Application deployment on OpenStack

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by
Ing. Tomáš Vondra
Cloud Architect at
HOME AT CLOUD

Openstack Introduction

Outline

- Openstack Introduction
  - Open Source Model, Industry, ...
- Openstack Architecture

Openstack - Facts

- Founded by NASA and Rackspace in 2010
- Currently involves 130 companies and 985 people (Stackalytics, 2017)
- Aim to be ‘Linux’ in cloud computing systems
- It is open-source
  - Amazon/VMWare is not
- Attracts start-ups

Openstack Organization Structure

- Foundation
  - board of directors
    - Rackspace, HP, AT&T, Dell, Aptira, Canonical Ltd, Red Hat, IBM, Yahoo!, DreamHost, eNovance, CERN, Cloudscaling, Nebula, UnitedStack, SUSE, ...
    - strategic and financial oversight of Foundation resources and staff
- Technical Committee
  - represents contributors and has technical insight
- User Committee
  - represents the community

Openstack Governance/Foundation

- Drives the Openstack
- Foundation Mission
  - *The OpenStack Foundation is an independent body providing shared resources to help achieve the OpenStack Mission by Protecting, Empowering, and Promoting OpenStack software and the community around it, including users, developers and the entire ecosystem.*

Openstack Governance/Foundation Responsibilities

- Development process and release management
- Developer, user and ecosystem community management
- Meet the needs of real world users by producing great software, and fostering their involvement in the community to provide feedback and direction
- Brand management (PR & marketing, trademark policy)
- Event management (Twice-annual Summit & Conference, meetups etc)
- Legal affairs (CLA process and docs, trademark defense)

Why Openstack?

Datacenters are being virtualized, Servers are first

Hypervisors provide abstraction between SW and HW (Servers)

- ✔ Hardware abstraction for each server
- ✔ Better resource utilization for each server

Next: Storage, Network…the building blocks

Compute Pool
Virtualized Servers

Network Pool
Virtualized Networks

Storage Pool
Virtualized Storage

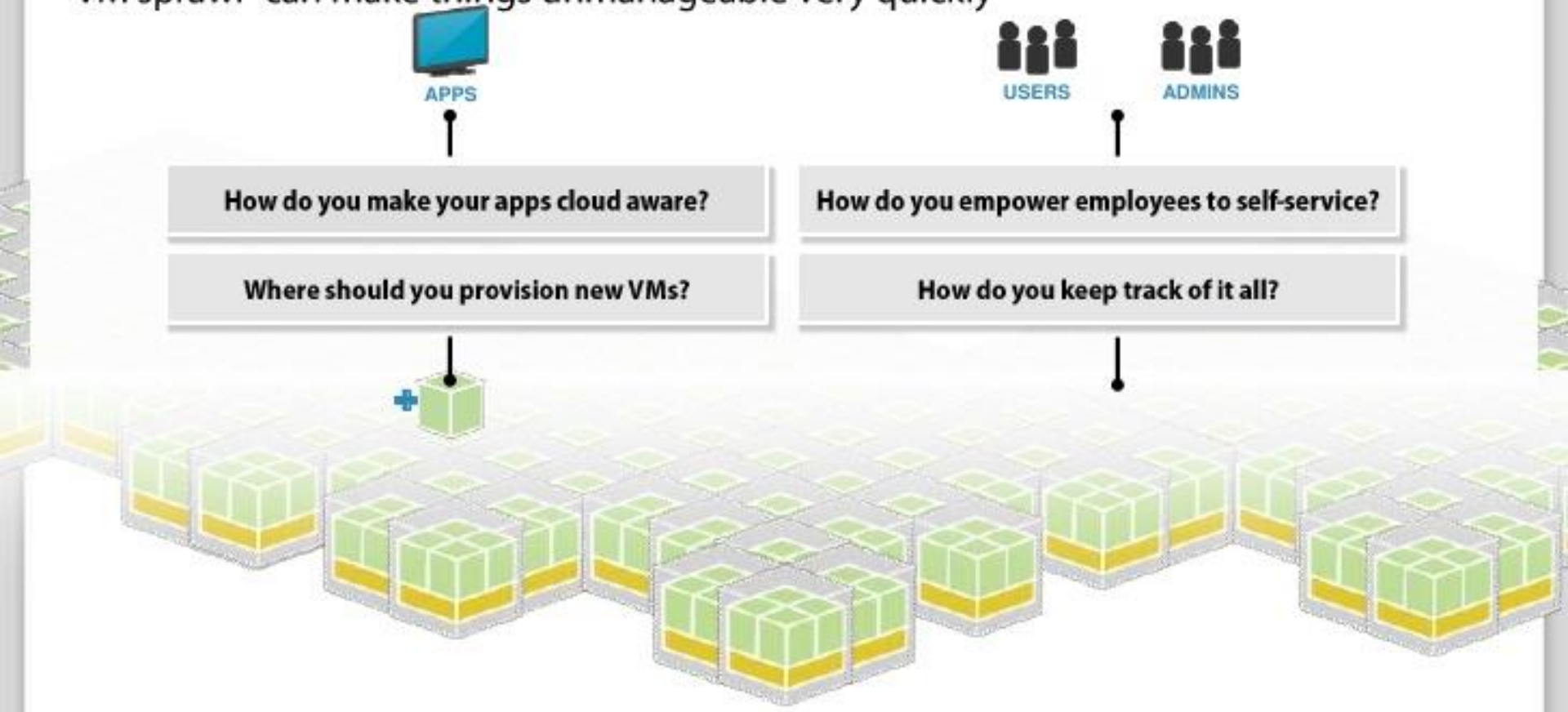
- ✔ Flexibility, Efficiency are key drivers
- ✔ Resource pools for apps starting to form...

