Volunteer clouds to extend the resources of EMI middleware based VOs

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http://edgi-project.eu
Start date: 2010-06-01
Duration: 27 months

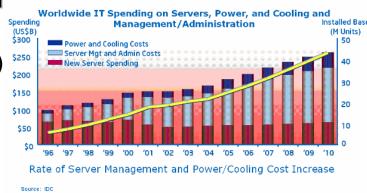# Background and motivations

- The computing capacity of Grid VOs is limited
  - Average size active VO in EGI has a few thousand CPU cores (job slots)
  - Heavy users and active communities would need more resources
  - TCO of data centers are increasing

Worldwide IT Spending on Servers, Power, and Cooling and Management/Administration

- Possible solutions to extend your VO:
  1. With commercial cloud resources but still too expensive for longer experiments
  2. With resources from the EGI cloud federation but most of the sites are still difficult to access/use
  3. With volunteer desktop machines based on virtualization ➔ you can easily access (ten)thousands of virtualized resourced from more than 100.000 desktops offered by volunteers

- Enable automatic and seamless job re-direction from the VO to its extension when the VO resources become overloaded
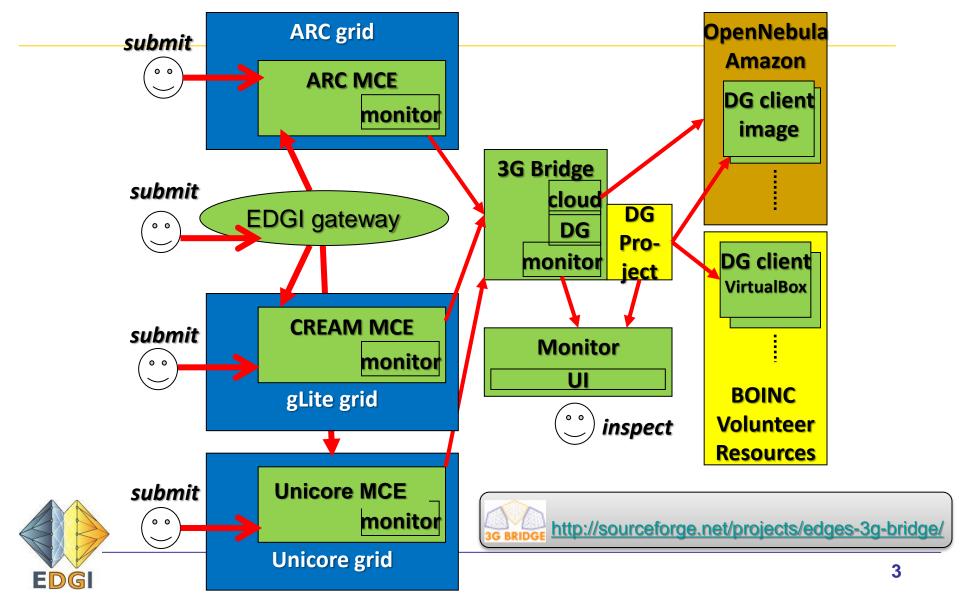
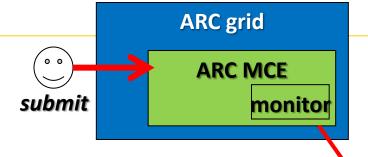# EDGI architecture to extend EMI VOs with clouds and virtualized DGs

ARC grid
- ARC MCE
  - monitor

submit

EDGI gateway

submit

CREAM MCE
- monitor

gLite grid

submit

Unicore MCE
- monitor

Unicore grid

submit

3G Bridge
- cloud
- DG
- monitor

DG Project

Monitor
- UI

inspect

OpenNebula Amazon
- DG client image

DG client
- VirtualBox

BOINC Volunteer Resources

http://sourceforge.net/projects/edges-3g-bridge/

ARC VO to extend with virtualized DGs

ARC grid

ARC MCE

monitor

submit

3G Bridge

DG

DG Pro-ject

DG client
VirtualBox
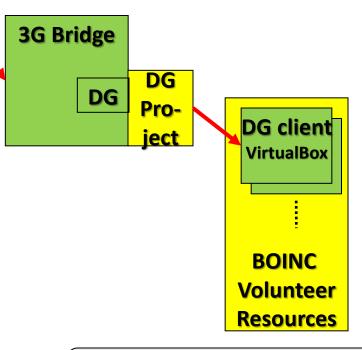
BOINC Volunteer Resources

