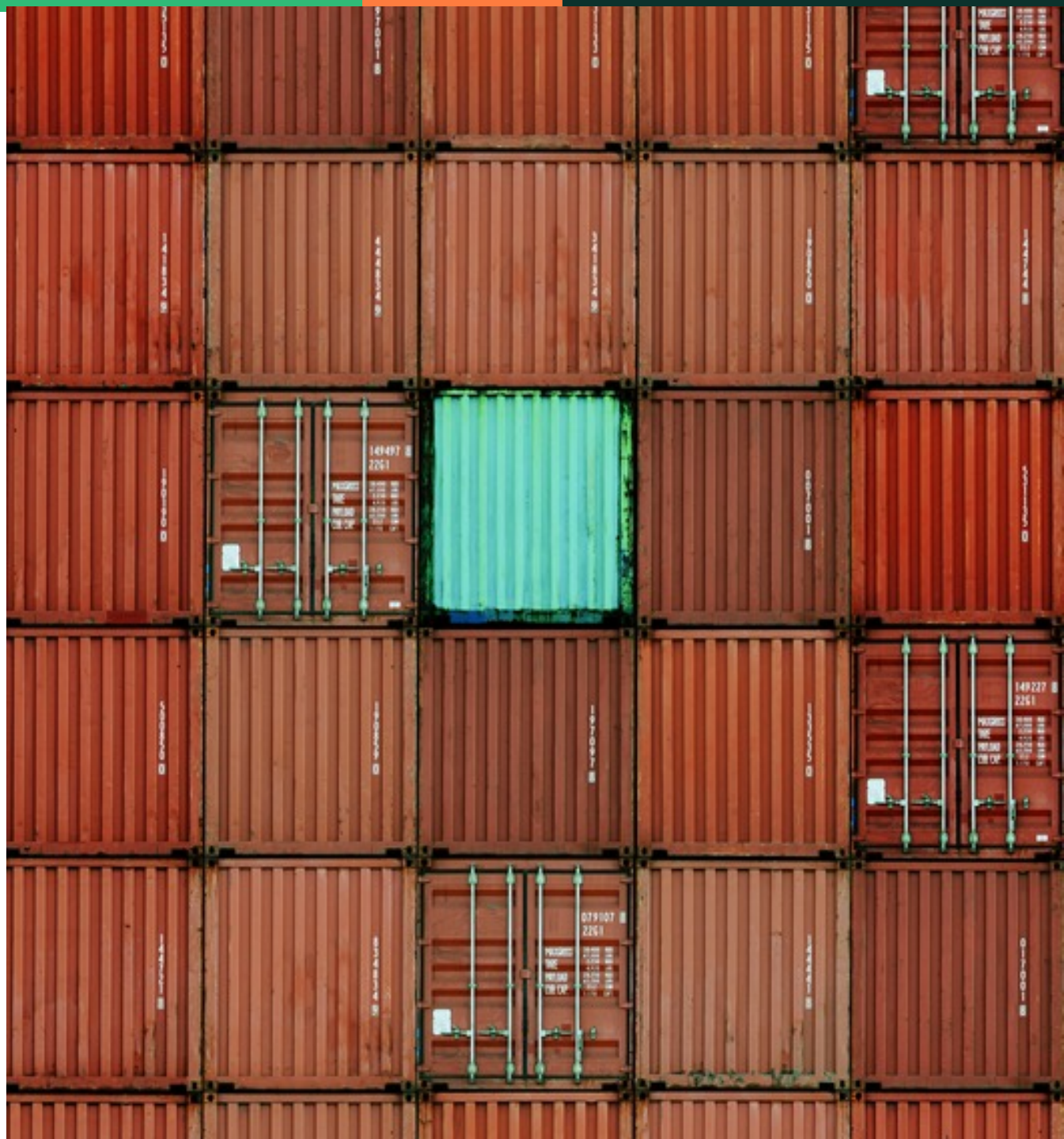


- Highly available, software-defined persistent block and file storage for k8s.
- Lightweight, reliable, and easy-to-use.
- DevOps can deploy Longhorn from Rancher with just one-click.
- Adds persistent volume support to any certified K8s cluster.
- Hardware Agnostic – any ext4 filesystem can be added to a Longhorn cluster
- NFS and S3 compatible (backup storage)
- Kubernetes-first design –implemented in CRDs and controller pattern
- Open source and owned by the CNCF



# Longhorn origins

- Longhorn started as a closed source pre-k8s era application written in C++ in 2014
- 2016: Open sourced and re-written in Go to work with Docker.
- Added support for S3, K8s, backups, disaster recovery and other interesting features.
- In 2019 it became a CNCF sandbox project.
- Version 1.0 becomes the first GA Release in 2020.
- 2021, Version 1.2, becomes an CNCF incubating project.
- December 2022, version 1.4 is released.