1. Virtualization
2. Cloud Data Center
3. Cloud Federation

Automation & Efficiency →

But questions arise as the environment grows...

"VM sprawl" can make things unmanageable very quickly



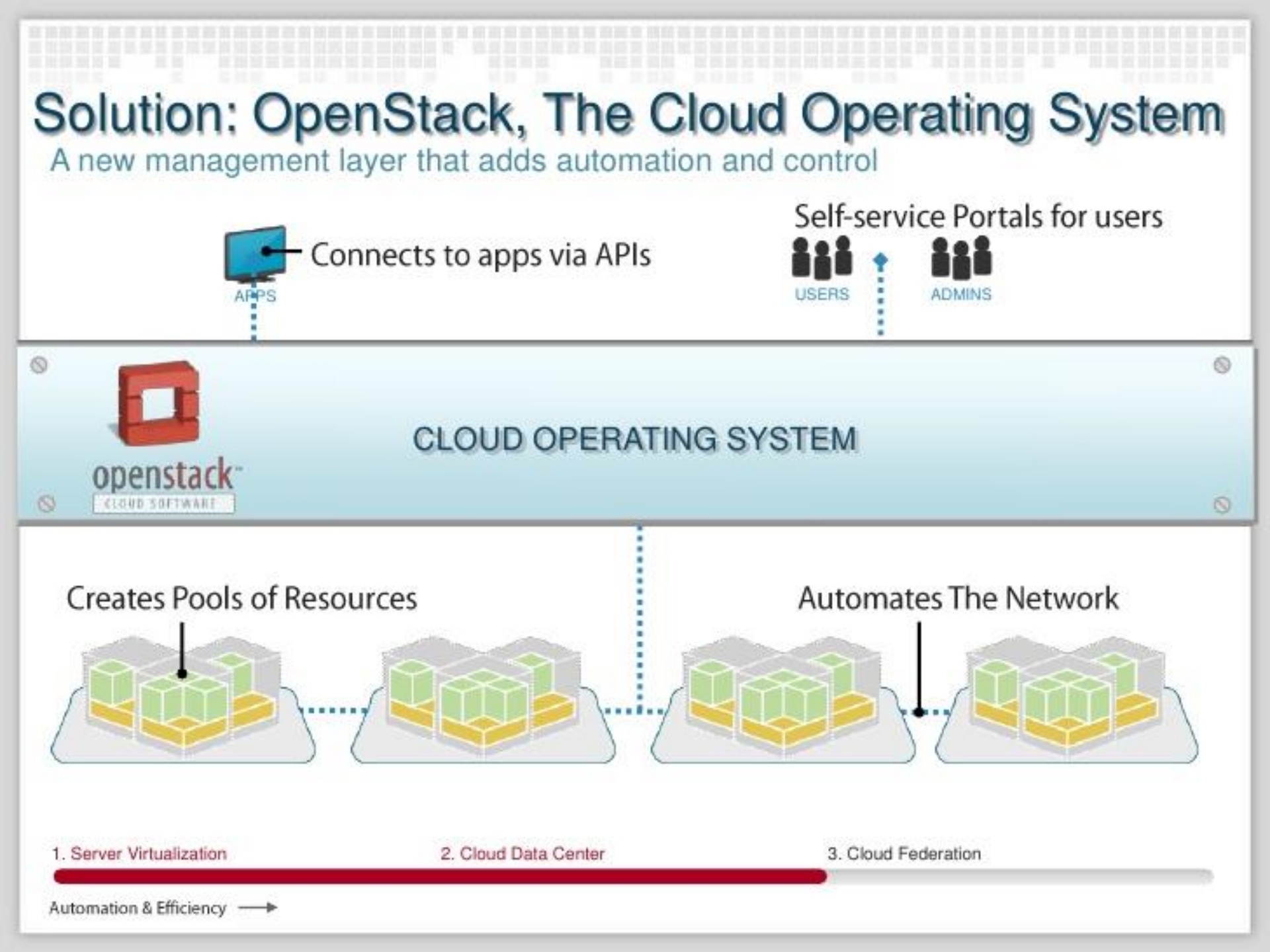
A Cloud Management Layer Is Missing

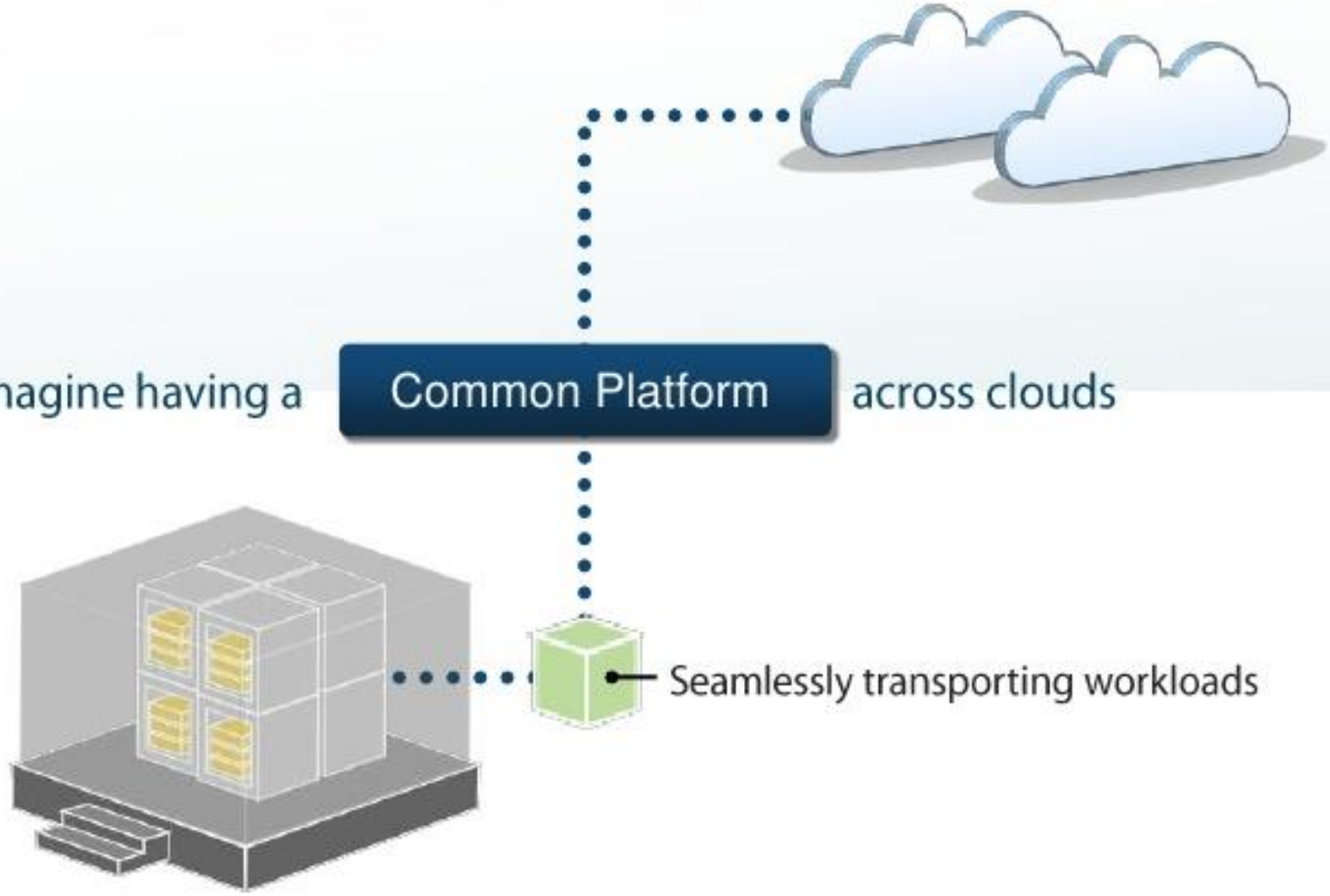
