ISGC 2011 & OGF 31
Conference report

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http://event.twgrid.org/isgc2011/index.html

Program

e-Science Application Workshop

Asia@home Hackfest

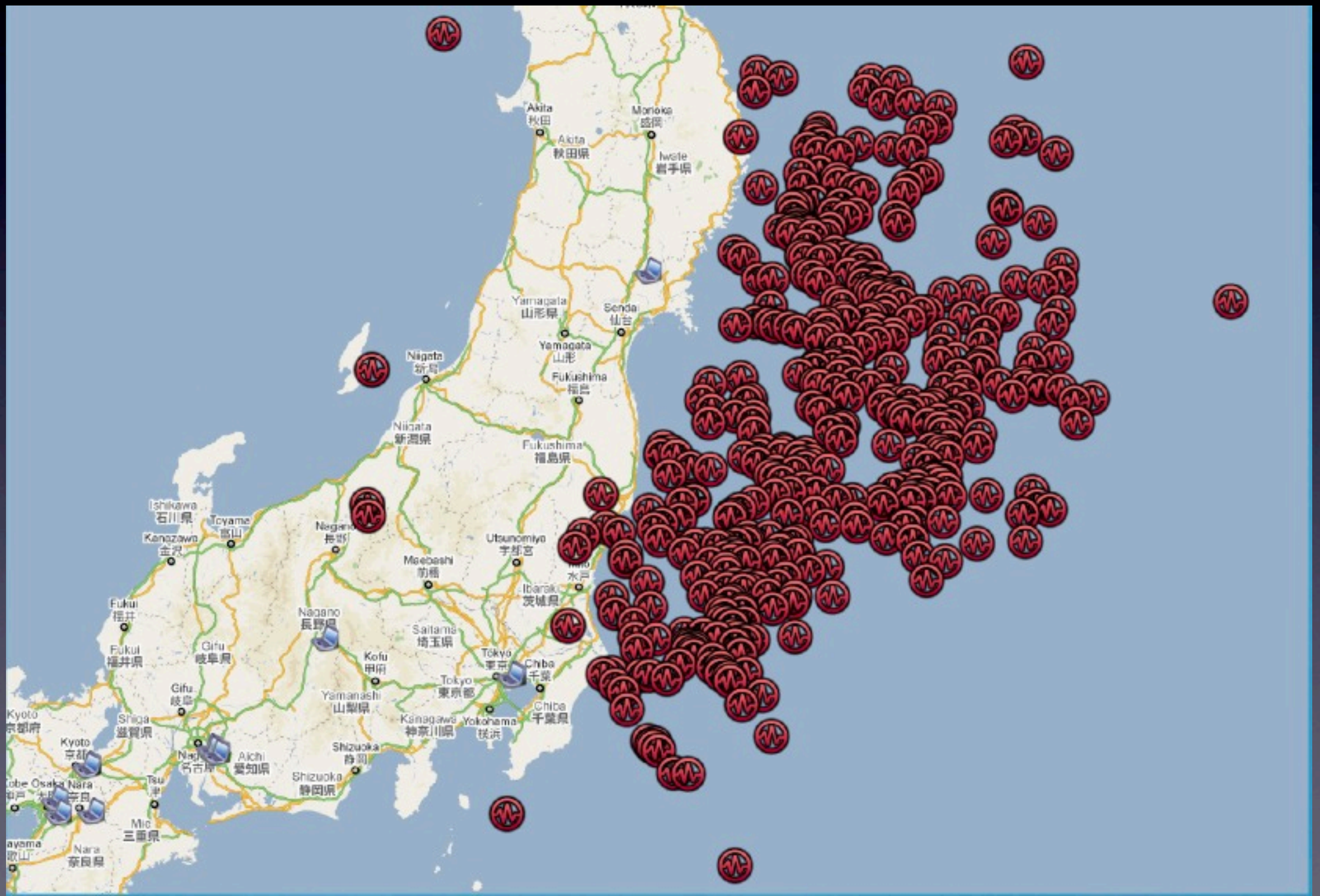
IDGF (Desktop Grid)

