oVirt

Glance Integration Deep Dive

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Agenda

- OpenStack Overview

- OpenStack Glance Service

- Interesting Use Cases for oVirt

- Glance as oVirt External Provider

- Interfacing with Glance (Java SDK)

- Glance Images Discovery

- Importing and Exporting Glance Images

- VDSM Sharing Image Support

- Current Constraints and Limitations

- Roadmap

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OpenStack Overview

- Cloud computing project to provide an Infrastructure as a Service (IaaS)

- Controls large pools of compute, storage, and networking resources
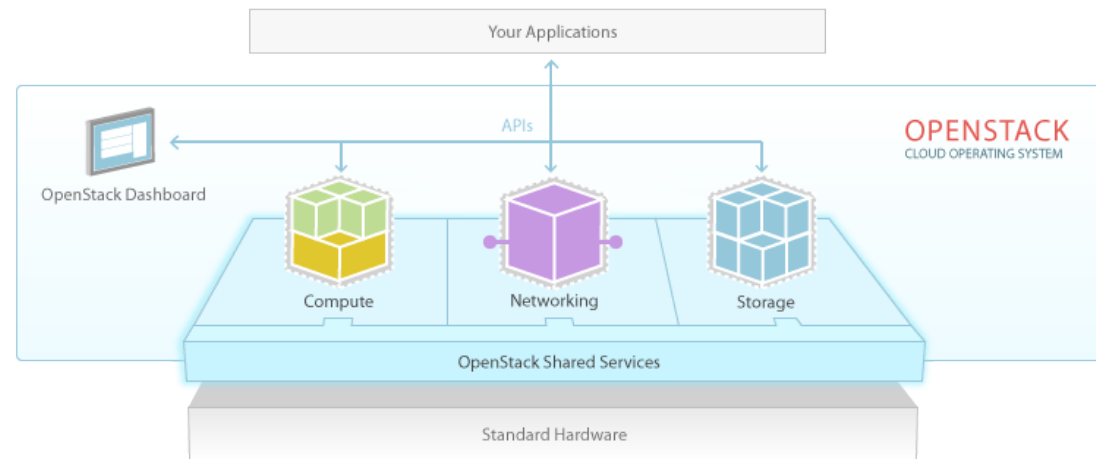
- Free open source software released under the terms of the Apache License
- Project is managed by the OpenStack Foundation, a non-profit corporate entity established in September 2012

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OpenStack Glance Service

- Provides services for discovering, registering, and retrieving virtual machine images

- RESTful API that allows querying of VM image metadata and retrieval of the actual image

- Stored images can be used as a template

- It can also be used to store and catalog an unlimited number of backups

- Images available through Glance can be stored in a variety of locations (simple filesystems, OpenStack Swift, etc.)

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Glance Supported Formats

Disk Formats

- **raw** (an unstructured disk image format)
- **qcow2** (disk format supported by the QEMU)
- **iso** (format for the data contents of an optical disc)
- **vhd, vmdk, vdi** (VMWare, Xen, Microsoft, VirtualBox, and others)
- **aki, ari, ami** (Amazon images)

Container Formats

- **bare** (no container or metadata envelope for the image)
- **ovf** (ovf container format)
- **aki, ari, ami** (Amazon containers)

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Glance Image Base Metadata

- **checksum:** md5 checksum of the image

- **container_format:** bare, ovf, ...

- **created_at, updated_at, deleted_at:** creation, last update and deletion date and time

- **deleted:** whether the image has been deleted or not (True/False)

- **disk_format:** raw, qcow2, ...

- **id, name:** uuid of the image and name

- **is_public:** whether the image is public or not (True/False)

- **min_disk, min_ram**: generic recommendation for using the image

- **owner:** uuid of the owner of the image

- **protected:** whether the image can be deleted or not (True/False)

- **size:** real size of the image (not the virtual image size seen by the guest)

- **status:** active, saving, queued, killed, pending_delete, deleted

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Glance Image Common Properties

- In Glance API Version 1 it is possible to add custom properties to the images (not officially standardized)

- In Glance API Version 2 some additional custom properties have been standardized:

  - **architecture:** the CPU architecture that must be supported by the hypervisor (e.g. x86_64, arm, ppc64, ...)

  - **hypervisor_type:** xen, qemu, kvm, lxc, uml, ...

  - **os_type, os_distro, os_version:** OS information

- More information at:

  http://docs.openstack.org/trunk/openstack-compute/admin/content/image-metadata.html
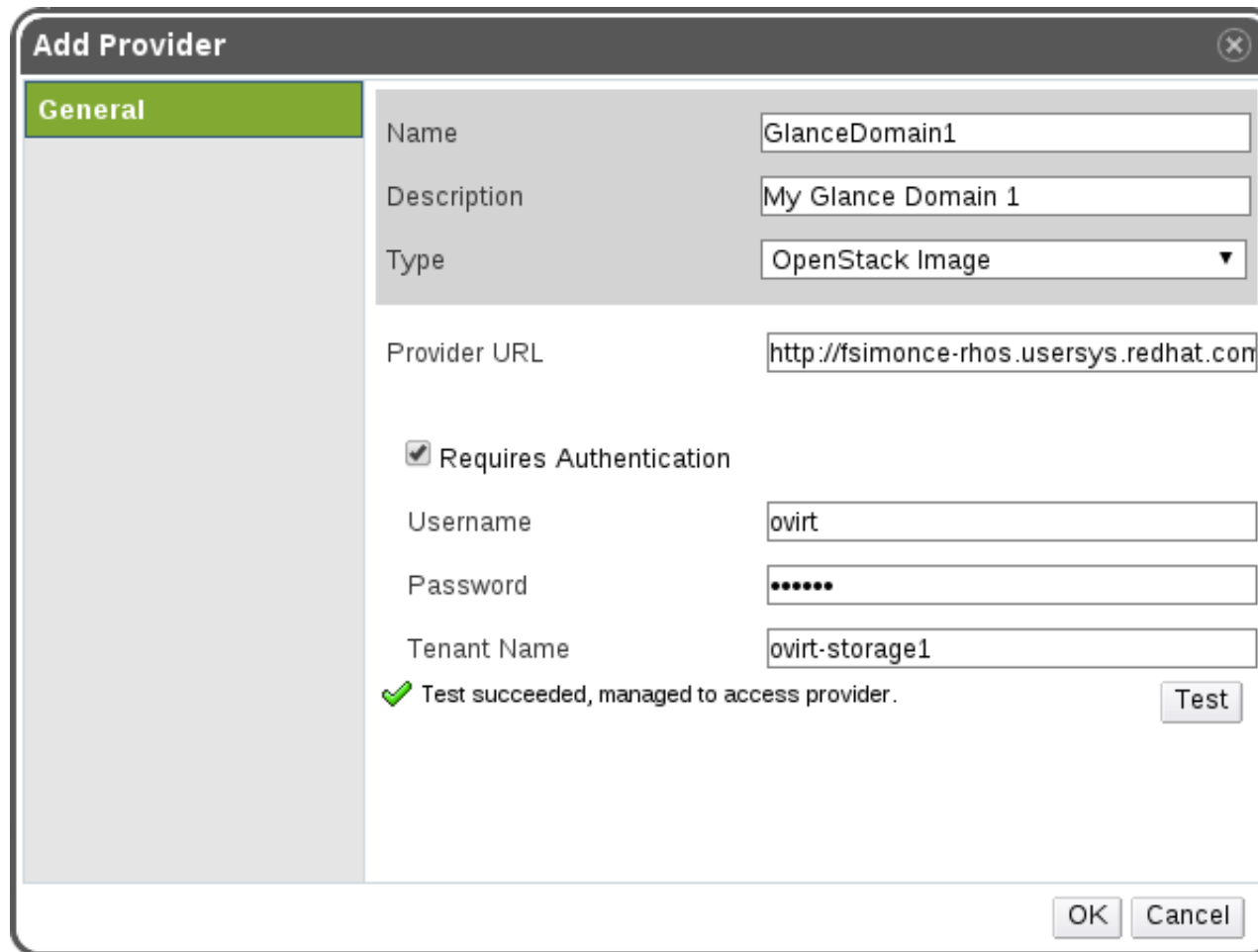
Interesting Use Cases for oVirt

- Import and Export single images (templates) from and to Glance for interoperability with OpenStack

- Unlimited number of backups for images and VMs

- Store ISO images in Glance and use them natively in the oVirt VMs

- Import and Export full VMs and templates supporting:

  - Complete VM definition

  - Multiple disks

  - Snapshots

Phase 1 Use Cases Implementation

- **Import and Export single images (templates) from and to Glance for interoperability with OpenStack**

- Unlimited number of backups for images and VMs

- Store ISO images in Glance and use them transparently for oVirt VMs

- Import and Export full VMs and templates supporting:

  - Complete VM definition

  - Multiple disks

  - Snapshots

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External Providers and Glance 1/2

- External Providers support in oVirt 3.3; oVirt is now capable to interface with some additional supported services (e.g. OpenStack Image/Network, Foreman)

- New "Providers" Tab in WebAdmin to add, edit and remove the External Providers

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External Providers and Glance 2/2
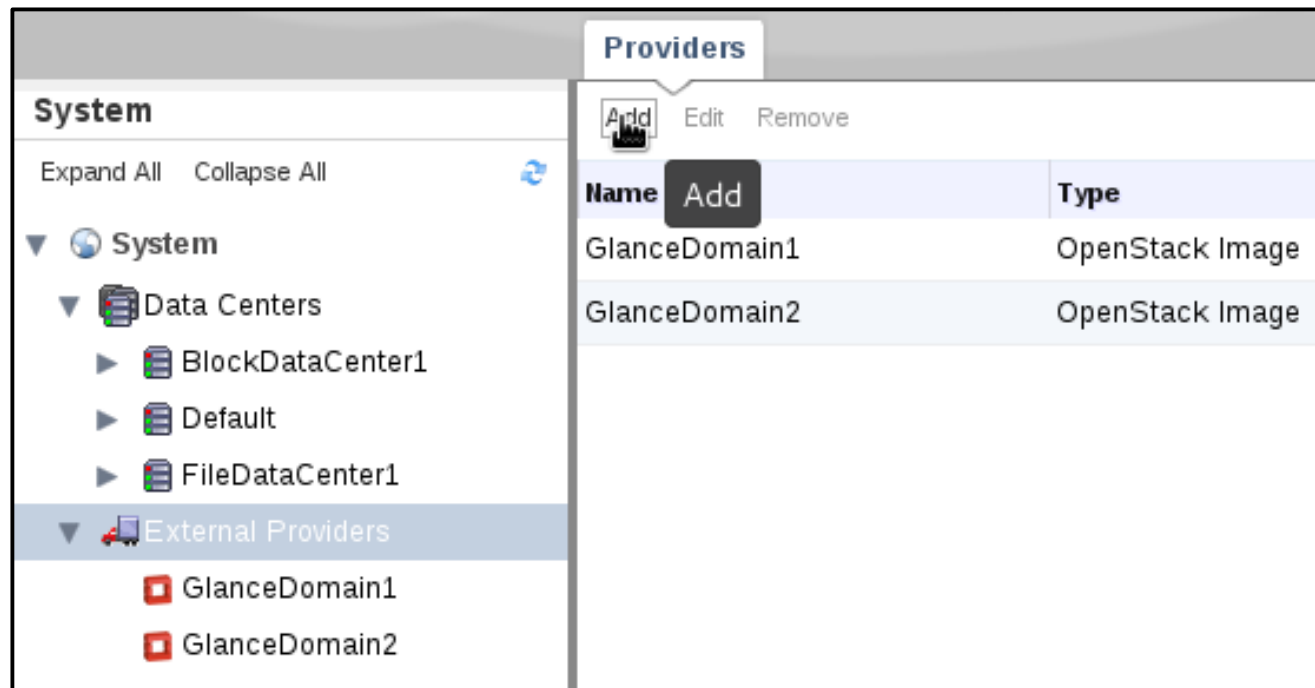
- Glance is the "OpenStack Image" External Provider