1. Virtualization
2. Cloud Data Center
3. Cloud Federation

Automation & Efficiency →

Solution: OpenStack, The Cloud Operating System

A new management layer that adds automation and control




Imagine having a
Common Platform
across clouds
Seamlessly transporting workloads
1. Virtualization
2. Cloud Data Center
3. Cloud Federation
Automation & Efficiency

A common platform is here.

OpenStack is open source software powering public and private clouds.

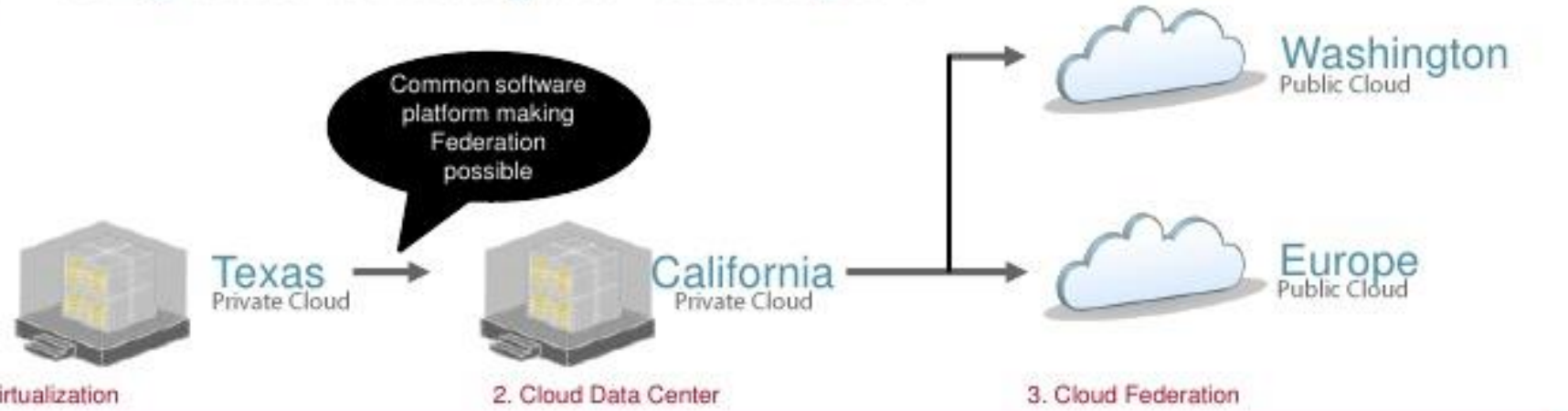
Private Cloud:
Run OpenStack software in your own corporate data centers

