

Research and application of OpenStack in CSNS Computing environment

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Agenda

About CSNS

Scenarios & Requirements

Computing Environment based on OpenStack

R & D

Summary

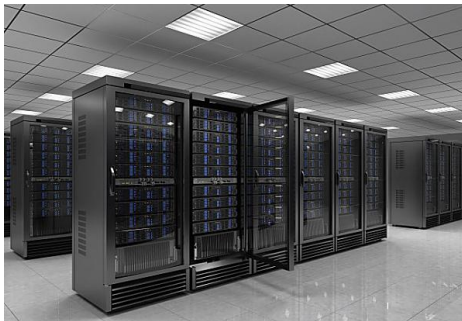
About CSNS

- Accelerator-based neutron source
- Designed to provide multidiscipline research platforms with neutron scattering
- Operated by the Institute of High Energy Physics, CAS
- Located at Dongguan in Guangdong province of China
- Will be complete in 2018

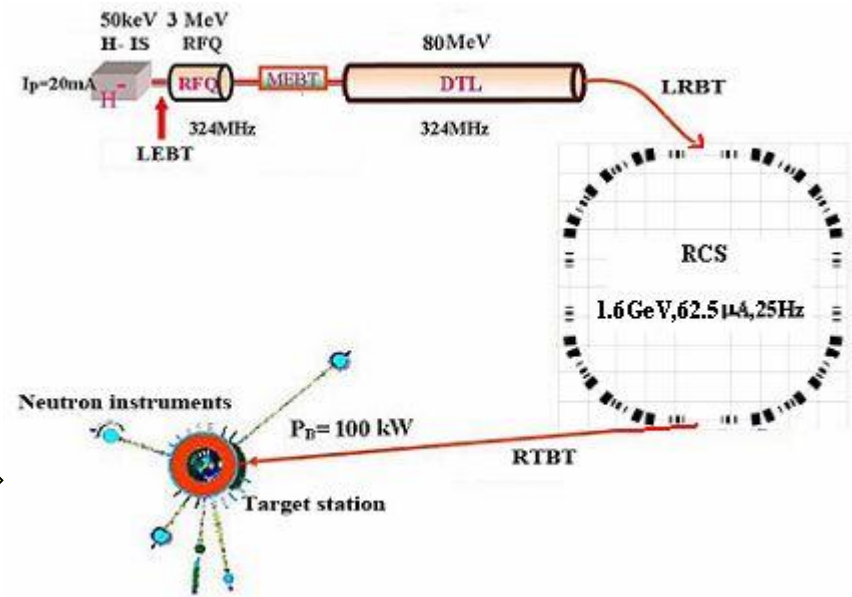
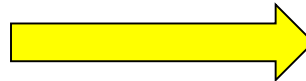


About CSNS

- 80-MeV HLinac
- 1.6-GeV proton rapid cycling synchrotron (RCS)
- beam transport lines
- tungsten target station
- 3 initial spectrometers



