The Cloud Computing Environment of China-VO

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Chinese Virtual Observatory (China-VO)
National Astronomical Observatory of China

Contents

- China-VO & Cloud Computing
- Architecture
- Technology details
- Application
- Maintenance

China-VO

- Chinese Virtual Observatory (China-VO) is the national VO project in China initiated in 2002 by Chinese astronomical community leading by National Astronomical Observatories, Chinese Academy of Sciences.

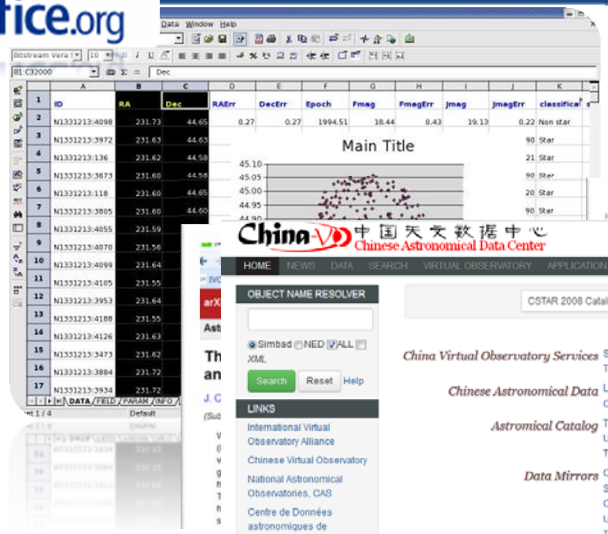
- China-VO became a member of the IVOA with the recommendation of Dr. Jim Gray

R&D Focuses

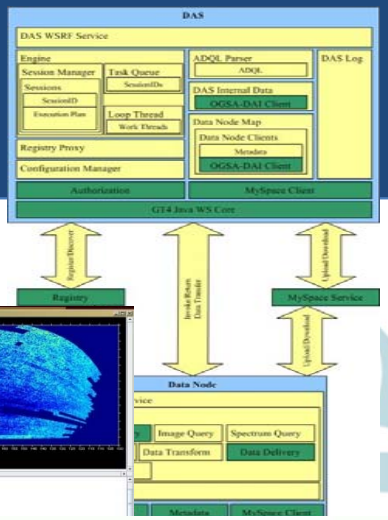
- China-VO Platform
- Unified Access to On-line Astronomical Resources and Services
- VO-ready Projects and Facilities
- VO-based Astronomical Research Activities
- VO-based Public Education