OGF

ISGC

Japan 03/10-14/2011

(each circle at least M4 quake)

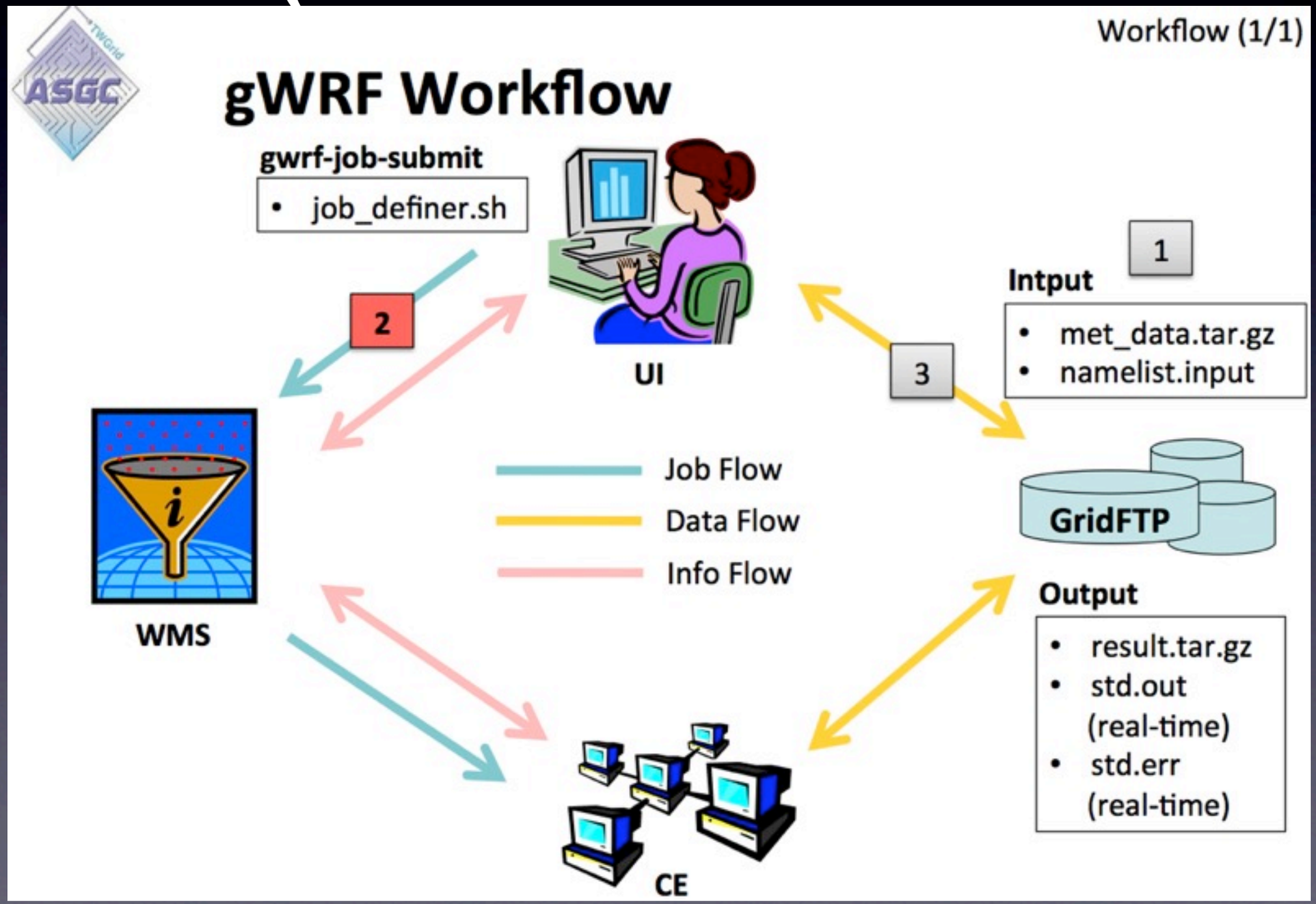


e-Science Application Workshop

- Weather Research and Forecasting (WRF).
- Computational Seismology.
- Natural Disaster Mitigation - Typhoon prediction.