Data Processing



Scenarios & Requirements

Appliacion

- OS(windows & Linux)
- Diverse Softwares

Diverse Host

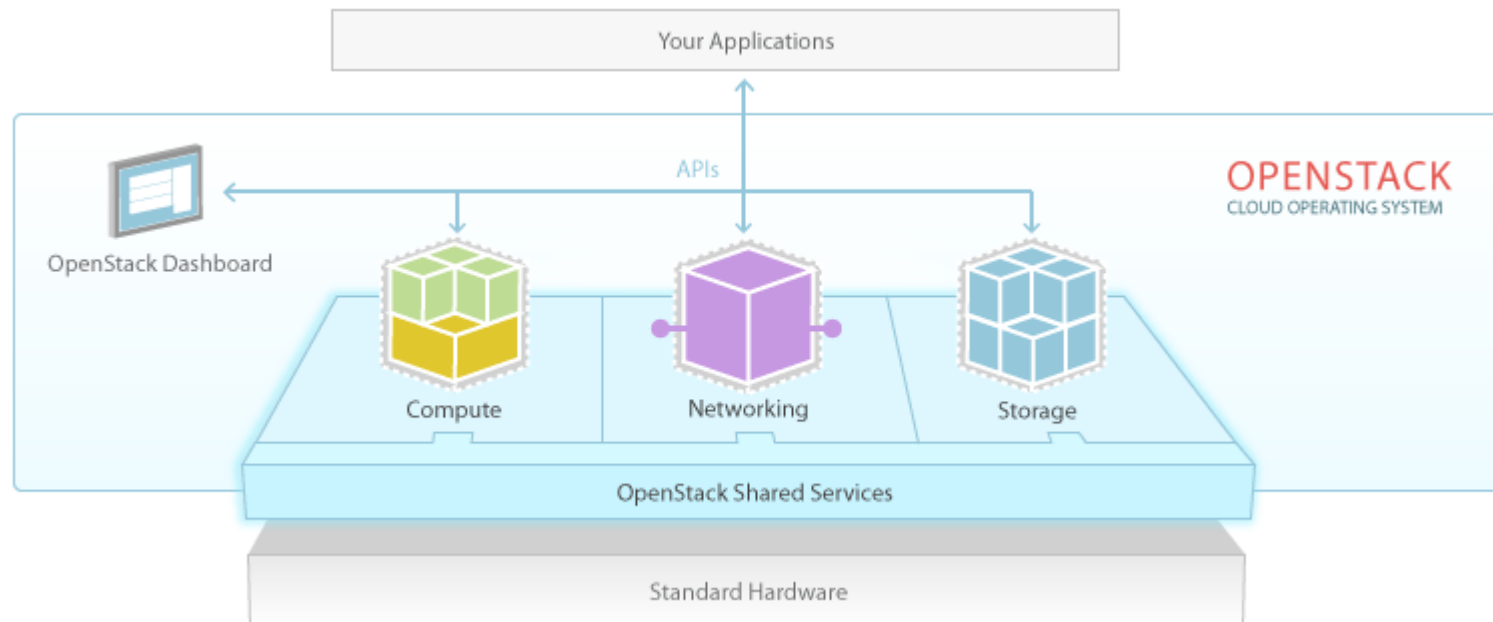
- More Memery
- More CPUs

Expansibility

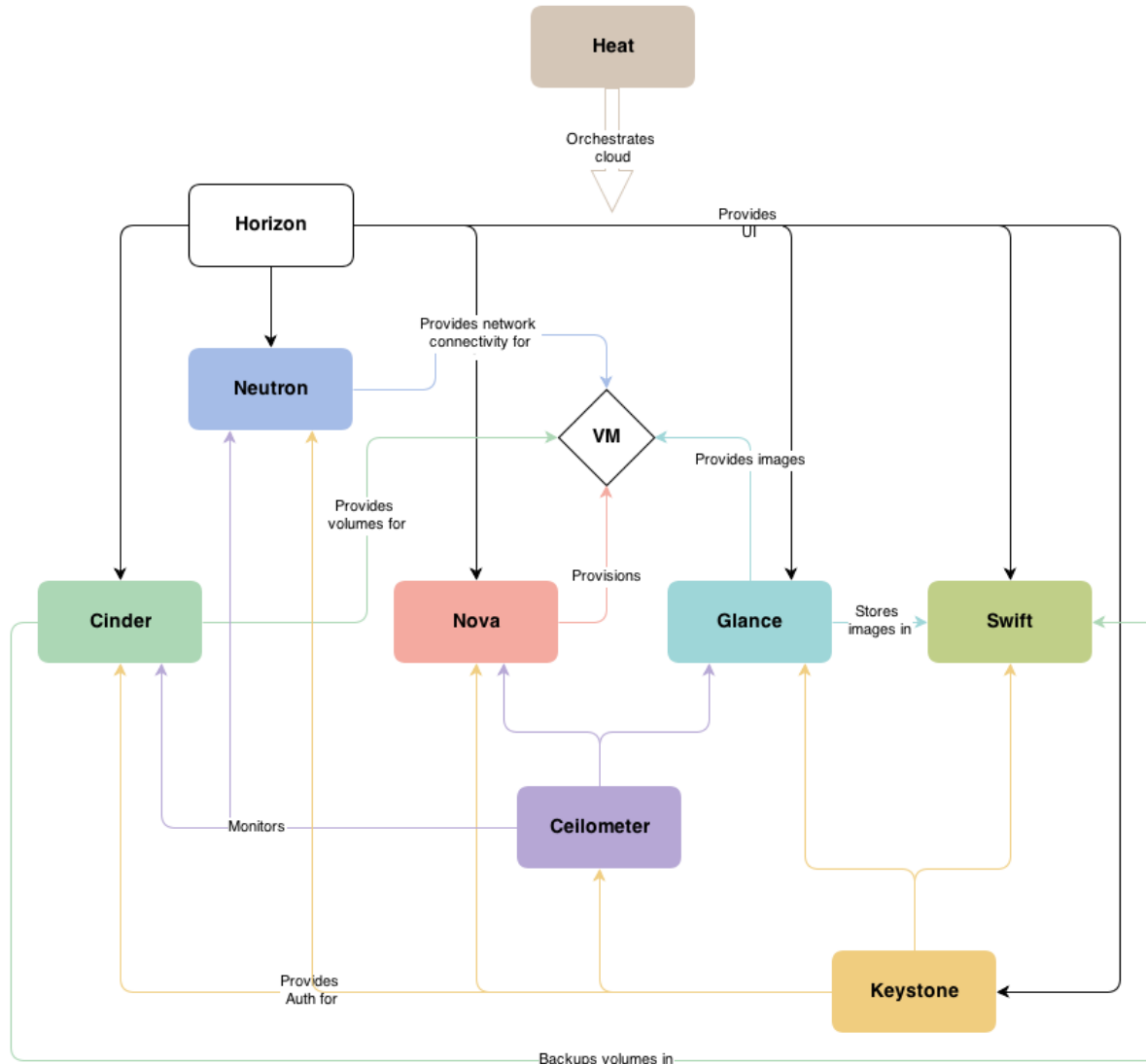
- More spectrometers