openstack™
CLOUD SOFTWARE

Public Cloud:
OpenStack powers some of the worlds largest public cloud deployments.

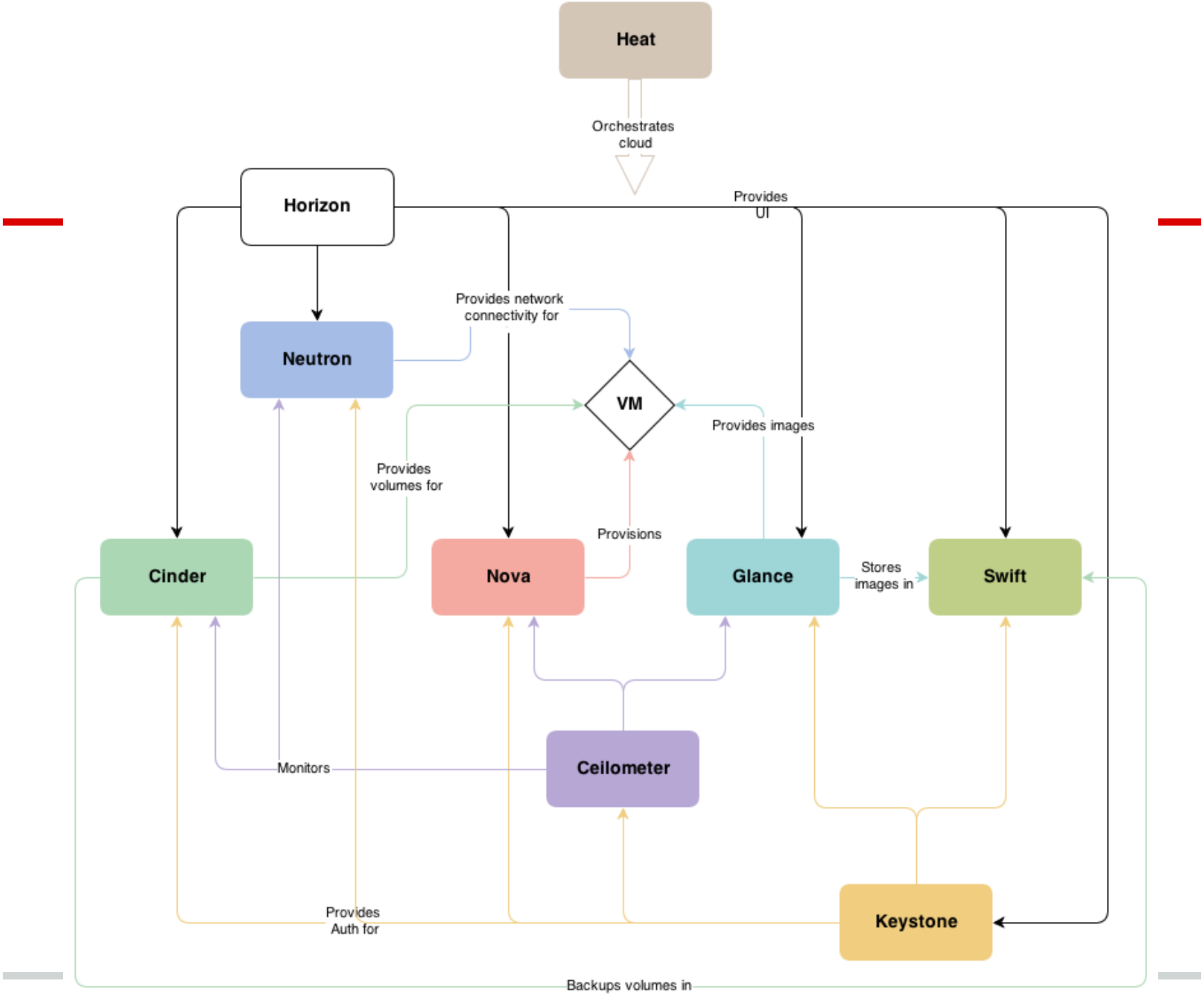