Main message: all these applications and analysis models utilizes Grid

e-Science: gLite-based WRF (Live Demo sessions)



Asia@home hackfest

- Earthquake analysis: Near Real-Time Waveforms and ShakeMovie!
- Volunteer computing.
- BOINC - OSS for volunteer computing and grid computing.
- All around earthquake simulation and analysis...

Volunteer computing

- 40 projects
- 500K volunteers
- 800K computers
  - 2.4 cores/computer
  - 65% average availability
- 14 PetaFLOPS
  - would cost $5 billion/year on Amazon EC2

Volunteer computing

- Volunteer computing offers more/cheaper resources than other paradigms
- BOINC supports many types of HPC jobs
  - parallel
  - large resources requirements
  - VM-based
- Non-technical barriers remain

The Quake-Catcher Network

Low cost seismic network that utilizes:

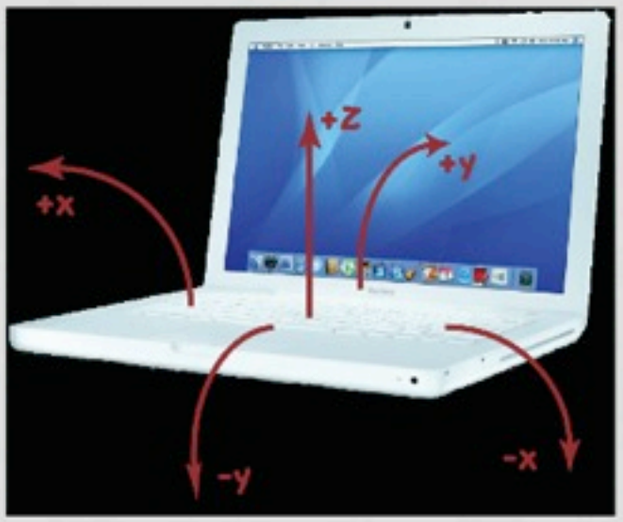
1. MEMS Sensors

We use triaxial MEMS accelerometers internal to laptops or connected to desktops via USB

Benefits: Very low cost sensing

$0 – laptops

$30-150 – desktops



USB-connected triaxial accelerometer

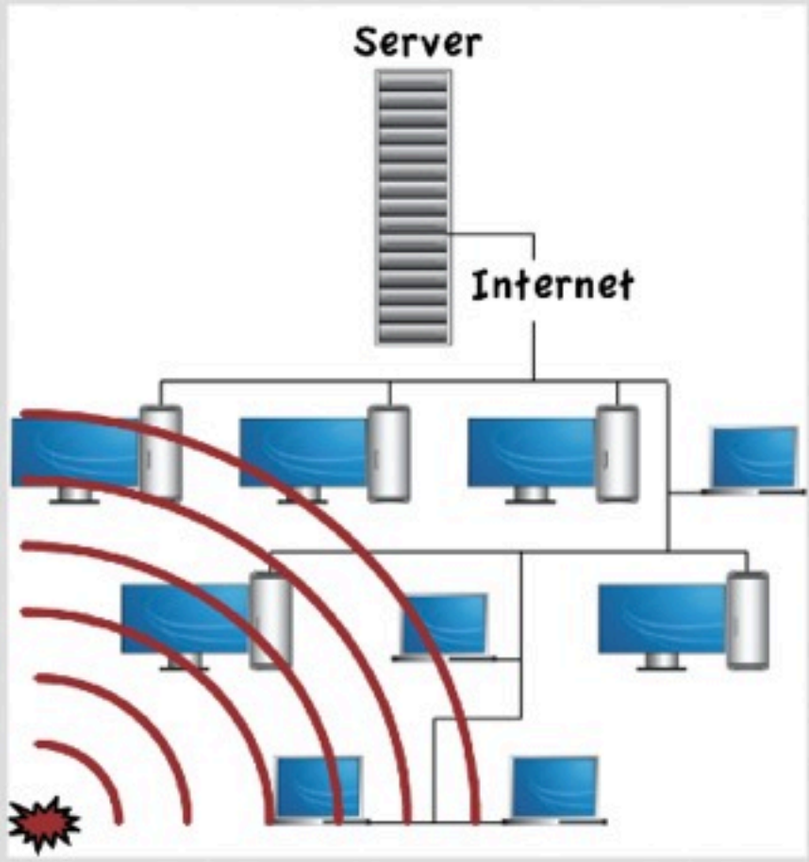
I. INTRODUCTION TO QCN

Low cost seismic network that utilizes:

2. Distributed Computing

Volunteers donate CPU time to monitor sensors attached to their computer.

We use the Berkeley Open Infrastructure for Network Computing (BOINC) open-source distributed computing platform



Advantages:

1) Reduced infrastructure costs (existing networked computers process data and send information to us
2) Easy to modify software and push changes to participants

Participants

Earthquake Locations

CURRENT NETWORK

2000+ STATIONS GLOBALLY IN 67 COUNTRIES

ISGC 2011

Adopting Infrastructure as Code at GSI

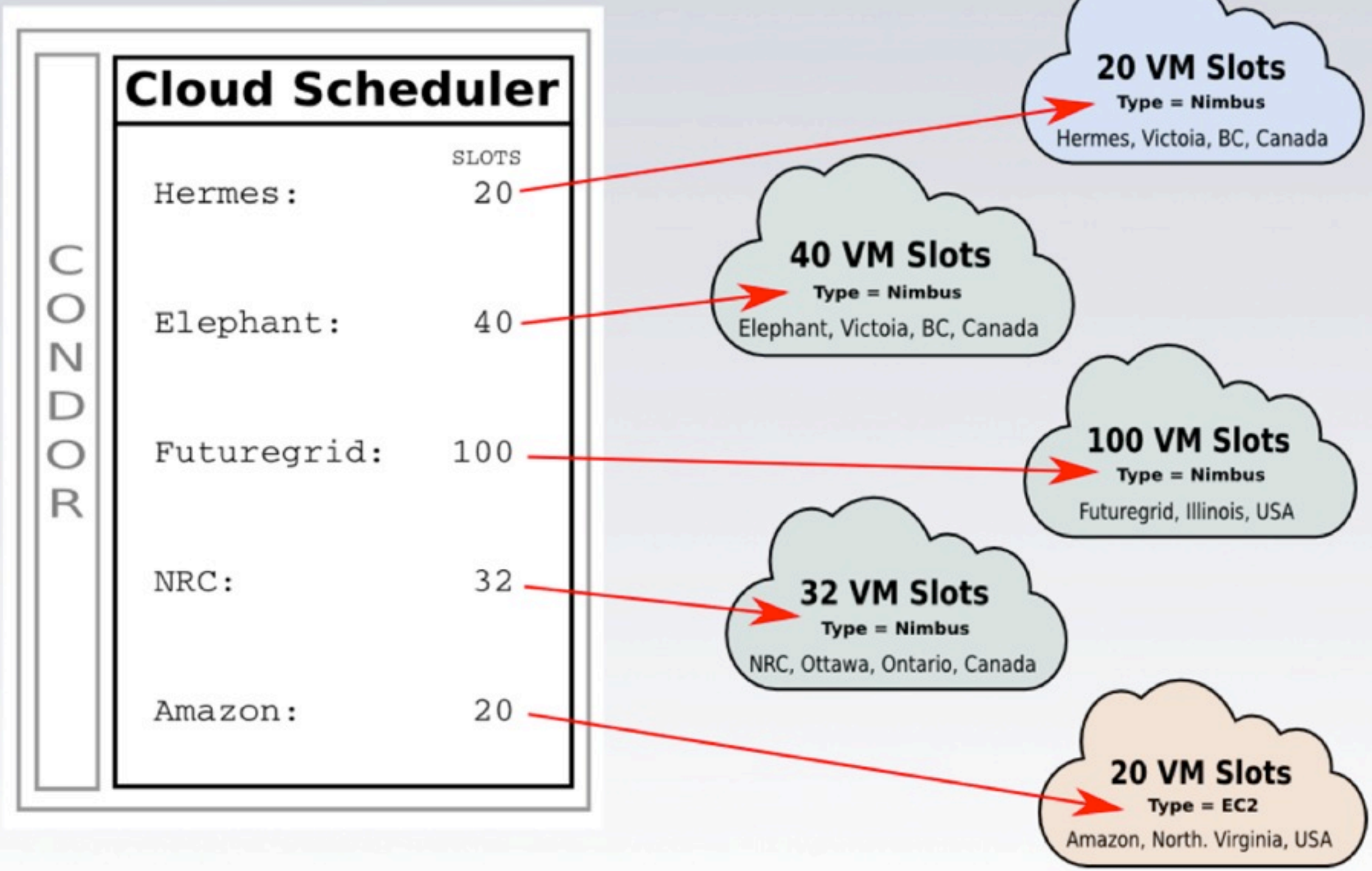
PoD

- Talk (HEP Applications).
- LIVE DEMO.
- After-session demos and hands on.

