Cloud meets GRID

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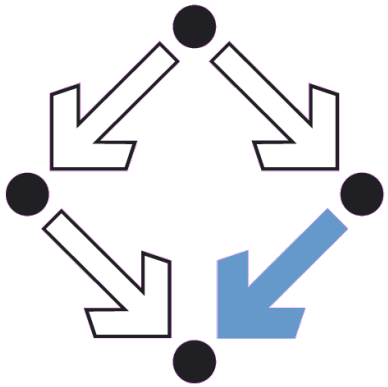
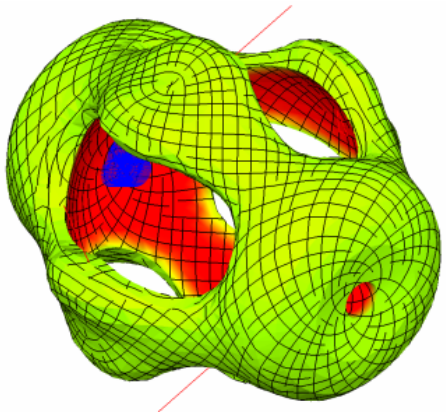

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IBM CloudBurst Hagenberg Hardware

- approximately 6 TB of SAN Storage
- IBM BladeCenter with 4 Blades
- 72 GB RAM, 12 Cores per Blade
- adds up to 288 GB RAM, 48 Cores

Plug and Play

Throughput on the wire

Or on the light path these days

- Internal Network Switch (Blade to Blade) operates on 10 Gigabit per second
- External connection (currently) 1 Gigabit per second to the University of Linz (JKU)
- 220 public IP Addresses for Virtual Machines

IBM Tivoli Cloud Stack

- Works very well with Windows Clients
- Supports Enterprise Linux Distributions (SUSE, Redhat Enterprise)
- Extremely customizable, although very hard to customize deployment scripts for other Linux distributions

Openstack

Open Source Cloud Computing Stack

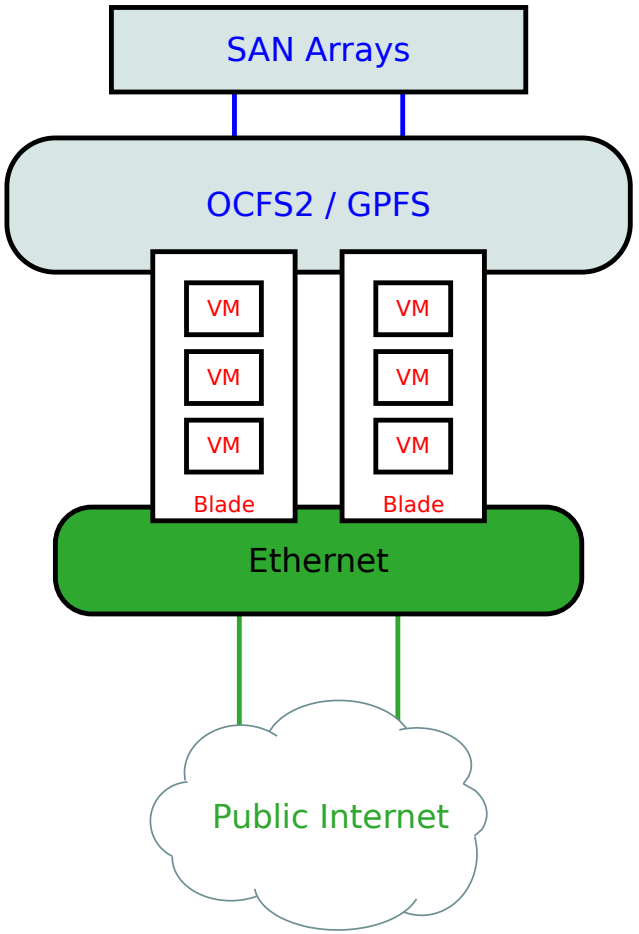
- `http://www.openstack.org`
- Fits our needs
- Open source software stack that can be operated on open source virtualization technology
- Works well enough for Linux guests in combination with Linux-KVM

