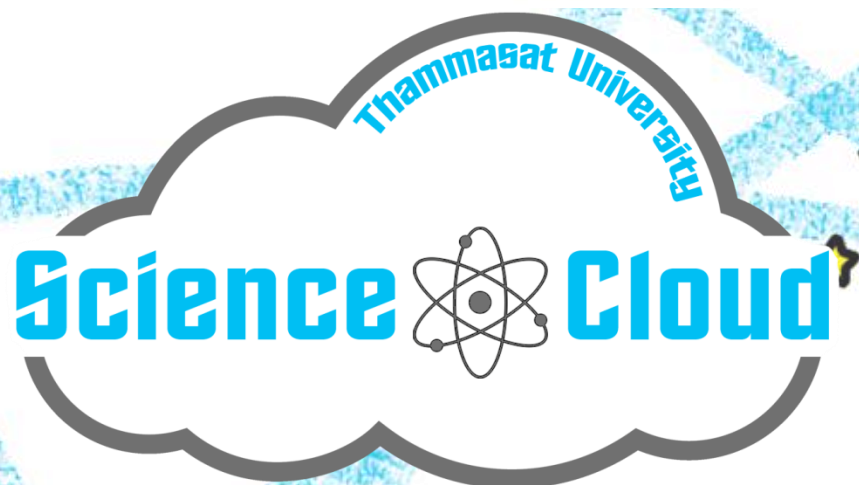




DEPARTMENT OF
COMPUTER SCIENCE
THAMMASAT UNIVERSITY



vasabiLab
VIRTUALIZATION ARCHITECTURE AND
SCALABLE INFRASTRUCTURE LABORATORY



OpenStack

tutorial



ทีมงาน **vasabilab**

Vasabilab Team

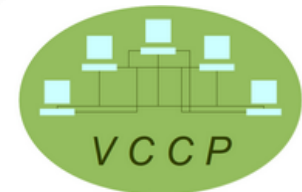
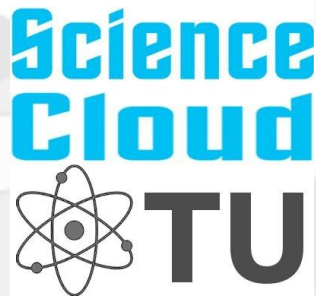
- กษิติศ ชาญเชื้อว
- วศินี ศิริบุญย์
- กรรณิการ์ ทรัพย์สมบูรณ์
- สมเกียรติ โกศลสมบัติ
- พิเชษฐ์ วงศ์วิบูลศิลป์
- พิทักษ์ แทนแก้ว
- ชยาวัฒน์ เพชรวิเศษ

THANK TO OUR SPONSORS



vasabilab

- วิจัย **Virtualization and Cloud Computing**
- **Promote OpenStack Software and ECO system**
 - ศึกษา เผยแพร่ และแลกเปลี่ยนความรู้
 - ส่งเสริมการใช้งานจริงและศึกษาจากการใช้งานจริง
 - **Hack** ให้มากที่สุดเท่าที่จะทำได้ เพื่อสร้างความรู้ใหม่และพัฒนาสิ่งใหม่ๆ
 - ร่วมกับ **user community** และ **developer community**



Outline

A light gray background illustration featuring a rocket ship in the upper right corner, several five-pointed stars scattered across the upper half, and a planet with a ring system in the lower left corner. Faint, curved lines suggest orbital paths or space trajectories.

- **Introduction to Cloud Computing**
- **OpenStack Overview**
- **OpenStack Demo**

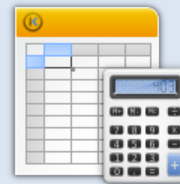
<http://vasabilab.cs.tu.ac.th/presentations/Openstack-tutorial-july2014.pdf>

Cloud Computing คืออะไร

- นิยาม **Cloud Computing (โดย NIST)** คือการประมวลผลที่:
 1. **On-demand, Self Services** เรียกใช้ได้เมื่อต้องการ และผู้ใช้สามารถร้องขอและบริหารจัดการสิ่งที่ตนต้องการได้ด้วยตนเอง
 2. **Broad Network Access** เข้าถึงได้โดยผู้ใช้งานจำนวนมาก
 3. **Resource Pooling** ผู้ใช้ใช้งานทรัพยากรร่วมกัน โดยมีระบบบริหารจัดการให้เป็นไปอย่างมีประสิทธิภาพ
 4. **Rapid Elasticity** เพิ่มความสามารถได้ตามความต้องการที่เพิ่มขึ้น
 5. **Measured Services** คิดราคาตามปริมาณการใช้งานเหมือนระบบสาธารณูปโภค

ระดับชั้นของการให้บริการ Cloud

SaaS



PaaS



IaaS



ขอบเขตของการให้บริการ Cloud

Private Cloud

- ใช้งานในองค์กร
- องค์กรจ่าย
- พนักงานในองค์กรแชร์ทรัพยากร

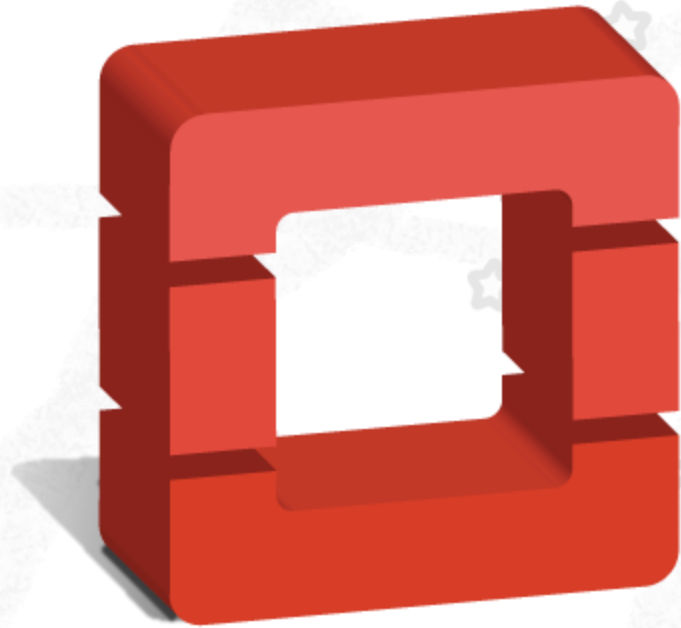
Public Cloud

- ใช้งานบน Internet
- จ่ายเท่าที่ใช้
- ผู้ใช้ทั่วโลกแชร์ทรัพยากร

ใช้น้อยลง

Hybrid Cloud

ใช้มากขึ้น



openstack™

CLOUD SOFTWARE



ระบบ OpenStack คืออะไร



- ระบบจัดการ **Cloud Computing** ที่ได้รับการพัฒนาขึ้นโดย **NASA** และ บริษัท **Rackspace**

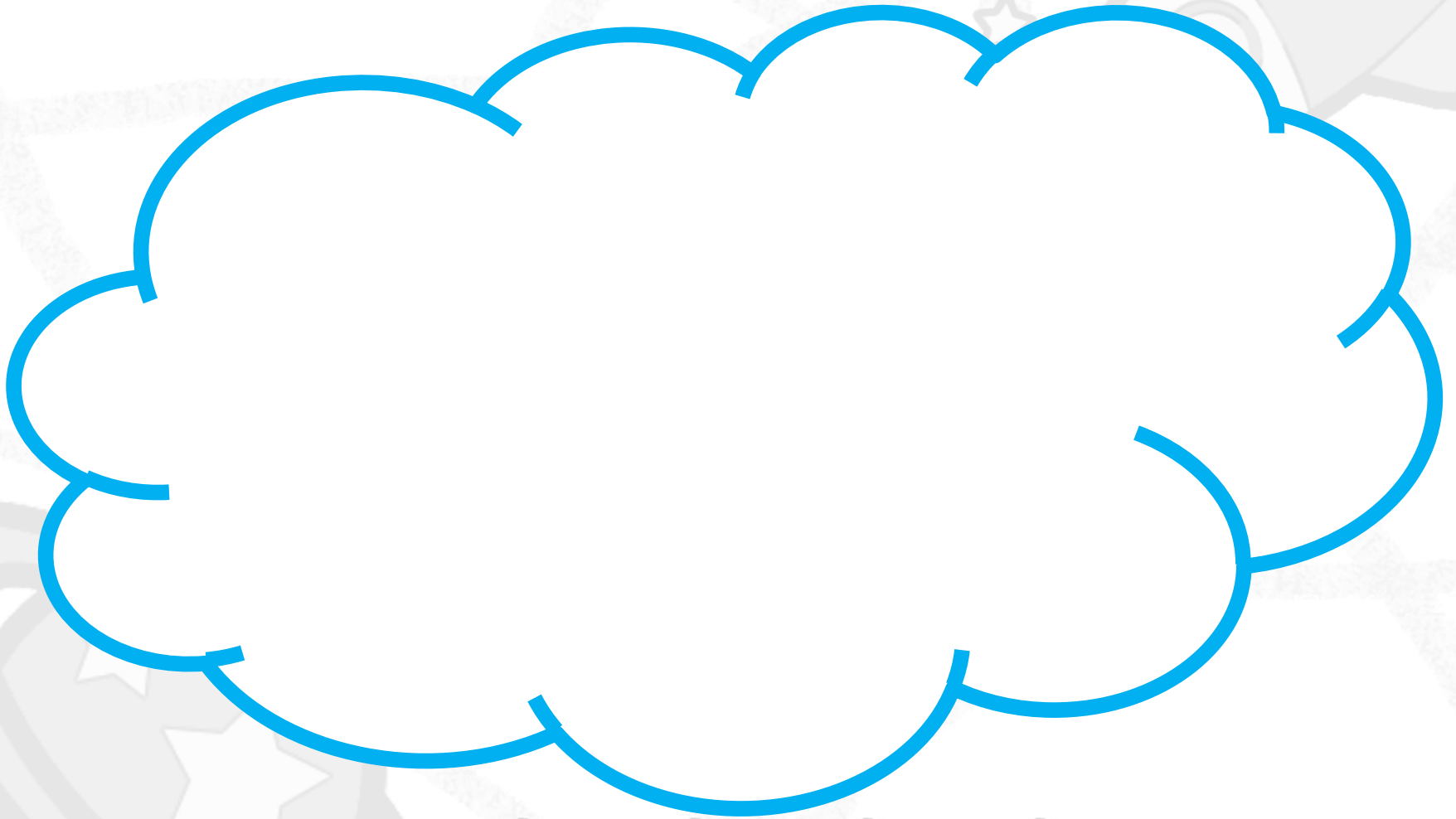


- ให้บริการ **Infrastructure as a Service**
- เป็นซอฟต์แวร์สำหรับสร้าง **Private Cloud** หรือ **Public Cloud**
- เป็นซอฟต์แวร์ **Open Source (Apache 2.0 license)**
- บริหารโดย **OpenStack Foundation**
- ได้รับความนิยมสูงและเติบโตอย่างรวดเร็ว

