KubeCon | CloudNativeCon

North America 2017

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Running Mesos Frameworks on Kubernetes with the Open-Source Universal Resource Broker

Fritz Ferstl, CTO, Univa

Who is Univa?

Univa is the #1 independent provider
of enterprise scheduling and orchestration products

- Solutions:
  - Proprietary software that optimizes workloads within data centers and cloud services
  - Deep expertise in distributed data center systems, applications and use cases

100+
Use Cases

- Univa solutions scale across diverse environments:
  - Over 250 Fortune 1000 customers
  - Industry leading position in Life Sciences, Oil & Gas, and other verticals
  - Up to 300,000 cores in a single cluster, ~2M cores under management

1,000+
Applications

- Corporate:
  - Global reach – based in Chicago with offices and staff in Markham, Canada, Munich and Regensburg, Germany, UK, Japan, Korea

10,000+
Deployments

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Univa Customer Depth

Data Services	Energy	Gov't	Financial	Life Sciences	Manufacturing / Technology
epsilon	HESS	CSH Cold Spring Harbor Laboratory	BMO	NOVARTIS	BMW
nielsen	PGS	CDC	Danske Bank	Evidera	TATA
TransUnion	Saudi Aramco	National Institutes of Health	symcor	VERTEX	NUANCE
CenturyLink	Marathon Oil	FBI	AMERICAN EXPRESS	Bristol-Myers Squibb	SAMSUNG
		National Security Agency		BAYER	Cummins
				SANOFI	ANSYS
				AstraZeneca	SIEMENS
				MERCK	navops by Univa

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Navops for Kubernetes

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Navops Command Dramatically Increases Utilization of Kubernetes Resources

✔	✔	✔	✔	✔
Virtual Multi-tenancy	Mixed Workloads	Manage Cloud Resources	Application Workflows	Run Mesos Frameworks
Share clusters across teams and applications	Run containerized and non-containerized workloads on shared resources	Prioritize workloads to efficiently use on-premises and cloud resources	Sequence workflows to address job dependencies	Run frameworks seamlessly on a Kubernetes cluster

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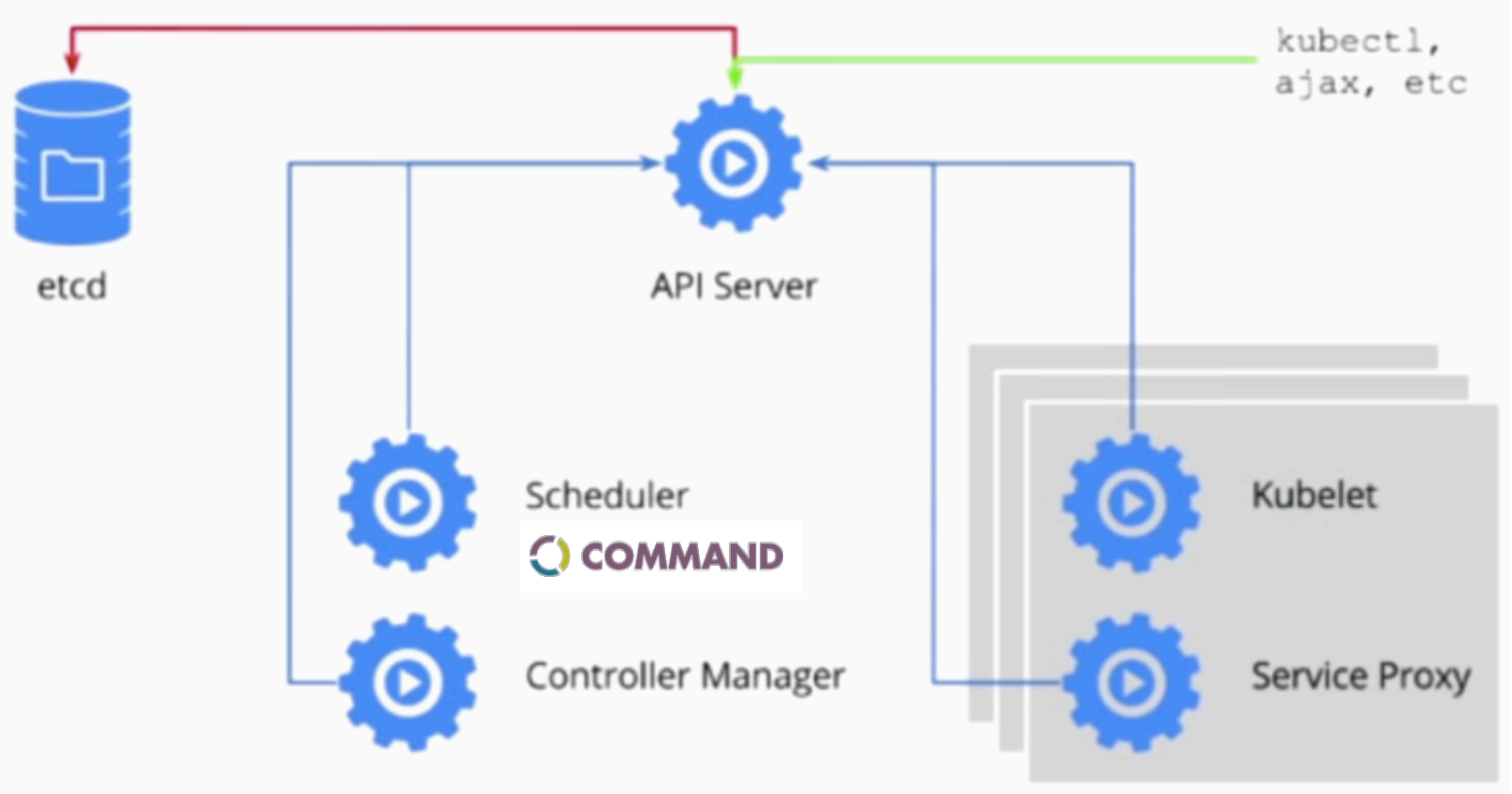
Navops Command K8s Integration



