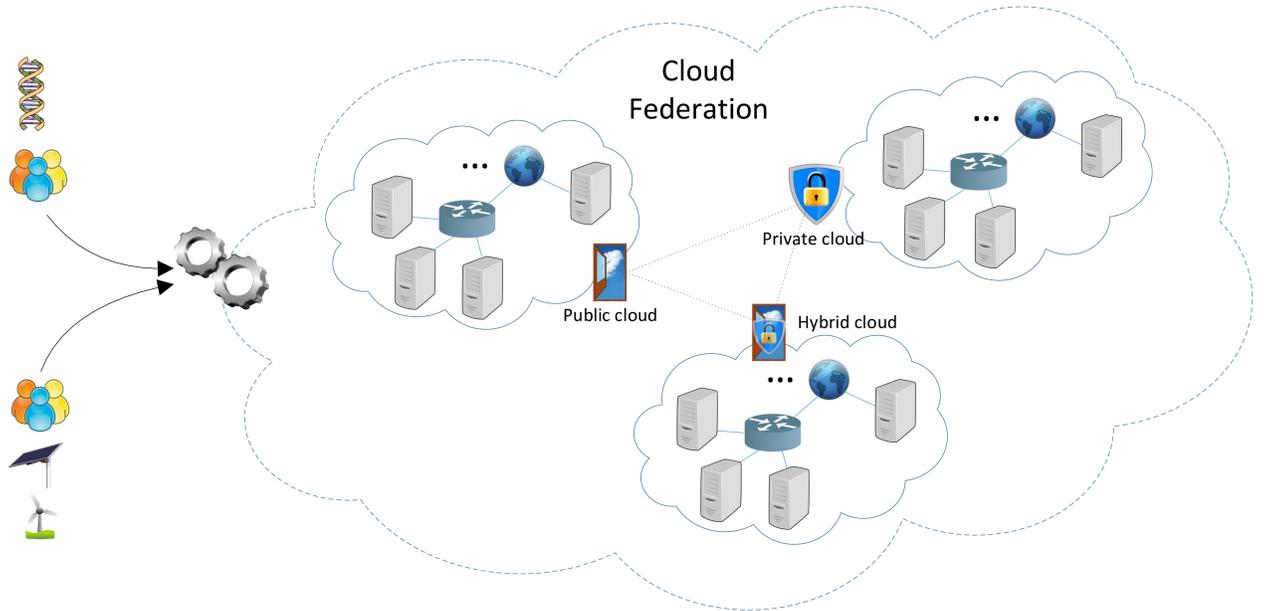


Cloud Federation and Multi-cloud Application Deployment for Bioinformatics Research

Fatih Turkmen, Yuri Demchenko, Miroslav Zirkovic, Cees de Laat (UvA), Eduard Escalona, Jose Aznar (I2CAT), Mathias Slawik, Ilke Zilci (TUB), Christophe Blanchet (CNRS-IFB), Oleg Lodygensky (CNRS-LAL), Cal Loomis (SixSq), Doris Hacker (QSC)

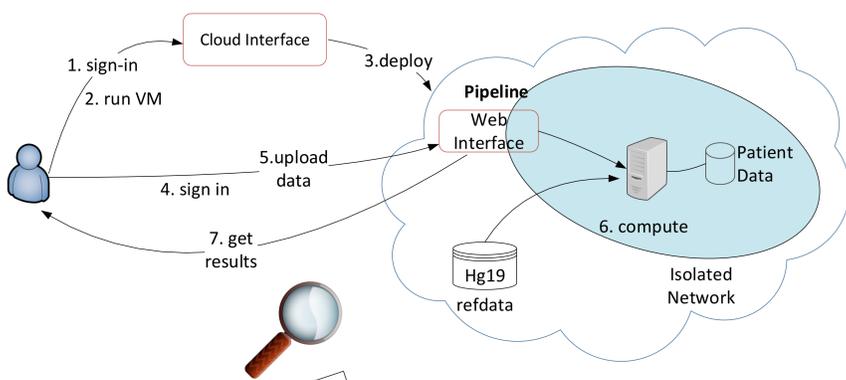
Overview

- Aims at multi-cloud resource/service integration and provisioning
- Focus on domains:
 - (1) **Bioinformatics Research**
 - (2) Energy Management
- Security is first-class citizen : federated identity and authorization management
- Innovation action, committed to open standards



Usecase 1 : Securing Human Medical Data

- Today, most of genomics analyses are done on exome (%5 of genome)
- Soon, full genome sequencing will be included in daily medical practices
- Genome sequences will be part of human biomedical data
- Security and Privacy may be put at stake