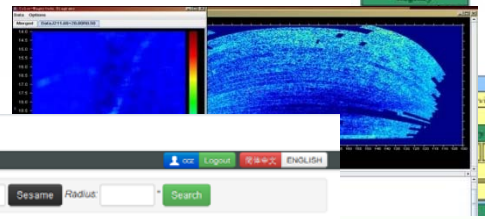
The First twelve Years

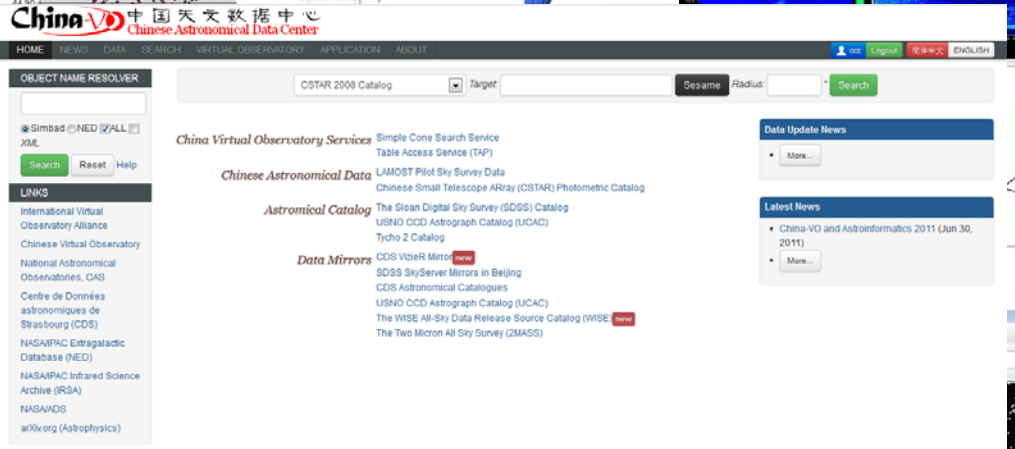
VOFilter

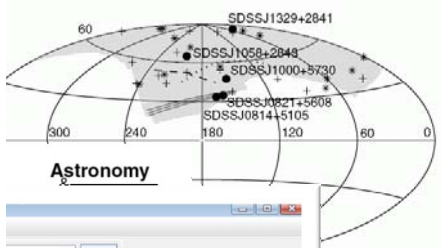


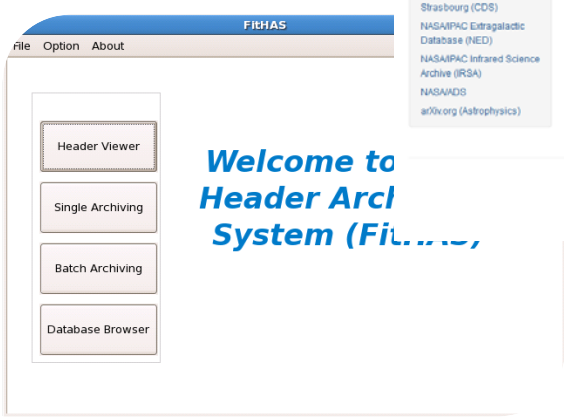
VO-DAS



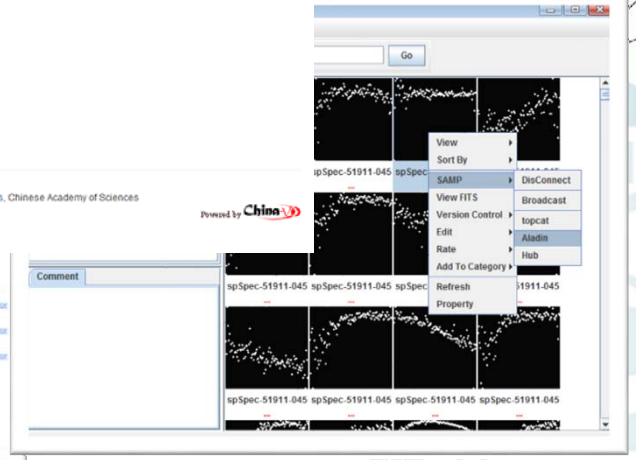






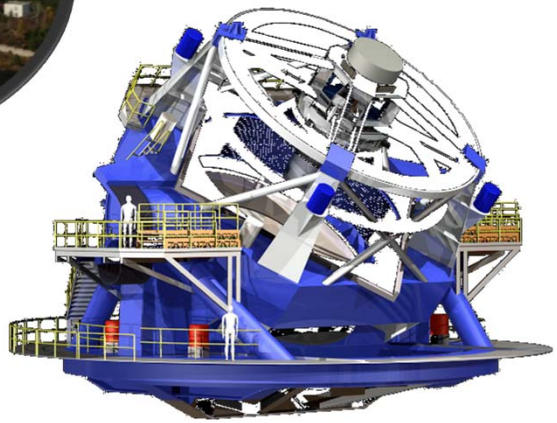


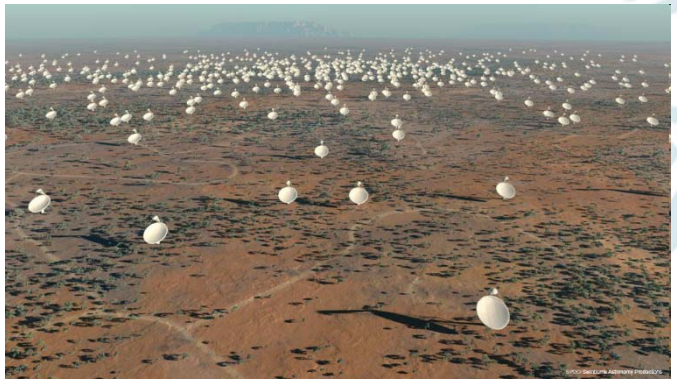
FitHAS



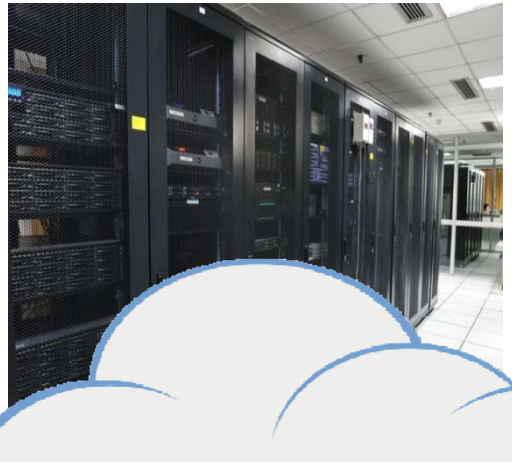
FITS Manager

Astronomical Big Data



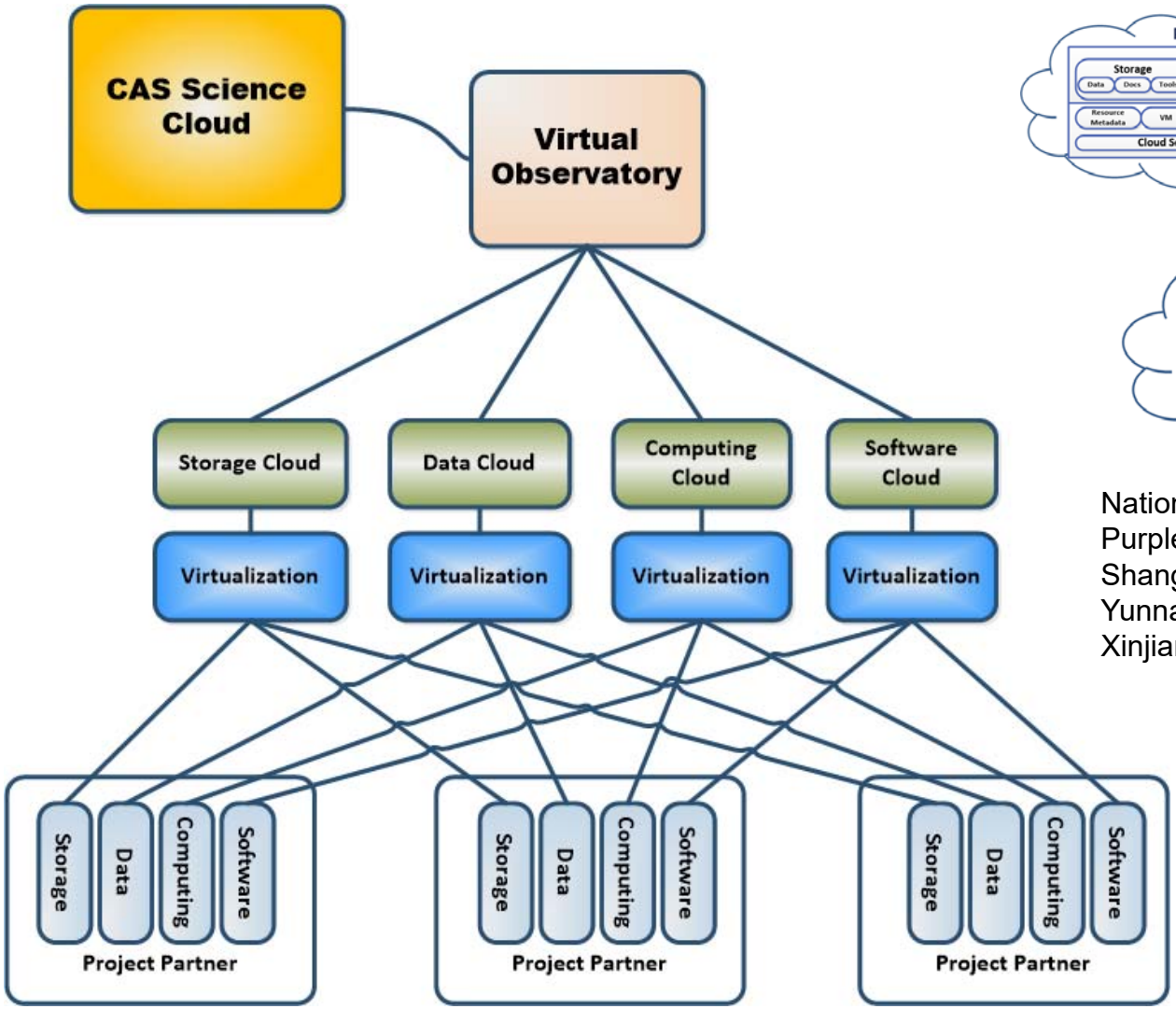


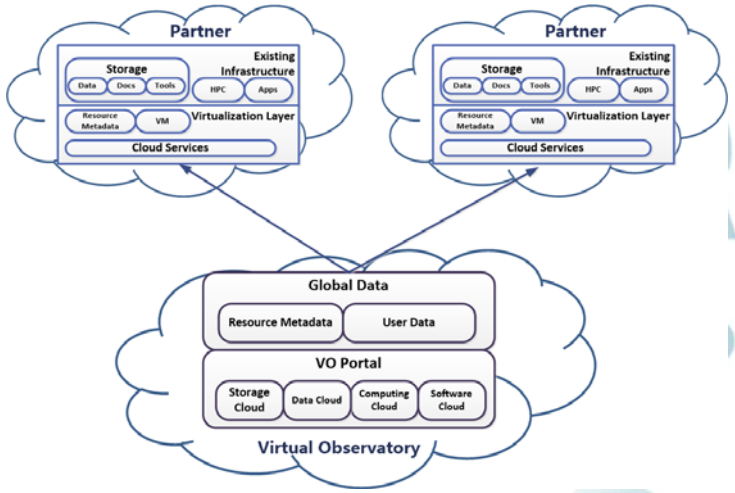
Large-scale computing & Storage



Computation migration to data

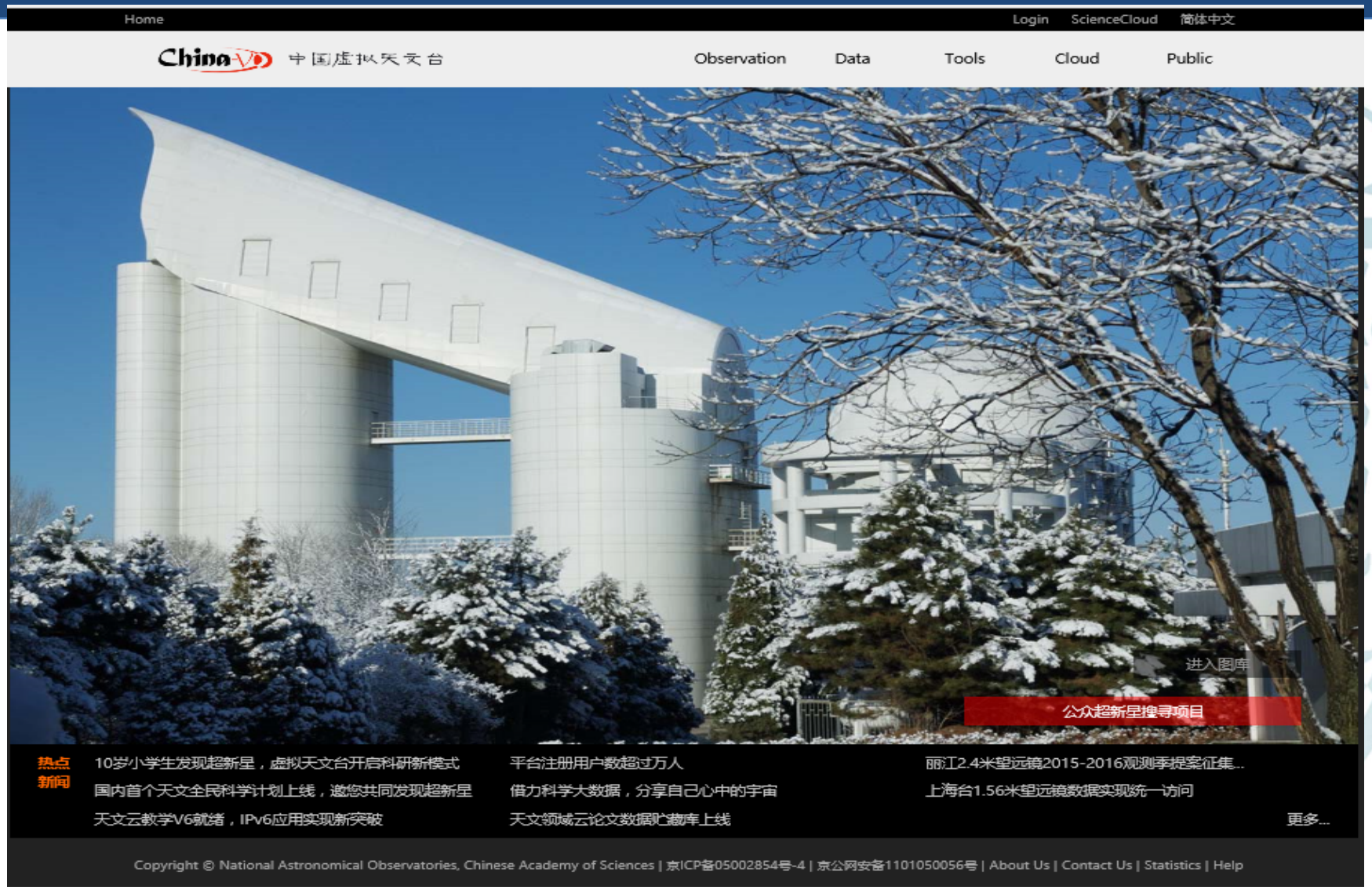
Astronomical Cloud in China-VO





National Astronomical Observatories, CAS
Purple Mountain Observatory
Shanghai Astronomical Observatory
Yunnan Astronomical Observatory
Xinjiang Astronomical Observatory

