Ceph in the Cloud

Using RBD in the cloud

Again, use #cephday :-)

Implemented in CloudStack, OpenStack and Proxmox

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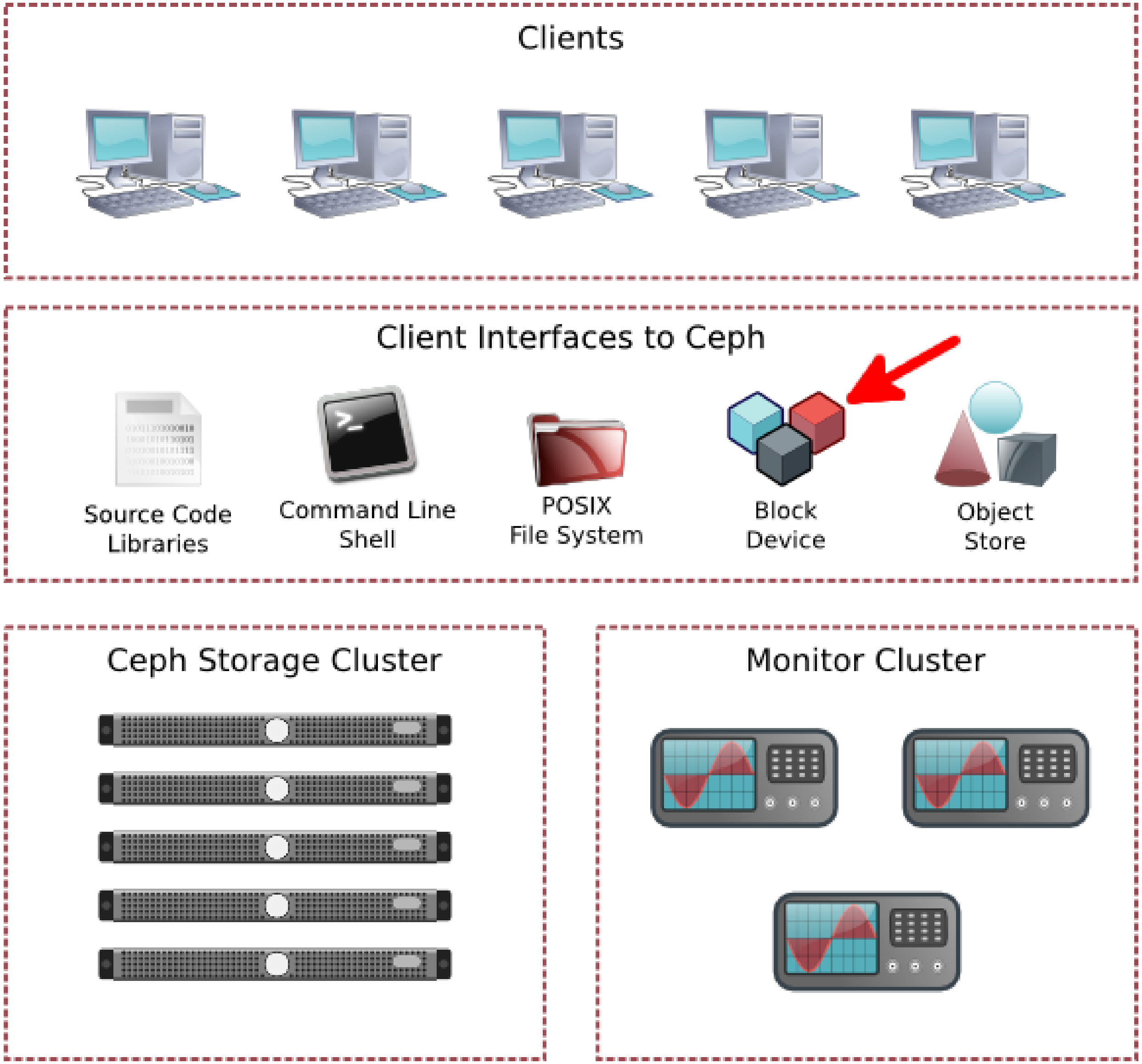
Ceph quick overview