- More data

Computing Environment based on OpenStack

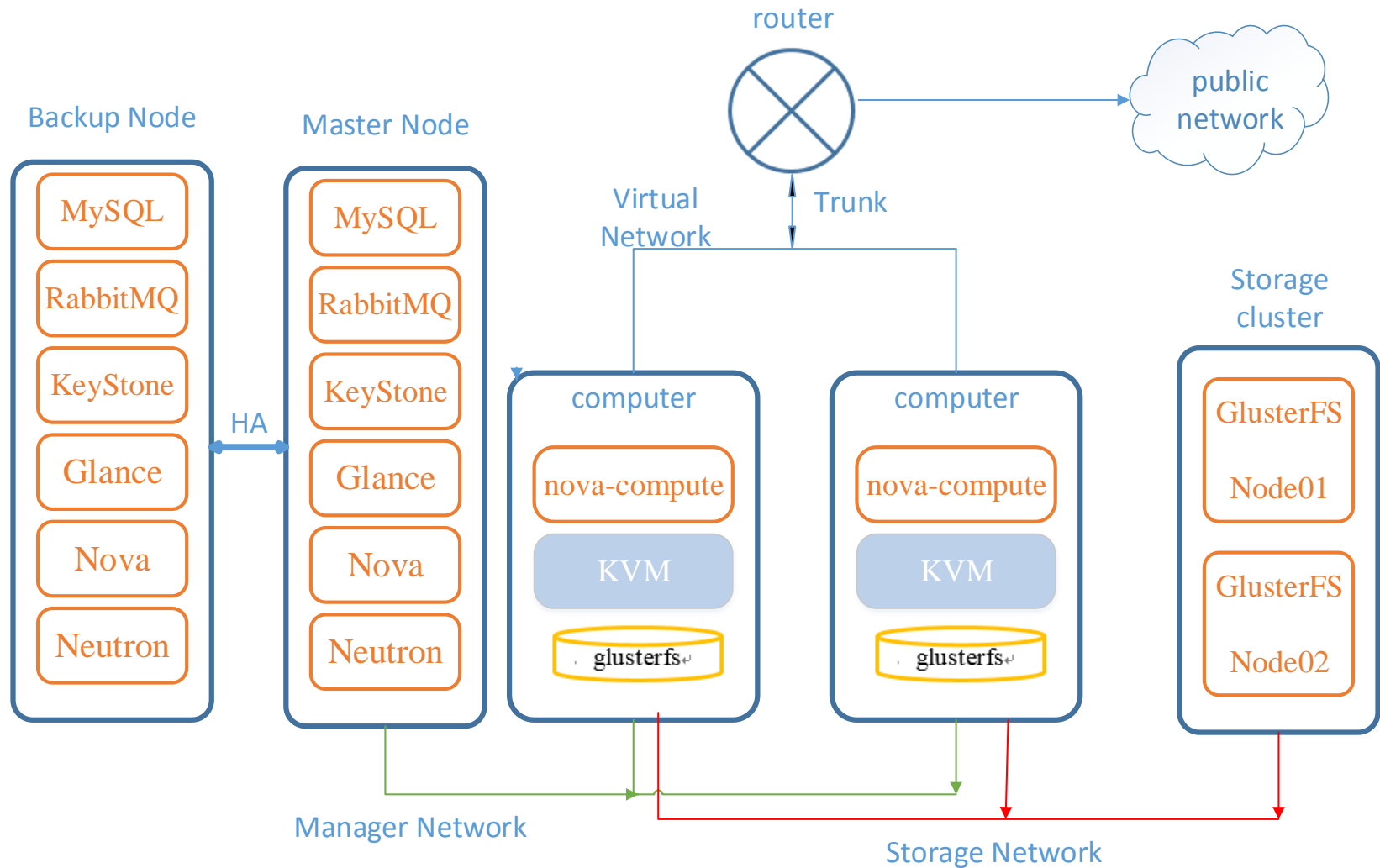
- What is OpenStack?