- 3G Bridge transforms ARC jobs to GBAC (Generic BOINC ApplicationClient) workunits (WUs)
- Volunteer DG clients equipped with VirtualBox will execute the GBAC WUs
- **GBAC takes the real executable as an input file and hence any application can run in BOINC**
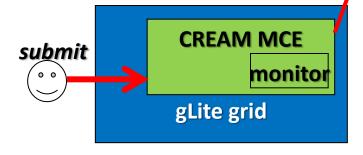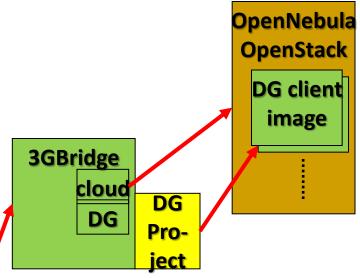
GBAC http://gbac.sourceforge.net/

EDGI

gLite VO to extend with EGI clouds

- 3G Bridge transforms gLite jobs to GBAC (Generic BOINC Appl Client) workunits (WUs)
- DG clients equipped with VirtualBox will be launched in the clouds by 3G Bridge

OpenNebula OpenStack

DG client image

3GBridge cloud

DG

DG Pro-ject

CREAM MCE

monitor

submit

gLite grid

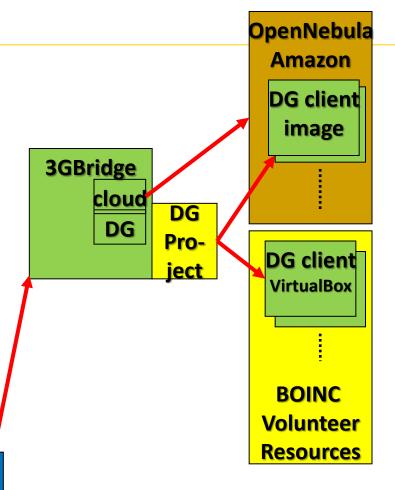- DG clients launched in the clouds will register for the DG project and execute the GBAC WUs

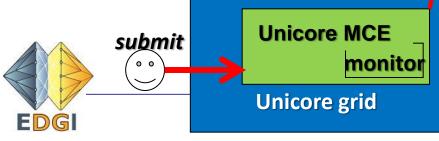# UNICORE VO to extend with both clouds and virtualized DGs

- 3G Bridge transforms UNICORE jobs to GBAC WUs
- DG clients equipped with VirtualBox will be launched in the clouds by 3G Bridge
- DG clients launched in the clouds will register for the DG project and execute the GBAC WUs
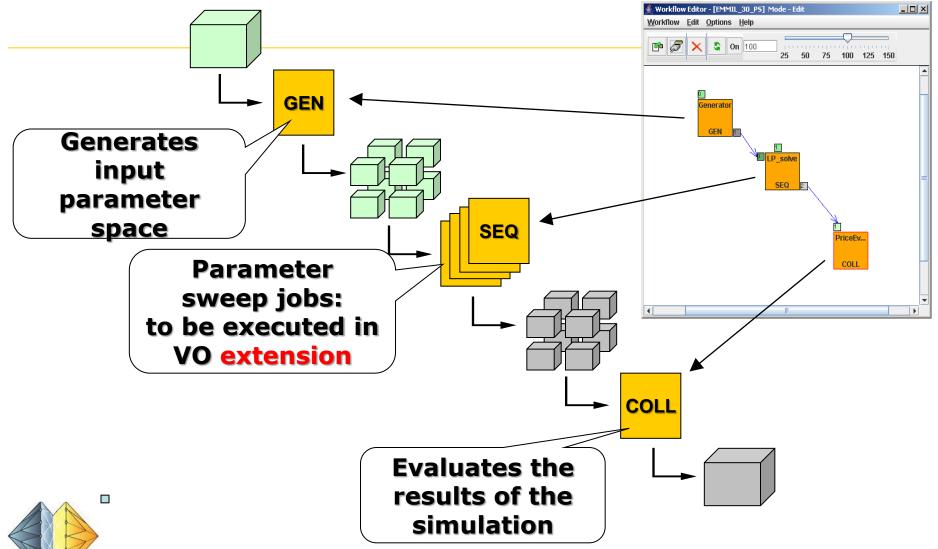- Volunteer DG clients equipped with VirtualBox will execute the GBAC WUs

