



Resources and Services

from National Astronomical Data Center

Chenzhou Cui

NAOC, CAS



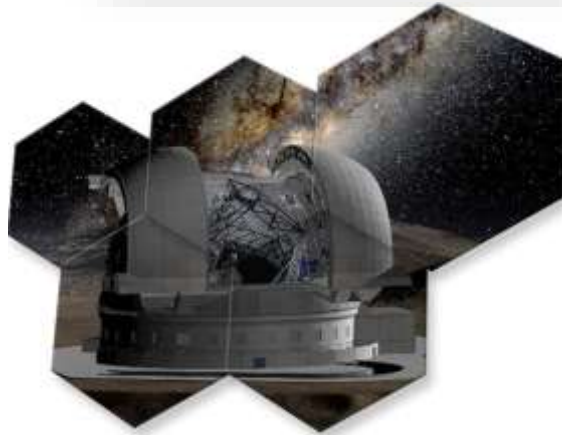
It is not a talk about Science
but one for Better Science

Contents

- **Introduction to VO and China-VO**
 - VO, IVOA, China-VO, Science Platform
- **NADC Resources**
 - data storage, data access, cloud computing, HPC, tools and information, WWT tours and curriculum
- **NADC Services**
 - data archiving, data management, software/system/platform design and development, cluster/HPC design, community outreach, education and public outreach



Heroes behind the **Big Data Astronomy**



The Idea of VO

Vision of the VO:

- The Web is *transparent*. The goal of the Virtual Observatory is to achieve the same feeling for astronomical data - that it is all available to explore in a single transparent system.
- Like the World Wide Web, the VO is not a fixed system, but rather a *way of doing things*.
- Astronomical datasets, tools, services should work seamlessly together.
- The VO allows astronomers to interrogate multiple data centers in a seamless and transparent way, provides new powerful analysis and visualization tools within that system, and gives data centers a standard framework for publishing and delivering services using their data.
- *Virtual Observatory (VO) is a data-intensively online astronomical research and education environment, taking advantages of advanced information technologies to achieve seamless, global access to astronomical information.*

-- my words



International Virtual Observatory Alliance

VO's vision is made possible by standardization of data and metadata, by standardization of data exchange methods, and by the use of a registry, which lists available services and what can be done with them.

IVOA:

- An organisation that debates and agrees the technical standards that are needed to make the VO possible
- A focal point for VO aspirations, a framework for discussing and sharing VO ideas and technology
- Promoting and publicising the VO

