Cloud Computing (24/25)
Q/A Session 2

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Assignment 1

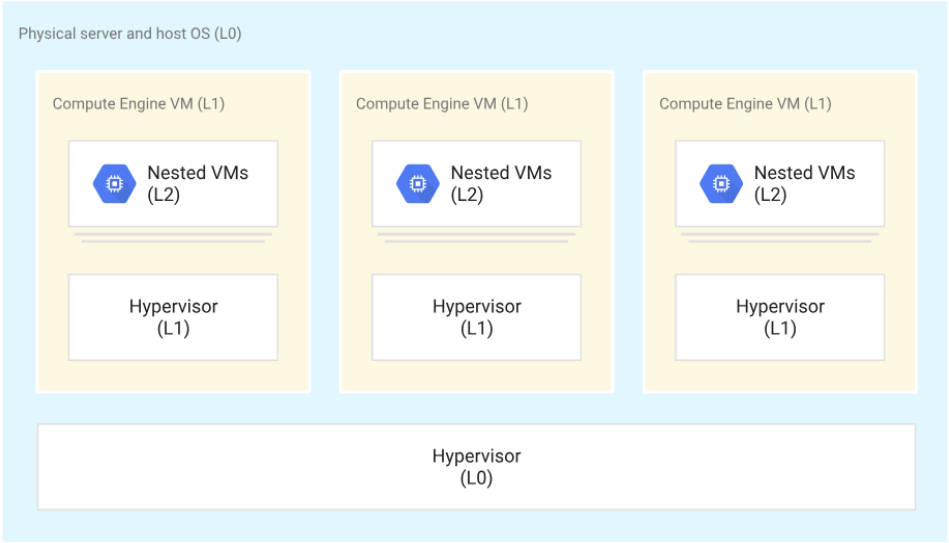
- Submissions from 22 groups
- Reviews and gradings by next week

Assignment 2

- In Assignment 1, you worked with cloud platforms from a user perspective
- For Assignment 2: switch role from cloud user to **cloud provider**
  - Deploy a cloud platform, make it usable for potential users
  - GCP VMs with nested virtualization are used as hosts

Nested Virtualization

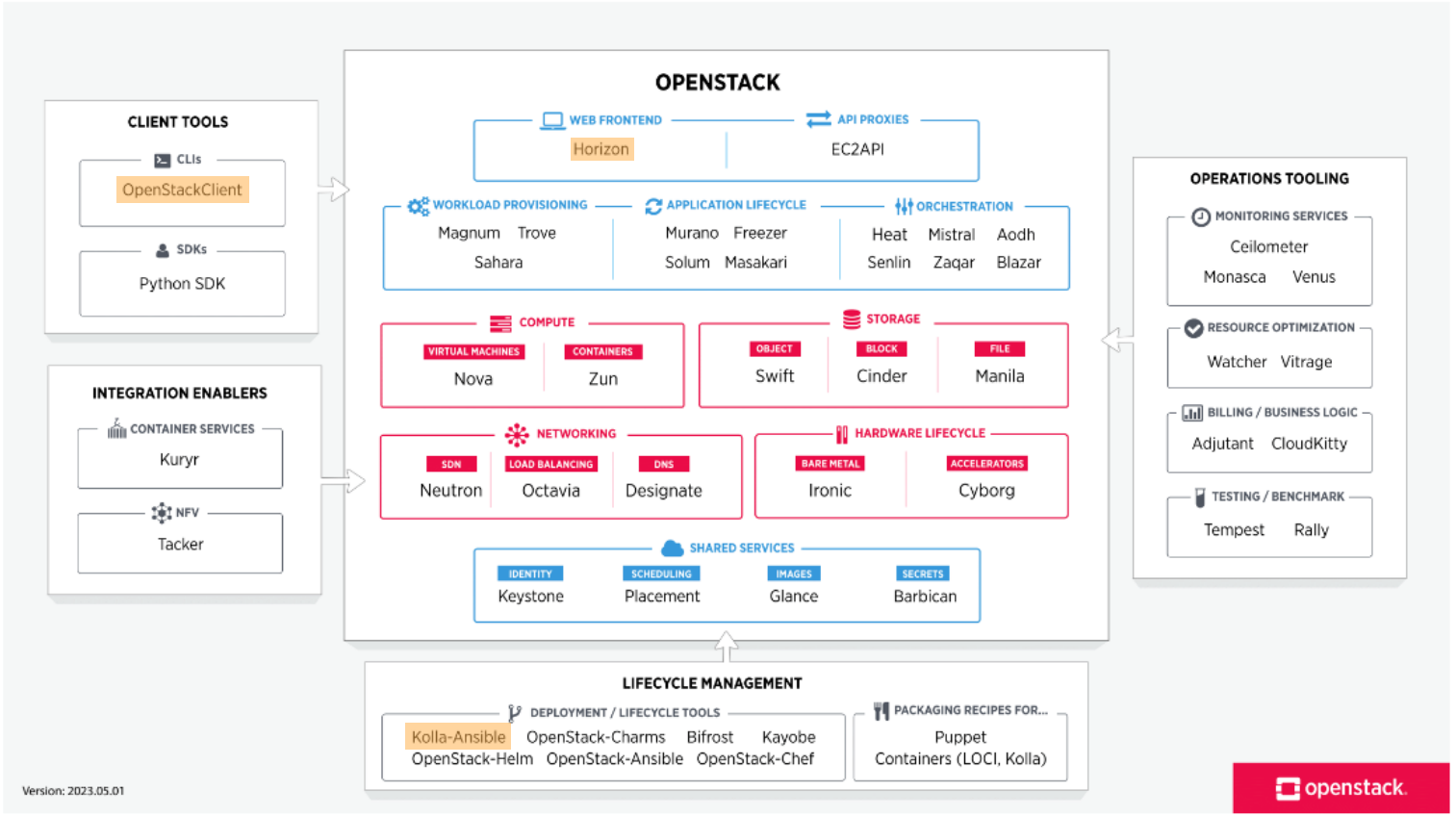
- GCP VMs need to support nested virtualization!
- Which virtualization type supports nested virtualization?



