The Virtual Block Store System

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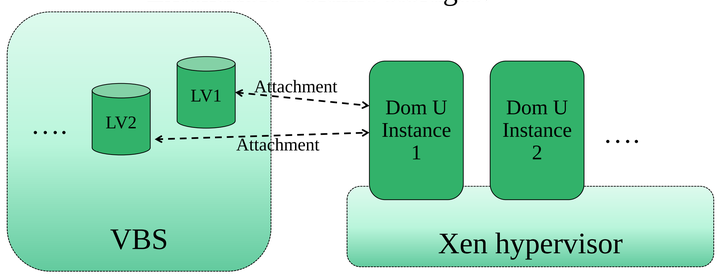
Motivation

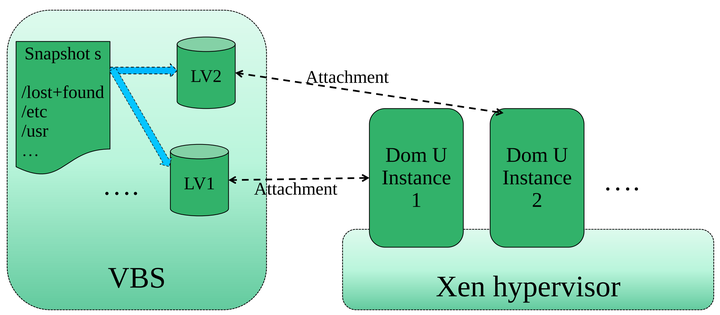
- Similar functionalities to Amazon's Elastic Block Store (EBS)
  - create/delete logical volumes/snapshots
  - describe volumes/snapshots
  - attach/detach volumes
- More flexibility
  - work directly with Virtual Machine Manager (VMM)
  - support various VMMs (Xen, KVM, etc.)
  - convenient integration with various cloud computing systems (Nimbus, Eucalyptus, etc.)
  - potential volume sharing and shared disk file systems

Typical use cases

Extendable volume storages:

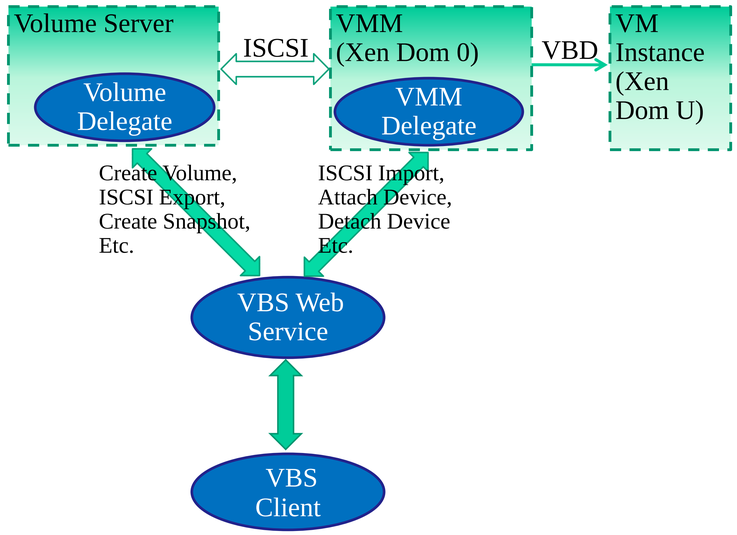


Data back up and reuse based on snapshots:



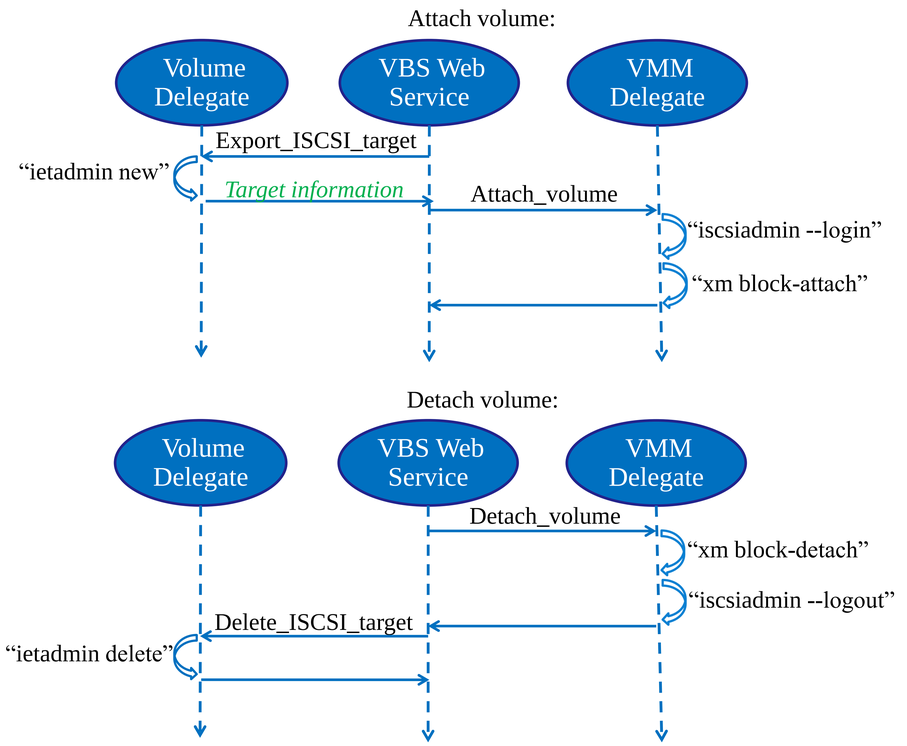
- LV: Logical Volume
- Snapshot: a special volume representing an exact copy of an existing logical volume, frozen at a particular point of time

Web service architecture



- VMM: Virtual Machine Manager
- VBD: Virtual Block Device
- ISCSI: can work over Internet (compared with ATA over Ethernet)

Example workflows



Support other volume servers and VMMs

- Build new Volume Delegate Service
- Build new VMM Delegate Service
- Command line extraction:

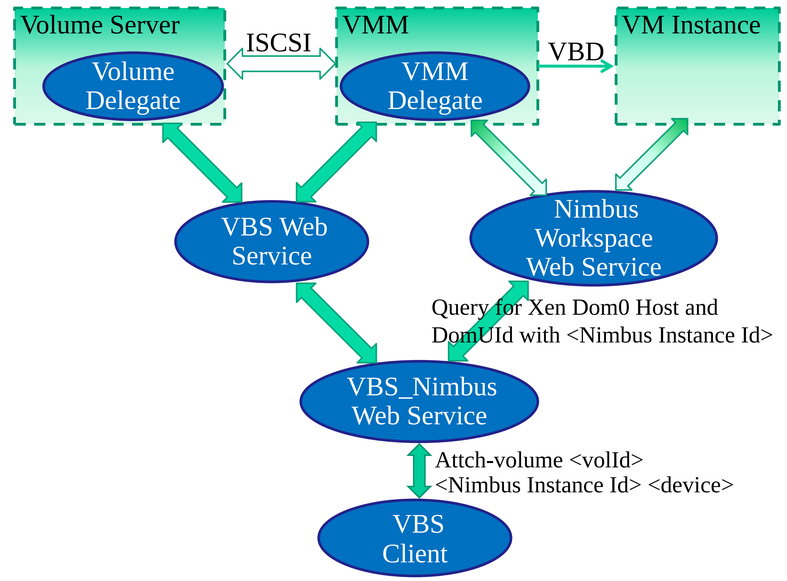
Java source code:

```
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> w
blockDetachCmd=xm block-detach <domUId> <domUDev>
```

Integration with Nimbus



Challenges and Future Work

- Consistency and fault tolerance
  - metadata maintenance, volume id generation
  - roll-back in case of failure, large volume creation
- Performance
  - multiple service instances, asynchronous snapshot creation
- Security
  - web service security, iSCSI security