SDC

STORAGE DEVELOPER CONFERENCE

SNIA SANTA CLARA, 2017

Advancing clustered storage architecture with Kubernetes

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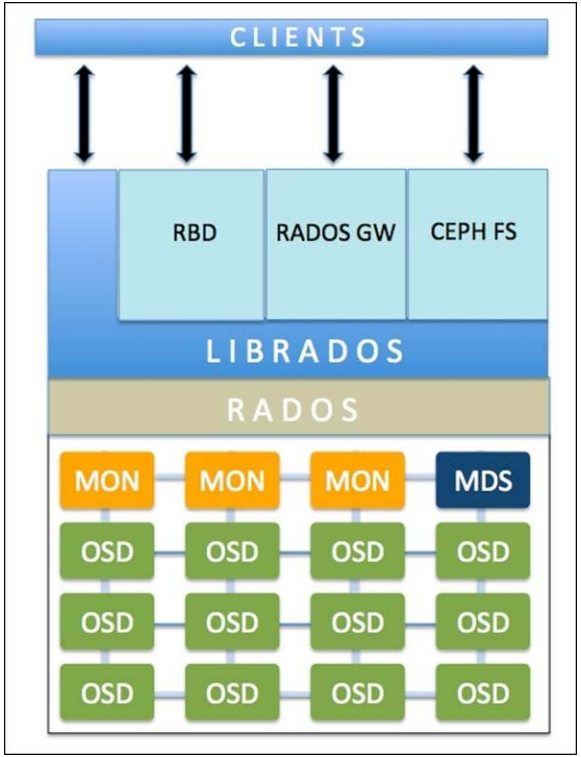
Quantum

Agenda

- Storage Systems Architecture
- Container Orchestration / Kubernetes
- The Rook Project
- Advantages and Disadvantages
- Demo

Storage Systems Architecture

- These are complex distributed systems
- > 10 distinct services
- Often 1,000s of instances
- Operationally complex



Kubernetes Features

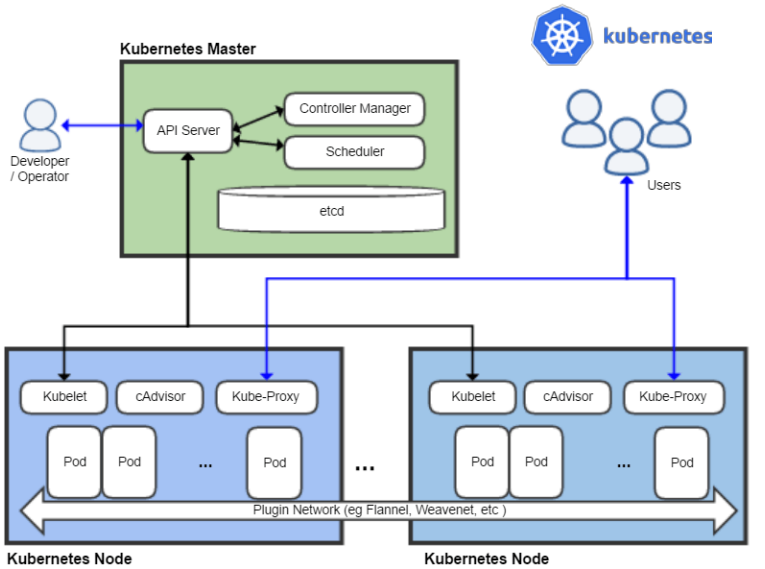
- Self-healing
- Binpacking
- Horizontal Scaling
- Service Discovery
- Load Balancing
- Rollout and Rollback
- Secrets
- Configuration Mgt
- Batch Execution

Container Orchestration

- Declarative Automation for:
  - Placement
  - Scheduling
  - Deployment
  - Update
  - Health
  - Scalability
  - Failover

Kubernetes

- Declarative Model
- Diverse Services
- Extensible control plane
- Complete application lifecycle support



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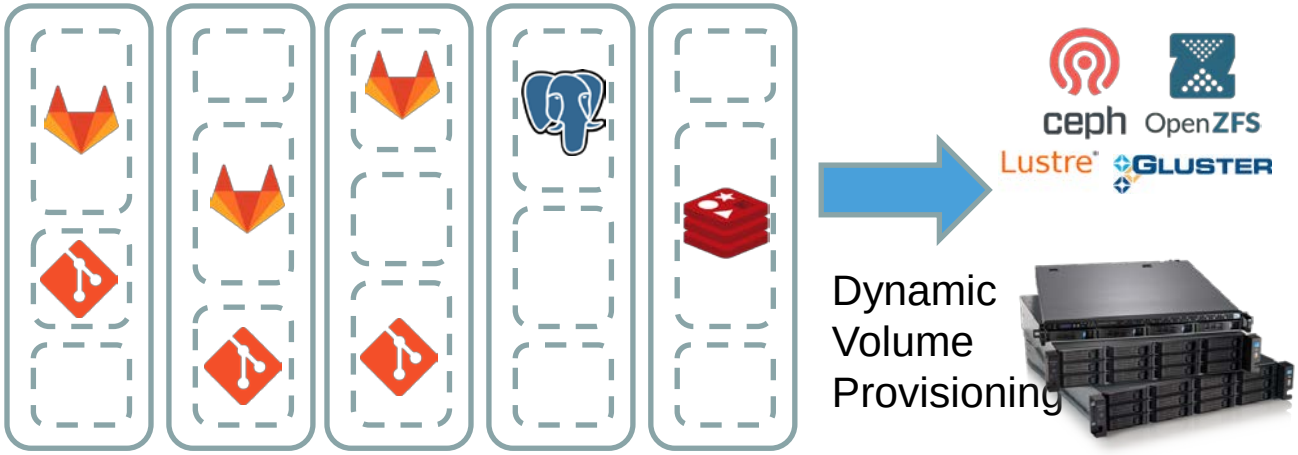
Storage in Kubernetes Clusters