Virtualization Architecture

- Linux-KVM
- Libvirt
- OCFS2 as cluster-file system, IBM GPFS planned
- No NFS as shared storage, opposed to the Openstack recommendation

Architecture Illustrated

Redundant Fibrechannel and Ethernet Switches neglected for simplicity



Working Features

- CoW-Deployments of Virtual Machines
- Live-Migration
- Snapshotting VMs (and using those snapshots as new templates)
- Firewalling of Virtual Machines
- Multi-Tenancy
- Quotas on Tenants
- Automatic resizing of Virtual Machines

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GridFTP

GridFTP in a sentence

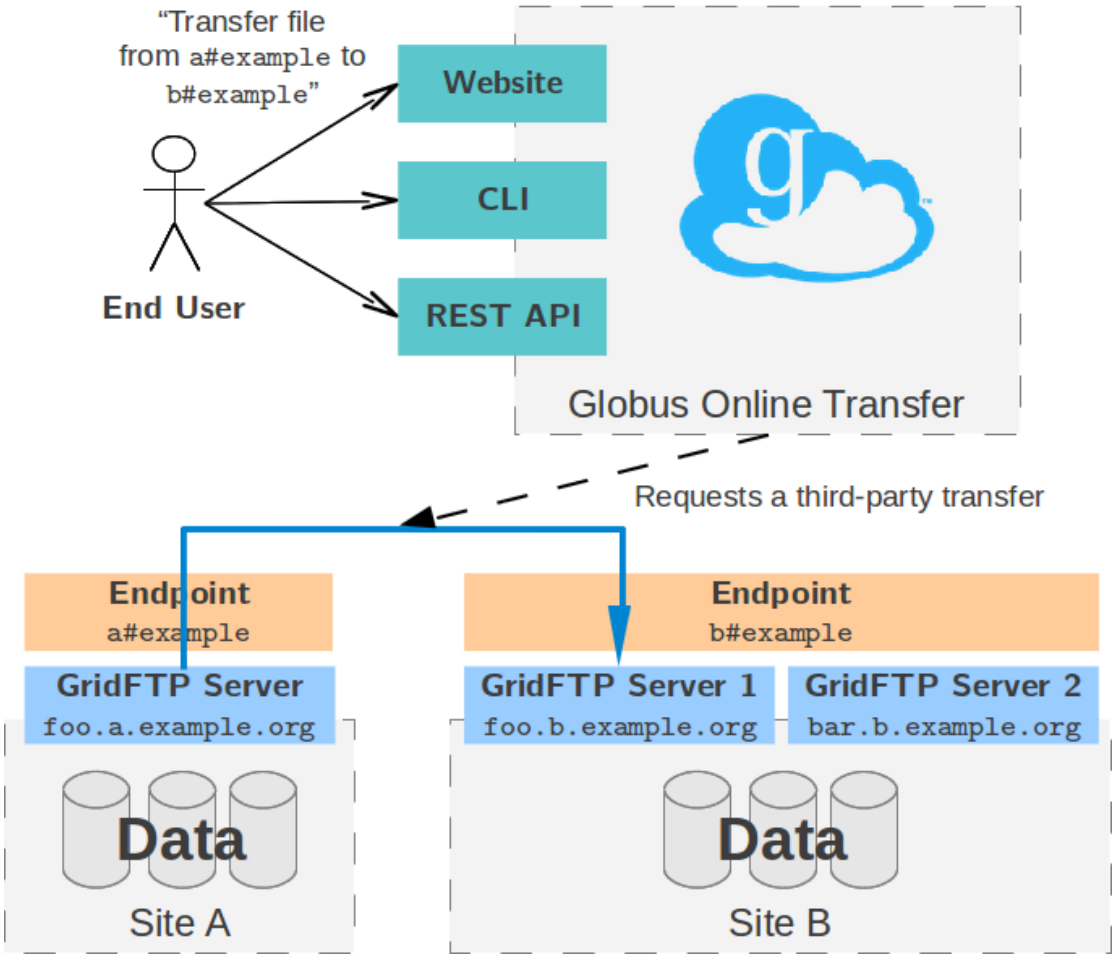
GridFTP is a high-performance, secure, reliable data transfer protocol optimized for high-bandwidth wide-area networks.