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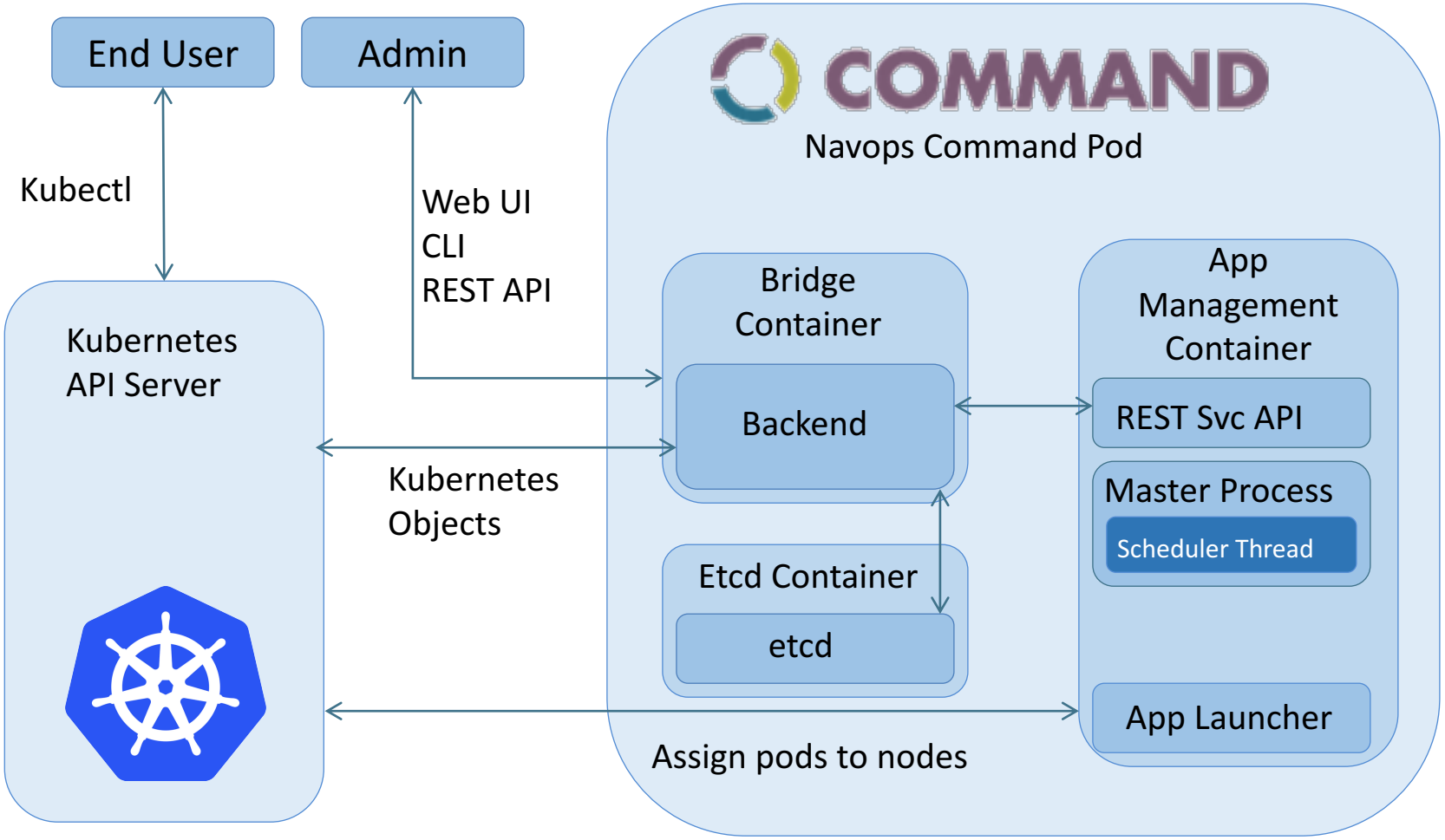
Navops Command Architecture