“Batch” Cloud

BaBar user analysis in a Distributed Cloud

System View of Batch Clouds

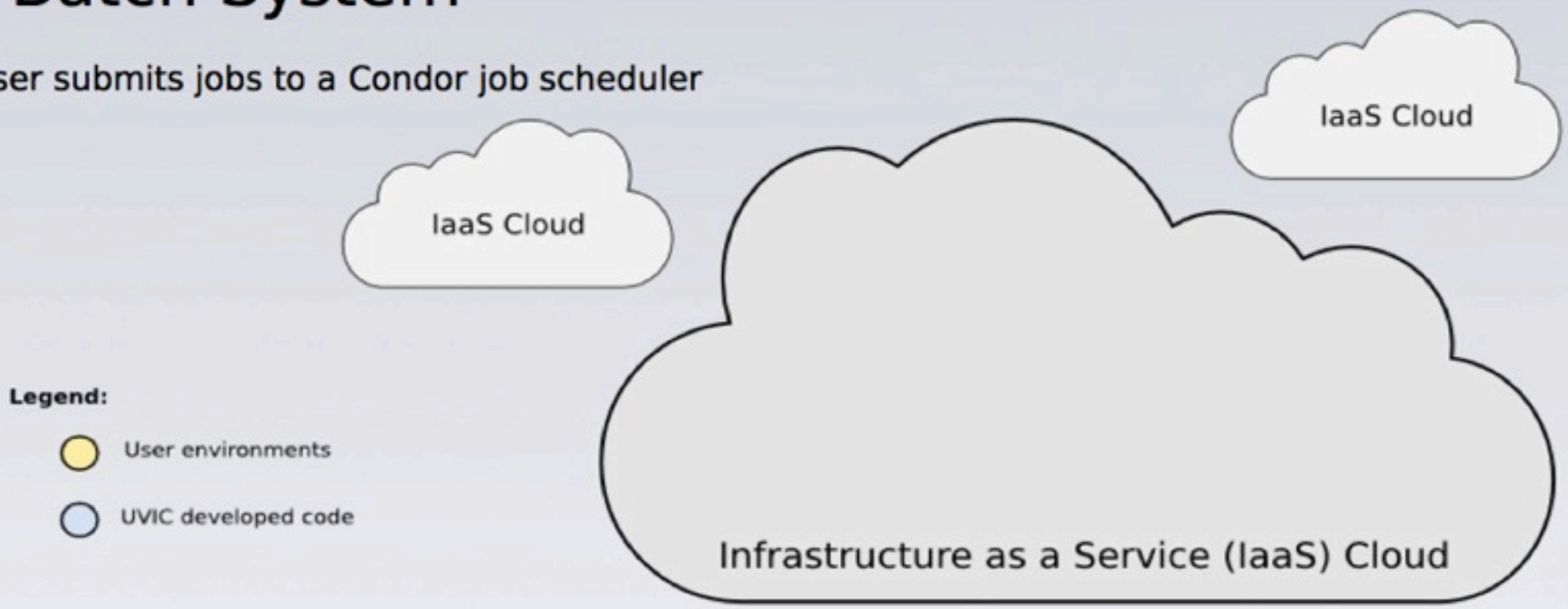


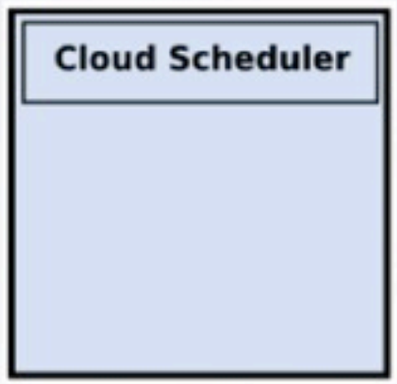
Sample Condor Job File (red text required for batch clouds/Cloud Scheduler)

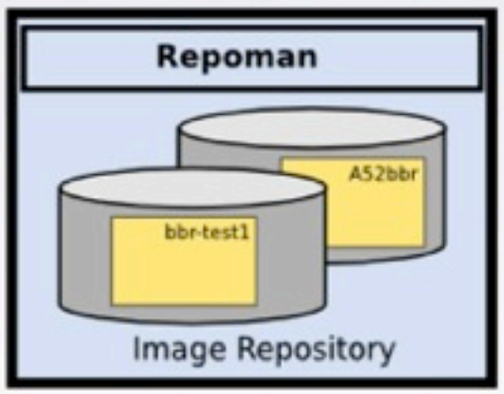
```
Universe                =       vanilla
Log                     =       SP-3429-Tau11-Run2-R24a3-3.l1341
Output                  =       SP-3429-Tau11-Run2-R24a3-3.o1341
Error                   =       SP-3429-Tau11-Run2-R24a3-3.e1341
Input                   =       a52.tcl
should_transfer_files   =       YES
when_to_transfer_output =       ON_EXIT
environment             =       CLUSTERID=1341


Requirements = VMType =?= "rsobie/rjs1"
+VMLoc          =       "http://elephant01.heprc.uvic.ca/api/images/raw/rsobie/rjs1"
+VMCPUArch      =       "x86"
+VMStorage      =       "1"
+VMCPUCores     =       "1"
+VMMem          =       "2555"
+VMAMI          =       "ami-64ea1a0d"
+VMInstanceType =       "m1.small"
+VMJobPerCore   =       True

getenv          =       True

Queue
```

The Batch System

User submits jobs to a Condor job scheduler







Components & References

- Open Source code developed by University of Victoria:
  - Cloud Scheduler >=0.11.1, https://github.com/hep-gc/cloud-scheduler
  - Repoman, https://github.com/hep-gc/repoman
- Other Open Source components used:
  - Scientific Linux 5.x (Xen, KVM), http://www.scientificlinux.org
  - Nimbus >=2.5, http://www.nimbusproject.org
  - Condor >=7.4, http://www.cs.wisc.edu/condor
  - MyProxy, http://grid.ncsa.illinois.edu/myproxy
  - Xrootd, http://xrootd.slac.stanford.edu
  - Lustre >=1.8.3, http://wiki.lustre.org/index.php/Main_Page
  - Squid 2.7.STABLE8, http://www.squid-cache.org
  - Munin 1.4.5 (epel repository), http://munin-monitoring.org