OpenStack enables cloud federation

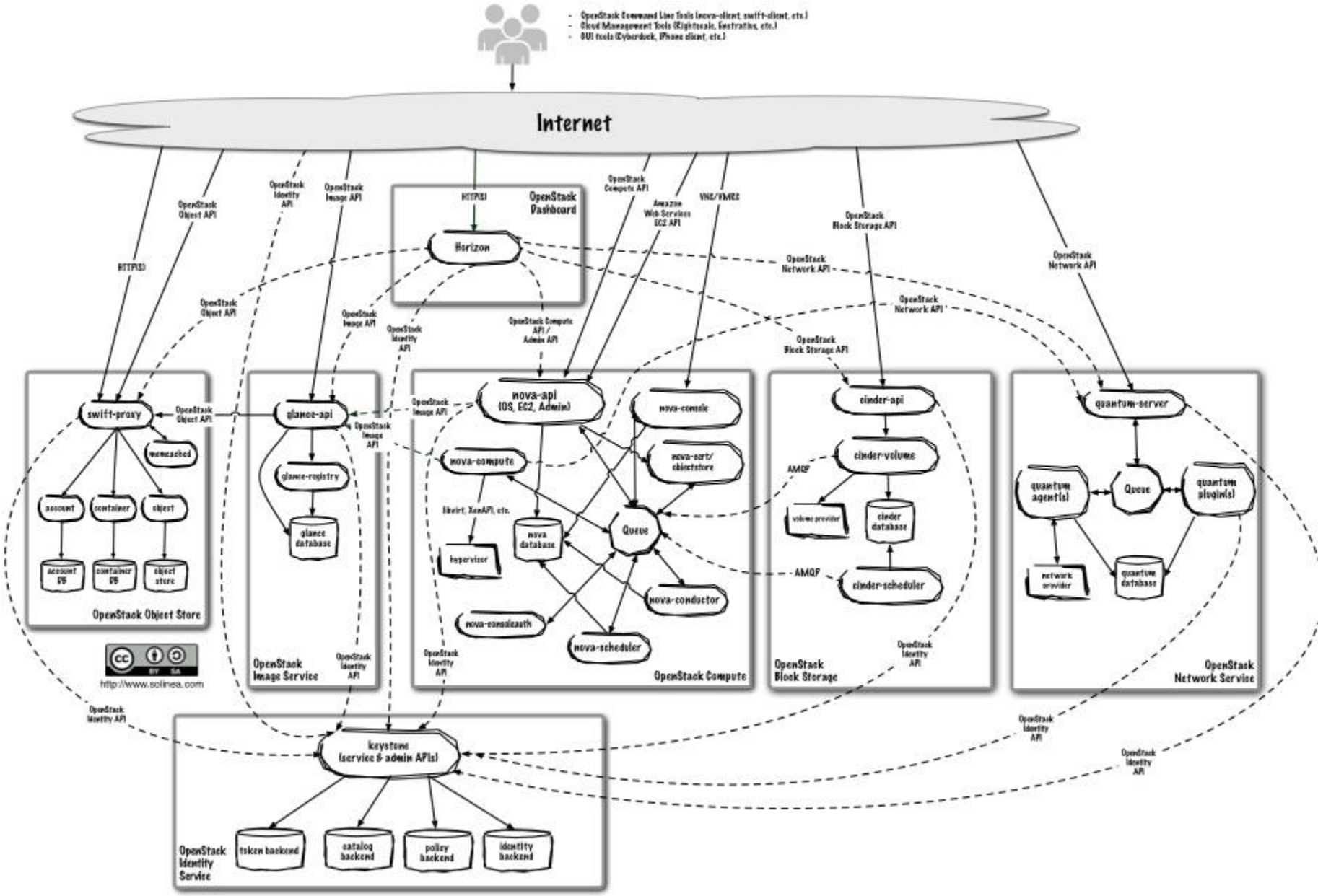
Connecting clouds to create global resource pools



