Hyperscale for All: Powering the Circular Data Center

ITRenew delivers maximum financial & sustainability returns from open technology

CIRCULAR CLOUD
Strategic Advisory Services

Infrastructure planning

TCO & Sustainability Modeling

Lifetime value maximization

DECOMMISSIONING
and Data Security

Data center decommissioning services

Teraware data sanitization platform

Value Recovery (*$1B+ TCO to date*)

End-to-end logistics solutions

SESAME BY ITRENEW
Rack-Scale Solutions

Rack-scale solutions for data centers

Open systems, HCI, AI/ML

Breakthrough TCO

EDGE SOLUTIONS
and Components

Edge solutions & building blocks

Server components

Laptop and PC memory

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WEBINAR REGISTRATION

SIMULTANEOUS SCALING FOR USER AND APPLICATION GROWTH

Accelerating the Journey to Cloud-Native with Kubernetes and Open Hardware on Tues, June 9 at 9:00 AM PT with Erik Riedel.

Is the clock suddenly ticking on your cloud-native and elastic infrastructure initiatives?

Changing market demands and priorities during this global crisis mean businesses can no longer afford to take a multi-year journey to cloud-native. Yet going cloud-native right now means that, overnight, your IT teams must scale capacity up from thousands to millions of users, and scale infrastructure out to support hundreds rather than dozens of apps and workloads. No pressure.

We all agree the need to serve more customers, add services and grow business revenues has never been more urgent. But accelerating cloud-native and elastic infrastructure can be complex and challenging. Increasingly, Product Managers and IT Managers are turning to open software to get more apps up and running quickly and to open hardware to rapidly and efficiently support user and application growth.

Join Erik Riedel, SVP of ITRenew Compute and Storage, on Tuesday, June 9 at 9:00 AM PT as he shares his insights on these trends and addresses why industry leaders worldwide are taking this approach to the multi-dimensional scaling dilemma. Drawing from implementation of ITRenew's Sesame for Open Systems in data centers across the globe, Erik will:

- Show how open hardware platforms deliver on the promise of elastic infrastructure orchestration.
- Explain how open technology takes care of which apps run on which nodes, making them perfect for frameworks like Kubernetes.
- Demonstrate how anyone can implement at scale, in record time, with a case study on how to go from server to serverless in 20 minutes or less.

Don't let the combined pressure of multi-dimensional workload scaling slow you down when Open Technology can accelerate your cloud-native initiatives today.

We have the proof that **Open for All** is not just a utopian vision, it is real and ready today: pre-configured, plug-in-ready rack-scale solutions, built on open architecture.

No assembly. No guesswork.
No army of engineers required.