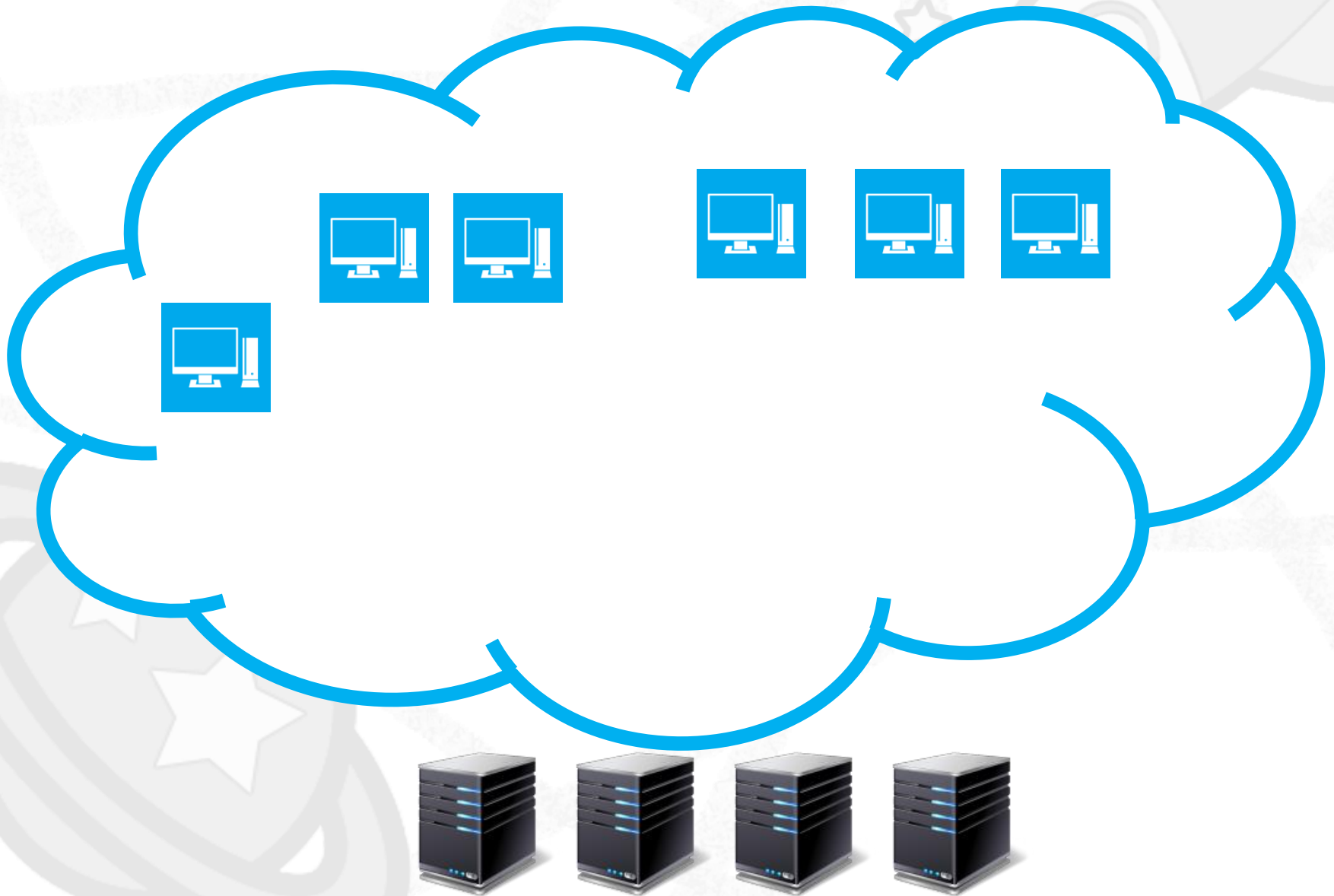
Some Current Stat

- Company: 338
- Members: 15000+
- Developers: 2100+
- IBM, HP, Rackspace, vmware, redhat, Dell, etc.
- CERN, Ebay, Disney, Intel, etc.

