Dynamic Block-level Management for Cloud Computing Systems

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Introduction

- Block-level network storage commonly used in cloud systems
  - E.g., iSCSI, NBD, SAN
  - Provide virtual machine (VM) storage
  - Fast virtual machine migrations
  - Improved data availability
Problem Addressed

- Serious scalability issue as the size of cloud systems increases
- Bottleneck in shared network storage
- Performance interference across VMs

**Goal:** Improve I/O performance of VMs in cloud systems using caching
Proposed Solution

- Dynamic block-level client-side caching for cloud computing systems
  - Exploit data locality in VM data access
  - Utilize capacity and speed of storage (particularly SSDs) on the client-side
  - Implement via block-level virtualization to support different cloud storage systems
  - Support flexible, dynamic configuration of cache replacement and write policies
DM-cached based Caching

Cloud system using dm-cache based client-side block-level caching

Shared Cache
/dev/sdc

Target
/dev/lv-disk#

IP-SAN
/SAN

Shared Storage
Performance improved
Evaluation

- **Experiment setup:**
  - Eight VM hosts, each with SSD based cache; One shared iSCSI-based network storage server

**IOzone**

- 14x higher throughput for reread

**Concurrent Booting**

*Up to 123% faster booting*
Thanks!!

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