Now anyone can power their data center like a hyperscaler while dropping their TCO and upping their sustainability game.
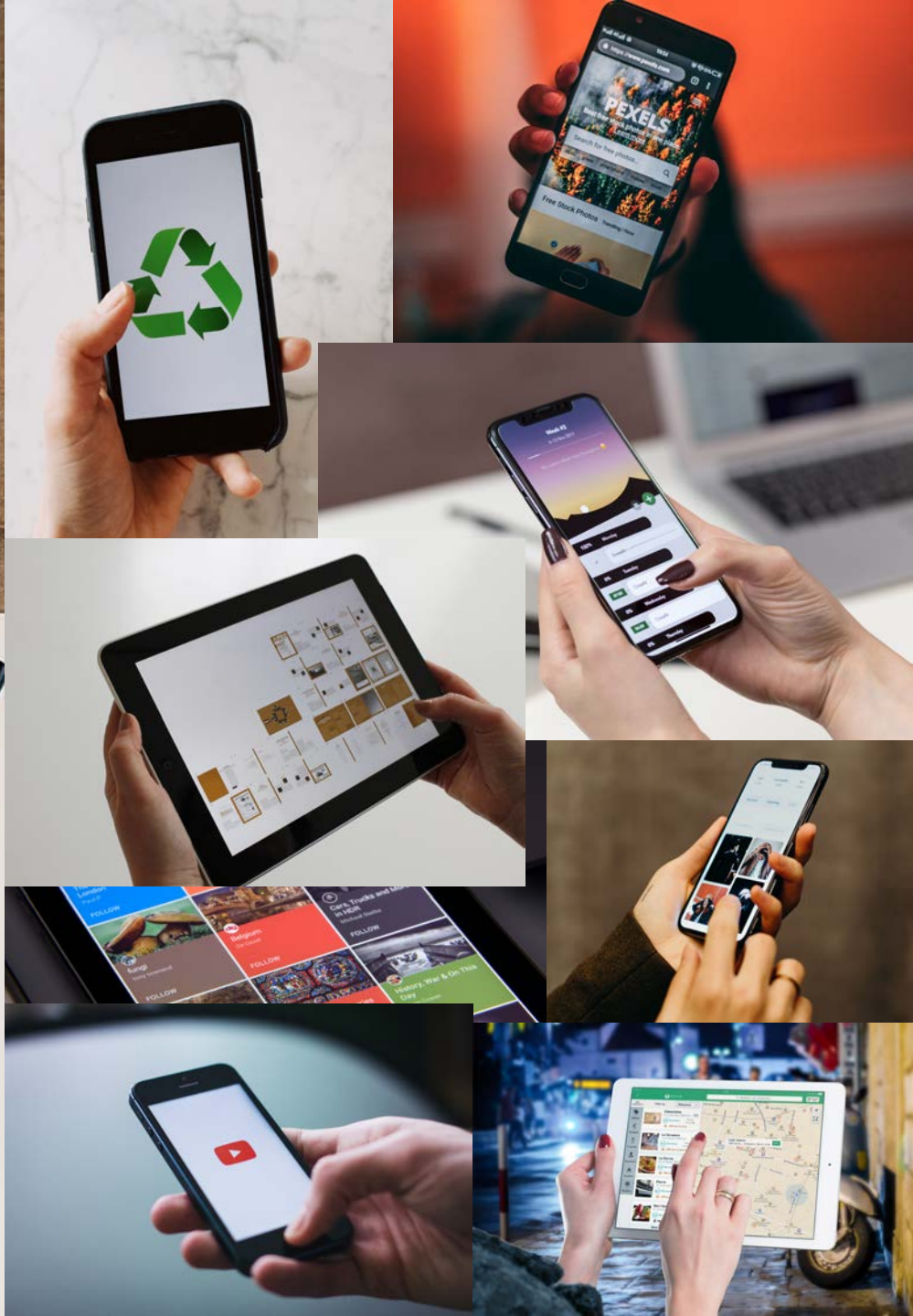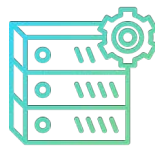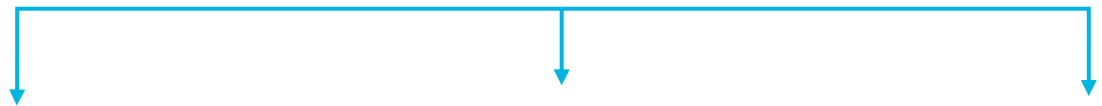
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open hardware