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Glance as oVirt External Provider

- Glance Storage Domains are also listed in the Storage Tab
- They don't belong to a specific Data Center (Unattached)

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OpenStack Java SDK

- To accomplish some operations (e.g. Glance images listing) oVirt Engine requires a direct connection to OpenStack services

- OpenStack clients are the native Python bindings for the OpenStack APIs (used to implement the command-line interfaces)

- openstack-java-sdk is a third-party OpenStack client API library for Java (licensed under the Apache 2 license)

- Since February 2013 (os-java-sdk 3.0.0) oVirt engineers have started contributing code, highlights:

  - Introduce "connectors" to reduce the number of dependencies (JBoss vs Glassfish)

  - Stabilize Keystone, Glance and Neutron (was Quantum) APIs

  - Improve Keystone authentication with Token Providers
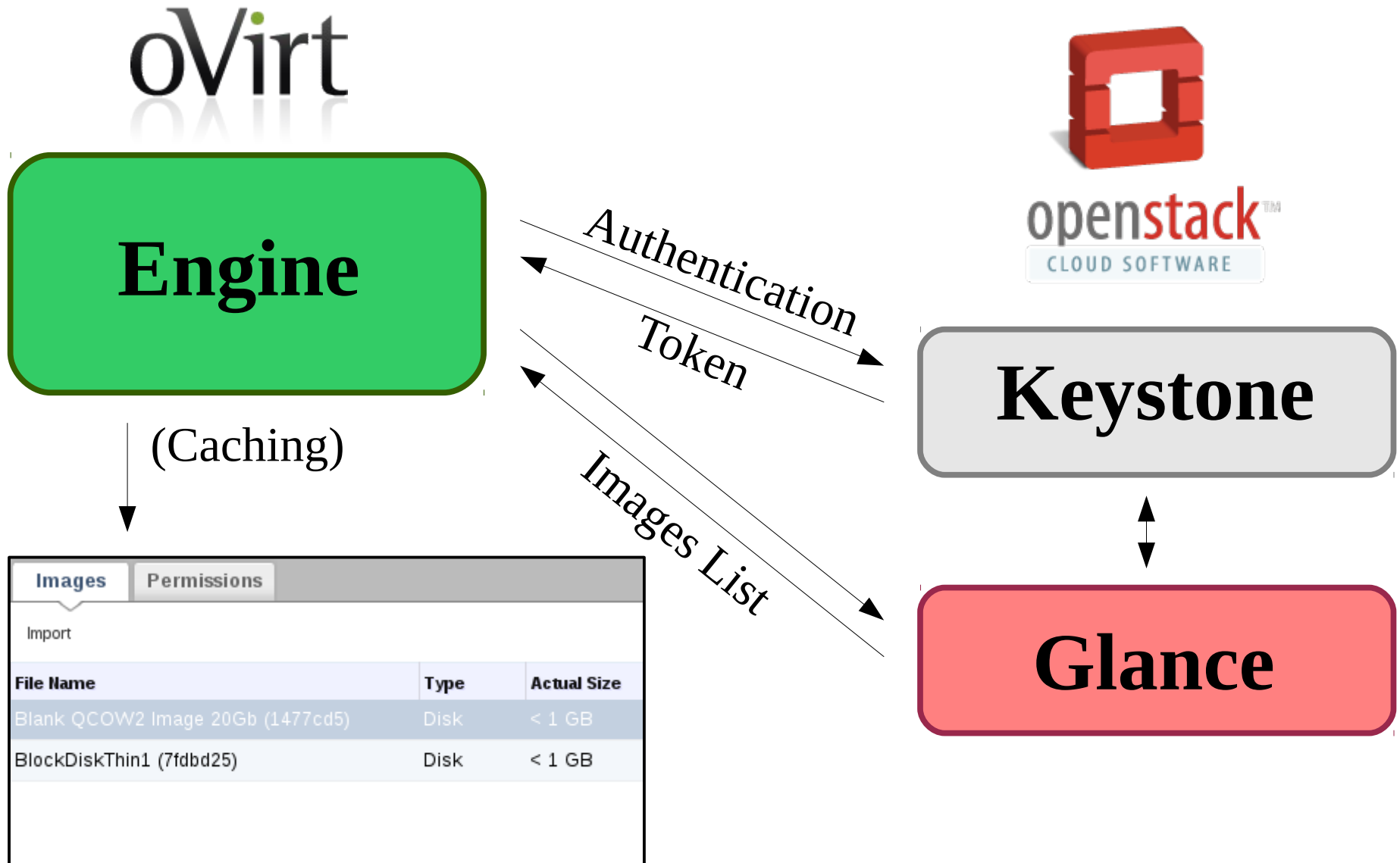
Glance Images Discovery

- Active Glance Images (in the known and supported formats) are listed in the Images sub-tab when a Glance domain is selected

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Glance Images Discovery Diagram

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Importing Glance Images

- To import from Glance select the relevant Images and click on the "Import" button in the "Images" sub-tab