The Portal of China-VO System

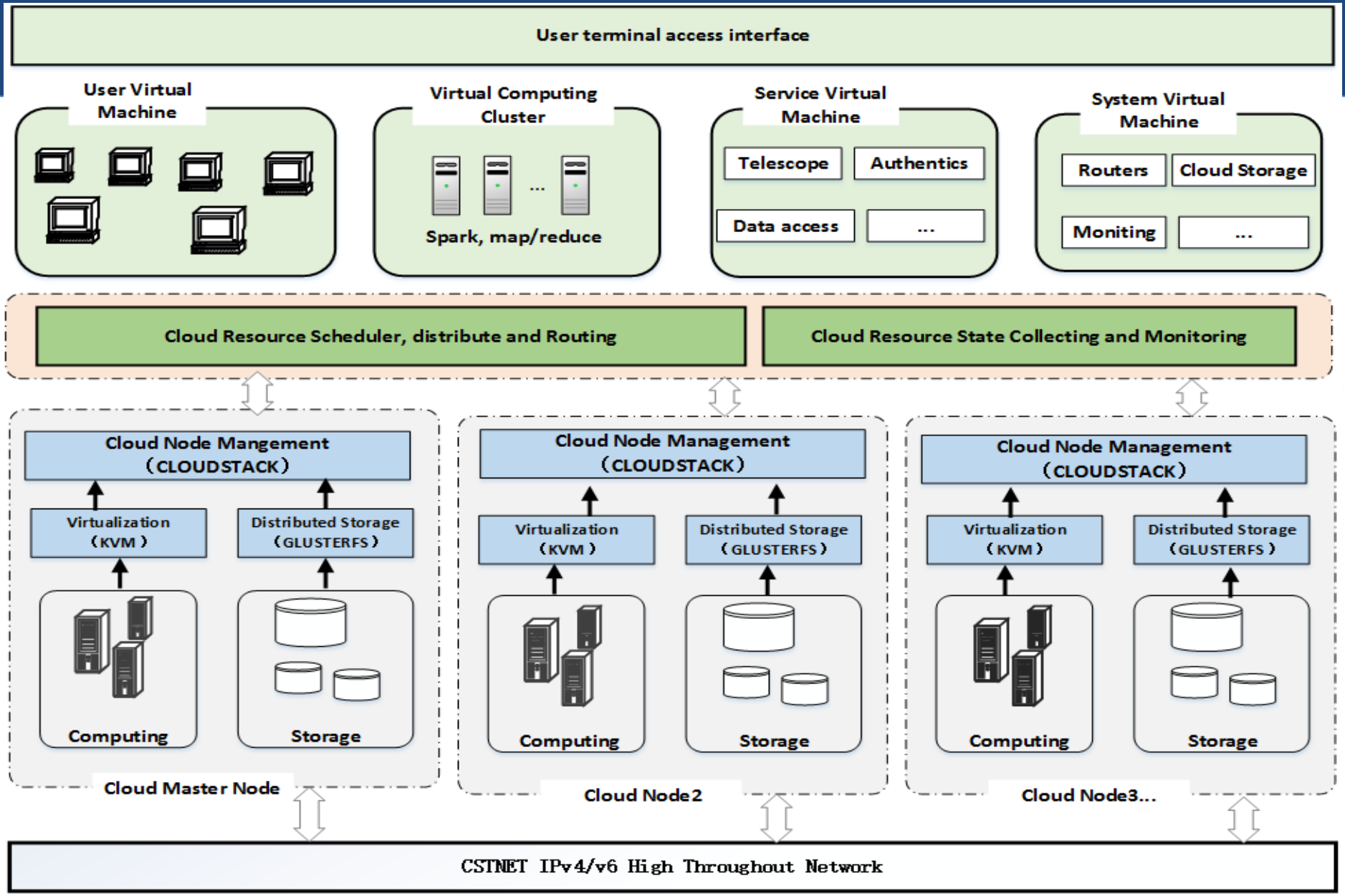


Achievement

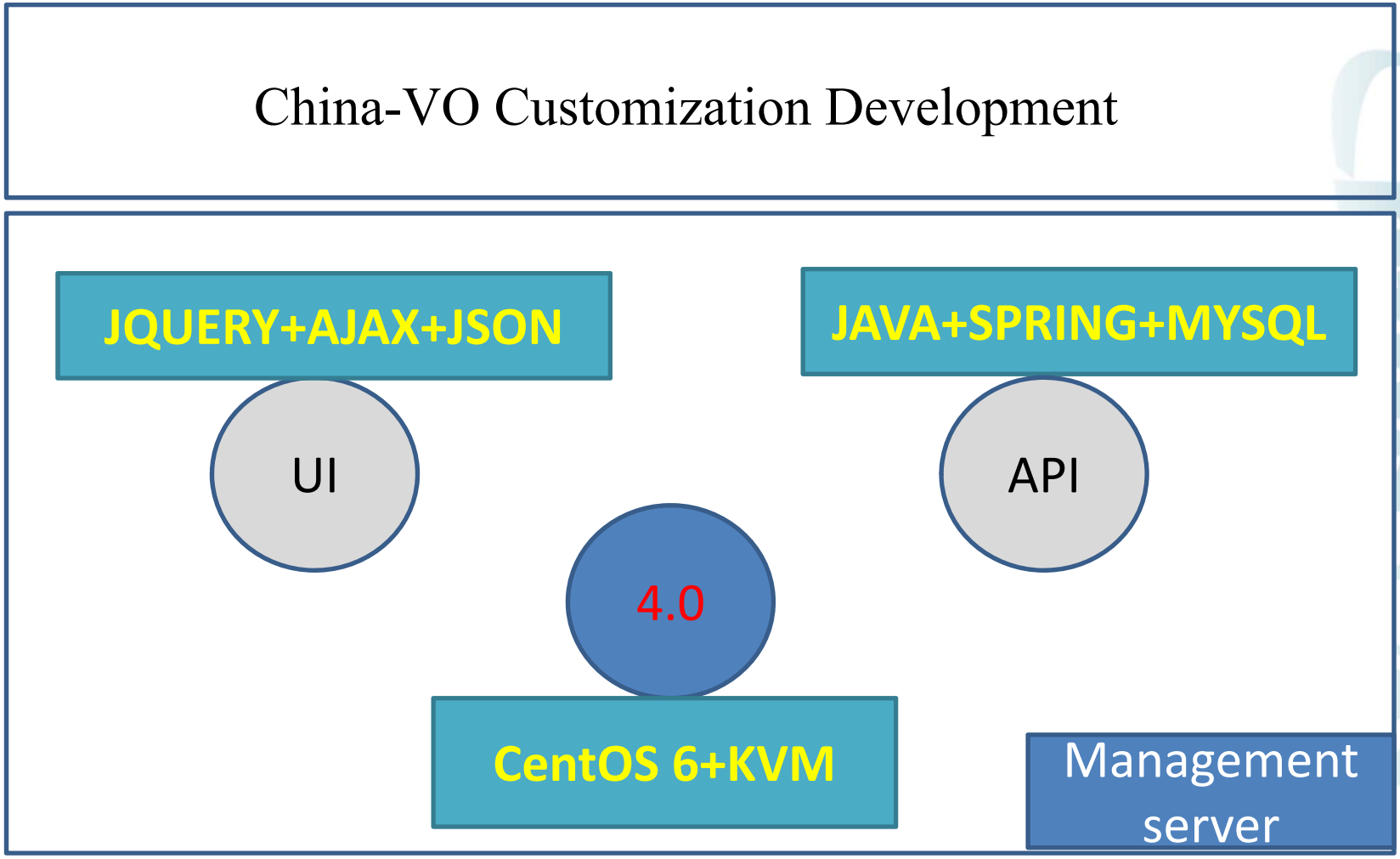
- Storage capacity：
  - 1500TB
- Calculate ability：
  - 702T+472 cores
- Network bandwidth：
  - 155Mbps-300Mbps
  - 10Gbps/1Gbps

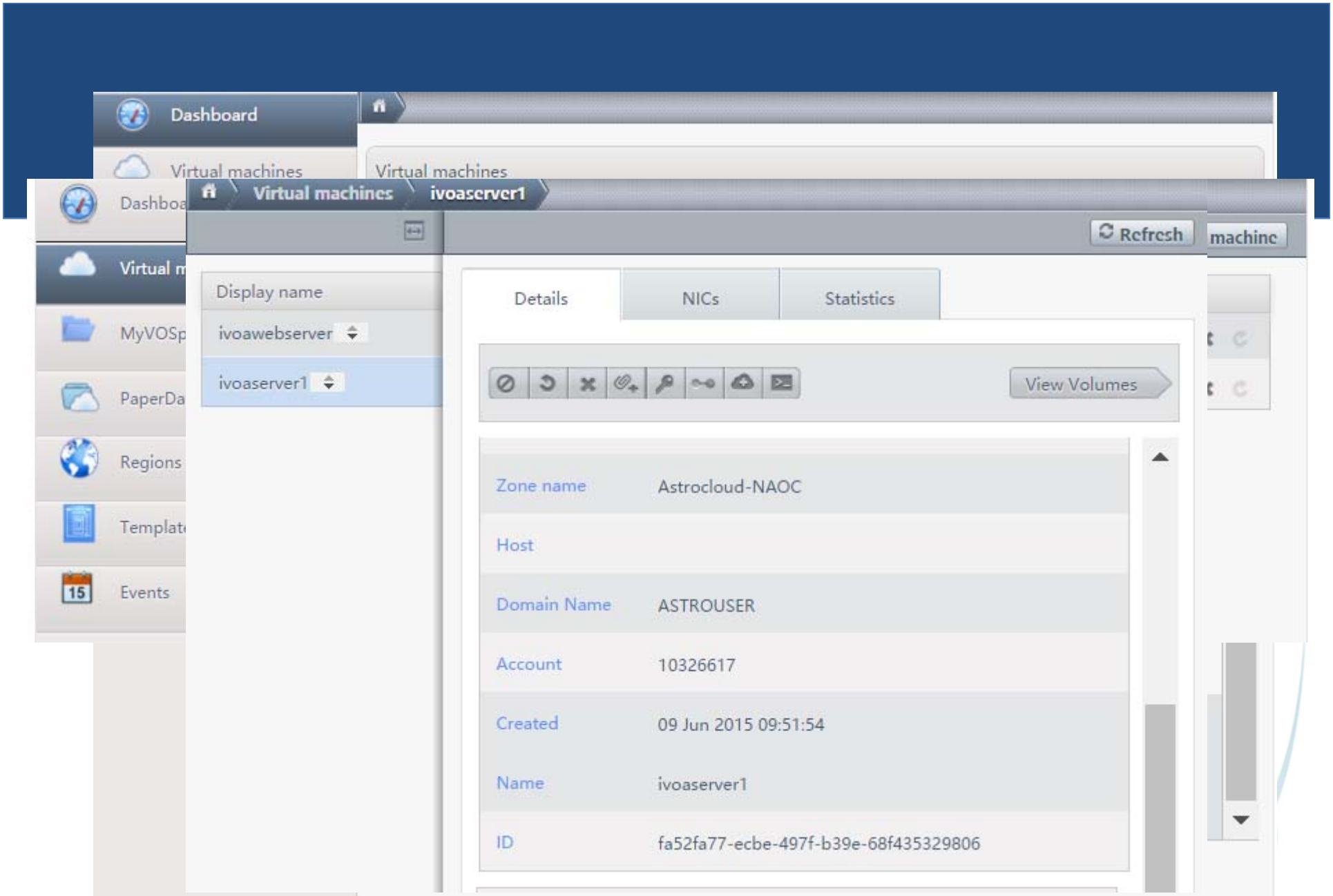
- Users： 18684 +
- Nodes： 7
- Virtual Machine Instances： 500+
- Supported Telescope： 4
- Archived Dataset： 24
- Mirror Dataset： 9
- Astronomy Software Environment： 4