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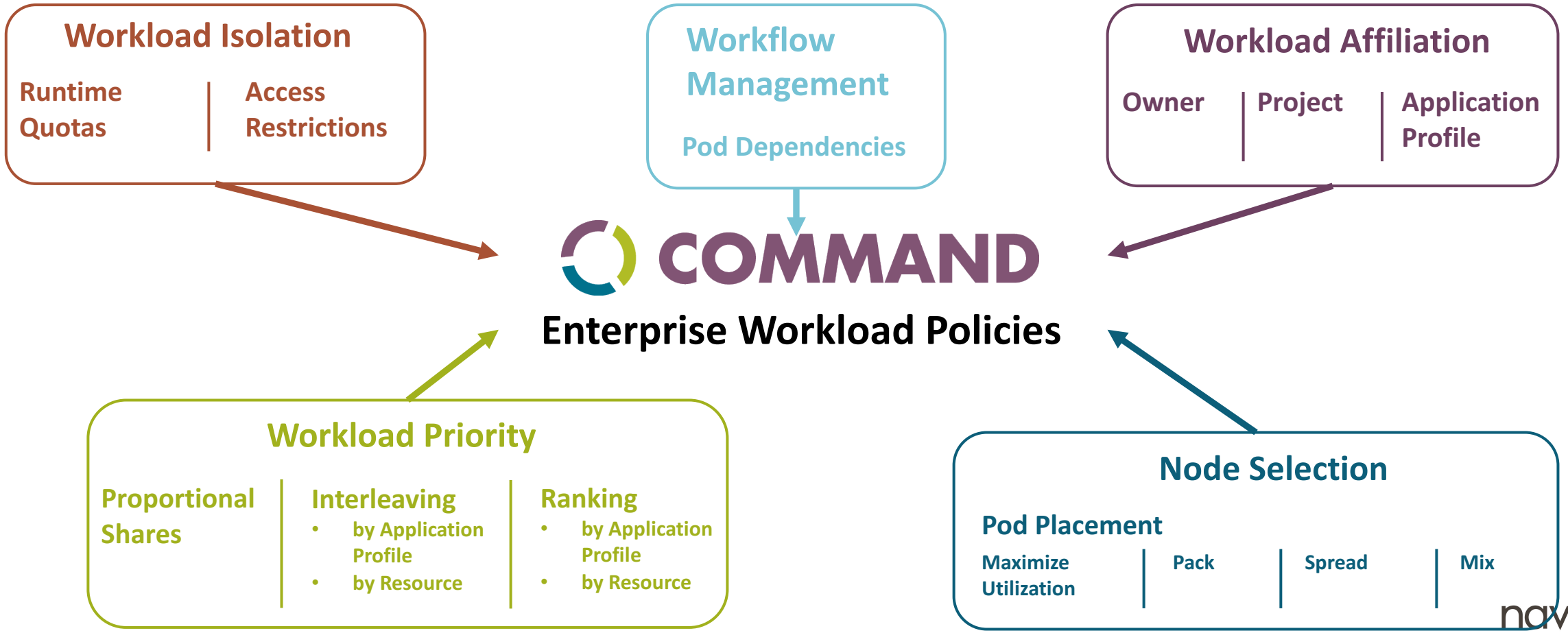
Advanced Policies for Kubernetes