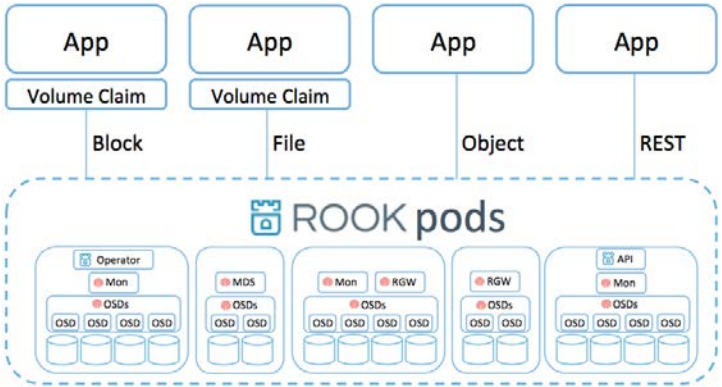
- Storage is handled externally to the cluster



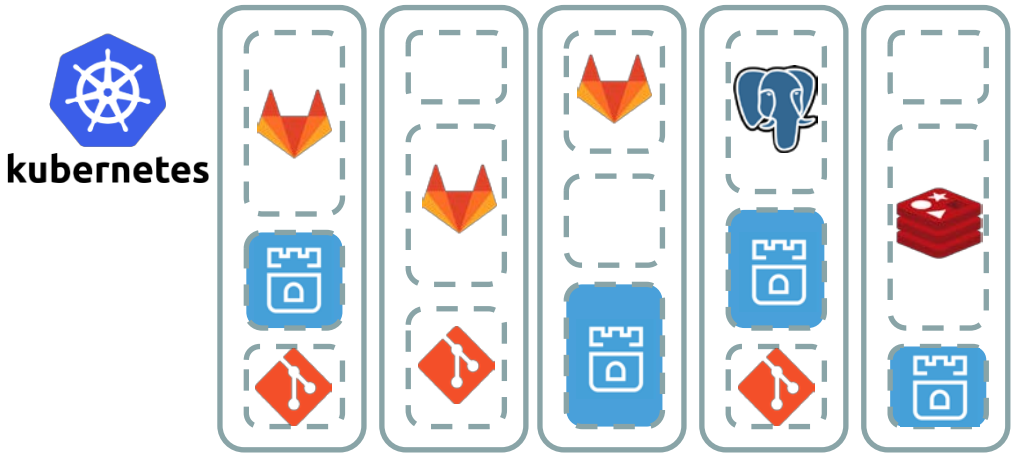
Rook

- Bring storage into the cluster and make storage systems self managing
  - Not exclusively Ceph
- The Rook Operator leverages Kubernetes to manage Ceph
- Both appliance and converged applications

https://rook.io



Storage Services running inside the Cluster



- Provisioning
- Open Source
- Multi-Cloud
- Federation
- Integrated Security
- Integrated Scheduling
- Integrated QoS
- Availability
- Backup and DR
- Upgrades
- Migrations
- Monitoring

Rook Components

- Rook Operator
- Ceph (mon, osd, rgw, mds, mgr)
- NFS, CIFS, iSCSI
- Rook Agent
- Rook API

Rook Components - Singletons

- Rook Operator
- Ceph Manager
- Rook API

Generally run one instance of these. Multiple instances for HA configurations.

Rook Components – Ceph Mon's

- Monitors do not like to be moved
  - Use service IP's for monitors
- Must be able to fail

Rook Components – OSD's

- One OSD pod per storage node
- Each pod contains N OSD's – generally one per drive
- Add necessary metadata comes from the Operator
  - No user supplied ceph.conf files
- Can optionally write metadata to different devices

Rook Components – Other Services

- RGW and MDS Daemons
  - Scale as needed based on traffic and load
    - Can specify minimums / maximums
  - SSL termination normally done at Kubernetes load balancer

What we get from Kubernetes

- Lifecycles are controlled by Kubernetes
  - node, pod, process
- Automatic failover
- Upgrade support
- Cluster-level metadata
- Secrets
- Extensible API

Demo: Rook in Kubernetes

Downsides

- We don’t own the software stack
- Stack is rapidly evolving
- We don’t have total control
  - Trading opportunity cost for total control

Conclusion

- Kubernetes turns lifecycle code into lifecycle declarations
  - Developers have more time to spend on logic
- Operationally complex systems can be simplified
- Overall systems reliability is increased

Questions – Shameless Plug

- Rook is taking pull requests at http://github.com/rook
- We're hiring Rook developers:
  - info@rook.io
  - http://quantum.com/jobs