Motivation

- Super Cloud is a super cool idea!
- Server virtualization decouples vm from physical hardware
- More VM more I/O
- VM’s are moved around sequential to Random I/O
- Multiple VM’s single Hypervisor
Supercloud

Nested Virtualization
May impact performance
Need for performance study
Test Setup

- Nested Guest/ Nested VM - CentOS 6.5
- Guest - Xen Blanket
- Guest Hypervisor - KVM
- Guest - CentOS 6.5
- Hypervisor - KVM
- Host - Ubuntu 12.04 - Baremetal server

Level 0
- Hypervisor: KVM
- Host: Ubuntu 12.04

Level 1
- Guest Hypervisor KVM; Xen-blanket
- Guest VM: CentOS 6.5

Level 2
- Nested Guest VM: CentOS 6.5
Methodology

- Storage
  - local
    - Raw Disk (dd)
      - Block size (4m/8M)
    - Count
    - Sequential read/write
  - Filesystem (iozone)
    - Random read/write
  - RACS
    - Single client
    - Multi-client
      - Concurrent access
      - No concurrent access
    - Other test (re-read, ...)

Performance Benchmarking Tools

- DD
- IOZONE
DD command
DD Command

dd if=/dev/zero if=zero oflag=direct bs=4M count=250
IOZone
Sequential Read and Write
Reread Rewrite
Random Read and Write
Result Analysis

- DD for block size of 8M:
  - from level 0 to level 1 throughput drops by 2.5 times
  - from level 1 to 2 drops by 1/2
  - From level 0 to level 2 drops by 1/5
  - DD for block size of 4M not stable, not consistent - take a bigger sample

- IOZONE
Lessons Learned

- Benchmarking Tools
- It's very tricky to get all the layers up and working
  - problems with Network, Storage space, Versions, Broken Packages, rebooting causes loss of connectivity - no console
  - Cloud Lab interface is constantly changing
  - Don’t take random advice from the internet
FutureWork

- Multiple VM’s
- NFS
- iSCSI
Thank you!!

- Ji Yong
- Weijia Song
- Zhiming Shen
- Prof Hakim Weatherspoon :)

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Appendix 1 : System Config

- Architecture: x86_64
- CPU op-mode(s): 32-bit, 64-bit
- Byte Order: Little Endian
- CPU(s): 32
- On-line CPU(s) list: 0-31
- Thread(s) per core: 2
- Core(s) per socket: 8
- Socket(s): 2
- NUMA node(s): 2
- Vendor ID: GenuineIntel
- CPU family: 6
- Model: 62
- Stepping: 4
- CPU MHz: 1200.000
Disk

Disk /dev/sda: 1000.2 GB, 1000204886016 bytes
255 heads, 63 sectors/track, 121601 cylinders, total
1953525168 sectors
Units = sectors of 1 * 512 = 512 bytes
Sector size (logical/physical): 512 bytes / 512 bytes
I/O size (minimum/optimal): 512 bytes / 512 bytes
Disk identifier: 0x90909090