open software

The big cloud providers have all the advantages

$2B
$1B $2B
$1B

Massive budgets and talent pools

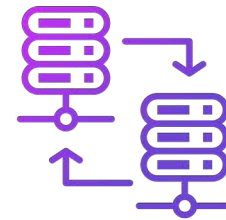Most advanced technology

Greatest flexibility to scale

Lowest costs

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If everyone had the advantages, they could...
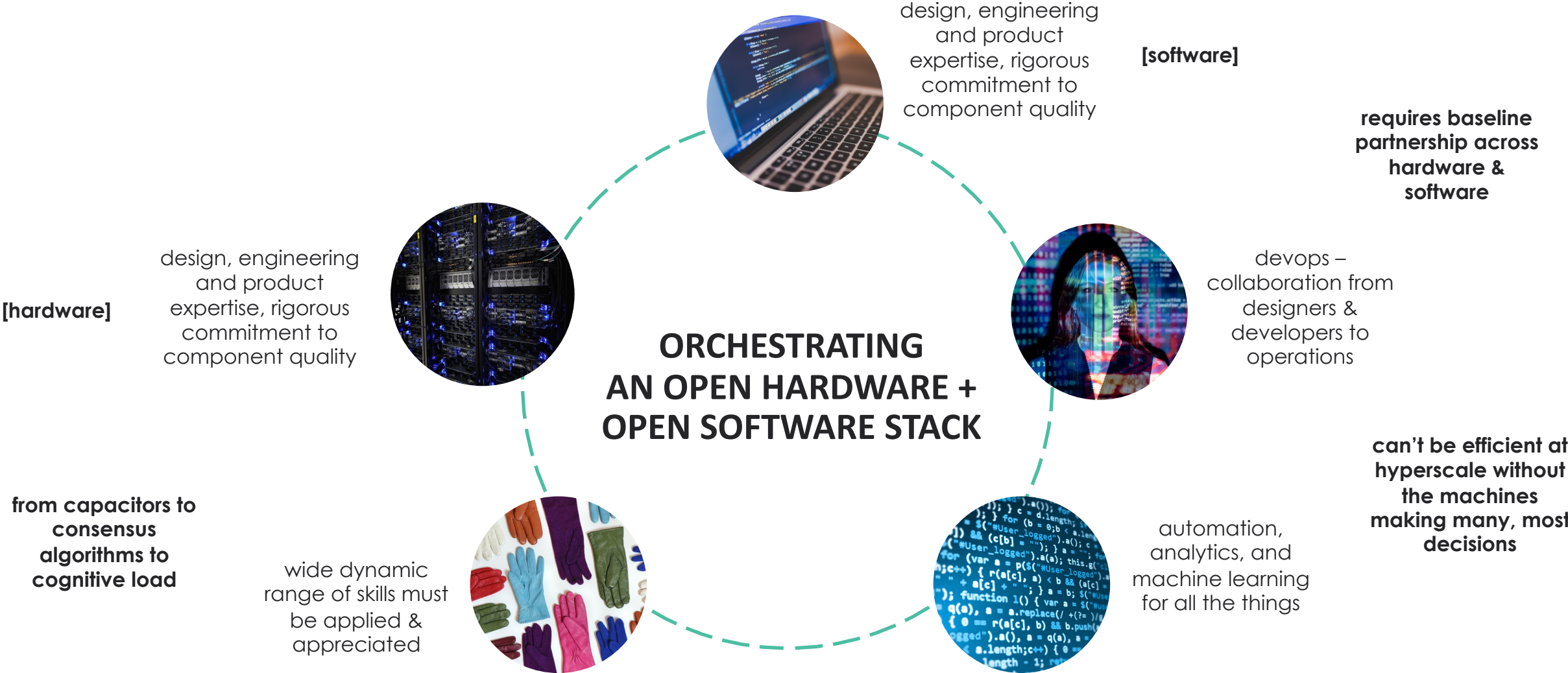
Deliver more new services

Respond faster to customer needs

Grow the user base

Increase margins & accelerate growth

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Open Is Necessary, But Not Sufficient Per Se

design, engineering and product expertise, rigorous commitment to component quality

[software]

requires baseline partnership across hardware & software

[hardware]

design, engineering and product expertise, rigorous commitment to component quality

devops – collaboration from designers & developers to operations

ORCHESTRATING AN OPEN HARDWARE + OPEN SOFTWARE STACK

from capacitors to consensus algorithms to cognitive load

can't be efficient at hyperscale without the machines making many, most decisions

wide dynamic range of skills must be applied & appreciated

automation, analytics, and machine learning for all the things

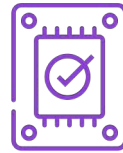ITRENEW

The Benefits of Open Hardware

MORE FLEXIBILITY

Multi-vendor, standards-based hardware for modular solutions to fit your needs

HIGH DENSITY COMPUTING

More server, storage, and network capacity, in less space saves costs

OPTIMIZED POWER

Rack-level power vs. individual server power. More efficient. Less cost. Fewer points of failure

OPTIMIZED COOLING

Rack-level cooling to operate more efficiently. Even more with free-air cooling, if the data centers support it
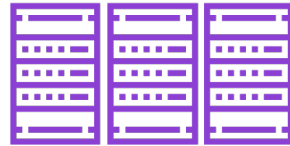
STREAMLINED MAINTENANCE

Flexible, easy-access design enables faster troubleshooting, updates, and upgrades

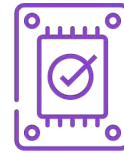ITRENEW

The Benefits of Open Software

MORE FLEXIBILITY

Multi-vendor, standards-based software for modular solutions to fit your needs
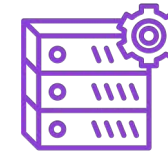
HIGH DENSITY COMPUTING

More automation, with API-driven scalability, allows more software per silicon in^2

