Testing Ceph
For the Cloud
In the Cloud

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- Public cloud provider
- Qemu/kvm-based virtual machines
- Ceph-based block and object storage
- Managed Kubernetes
- Managed databases
- Managed load balancers
- Firewalls, DNS, floating IPs, etc.
Ceph at DigitalOcean

- Block storage launched in mid 2016
- Object storage launched late 2017
- 21 clusters in 9 datacenters*
  - 17 block
  - 4 object
- 40 PiB total raw disk capacity*

* numbers may be slightly outdated
At First...

- Used community releases of Ceph
- No major problems - everything worked well
- Minor upstream contributions
- Some in-house tooling
  - ansible for deployment
  - ceph_exporter for metrics
  - proprietary (for now) prometheus exporter on nodes
  - icinga alerting
As We Scaled...

● Ran into limitations of ceph, e.g.:
  ○ QoS for block storage
  ○ Scale and performance for object storage

● Wanted to contribute more actively
New Requirements

- Build ceph in-house
- Run custom builds in staging or production
- **Test development builds**
Ceph Testing Landscape

- Teuthology framework
- Ceph integration test suites
- Sepia lab
Testing Outside Sepia

- We didn’t want to rely on Sepia
  - Not everyone has access
  - It’s shared - contention
  - Want to run tests from our own CI system
  - We are the cloud!
The Grand Plan

- Build a wrapper or module that:
  - Provisions, on demand, VMs to use as test nodes
  - Provides these nodes to teuthology
  - Destroys these test nodes when a test is done
- If possible use the existing libcloud module
Teuthology Doesn’t Work Like That

- Deeply intertwined with paddles
  - Tests request nodes to use from paddles
  - Even if you provide nodes, they get locked in paddles
- libcloud module has limitations
  - Not actively maintained
  - Very OpenStack-specific
  - Creates entire lab infrastructure, not just nodes
New Plan: Deploy a Ceph Lab

- Deploy a ceph lab on our own infrastructure
- Automate it so it’s repeatable
- Open-source the automation
  - Other Ceph developers might want it!
Components of a Ceph Lab

- **Paddles and Pulpito server**
  - Node reservation system
  - Test result tracker

- **Head node**
  - Test queue
  - A convenient place to run tests from

- **Test nodes**
  - Servers that can have ceph installed on them
  - Need some disks for ceph to use
Automating Ceph Lab Deployment

- Terraform to create and configure nodes
- Ansible (invoked by terraform)
- Single command to create a lab
Live Demo!

https://github.com/digitalocean/digitalocean-ceph-lab
Challenges
Expected Assumptions:

DNS

- Assumes nodes can find each other by DNS
- Solution:
  - Run dnsmasq on the paddles node
  - Put all the other nodes’ IPs in /etc/hosts
  - Use paddles as the resolver for all other nodes
Unexpected Assumptions: /scratch_devs

- A special file listing which disks are for tests
- Solution: Create it from ansible
Inflexibility: ceph-cm-ansible

- Some plays conflict with our configuration
  - Creating users
  - Setting hostnames
  - Configuring DNS
  - Network configuration
- Solution: Blacklist them in overrides.yml
Inflexibility:
Build Artifact Location

- Teuthology looks up builds in Shaman
- We’re doing our own builds - not in Shaman
- Shaman is non-trivial to run or emulate
- Solution: Set URL for builds via overrides.yml
Inflexibility:
Special Paths for Builds

● Teuthology looks for packages by any of:
  ○ Branch name
  ○ Git SHA1
  ○ Version number
● All within the same run!
● Solution: Many symlinks
Inflexibility:
Git SHA1 Verification

- Teuthology validates that SHA1s exist
- But it only looks in the upstream ceph repo
- We’re using a fork
- Solution: Add a flag to teuthology
Back to the Live Demo!
Takeaways

● Teuthology is a powerful test framework
● Teuthology makes a lot of assumptions
  ○ About where it runs
  ○ About where builds happen
  ○ About where code lives
● We’ve worked around the problems
● You too can test Ceph in the cloud!
  ○ Please try it!
Thank You!

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