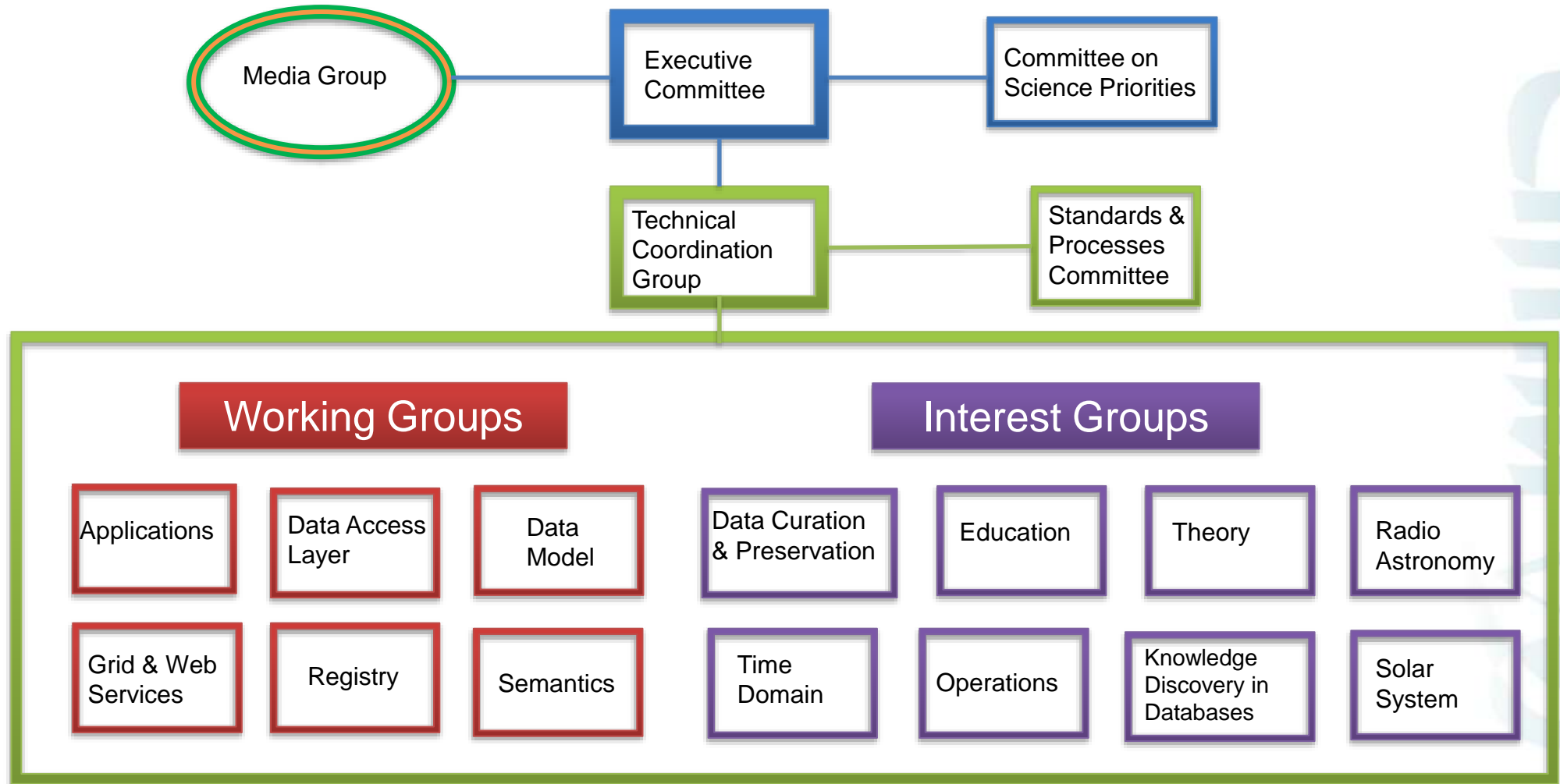


Basic Information about IVOA

- Created in 2002
- 21 member VO projects
 - Netherlands shows strong interests
- 6 Working Groups, 8 Interest Groups
- 2 Interoperability meetings per year
 - May
 - Oct/Nov with ADASS
- ~ 46 interoperability standards