OPTIMIZED POWER

Stack-level power vs. individual packaged software. More efficient. Less cost. Fewer points of failure
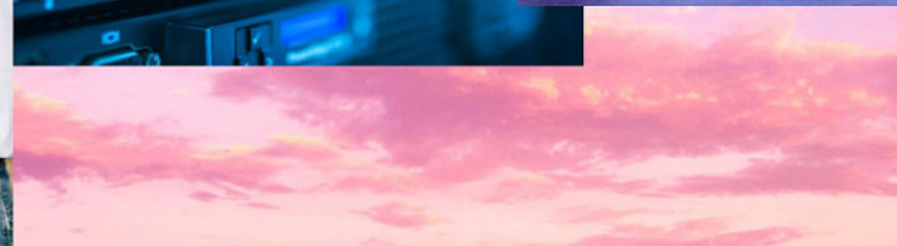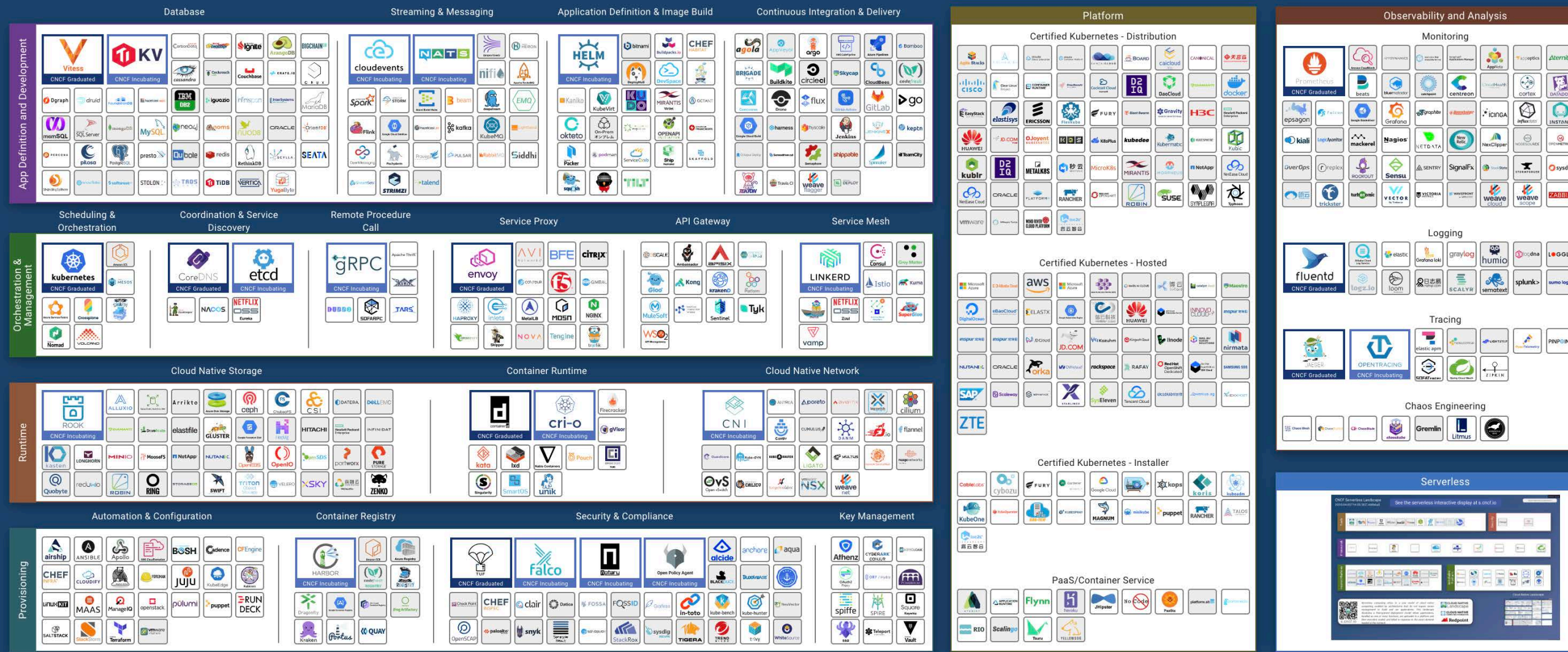
OPTIMIZED VALIDATION

Stack-level continuous integration, continuous deployment (CI/CD) to validate more efficiently. Fewer points of failure in the field