Openstack Architecture

- The OpenStack project is an open source cloud computing platform for all types of clouds, which aims to be simple to implement, massively scalable, and feature rich.
- OpenStack provides an Infrastructure as a Service (IaaS) solution through a set of interrelated services. Each service offers an application programming interface (API) that facilitates this integration.


Heat
Orchestrates cloud
Horizon
Provides UI
Provides network connectivity for
Neutron
VM
Provides images
Provides volumes for
Provisions
Cinder
Nova
Glance
Stores images in
Swift
Monitors
Ceilometer
Provides Auth for
Keystone
Backups volumes in


- OpenStack Command Line Tools (nova-client, swift-client, etc.)
- Cloud Management Tools (Rightscale, Enstratius, etc.)
- GUI tools (Cyberduck, iPhone client, etc.)
Internet
OpenStack Dashboard
HTTP(S)
Horizon
OpenStack Object API
OpenStack Identity API
OpenStack Image API
OpenStack Compute API
Amazon Web Services EC2 API
VNC/RMDE
OpenStack Block Storage API
OpenStack Network API
OpenStack Compute API / Admin API
swift-proxy
memcached
account
container
object
account DB
container DB
object store
OpenStack Object Store
glance-api
glance-registry
glance database
OpenStack Image Service
nova-api (OS, EC2, Admin)
nova-console
nova-compute
nova-cert/ objectstore
libvirt, XenAPI, etc.
hypervisor
nova database
Queue
nova-conductor
nova-consoleauth
nova-scheduler
OpenStack Compute
cinder-api
cinder-volumes
AMQP
volume provider
cinder database
cinder-scheduler
OpenStack Block Storage
quantum-server
quantum agent(s)
Queue
quantum plugin(s)
network provider
quantum database
OpenStack Network Service
http://www.solinea.com
keystone (service & admin APIs)
token backend
catalog backend
policy backend
identity backend
OpenStack Identity Service

Openstack Services

Service	Project	Description
Dashboard	Horizon	Enables users to interact with all OpenStack services to launch an instance, assign IP addresses, set access controls, and so on.
Identity Service	Keystone	Provides authentication and authorization for all the OpenStack services. Also provides a service catalog within a particular OpenStack cloud.
Compute Service	Nova	Provisions and manages large networks of virtual machines on demand.
Object Storage Service	Swift	Stores and retrieve files. Does not mount directories like a file server.
Block Storage Service	Cinder	Provides persistent block storage to guest virtual machines.
Image Service	Glance	Provides a registry of virtual machine images. Compute Service uses it to provision instances.

Openstack Services

Service	Project	Description
Networking Service	Neutron	Enables network connectivity as a service among interface devices managed by other OpenStack services, usually Compute Service. Enables users to create and attach interfaces to networks. Has a pluggable architecture that supports many popular networking vendors and technologies.
Metering/Monitoring Service	Ceilometer	Monitors and meters the OpenStack cloud for billing, benchmarking, scalability, and statistics purposes.
Orchestration Service	Heat	Orchestrates multiple composite cloud applications by using the AWS CloudFormation template format, through both an OpenStack-native REST API and a CloudFormation-compatible Query API.

