

# Advanced PaaS Layer for exploiting Hybrid-Cloud environment: the INDIGO-DataCloud Solution



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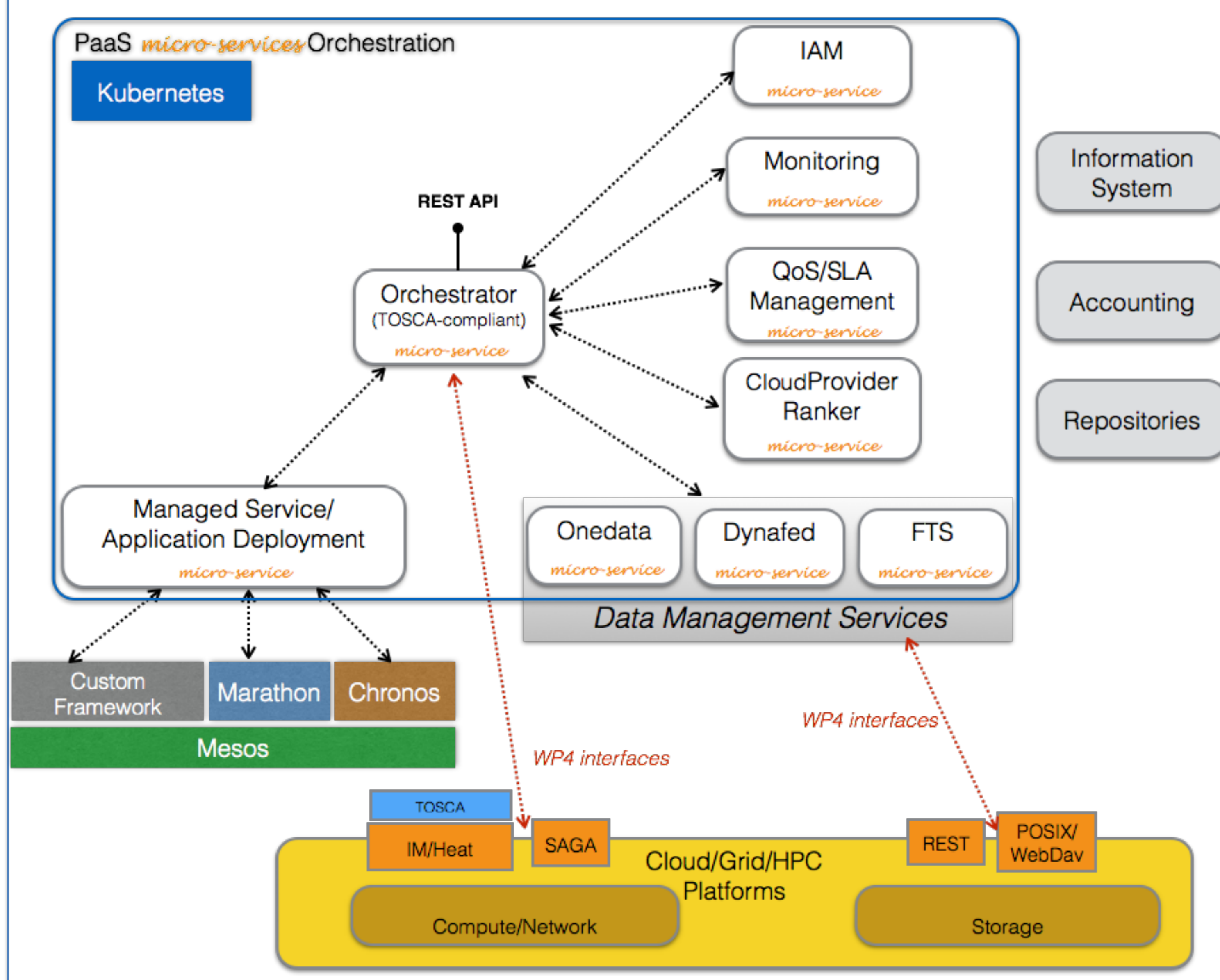
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INDIGO-DataCloud has implemented an **advanced PaaS layer** allowing scientific communities to exploit, in a powerful and high-level way, several heterogeneous computing and data e-infrastructure such as: Private IaaS Cloud, EGI Grid, EGI Federated Cloud, Public Cloud (AWS Amazon, Microsoft Azure).

The **INDIGO PaaS Layer** is implemented with the  $\mu$ Services approach: each service has a specific function and interact with each other with REST APIs. This makes easier the development and the deployment: each PaaS instance could be customized with the needed services/components.



## AUTOMATED SOLUTIONS:

- **PaaS Orchestrator** is the core component of the PaaS layer. It collects high-level deployment requests and coordinates the resource or service deployment over dynamic Mesos clusters or directly over IaaS platforms.
- **Core PaaS** provides the basic functionalities and tools to steer the performance of all the PaaS services available in the infrastructures. In particular:
  - availability and scalability of the core services
  - monitoring of the Computational and Storage resources and of the PaaS  $\mu$ Services
  - accounting of the resource usage in terms of computing and storage
- **QoS/SLA Management Service** allows to define a proper Service Level Agreements among customers and providers (resources or services).
  - Moreover the service can drive the decisions of the PaaS Orchestrator and the **Cloud Provider Ranker** on the basis of the signed SLA.
  - Support for data requirements in **resource allocations** (to request specific QoS categories when requesting computing resources and/or storing or accessing data) is also driven by this service.

## AUTHENTICATION/AUTHORIZATION:

- The **IAM** service provides a layer where identities, enrolment, group membership, attributes and policies to access distributed resources and services can be managed in a homogeneous and interoperable way.
- Identity and Access Management is provided through **multiple methods** (SAML, OpenID Connect and X.509) by leveraging on the credentials provided by the existing Identity Federations (i.e. IDEM, EDUGAIN, etc.). Distributed authorization policies and Token Translation Service will guarantee selected access to the resources as well as data protection and privacy

## GLOBAL DATA ACCESS:

- Global Data Access is the global data management system providing easy access to distributed storage resources and supports a wide range of use case, from data management to data-intensive scientific computations.

## MANAGED SERVICE/APPLICATION DEPLOYMENT SERVICE :

- It is in charge of scheduling, spawning, executing and monitoring applications and services on a distributed infrastructure exploiting the advanced functionalities of Apache Mesos and its frameworks

## KEY FEATURES:

- Improved capabilities in the **geographical exploitation** of Cloud resources.
- **Standard interface** to access PaaS services.
  - ▶ INDIGO PaaS exploits the **TOSCA** standard
- Support for **data requirements** in cloud resource allocations
  - ▶ Resources can be allocated where data is stored
- Integrated use of resources coming from both **public** and **private** Cloud infrastructures
- Deployment, **monitoring** and **automatic scalability** of existing applications
- Allows the handshake between a user and a site on a given **SLA**
- Describes the **QoS** for user/group both over a given site or on the PaaS as a whole
- Support **federated authentication mechanisms** (SAML, OpenID connect)
- Support for **dynamic and elastic clusters** of resources
  - **Batch systems on-demand** (such as HTCondor or Torque)
  - **Extensible application platforms** (such as Apache Mesos) capable of supporting both application execution and instantiation of long-running services.