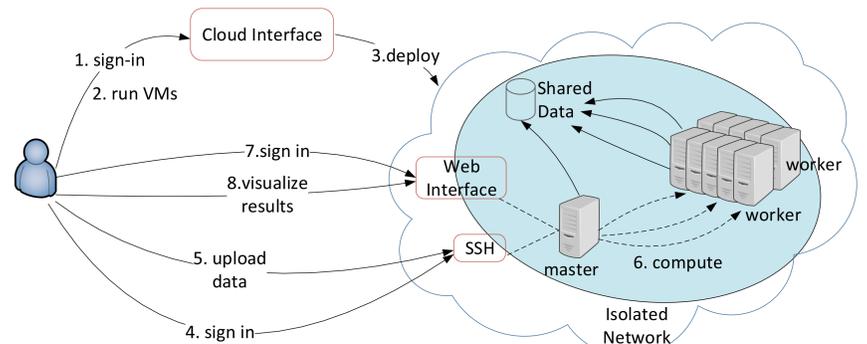


Usecase 2 : Cloud Virtual Pipeline for Microbial Genome Analysis

Microbial genome sequencing is important for the identification of microbes and for building accurate genome references. The obtained sequences are annotated for future use.

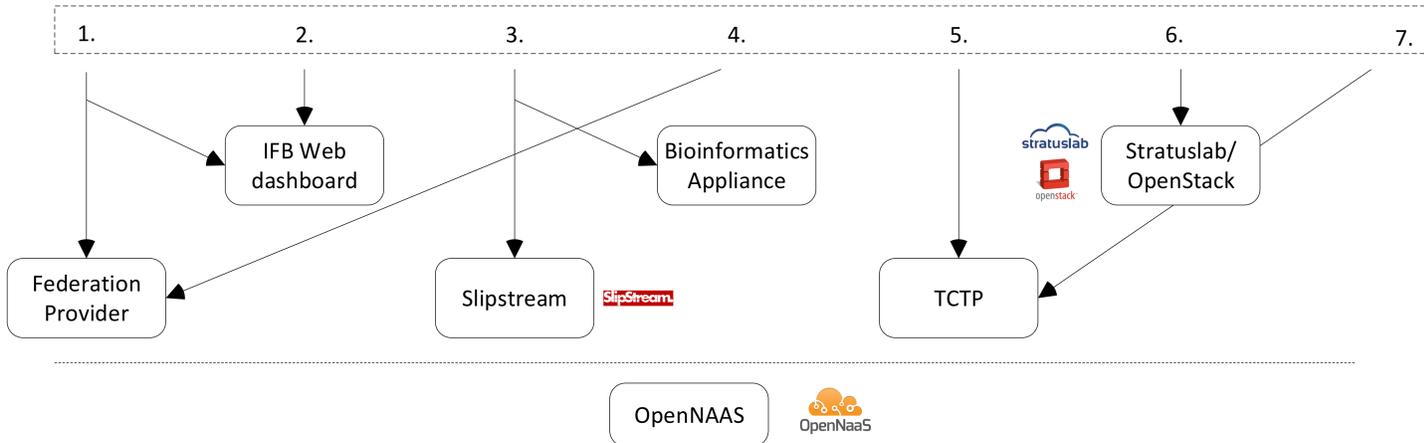
It may involve the comparison of large collections of related genomes (strains) for automated annotation

A dedicated private cloud may be required that includes virtualization of networking resources and large-scale data replication



Putting the Pieces Together : Application Components

- **Federation Provider** : Point of Access to Cloud Federation, Identity Management
- **Web dashboard** : Interface to Federation
- **Slipstream** : Multi-cloud Application Management Platform
- **Bioinformatics Appliance** : Genome Analysis tools (e.g. BLAST)
- **TCTP** : Trusted Cloud Transfer Protocol
- **StratusLab / OpenStack** : Infrastructure as a Service (IAAS)
- **OpenNAAS** : Deployment and automated configuration of dynamic network infrastructures (Network as a Service)



Acknowledgement

CYCLONE project is supported by the EU Horizon 2020 Program under the grant agreement No 644925.

For more information refer to

CYCLONE web site - <http://www.cyclone-project.eu>
 CYCLONE repository - <https://github.com/cyclone-project>



Contact : Jose Aznar (jose.aznar@i2cat.net)
 Eduard Escalona (eduard.escalona@i2cat.edu)
 Yuri Demchenko (y.demchenko@uva.nl)