STREAMLINED MAINTENANCE

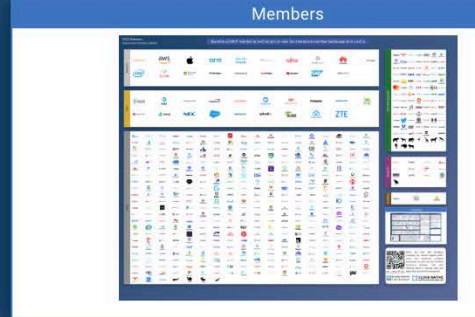Flexible, API-based, devops-considered design enables faster troubleshooting, updates, and upgrades

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Database

Vitess — CNCF Graduated
KV — CNCF Incubating

Streaming & Messaging

cloudevents — CNCF Incubating
NATS — CNCF Incubating

Application Definition & Image Build

HELM — CNCF Incubating
CHEF HABITAT

Continuous Integration & Delivery

agola · AppVeyor · argo · AWS CodePipeline · Azure Pipelines · Bamboo
BRIGADE · Buildkite · circleci · Skycap · CloudBees · codefresh
Concourse · DeployHub · DevSpace · Drone · flux · GitHub Actions · GitLab · go
harness · hyscale · Jenkins · keptn
OPENAPI INITIATIVE · Screwdriver.cd · semaphore · shippable · Spinnaker · TeamCity
TEKTON · Travis CI · weave flagger · DEPLOY

App Definition and Development

Orchestration & Management

Scheduling & Orchestration
kubernetes — CNCF Graduated
Amazon ECS · MESOS · Nomad · VOLCANO · Crossplane

Coordination & Service Discovery
CoreDNS — CNCF Graduated
etcd — CNCF Incubating
NACOS · NETFLIX OSS Eureka

Remote Procedure Call
gRPC — CNCF Incubating
Apache Thrift · DUBBO · SOFARPC · TARS

Service Proxy
envoy — CNCF Graduated
AVI · BFE · CITRIX · Gloo · Kong · KrakenD · Tyk
HAPROXY · inlets · MetalLB · MOSN · NGINX · Tengine · traefik · NOVA · Skipper

API Gateway
3SCALE · Ambassador · APISIX
Sentinel · MuleSoft · WSO2 API Management

Service Mesh
LINKERD — CNCF Incubating
Consul · Grey Matter · Istio · Kuma
NETFLIX OSS Zuul · SuperGloo · vamp

Runtime

Cloud Native Storage
ROOK — CNCF Incubating
ALLUXIO · Arrikto · Azure Disk Storage · Ceph · ChubaoFS · CSI · DATERA · DELL EMC
DriveScale · elastifile · GLUSTER · Hedvig · HITACHI · Hewlett Packard Enterprise · INFINIDAT
kasten · LONGHORN · MINIO · MooseFS · NetApp · NUTANIX · OpenEBS · OpenIO · portworx · PURE STORAGE
Quobyte · reduxio · ROBIN · RING · STORAGEOS · SWIFT · TRITON · VELERO · XSKY · ZENKO

Container Runtime
containerd — CNCF Graduated
cri-o — CNCF Incubating
Firecracker · gVisor
kata · lxd · Nabla Containers · Pouch · Singularity · SmartOS · unik

Cloud Native Network
CNI — CNCF Incubating
ANTREA · Aporeto · avi · cilium · flannel · Contiv · CUMULUS · DANM · ligato.io
Guardicore · Kube-OVN · KUBE ROUTER · LIGATO · MULTUS · NSX · weave net · Open vSwitch · CALICO

Provisioning

Automation & Configuration
airship · ANSIBLE · Apollo · BOSH · Cadence · CFEngine
CHEF INFRA · CLOUDIFY · FIREHOL · JUJU · KubeEdge · Rudder
LINUXKIT · MAAS · ManageIQ · openstack · pulumi · puppet · RUNDECK
SALTSTACK · StackStorm · Terraform

Container Registry
HARBOR — CNCF Incubating
codefresh registry · Azure Registry · Amazon ECR · Dragonfly · JFrog Artifactory

Security & Compliance
TUF — CNCF Graduated
falco — CNCF Incubating
Notary — CNCF Incubating
Open Policy Agent — CNCF Incubating
alcide · anchore · aqua · BLACK DUCK · BLOOMBASE
Check Point · CHEF INSPEC · clair · Datica · FOSSA · FOSSID · Qualys · in-toto · kube-bench · kube-hunter · NeuVector
Kraken · Portus · QUAY · OpenSCAP · paloalto · snyk · Spreeze Security · sysdig · TIGERA · TREND MICRO · Trivy · WhiteSource

