Desarrollo de un cloud privado como soporte para docencia en Informática

Opensouthcode 2019 - Málaga

ual cloud.di

UNIVERSIDAD DE ALMERÍA

Foto: Free-images.com

01
Cloud-DI. La razón

Foto: Free-images.com

Cloud-DI (home)

Guía de uso de OpenStack-DI

Infraestructura como servicio (IaaS). La base de los servicios de Cloud-DI. Crea con OpenStack tus máquinas virtuales

Servicio de almacenamiento de archivos. Un *Dropbox* privado

Petición Cloud-DI

Gestión de proyectos. Gestiona también las peticiones de alta de servicios, solución de errores, y nuevas características de Cloud-DI

Sistema de control de versiones Git. Nuestro *Github* privado

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Servidor de automatización de tareas

Kubernetes como servicio. Administración de Kubernetes multicluster.

OpenShift. Plataforma como servicio (PaaS) basada en contenedores para el despliegue de aplicaciones Javascript, Node, PHP. Ruby, Perl, ...

Plataforma de formación online

Servicio de autenticación de usuarios. Necesario para acceder a la mayoría de servicios de Cloud-DI (OwnCloud-DI, Rancher-DI, Redmine-DI y Moodle-DI)

Administración, monitorización y aprovisionamiento de clusters Hadoop

Respuestas a preguntas frecuentes

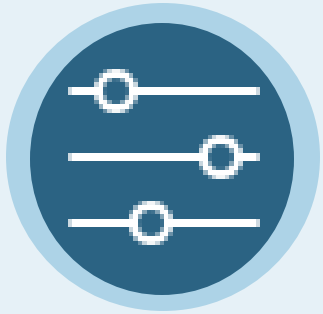
Y por qué no un cloud público

Rigidez
Dificultad en la contratación
Facturas proforma
Velocidad de gestión

Económica
Partida presupuestaria anual no garantizada
Costes

Inconvenientes

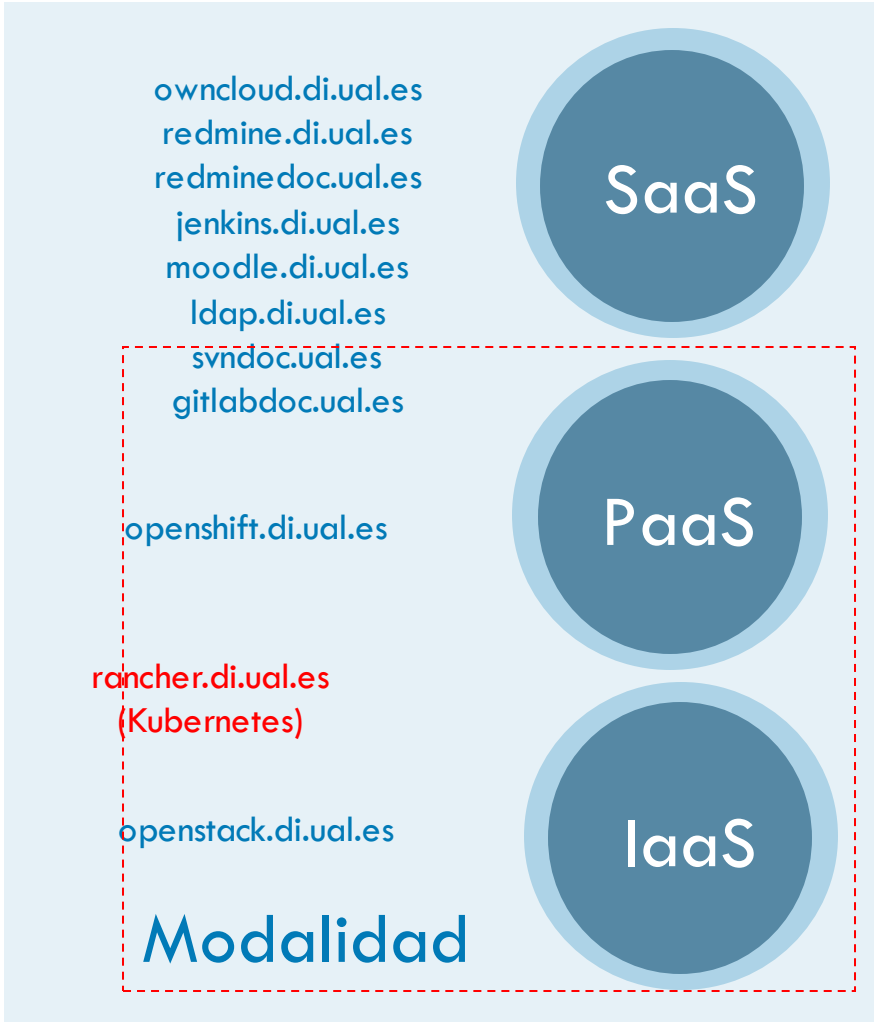
Disponibilidad



Facilidad mantenimiento

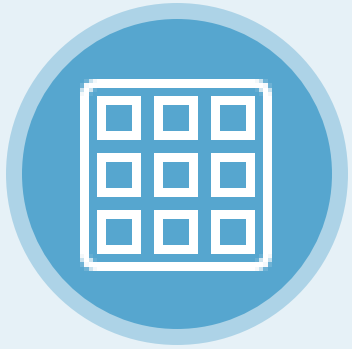
Ventajas

Cloud-DI



Plataforma cloud on-premise para Docencia e Investigación del Departamento de Informática de la UAL

Infraestructura Cloud-DI



Servidores de cómputo: 16
RAM disponible: 3.072 GB
Núcleos: 384
Espacio disponible para instancias: 43,2 TB
Almacenamiento disponible para volúmenes: 21,7 TB

Adquirido en 2015 Convocatoria JA Infraestructura Investigación

Producción

Servidores de cómputo: 2
RAM disponible: 48 GB
Núcleos: 24
Espacio disponible para instancias: 1.9 TB
Almacenamiento disponible para volúmenes: 10,8 TB

Adquirido en 2017 por Departamento de Informática

Testing

Cloud-DI

OpenStack-DI

Tools-DI

Tecnología Cloud-DI

Servicios de Cloud-DI

GitLab, SVN, Redmine, Moodle, Jenkins, …

openstack.

0 €
Licencias Open Source

ANSIBLE

Software para la automatización de construcción y mantenimiento de infraestructuras TI

02
Cloud-DI. El corazón

Qué es OpenStack

Open source software for creating private and public clouds.

OpenStack software controls large pools of compute, storage, and networking resources throughout a datacenter, managed through a dashboard or via the OpenStack API. OpenStack works with popular enterprise and open source technologies making it ideal for heterogeneous infrastructure.

Hundreds of the world's largest brands rely on OpenStack to run their businesses every day, reducing costs and helping them move faster. OpenStack has a strong ecosystem, and users seeking commercial support can choose from different OpenStack-powered products and services in the Marketplace.

openstack.org

Quién está detrás de OpenStack

Clouds soportados por OpenStack

IBM Cloud is an OpenStack-powered private cloud. Fully managed, single-tenant IaaS available in IBM Cloud data centers or on-premises in yours. Achieve the security, control, and performance of private cloud with the ease of public cloud.

Rackspace delivers OpenStack private clouds as-a-service, architected like a public cloud and designed for scale and service availability to any data center in the world.

BootStack, the fully managed cloud service from Canonical is the fastest path to a production private OpenStack cloud. Focus on your business while Canonical takes care of building and running your OpenStack cloud.

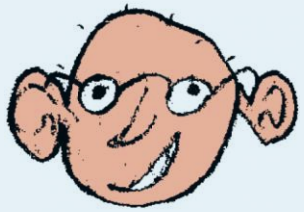
Oracle OpenStack is cloud management software that provides customers an enterprise-grade solution to deploy and manage their entire IT environment.

Open Cloud Stack is the private cloud solution based on Telefonica Open Cloud. This allows our customers to create a truly Hybrid Cloud with a the same user interfaces and APIs.

Discover digital opportunities by using **Cloudwatt** resources & OpenStack APIs to build your app and platform. Scale up & down resources to maximize performance.

La auténtica razón ;-)

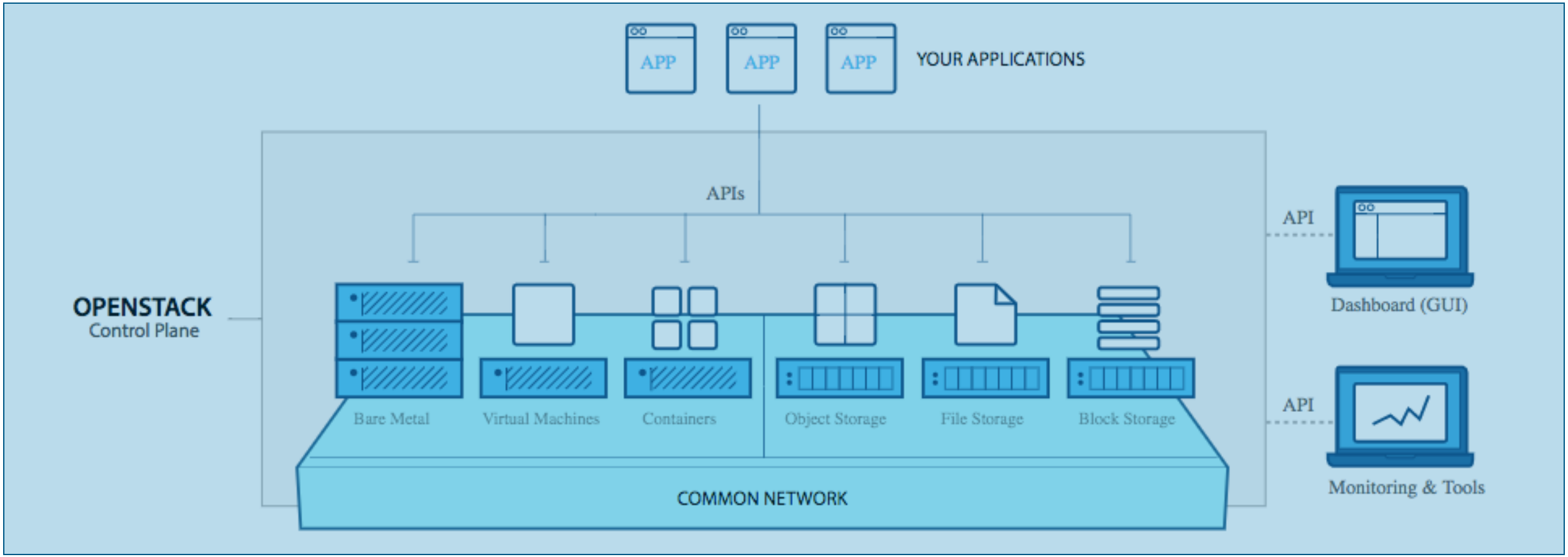
2015 (Año 0)
Contacto con Alberto Molina y José Domingo Muñoz
(IES Gonzalo Nazareno - Dos Hermanas – Sevilla)