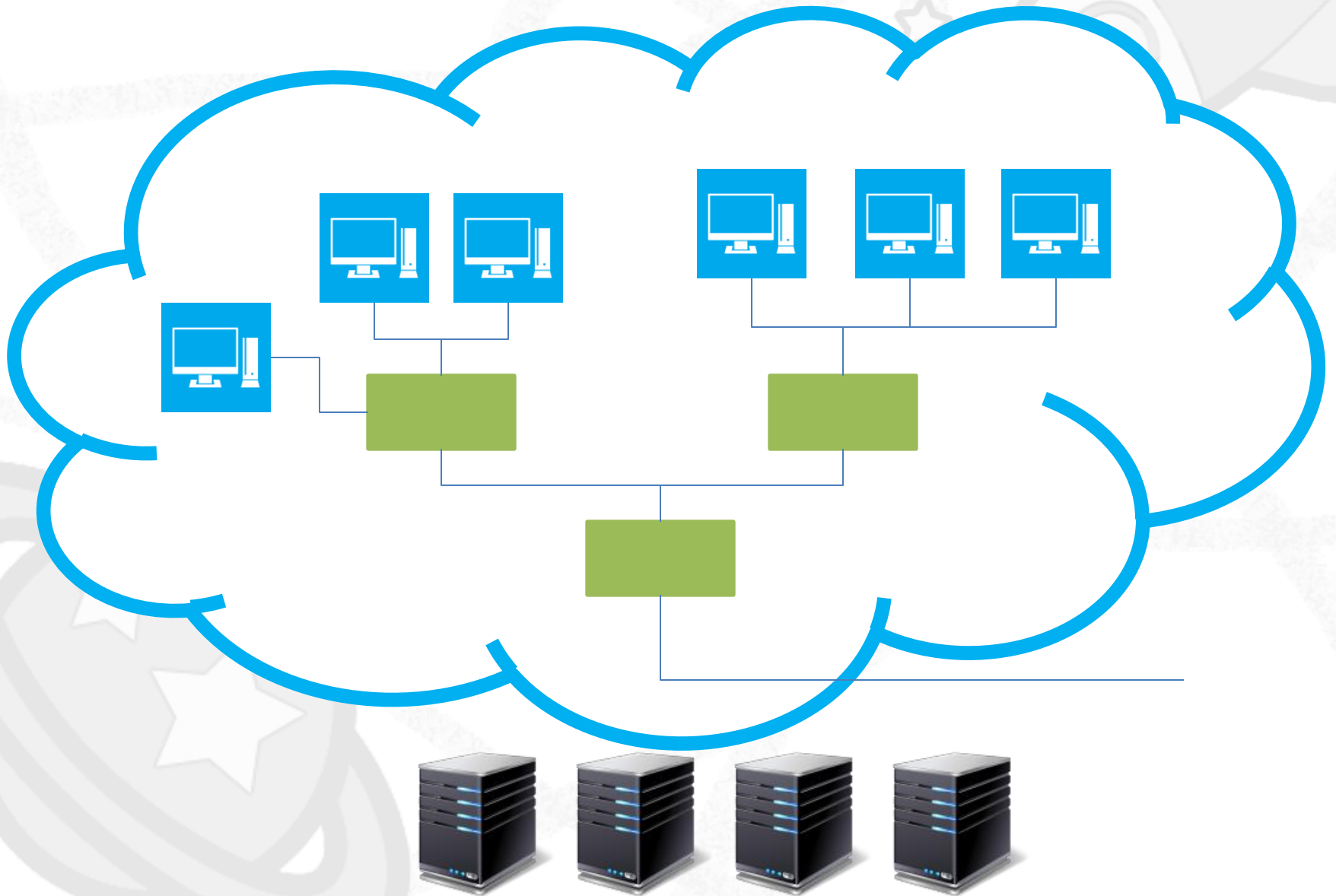
OpenStack ให้บริการอะไร



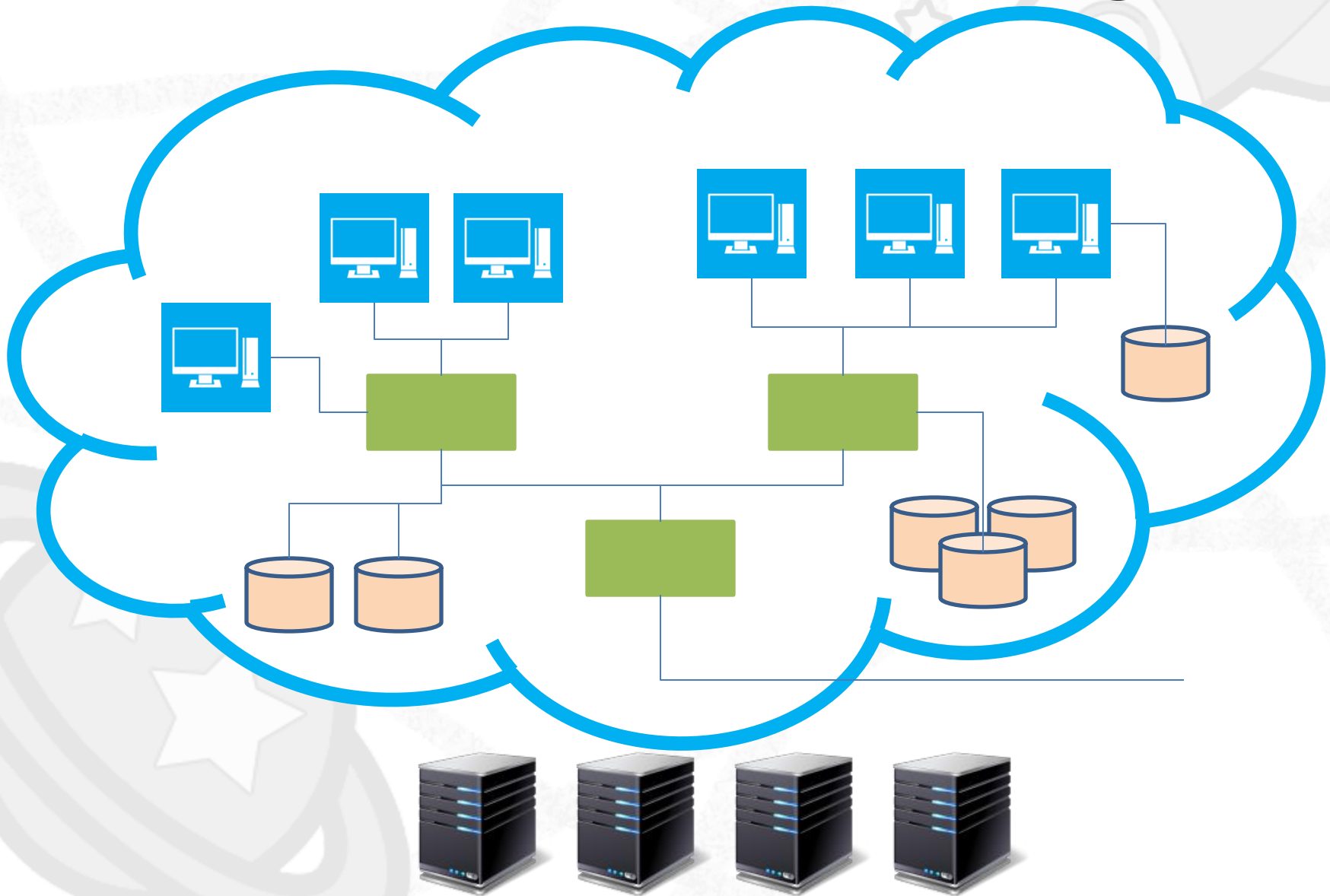
1. สร้างและใช้งาน **virtual machines**



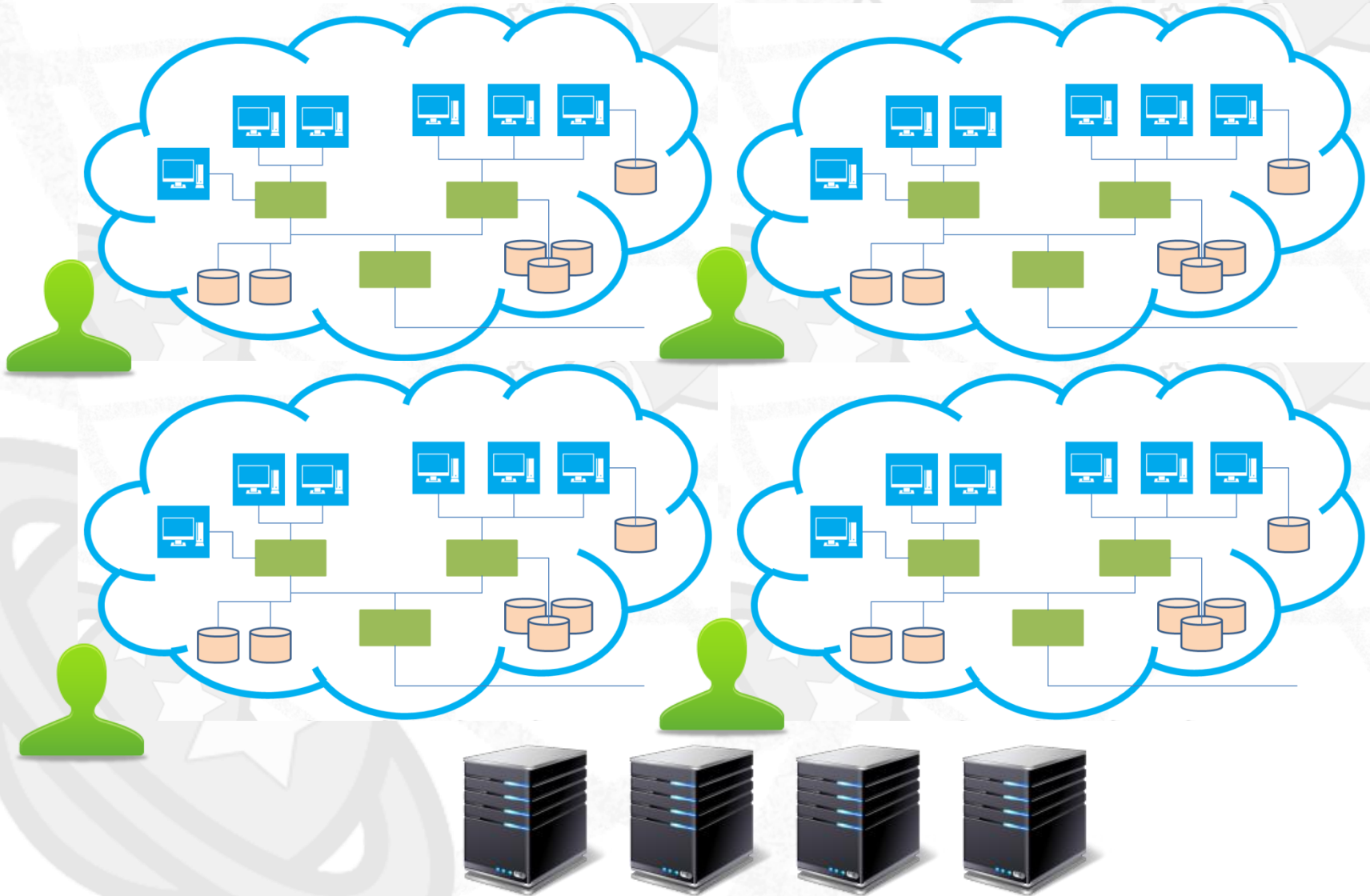
2. สร้างและใช้งาน **virtual networks**



3. สร้างและใช้งาน **virtual storages**



4. ให้บริการผู้ใช้หลายคน **multi-tenants**



OpenStack ปฏิบัติการอยู่ใน Layer ไหน

ระบบสารสนเทศ(เสมือน) ของผู้ใช้

cloudstack
open source cloud computing

OpenNebula.org
The Open Source Solution for Data Center Virtualization

ระบบจัดการ Cloud

openstack™
CLOUD SOFTWARE

vmware®

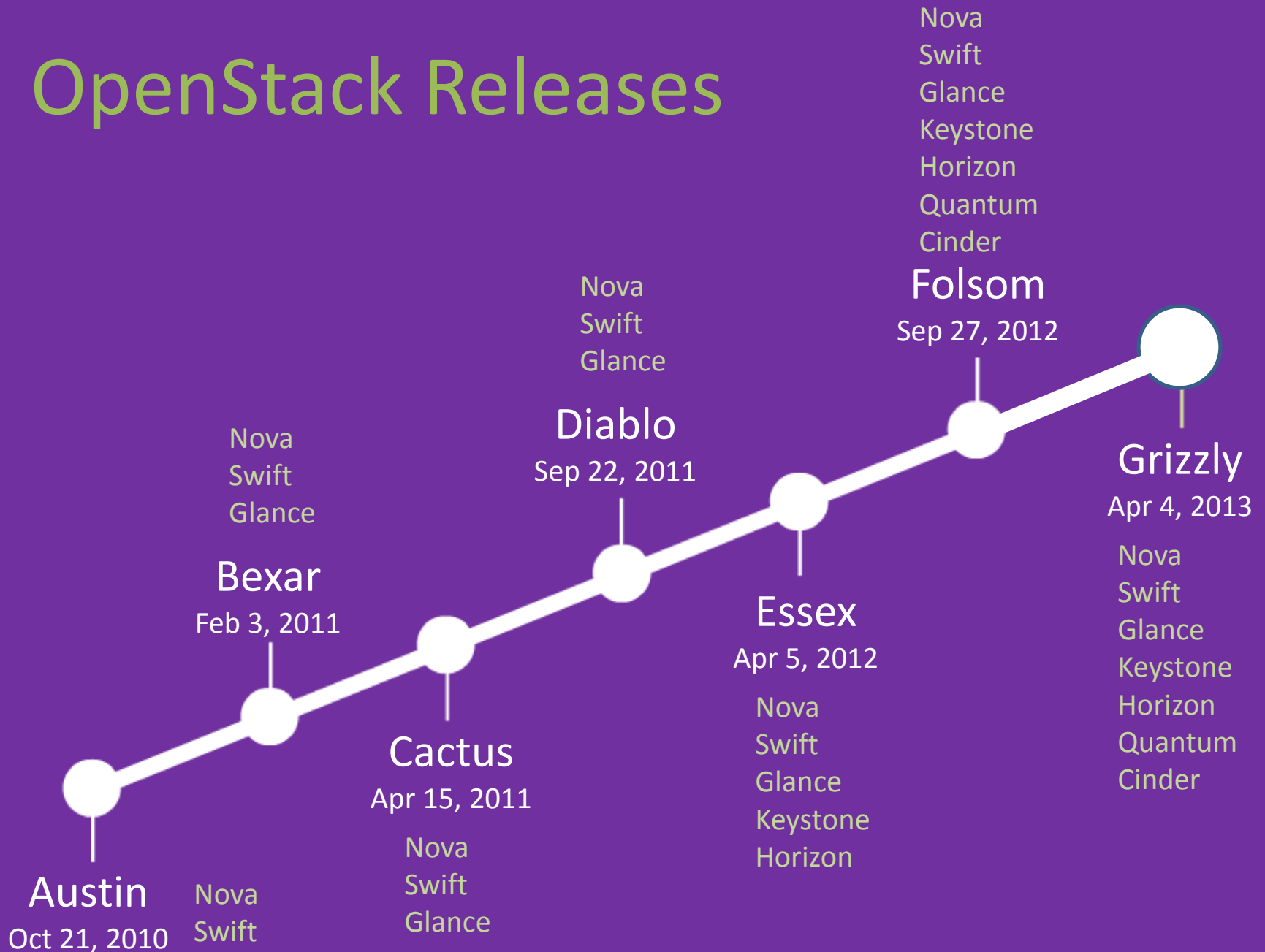
Xen®

Virtualization/OS

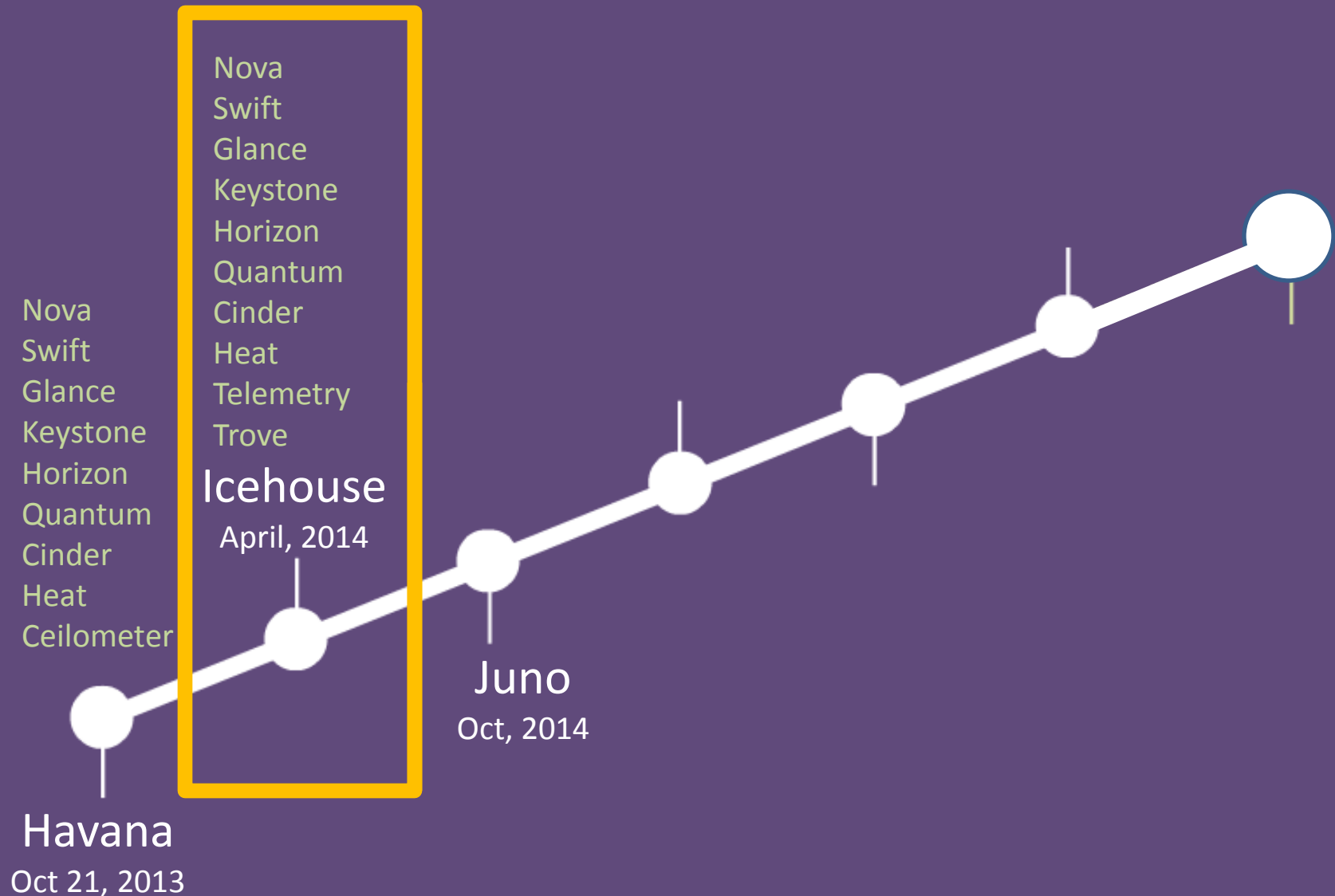
KVM
Microsoft®
Hyper-V™

Hardware/Storage/Network

OpenStack Releases



OpenStack Releases



Main Components



- OpenStack **Compute (Nova)**: Provision and manage large networks of virtual machines
- OpenStack **Object Storage (Swift)**: Create petabytes of secure, reliable storage using standard hardware
- OpenStack **Image Service (Glance)**: Catalog and manage massive libraries of server images

Main Components



- OpenStack **Dashboard (Horizon)** : a modular web-based user interface for all the OpenStack services.



- OpenStack **Identity Service (Keystone)** : authentication and authorization for all the OpenStack services.



- OpenStack **Network Service (Neutron)** : handle network virtualization

Main Components



- OpenStack **Block Storage (Cinder)** : a modular web-based user interface for all the OpenStack services.



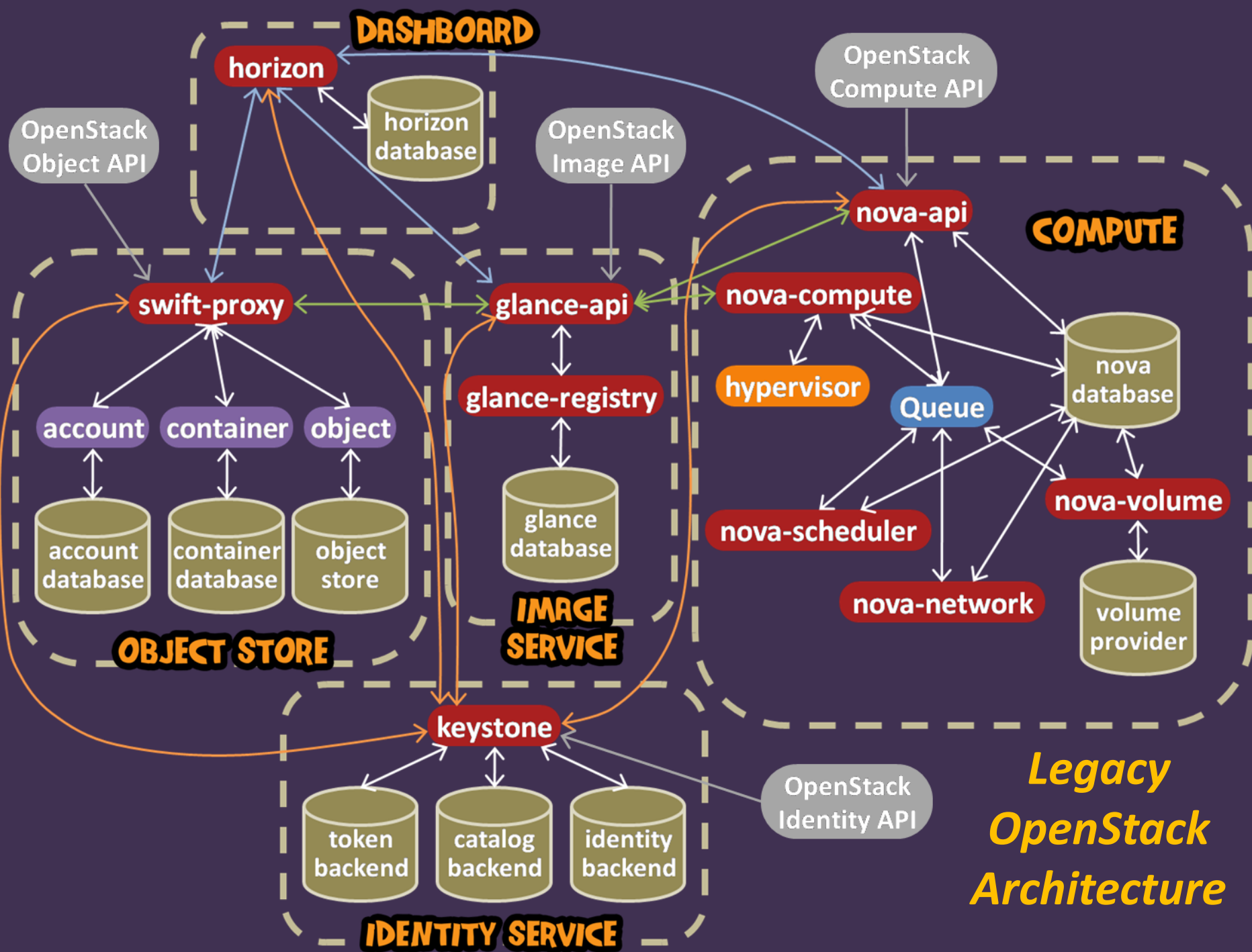
- OpenStack **Orchestration (Heat)** : authentication and authorization for all the OpenStack services.