Clients

Client Interfaces to Ceph

Source Code Libraries

Command Line Shell

POSIX File System

Block Device

Object Store

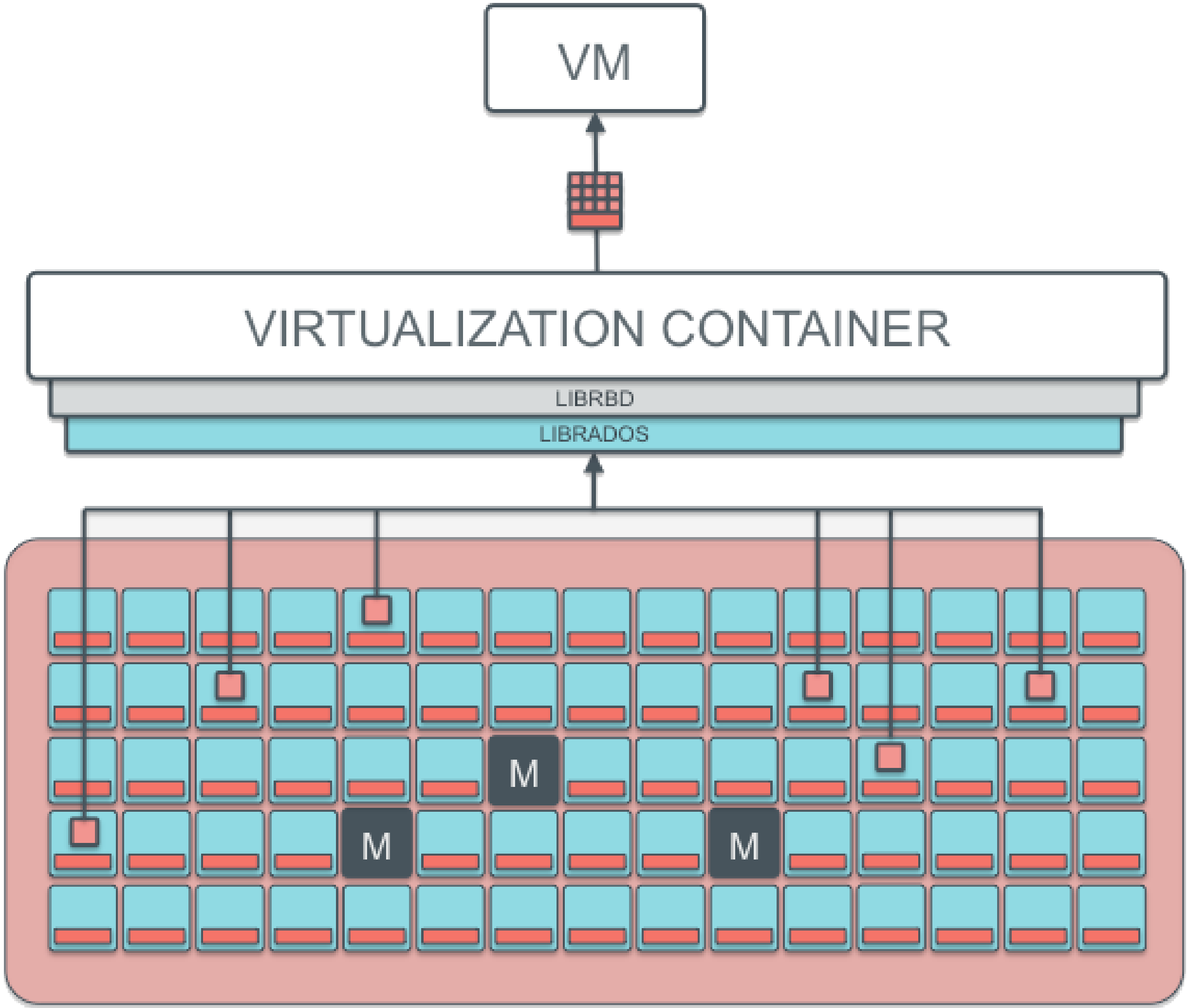
Ceph Storage Cluster

Monitor Cluster

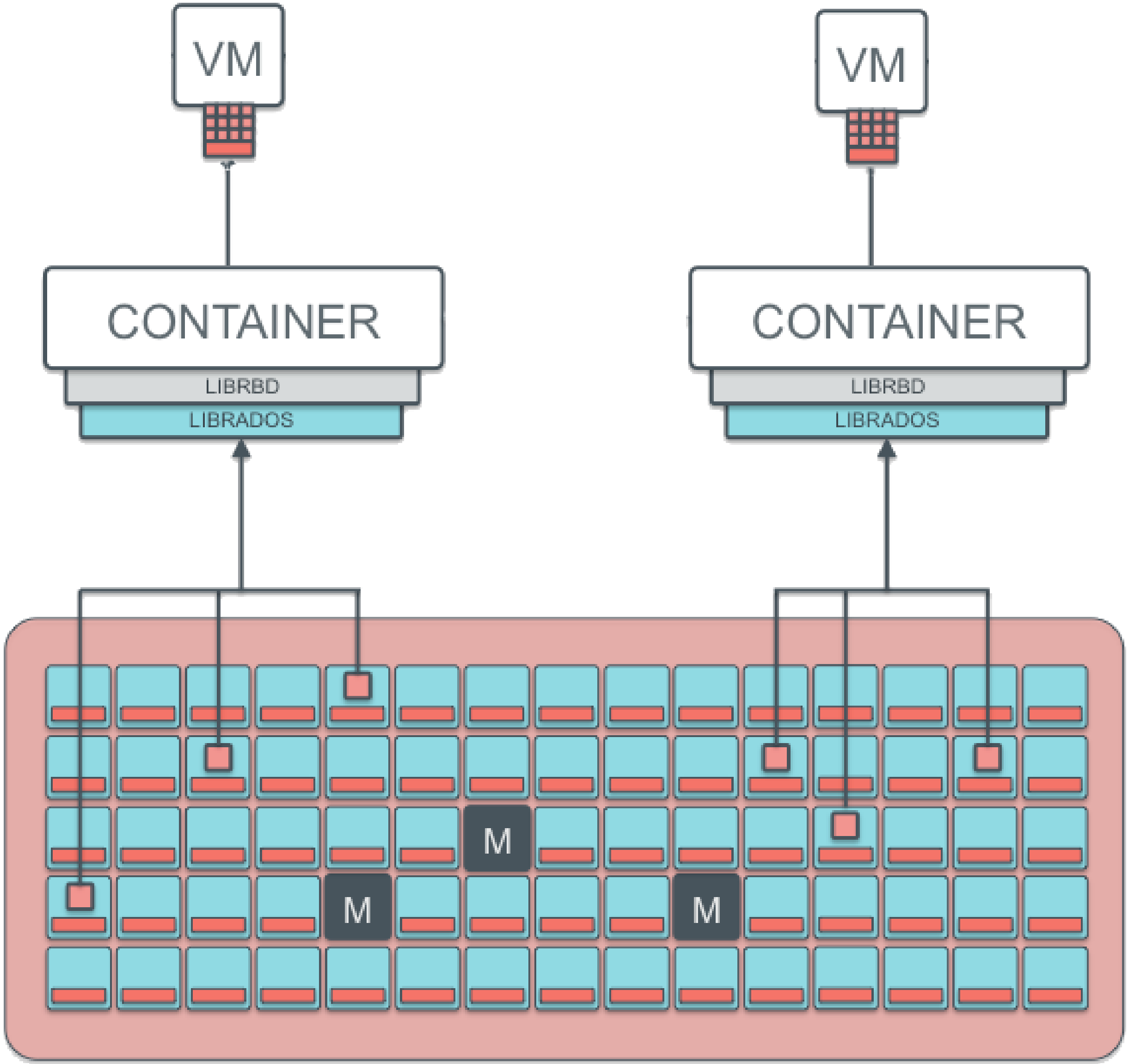
RBD (RADOS Block Device)

- 4MB stripe over RADOS objects
- Sparse allocation (TRIM/discard support)
  - Qemu with SCSI the driver support trim
  - VirtIO lacks necesarry functions
- Snapshotting
- Layering

RBD



RBD with multiple VMs



TRIM/discard

- Filesystem like ext4 or btrfs tell the block device which blocks can be discarded
- Only works with Qemu and SCSI drives
- Qemu will inform librbd about which blocks can be discarded

Using TRIM/discard with Qemu

- Add 'discard_granularity=N' option where N is usually 512 (sector size)
  - This sets the QUEUE_FLAG_DISCARD flag inside the guest indicating that the device supports discard
- Only supported by SCSI with Qemu
  - Feature set of SCSI is bigger than VirtIO