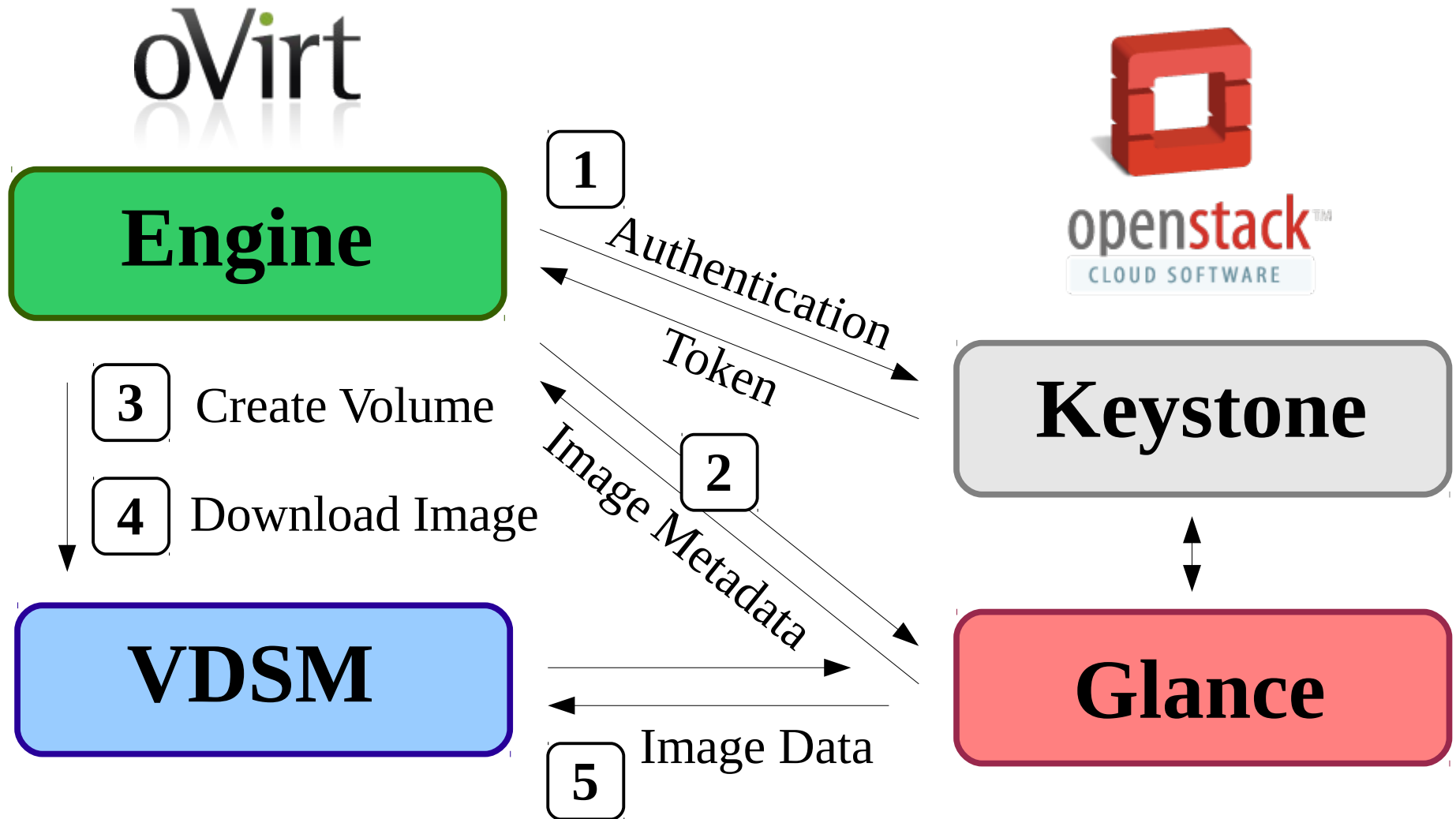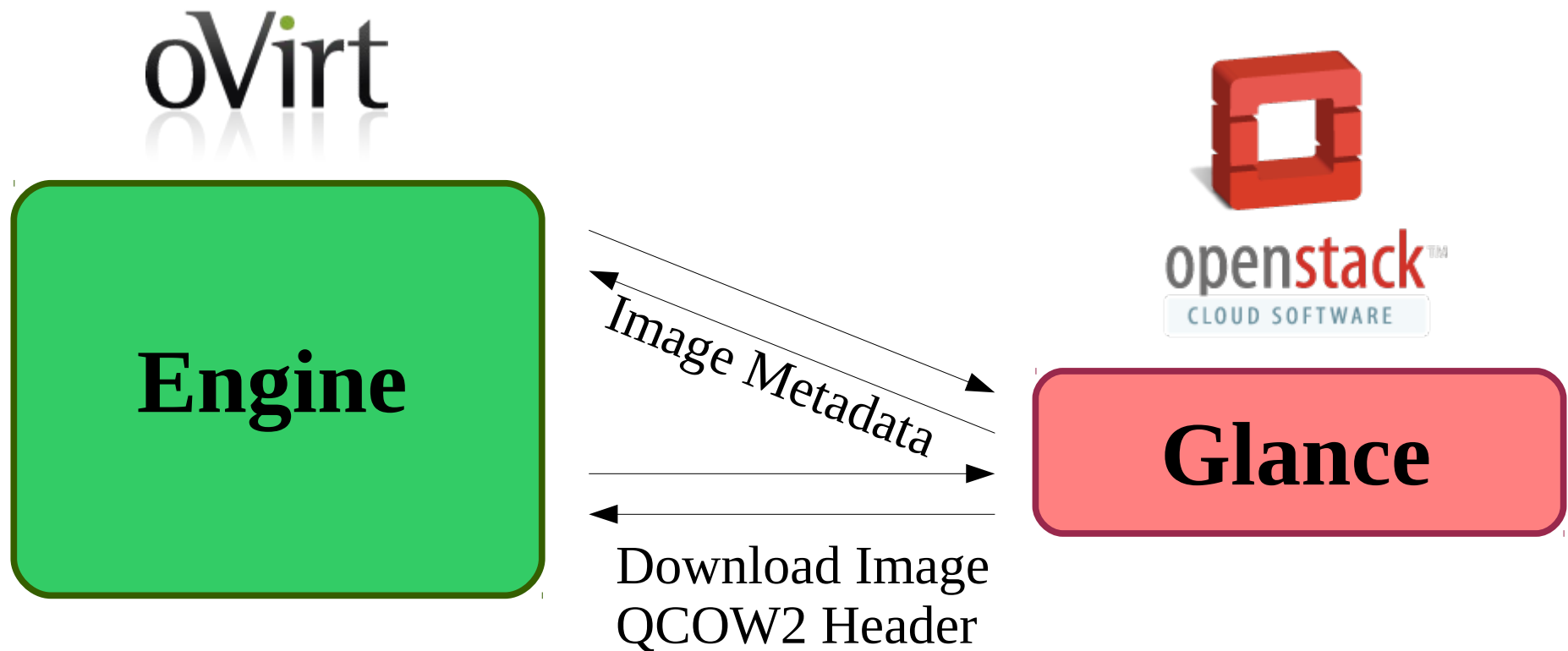- Select the destination parameters in the pop-up dialog as the destination Data Center, Domain and Quota