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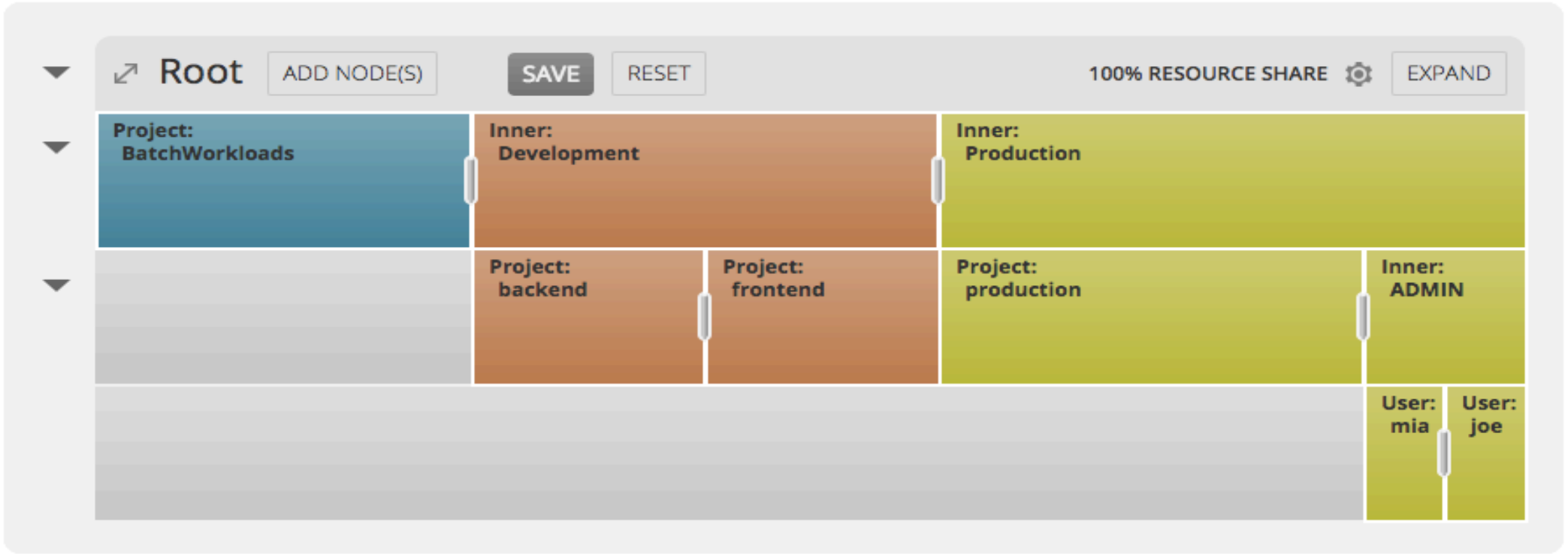
Navops Proportional Sharing

Proportional Shares



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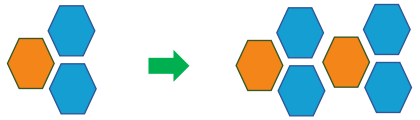
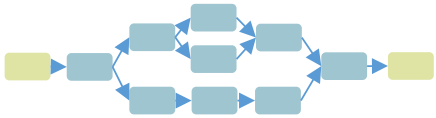
Bringing new capabilities to Kubernetes

Capability	Description	
Advanced Multi-Tenancy	▪ Teams and projects get equitable share of K8s cluster ▪ Automatic implementation of desired resource partitioning ▪ Use overflow capacity while guaranteeing critical needs	
Run-Time Quotas	▪ Effectively limit workloads from growing out of bounds ▪ Put limits on various resource consumables ▪ Automate limit management flexible rule sets	
Balanced Replicas	▪ Maintain replica ratios across service components ▪ Automatic implementation of desired replica ratios ▪ Dynamic adjustments as services get scaled	
Best Fit	▪ Optimize utilization &performance via best-fit placements ▪ Match workloads needs against actual availability on nodes ▪ Automatic best-fit or various pack/spread options	
Automatic Eviction	▪ Automatic adjustment of service scale on behalf of policies ▪ Evict replicas of services violating policies that control multi-tenancy, access restrictions, quotas or replication balance	
Mixed Workloads	▪ Run non-containerized workloads on top of K8s ▪ Avoid silos plus simplify management and app integration ▪ Increase utilization and facilitate smooth migration to K8s	
Workflows	▪ Support workflows with interdependent steps ▪ Automate orchestrated execution and avoid errors	