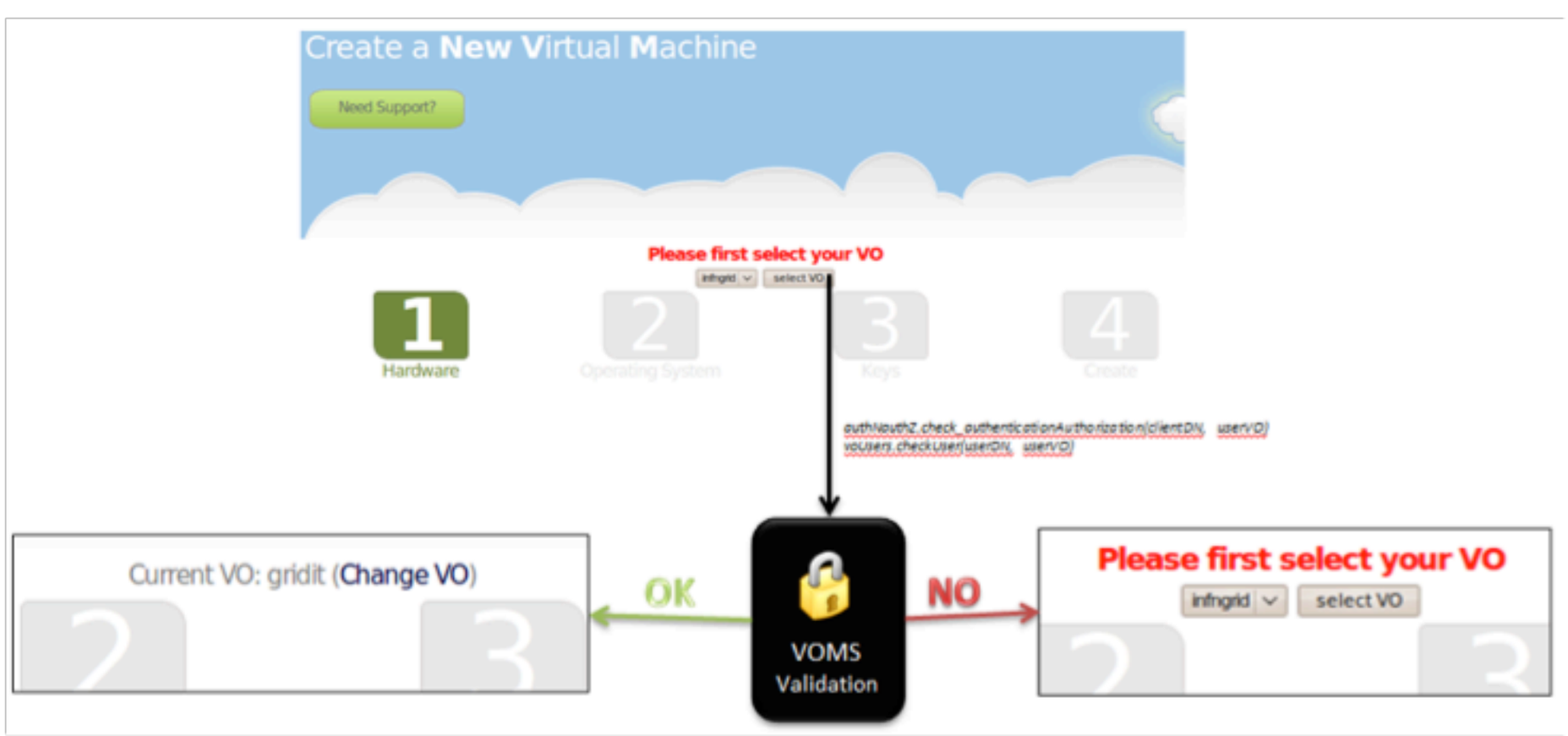
WNoDes Virtualized Cloud Resources

(The INFN Worker Nodes on Demand Service)