The Architecture of China-VO System



Cloud Operation System




Dashboard
Virtual machines
Virtual machines
Virtual machines
ivoaserver1
Refresh
Display name
ivoawebserver
ivoaserver1
Details
NICs
Statistics
View Volumes
Zone name
Astrocloud-NAOC
Host
Domain Name
ASTROUSER
Account
10326617
Created
09 Jun 2015 09:51:54
Name
ivoaserver1
ID
fa52fa77-ecbe-497f-b39e-68f435329806
MyVOSp
PaperDa
Regions
Templat
Events

Multi-node management

New Member: NJU

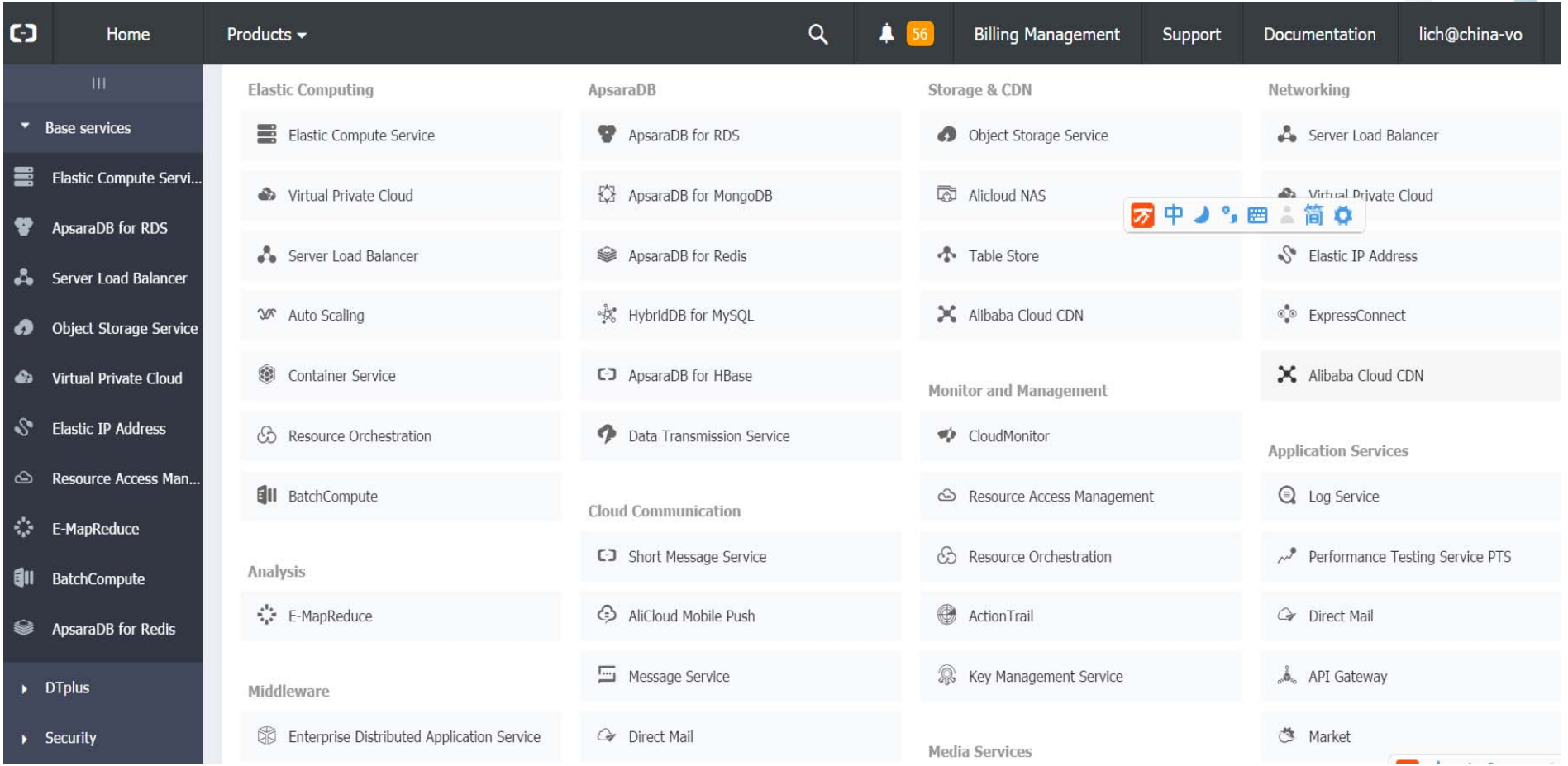
School of Astronomy & Space Science

Is the first university node.