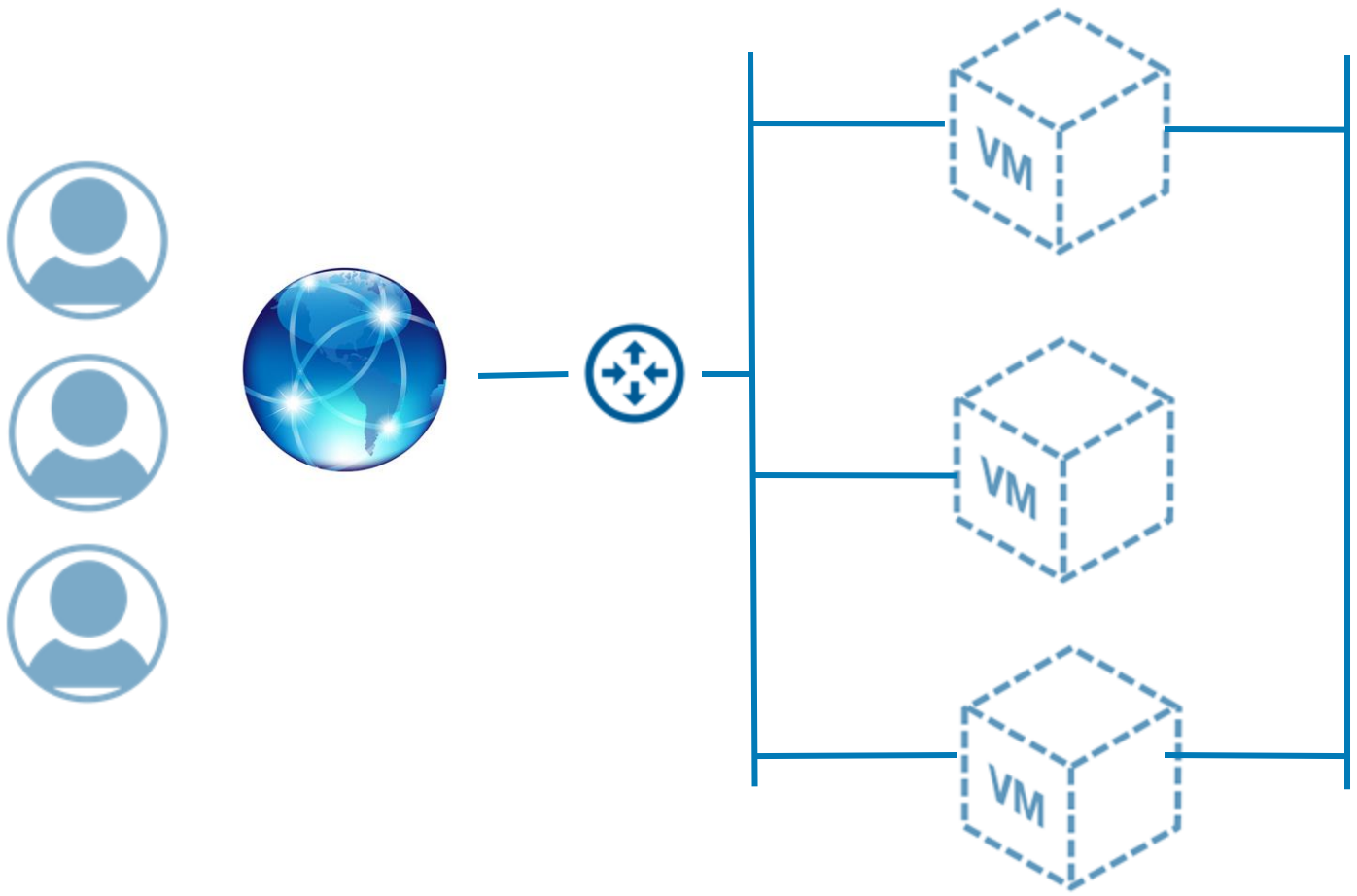
Alberto Molina
@alberto_molina

José Domingo Muñoz
@Pledin_JD

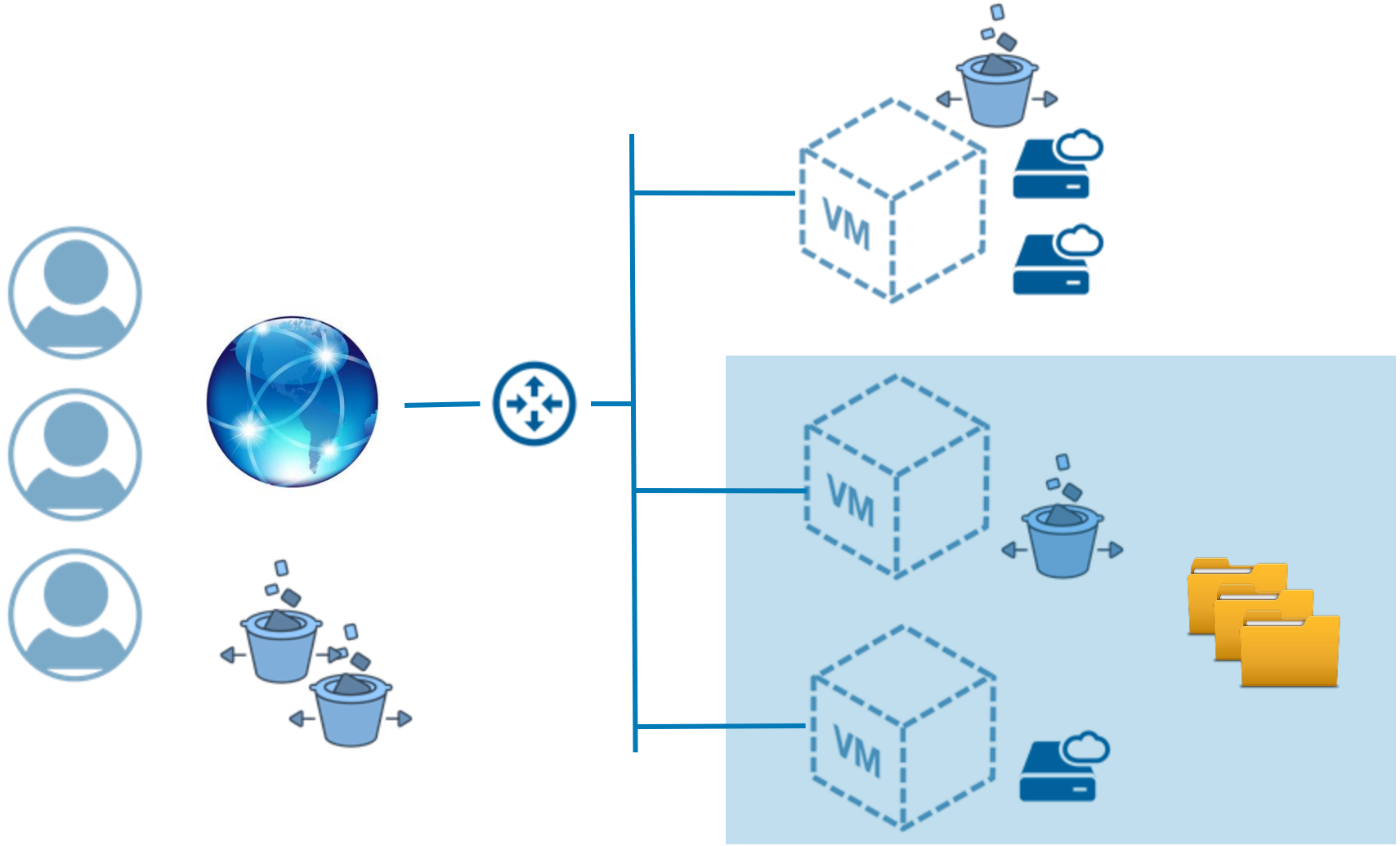
Arquitectura de OpenStack



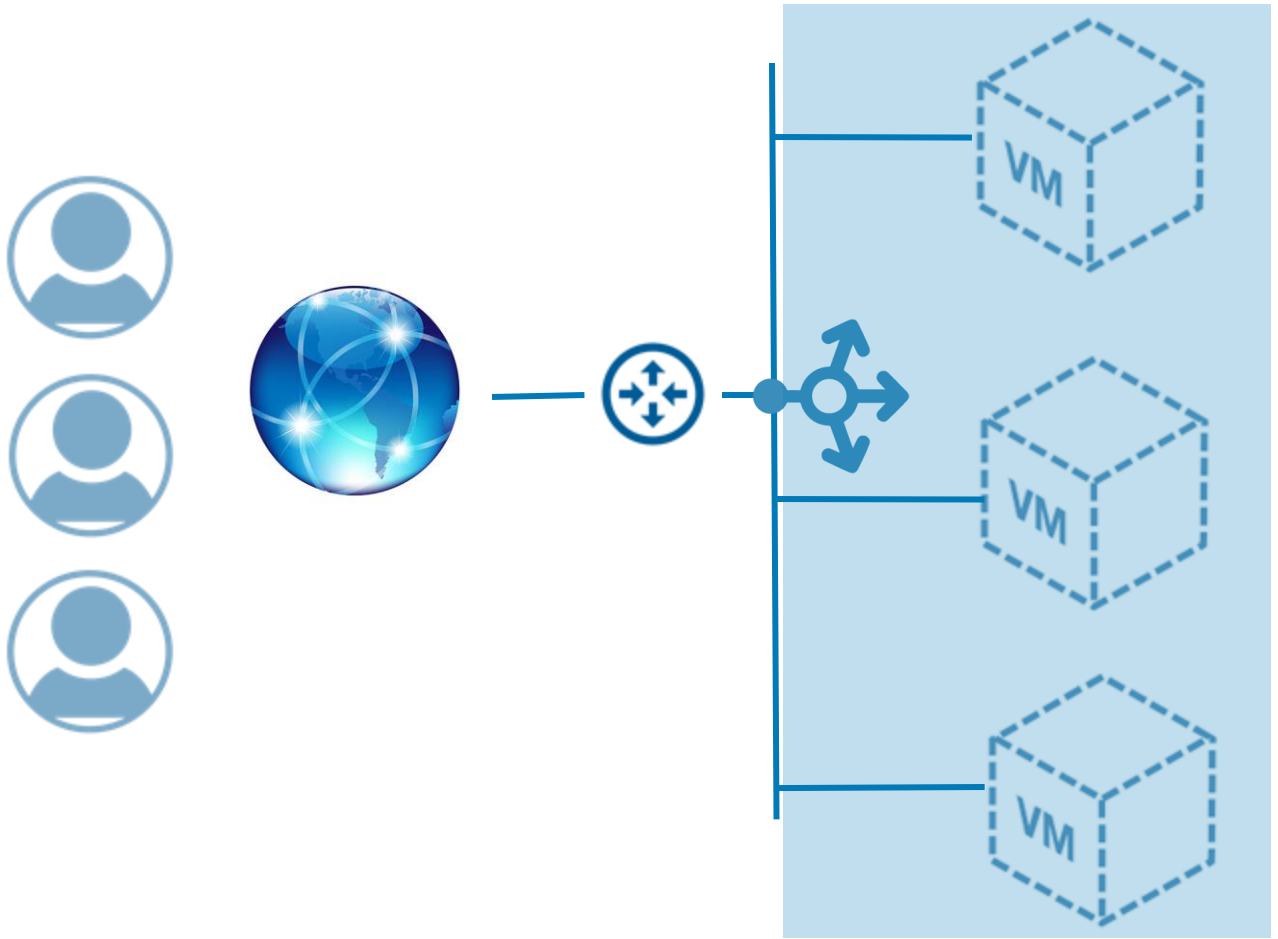
Máquinas virtuales y Redes como servicio



