# CELAR: Automatic multi-grained elasticity provisioning for the cloud

#### Dimitrios Tsoumakos, ATHENA R.C. CELAR project Technical Coordinator



EU-Mexico Workshop: Exploring common research interests in the Future Internet and Cloud Computing March 20,2014 Athens, Greece

EU-Mexico Workshop, 20/03/2014

# **Elastic Resource Allocation**

 Elasticity: (De)allocation of virtual resources according to an objective function (over quality or cost)



- One of Cloud's biggest challenges
- True pay-as-you-go
- Infrastructure, platform or even application level
- Provider and User gains





### Elastic Resource Allocation(2)

Sub-optimally handled to-date:

- Manual
  - Type of resource, timing and size of action
  - Trial and error process
- Vendor-specific
- No control over cost, performance and resources
  - Non-customizable

Elasticity modeled as a single-dimensional property





## **CELAR** Vision

- "Develop methods and tools for applying and controlling <u>multi-grained</u>, elastic resource provisioning for Cloud applications in an <u>automated</u> manner"
- Fully automated
  - No manual setup, let system decide when, where and how
- Fine-grained
  - Not strictly at VM-level
- Real-time
  - Adaptive to changes in load, infrastructure and user policy
- Standards- and open API-based
  - Completely open-source



4

### **Elastic Decisions and Actions**



# The CELAR way

- Programming level: c-Eclipse
  - Application description, submission, deployment
  - Cloud IS
- Monitoring level
  - cross-layer, scalable monitoring
  - application-level metric evaluation
- Platform level
  - Model Elasticity: cost, quality and resource
  - Real-time, learning Decision module
  - Middleware to support elasticity over multiple IaaS







## **CELAR Outcomes**

- Vendor neutrality
  - ~Okeanos open source laaS (GRNet)
  - FCO (Flexiant)
- Two exemplary applications:
  - On-line gaming
  - Policy game, cloud-based (Playgen)
  - Scientific Computing

Translational Cancer Detection pipeline (UNIMAN)





# Highlights

- Cloud Elasticity System Architecture
- Working prototype v.1
  - github.com/CELAR open-source code
- Strong output
  - Over 10 research publications
    - Best paper award (CCGRID 2013)
  - Data.gov.uk associate in the project
  - Involvement in many open-source communities
    - □ Synnefo, eclipse, slipstream





# R&D collaboration in view of CELAR

- Vendor neutrality and open source communities
  - empower users, support multiple providers
  - Startups and initiatives based on open source code
- Applications
  - Provide platforms or middleware for innovation
  - Variety of disciplines
- Research
  - Resource management and optimization





### Thank you

Contact Information: Dimitrios Tsoumakos, ATHENA R.C. <u>dtsouma@imis.athena-innovation.gr</u>



#### www.celarcloud.eu