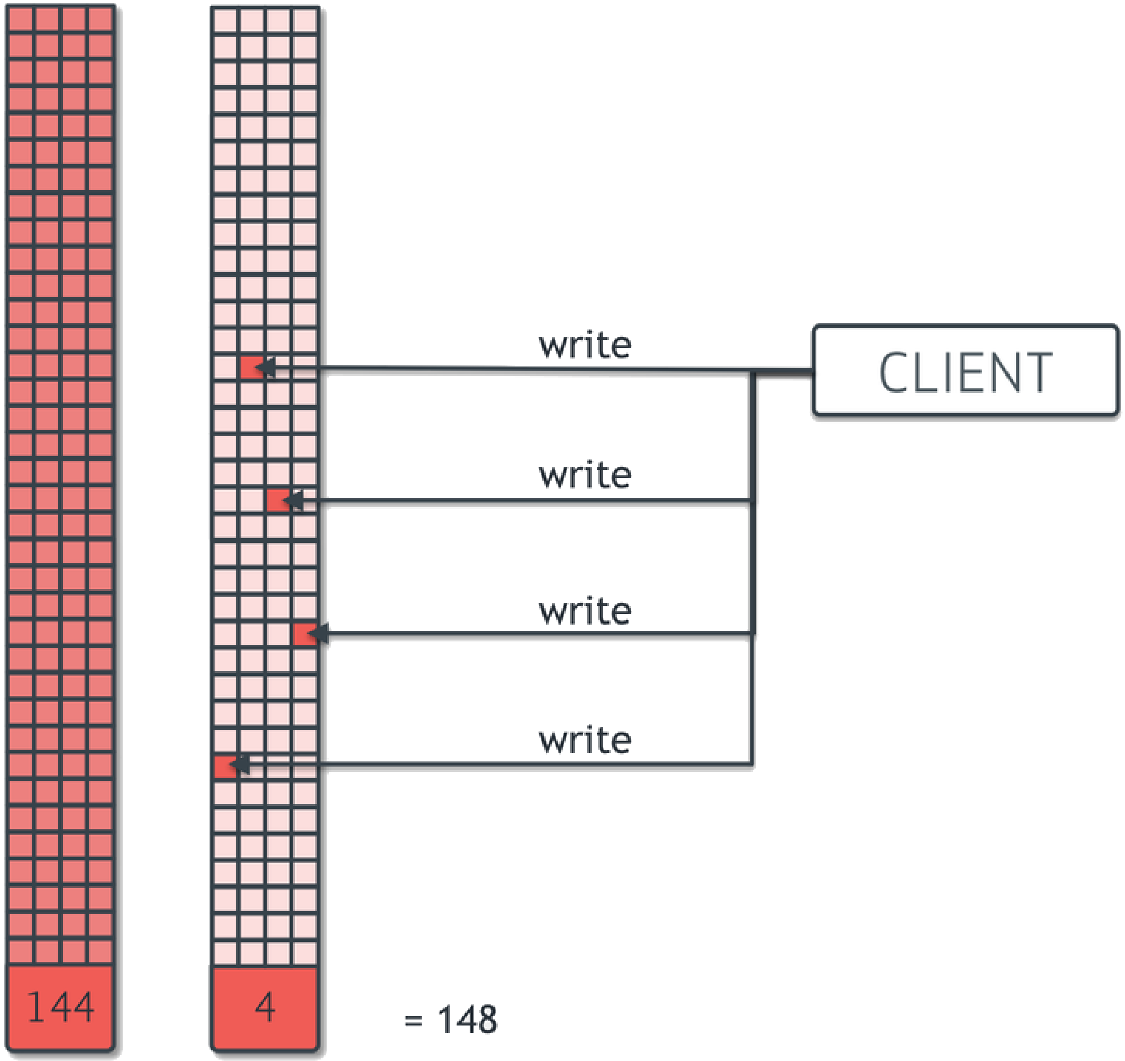
Snapshotting

- Normal snapshotting like we are used to
  - Copy-on-Write (CoW) snapshots
- Snapshots can be created using either libvirt or the rbd tool
- Only integrated into OpenStack, not in CloudStack or Proxmox

