



The mOSAIC project aims to develop an open-source platform that enables applications to negotiate Cloud services as requested by their users. Using the Cloud ontology, applications will be able to specify their service requirements and communicate them to the platform via the innovative API. The platform will implement a multi-agent brokering mechanism that will search for services matching the applications' request, and possibly compose the requested service if no direct hit is found. The platform will facilitate competition between Cloud providers, who, in return, will be able to reach customers they could not reach before.

## At a glance

### Project title

Open-Source API and Platform for Multiple Clouds

### Project coordinator

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European Space Agency (France)  
Terradue SRL (Italy)  
AITIA International Informatics Inc. (Hungary)  
Fatronik Tecnalía (Spain)

### Duration:

September 2010 – February 2013

### Total cost:

2.87 MEuros

### Programme:

FP7-ICT-2009-5 Objective ICT-2009.1.2

### Further information:

[www.mosaic-cloud.eu](http://www.mosaic-cloud.eu), [www.mosaic-project.eu](http://www.mosaic-project.eu)

## mOSAIC is for you

Imagine that you are responsible for your corporation's data center, and you experience wild variability in the computational load in your data center. You only have jobs to run at the end of every month, in the rest of time your infrastructure is almost unused. Still, you have high maintenance costs.

You heard about Cloud computing earlier, you took a two days course, and you are made to believe that it will solve your problems.

When you introduce Cloud services to your organization, however, you realize that this task is not as easy as it seemed. First, you realize that you should use different Cloud providers each month, since the variable computational requirements fit different Clouds offers. The second issue is that you cannot find a single Cloud provider that has all the required services.

If you think that the above description fits you, then the mOSAIC platform is for you. Using mOSAIC's solution you do not have to decide on a specific Cloud provider at design time. Instead, any time you use Cloud services, you will access the ones fitting your needs the best.

## Responding to the needs

In order to respond to the above described community needs, the mOSAIC project, involving 6 organizations from 5 European countries, has been initiated in the frame of the FP7-ICT programme. It intends to improve the state-of-the-art in Cloud computing by creating, promoting and exploiting an open-source Cloud application programming interface and a platform targeted for developing multi-Cloud oriented applications.

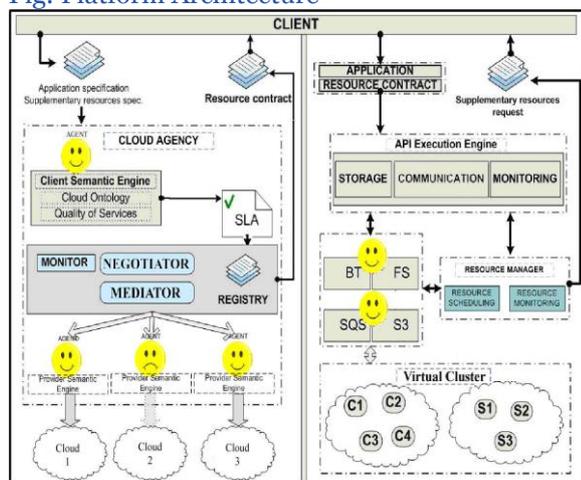
The main benefit of using the mOSAIC software package will be a transparent and simple access to heterogeneous Cloud computing resources and the avoidance of lock-in into proprietary solutions.

A special attention will be given to the applications that are data-intensive (see Table 1). In this context the Earth Observation (EO) community is strongly involved in the platform testing.

Using mOSAIC, Cloud-application developers and maintainers will be able to postpone their decision on the procurement of Cloud services until runtime, while end-user applications will be able to find best-fitting Cloud services to their actual needs and efficiently outsource computations.

In the current context of the Cloud-based exchange for computing resources, mOSAIC implementation would have a significant impact on the current oligopoly-structured market, where a few providers can offer computing resources at prices higher than those possible in a competitive market. mOSAIC is expected to offer the freedom of choice at the programming level as well as at the resource level.

Fig: Platform Architecture



### For further information

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Europe's Information Society Thematic Portal: [http://ec.europa.eu/information\\_society](http://ec.europa.eu/information_society)

CORDIS ICTWeb: <http://cordis.europa.eu/software-services>

Project factsheet mOSAIC/256910 – May, 2010

## Expected outputs

- ◆ **The mOSAIC API** will be a Cloud-based language- and platform-independent application programming interface that extends the existing language- or platform-dependent API capabilities with composite features based on usage patterns.
- ◆ **The mOSAIC framework** will include the complete set of scientific and technical solutions provided by mOSAIC. In particular, behind the solutions related to the API definition and instantiation, the framework will include semantic-oriented proposals like a Cloud ontology, which will allow for the semantic representation of Cloud resources and a direct application of semantically driven information processing.
- ◆ **The open-source platform** will be a proof-of-the-concept prototype ready to be tested, exploited or extended by its users (see the time line in Table 2). It will include instances of the APIs for several programming languages and application tools (e.g., a workflow editor). Its semantic engine that, based on the Cloud ontology, expresses the application's needs for Cloud resources in terms of SLAs and QoS requirements. These are the inputs of the negotiation module that is also part of the mOSAIC stack. This module initiates a bid to the agents representing different Cloud resource providers (see Figure). Each agent representing a vendor understands these bids, using the unified representation of resources, and translates them to vendor specific requirements. Cloud resources can vary from software services (including virtual appliances) or data services to hardware services.

Table 1 : mOSAIC's applications

Type	Title
Data intensive	Storage and data distribution in EO
	EO mission reprocessing
	Routine production of EO products
	Fast data access for crisis situations
Compute	Distributed intelligent maintenance
	Cloud-distributed parameter sweep

Table 2 : Expected results and products

Month	Achievement
6	Architecture, Cloud usage patterns
12	1st API, usage cases, ontologies
18	2nd API and framework available
24	Platform available, first application
30	Full software package, applications