New Member: AliCloud

阿里云

China 's largest public cloud provider

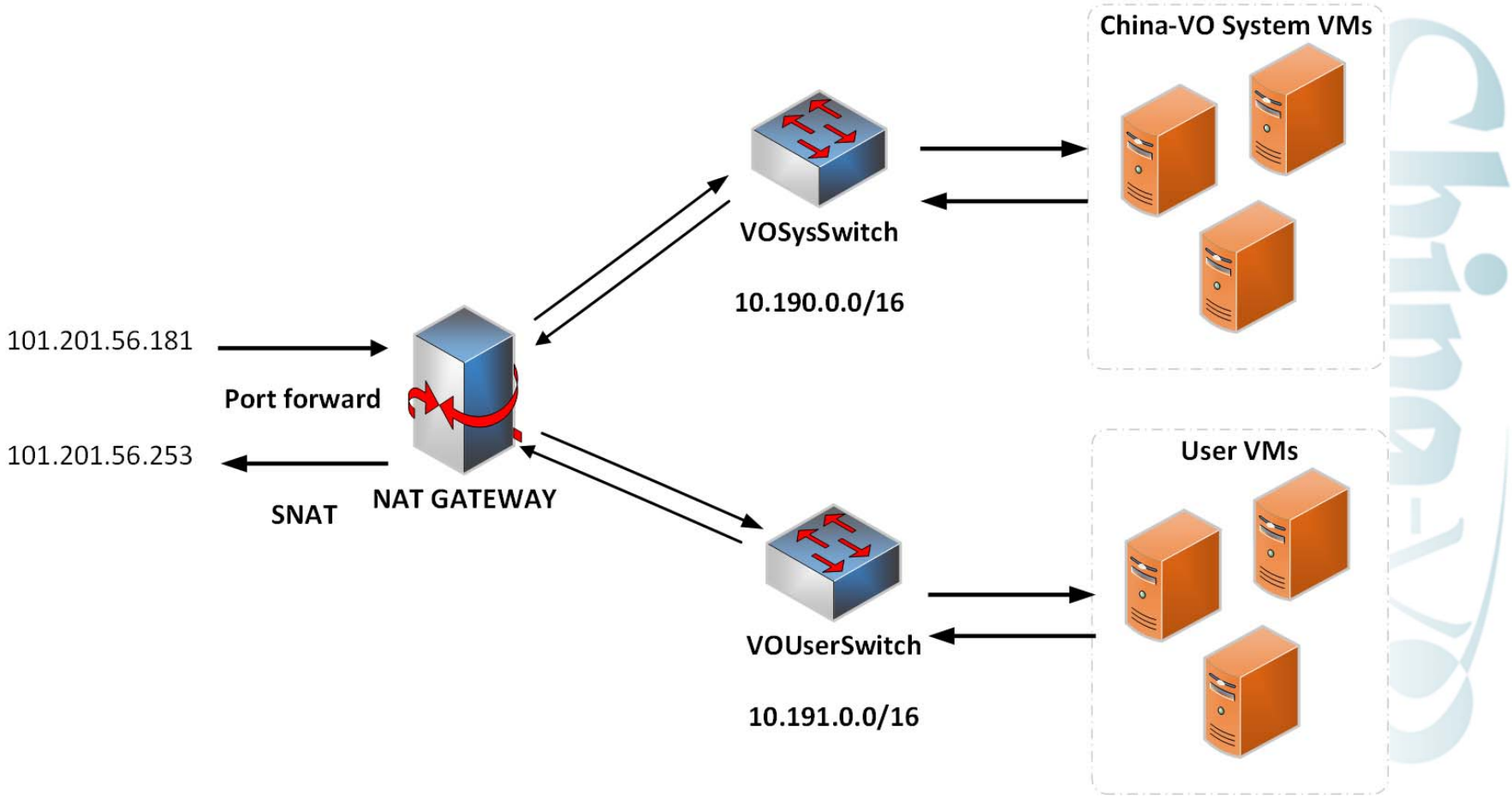


New Member: AliCloud

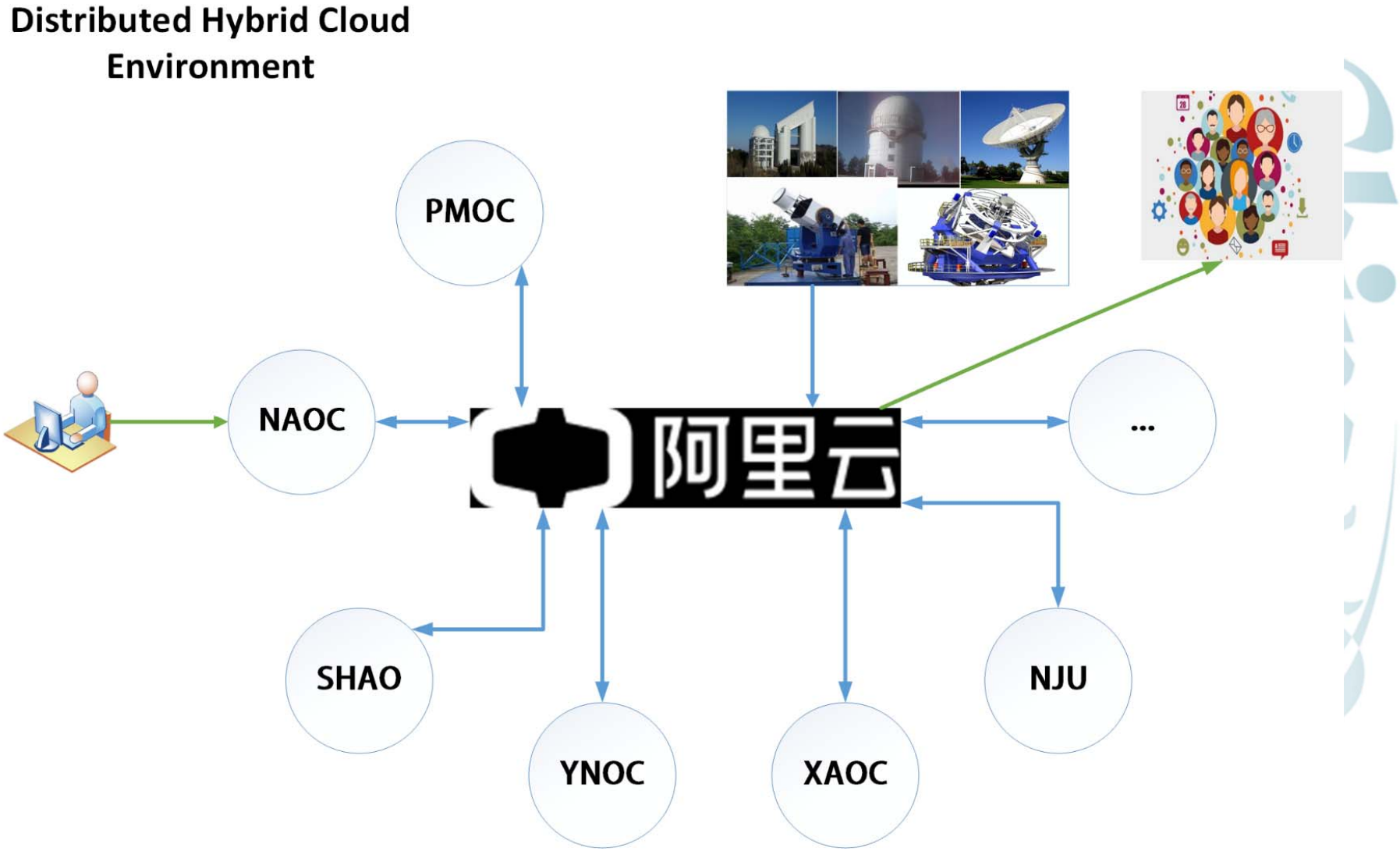
China 's largest public cloud provider

China South 1 (Shenzhen)	Asia Pacific SE 1 (Singapore)	China North 1 (Qingdao)
China North 2 (Beijing)	China North 3 (Zhangjiakou)	China East 2 (Shanghai)
US East 1 (Virginia)	Hong Kong	Middle East 1 (Dubai)	Asia Pacific SE 2 (Sydney)
China East 1 (Hangzhou)	EU Central 1 (Frankfurt)	Asia Pacific NE 1 (Tokyo)
US West 1 (Silicon Valley)		

New Member: AliCloud

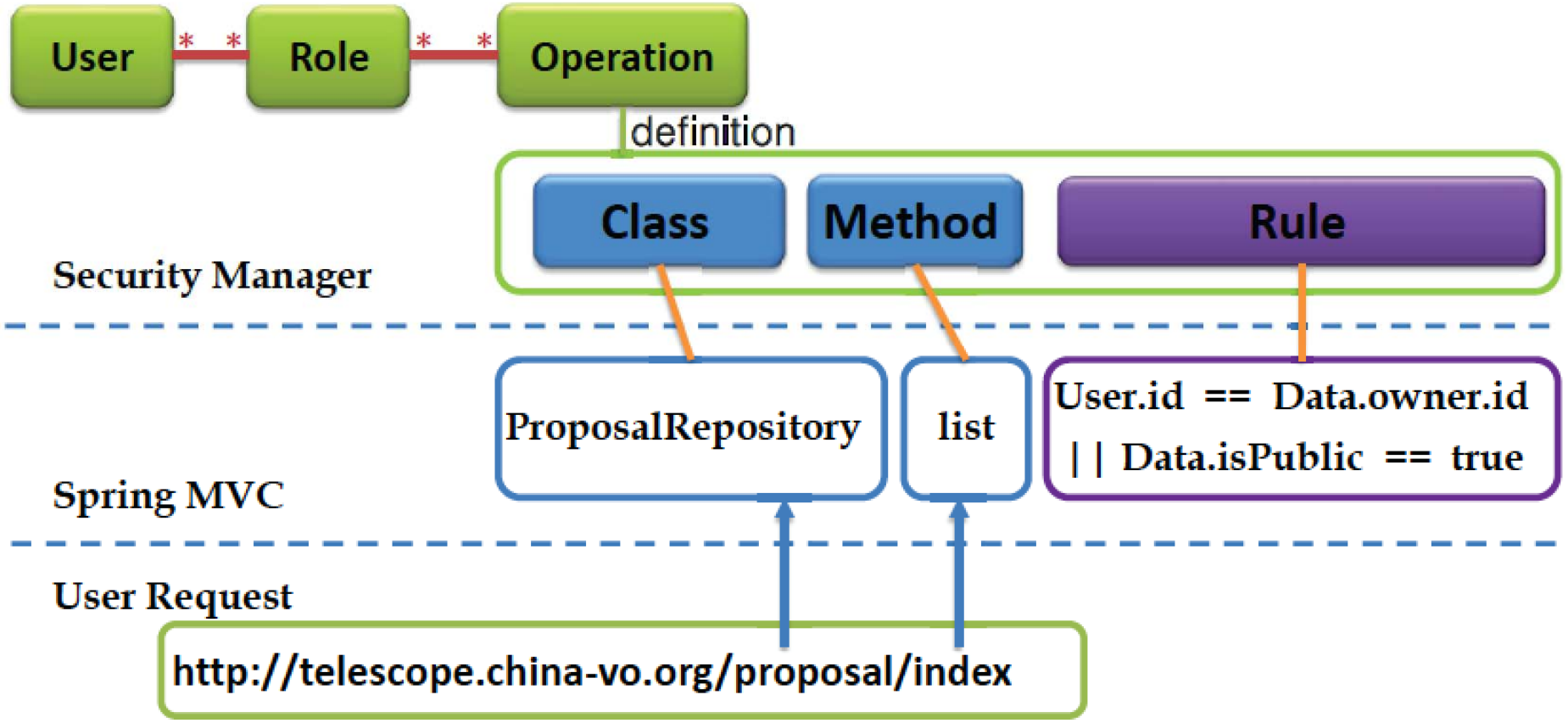


New Member: AliCloud



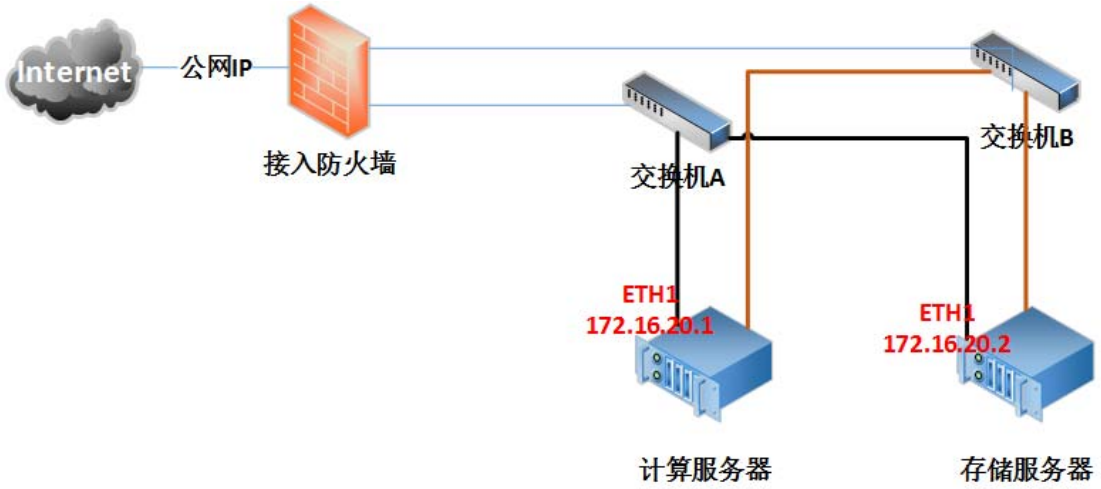
Technology Details

- Single Sign On
  - CST cloud passport (OAuth 2.0)