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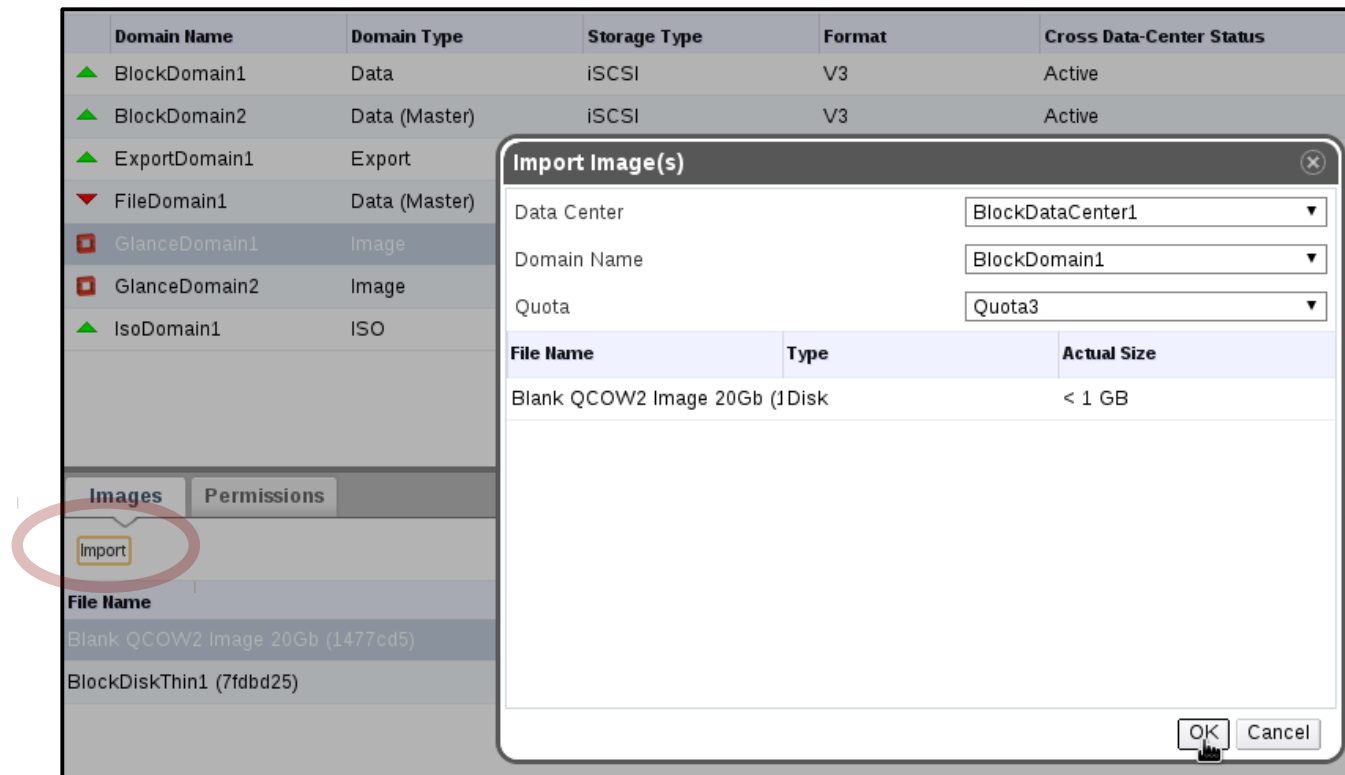
- Glance Metadata doesn't provide the Image Virtual Size

- When the Image is in the qcow2 format, the virtual size is discovered by downloading the image qcow2 header (72 bytes)

Engine

Image Metadata

Download Image
QCOW2 Header

Glance

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Imported Glance Image in oVirt

- The imported Image can be found in the "Disks" tab

- The relevant Metadata is maintained, some other parameters are set to the default (e.g. interface VirtIO) and they can be modified later

- An oVirt VM can now be instantiated with the Disk and eventually it can be transformed into a Template

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Exporting Disks to Glance

- To export to Glance select the relevant Disks and click on the "Export" button in the "Disks" tab