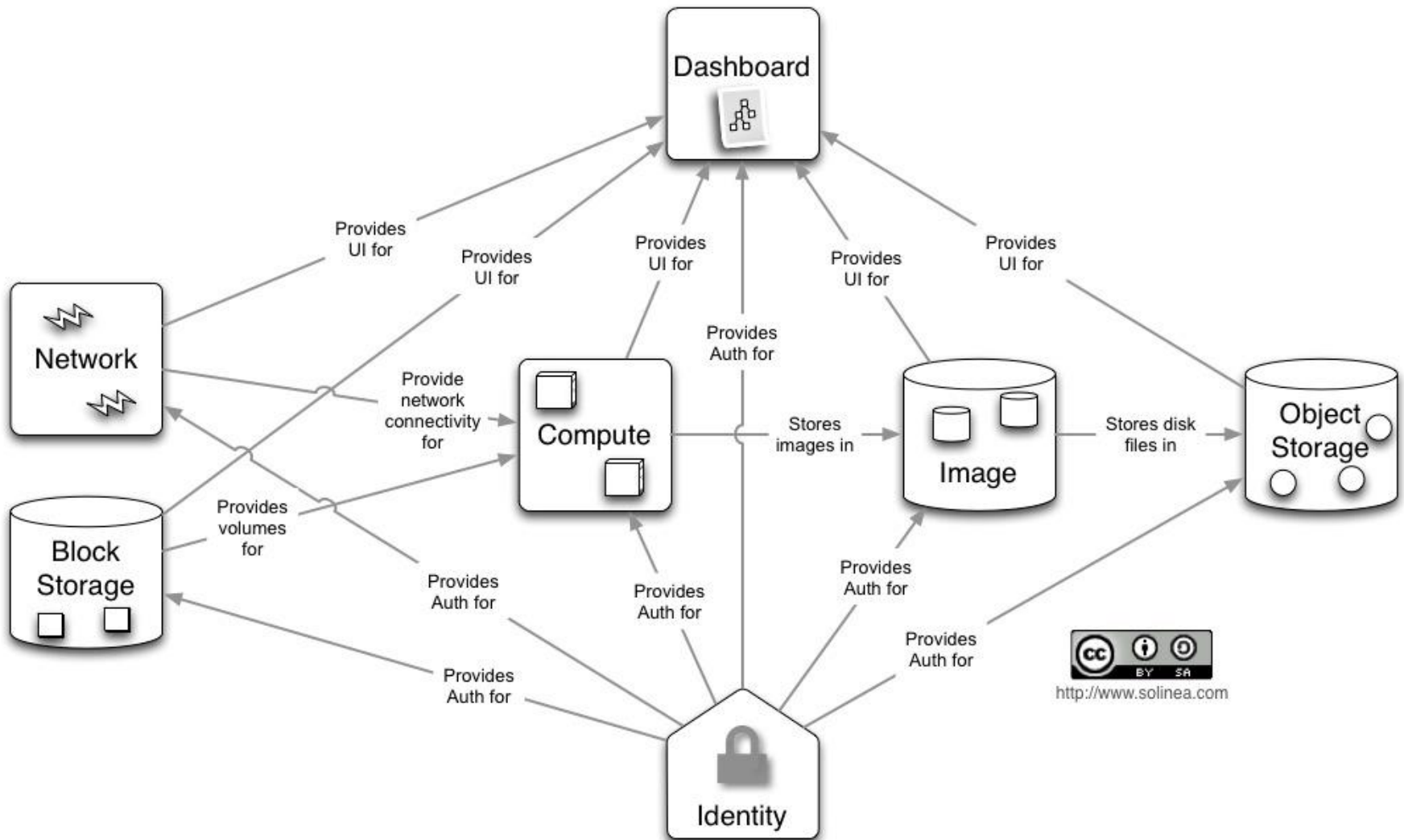
- OpenStack **Telemetry (Ceilometer)** : Monitor and meter openstack cloud



- OpenStack **Database (Trove)** : Provide Database Service



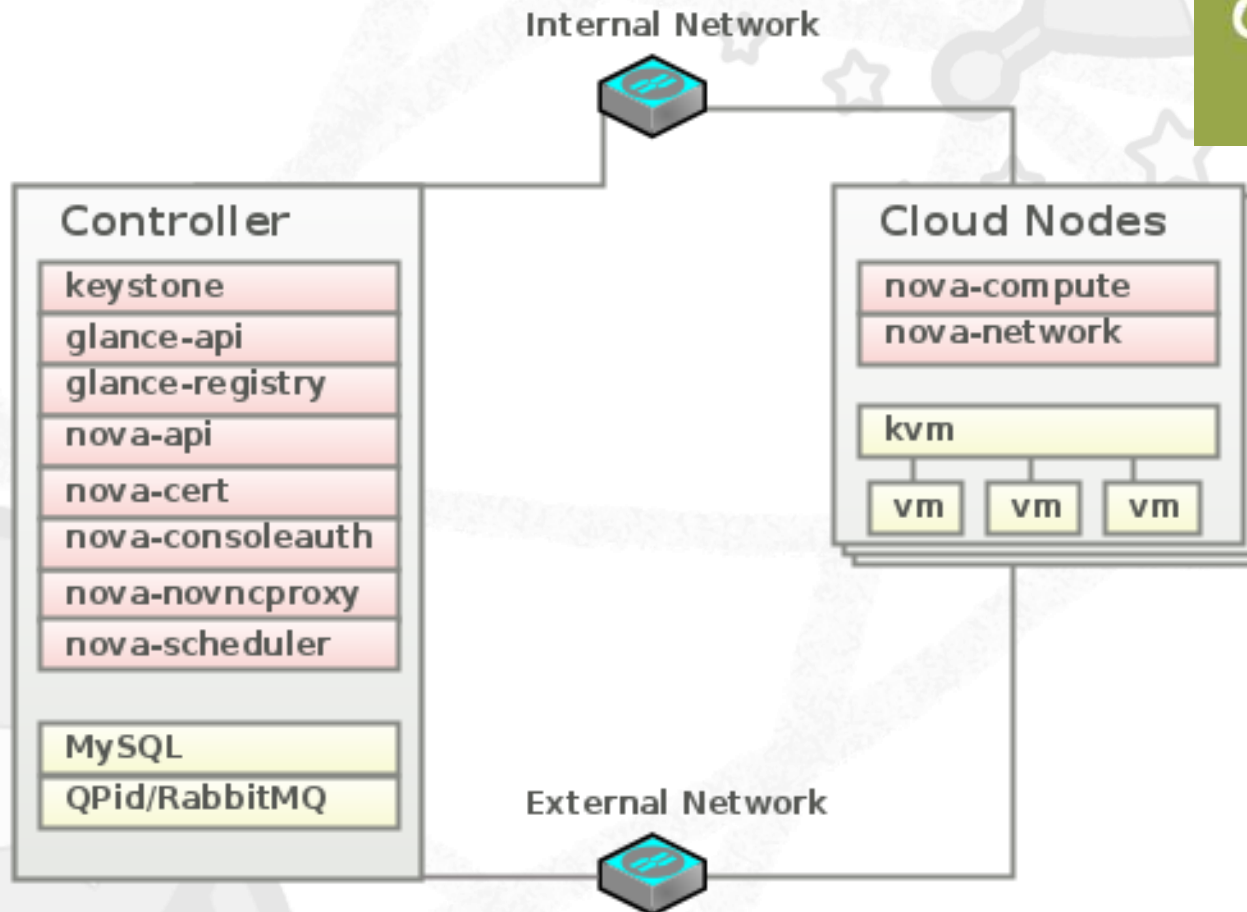
OpenStack Architecture



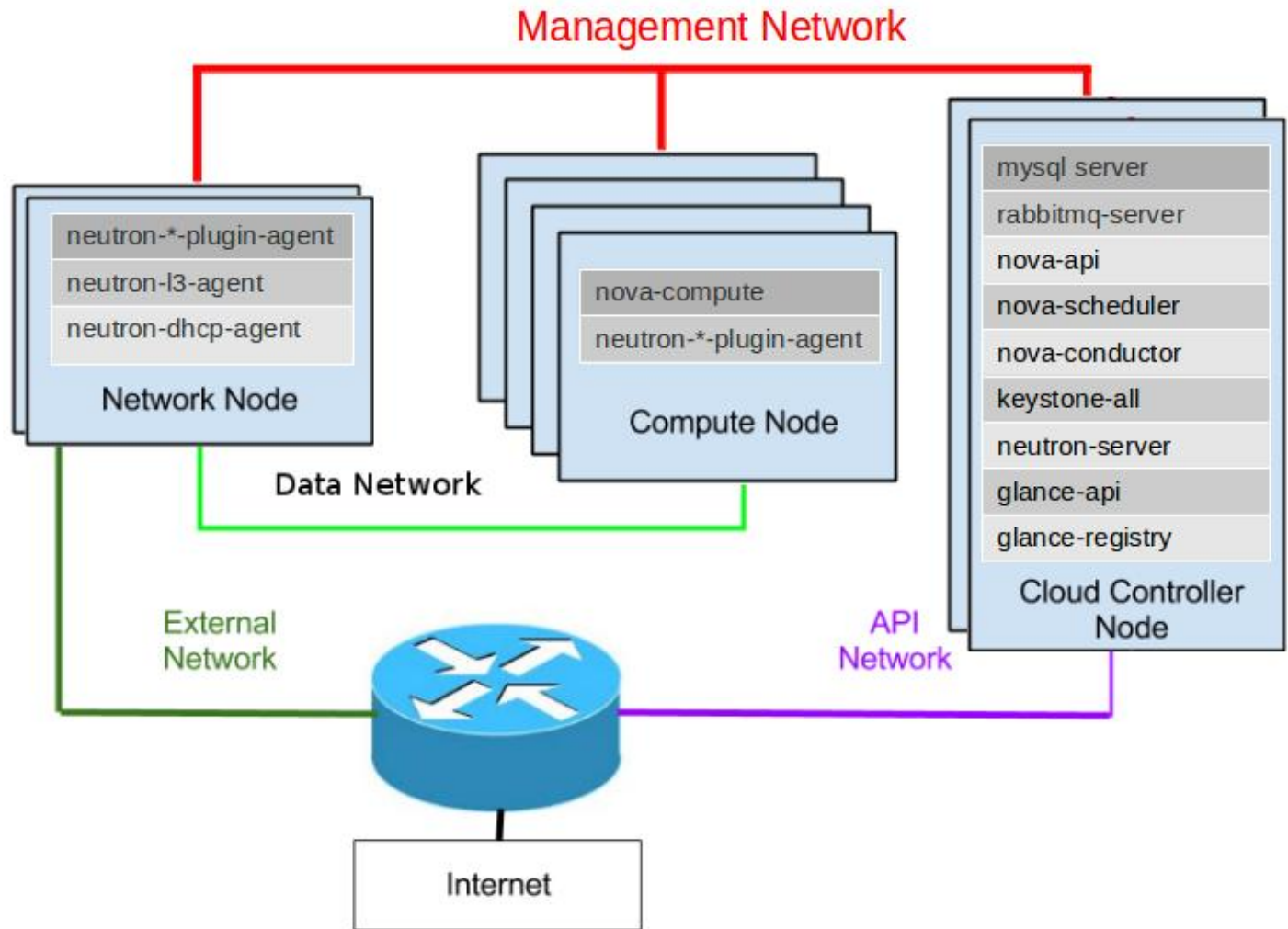
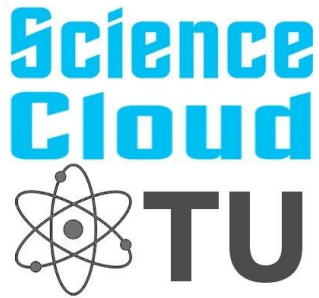
Lecture