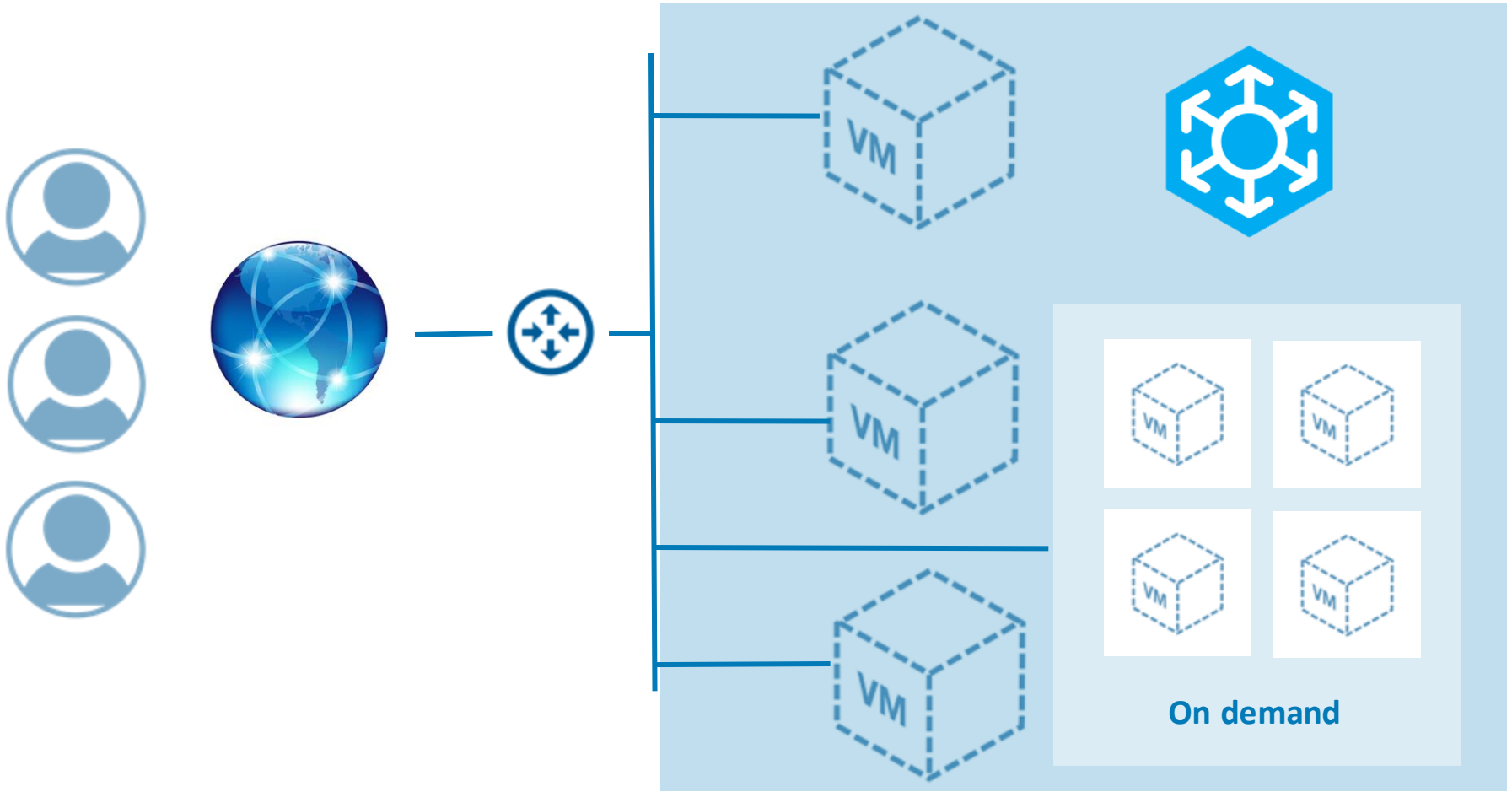
Almacenamiento como servicio



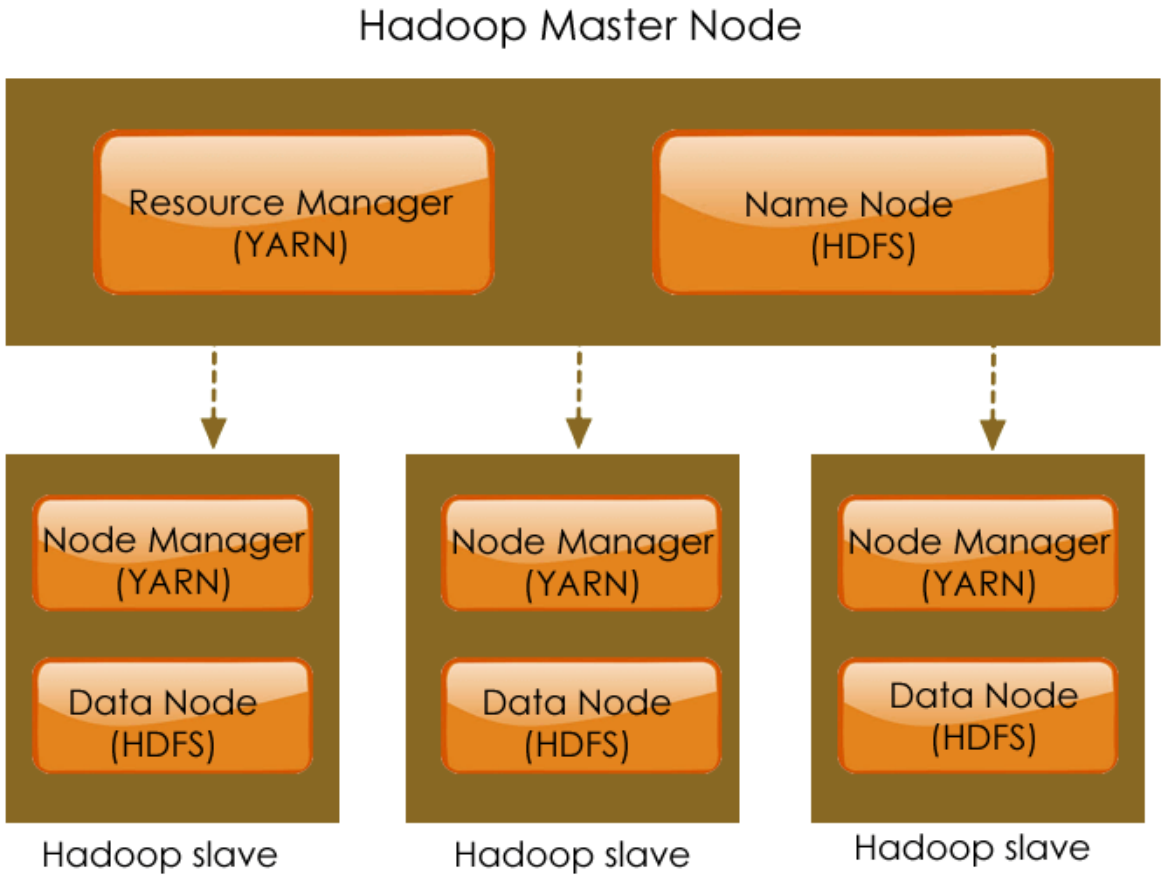
Balanceadores de carga como servicio



Orquestación de infraestructura

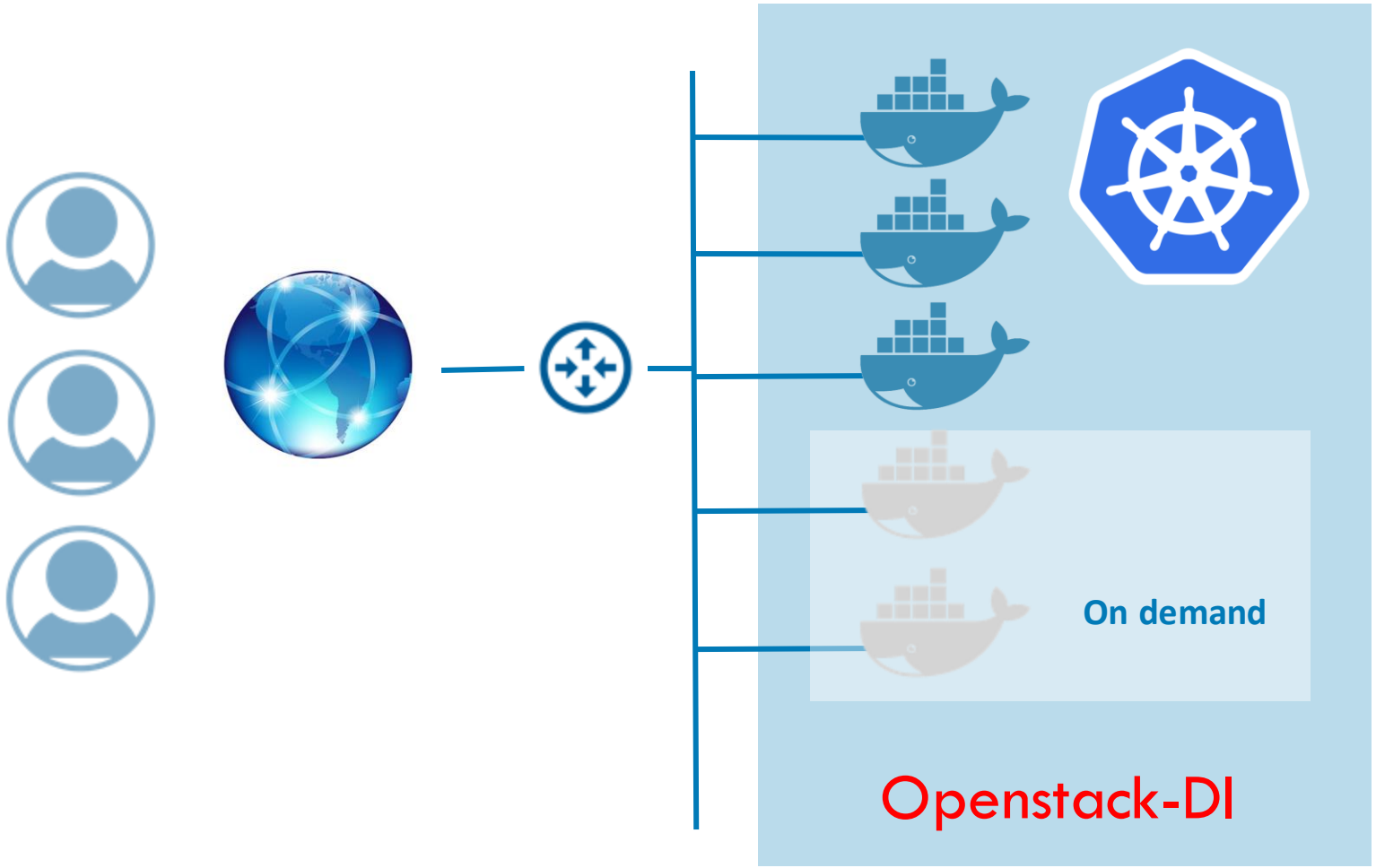


Framework de procesamiento para Big data