- Select the destination Glance Domain in the pop-up dialog

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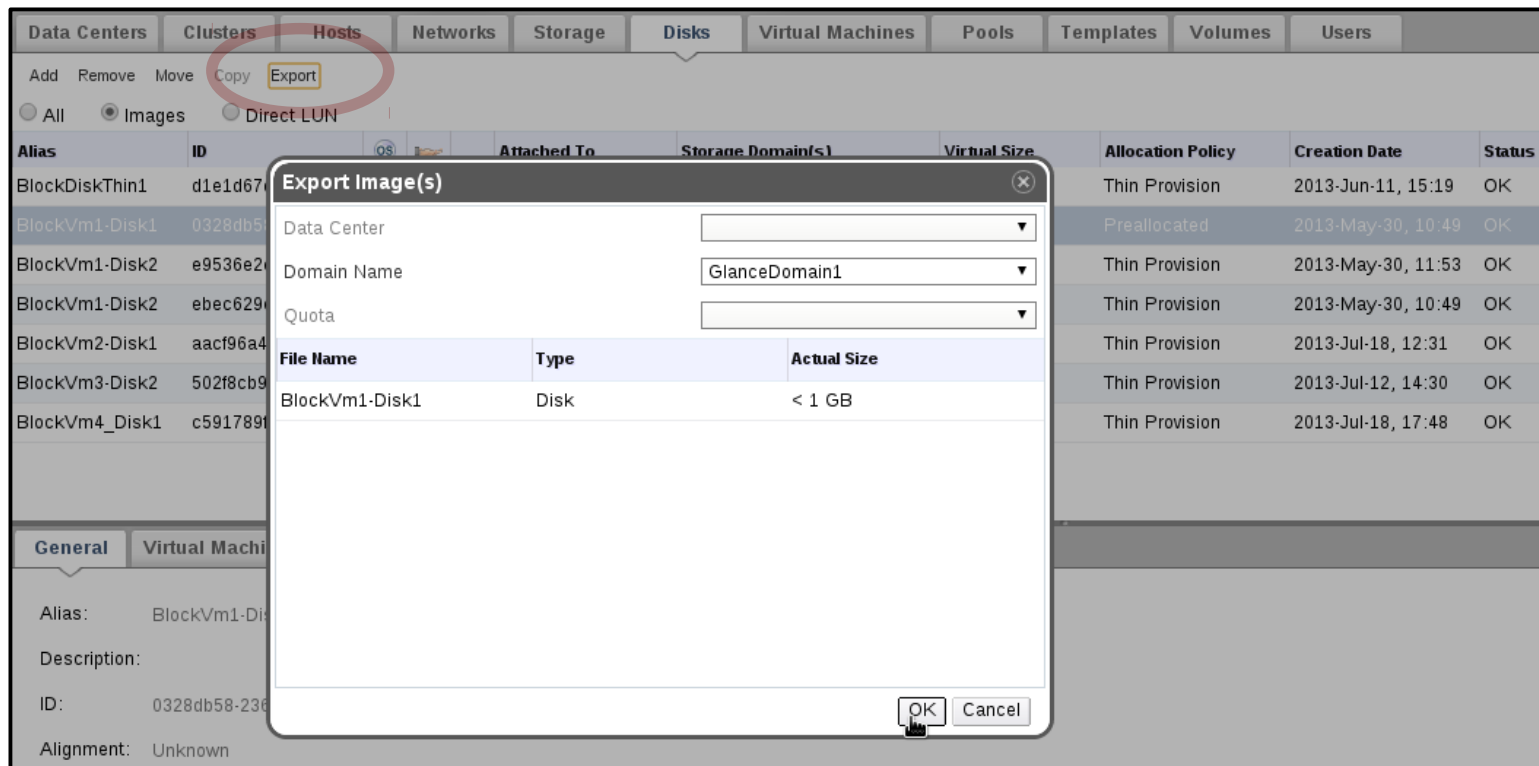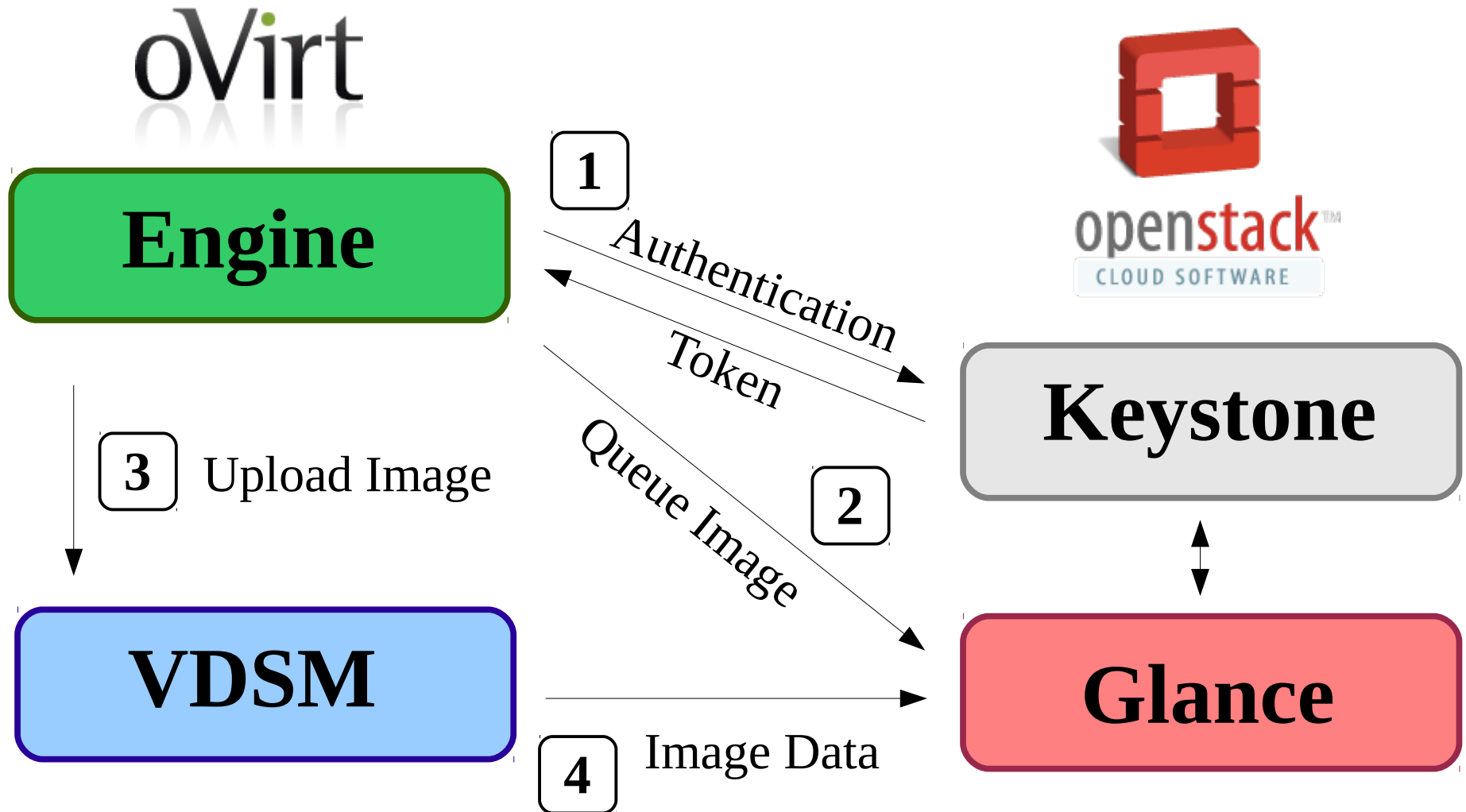
Exported oVirt Disk in Glance

```
# glance image-list
+-------------+--------------------+--------+-----------+-----------+--------+
| ID          | Name               | Disk   | Container  | Size      | Status |
+-------------+--------------------+--------+-----------+-----------+--------+
| 1477cd5a... | Blank QCOW2 Image 20Gb | qcow2 | bare     | 262144    | active |
| 7fdbd255... | BlockDiskThin1     | qcow2  | bare      | 134217728 | active |
+-------------+--------------------+--------+-----------+-----------+--------+

# glance image-show 7fdbd255-4851-495e-8af2-300f9967c6b5
+-----------------+--------------------------------------+
| Property        | Value                                |
+-----------------+--------------------------------------+
| checksum        | 089092ee15690fe33ec12d426ac50e70     |
| container_format | bare                                |
| created_at      | 2013-07-24T16:41:11                  |
| deleted         | False                                |
| disk_format     | qcow2                                |
| id              | 7fdbd255-4851-495e-8af2-300f9967c6b5 |
| is_public       | False                                |
| name            | BlockDiskThin1                       |
| owner           | 5b7d836142f9444a9e2bd3494669c831     |
| protected       | False                                |
| size            | 134217728                            |
| status          | active                               |
| updated_at      | 2013-07-24T17:07:15                  |
+-----------------+--------------------------------------+
```

