Enhancing Grid Infrastructures with Virtualization and Cloud Technologies

April 2011

STRATUSLAB is developing and deploying cloud technologies with the aim of simplifying and optimizing the use and operation of distributed computing infrastructures such as the European Grid Infrastructure (EGI).

The StratusLab Toolkit integrates cloud and virtualization technologies and services within grid sites and enriches existing computing infrastructures with "Infrastructure as a Service" (IaaS) provisioning paradigms.

StratusLab Distribution

StratusLab integrates, distributes and maintains a sustainable open-source cloud distribution to bring cloud to existing and new grid sites. The StratusLab distribution is composed of existing cutting-edge open source software, such as OpenNebula, and the innovative services and cloud management technologies developed in the project. It incrementally delivers a production grade distribution that is being demonstrated through the operation of production-level grid sites in the project.

Benefits

StratusLab brings several benefits to the e-Infrastructure ecosystem, in terms of simplification, added flexibility, increased maintainability, quality, energy efficiency and resilience of computing sites. The new StratusLab cloud distribution complements existing grid middleware services, with the aim for the cloud layer to be fully transparent to layers above.

Interoperability

Existing grid middleware, as provided by EMI, continues to provide the glue to federate the distributed resources and the services for high-level job and data management. StratusLab improves the usability of distributed computing infrastructures; attracts scientific user communities; appeals equally to industrial users; keeps European research infrastructures at the technological forefront, and strengthens the know-how in virtualization and cloud computing of European industry.

Action plan

StratusLab is a two-phase project. In the *first phase*, the project focuses on cloud computing for resource provisioning in grid sites. This entails development of the StratusLab cloud platform and creation of virtual appliances for the scientific application domains in the project.

In the *second phase* the emphasis will shift towards developing new cloud-like delivery paradigms in grid sites. This will build on the first phase, including new IaaS cloud interfaces that can be used for community services, directly by users, and to deploy novel cloud-based services

Project details

Contract n^o	RI-261552
Project type	CP-CSA
Start date	01/06/2010
Duration	24 months
Total budget	€ 3 317 657
EC Funding	€ 2 300 000
Effort	340 person-months

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Partners

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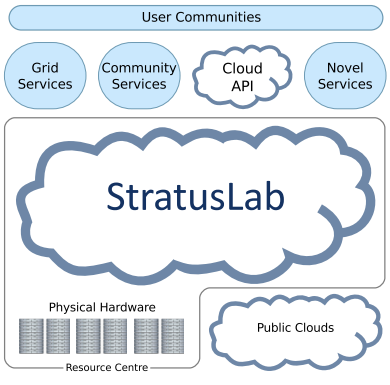
Universidad Complutense de Madrid (UCM), *Spain*

Greek Research And Technology Network S.A. (GRNET), *Greece*

SixSq Sàrl, *Switzerland*

Telefonica Investigacion y Desarrollo S.A. (TID), *Spain*

Trinity College Dublin (TCD), *Ireland*



User communities

StratusLab benefits a wide variety of users; from scientists to system administrators.

Scientists	End-users that take advantage of existing machine images to run their scientific analyses.
Software Scientists and Engineers	Scientists and engineers that write and maintain core scientific community software and associated machine images.
Community Service Administrators	Scientists and engineers who are responsible for running community specific data management and analysis services.
System Administrators	Engineers or technicians who are responsible for running grid and non-grid services in a particular resource centre.
Hardware Technicians	Technicians who are responsible for maintaining the hardware and infrastructure at a resource centre.

Achievements June 2010 – April 2011

SURVEYS StratusLab surveyed target communities of system administrators and users, providing valuable input for the project's direction.

USER COMMUNITIES The project has developed contacts with the ATLAS high-energy physics community, and to the bioinformatics community through CNRS IBCP. The bioinformatics community have contributed virtual appliances to the StratusLab Marketplace.

BENCHMARKS The project has developed benchmarks for realistic scientific application workloads.

DISSEMINATION StratusLab has undertaken dissemination activities including press releases, website and other online media, and invited talks and keynotes.

BUILD SYSTEM The project has established a build system for its developers to support continuous integration and product packaging.

CLOUD TOOLS Command-line tools have been created to make installing and managing a StratusLab cloud straightforward.

REFERENCE INFRASTRUCTURE The project maintains a reference infrastructure for users to try out the StratusLab software without installing.

CLOUD TESTBED A cloud testbed has been set up for testing the StratusLab toolkit. Deployment has helped to uncover problems and provide feedback to developers.

GRID INTEGRATION Grid services using gLite middleware have been installed and configured on a StratusLab cloud and StratusLab now maintains a Grid site in the GRNET NGI which is entirely run on StratusLab resources.

QUATTOR Configuration components for the Quattor fabric management system (`http://quattor.org/`) – widely used for grid site management – have been created to simplify integration of StratusLab into Quattor-managed sites.

STRATUSLAB BETA RELEASES Version 0.1 - the first public release of StratusLab, the first open-source cloud solution designed for the grid! Version 0.2 with proxy server and local and private IP address assignment, Version 0.3 with major security enhancements and Version 0.4 a feature-complete release which added support for persistant storage.

STRATUSLAB MARKETPLACE The Martketplace is a registry for shared images, storing cryptographically-signed metadata about machine and disk images. It provides a search facility which allows users to search for pre-existing images that suit their requirements, digital signatures to validate and endorse image descriptions, and tools for admins to create policies on trusting third-party images. The Marketplace is populated with useful virtual machine images, including base images for Grid machines.

MONITORING & ACCOUNTING The StratusLab toolkit provides a Web Monitor administrator dashboard for cloud, Ganglia integration for VM and physical hosts and collection of metrics and generation of accounting reports.

STORAGE MANAGEMENT Advanced Storage management including persistent storage areas.

SIMPLE USER MANAGEMENT User administration is easy with automatic management of user quotas amd Group/role based authorization.

OPENNEBULA 2.2 AND THE CLOUDIA SERVICE MANAGER StratusLab integrates OpenNebula 2.2. and can leverage the benefits of this latest version of OpenNebula. It also users the Cloudia Service Manager.

Release 1.0

StratusLab v1.0 distribution is due for release in May 2011. It is a complete solution with all of the features needed to deploy virtualized Grid services in a Grid site. To be notified about this and future releases contact support@stratuslab.eu.

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