Hadoop version 2

Rancher-DI y OpenShift-DI (Servicios Cloud-DI)



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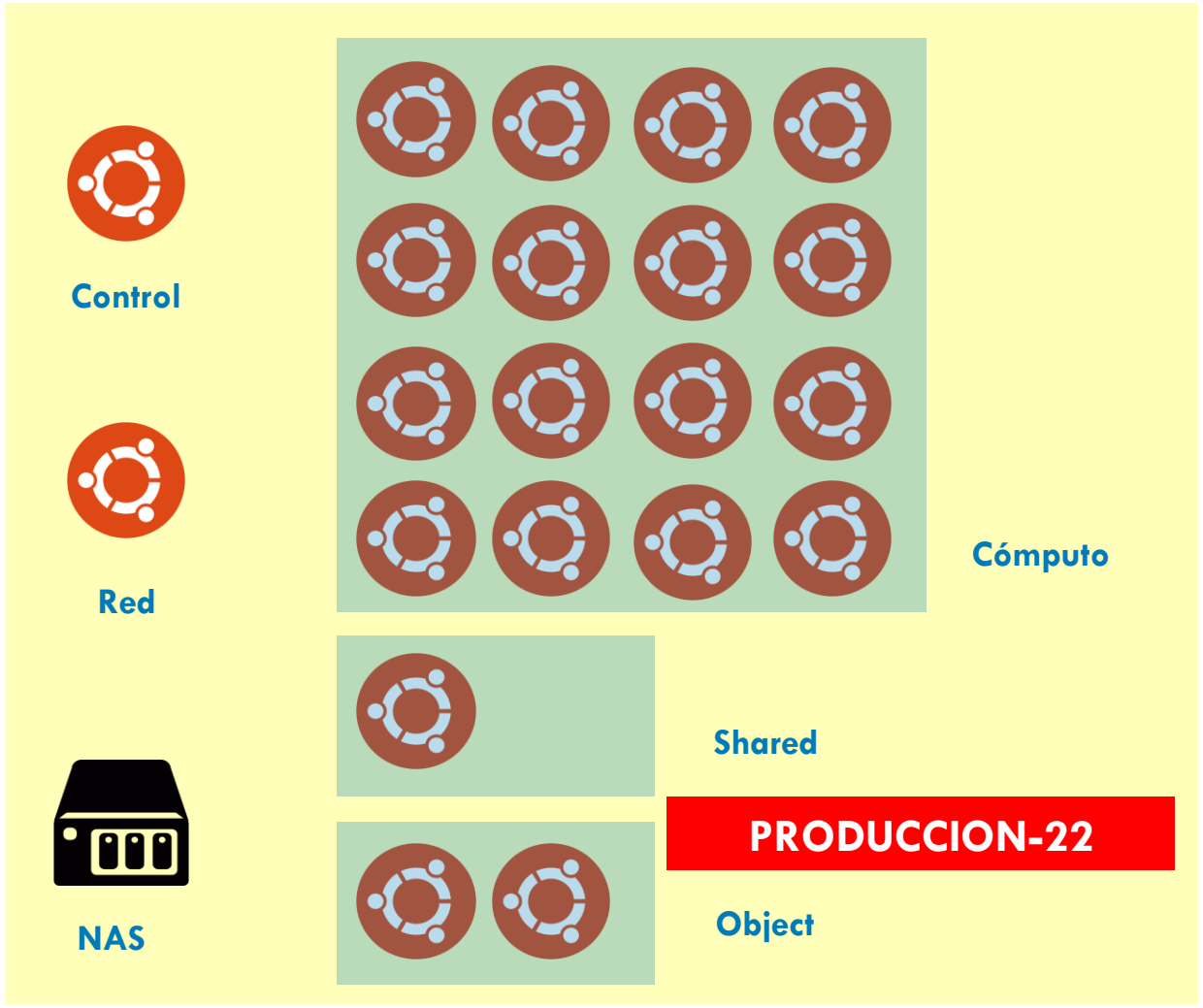
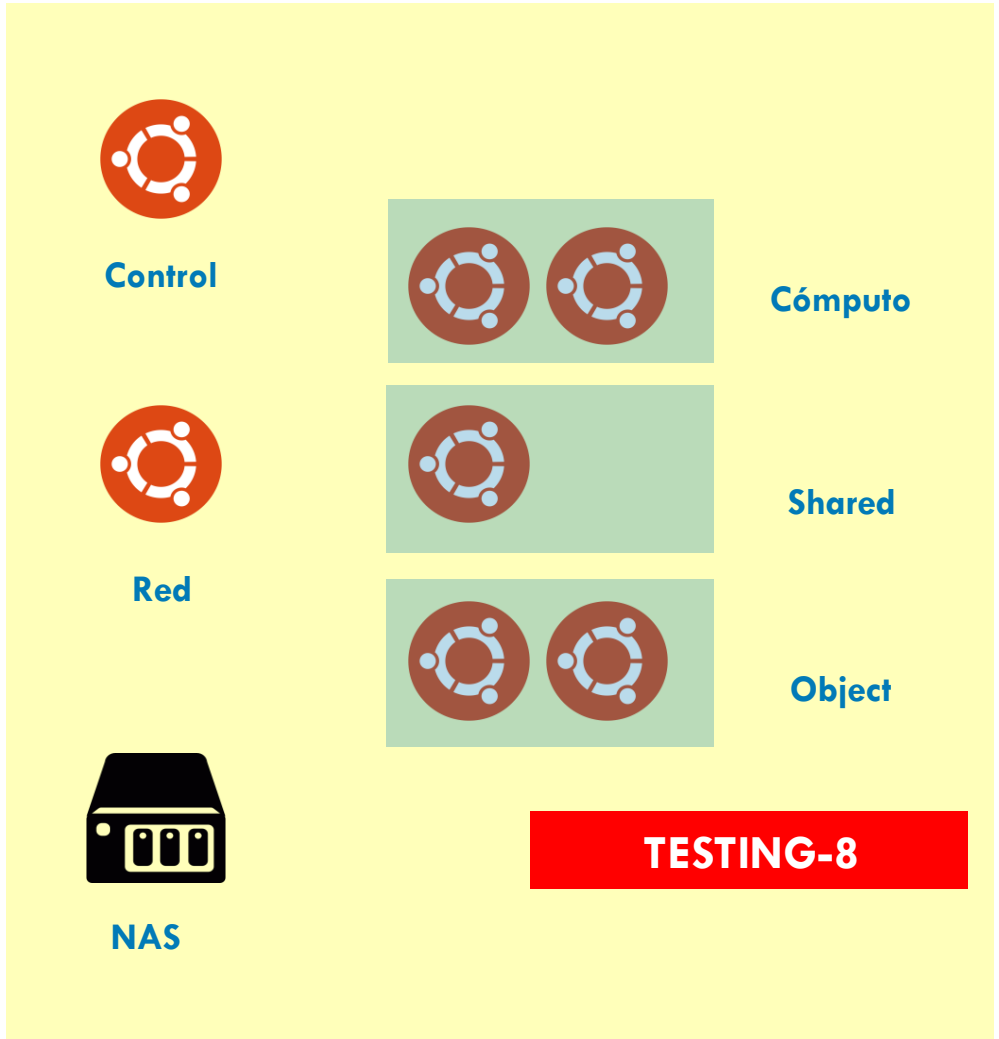
03
Cloud-DI. Las herramientas