How to start with Openstack?

- http://www.openstack.org/software/start/
  - you can install it yourself
    - http://devstack.org/
      - For O/S developers
    - Installation projects like Kolla, Fuel; distributions
  - Public clouds
    - Such as Homeatcloud
      - https://www.homeatcloud.cz
      - Horizon at https://openstack.homeatcloud.cz

How to Create VM in VIA O~S?

- Configure Virtual Network
- Configure Security
- Create VM

Virtual Network Configuration

- public network
  - aka ‘internet’
- private network
  - created VMs will be connected to this network
- router
  - connects private network and public network

Security Configuration

- keypair
  - ssh key to sign in to VM
  - it is injected into VM on creation
- security group
  - ‘firewall’ configuration

VM creation

- Image
  - What will be running - e.g., Linux, Windows, ...
- Flavor
  - HW machine type - e.g., CPU, memory,
- Security
  - keypair
  - security group
- Network
  - VM will be connected to the network
- Volumes
- After creation run script

Demo/Network Configuration

- Private Network creation
  - *Project/Networks, +Create Network*
    - enter: *Network Name, Subnet Name, Network Address (e.g., 192.168.77.0/24)*
    - enter: *Subnet details/DNS Name Servers:* 8.8.8.8
- Router creation
  - *Project/Routers, + Create Router*
    - *enter:* Router Name
  - Action *Set Gateway* on your router
    - select *External Network: public*
  - Show detail of your router, *+Add Interface*
    - select your private network subnet in *Subnet*

Demo/Security Configuration

- Configure *default* Security Group
  - *Project/Access & Security/Security Groups*
  - select *default* security group and click *Edit Rules*
  - Add rules:
    - SSH: TCP, port 22
    - Web: TCP, port 80
- Keypair
  - *Project/Access & Security/Keypairs, +Add Keypair*
    - enter: name
  - download keypair

Demo/VM creation

- *Project/Instances, +Launch Instance*
  - Tab *Details*
    - Select *Image* - e.g., *TurnKey Wordpress*
    - Enter *Instance name*
    - Select *Flavor* - e.g., *b1.micro*
  - Tab *Acces & Security*
    - check if values created in previous steps are used
  - Tab *Networking*
    - select network created in previous step
  - click on *Launch*

Demo/VM accessing

- Assign floating IP
  - *Project/Instances,* on instance run action *+Associate Floating IP*
    - select IP address
      - note: if it fails, check if IP address are associated to the project in *Project/Access & Security/Floating IPs.* Allocate new ones using *+Allocate IP to project*
- Connect to the VM

  $ ssh -i <keypair.pem> ubuntu@<floating-ip>

Demo/Using Volume

- Volume is a persistent block device
- Can be mounted in VM
- Steps
  - create volume
  - attach it to VM
  - use it in VM

Demo/Volume Create

- *Project/Volumes, +Create Volume*
  - enter *Volume name*
  - enter *size (in GB)*
- on volume, +*Edit Attachments*
  - select instance
  - enter device name: */dev/vdb*

Demo/Volume Usage

- ssh to VM
- use block device

 # lsblk

vdb 253:16 0 1G 0 disk

 # mkfs.ext3 /dev/vdb

 # mkdir /_

 # mount /dev/vdb /_

Demo/Volume Snapshots

- Volume can be ‘shared’ between VMs
  - volume must be duplicated
- Steps
  - create snapshot
  - create volume from snapshot
  - upload to image
  - download to volume
    - Last two steps because of our HPE storage

Demo/Launch VM from Volume

- In the New Instance dialog, do as before
- Choose Boot Source: from Volume

Demo/Blue-Green Deployment

- Disassociate Floating IP
- Associate to second instance

Is there more time?

- Start a second instance
- Load Balancer or Database?

Questions?

If not:
You can keep the trial account for 1 week.
Write to support@homeatcloud.cz
If you need an extension.