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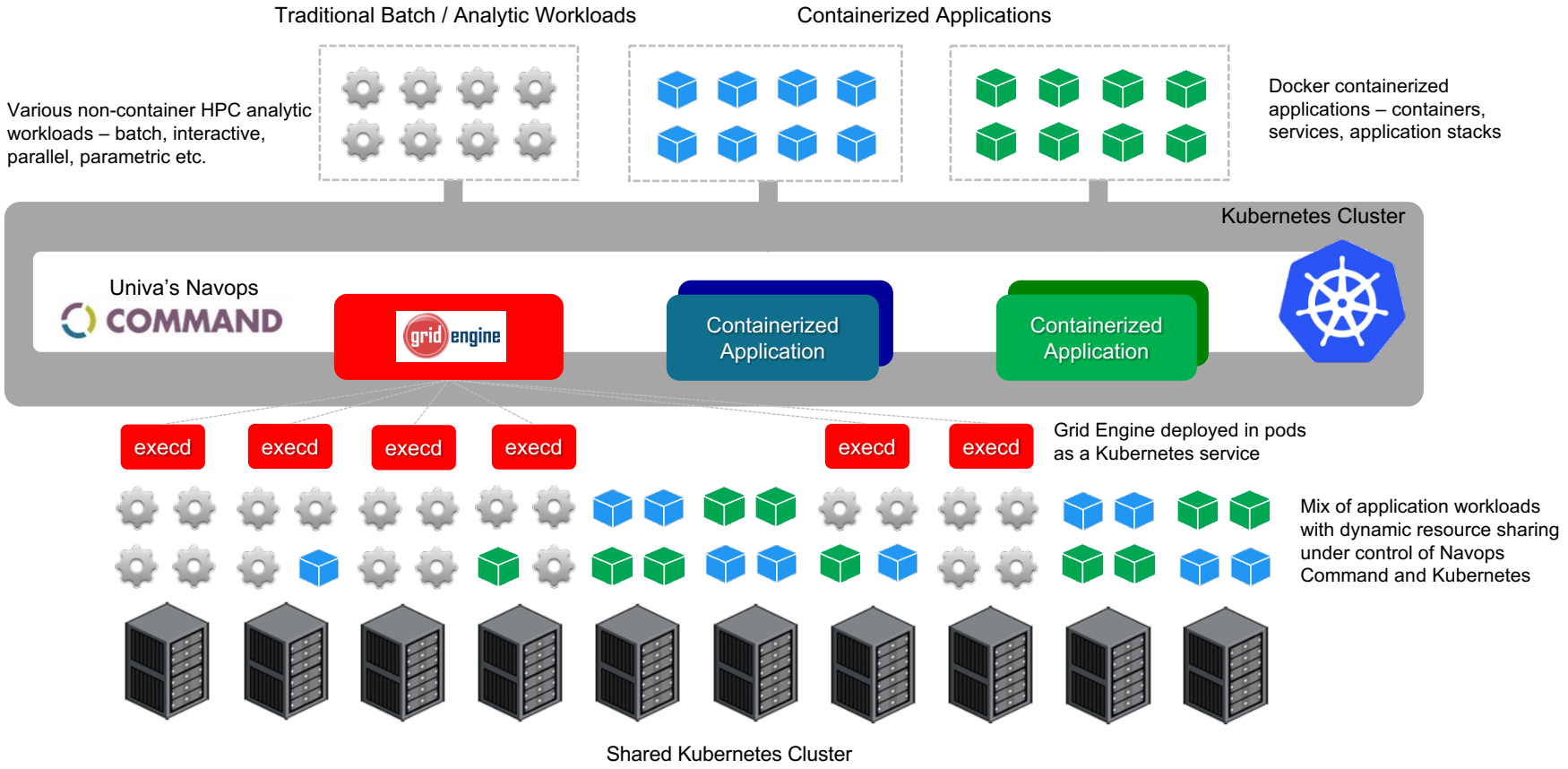
Mixed Workloads with Navops

Using Navops Command with Grid Engine, customers can support mixed-workloads on a shared Kubernetes cluster



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Universal Resource Broker

WHAT IS UNIVERAL RESOURCE BROKER FOR KUBERNETES?