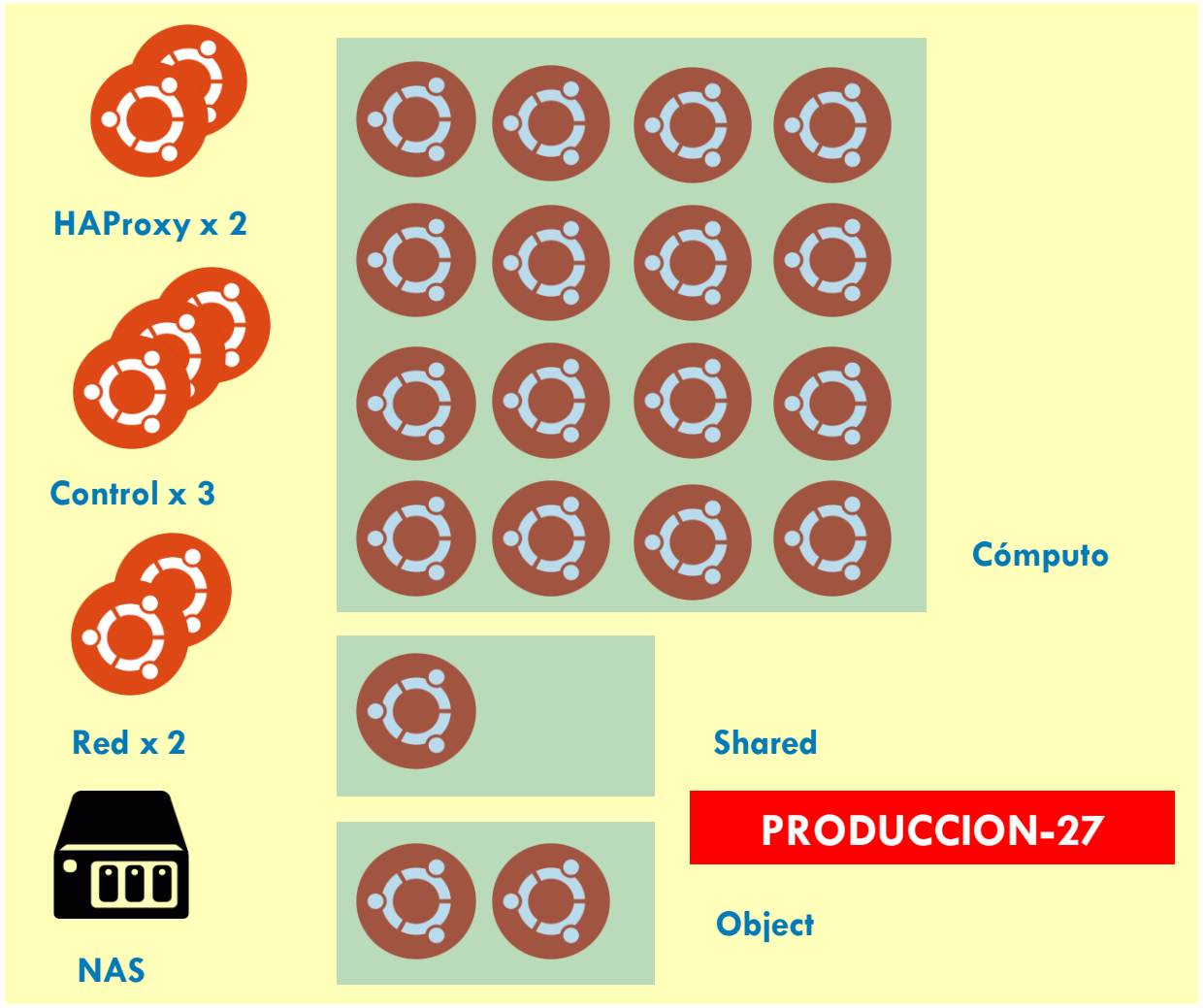
Foto: Flickr. Dboybaker

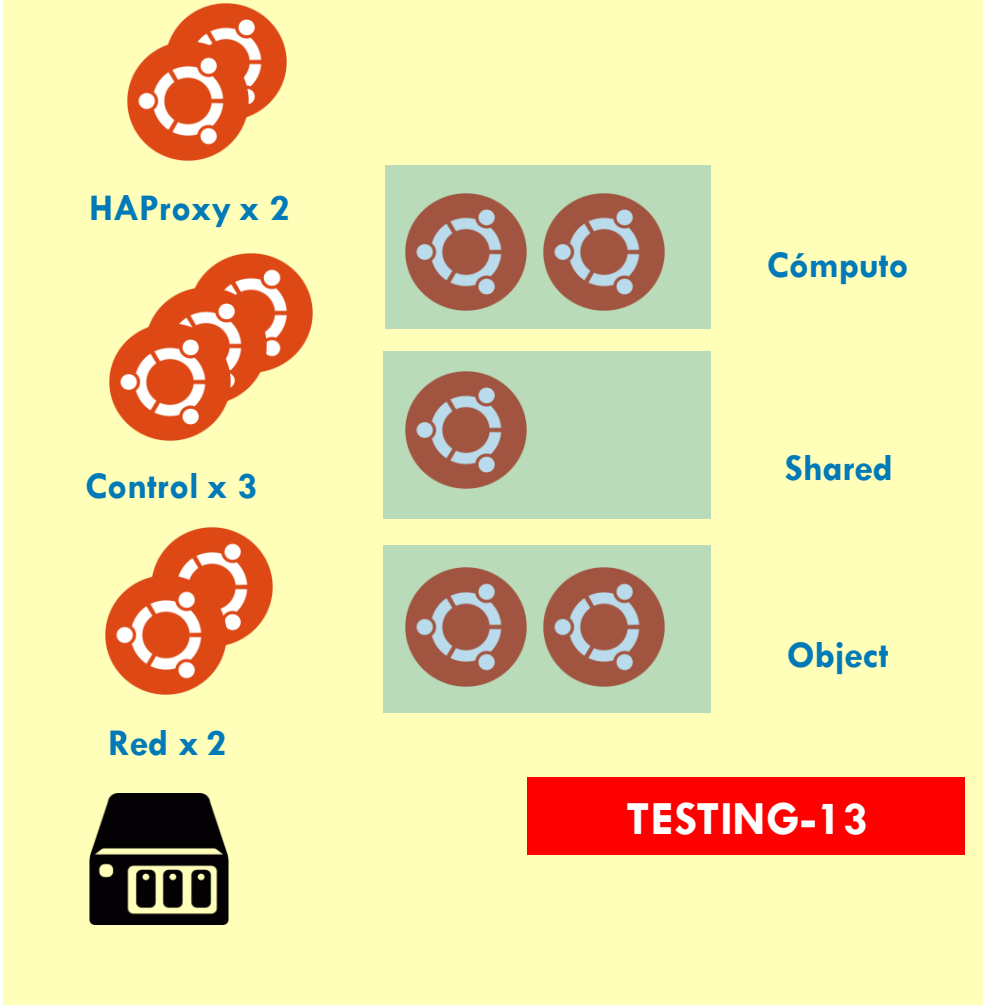
OpenStack-DI. El hardware





OpenStack-DI Alta disponibilidad. Más hardware





Módulos de Ansible

- Commands
- Files
- Packaging
- Database
- Messaging
- OpenStack
- ….

