The Virtual Block Store System

Xiaoming Gao¹, Mike Lowe², Marlon Pierce³

¹Community Grids Laboratory
²University Information Technology Services
³Indiana University

Motivation

- Similar functionalities to Amazon’s Elastic Block Store (EBS)
- More flexibility
- Interfaces:
  - create-volume <size> <comment>
  - delete-volume <volume id>
  - describe-volumes
  - describe-volume <volume id>
  - create-snapshot <volume id> <comment>
  - delete-snapshot <snapshot id>
  - describe-snapshots
  - describe-snapshot <snapshot id>
  - attach-volume <volume id> <VMM Hostname> <VM Id> <VM Device>
  - detach-volume <volume id>

Web service architecture

- VMM: Virtual Machine Manager
- VBD: Virtual Block Device

Workflows

Create volume:

- Volume Delegate
- VBS Web Service
- Create_volume

Delete volume:

- Volume Delegate
- VBS Web Service
- Delete_volume

Create snapshot:

- Volume Delegate
- VBS Web Service
- Create_snapshot

Delete snapshot:

- Volume Delegate
- VBS Web Service
- Delete_snapshot

Attach volume:

- VBS Web Service
- VMM Delegate
- Export_ISCSI_target

Detach volume:

- VBS Web Service
- VMM Delegate
- Detach_volume

Support other volume servers and VMMs

- Build new Volume Delegate Service
- Build new VMM Delegate Service
- Command line extraction:
  Java source code:
  ```java
  String program = "xm
  String[] args = {"block-attach", domUId, "phy:" + dom0Dev, domUDev, "w"};
  UtilSet.antExecute(program, args, ...);
  
  Property file:
  |blockAttachCmd=|xm block-attach <domUId> phy<dom0Dev> <domUDev> <domUDev>
  |blockDetachCmd=xm block-detach <domUId> <domUDev>
  ```

Integration with Nimbus

- VBS Web Service
- VMM Delegate
- VBD
- Nimbus Workspace
- Web Service

Challenges and Future Work

- Consistency
  - metadata maintenance, volume id generation
- Performance
  - multiple service instances, asynchronous snapshot creation
- Fault tolerance
  - roll-back in case of failure, large volume creation