Client Caches and VM Mobility

The Five Cache Responses To VM Migration

By

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Agenda

- Storage Switzerland Background
- The Client Side Cache Appeal
- The Problem Areas
- The Five Cache Responses To Migration
  - Evict and Rebuild
  - Evict and Pre-Load
  - Remote Cache
  - Cache Area Network
  - Shared Server Side Cache

Server Side Cache Appeals To Virtualized Environments

- Lot's of Random I/O

- Performance improvement at source
- Inexpensive to deploy
  - No/Limited Networking Changes
  - No/Limited Storage System Changes
  - Client Side SSD *can* be less expensive than shared SSD, some leverage DRAM

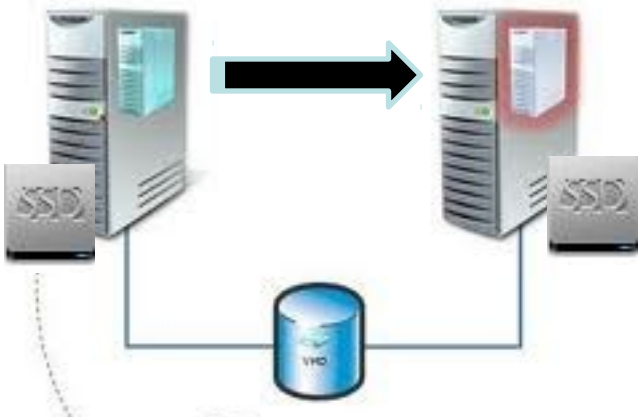
The Problem Areas

- Virtual Machine Migration
- Distributed Resource Management
- Server Side Cache Failure
- The Migrated VM Has Become Dependent on Flash Performance

The Five Cache Responses To Migration

- Evict and Rebuild
- Evict and Pre-Load
- Remote Cache
- Cache Area Network
- Shared Server Side Cache

Evict and Rebuild

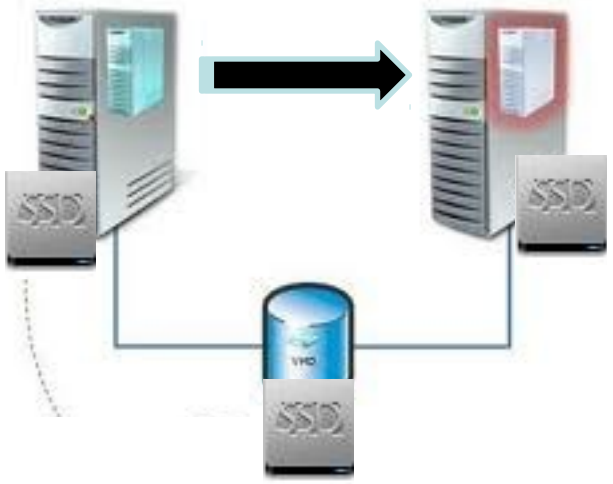


- Migration/DRS - Process
  - Cache contents is invalidated
  - If Write cache, cache is flushed to shared storage
  - VM is migrated as normal
  - Cache is rebuilt on new VM
  - Initial cache-warm up has no intelligence so most access is from HDD
  - High probability of misses until analytics can be re-established
- Key issue: Hard Drive performance on a VM that was designed for Flash

Evict and Pre-load

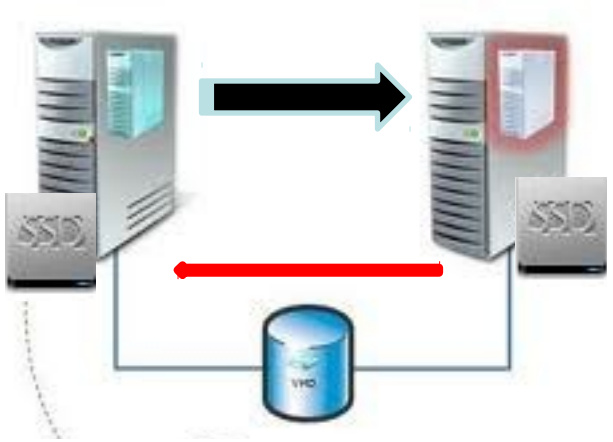
- Migration/DRS - Process
  - Cache contents is invalidated
  - If Write cache, cache is flushed to shared storage
  - Prior to VM Migration a map of the data that was in cache is sent to second server
  - VM is migrated as normal
  - Cache is intelligently rebuilt on new VM
    - Cache warm up time reduced, accuracy increased
    - Still HDD access while rebuild happening
- Key issues:
  - Hard Drive performance on a VM that was designed for Flash
  - Limited Protection from Failure

Remote Cache



- Migration/DRS - Process
  - Local Cache contents is invalidated
  - All Writes are sent to local and share cache
  - VM is migrated as normal
  - Cache is rebuilt on new Host from shared cache
    - Cache warm up time reduced, accuracy increased
    - Access is from shared cache until rebuilt on new host
    - Shared cache can be a backup to host caches
- Key issues:
  - Almost doubles the amount of flash investment (better efficiency)
  - Shared SSDs are more expensive than server/client SSDs
  - Latency of Storage Network (north-south) a concern

Cache Area Network

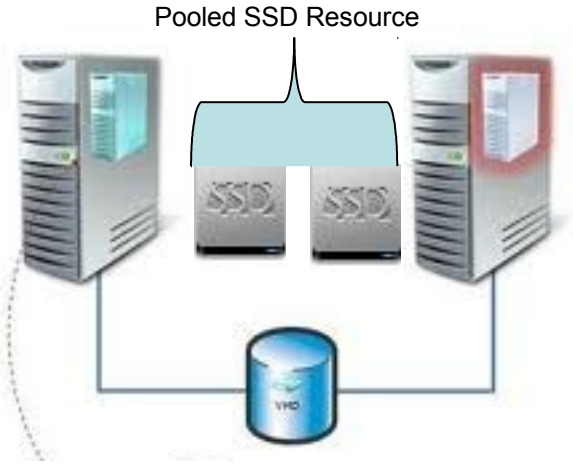


- Migration/DRS - Process
  - Local Cache contents are not invalidated
  - VM is migrated as normal
  - Cache is not rebuilt on new Host
    - Cache is access remotely onoriginal host
    - Access is east-west more bandwidth less latency
    - No re-build time at all

- Key issues:
  - Limited cache redundancy, cache or HBA failure means rebuild
  - Cache is never rebuilt on local server

Shared Client Side Cache

- Migration/DRS - Process
  - No Cache contents are not invalidated
  - VM is migrated as normal
  - Cache is not rebuilt on new Host
    - Cache is a shared pool of SSD from some or all host
    - Access on separate network => more bandwidth less latency
    - No re-builds time
    - Redundant
    - Safe enough for write caching



- Key issues:
  - Needs a separate Network
  - Cache access is network based

Which Cache VM Migration Response is Best?

- Evict and Rebuild
  - Evict and Pre-Load
  - Remote Cache
  - Cache Area Network
  - Shared Server Side Cache

Questions?