A unified architecture of IaaS cloud solutions

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XLAB and FRI
At least 50 different definitions of Cloud Computing.
NO unified IaaS architecture is available.

Many organizations do not take advantage of IaaS solutions, partly due to uncertainty and a lack of information about their capabilities.

A mechanism for common understanding of IaaS technologies is required.
Introduction

IaaS (Infrastructure as a Service)

- IaaS (Infrastructure as a Service)
- Internal datacenter
- Physical host 1
- Physical host 2
- VM 1
- VM 2
- VM N...
- Hardware
- Virtual Infrastructure (VI) manager
- External cloud
- Application
- Data
- Runtime
- Middleware
- Operating Systems
- Virtualization
- Servers
- Storage
- Network
- Managed by provider
- Manager by end-user
The goal of the proposed architectural framework is to
1) present a common ground for analysis, comparison and evaluation of IaaS cloud implementations,
2) organize the essential architectural components into layers, and
3) define dependencies between particular layers and components

- 44 components, 7 layers
We evaluated the classification by assessing five open-source and four commercial IaaS platforms, and mapped their capabilities to components and layers defined within our framework.

<table>
<thead>
<tr>
<th>Layers</th>
<th>OpenNebula</th>
<th>Eucalyptus</th>
<th>OpenStack</th>
<th>Nimbus</th>
<th>Citrix Cloud Stack</th>
<th>Microsoft Private Cloud</th>
<th>VMware vCloud</th>
<th>Cisco USD</th>
<th>Oracle IaaS</th>
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</table>

Mappings between the proposed framework and chosen IaaS platforms
Classification Evaluation

- Average product coverage (%) of IaaS architectural framework
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Classification Evaluation

- Average product coverage (%) of IaaS architectural framework
Functional Dependencies

- Example 1 (hybrid support – VaS)
Example 2 (orchestrator component - management layer)
Functional Dependencies

- Functional dependencies between particular components
**Evaluation and Results**

- **Success rate of particular project**

  - [Project A]: 18.2
  - [Project B]: 19.4
  - [Project C]: 7.7
  - [Project D]: 13.3
  - [Project E]: 8.0

- **Number of evaluated/chosen IaaS systems**

  - [Project A]: 0
  - [Project B]: 2
  - [Project C]: 4
  - [Project D]: 6
  - [Project E]: 8

- **Projects:** KC Class, Telekom Slovenije...
Evaluation and Results

- The evaluation has shown:
  1) notable **distinction** of feature support and capabilities between **commercial** and **open-source** IaaS platforms,
  2) significant **deficiency** of **important architectural components** in terms of fulfilling true promise of infrastructure clouds, and
  3) **real-world usability** of the proposed architectural framework that facilitates the decision making in IT organizations for choosing the most suitable IaaS cloud solution

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HVALA!

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