Computing Environment based on OpenStack



Computing Environment based on OpenStack



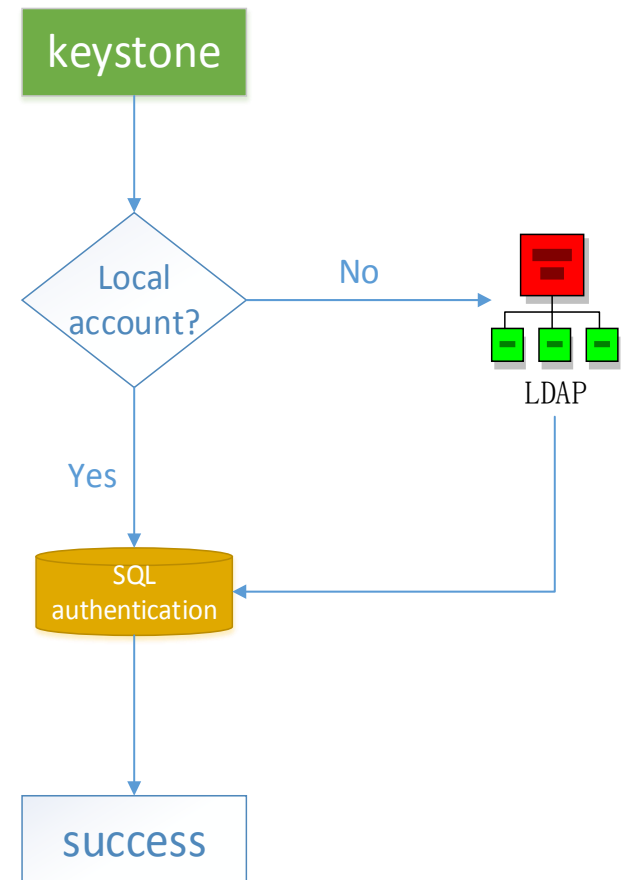
Research and development



R & D

Unified Authentication

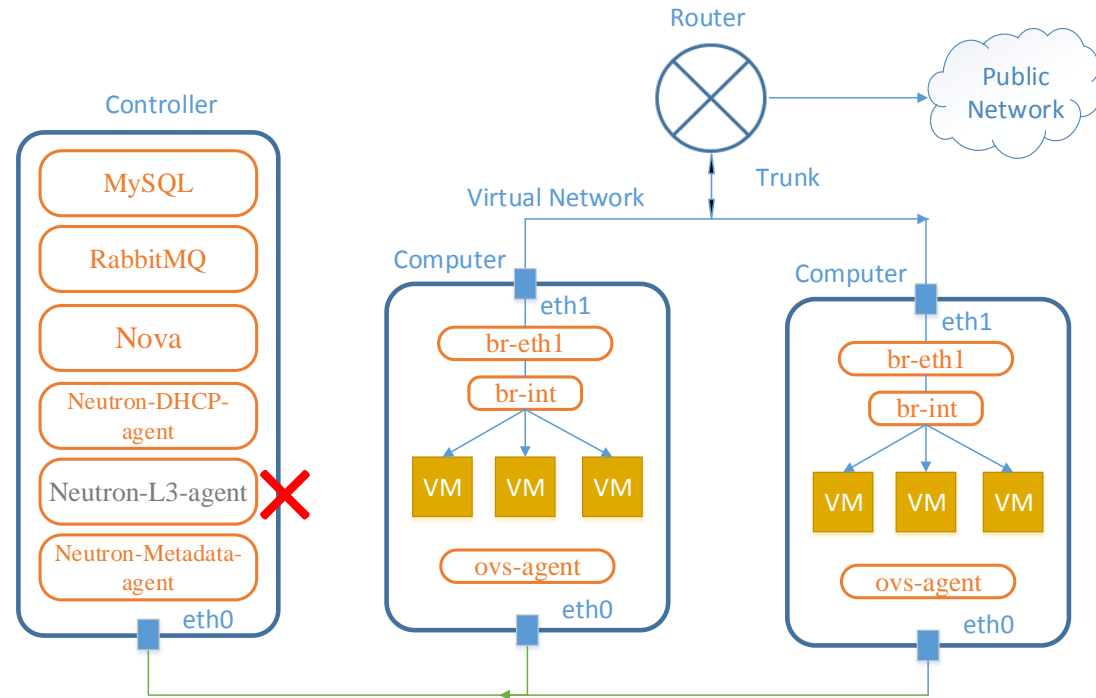
- **Existing intergration schema doesn't meet the requirement**
 - All stores in ldap
 - Too much change to ldap
- **Loosely coupled schema**
 - Local user and common user
 - To common users , only authencate username and password by ldap service
 - Other information authenticate through keystone local DB



Network

• Virtual Network

- **Disable L3-agent**
- Physical gateway replace virtual router
- VMs directly connect to the trunk mode switch



- To ensure the performance and stability of the network
- To achieve seamless communication directly with local network

Images & instances

- **Images storage**
 - Stored in glusterfs SSD volume
- **Cloud-init**
 - Configuring instances at boot time
 - Set an instance hostname
 - Generate instance SSH private keys
 - Automatically register in puppet, DNS, IPDB
- **Live Migration**
 - All instances share storage with glusterfs volume
 - Completed within a few seconds
 - Instance will not stop in the migration process



Distributed Messaging System

- **RPC Messaging is critical for OpenStack**
- **Default Messaging System**
 - RabbitMQ
- **Problems**
 - single point failure
 - Difficult to scale out
 - Performance bottleneck