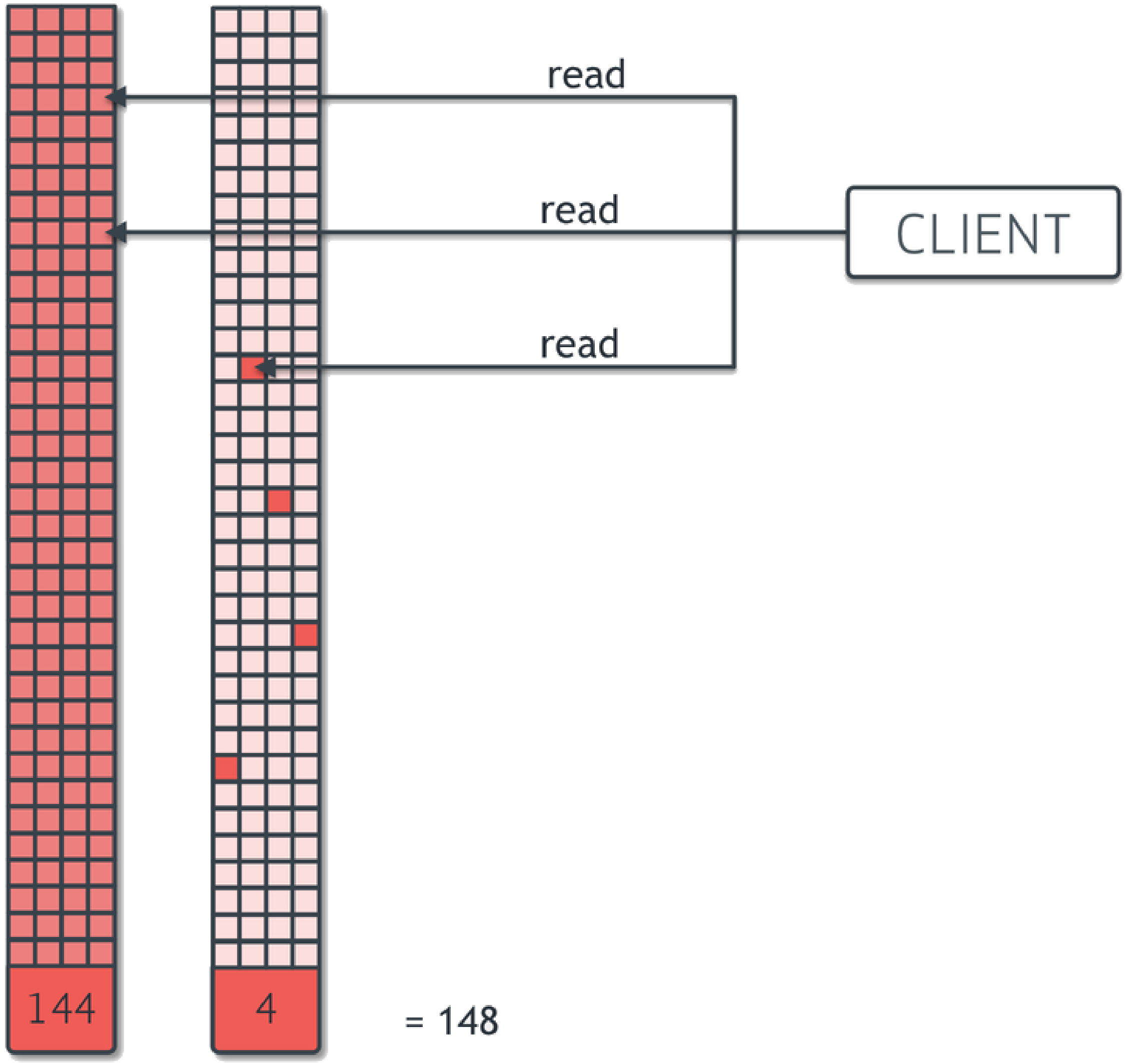
Layering

- One parent / golden image
- Each child records it's own changes, reads for unchanged data come from the parent image
- Writes go into separate objects
- Easily deploy hundreds of identical virtual machines in a short timeframe without using a lot of space

Layering – Writes



Layering – Reads



RBD in the Cloud?

