



**Multiple Clouds and multiple interest communities:
challenges in developing open-source software
in Cloud-related collaborative projects**

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Measure the openness of Cloud services: degree of freedom to ...

1. **choose** [in IaaS, PaaS]

- ▶ the infrastructure service
- ▶ the operating system
- ▶ the virtualization technologies
- ▶ the language
- ▶ the stack components (like web framework, application server, database)
- ▶ the third party open components

2. [PaaS specific]

- ▶ **customize** the platform or add additional components
- ▶ **move** data, scripts and applications to other Clouds
- ▶ **re-use** tools and components of the platform when moving to another platform



PaaS and open-source

[Two categories of PaaS]

1. **Platform services** / hosting services/integrated solutions
 - ▶ Open source level: allow only to customize the interfaces
 - ▶ Deployment and hosting remains on the provider site

1. **Platform software** / software services/deployable middleware/Cloudware
 - ▶ Open source: increases the service delivery over the traditional form of software consumption
 - ▶ Through Clouds open-source software can reach a new level of maturity



FP7 Projects for open-source Cloudware

▶ 2008

- ▶ RESERVOIR : OpenNebula

▶ 2010

- ▶ Contrail: ConPaaS
- ▶ Optimis: Optimis Toolkit
- ▶ Cloud4SOA: portability between PaaS
- ▶ mOSAIC: open-source and deployable PaaS

▶ 2012:

- ▶ MODAClouds: DSS, IDE, Execution platform
- ▶ PaaSage
- ▶ ...





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- ▶ Finished in Feb 2013
 - ▶ Open source PaaS ensuring portability of component based apps consuming IaaS
 - ▶ Multiple tools in multiple repositories
 - ▶ Open-source codes: Bitbucket.org/mosaic
 - ▶ 9 teams
 - ▶ www.mosaic-cloud.eu
- ▶ On-going from Oct 2012
 - ▶ Model-driven-engineering for Multiple Clouds applications using PaaS or IaaS
 - ▶ Multiple tools in multiple repositories
 - ▶ Sample of available codes: CloudML related
 - ▶ 10 teams
 - ▶ www.modaclouds.eu

Challenges in multi-team projects

- ▶ choice of open source license
- ▶ establish the constraints imposed by the licenses dependencies
- ▶ use of widely-accepted standards and other open-source codes
- ▶ management of the copyright
- ▶ contributor license agreements
- ▶ source code opening moment
- ▶ issue tracker
- ▶ open mailing lists
- ▶ open wiki
- ▶ *building a community beyond the project consortium*
- ▶ *establish the means to maintain the code beyond the project*
- ▶



Potential of open-source in PaaS world

- ▶ Avoid vendor lock-in
- ▶ Contribute to portability and interoperability
- ▶ Fast adoption by the research community
- ▶ Allow to offer new innovative services on top of them
- ▶ Cost reductions by providing alternatives
- ▶ Redefine the software services delivery
- ▶ Help spreading other open-source tools

