ITEA 3

Project Results

EASI-CLOUDS

Technology for a sustainable cloud ecosystem: accelerating innovation and enabling new business models

Executive summary

The ITEA 2 EASI-CLOUDS project addresses the challenge of delivering on-demand services on top of any public or private cloud, with custom Service-Level Agreements (SLAs), automated provisioning and adaptation of virtual resources, as well as customised real-time billing. Its technology can be used to build a variety of business models, including cloud brokerage and federation.

Project origins

The key challenge posed to EASI-CLOUDS was to provide solutions to recurring concerns about the migration to Cloud Computing: vendor lock-in, quality of service guarantees, data protection and unclear financial impact of cloud-based business models. Public cloud providers as well as solutions to run private clouds (such as OpenStack) were already commonplace. However, seamlessly switching to the appropriate provider according to cost, location or quality was still a technical challenge, and one that would open a wide range of business opportunities. For cloud consumers, it could mean, for instance, outsourcing non-critical workloads to the cheapest provider or selecting hosting countries according to data protection laws. On the cloud provider side, it would enable new business relationships such as cloud brokerage (a 'one-stop shop' or 'travel agency' for different providers) or cloud federation (a set of providers that agree to share workloads, similar to airline alliances).

Technology applied

OpenStack was quickly identified as the most promising solution for virtual infrastructure management – the dynamic allocation of virtual compute, storage and network resources in a data centre that is the cornerstone of an Infrastructure-as-a-Service (IaaS). Partners gained expertise by setting up several IaaS testbeds and

even contributed with code to the OpenStack community. The main project contribution is the EASI-CLOUDS platform, a system that acts as an intermediary between consumers and heterogeneous IaaS providers with innovative added-value features. It reuses software from the French CompatibleOne[1] project, based on the OCCI[2] standard, and extends it with innovative features. Depending on the target business case, the EASI-CLOUDS platform can be used in different ways: to automate elastic Software-as-a-Service delivery, to extend the resources of private clouds with public providers, to act as a cloud broker or 'one-stop shop' for several providers, or to establish a cloud federation in which several providers agree to share workloads.

Key innovations included: negotiation of SLA terms (such as quality or cost) between consumers and providers, automated
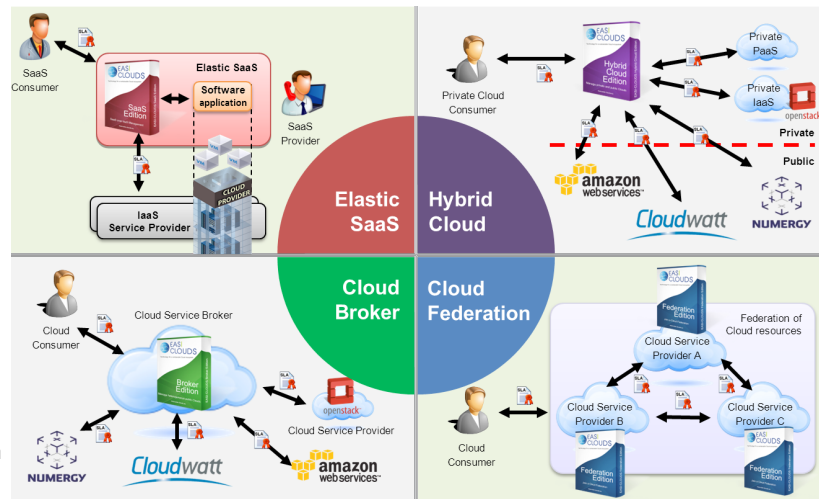
Business models enabled by the EASI-CLOUDS platform

provisioning of virtual resources and software configuration, as well as scalable monitoring mechanisms to achieve elasticity and high availability.

EASI-CLOUDS also developed tools to accelerate the delivery and simplify the management of cloud-based applications. In addition, customised mechanisms for real-time rating, charging and revenue sharing were developed to facilitate the monetisation of new cloud services.

Making the difference

The ambitions of the project proved to be in line with the fast-moving market, especially

[1] http://www.compatibleone.org   [2] http://occi-wg.org

given the overwhelming abundance of cloud providers, most offering limited SLA guarantees. Several prototypes demonstrated how to leverage EASI-CLOUDS to improve brain imagery analysis, simplify the management of an elastic Software-as-a-Service such as photo-stitching, accelerate the delivery of web media through a distributed mesh cloud or evaluate the worldwide performance of game servers.

Its impact goes well beyond technology, as EASI-CLOUDS contributed through business analysis and internal workshops to raise the awareness of corporate management about the importance of switching to service-based business models. Its academic partners also played a pioneering role by enriching university curricula and training highly skilled PhDs and MSc graduates, thus heavily contributing to their employability. Exploitation perspectives are already very promising: thanks to EASI-CLOUDS two spin-off companies have been created in France and Korea to industrialise cloud broker technology. In Finland, the gained expertise has helped Gearshift Group provide consulting services to two customers with promising growth perspectives.

The German partner Orga Systems has established a new Business Unit for the Utility sector based especially on the results from EASI-CLOUDS and other ITEA projects as well. The project's success was recognised in winning the Korea EUREKA Day Award for developing the most innovative and commercially viable EUREKA project.

Future prospects

The cloud computing model is continuously expanding: in the telco industry, network softwarisation will soon reduce costs and enable on-demand network service provisioning. The access network is a key part when it comes to delivering end-to-end services with guarantees. The EASI-CLOUDS platform is highly promising in that area since it can be extended to coherently provisioning services not only in data centres but also in access networks. Research investments are essential to maintain the competiveness of our industry in such challenging domains.

Major project outcomes

Dissemination
- 73 publications
- 37 presentations at conferences/fairs

Exploitation (so far)
- 6 fast exploitation cases including 2 spin-offs:
  - Orga Systems: New Business Unit 'Utility' established based on results from EASI-CLOUDS and other ITEA projects
  - Gearshift Group: Consulted a cloud brokerage firm leading to significant growth
  - SoftwareInLife: Korean spin-off launched csb.io, a cloud marketplace in Korea
  - Cloud Orbit & Amenesik: 2 French spin-offs building on the EASI-CLOUDS platform
  - Nexedi: Customers testing dynamic CDN technology
  - Hexaglobe: New edge computing feature for video on-demand
- 6 success stories by top management of industrial partners: Bull, Thales, Materna, Orga Systems, F-Secure, ITWorx

Standardisation
- 3 contributions to standardisation bodies:
  - Proposal of a PaaS extension to the OCCI WG
  - Contribution to RFC 182 of the OSGi Alliance
  - Participation at Cloud Interoperability Plugfests

Patents
- 1 patent application in preparation

Spin-offs
- 2 spin-offs: Cloud Orbit & Amenesik (France)