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VDSM Sharing Image Support

- New API to download and upload images using predefined methods

  ```
  downloadImage(methodArgs, spUUID, sdUUID, imgUUID, volUUID=None)

  uploadImage(methodArgs, spUUID, sdUUID, imgUUID, volUUID=None)
  ```

- HTTP method implemented and fully compatible with Glance

  ```
  methodArgs = {
      'method': 'http',
      'url': 'http://source-or-destination/path/to/image',
      'headers': {'X-My-Header', 'MyHeaderValue'},
  }
  ```

- X-Auth-Token provided by Keystone is passed as one of the headers

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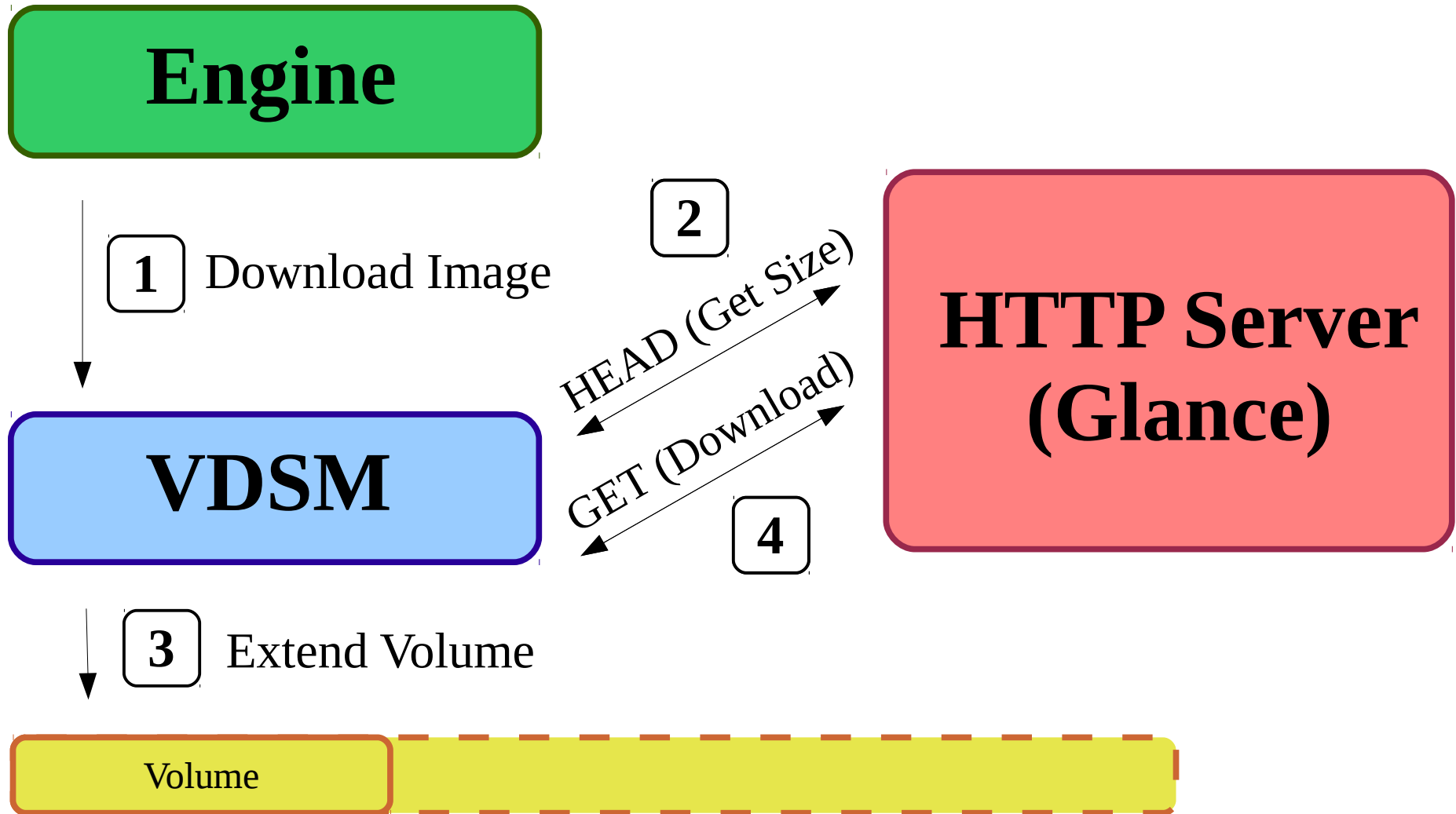
VDSM Client Download Examples
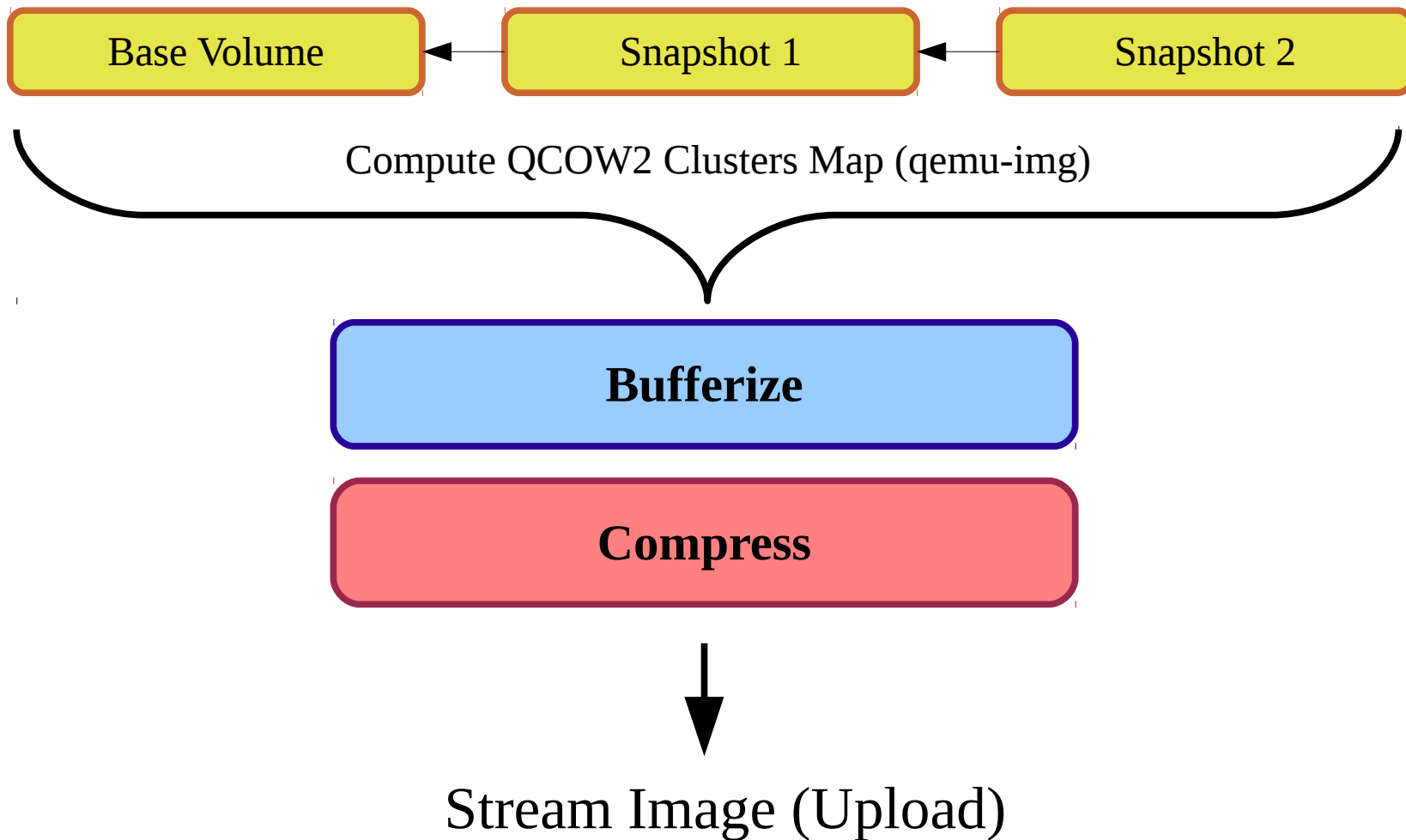
- VDSM gained support for Glance:

```
$ vdsClient 0 downloadImage http '{
 "method": "http",
 "url": "http://glance:9292/v1/images/320897a4-6924-4b31-a256-f51c97d15d95",
 "headers": {
    "X-Auth-Token": "1ad97ccf22aa47a89e082b6491fb4b70",
}}' \
0b11dedd-6134-4775-8ccb-6a935d16320c d26915e8-9049-43a3-ba74-e403730875dc \
11400413-b99f-4eae-a0dd-24bd347bac18 16e71d6c-bf73-4e0f-a49d-8df45967d28c
```

- And for all other HTTP servers as well:

```
$ vdsClient 0 downloadImage http '{
 "method": "http",
 "url": "http://download.fedoraproject.org/.../Fedora-x86_64-19-sda.qcow2",
}' \
0b11dedd-6134-4775-8ccb-6a935d16320c d26915e8-9049-43a3-ba74-e403730875dc \
11400413-b99f-4eae-a0dd-24bd347bac18 16e71d6c-bf73-4e0f-a49d-8df45967d28c
```