Instalación

Foto: Free-images.com
Joe Zlomek

Playbook Cluster Galera (OpenStack HA)


```
- hosts: controller
  become: true
  roles:
    - galera_cluster

- hosts: controller01
  become: true
  tasks:
    - name: Create new cluster
      command: galera_new_cluster

- hosts: controller:!controller01
  become: true
  tasks:
    - name: Start mariadb
      service:
        name: mysql
        state: started

- hosts: controller01
  become: true
  tasks:
    - name: Get Debian Maintenance User
      fetch:
        src: /etc/mysql/debian.cnf
        dest: /tmp/debian.cnf
        flat: true

- hosts: controller:!controller01
  become: true
  tasks:
    - name: Update Debian Maintenance User
      copy:
        src: /tmp/debian.cnf
        dest: /etc/mysql/debian.cnfd text
```

playbook-galera-ha.yml

Rol galera_cluster (OpenStack HA)


```
- name: Add an apt key by id from a keyserver
  command: apt-key adv --recv-keys --keyserver hkp://keyserver.ubuntu.com:80 0xF1656F24C74CD1D8

- name: Add MariaDB 10.1 Ubuntu 16.04 repository
  apt_repository:
    repo: "deb [arch=amd64,i386,ppc64el] http://nyc2.mirrors.digitalocean.com/mariadb/repo/10.1/ubuntu xenial main"
    state: present
    update_cache: yes

- name: Install MariaDB and rsync
  apt:
    name={{ item }}
  with_items:
    - mariadb-server
    - rsync

- name: "Adding Galera configuration to /etc/mysql/conf.d/galera.cnf"
  template: >
    src=etc/mysql/conf.d/galera.cnf
    dest=/etc/mysql/conf.d/galera.cnf
    owner=root
    group=root
    mode=0644

- name: Stop mariadb
  service:
    name: mysql
    state: stopped
```

roles/galera_cluster/tasks/main.yml

Playbook Cluster RabbitMQ (OpenStack HA)

```
- hosts: controller
  become: true
  roles:
    - rabbitmq_ha

- hosts: controller:!controller01
  become: true
  roles:
    - rabbitmq_ha_others
```

```
- hosts: controller01
  become: true
  tasks:
    - name: ensure the HA policy
      rabbitmq_policy:
        name: HA
        pattern: .*
        tags:
          ha-mode: all

    - name: Add user admin
      command: rabbitmqctl add_user admin {{ RABBIT_PASS }}
      ignore_errors: True

    - name: Grant admin role to admin
      command: rabbitmqctl set_user_tags admin administrator

- hosts: controller
  become: true
  tasks:
    - name: Enable management plugin
      command: rabbitmq-plugins enable rabbitmq_management

    - name: Restart rabbitmq
      service:
        name: rabbitmq-server
        state: restarted
```

playbook-rabbitmq-ha.yml

Rol `rabbitmq_ha` (OpenStack HA)


```
- name: Install rabbitmq
  apt:
    name: rabbitmq-server

- name: Add the openstack user
  rabbitmq_user:
    user: openstack
    password: "{{ RABBIT_PASS }}"
    configure_priv: .*
    read_priv: .*
    write_priv: .*
    state: present

- name: Setup .erlang.cookie
  template: >
    src=var/lib/rabbitmq/.erlang.cookie
    dest=/var/lib/rabbitmq/.erlang.cookie
    owner=rabbitmq
    group=rabbitmq
    mode=0400

- name: Restart rabbitmq
  service:
    name: rabbitmq-server
    state: restarted
```

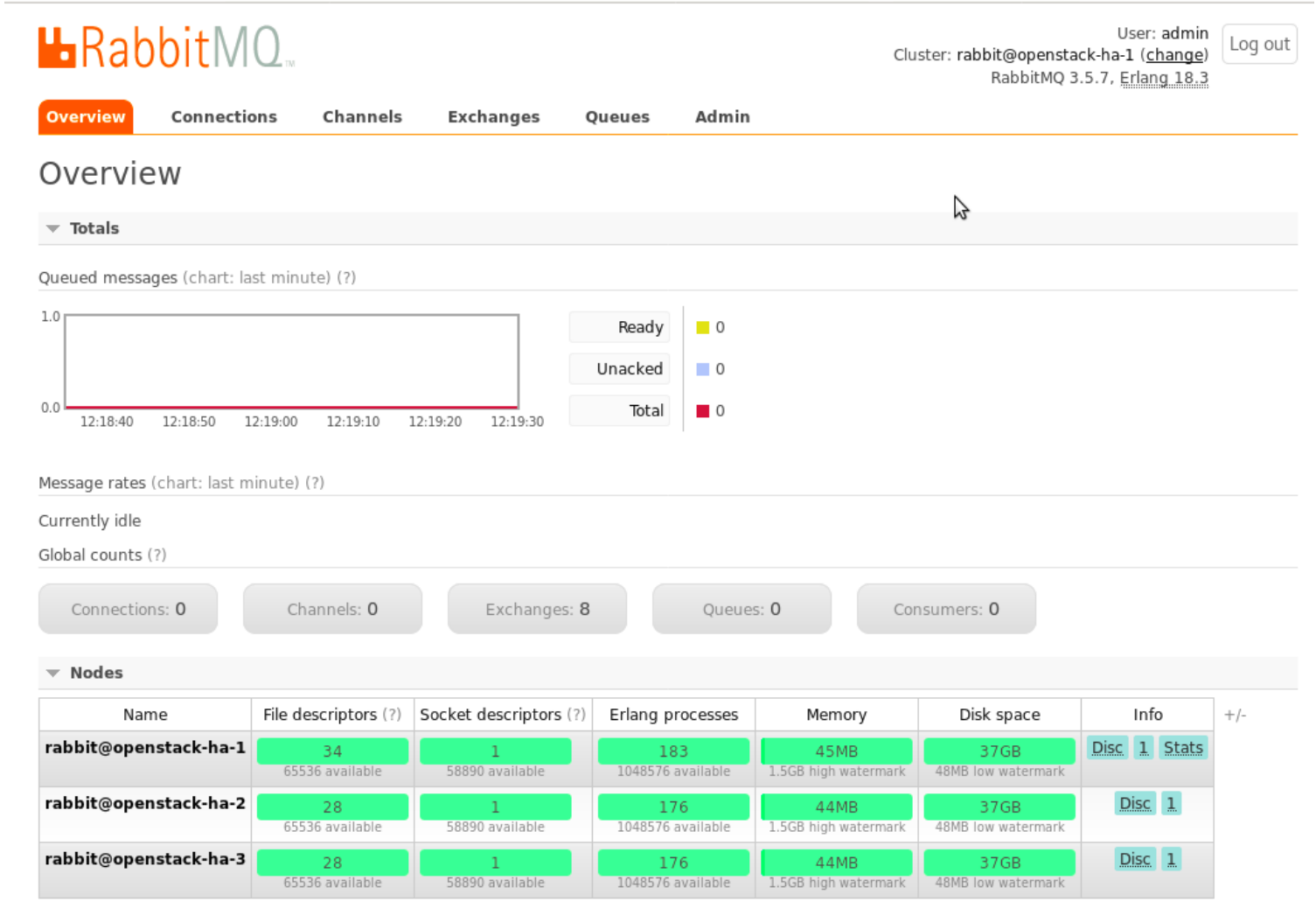
roles/rabbitmq_ha/tasks/main.yml

Rol rabbitmq_ha_others (OpenStack HA)