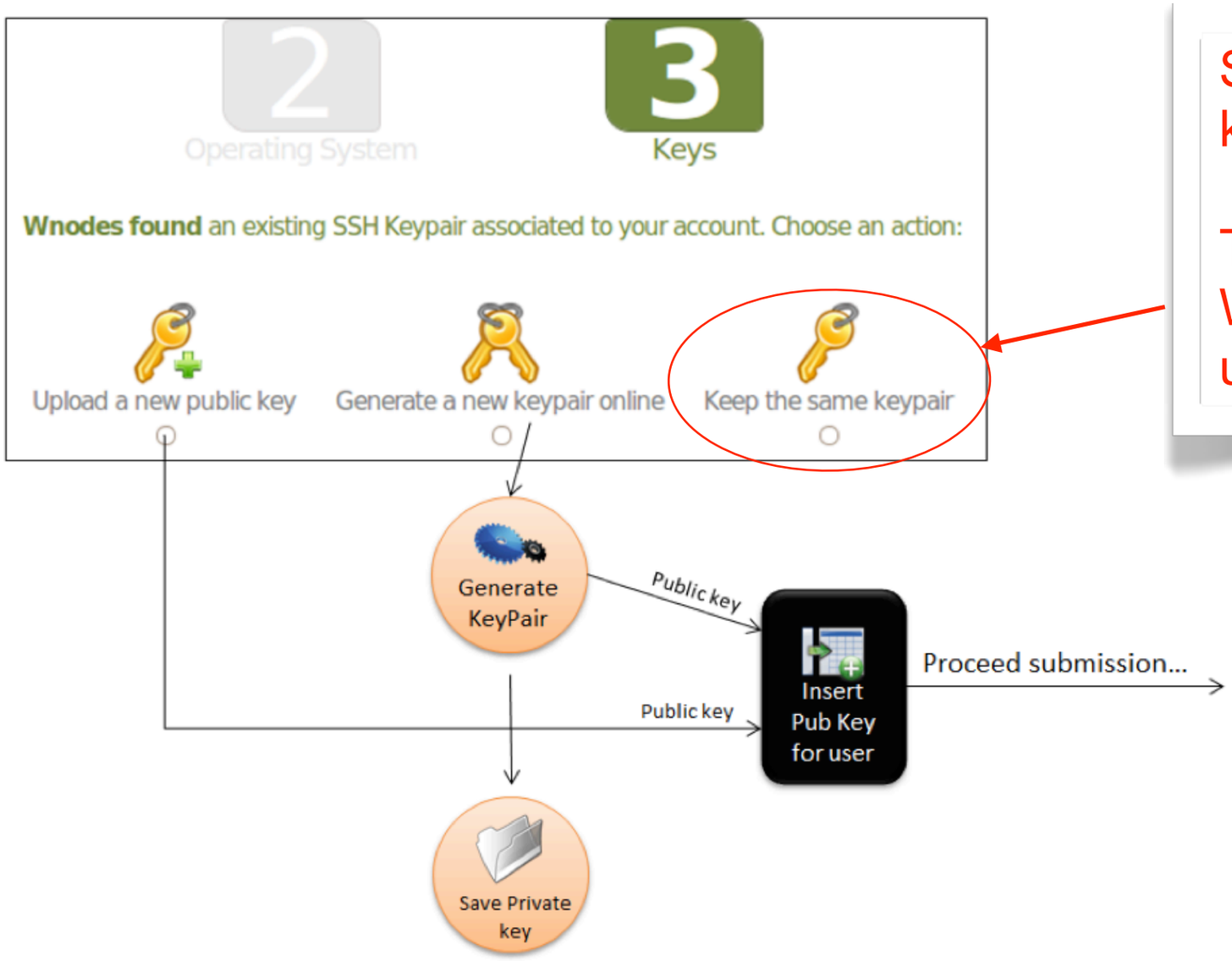
- Uses Linux KVM to virtualize resources on-demand; the resources are available and customized for:
  - direct job submissions by local users
  - Grid job submissions (with direct support for the EMI CREAM-CE and WMS components)
  - instantiation of Cloud resources
  - instantiation of Virtual Interactive Pools (VIP)
- VM scheduling is handled by a LRMS (a "batch system software")
  - No need to develop special (and possibly unscalable, inefficient) resource brokering systems
  - The LRMS is totally invisible to users for e.g. Cloud instantiations
- No concept of "Cloud over Grid" or "Grid over Cloud"
  - WNoDeS simply uses all resources and dynamically presents them to users as users want to see and access them

The Cloud Web Interface

- Integrated VOMS / gLite Argus support
  - VO selection validate through VOMS servers
  - Resource usage (wallclock time) billed to the VO
  - Access authorization based on policies defined on an Argus server



Public/Private `ssh` keys



Single sign-on (reusing an ssh key pair)

The ssh public key is put by WNoDeS on the created VMs using `libguestfs`