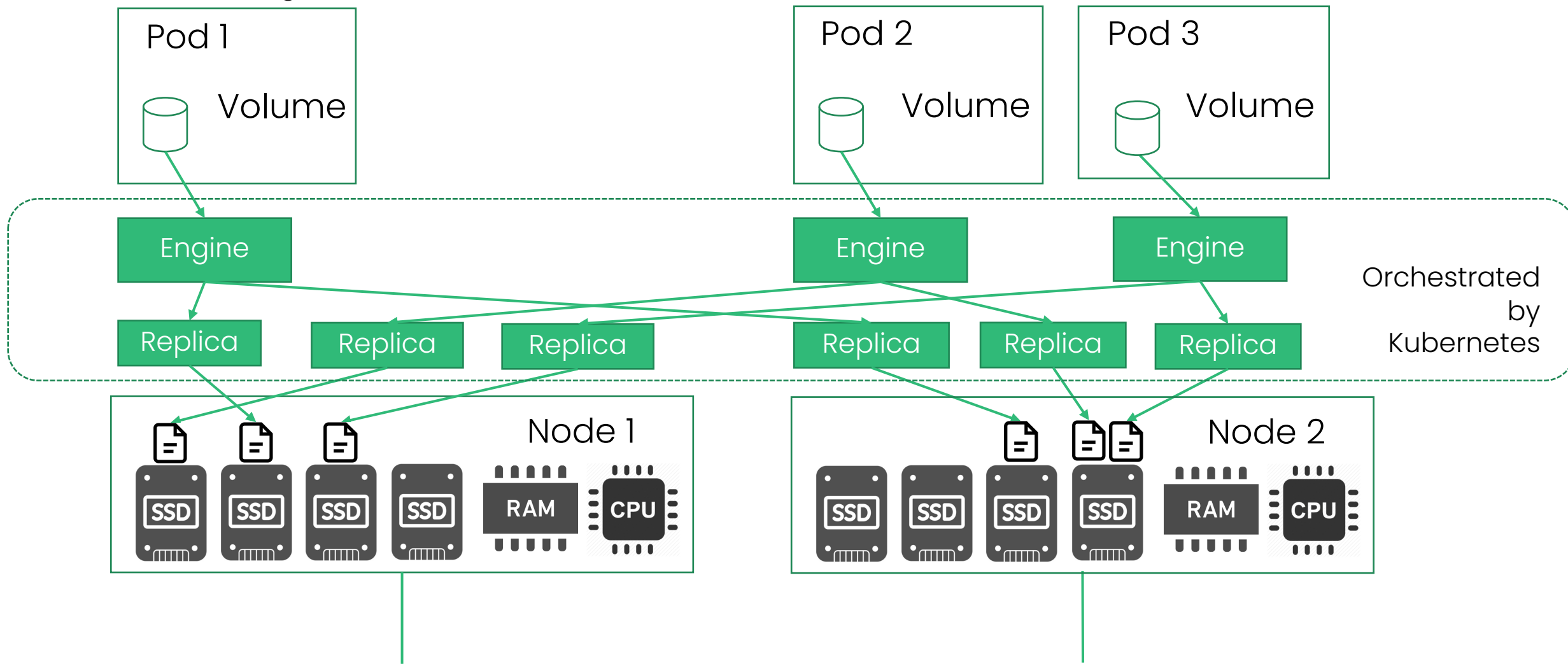
# Requirements

- Kubernetes  $\geq$  v1.21
- Minimum Hardware
  - 3 Nodes
  - 4 GB RAM per node
  - 4 vCPU per node
  - SSD/NVMe or similar recommended
- OS
  - Tested on OpenSUSE, SLES, SLE Micro, Centos, RHEL, Oracle Linux, Rocky linux, ...
  - Any certified Kubernetes cluster running on Linux nodes.
  - Architectures: ARM64, AMD64
- More information and script to check:
  - <https://longhorn.io/docs/1.4.1/deploy/install/>