OpenStack

- Free open standard cloud computing platform
- Made up of many components for:
  - Computing
  - Storage
  - Networking
  - Identity management
  - Orchestration
  - …
- Complex solution that easily exceeds scope of any assignment
- Simplified approach: we will deploy it using **kolla-ansible**

OpenStack


CLIENT TOOLS
CLIs
OpenStackClient
SDKs
Python SDK
INTEGRATION ENABLERS
CONTAINER SERVICES
Kuryr
NFV
Tacker
OPENSTACK
WEB FRONTEND
Horizon
API PROXIES
EC2API
WORKLOAD PROVISIONING
Magnum Trove
Sahara
APPLICATION LIFECYCLE
Murano Freezer
Solum Masakari
ORCHESTRATION
Heat Mistral Aodh
Senlin Zaqar Blazar
COMPUTE
VIRTUAL MACHINES
Nova
CONTAINERS
Zun
STORAGE
OBJECT
Swift
BLOCK
Cinder
FILE
Manila
NETWORKING
SDN
Neutron
LOAD BALANCING
Octavia
DNS
Designate
HARDWARE LIFECYCLE
BARE METAL
Ironic
ACCELERATORS
Cyborg
SHARED SERVICES
IDENTITY
Keystone
SCHEDULING
Placement
IMAGES
Glance
SECRETS
Barbican
OPERATIONS TOOLING
MONITORING SERVICES
Ceilometer
Monasca Venus
RESOURCE OPTIMIZATION
Watcher Vitrage
BILLING / BUSINESS LOGIC
Adjutant CloudKitty
TESTING / BENCHMARK
Tempest Rally
LIFECYCLE MANAGEMENT
DEPLOYMENT / LIFECYCLE TOOLS
Kolla-Ansible OpenStack-Charms Bifrost Kayobe
OpenStack-Helm OpenStack-Ansible OpenStack-Chef
PACKAGING RECIPES FOR...
Puppet
Containers (LOCI, Kolla)
Version: 2023.05.01
openstack.

Kolla-ansible

- Open-source community project since 2014
- Containerized deployment of OpenStack services
- Aims at simplification of OpenStack deployment
- Realized with Infrastructure as Code paradigm

  ➔ Ansible

Infrastructure as Code (IaC)

- Automates infrastructure provisioning and management using code, ensuring consistency and repeatability
- Advantages:
  - Consistent deployments with fewer manual errors
  - Version-controlled infrastructure configurations
  - Scalable and consistent across environments (e.g., dev, test, prod)

Types of IaC

Imperative

- Specifies how to achieve a desired state
- Manually defining and scripting each step
- Greater control over operations
- Higher complexity and risk of errors

ANSIBLE

Declarative

- Specifies what the desired state should be
- Easier to maintain and audit
- Relies on tools to handle implementation

Ansible

- Published in 2012
- Deployment & configuration described in YAML files
- Agentless -> Push
  - Only OpenSSH (and Python) needed
- Playbooks -> **imperative** with **declarative** features
  - Contain configuration, variables and templates of a deployment
  - Using roles
- Roles
  - Describe a configuration of a specific component
  - e.g. database server; set up a VPN

Practical Assignment 2

- **Task 1**: Prepare GCP VMs for OpenStack
  - Create a shell script that sets up a virtual machine environment
  - Set up disk, image, VMs, VPC networks, firewall rules
  - VMs must support nested virtualization
- **Task 2**: Install OpenStack
  - Using kolla-ansible
- **Task 3**: Configure OpenStack
- **Task 4**: Execute Data Processing Application
  - Deploy Apache Spark
  - Execute JavaSparkPi job

Common Pitfalls & General Remarks

- Make sure IP (v4) forwarding is enabled (*cat /proc/sys/net/ipv4/ip_forward*)
  - If not, enable it with "sysctl -w net.ipv4.ip_forward=1"
- Firewall Rules, Firewall Rules, Firewall Rules!
- Execute commands one after another; validate before proceeding
- Location of Spark logs depends on your chosen installation path

Assignment Submission: ISIS

- Submit all required files on ISIS
- Resubmissions are possible: only the last submission will be counted
- Submission will be partially validated automatically:
  - Use the correct file names
  - Submit exactly the required files described in the assignment
  - Text with answers to questions in submission text field / separate file

Last Reminder

Always remember to shut down your unused VMs!