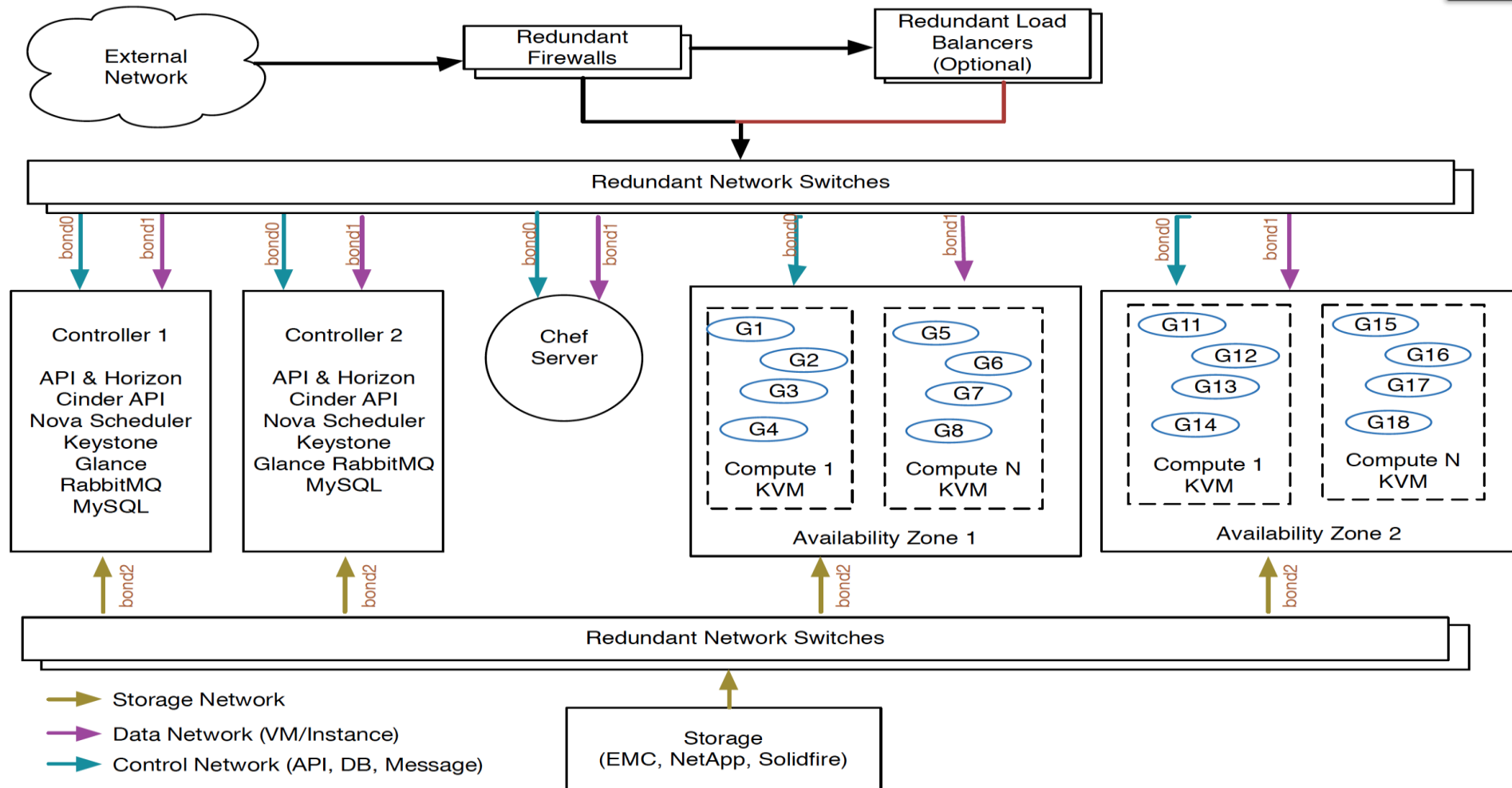
Basic Deployment Layout (Nova Network)



Full Deployment Layout (Neutron Network Virtualization)



Deployment at Rackspace



Information taken from rackspace's slide

User/Tenant/Role

- A user is an entity that want to use the system. A user can be in multiple tenants.
- A Tenant is an openstack project in which one project can have multiple users.
- A user has either an admin role or a member role.

Availability Zone/Aggregate Group

- **Availability Zone**: Define the physical segregation of resources. An OpenStack cloud resources can be divided into several availability zones.
- **Aggregate Group**: Group a set of resources user want to use based on certain requirements or policies.

Fixed and Floating IPs

- **Fixed IPs** are IP addresses that are assigned to an instance on creation and stay the same until the instance is explicitly terminated.
- **Floating IPs** are addresses that can be dynamically associated with an instance. A floating IP address can be disassociated and associated with another instance at any time.

OpenStack Demo

- การเข้าใช้งานระบบโดยใช้ **Dashboard**
- กำหนด **security group**
- การสร้างและเข้าใช้งาน **VM**
- การสร้างและใช้งาน **Networks**
- การสร้างและใช้งาน **Block storage**
- การสร้างและใช้งาน **Orchrstration**

Demo Outline

- **Dashboard overview**
- **Create Instance**
- เข้าใช้งาน **instance** ทางหน้า **console**
- ใช้ **Remote Desktop** เพื่อ **transfer file**
- **Terminate Instance**

Dashboard overview

- Log In

<http://sciencecloud.cs.tu.ac.th>



The login form is centered on a light purple background. It features the "Science Cloud" logo at the top, which consists of a blue cloud shape with the text "Science Cloud" and a small atom symbol. Below the logo, the text "Log In" is displayed. Underneath, there are two input fields: "User Name" and "Password". At the bottom right of the form is a blue button labeled "Sign In".

Dashboard overview

The screenshot shows the Science Cloud dashboard for Thammasat University. The left sidebar contains navigation menus for Project, Current Project (Enterprise), Manage Compute, Manage Network, and a bottom section with Overview, Instances, Volumes, Images & Snapshots, and Access & Security. The main content area displays an Overview section with Quota Summary (Instances, vCPUs, MB, volumes, GB) and Usage Summary (Instance Name). Numbered callouts 1, 2, and 3 point to the 'Access & Security', 'Images & Snapshots', and 'Instances' links respectively.

Science Cloud
Thammasat University

Project

CURRENT PROJECT
Enterprise

Manage Compute

Overview

Instances

Volumes

Images & Snapshots

Access & Security

Manage Network

Networks

Routers

Network Topology

Overview

Quota Summary

Used 0 of 10 Available Instance:

Used 0 of 20 Available vCPUs

Used 0 MB of 51,200 MB Availat

Used 0 of 10 Available volumes

Used 0 GB of 1,000 GB Availabl

Select a month to quer

June

Active Instances: - Active RAM:

