



VM-MAD

bridging grids and clouds in the Swiss DCI

Sergio Maffioletti
GC3: Grid Computing Competence Center
University of Zurich

Outline



1. What is VM-MAD ?
2. Usecases
3. FGCZ golden image
4. Apppot
5. Integration with SMSCG
6. Conclusions

What is VM-MAD ?



Provide **simple** mechanisms to **deploy** complex scientific applications on **heterogeneous** hardware and software resources using **virtualization** techniques.

Virtual Machines Management and Advanced Deployment

AAA/SWITCH project (ETH.7)

Start: 01.08.2010

End: 31.12.2011

Partners: ETH, UZH, FGCZ, SWITCH

What is VM-MAD ?



- Cloudburst
- Minimal impact on current usage patterns
- Integration with current SMSCG national infrastructure
- Progressive migration from classic batch model towards virtualized infrastructure

- **Expand** current FGCZ computing resources on demand
 - Peptide-spectrum matches
- **Orchestrator** to control the VM infrastructure
 - Automatic activation, control and shutdown of VM instances according to defined policies and metrics

FGCZ golden image



Application binaries installed

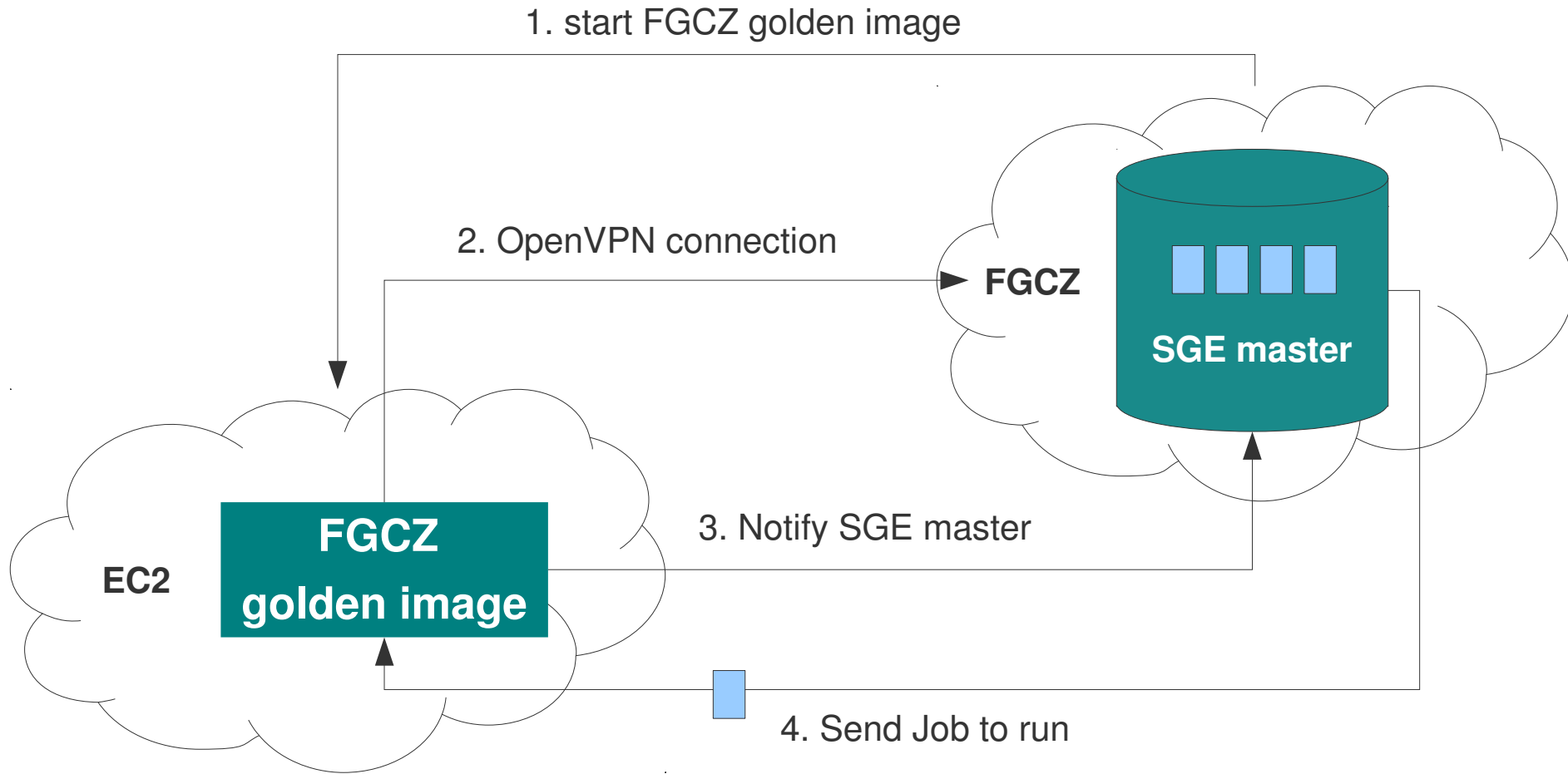
SGE execution node

openVPN

Basic Debian Squeeze 6.0

Configured to work with
the FGCZ SGE master

FGCZ golden image



User-mode Linux is a Linux virtualization technology, running entirely in user-space.

UML consists of a modified Linux kernel (guest), that runs as a **process** within another Linux system (host).

AppPot image can be easily executed on **EC2** or on almost any other **public/private** cloud infrastructure

AppPot main idea:

Run a UML machine as a Grid job

. . . Complex application **deployment**?