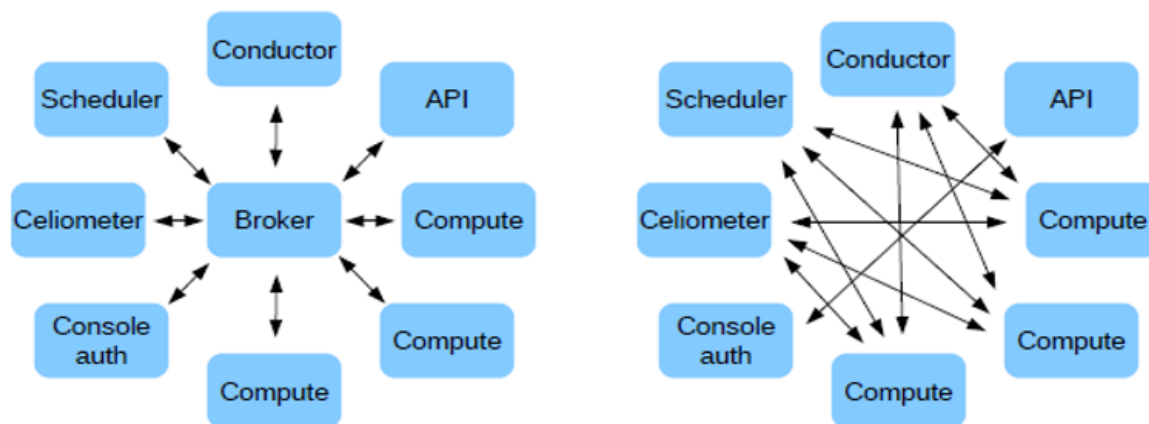
How to implement a broker-less architecture for OpenStack RPC