3GBridge cloud

DG

DG Pro-ject

OpenNebula Amazon

DG client image

DG client **VirtualBox**

BOINC Volunteer Resources

submit

Unicore MCE monitor

Unicore grid

Typical use case scenario:
Parameter study application execution

Generates input parameter space

Parameter sweep jobs: to be executed in VO extension
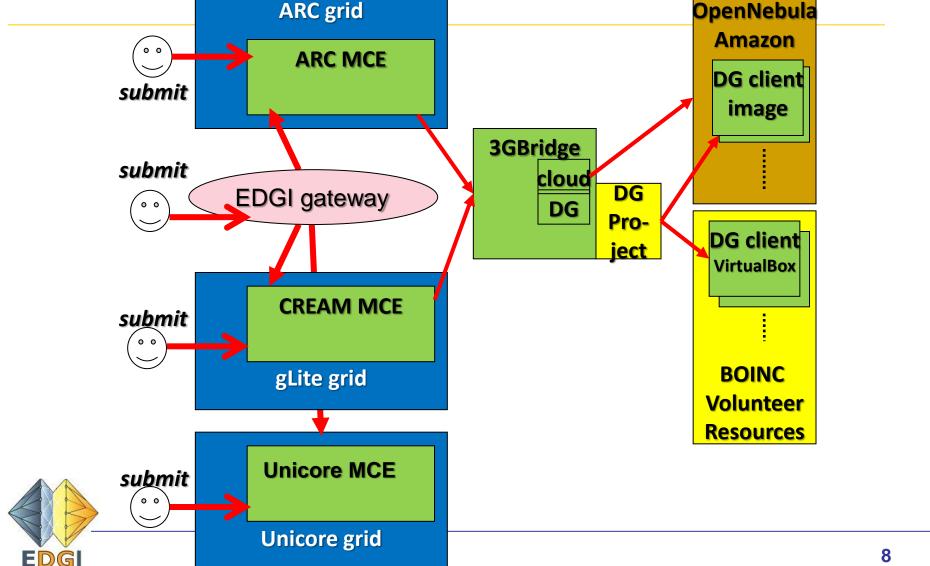
GEN

SEQ

COLL

Evaluates the results of the simulation

EDGI gateway to realize the typical use case scenario of parameter sweep execution in the integrated EMI-DG-cloud infrastructure