Technology Details

- Hardware and software configuration standard

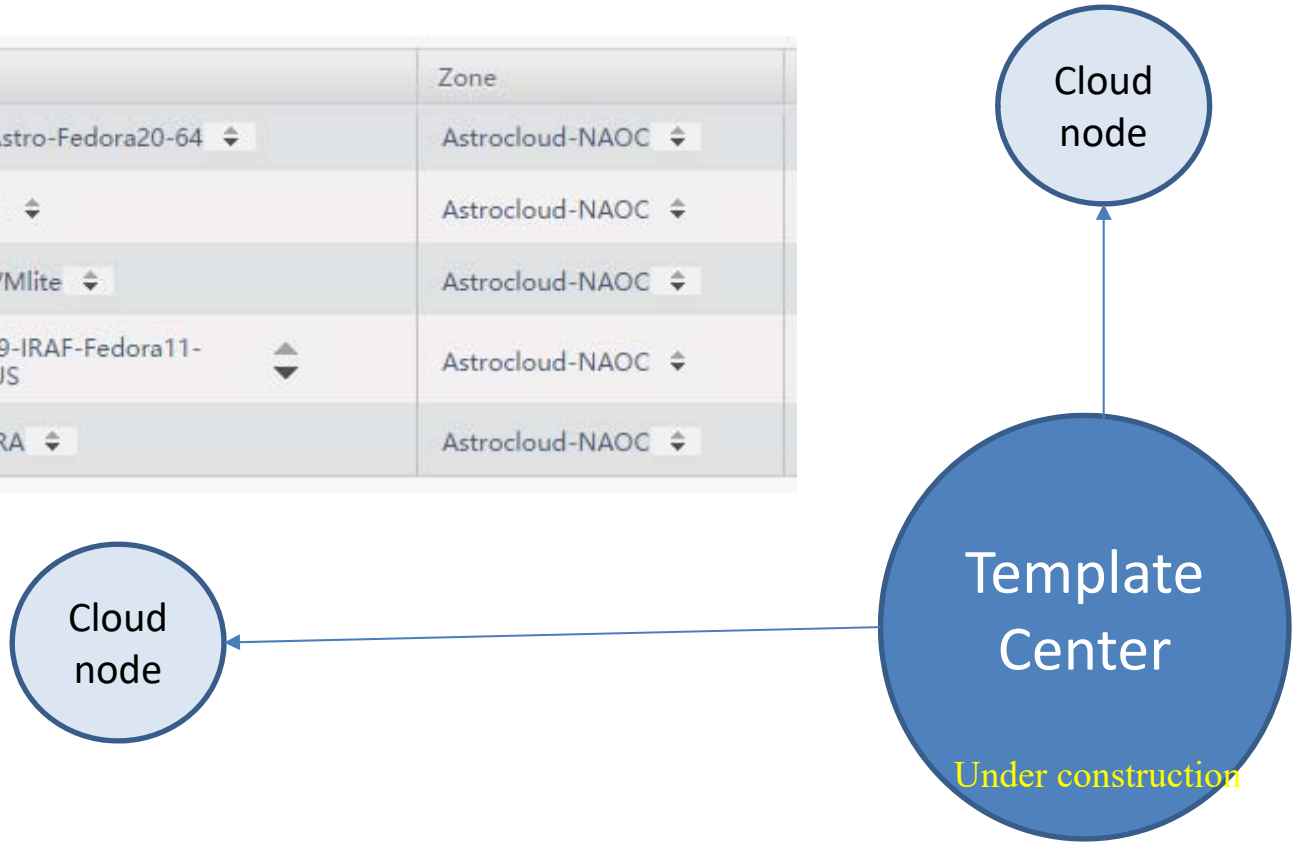


- Remote installation and configuration

Technology Details

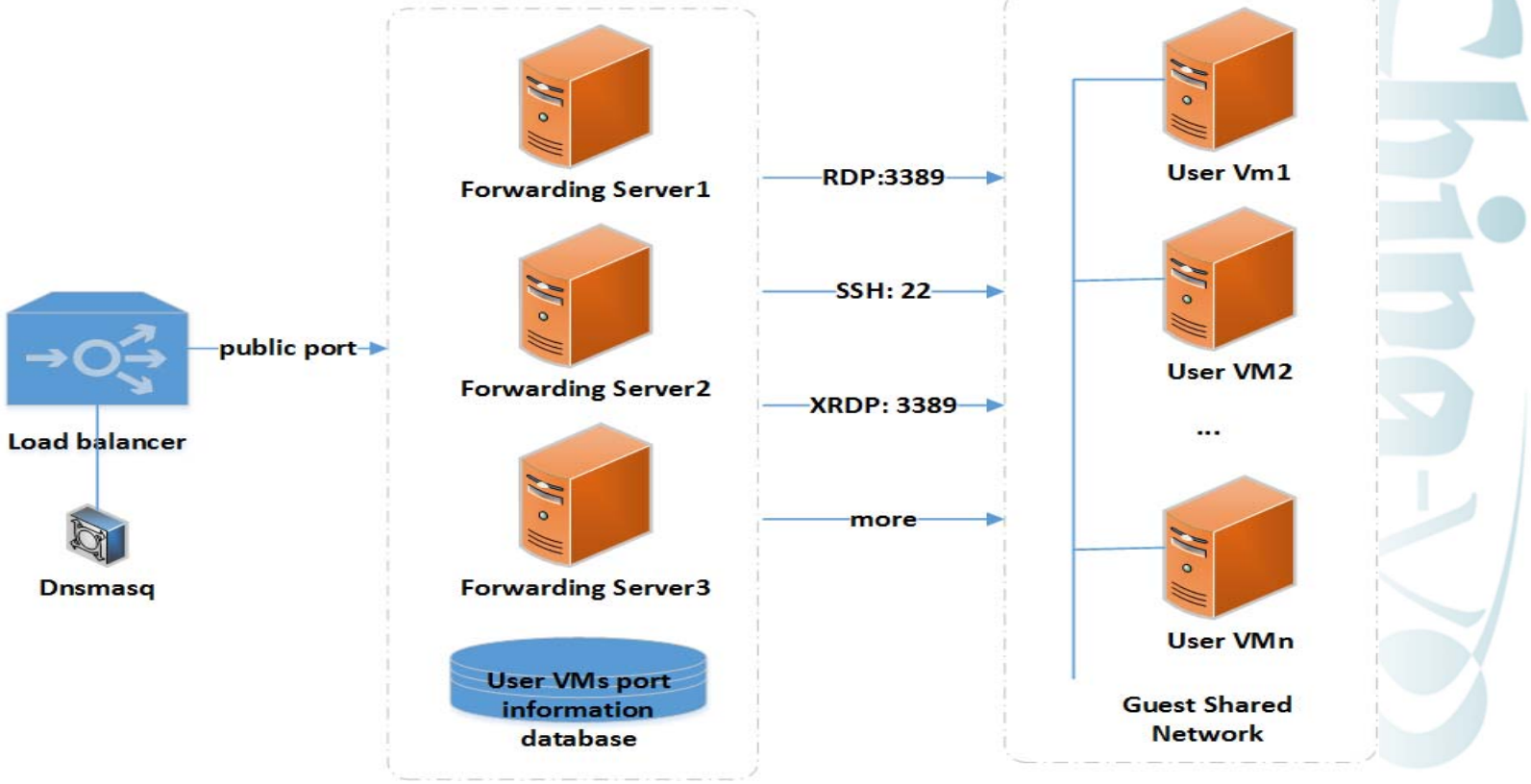
- VM Template management

Name	Zone
Basic-Astro-Fedora20-64	Astrocloud-NAOC
AIRE0.1	Astrocloud-NAOC
pulsarVMlite	Astrocloud-NAOC
SCI-DS9-IRAF-Fedora11-32EN-US	Astrocloud-NAOC
MADARA	Astrocloud-NAOC