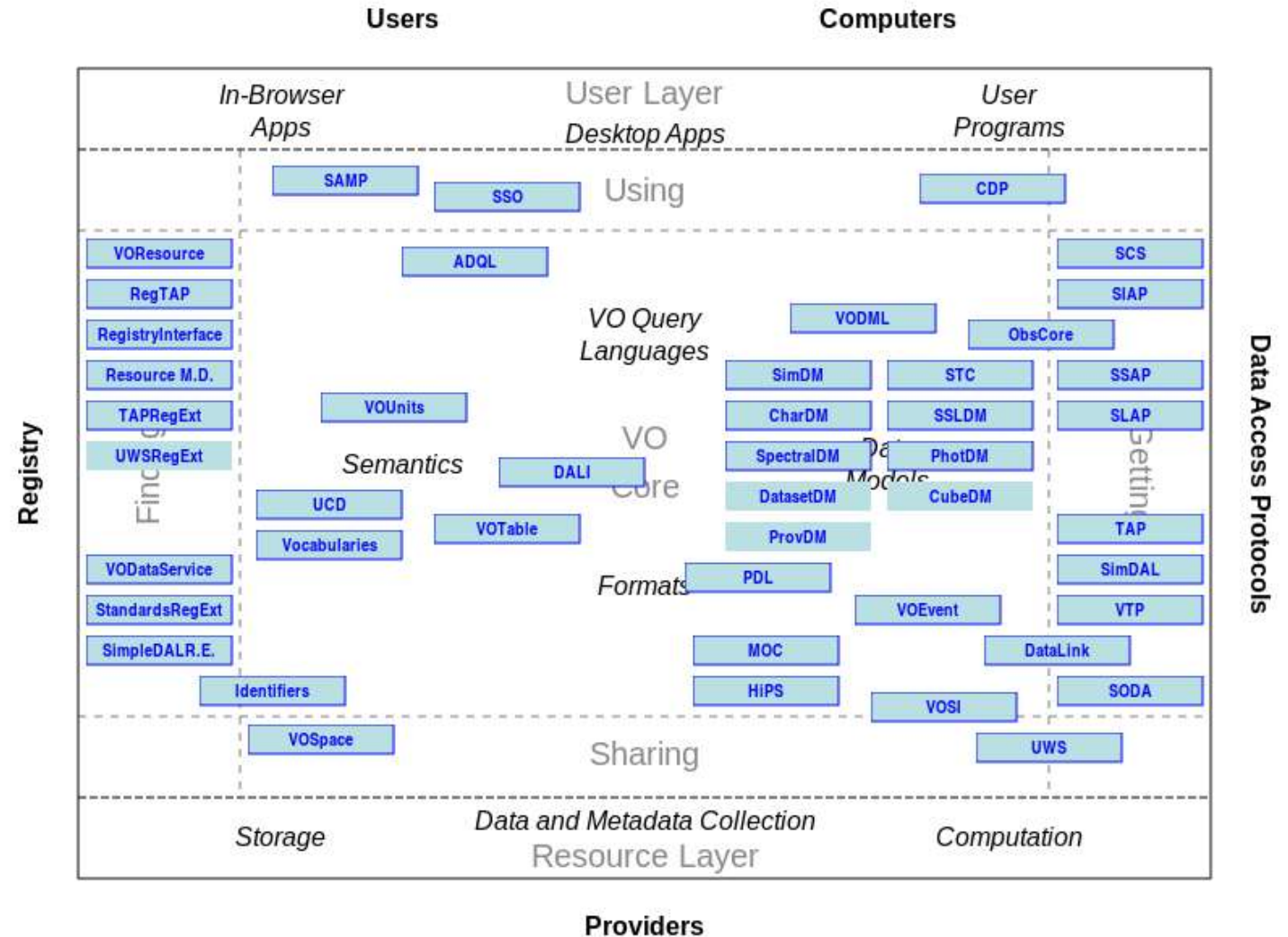
IVOA Organization Chart



Process

IVOA Standards

IVOA Document Standards and Processes



Standards documents

Recommendations, and 'in progress' all available on IVOA pages

Recommendations and Endorsed notes – also on ADS with DOIs

INTERNATIONAL VIRTUAL OBSERVATORY ALLIANCE

Home Astronomers Deployers Members About

Documents & Standards

DOCUMENTS XML SCHEMA TEMPLATES DOC SUBMISSION

- Technical Specifications
- Notes
- Promotion process
- IVOA Technical Assessment and Roadmap Documents
- Submission Log

Technical Specifications

Group	Title	Most stable	In progress	Version history
App	SAMP - Simple Application Messaging Protocol	1.0		1.0 1.1 1.2 1.3 1.4 1.5 1.6 1.7 1.8 1.9 2.0
	VOTable - VOTable Format Definition	1.0	1.4	1.4 1.4.1 1.4.2 1.5 1.6 1.7 1.8 1.9 2.0
	MOC - HEALPix Multi-Order Coverage Map	1.0	1.1	1.1 1.2 1.3 1.4 1.5 1.6 1.7 1.8 1.9 2.0
	HiPS - Hierarchical Progressive Survey	1.0		1.0 1.1 1.2 1.3 1.4 1.5 1.6 1.7 1.8 1.9 2.0
DAL	DALI - Data Access Layer Interface	1.0		1.0 1.1 1.2 1.3 1.4 1.5 1.6 1.7 1.8 1.9 2.0
	DataLink	1.0		1.0 1.1 1.2 1.3 1.4 1.5 1.6 1.7 1.8 1.9 2.0
	Simple Cone Search	1.0		1.0 1.1 1.2 1.3 1.4 1.5 1.6 1.7 1.8 1.9 2.0
	SIA - Simple Image Access	2.0		2.0 2.1 2.2 2.3 2.4 2.5 2.6 2.7 2.8 2.9 3.0
	SLAP - Simple Line Access	1.0	2.0	1.0 1.1 1.2 1.3 1.4 1.5 1.6 1.7 1.8 1.9 2.0
	SSA - Simple Spectral Access	1.0		1.0 1.1 1.2 1.3 1.4 1.5 1.6 1.7 1.8 1.9 2.0
	STC-S: Space-Time Coordinate Metadata Linear String implementation	1.0		1.0
	TAP - Table Access Protocol	2.0	RFC	1.0 1.1 1.2 1.3 1.4 1.5 1.6 1.7 1.8 1.9 2.0
	TAPRegExt - A VOResource Schema Extension for Describing TAP Services	1.0		1.0 1.1 1.2 1.3 1.4 1.5 1.6 1.7 1.8 1.9 2.0
	ADQL - Astronomical Data Query	2.0		1.0 2.0 2.1 2.2 2.3 2.4 2.5 2.6 2.7 2.8 2.9 3.0