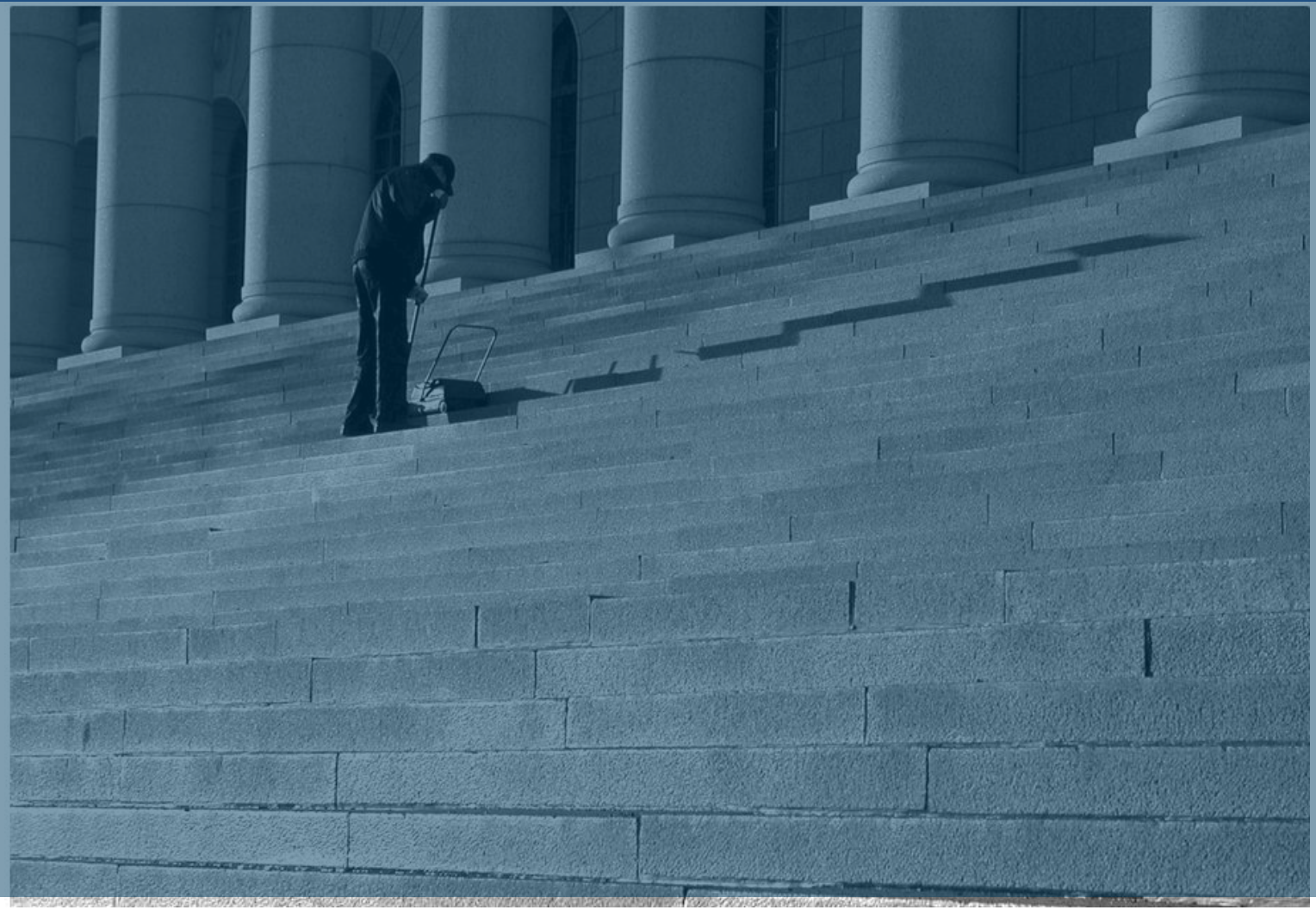

```
- name: Stop application
  command: rabbitmqctl stop_app

- name: Reset application
  command: rabbitmqctl reset

- name: Join cluster
  command: rabbitmqctl join_cluster rabbit@{{ nodes_by_name.controller.name }}

- name: Start application
  command: rabbitmqctl start_app
```

roles/rabbitmq_ha_others/tasks/main.yml

Cluster RabbitMQ HA



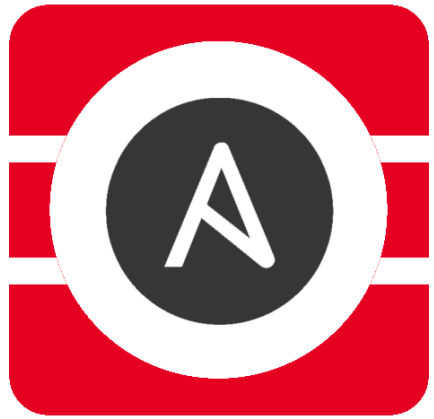
Mantenimiento



Algunos datos

- 200 proyectos
- 1750 instancias
- 1500 repositorios

- Crear un proyecto OpenStack
  - Crear proyecto
  - Crear usuario
  - Crear red
  - Crear subred
  - Crear router
  - Conectar router a subred



Por favor, puedes?

Cloud-DI Team

Archivo de usuarios `users.yml`


```
network: "ext-net"
cidr: 10.0.0.0/24
dns:
  - 150.214.156.2
  - 8.8.8.8

quota: {
  state: present,
  instances: 10,
  cores: 20,
  ram: 324800,
  gigabytes: 60,
  backups: 0,
  backup_gigabytes: 0,
  floatingip: 10,
  gigabytes_lvm: 60,
  snapshots: 0,
  snapshots_lvm: 0,
  volumes: 2,
  volumes_lvm: 2
}


watchers:
  - {username: "jjcanada", role: "user"}
  - {username: "jmartine", role: "user"}
  - {username: "mtorres", role: "user"}


projects:
  - {project: "pedro", user: "Pedro Picapiedra", email: "pedro@flintstones.com", password: "XXX", quota: "absent"}
  - {project: "pablo", user: "Pablo Marmol", email: "pablo@flintstones.com", password: "YYY, quota: "present"}
```

vars/users.yml

Rol setup_new_project (1)

```
- name: Include var file
  include_vars:
    file: users.yml


- name: Create a project
  os_project:
    cloud=lowcost
    state=present
    name={{ item.project }}
    description="Proyecto de {{ item.user }}"
    enabled=True
    domain=default
  with_items:
    - "{{ projects }}"

- name: Grant admin role on user admin in the project
  os_user_role:
    cloud=lowcost
    user=admin
    role=admin
    project={{ item.project }}
  with_items:
    - "{{ projects }}"
```

roles/setup_new_project/tasks/main.yml

Rol setup_new_project (2)


```
- name: Create the user for the project
  os_user:
    cloud=lowcost
    state=present
    name={{ item.project }}
    password={{ item.password }}
    description={{ item.user }}
    update_password=on_create
    email={{ item.email }}
    default_project={{ item.project }}
    domain=default
  with_items:
    - "{{ projects }}"
- name: Grant user role on user in the project
  os_user_role:
    cloud=lowcost
    user={{ item.project }}
    role=user
    project={{ item.project }}
  with_items:
    - "{{ projects }}"
- name: Grant watchers to the projects
  os_user_role:
    cloud: lowcost
    project: "{{ item[0].project }}"
    user: "{{ item[1].username }}"
    role: "{{ item[1].role }}"
  with_nested:
    - "{{ projects }}"
    - "{{ watchers }}"
  ignore_errors: True
```

roles/setup_new_project/tasks/main.yml

Rol setup_new_project (3)


```
- name: Create the network of the project
  os_network:
    cloud=lowcost
    state=present
    name="{{ item.project }}-net"
    project={{ item.project }}
  with_items:
    - "{{ projects }}"

- name: Create the subnet
  os_subnet:
    cloud=lowcost
    state=present
    network_name="{{ item.project }}-net"
    name="{{ item.project }}-subnet"
    cidr={{ cidr }}
    dns_nameservers={{ dns }}
    project={{ item.project }}
  with_items:
    - "{{ projects }}"

- name: Create the router connecting the network and the subnet
  os_router:
    cloud=lowcost
    state=present
    name="{{ item.project }}-router"
    network={{ network }}
    interfaces="{{ item.project }}-subnet"
    project={{ item.project }}
  with_items:
    - "{{ projects }}"
```

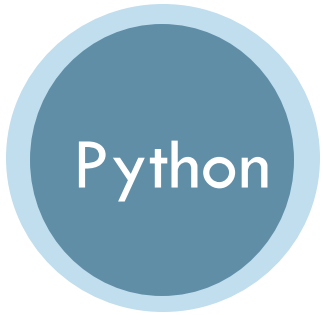
roles/setup_new_project/tasks/main.yml

Rol setup_new_project (4)

```
- name: Apply quotas
  os_quota:
    cloud: lowcost
    name: "{{ item.project }}"
    instances: " {{ quota.instances}} "
    cores: " {{ quota.cores}} "
    ram: " {{ quota.ram }} "
    gigabytes: " {{ quota.gigabytes }} "
    backups: " {{ quota.backups }} "
    backup_gigabytes: " {{ quota.backup_gigabytes }} "
    floatingip: " {{ quota.floatingip }} "
    gigabytes_types:
      gigabytes_lvm: " {{ quota.gigabytes_lvm }} "
    snapshots: " {{ quota.snapshots }} "
    snapshots_types:
      snapshots_lvm: " {{ quota.snapshots_lvm }} "
    volumes: " {{ quota.volumes}} "
    volumes_types:
      volumes_lvm: " {{ quota.volumes_lvm }} "
  with_items:
    - "{{ projects }}"
  when: item.quota == "present"
```

roles/setup_new_project/tasks/main.yml

Otros scripts de mantenimiento



Gestión de repositorios y permisos
- SVN
- Git (GitLab)

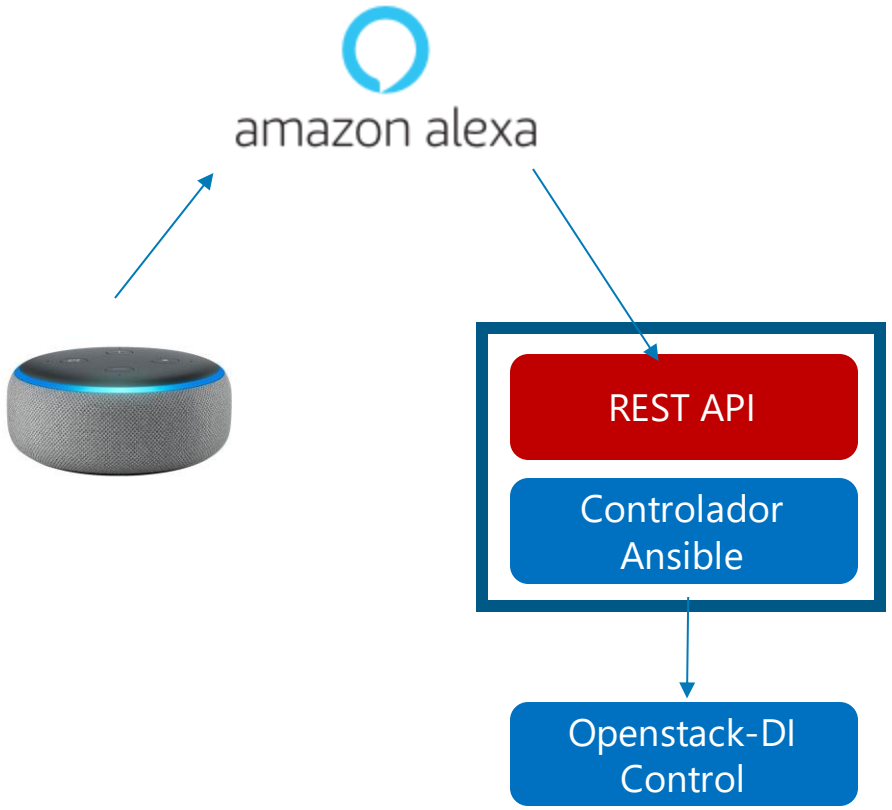
Limpieza de recursos
Attachments de volúmenes
Volúmenes
Instancias
Imágenes
...