Technology Details

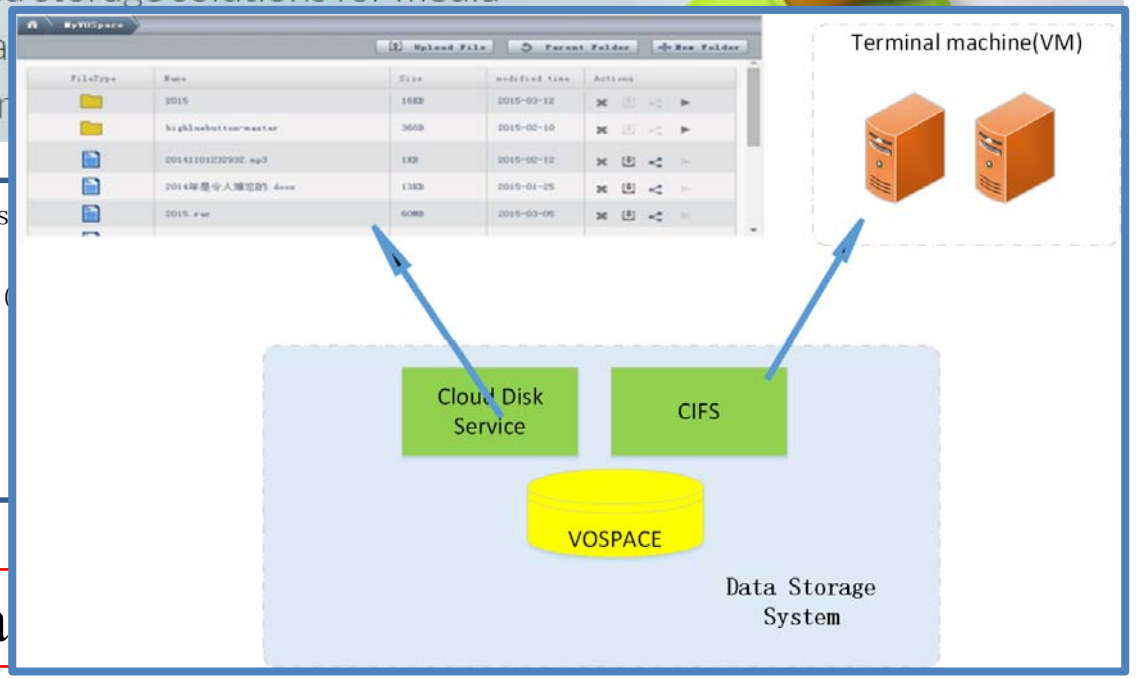
- Virtual machine access



Technology Details

- The distributed storage--GlusterFS

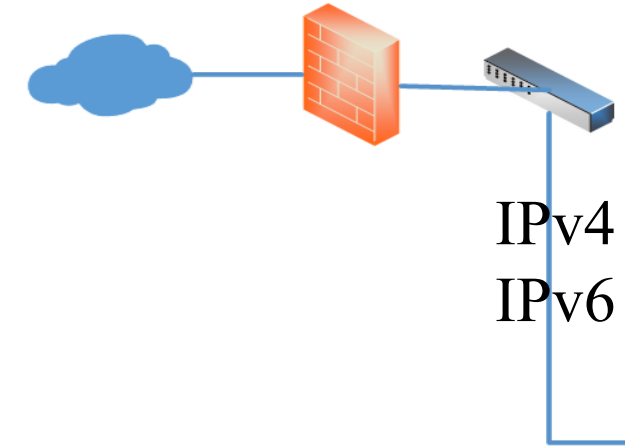

```
time dd if=/dev/zero of=/root/cloudvol/iotes

 1677721600000 bytes (1.7 TB) copied, 2343.(

 real    39m21.953s
 user    0m0.520s
 sys     20m29.405s
```