Key Management
Athenz · CYBERARK CONJUR · KEYCLOAK
OAuth2 Proxy · ORY / Hydra
spiffe · SPIRE · Square Keywhiz
sso · Teleport · Vault

Platform

Certified Kubernetes - Distribution

Certified Kubernetes - Hosted

Certified Kubernetes - Installer

PaaS/Container Service

Observability and Analysis

Monitoring
Prometheus — CNCF Graduated

Logging
fluentd — CNCF Graduated

Tracing
JAEGER — CNCF Graduated
OPENTRACING — CNCF Incubating

Chaos Engineering
Gremlin · Litmus

Serverless

Kubernetes Certified Service Provider

Kubernetes Training Partner

Members

CLOUD NATIVE Landscape
CLOUD NATIVE COMPUTING FOUNDATION
Redpoint · Amplify

l.cncf.io

This landscape is intended as a map through the previously uncharted terrain of cloud native technologies. There are many routes to deploying a cloud native application, with CNCF Projects representing a particularly well-traveled path.

THE POWER OF HYPERSCALE FOR ALL

Optimized for your workload, from deskside to data center. No assembly. No guesswork. Just plug them in.

SESAME BY ITRENEW

PROVEN HYPERSCALE TECH
BUILT ON OPEN ARCHITECUTURE

CONSISTENT PRODUCT
DEPENDABLE SUPPLY

BUSINESS-CHANGING
TCO

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Optimized For Workloads. Ready To Deploy

NO GUESSWORK. NO ASSEMBLY. JUST PLUG THEM IN.

SESAME FOR OPEN SYSTEMS

Massive scale, cross-rack switching interconnects up to 20 racks; 750+ nodes in a single cluster, network domain

Pre-validated with Kubernetes software and infrastructure stacks

Linux-ready with scalable hardware management

SESAME FOR AI/ML

High bandwidth, low latency platform to optimize learning

Powerful application processing on large and small accelerated compute nodes

100G and bandwidth-optimized connectivity for top throughput

SESAME FOR CONVERGED

Simplicity of design with standardized converged nodes

Compute, storage and network capability scalable in lockstep as needed

Fully open configuration and manageability tools, qualified and optimized for Linux

SESAME BY ITRENEW

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Sesame for Open Systems

- Massive scale; cross-rack switching interconnects up to 20 racks; 900+ nodes in a single cluster, network domain

- Pre-validated with Kubernetes software and infrastructure stacks

- Linux-ready with scalable node-level management

CAPACITY

- 6 to 36 nodes per rack – mix of node types
  - single-socket x86 compute
  - 2-socket x86 compute
  - storage nodes w/ NVMe flash
- 3, 6, or 9 infrastructure nodes/rack

PERFORMANCE

- BASE config: 150+ cpu cores & >1 TB memory
- SCALE config: 700+ cpu cores & >8 TB memory
- 5 TB to 250 TB of high IOPS flash storage/ rack
- 2.5 kW to 18.9 kW per rack
- Full 25 GbE connectivity within the rack

WORKLOAD FLEXIBILITY

- Pre-designed/integrated racks fit most common Kubernetes/VM orchestration deployment architectures
- Servers, storage, and networking hardware is pre-qualified and pre-tested
- Designed to fit the space & power constraints of most modern data centers

external TOR switches (2x)		
ingress	ingress	ingress
internal TOR switches (2x)		
compute	compute	compute
compute	compute	compute
compute	compute	compute
compute	compute	compute
compute	compute	compute
compute	compute	compute
power zone BB		
compute	compute	compute
compute	compute	compute
compute	compute	compute
storage	storage	storage
storage	storage	storage
storage	storage	storage
mgmt	mgmt	mgmt
infra	infra	infra
power zone AA		

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Servers

compute		
compute		
compute		
compute		
infra		
power supply + switch		

up to 5 nodes

Fast-Start

external TOR switches (2x)		
ingress	ingress	ingress
internal TOR switches (2x)		
compute	compute	compute
compute	compute	compute
compute	compute	compute
compute	compute	compute
compute	compute	compute
compute	compute	compute
power zone BB		
compute	compute	compute
compute	compute	compute
compute	compute	compute
storage	storage	storage
storage	storage	storage
storage	storage	storage
mgmt	mgmt	mgmt
infra	infra	infra
power zone AA		

up to 45 nodes

for Open Systems
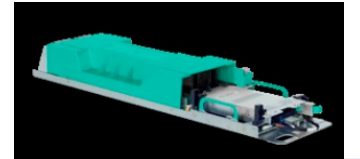
single or 2- socket nodes, 25 GbE connectivity
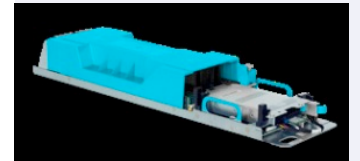
flash-based storage nodes; millions of IOPS and terabytes of capacity