e.g. HiPS standard

International Virtual Observatory Alliance

HiPS – Hierarchical Progressive Survey

Version 1.0
IVOA Recommendation
19th May 2017

This version:
1.0: Recommendation 2017-05-19

Previous version(s):
1.0: Proposed Recommendation 2017-04-06
1.0: Proposed Recommendation 2017-04-03
1.0: Proposed Recommendation 2017-02-07
1.0: Proposed Recommendation 2016-11-22
1.0: Working Draft 2016-06-23

Interest/Working Group:
Applications: <http://www.ivoa.net/twiki/bin/view/IVOA/IvoaApplications>

Editor:
Pierre Fernique

Authors:
Pierre Fernique, Mark Allen, Thomas Boch, Tom Donaldson, Daniel Durand, Ken Ebisawa, Laurent Michel, Jesus Salgado, Felix Stoehr

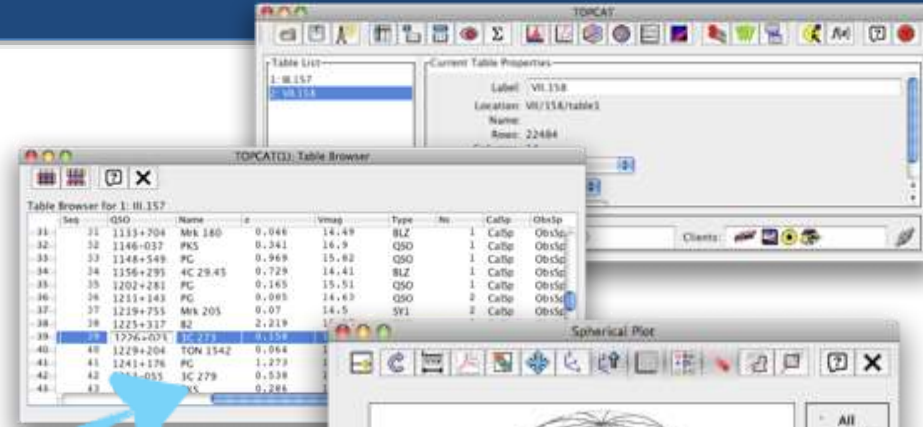
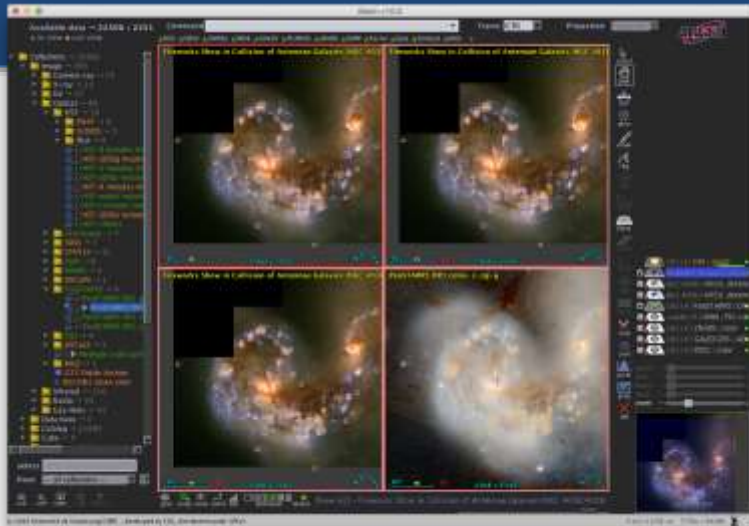
Abstract

This document presents HiPS, a hierarchical scheme for the description, storage and access of sky survey data. The system is based on hierarchical tiling of sky regions at finer and finer spatial resolution which facilitates a progressive view of a survey, and supports multi-resolution zooming and