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Future: Squashing and Compression

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Current Constraints and Limitations

- It's not currently possible to export images with multiple volumes:

  - Disks cannot have snapshots

  - Disks cannot be Thin-Provisioned on a Template

- There is no live VM disk export, VM should be down (but uploading Templates is always possible)

- No sparseness support (on file domains) for the raw format, imported images are always preallocated

- No resume option for partially downloaded images

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Roadmap

- **oVirt-Engine**: additional simple operations (e.g. Delete Image)

- **VDSM**: volume chain online squash (to support disks with snapshots)

- **VDSM/Glance**: upload Image compression (and sparseness)

- **oVirt-Engine**: integrated upload and download via WebAdmin and UserPortal

- **oVirt-Engine/VDSM**: Store ISO images in Glance and use them natively in the oVirt VMs

- **oVirt-Engine/VDSM/OpenStack**: Import and Export full VMs and Templates

Useful Links and Mailing Lists

- **Useful Links**
  - http://www.ovirt.org/Features/Glance_Integration
  - http://www.openstack.org
  - http://docs.openstack.org/developer/glance/

- **Mailing lists**
  - arch@ovirt.org users@ovirt.org
  - vdsm-devel@lists.fedorahosted.org
  - engine-devel@ovirt.org

- **IRC**
  - #ovirt on OFTC
  - #vdsm on Freenode

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