Usage Summary

Instance Name

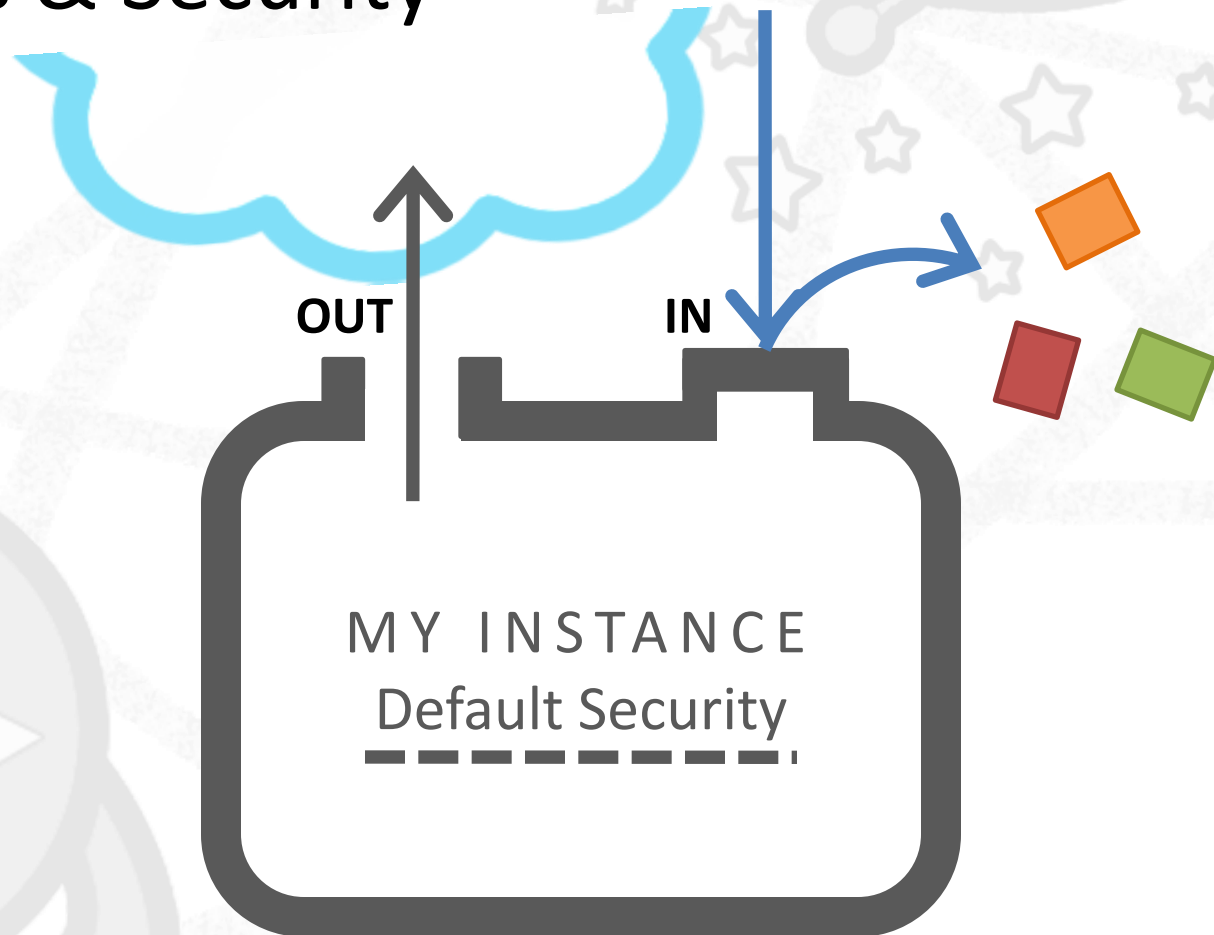
1

2

3

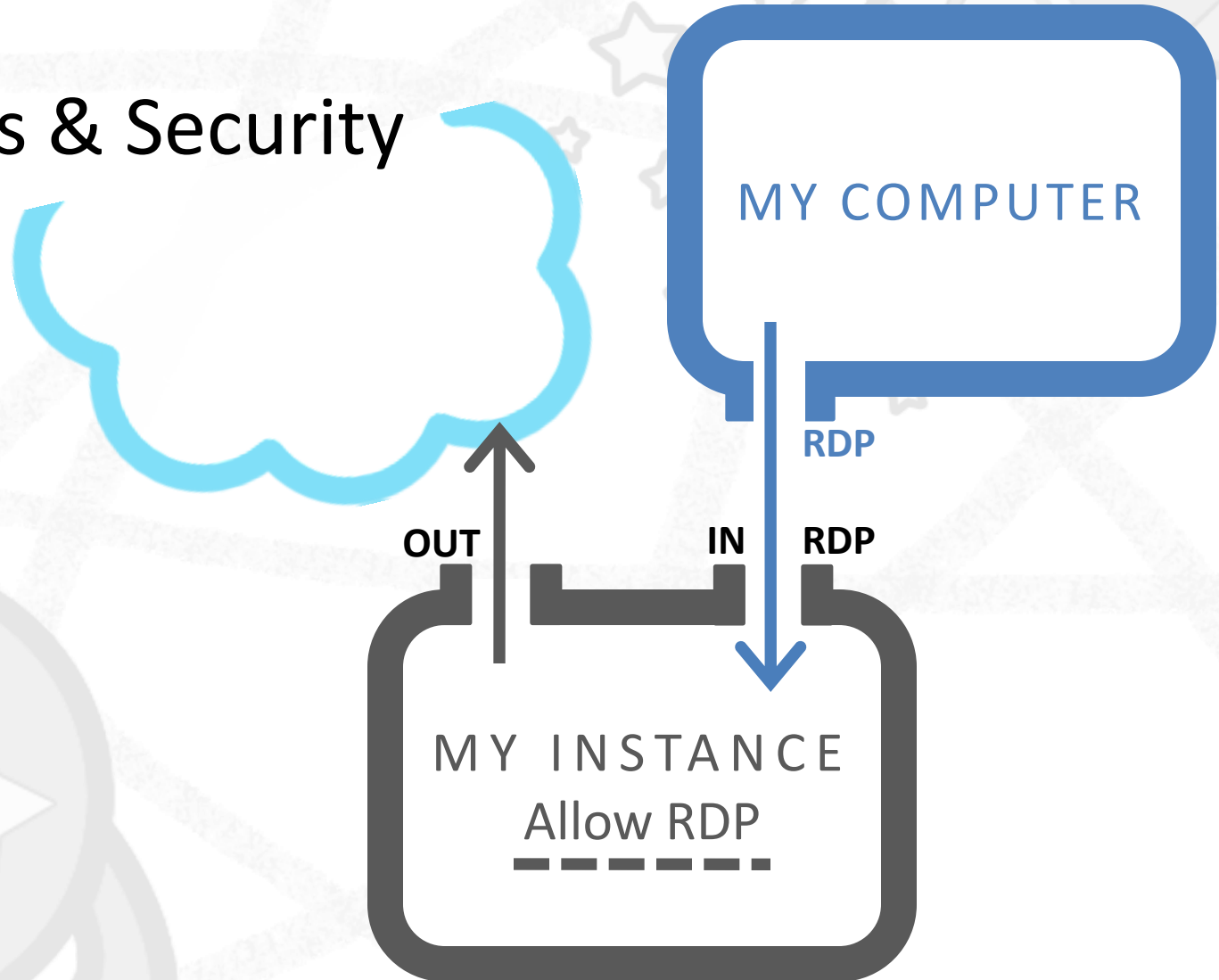
Dashboard overview

- Access & Security



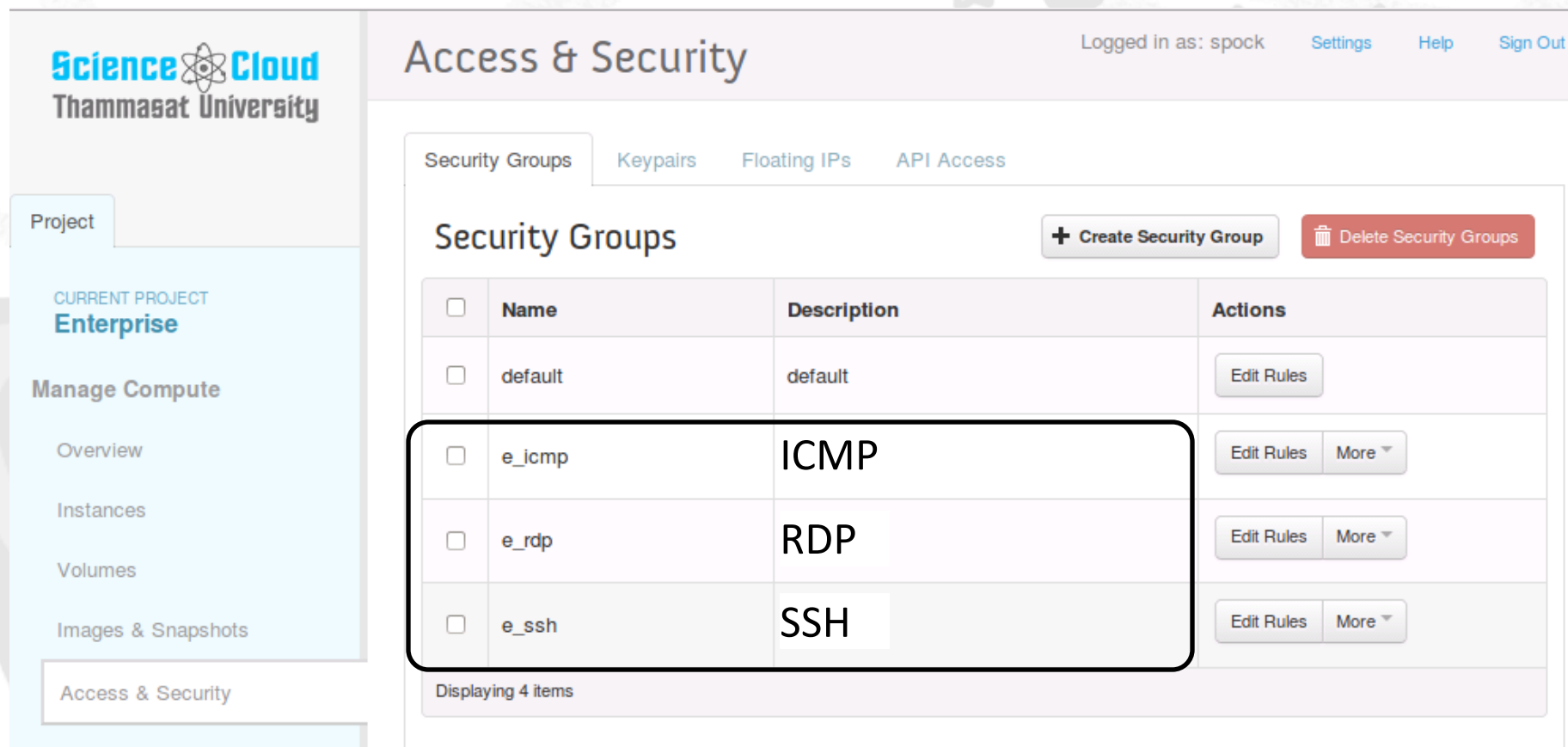
Dashboard overview

- Access & Security



Dashboard overview

- Access & Security



Science Cloud
Thammasat University

Access & Security

Logged in as: spock [Settings](#) [Help](#) [Sign Out](#)

Security Groups [Keypairs](#) [Floating IPs](#) [API Access](#)

Security Groups [+ Create Security Group](#) [Delete Security Groups](#)

<input type="checkbox"/>	Name	Description	Actions
<input type="checkbox"/>	default	default	Edit Rules
<input type="checkbox"/>	e_icmp	ICMP	Edit Rules More ▾
<input type="checkbox"/>	e_rdp	RDP	Edit Rules More ▾
<input type="checkbox"/>	e_ssh	SSH	Edit Rules More ▾

Displaying 4 items

Project


CURRENT PROJECT
Enterprise

Manage Compute

- Overview
- Instances
- Volumes
- Images & Snapshots
- Access & Security**

Dashboard overview

- Images & Snapshot



Thammasat University

Project

CURRENT PROJECT
Enterprise

Manage Compute

Overview

Instances

Volumes

Images & Snapshots

Access & Security

Images & Snapshots

Logged in as: spock [Settings](#) [Help](#) [Sign Out](#)

Images

[Project \(0\)](#) [Shared with Me \(0\)](#) [Public \(5\)](#) [+ Create Image](#) [Delete Images](#)

<input type="checkbox"/>	Image Name	Status	Public	Format	Actions
<input type="checkbox"/>	Windows-8	Active	Yes	QCOW2	Launch
<input type="checkbox"/>	CentOS-6.4-Desktop	Active	Yes	QCOW2	Launch
<input type="checkbox"/>	CentOS-6.4-Server	Active	Yes	QCOW2	Launch
<input type="checkbox"/>	Ubuntu-12.04-Desktop	Active	Yes	QCOW2	Launch
<input type="checkbox"/>	Ubuntu-12.04-Server	Active	Yes	QCOW2	Launch

Displaying 5 items

Dashboard overview

- Instances

คลิกที่ Instances จะยังไม่มี
รายการขึ้นมา เพราะเรายังไม่ได้สร้าง
Instance

Science Cloud
Thammasat University

Project

CURRENT PROJECT
Enterprise

Manage Compute

- Overview
- Instances**
- Volumes
- Images & Snapshots
- Access & Security

Manage Network

- Networks
- Routers
- Network Topology

Overview

Quota Summary

Used 0 of 10 Available Instance:

Used 0 of 20 Available vCPUs

Used 0 MB of 51,200 MB Availabl

Used 0 of 10 Available volumes

Used 0 GB of 1,000 GB Availabl

Select a month to quer

June

Active Instances: - Active RAM:

Usage Summary

Instance Name

Create Instance

Launch Instance

Details Access & Security Networking Volume Options Post-C

Instance Source
Image

Image
Windows-8

Instance Name
win8

Flavor
medium

Instance Count
1

Specify the details for lau
The chart below shows th
in relation to the project's

Flavor Details

Name
VCPUs
Root Disk
Ephemeral Disk
Total Disk
RAM

Project Quotas
Number of Instances (0)

เลือก Windows



เลือก medium
หรือ large

Create Instance

Launch Instance

Details Access & Security Networking Volume Options Post-Creation

Keypair

No keypairs available.  

Security Groups

☒ default

☐ e_icmp

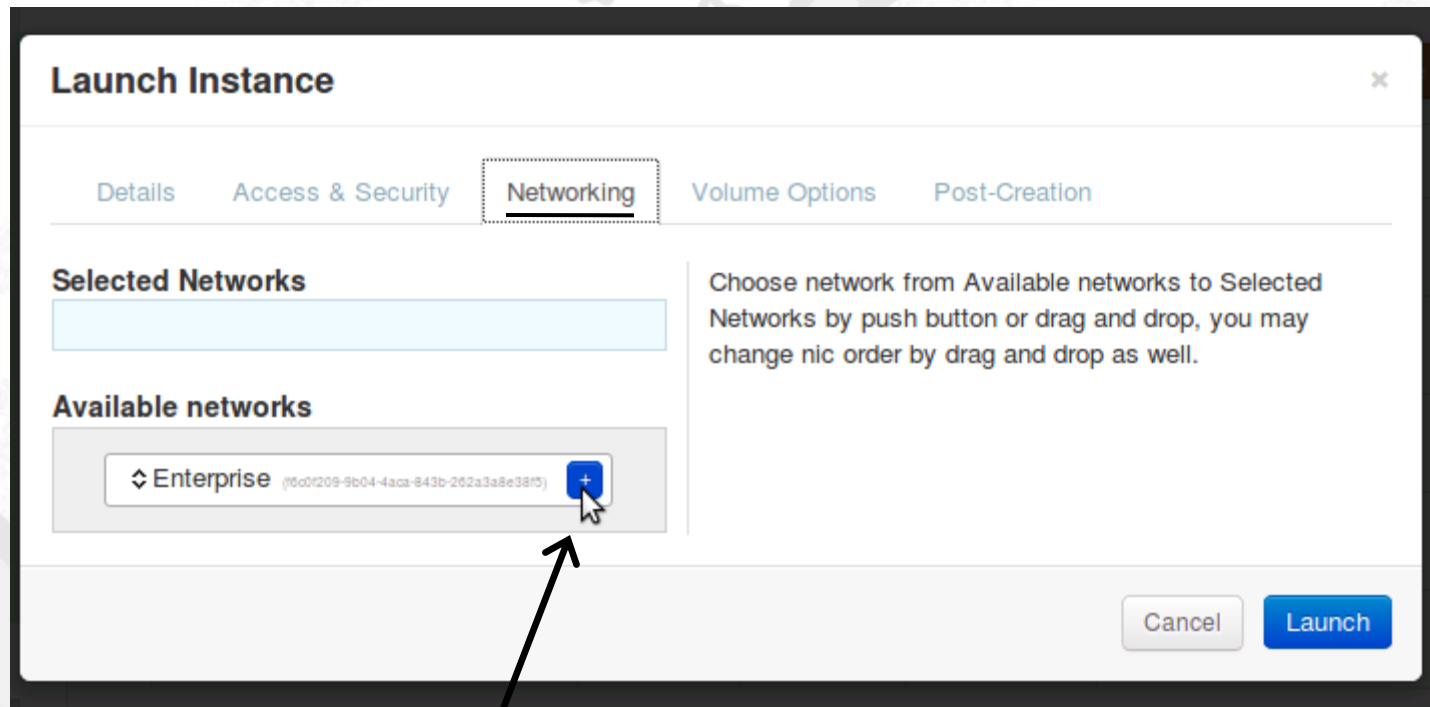
☒ e_rdp

☐ e_ssh

Control access to your instance groups, and other mechanisms.

เลือก RDP

Create Instance



The image shows a 'Launch Instance' dialog box with a dark border and a close button (X) in the top right corner. It has five tabs: 'Details', 'Access & Security', 'Networking' (which is selected and highlighted with a dashed border), 'Volume Options', and 'Post-Creation'. Under the 'Networking' tab, there are two sections: 'Selected Networks' with an empty light blue box, and 'Available networks' with a list item 'Enterprise' (ID: 76c0f209-9b04-4acc-843b-202a3a8e38f5) that has a blue square button with a white plus sign next to it. A black arrow points from a text box below to this plus button. To the right of these sections is a text instruction: 'Choose network from Available networks to Selected Networks by push button or drag and drop, you may change nic order by drag and drop as well.' At the bottom right of the dialog are 'Cancel' and 'Launch' buttons.

Launch Instance

Details Access & Security **Networking** Volume Options Post-Creation

Selected Networks

Available networks

↕ Enterprise (76c0f209-9b04-4acc-843b-202a3a8e38f5)


Choose network from Available networks to Selected Networks by push button or drag and drop, you may change nic order by drag and drop as well.