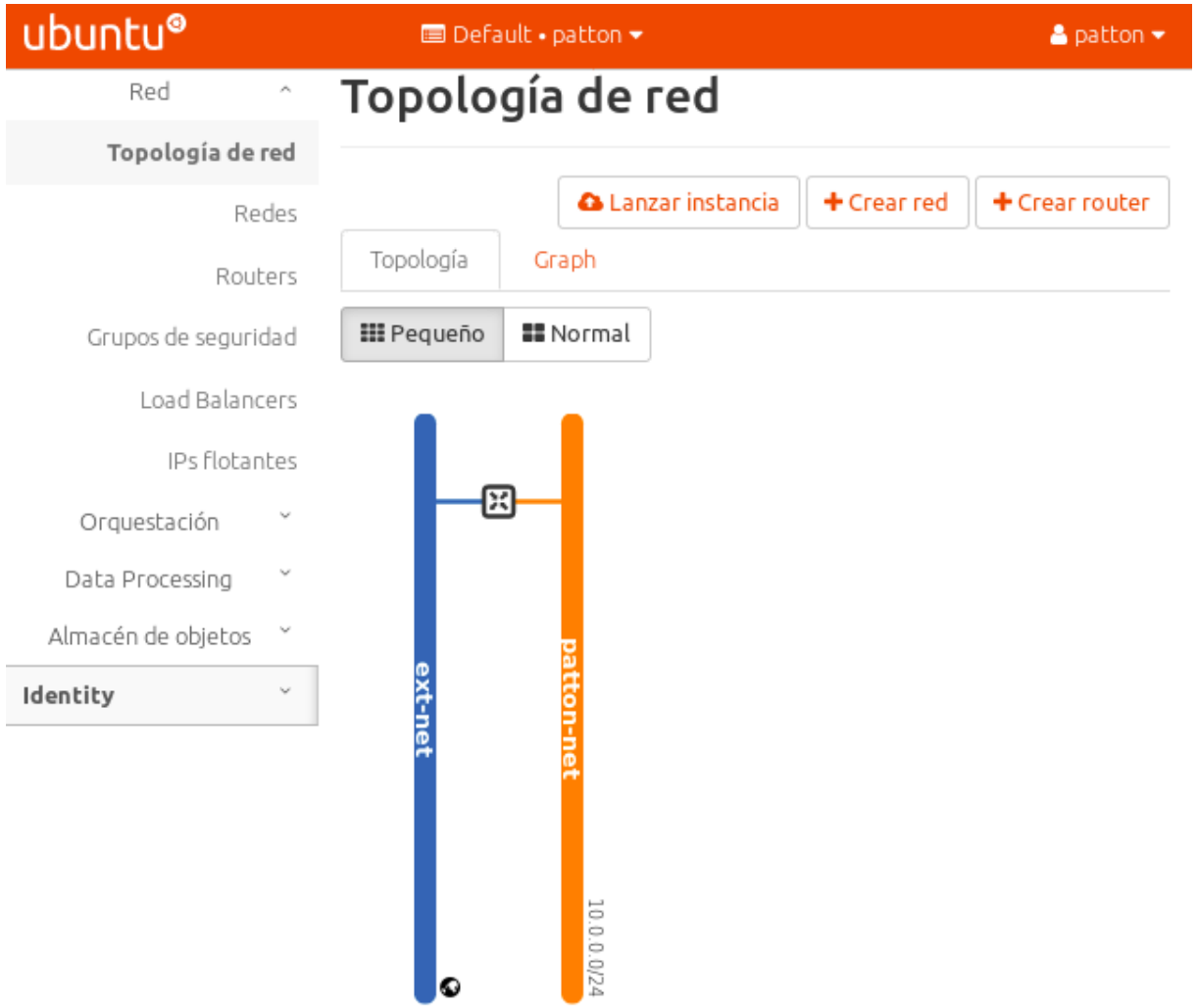
Creación de proyectos OpenStack-DI
Skills para REST API sobre playbooks Ansible

Limpieza con SQL

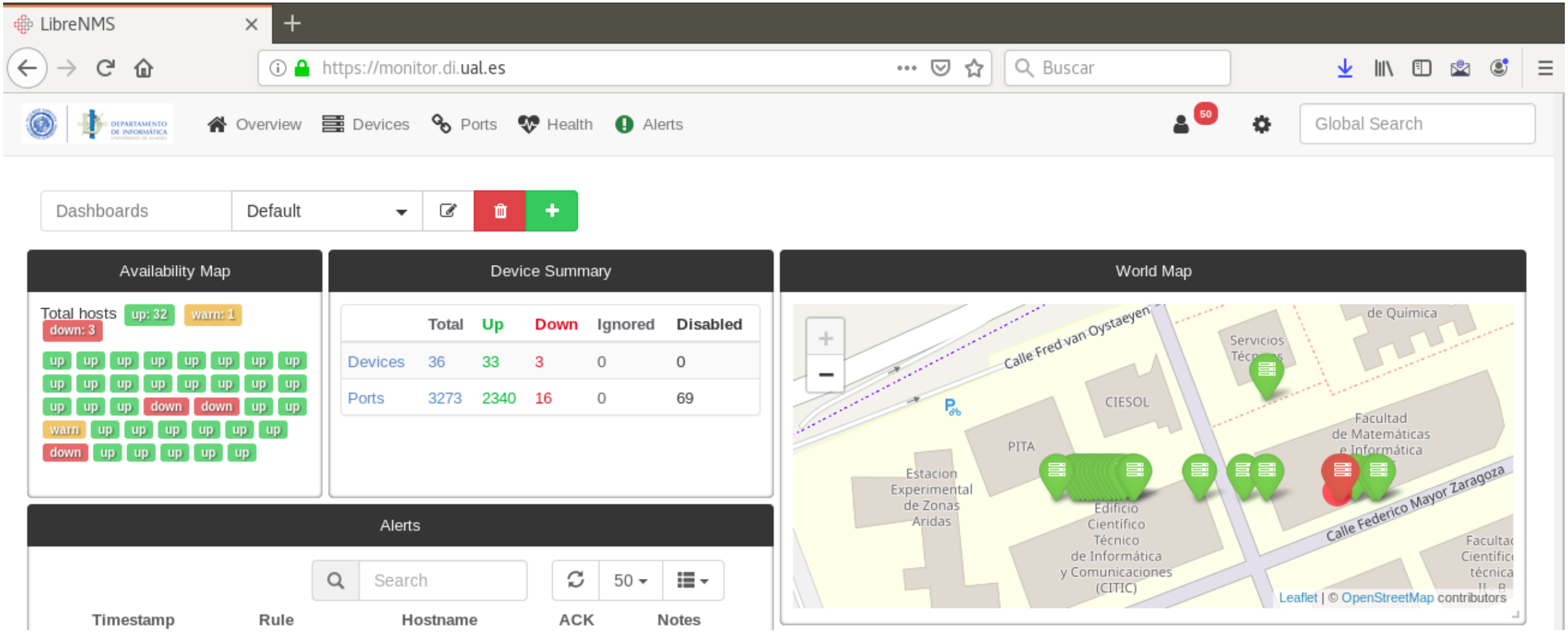
```
MariaDB [(none)]> SELECT CONCAT ('openstack delete server ', I.uuid)
    -> FROM nova.instances I JOIN
    -> keystone.project P ON I.project_id = P.id
    -> WHERE I.deleted = false AND
    -> P.id IN (
    -> SELECT id
    -> FROM keystone.project
    -> WHERE name IN ('hpcjmart', 'jjcanada', 'mtorres')
    -> );
+-----------------------------------------------------------+
| CONCAT ('openstack delete server ', I.uuid)               |
+-----------------------------------------------------------+
| openstack delete server 8ad04b31-c752-4f11-b110-7144ce7b79c1 |
| openstack delete server 86ecf012-8dfc-44cf-9444-170acd3ba252 |
| openstack delete server 5d769559-322b-428d-86e5-02b9f008b67e |
| openstack delete server 52170c62-917f-4fe9-a753-df3f59189088 |
| openstack delete server 6cb6212d-ee1e-4da7-9569-9462a9187fba |
| openstack delete server 7965428d-15e0-4707-bd62-144d999f864b |
| openstack delete server 4a55fbfc-8635-4e91-9c03-aeb4cfca9cc8 |
```

Amazon Alexa ahora está en Cloud-DI Team





Monitorización



Gracias por la atención
Preguntas?

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