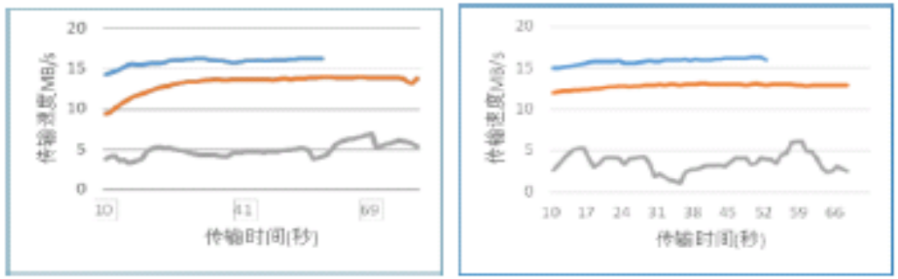


VOSPACE

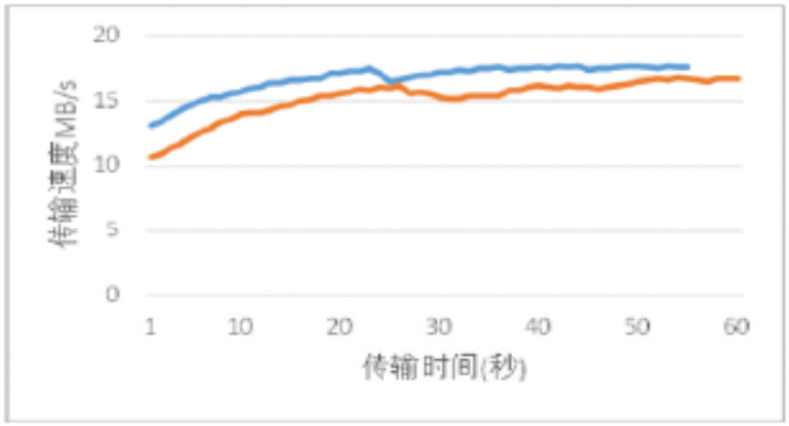
PaperData

The speed in IPv6 is 50 times faster than IPv4

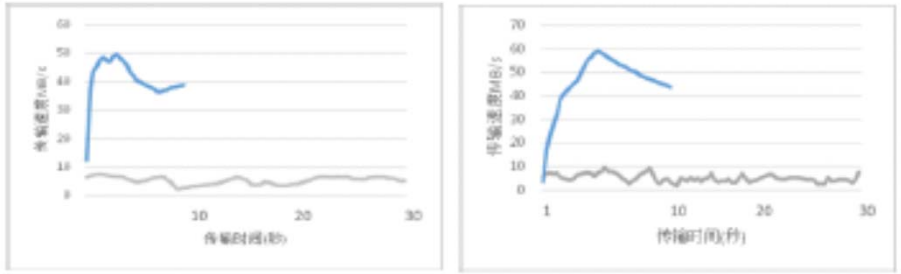




a) 在两个地域不同的云节点虚拟机上通过 SCP 下载文件的时间与速度对比图



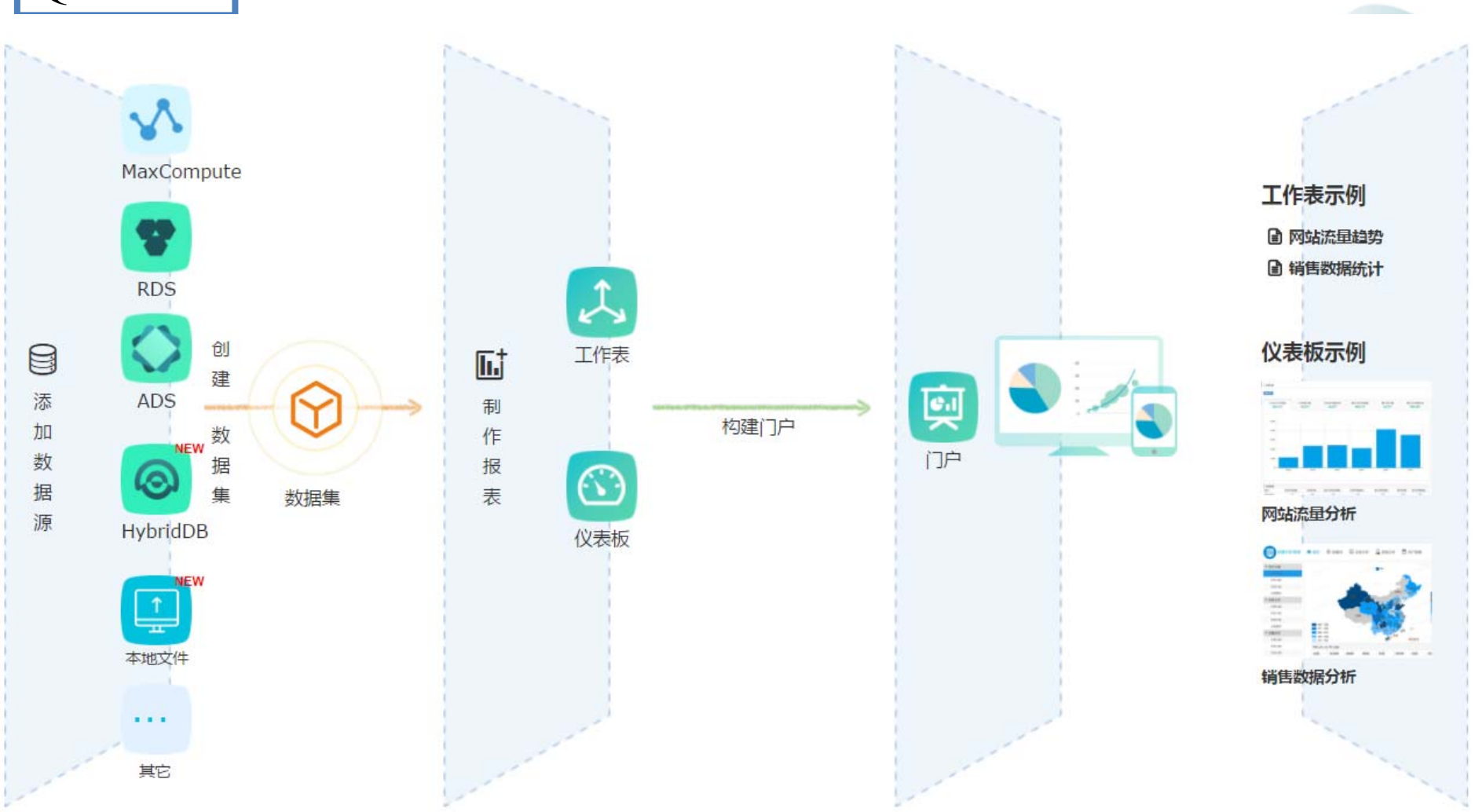
b). 云内网虚拟机间使用 IPv4 与 IPv6 速度对比



c). 在两个地域不同的云节点虚拟机上通过 wget 下载 VOSPACE 文件的时间与速度对比图

Usage statistic

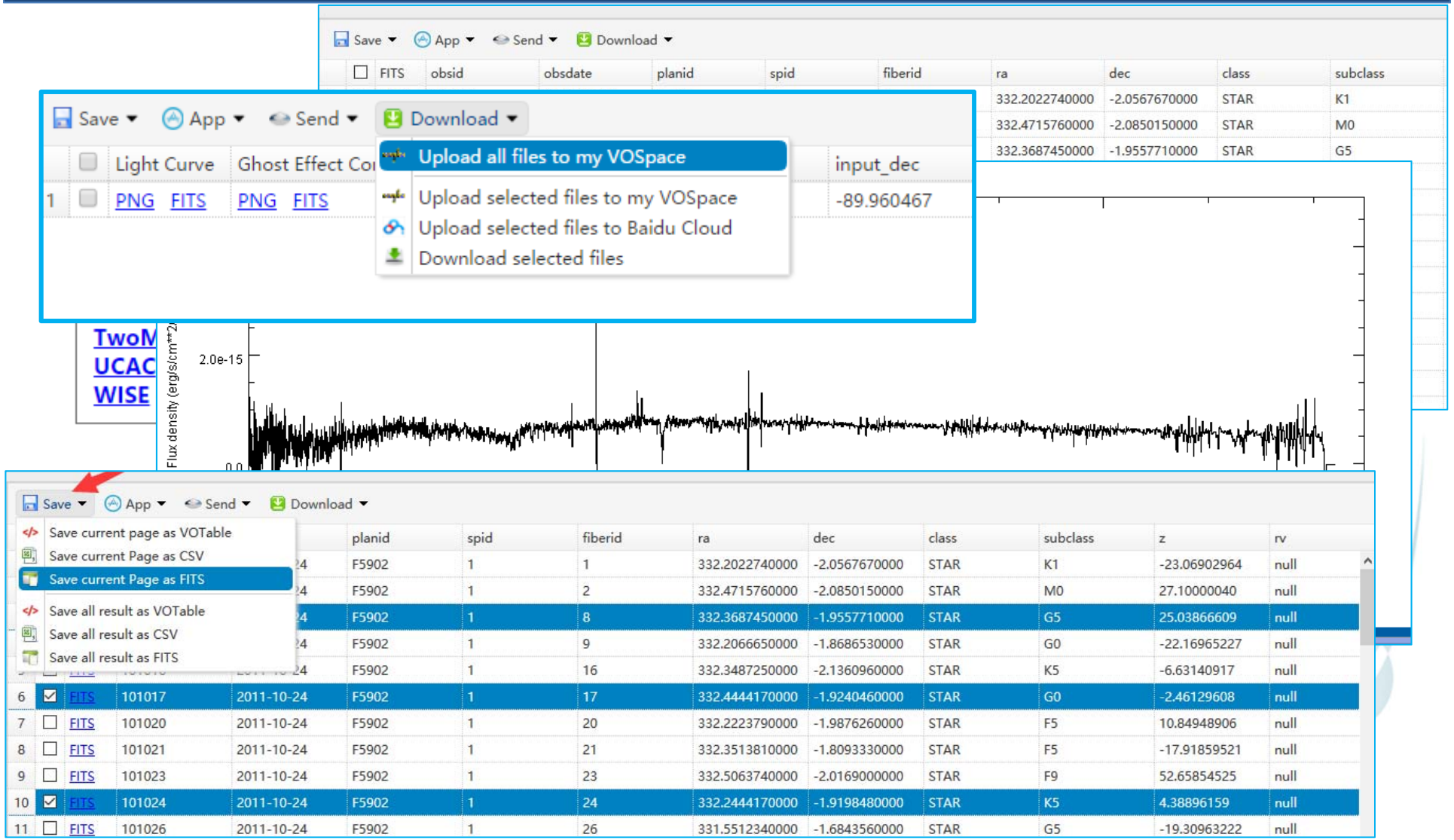
Quick BI



Application of China-VO Cloud

- Telescope proposal management
- Data archive and exploration
- Astronomy Teaching
- The astronomy big data processing
- WWT tours management
- …

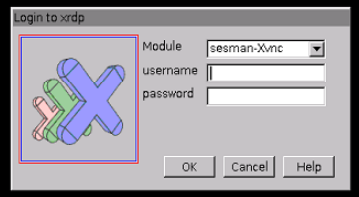
Data Exploration

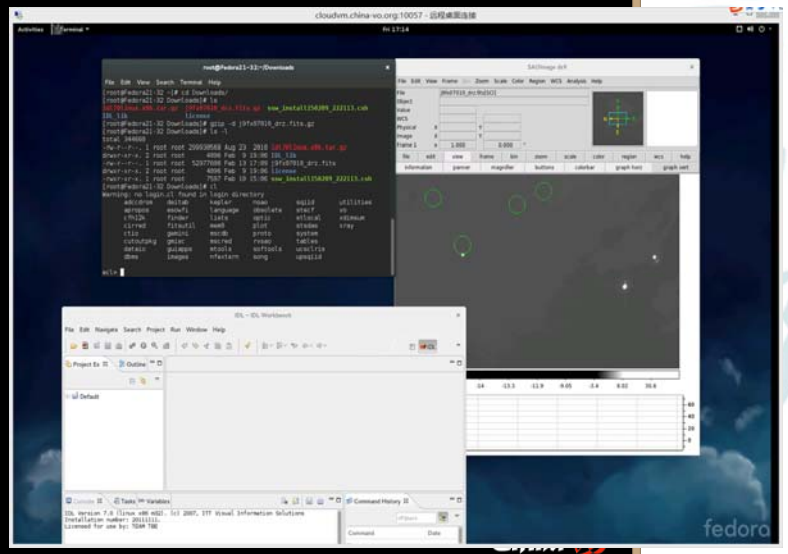


Astronomy Teaching

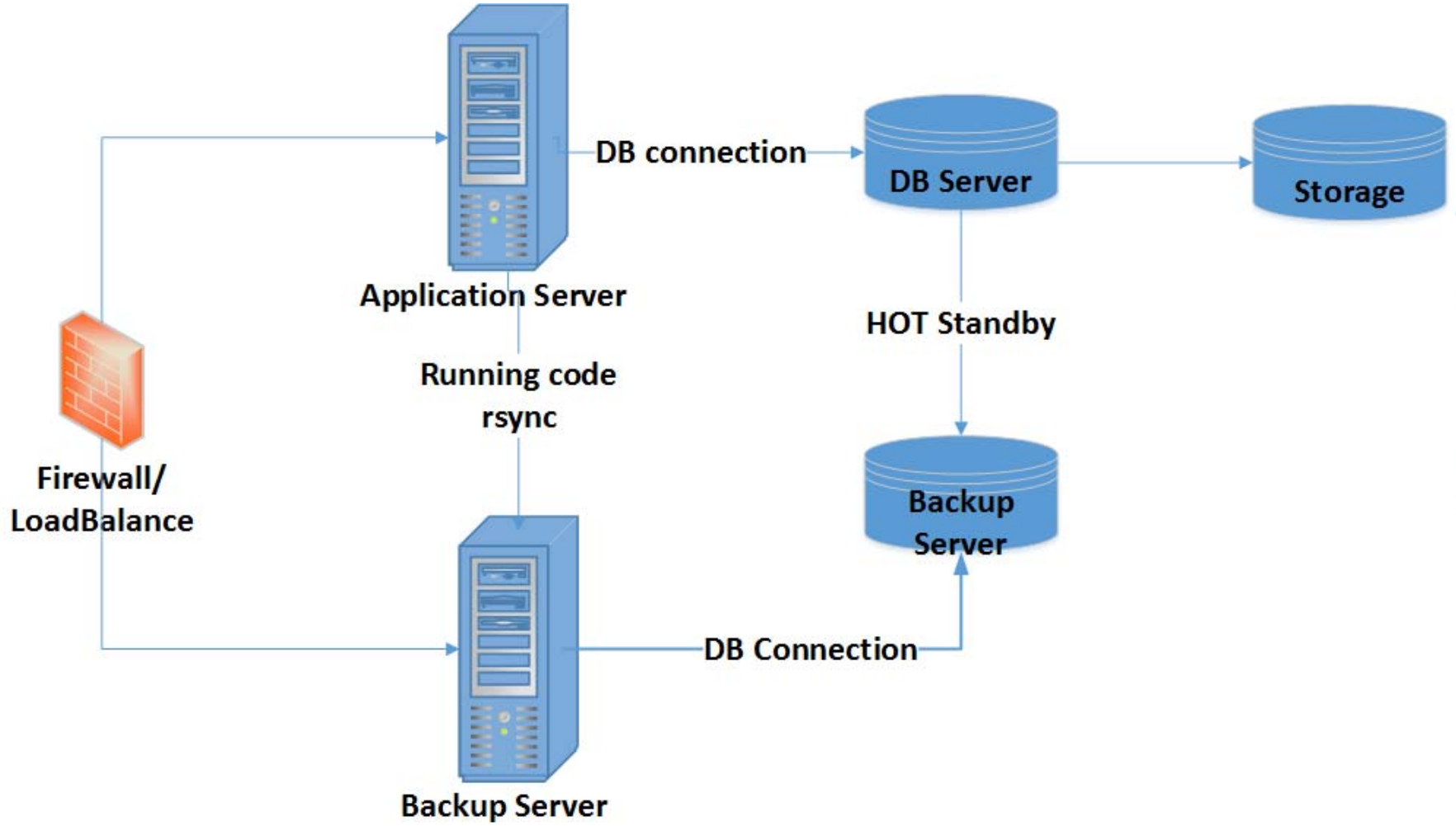
cloudvm.china-vo.org:10057 - 远程桌面连接

- **Class： Multi-band astronomical data acquisition and processing**
- VM Template Software：
  - Python 2.7.5、Geany Editor
  - numpy、scipy、matlibplot
  - IDL7.0、SSW
  - DS9
  - IRAF
  - HEASOFT
  - CIAO
  - Glidas
  - CASA





Maintenance



Thank You!