1

Interoperable applications and services

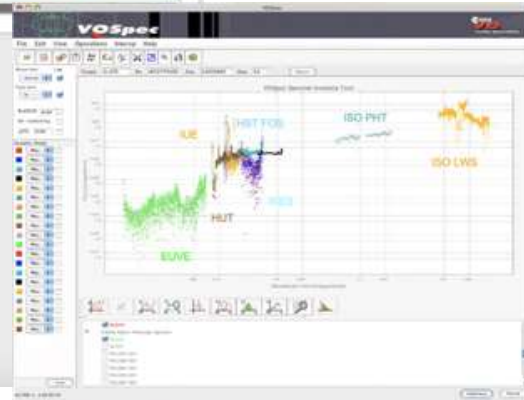
Aladin



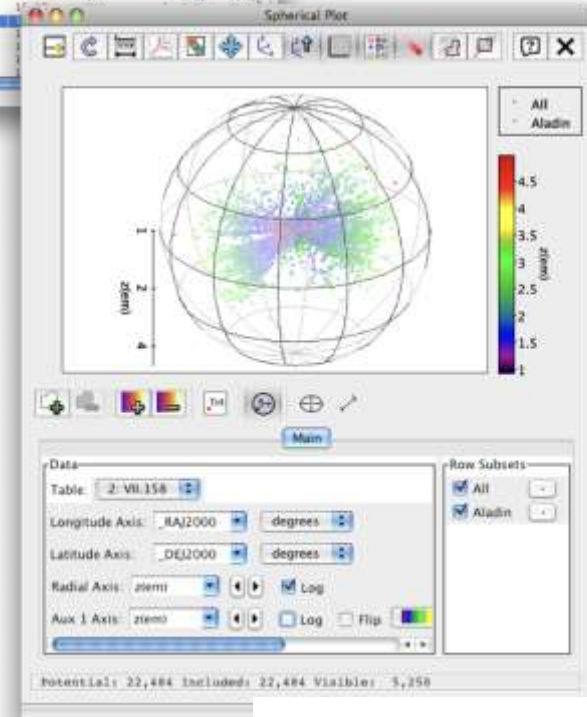
Your apps
& programs

```
In [ ]: 1 from ipyaladin import Aladin
2 a = Aladin(target='18 53 24.548 +04 29 46.12', survey='F/Milliqueet/color', fov=180)
3 a
In [ ]: 1 a.survey = 'F/ALZAMUS/ASD/color'
2 a.target = 'M101'
3 a.fov = 0.3
In [ ]: 1 a.loadDataFromPromet-vot&file=vrizist_M101_11_128_allwise_30190322'. {'color': 'red', 'onClick': 'showTable'}
```