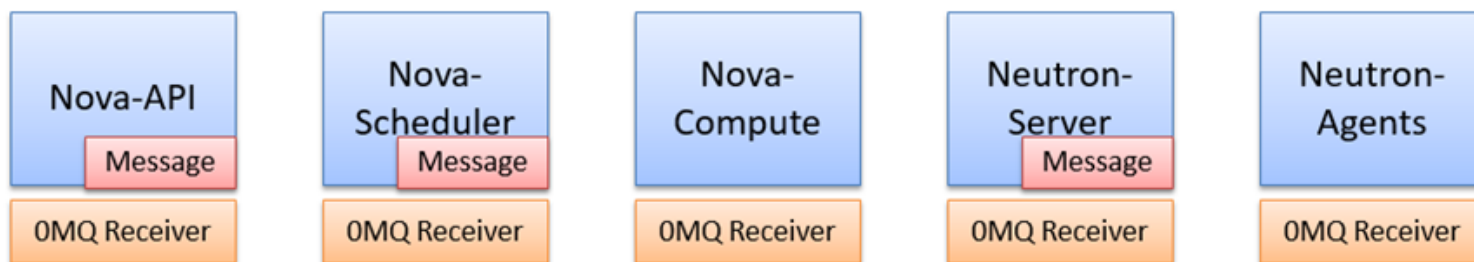
Distributed Messaging System

ØMQ

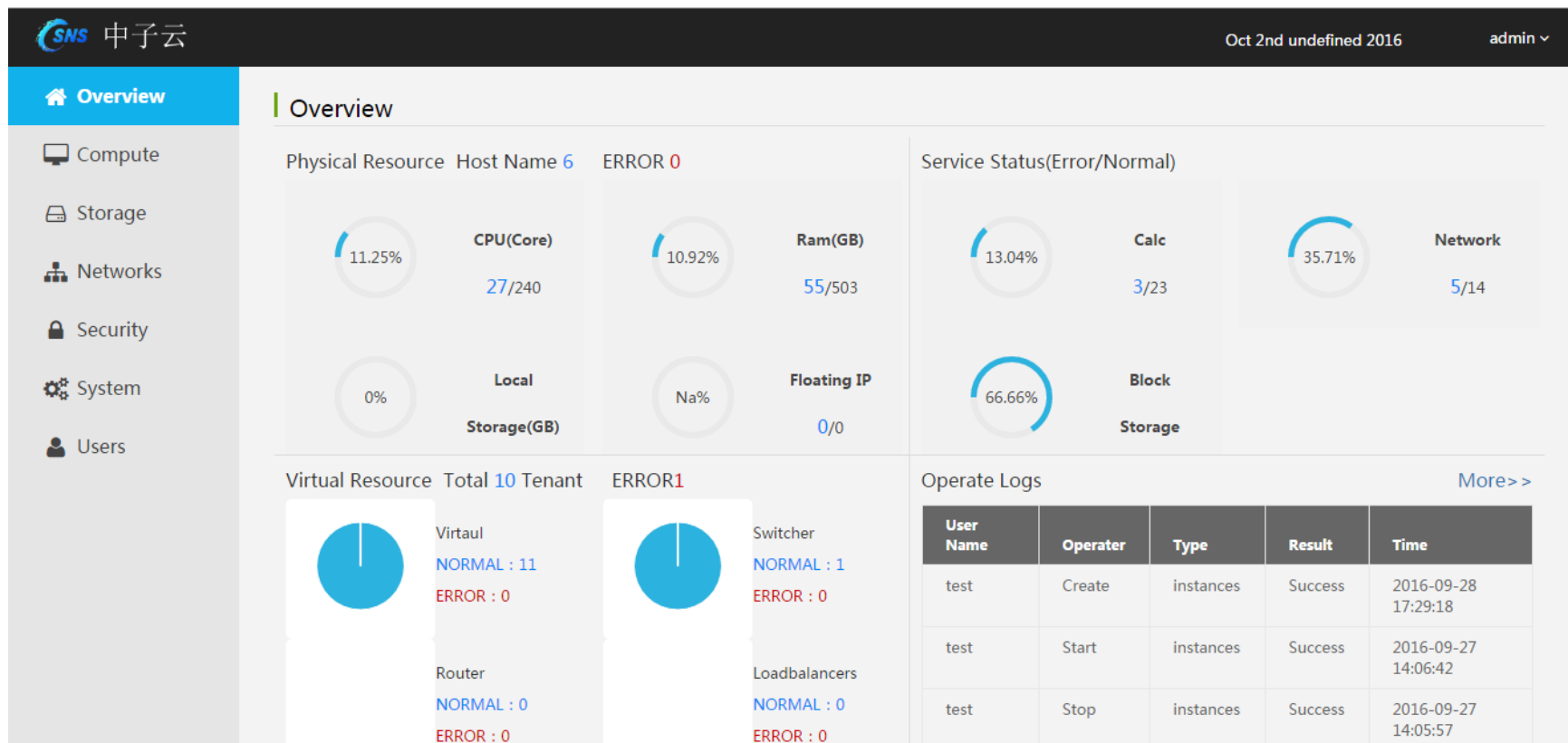
Distributed Messaging System



Source: Going brokerless, the transition from qpidd to 0mq.



Dashboard



Dashboard

- **RealTime Notification -> WebSocket Push**
- **Use socket.io running inside a NodeJS loop.**
- **A high performance websocket (RFC 6455) implementation has been added**
- **Using Redis as a message queue.**
- **Two instances of a uWSGI server:**
 - one to handle normal HTTP requests for Django
 - one to handle WebSocket requests

Summary

- The overview about CSNS;
- OpenStack and virtualization technology are good solution according to the computing scenarios and requirements of CSNS;
- The overall architecture of computing environment based on OpenStack is introduced;
- Some R&D points are mainly demonstrated from the aspects of unified authentication, network, messaging system, etc;
- More advice, suggestion and helps are strongly expected

Thank You !

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CSNS