"An open-source resource broker that enables Mesos compatible frameworks to run seamlessly on a shared Kubernetes cluster."

MANY BENEFITS

- Share resources among Mesos and Kubernetes applications
- Reduce cost, avoid replicated infrastructure
- Simplify cluster and application administration
- Boost service levels and resource utilization
- Avoid costly re-engineering efforts
- Enable a smooth transition from Mesos to Kubernetes

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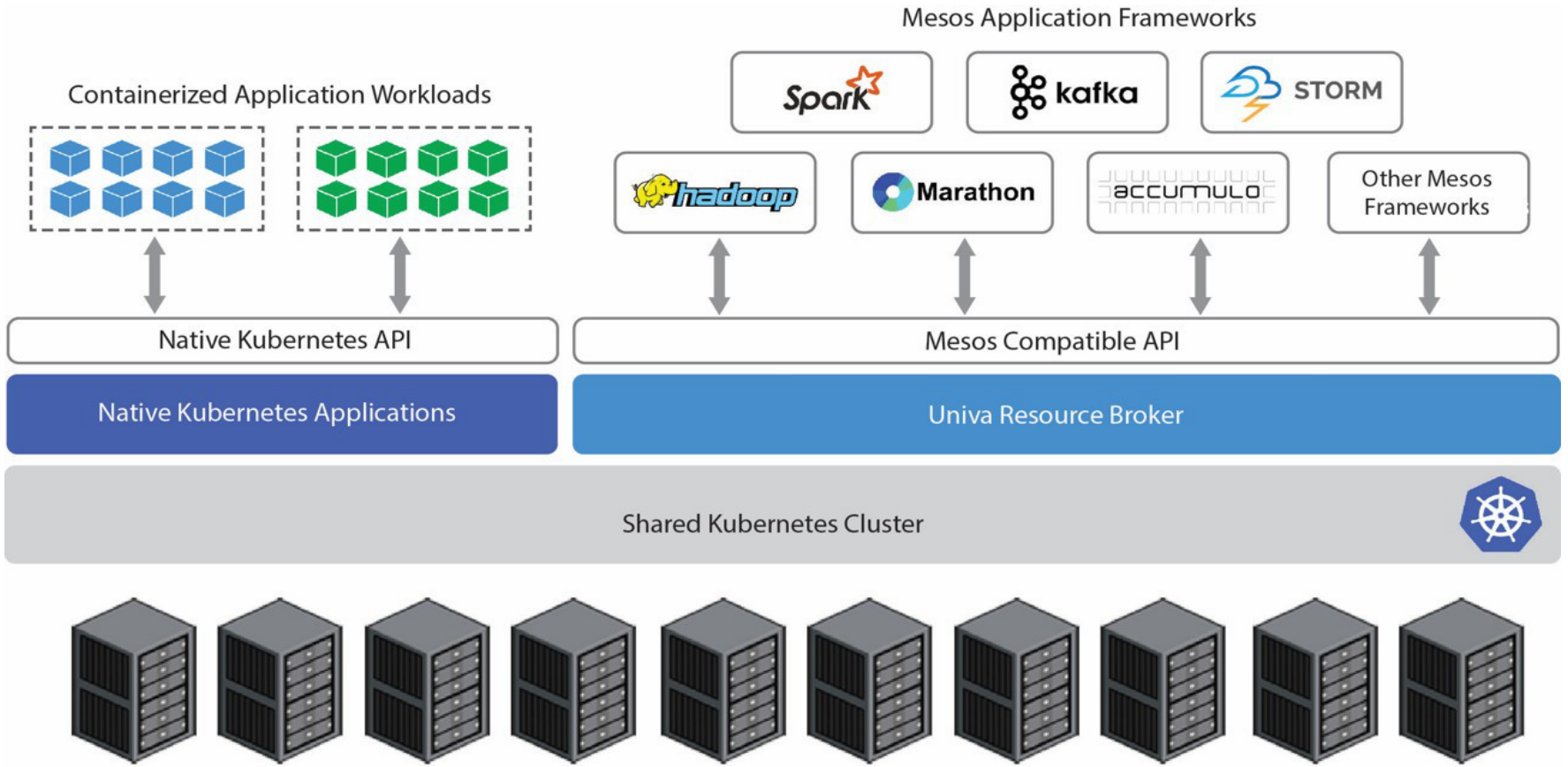
Mixed Workloads with URB