Globus Online

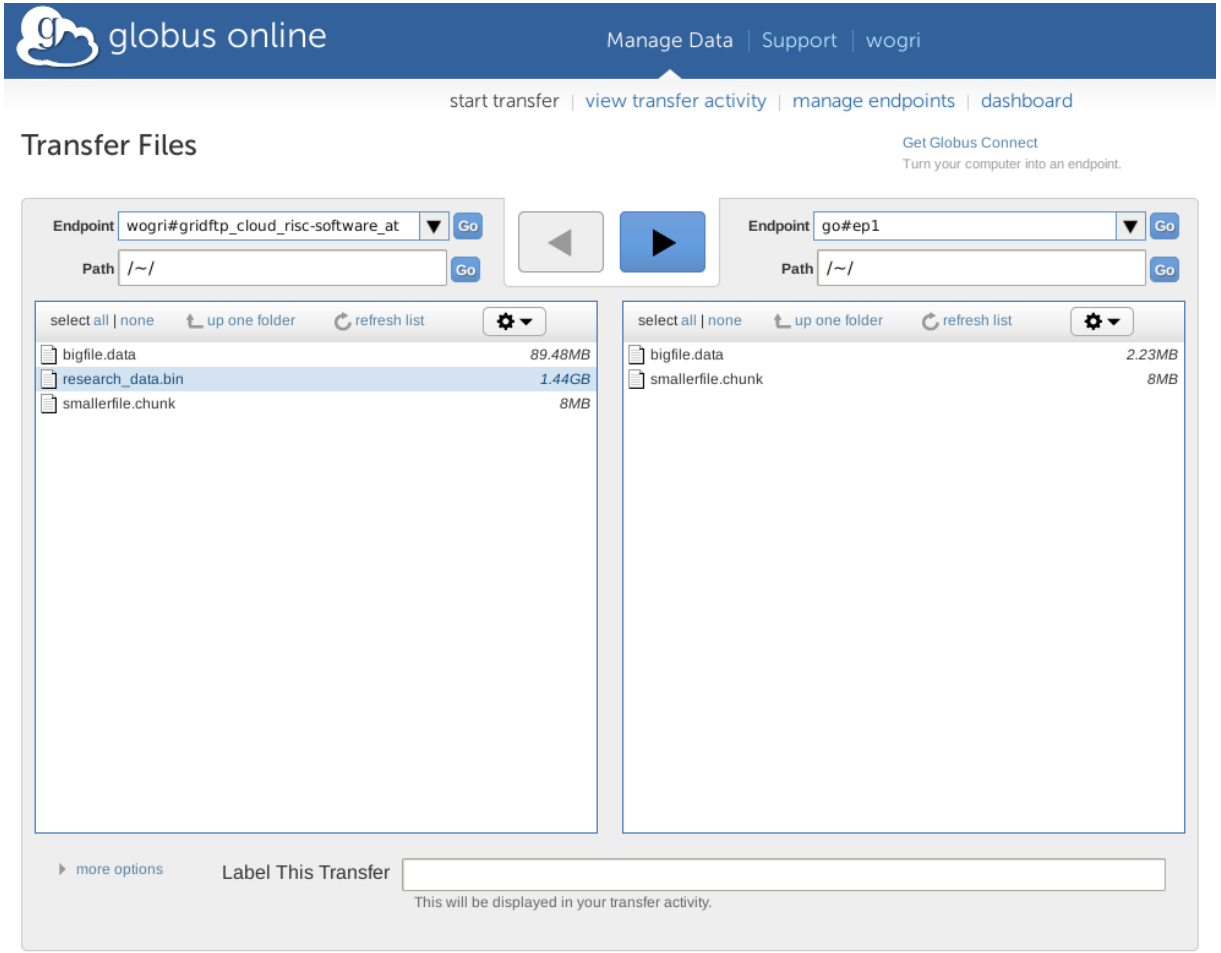
The Software-as-a-Service GridFTP Broker

- Takes care of all your transfers
- Re-starts a transfer in case something goes wrong
- Sends out an e-mail once the transfers have completed
- Also supports transfers from your workstation to the GRID
- Anyone can use globus online