An application expert creates an AppPot base image with the software correctly installed and validated.

Users just submit it as a Grid job.

Sysadmins do not need to be involved. . .

. . . how to deploy **home written** code with fast **update cycles** ?

Developer keeps an **own copy** of the AppPot base image where the code is compiled and tested **locally**

The submits only a **diff** between the **original** AppPot base image and the **modified** one.

The diff package is **integrated** with the AppPot base image as part of the **execution** of the Grid job.

Sysadmins do not need to be involved. . .

Integration with SMSCG

FGCZ golden image **submitted** as appPot image to the SMSCG infrastructure as **regular grid job**

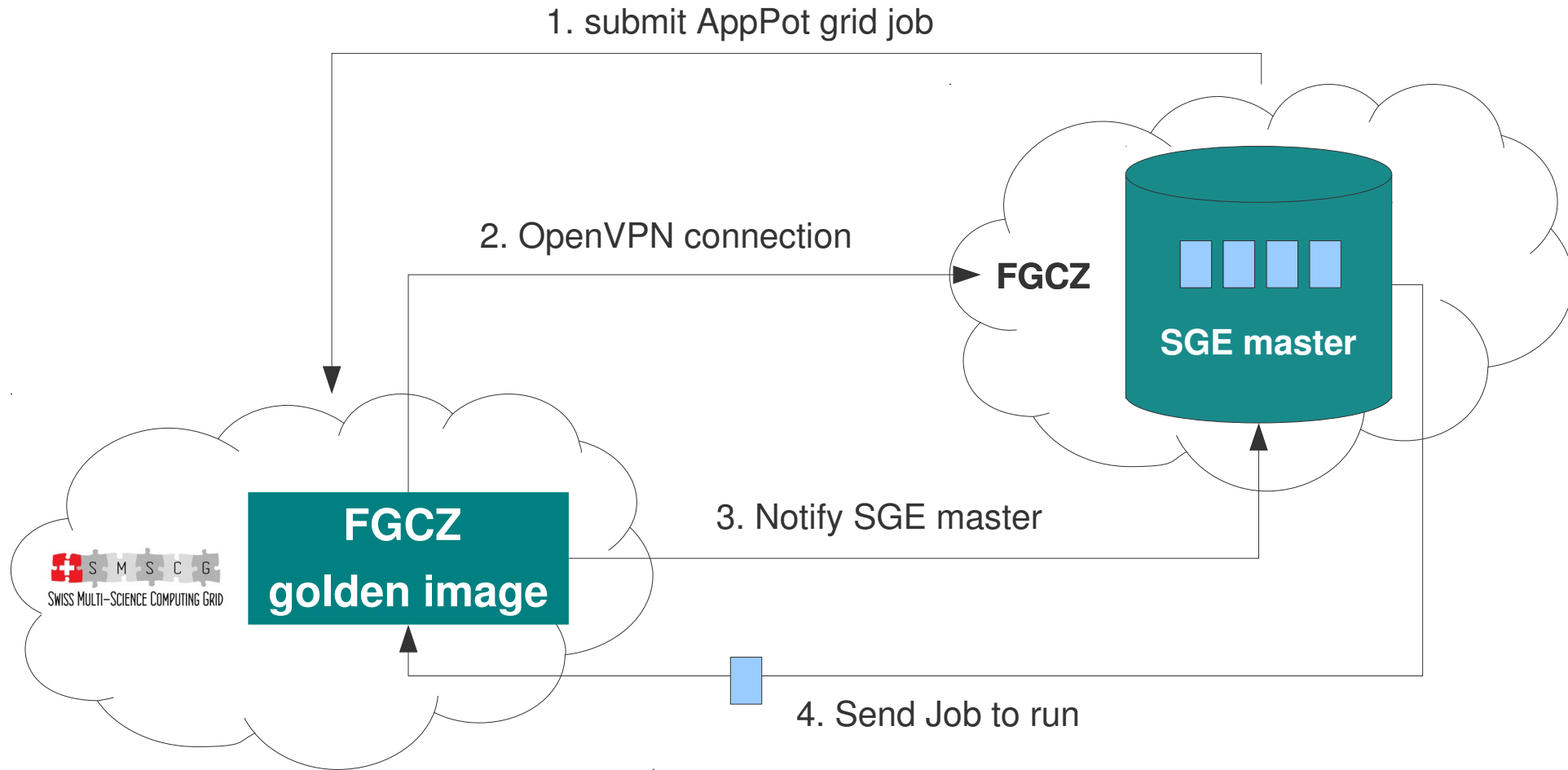
appPot image starts up and **connects** back to FGCZ SGE master

A new SGE **execution nodes** becomes available

Queued jobs can be then **scheduled** and **executed** there

Very much like a **pilot job** model

Integration with SMSCG



In development:

Orchestrator

- Monitors the LRMS and **starts/stops** virtual machines when certain **criteria** (specified by the cluster administrator) are met.
- For instance, the Orchestrator should be able to start new VMs when the number of **queued jobs** exceeds a **certain threshold**.
- Already several similar implementations available

VM repository

- AppPot images will be available through simple web server
- No admin interface foreseen at the moment

Conclusions



VM-MAD home page: <http://code.google.com/p/vm-mad/>

AppPot home page: <http://apppot.googlecode.com>

SMSCG home page: <http://www.smscg.ch>

User Mode Linux: <http://user-mode-linux.sourceforge.net/>