Complex Mesos cluster deployment: an ansible and docker-based turnkey solution

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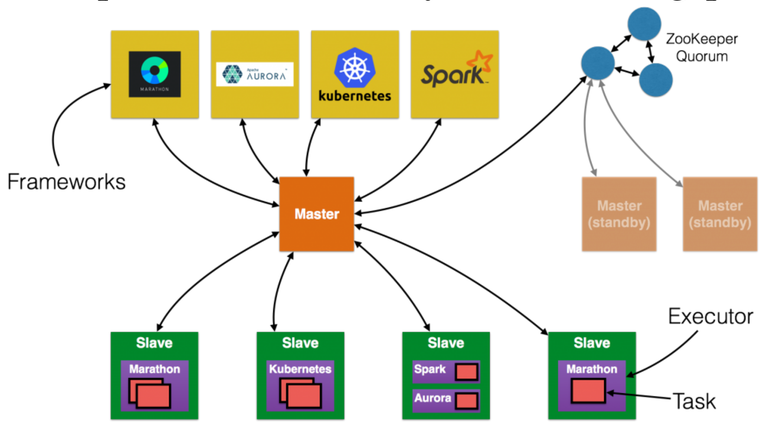
Apache **Mesos** has been widely adopted by large organizations like Apple, Twitter, AirBnB, eBay for running their production workloads. Yet, configuring a Mesos cluster can be complex and time-consuming. Therefore it is important to leverage tools that **automate** the installation and configuration.
In this respect, we have implemented a suite of tools that allow to deploy a **fully functional cluster** in a straightforward way.

Apache Mesos and its Frameworks

Apache Mesos[1] is an open-source cluster manager that provides efficient resource isolation and sharing across distributed applications (**frameworks**) ensuring automated self-healing and scalability.

Mesos implements a **two-level meta-scheduler** that provides **primitives** to express a wide variety of scheduling patterns and use cases.

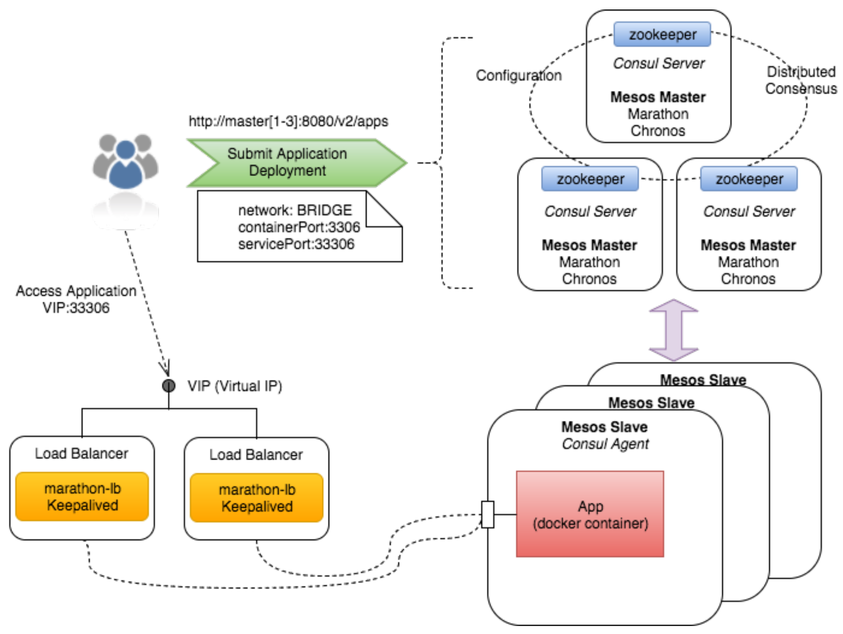


Mesos offers a layer of software that organizes the machines (*physical servers* and/or *VMs* and/or *cloud instances)* letting applications draw from a single pool of intelligently- and dynamically-allocated resources.
Examples of **Mesos frameworks** include:
Marathon - a production-grade container orchestration platform designed to launch long-running applications;
Chronos - a distributed fault-tolerant job scheduler; it can be used to run processing tasks.

Production-ready Mesos Cluster

The suite of tools implemented in the framework of the project **INDIGO-DataCloud** allows to deploy a fully functional cluster with the following features:

- **High-availability** of the master nodes;
- HA **Load-balancing**;
- **Service discovery** through *Consul*[4];
- **Persistent storage** through *RexRay*[5] driver;
- **Virtual networks** using *Calico*[6];
- **Cluster elasticity** through INDIGO *Clues*[7] plugin.

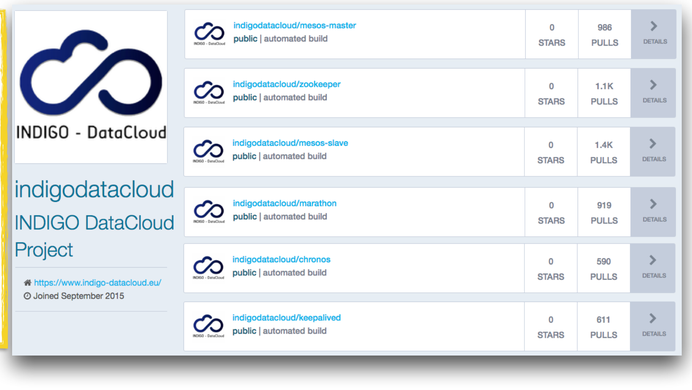


Automation, automation, automation

In the framework of the project **INDIGO-DataCloud** we have implemented:

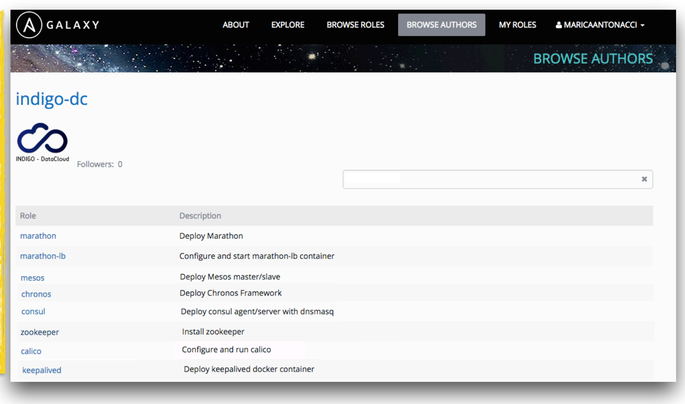
- A set of **docker** images published on the **Docker Hub**[8]:

All the components of the cluster have been dockerized ensuring
- **portability**: the same image can be run on bare metal or virtual machines;
- **isolation**: each service is segregated and can use also different versions of libraries and applications.



- A set of **ansible** roles shared on **Ansible-Galaxy**[9]**:**

The deployment of the several cluster components is managed through dedicated ansible recipes organized into roles:
- services can be easily **orchestrated** and distributed across the cluster machines;
- **customized** configurations can be enabled/disabled using role variables

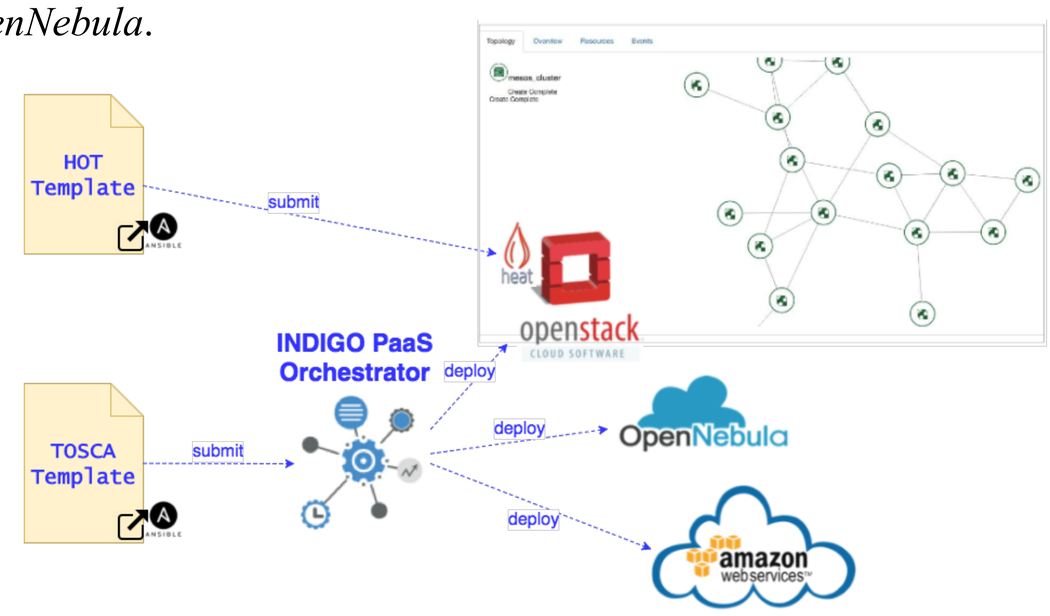


WIP: in addition to Marathon and Chronos, we will provide the possibility to automatically configure frameworks for data analytics like **Hadoop/Spark**.

A simple **ansible playbook** can be used to deploy the Mesos cluster on bare metal and/or VMs just specifying the hosts, their roles and a few parameters.

```
- hosts: mesos_masters
  roles:
    - { role: indigo-dc.consul, consul_mode: "server"  }
    - { role: indigo-dc.zookeeper }
    - { role: indigo-dc.mesos, mesos_install_mode: "master"}
    - { role: indigo-dc.marathon, marathon_password: "password" }
    - { role: indigo-dc.chronos, chronos_password: "password" }
-  hosts: mesos_slaves
   roles:
    - { role: indigo-dc.consul, consul_mode: "agent"  }
    - { role: indigo-dc.mesos, mesos_install_mode: "slave" }
.....
```

Moreover we have prepared some **templates** in two different formats, **HOT** and **TOSCA**[10], that make use of the developed *ansible roles*. This means that we can exploit both ***Heat*** on the single IaaS (Openstack) or the ***INDIGO PaaS Orchestrator***[7] to instantiate the Mesos cluster on different cloud providers, including *AWS* and *OpenNebula*.



References				
[1] http://mesos.apache.org/	[3] https://mesos.github.io/chronos/	[5] https://rexray.readthedocs.io/en/stable/	[7] https://www.gitbook.com/book/indigo-dc/	[9] https://galaxy.ansible.com/indigo-dc/
[2] https://mesosphere.github.io/marathon/	[4] https://www.consul.io/	[6] https://www.projectcalico.org/	[8] https://hub.docker.com/r/indigodatacloud/	[10] http://docs.oasis-open.org/tosca/

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