Globus Online illustrated



Globus Online live demo



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Cloud meets Grid

What happens if a Grid hooks up with a Cloud

- Combining those two technologies is not too hard
- A GridFTP server can run as a virtual machine inside a cloud stack
- The GridFTP server can export its storage resources to other authorized virtual machines

GridFTP-Virtual Machine

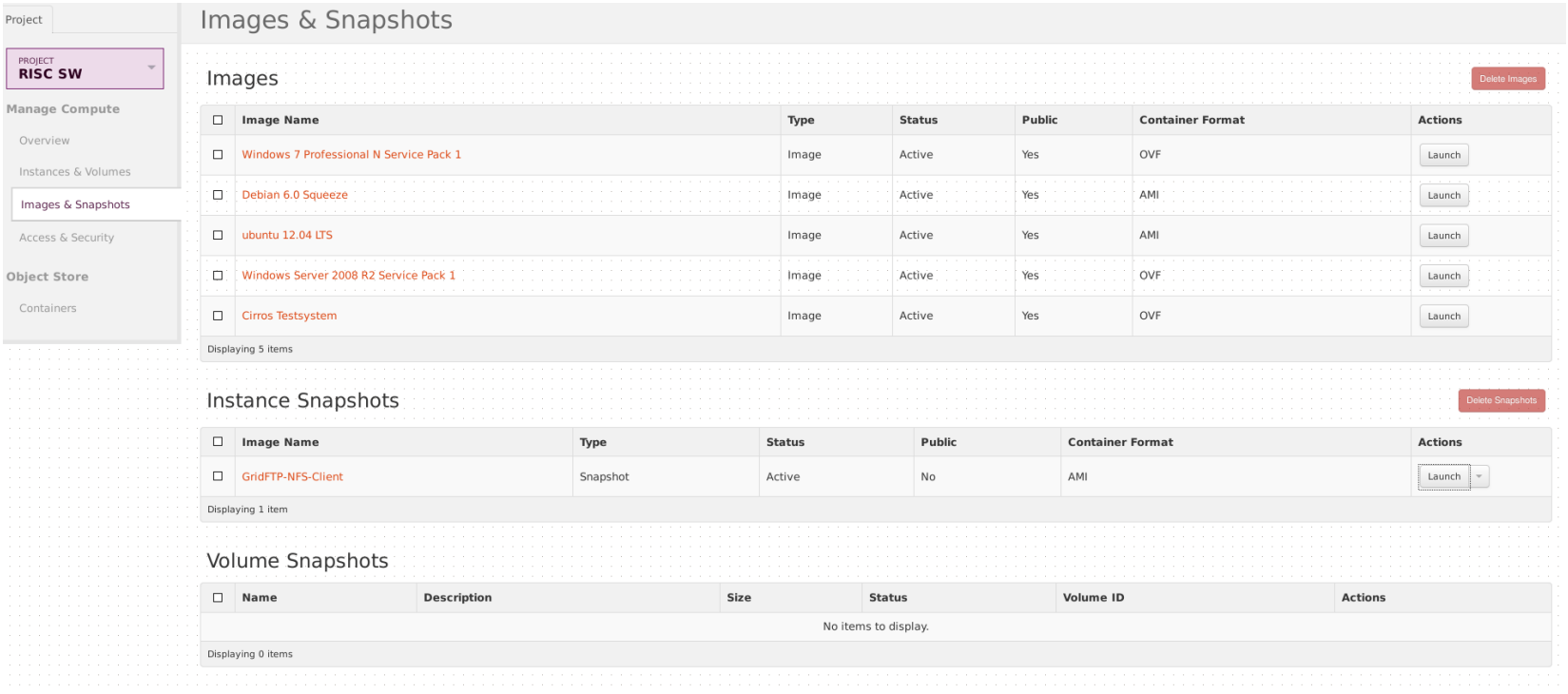
- Basic installation of Globus GridFTP and myProxy for GlobusOnline-Access
- All the users are authenticated and authorized through the LDAP Service
- GridFTP Directory is shared via NFS to authorized users for authorized machines