# How does Longhorn work?

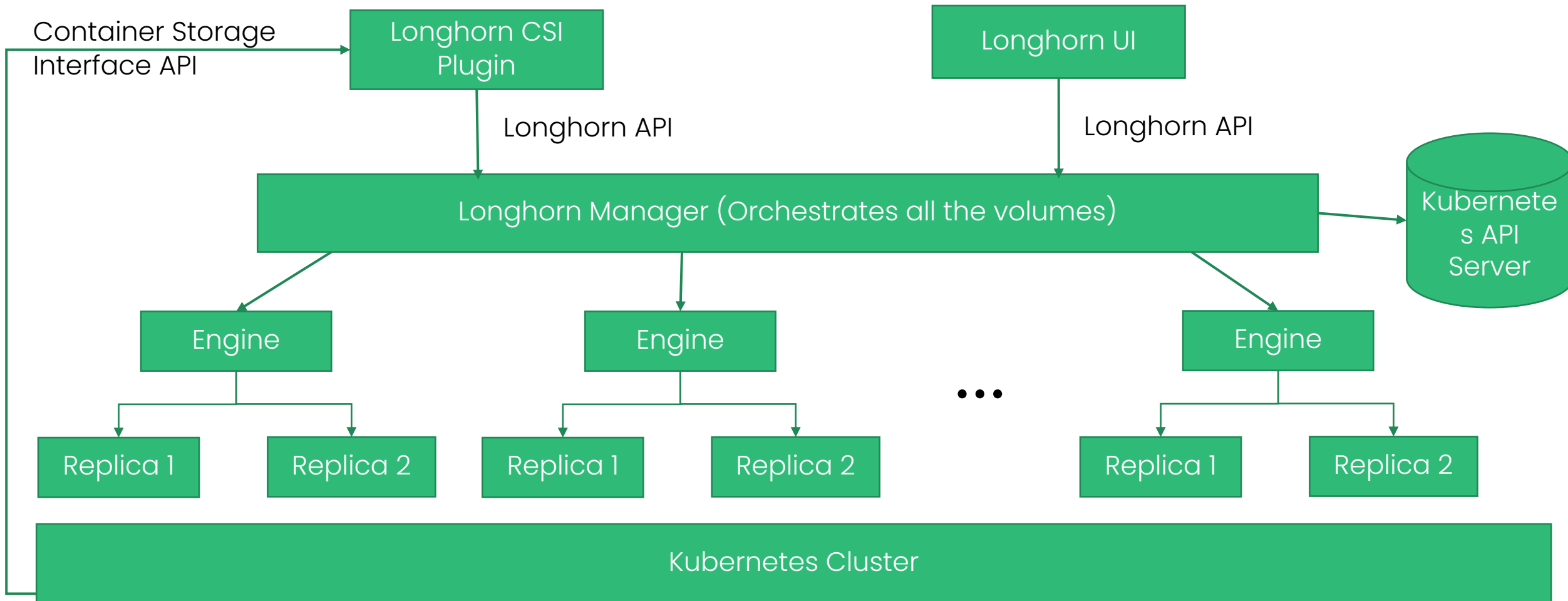


## Architecture - Engine





# Longhorn Architecture - Manager



# Longhorn Key Feature List

- Enterprise-grade distributed block storage software for Kubernetes
- Volume thin-provisioning
- Volume snapshots
- Volume backup and restore
- Online volume expansion
- Cross-availability-zone replica scheduling
- TRIM Support
- Encryption at-rest and in-transit
- s390x Support (experimental)
- Storage Tag for node and disk selection
- Cross-cluster disaster recovery volume with defined RTO and RPO
- RWX (File) Support
- Live upgrade of Longhorn software without impacting running volumes
- Policy based recurring jobs
- ARM64 Support
- Intuitive UI
- Bitrot protection
- CRD-based interfaces





# Thank you

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