Cancel Launch

เลือก Enterprise

Create Instance

- คลิก **Launch** แล้วรอให้ **Status Active**



Science Cloud
Thammasat University

Project

CURRENT PROJECT
Enterprise

Manage Compute

- Overview
- Instances
- Volumes
- Images & Snapshots
- Access & Security

Instances

Logged in as: spock [Settings](#) [Help](#) [Sign Out](#)

Instances + Launch Instance Terminate Instances

<input type="checkbox"/>	Instance Name	IP Address	Size	Keypair	Status	Task	Power State	Actions
<input type="checkbox"/>	win8	10.1.0.4	medium 4GB RAM 2 VCPU 40GB Disk	-	<u>Active</u>	None	Running	Create Snapshot More ▾

Displaying 1 item

เข้าใช้งาน **instance** ทางหน้า **console**

- More -> Console

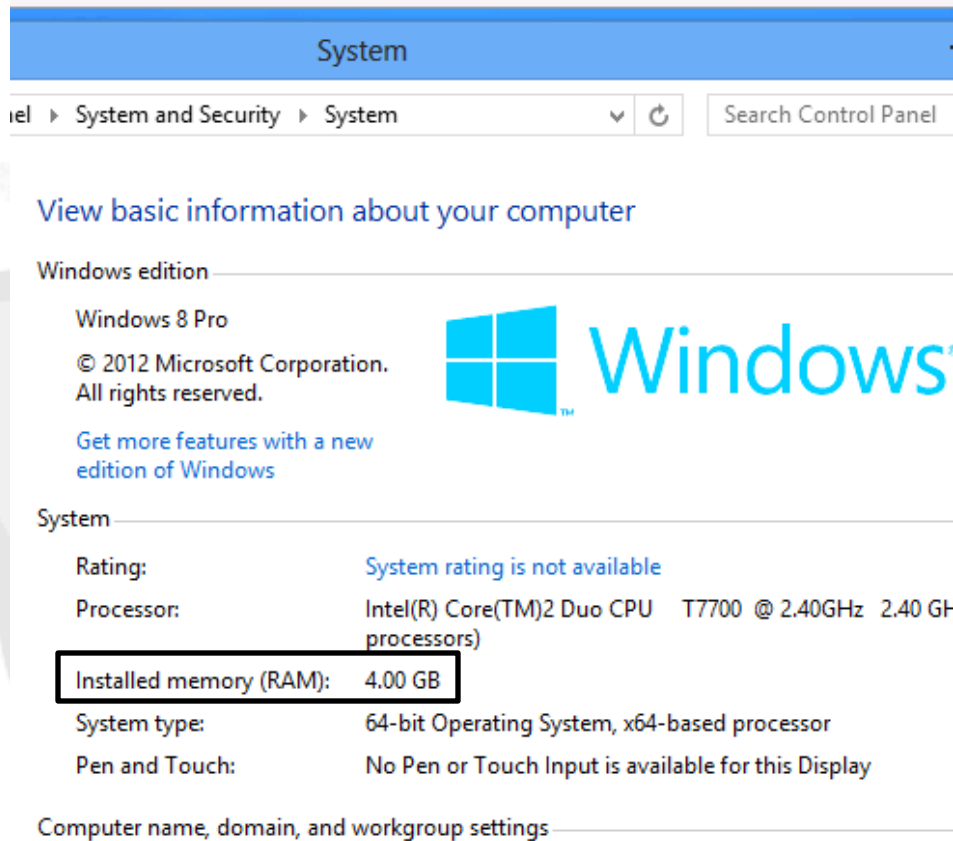
Instances + Launch Instance Terminate Instances

<input type="checkbox"/>	Instance Name	IP Address	Size	Keypair	Status	Task	Power State	Actions
<input type="checkbox"/>	win8	10.1.0.4	medium 4GB RAM 2 VCPU 40GB Disk	-	Active	None	Running	<div><div>Create Snapshot More</div><div><div>Associate Floating IP</div><div>Disassociate Floating IP</div><div>Edit Instance</div><div>Edit Security Groups</div><div>Console</div><div>View Log</div><div>Pause Instance</div><div>Suspend Instance</div><div>Soft Reboot Instance</div><div>Hard Reboot Instance</div><div>Terminate Instance</div></div></div>

Displaying 1 item

เข้าใช้งาน **instance** ทางหน้า **console**

- ตรวจสอบว่าสามารถใช้ **internet** ได้
- ตรวจสอบจำนวน **RAM, CPU**



The screenshot shows the Windows System Control Panel window. The title bar is blue and says "System". Below the title bar, there's a breadcrumb trail: "Control Panel > System and Security > System". To the right of the breadcrumb is a search bar labeled "Search Control Panel". Below the breadcrumb, there's a link "View basic information about your computer". Under "Windows edition", it says "Windows 8 Pro" and "© 2012 Microsoft Corporation. All rights reserved." with a link "Get more features with a new edition of Windows". Under "System", it shows "Rating: System rating is not available", "Processor: Intel(R) Core(TM)2 Duo CPU T7700 @ 2.40GHz 2.40 GHz (2 processors)", "Installed memory (RAM): 4.00 GB" (highlighted with a black box), "System type: 64-bit Operating System, x64-based processor", and "Pen and Touch: No Pen or Touch Input is available for this Display". At the bottom, there's a link "Computer name, domain, and workgroup settings".

System

Control Panel > System and Security > System

Search Control Panel

View basic information about your computer

Windows edition

Windows 8 Pro

© 2012 Microsoft Corporation.
All rights reserved.

Get more features with a new
edition of Windows

System

Rating: System rating is not available

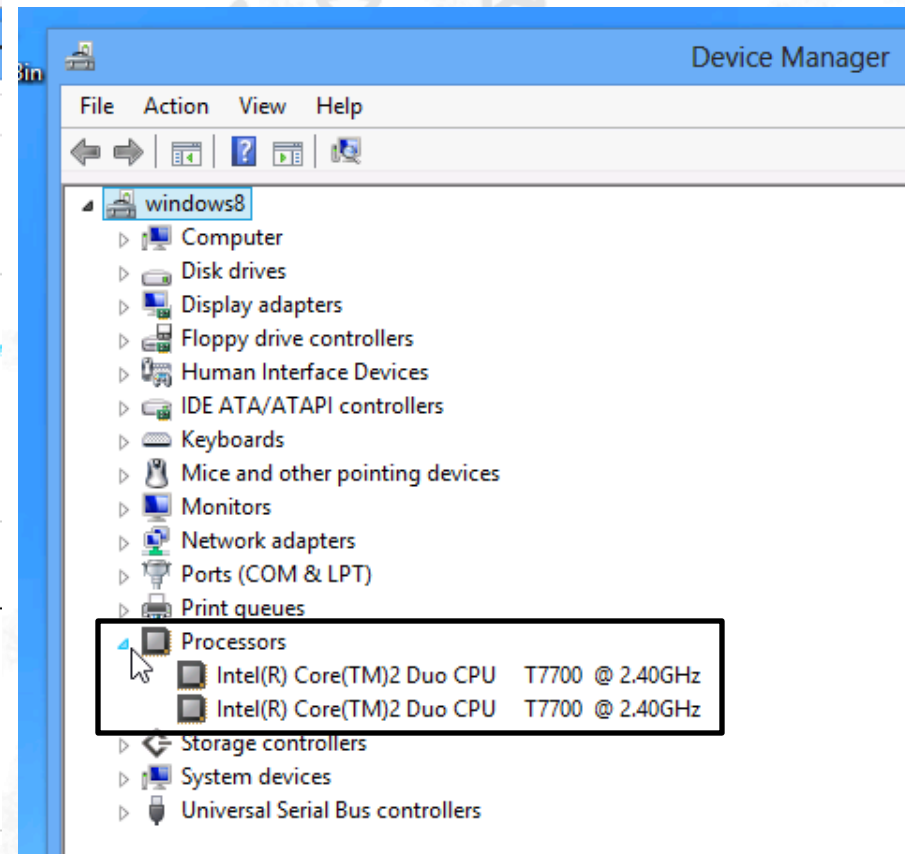
Processor: Intel(R) Core(TM)2 Duo CPU T7700 @ 2.40GHz 2.40 GHz (2 processors)

Installed memory (RAM): 4.00 GB

System type: 64-bit Operating System, x64-based processor

Pen and Touch: No Pen or Touch Input is available for this Display

Computer name, domain, and workgroup settings



The screenshot shows the Windows Device Manager window. The title bar is blue and says "Device Manager". Below the title bar, there's a menu bar with "File", "Action", "View", and "Help". Below the menu bar, there's a toolbar with icons for "Back", "Forward", "Refresh", "Help", "Add", and "Remove". Below the toolbar, there's a tree view showing the hierarchy of devices. The "Processors" folder is expanded and highlighted with a black box. It shows two entries: "Intel(R) Core(TM)2 Duo CPU T7700 @ 2.40GHz" and "Intel(R) Core(TM)2 Duo CPU T7700 @ 2.40GHz".

Device Manager

File Action View Help

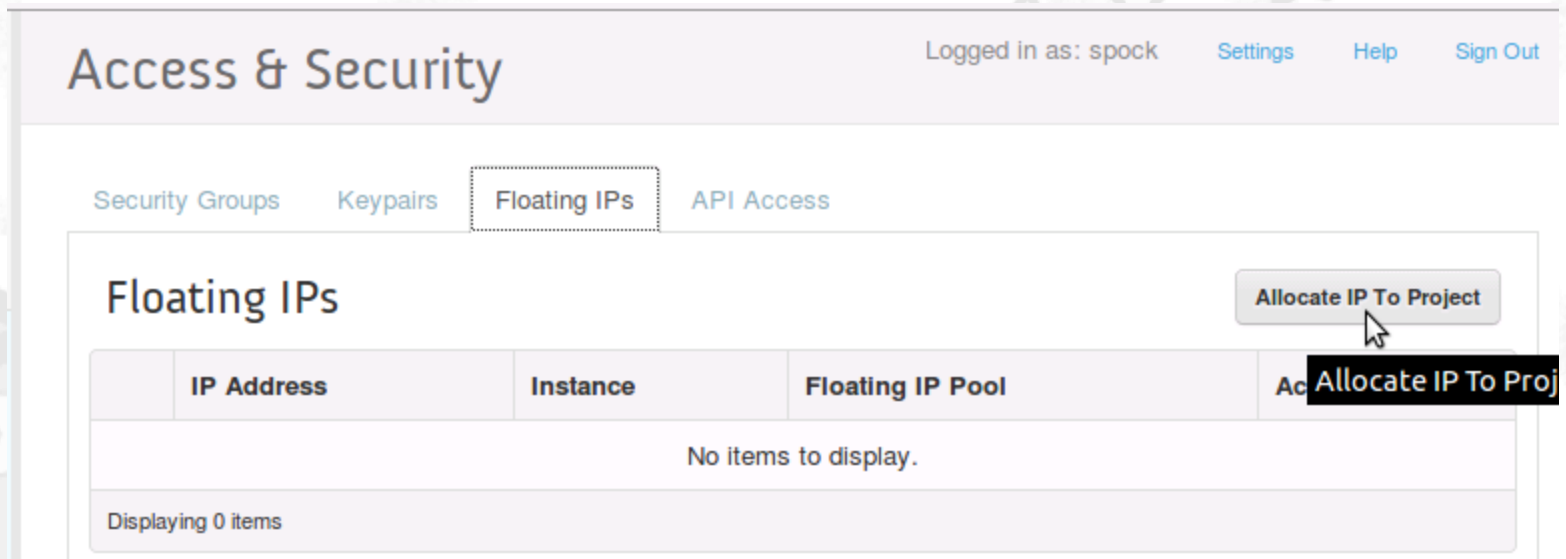
Back Forward Refresh Help Add Remove

windows8

- Computer
- Disk drives
- Display adapters
- Floppy drive controllers
- Human Interface Devices
- IDE ATA/ATAPI controllers
- Keyboards
- Mice and other pointing devices
- Monitors
- Network adapters
- Ports (COM & LPT)
- Print queues
- Processors
 - Intel(R) Core(TM)2 Duo CPU T7700 @ 2.40GHz
 - Intel(R) Core(TM)2 Duo CPU T7700 @ 2.40GHz
- Storage controllers
- System devices
- Universal Serial Bus controllers

ใช้ Remote Desktop เพื่อ transfer file

- Associate Floating IP



Access & Security

Logged in as: spock [Settings](#) [Help](#) [Sign Out](#)

[Security Groups](#) [Keypairs](#) [Floating IPs](#) [API Access](#)

Floating IPs

[Allocate IP To Project](#)

IP Address	Instance	Floating IP Pool	Allocate IP To Project
No items to display.			

Displaying 0 items

ใช้ Remote Desktop เพื่อ transfer file

- Associate Floating IP

Floating IPs Allocate IP To Project Release Floating IPs

<input type="checkbox"/>	IP Address	Instance	Floating IP Pool	Actions
<input type="checkbox"/>	10.100.20.12	-	public	Associate Floating IP More ▾

Displaying 1 item

Manage Floating IP Associations ×

IP Address

IP Address
 ▾ +

Port to be associated
 ▾
Select a port
centos: 10.1.0.5
win8: 10.1.0.4

Select the IP address you wish to associate with the selected instance.