GridFTP-Client-Images

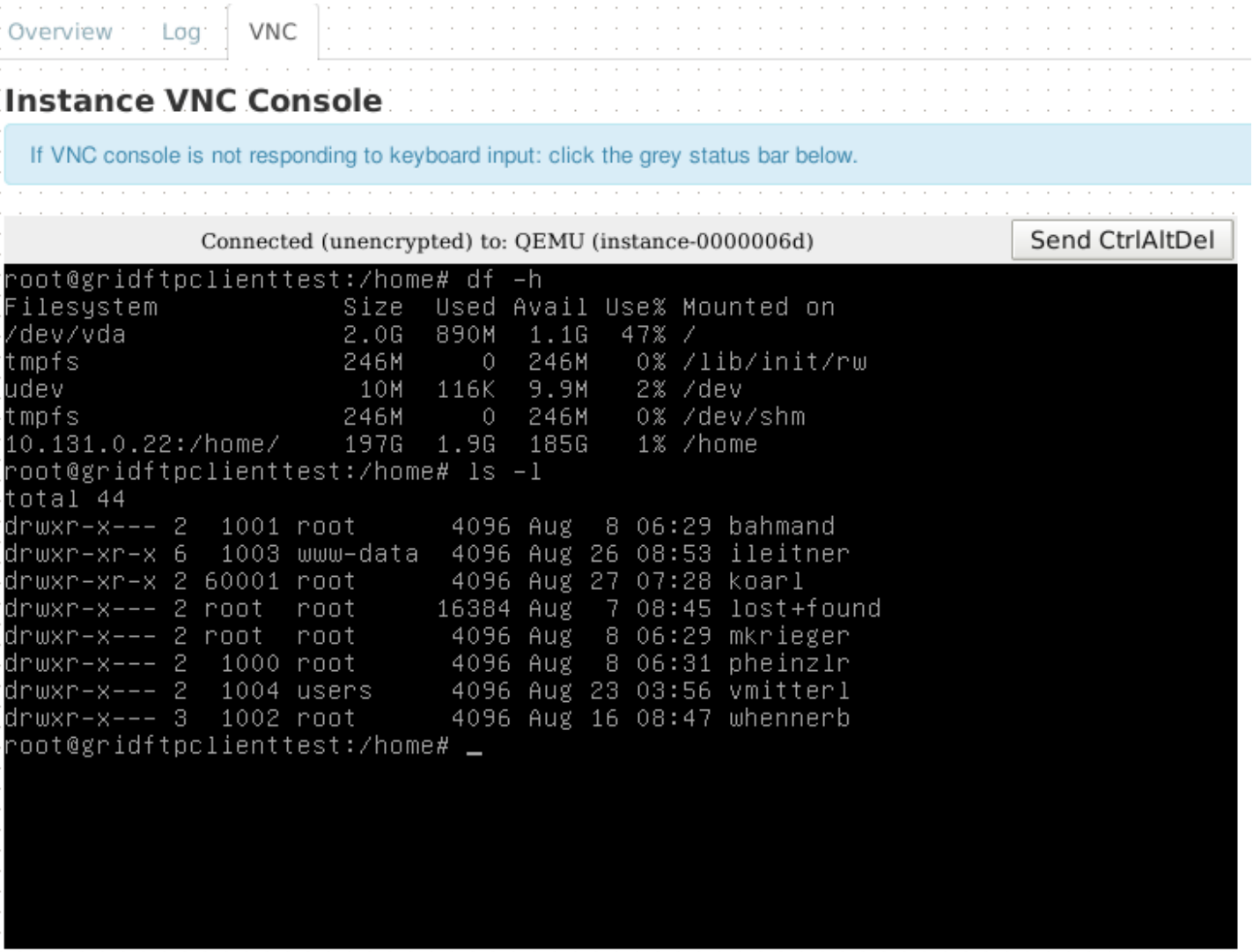
Boot, authorize and go

- Special VM Image is prepared as NFS and LDAP-Client
- Researcher builds his environment of choice in a VM
- Deployment of such a virtual machine is done within a minute
- No extra setup for GridFTP or Globus Online necessary

Live Demo of Grid Client VM



Fallback slides



Questions?

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