Case Study – Project Goals and Genesis
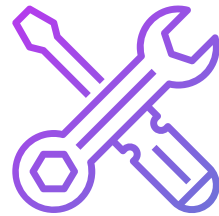
OCP adoption could be accelerated by offering **pre-designed** and **pre-qualified** solutions for key computing use cases.
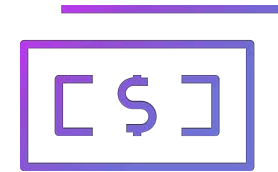
Many service provider & enterprise SaaS companies are looking for **solutions** to roll onto the floor, plug in, and quickly run workloads.

We are working with **infrastructure software** stacks and **software partners** to pre-design and pre-qualify solutions with OCP equipment.

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Case Study – From Servers to Serverless in ~~10~~ 23 Minutes

Provisioning Server	Linux	DevOps	Automation
Our Choices	Ubuntu 19.04	docker, Ansible	Rancher
Deployed Services	DRP (PXE server) DHCP (static IPs)	Digital Rebar docker registry	Rancher

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Servers

compute
compute
compute
compute
infra
power supply + switch
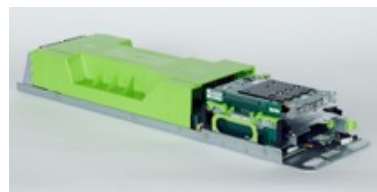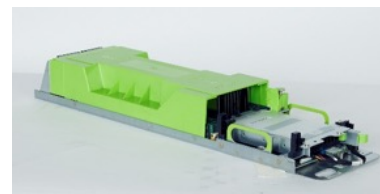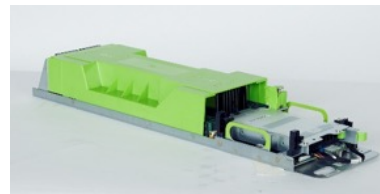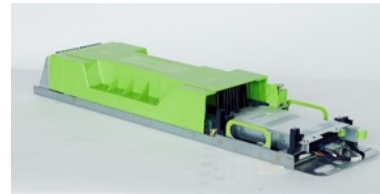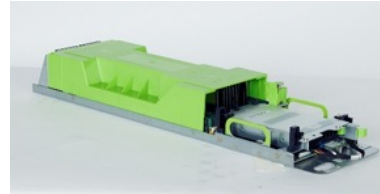
SCALE		
compute	**CRIMSON**	2x 12c 256GB 10G
compute	**CRIMSON**	2x 12c 256GB 10G
compute	**CRIMSON**	2x 12c 256GB 10G
compute	**CRIMSON**	2x 12c 256GB 10G
	96 cores	1 TB memory

DRP (PXE server)
DHCP (static IPs)

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1ˢᵗ Step – Success! OSes Deployed

2nd Step – Deploy Rancher

4ᵗʰ Step – Success!