Cancel Associate

ใช้ Remote Desktop เพื่อ transfer file

- Associate Floating IP

Instances

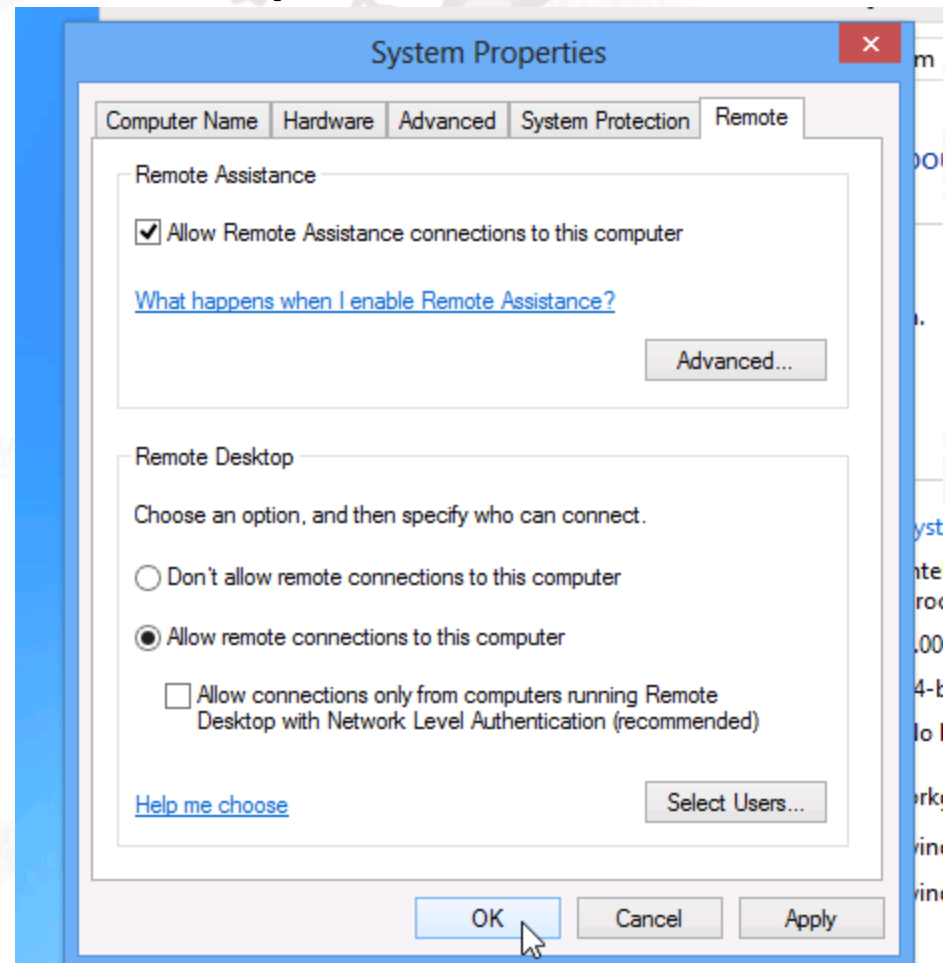
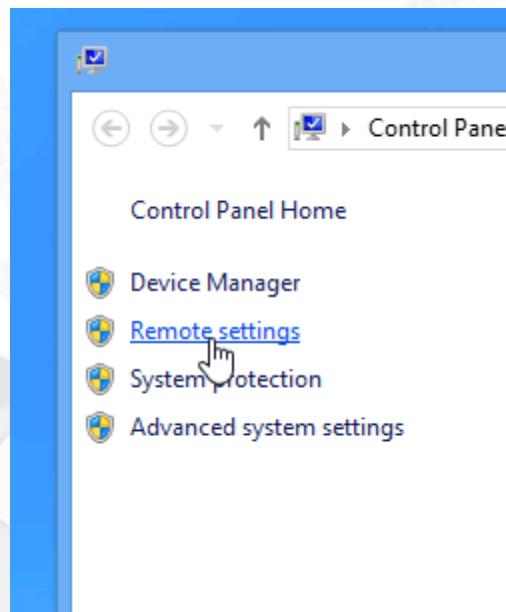
[+ Launch Instance](#)[Terminate Instances](#)

<input type="checkbox"/>	Instance Name	IP Address	Size	Keypair	Status	Task	Power State	Actions
<input type="checkbox"/>	centos	10.1.0.5	m1.large 8GB RAM 4 VCPU 80GB Disk	-	Active	None	Running	Create Snapshot More ▾
<input type="checkbox"/>	win8	<u>10.1.0.4</u> <u>10.100.20.12</u>	medium 4GB RAM 2 VCPU 40GB Disk	-	Active	None	Running	Create Snapshot More ▾

Displaying 2 items

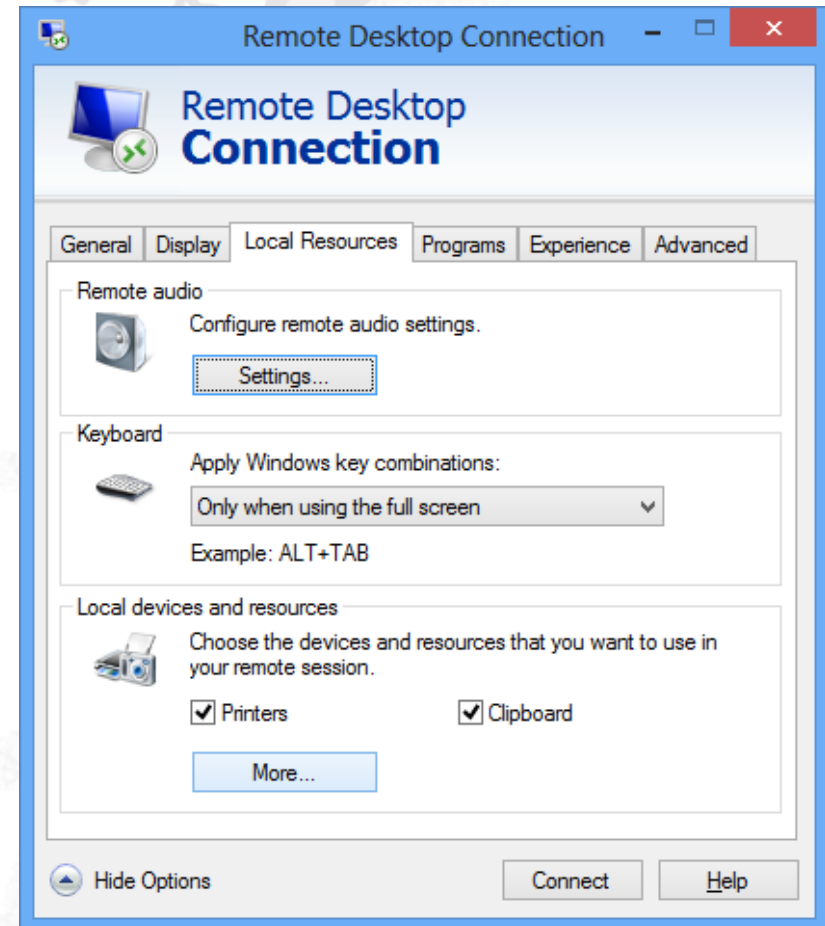
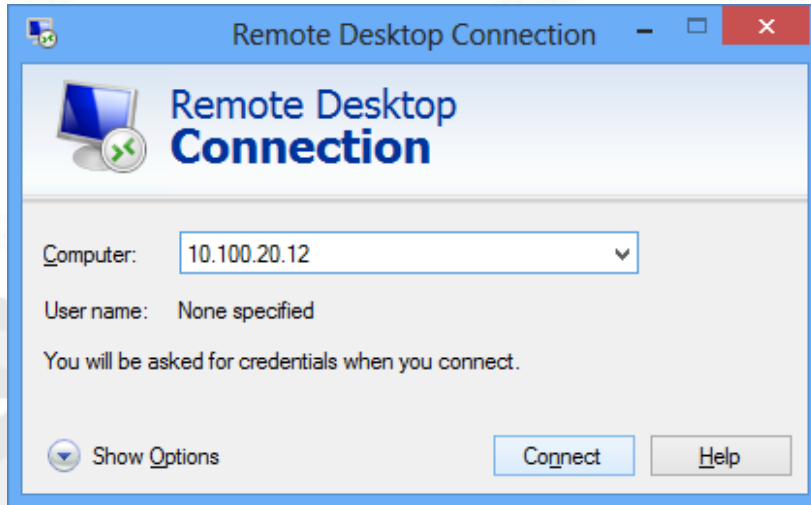
ใช้ Remote Desktop เพื่อ transfer file

- Enable Remote Desktop บน instance

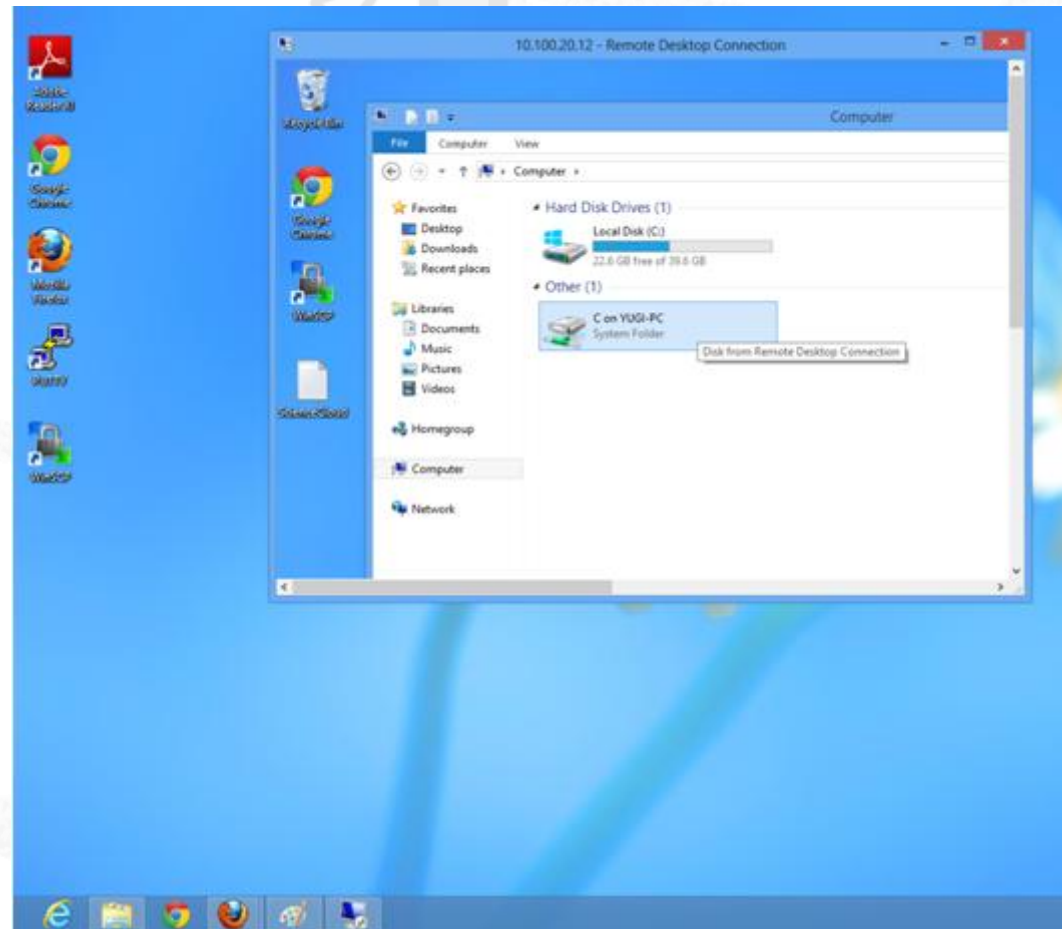


ใช้ Remote Desktop เพื่อ transfer file

- เปิด Remote Desktop Connection บนเครื่อง local



- เปิด Remote Desktop Connection บนเครื่อง local



Terminate Instance

Instances

Logged in as: spock [Settings](#) [Help](#) [Sign Out](#)

Instances

[+ Launch Instance](#)[Terminate Instances](#)

<input type="checkbox"/>	Instance Name	IP Address	Size	Keypair	Status	Task	Power State	Actions
<input type="checkbox"/>	win8	10.1.0.4	medium 4GB RAM 2 VCPU 40GB Disk	-	Active	None	Running	<div>Create SnapshotMore</div> <div>Associate Floating IPDisassociate Floating IPEdit InstanceEdit Security GroupsConsoleView LogPause InstanceSuspend InstanceSoft Reboot InstanceHard Reboot InstanceTerminate Instance</div>

Displaying 1 item