- High parallel performance due to object striping
- Discard for removing discarded data by virtual machines
- Snapshotting for rollback points in case of problem inside a virtual machine
- Layering for easy and quick deployment
  - Also saves space!

RBD integrations

- CloudStack
- OpenStack
- Proxmox

RBD in Proxmox

- Does not use libvirt
- RBD integrated v2.2, not in the GUI yet
- Snapshotting
- No layering at this point

PROXMOX

Proxmox demo

- Show a small demo of proxmox
- Adding the pool
- Creating a VM with a RBD disk

RBD in CloudStack

- Has been integrated in version 4.0
- Relies on libvirt
- Basic RBD implementation
  - No snapshotting
  - No layering
  - No TRIM/discard
- Still need NFS for SystemVMs

CloudStack demo

- Show a CloudStack demo
- Show RBD pool in CloudStack
- Create an instance with RBD storage

RBD in OpenStack

- Can use RBD for disk images both boot and data
- Glance has RBD support for storing images
- A lot of new RBD work went into Cinder

Using RBD in the Cloud

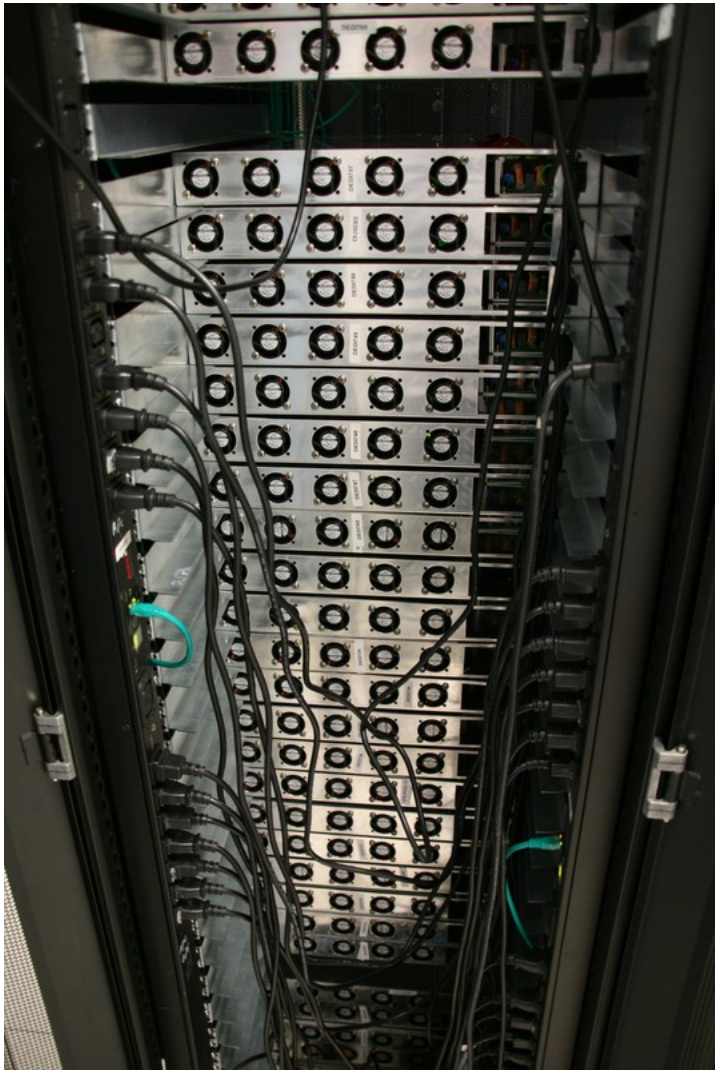
- Virtual Machines have a random I/O pattern
- 70% write, 30% read disk I/O
  - Reads are cached by the OSD and the virtual machine itself, so the disks mostly handle writes
  - 2x replication means you have to divide your write I/O by 2.
- Use Journaling! (Gregory will tell more later)
- Enable the RBD cache (rbd_cache=1)

Is it production ready?

- We think it is!
- Large scale deployments out there
  - Big OpenStack clusters backed by Ceph
  - CloudStack deployments known to be running with Ceph
- It is not “1” or “0”, you will have to evaluate for yourself

Commodity hardware #1

Commodity hardware #2



Thank you!

I hope to see a lot of RBD powered clouds in the future!

Questions?