EDGI Gateway

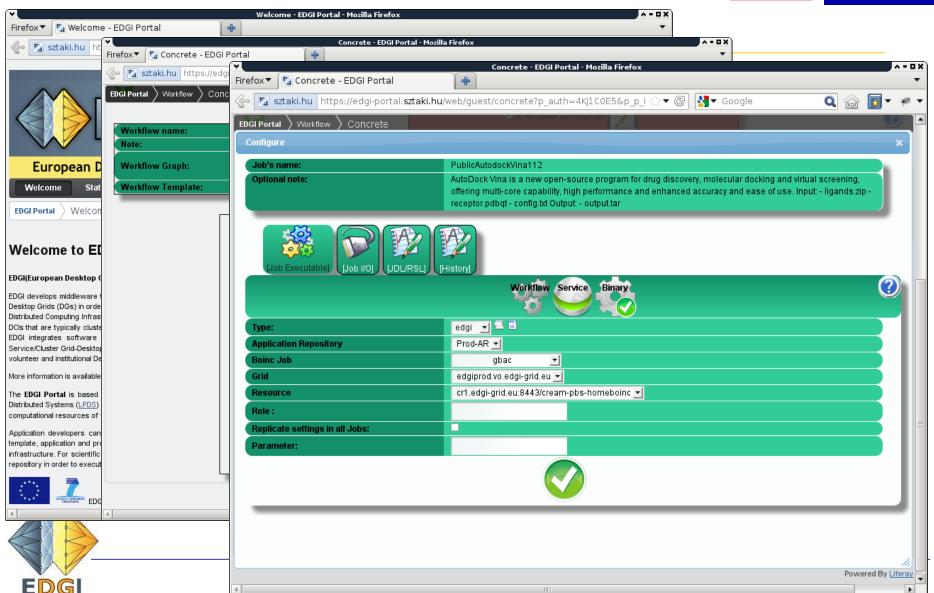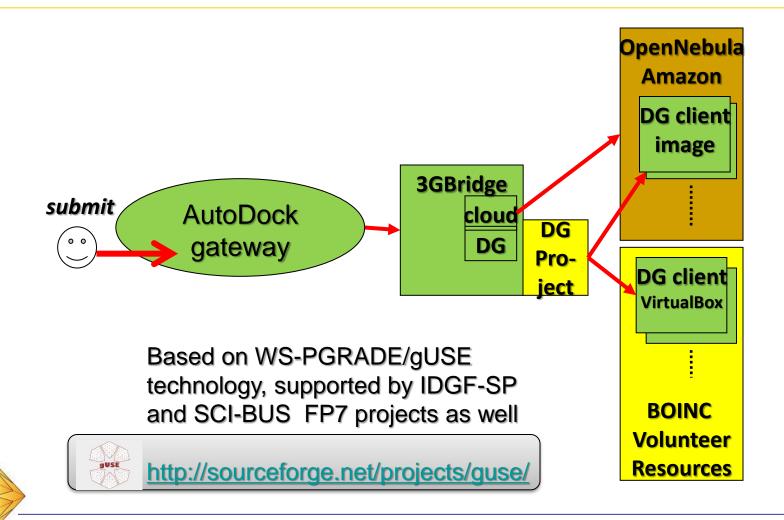# Autodock gateway to execute AutoDock and VINA applications on the EDGeS@home - cloud infrastructure