Workloads Configured
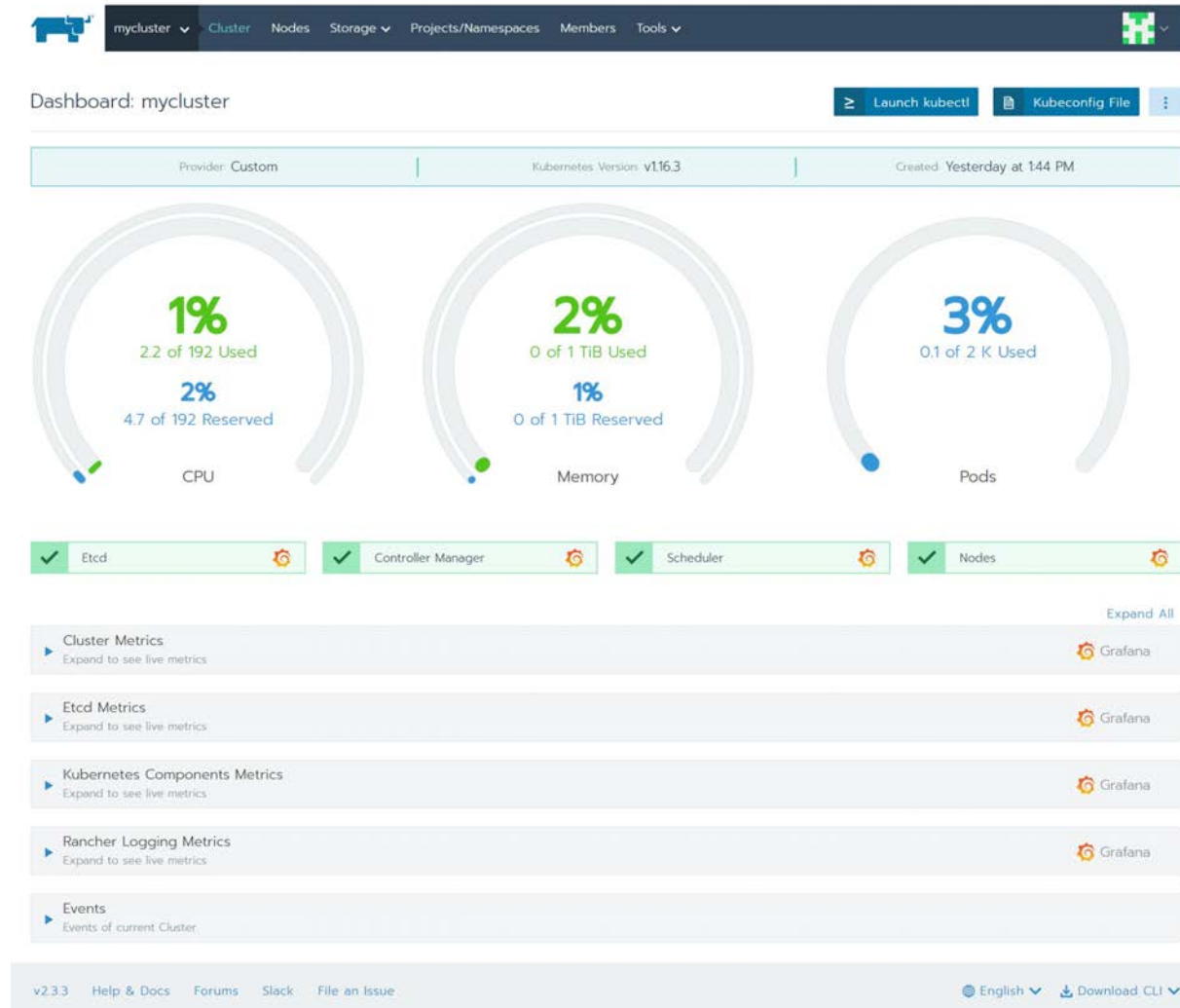
We Did This With Three Different Stacks

RANCHER	KSPHERE	TALOS	STACKS
20 minutes to full cluster readiness	60 minutes to full cluster readiness	31.5 minutes to full cluster readiness	
1,650 pods	1,800 pods	3,000 pods	SLEEP CONTAINER
500 pods* * docker errors started at 507 pods, crashed at 600 pods	500 pods* * containers began to die, kubelet crashed at 550 pods	500 pods* *health checks began to fail at 500 pods	NGINX CONTAINER

** note that all these tests were done after overriding the default 110 maximum pods per node, as set by Kubernetes

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Serverless

Call To Action

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bit.ly/webinar-uncomplicated

www.sesame.com

Watch Our Videos:
Sesame By ITRenew
bit.ly/sesame-youtube

QUESTIONS OR COMMENTS, REACH US:

@RiedelAtWork

Erik Riedel
@RiedelAtWork

engineering leader, do-er, & creator @itrenewinc; pursuing sustainable #innovation; democratizing tech; #inclusive teams; think big; he/him

Boston, MA   twittter.com/er1p   Joined September 2016

3,257 Following   801 Followers

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BACKGROUND
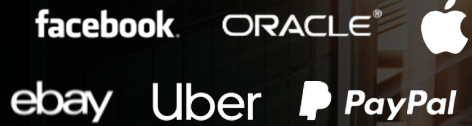
The Circular IT Hardware Industry Opportunity

WHAT IF...

46 million servers

>

31 million tonnes CO2e

=

6.7 million cars' annual emissions

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