With the URB, Kubernetes and Mesos applications co-exist seamlessly on a shared Kubernetes cluster



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Universal Resource Broker - Details

- Shared C++ Library
  - Implements Mesos binary interface
  - Symbols to support JNI
  - Python wrapper
- Master Broker Service
  - Python daemon
  - Event driven through gevent
- Redis based message bus
  - Supports HA and high speed interface
- Univa Grid Engine and Kubernetes Interfaces
  - Wrappers to create a Mesos like runtime environment
  - Configuration to control Resource Allocation

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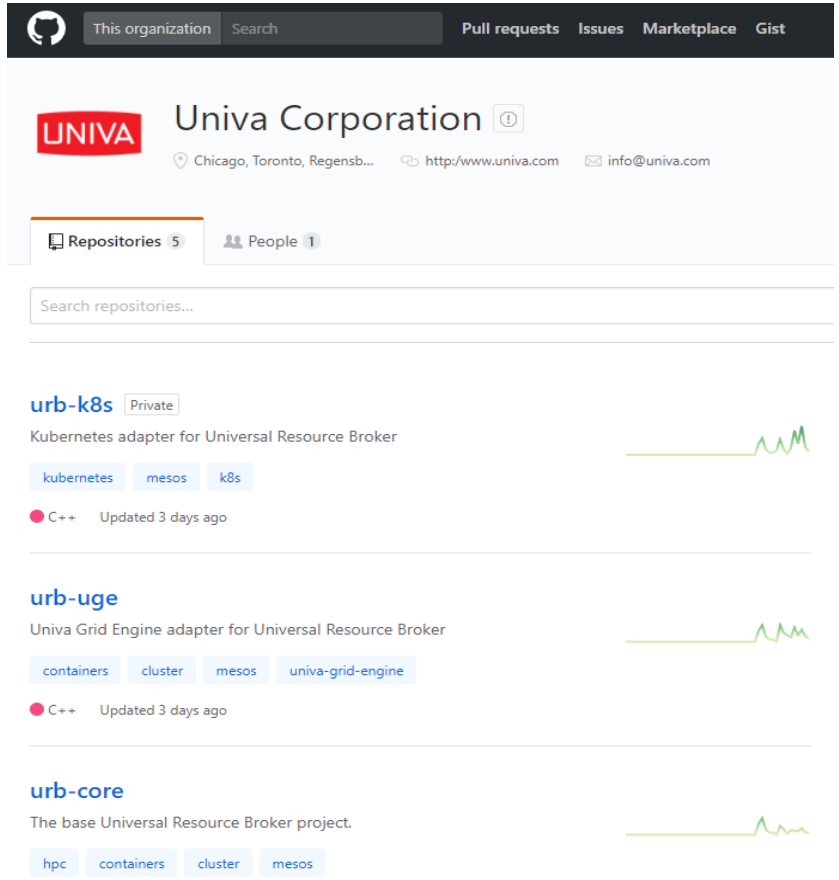
Getting started with the URB

- Freely available on GitHub
- Apache license
- URB core plus adapters for Grid Engine or Kubernetes
- Getting started guide and tutorial included in README
- Working URB examples provided for:
  - Marathon
  - Spark
  - C++ & Python Frameworks

http://GitHub.COM/UnivaCorporation



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Navops Command Delivers

Virtual multi-tenancy	**Share clusters across teams and applications**
Mixed Workloads	**Allow batch and microservice applications to run on shared resources**
Management of Resource Scarcity	**Allow application loads to take advantage of non peak times for other workloads**
Workflows	**Orchestrate workflows with interdependent jobs**

Faster Results / Higher Utilization / Lower Cost / Less Admin Effort

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Thank You!

- Questions? Ask now or ...

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- Contact me at fferstl@univa.com

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