submit

AutoDock gateway

3GBridge

cloud

DG

DG Pro-ject

OpenNebula Amazon

DG client image

DG client VirtualBox

BOINC Volunteer Resources

Based on WS-PGRADE/gUSE technology, supported by IDGF-SP and SCI-BUS FP7 projects as well
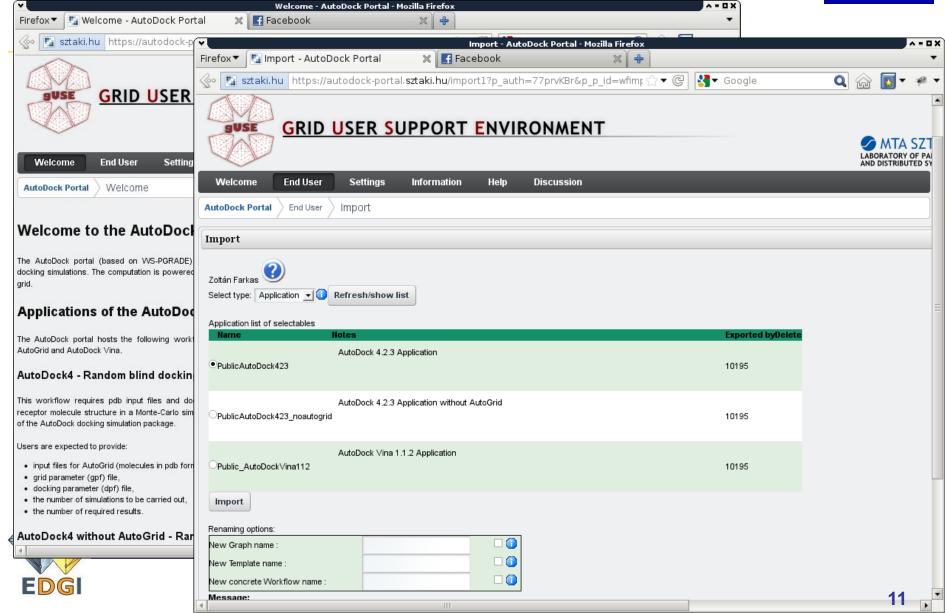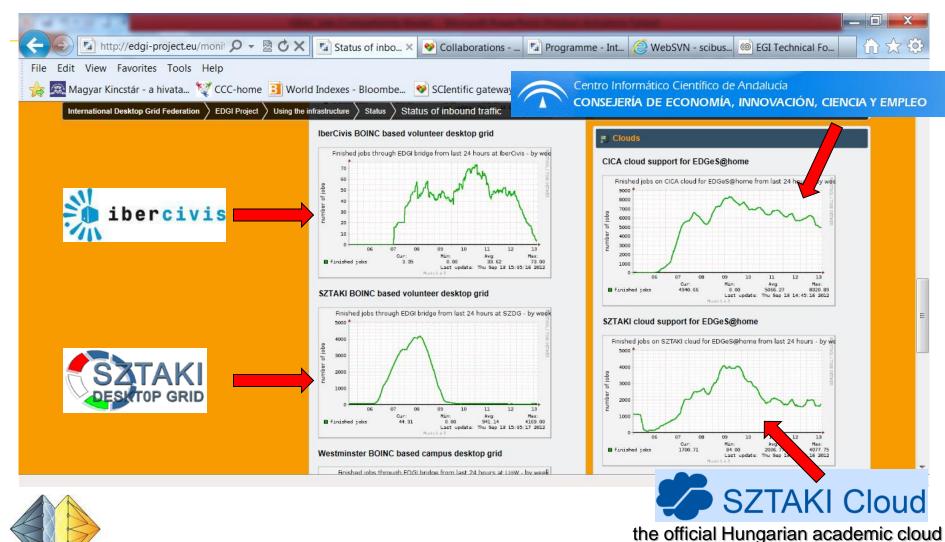
http://sourceforge.net/projects/guse/

Autodock Gateway

Monitoring the EDGeS@home – cloud infrastructure

Conclusions and future work

- Overloaded EMI middleware based VOs can easily be extended with both clouds and virtualized volunteer and institutional DGs
  - Involve citizens, students, and volunteers ➔ dissemination channel
  - Self-maintained, self-financed resources (using spare capacities of computers) ➔ green alternative
  - It might be the part of your Social Responsibility Plan
- The typical application type where all the advantages of this integrated infrastructure appears are the parameter sweep or similar applications; domain decomposition, master-worker, etc.
- These applications can be launched from
  - EMI UI machines
  - EDGI gateway
  - Application-oriented science gateways

Conclusions and future work II.

- **Next planned steps from our side:**
  - Join the EGI Cloud Federation as resource provider with SZTAKI Cloud
  - Join the EGI Cloud Federation as technology provider with our software stack
  - Demo / production level service
  - Initiate new projects
- **What do we expect from you?**
  - Provide access to your cloud for us and for our users who are EGI community members
  - Help improve access policy

- **Visit the SCI-BUS booth**
- **Listen to the presentations at the Science Gateway Session on Thursday**
  - "*WS-PGRADE/gUSE generic DCI gateway framework for EGI user communities*" by Zoltan Farkas (MTA SZTAKI)
  - "*Science Gateways and Clouds*" by Wibke SUDHOLT (CloudBroker GmbH)

Thank you!

http://edgi-project.eu/