Notebooks



Spectral tools



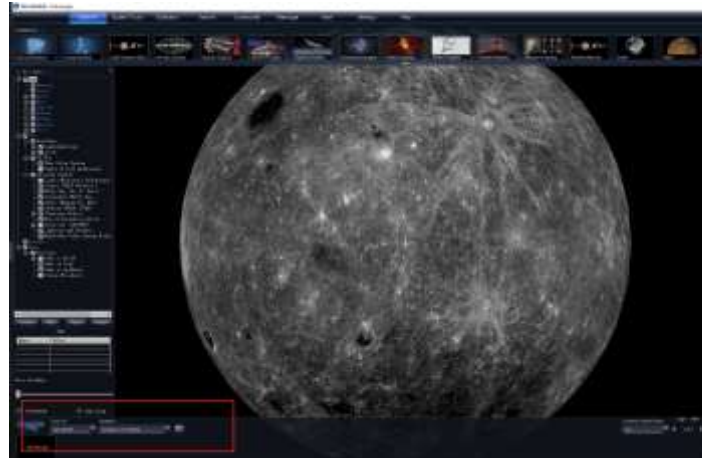
TOPCAT



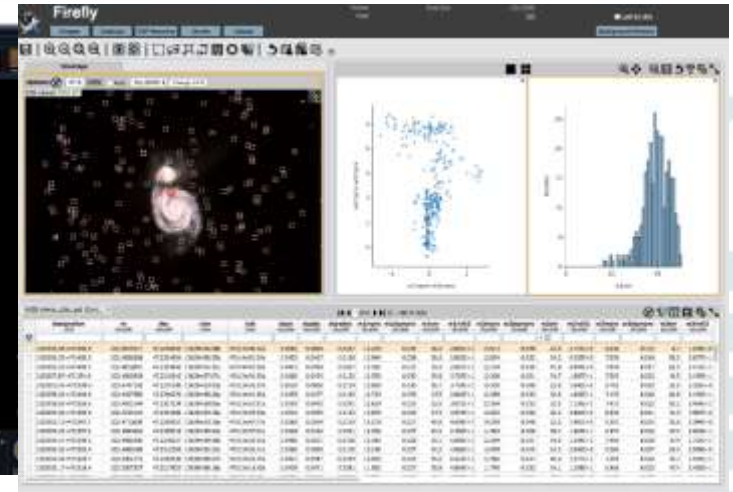
VO embedded in astronomy services



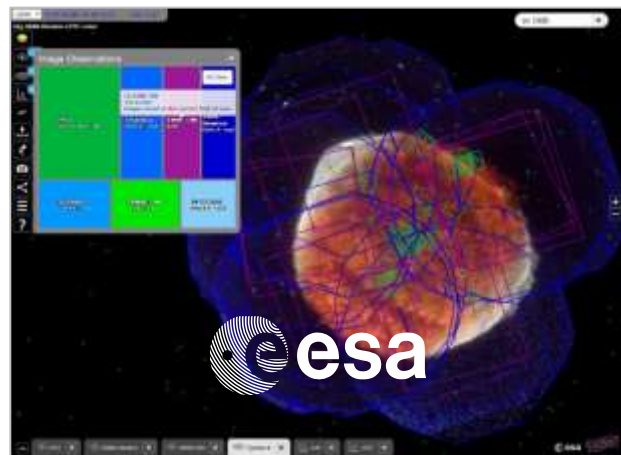
ESO Science Portal



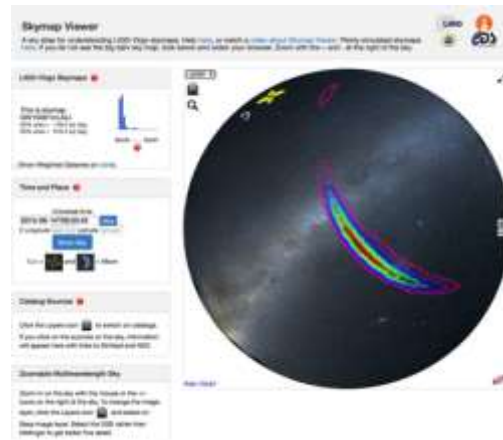
WWT



Firefly
Caltech-IPAC



ESA Sky



Grav. waves



CDS reference data service

SVO Filter Profile service



VO is FAIR

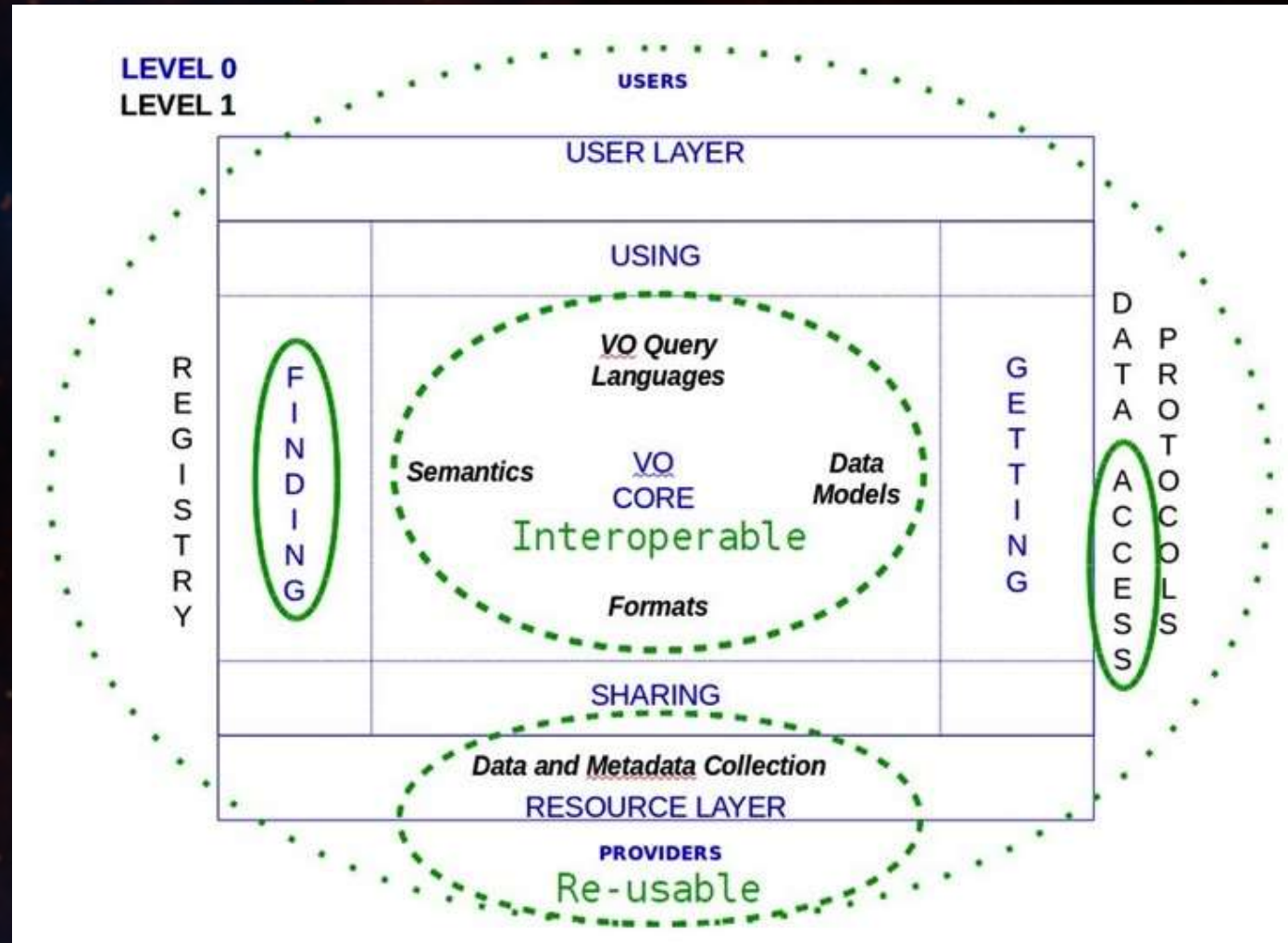
Making data:

Findable

Accessible

Interoperable

Reusable



International Virtual Observatory Alliance

Credit: X-ray: NASA/CXC/CfA/R. Tullmann et al.; Optical: NASA/AURA/STScI

NASA VO & ESA VO

- The US Virtual Observatory Alliance (USVOA) is a US-wide open collaboration endorsed by the AAS to expand and promote VO tools and services. The USVOA is also the US project of the IVOA. So far, participating US institutions include:
 - [Association of Universities for Research in Astronomy](#) (AURA)
 - NOAO, LSST, TMT
 - [Associated Universities, Inc.](#) (AUI)
 - NRAO
 - [California Institute of Technology](#) (Caltech)
 - [Harvard Smithsonian Center for Astrophysics](#) (CfA)
 - HCO, SAO, CXC
 - [NASA Astronomical Virtual Observatories](#) (NAVO)
 - HEASARC, IPAC, NED, IRSA, STScI
- The ESAC Science Data Centre (ESDC), located at the [European Space Astronomy Centre \(ESAC\)](#), Madrid, Spain, provides services and tools to access and retrieve observations and data from ESA's space science missions (astronomy, planetary science and heliophysics). The majority of ESA's space science mission archives are developed and maintained by the ESDC, in coordination with the science operations centres, the instrument teams and the consortia of the various missions. The team is an active member of the [International Virtual Observatory Alliance \(IVOA\)](#), a worldwide scientific organisation aimed at enabling global and integrated access to astronomical data, and the [International Planetary Data Alliance \(IPDA\)](#), a worldwide cooperating partnership to maintain the quality and performance of data from planetary research using instruments in space.



China-VO

VO-Driven Science Platforms

- The amount of astronomy data will increase greatly in the near future. Science platforms are being developed to allow researchers to efficiently analyze big data sets. These science platforms enable analysis close to the data, support online data mining and machine learning.
- Most science platforms in astronomy employ a similar architecture and technologies to provide an interactive data analysis environment. Basing on a [Cloud computing](#) platform, [JupyterHub with JupyterLab](#) are used as an interface for exploratory data mining and analysis. The interactive environment is generally deployed using [container](#) techniques (e.g., docker).



Open Science Cloud Platforms

- European Open Science Cloud

- It is a trusted system providing seamless access to data and interoperable services. It supports the whole research data cycle, from discovery and mining to storage, management, analysis and re-use across borders and disciplines.

- [African Open Science Platform](#)

- The *African Open Science Platform* initiative (AOSP), funded by the [South African Department of Science and Technology \(DST\)](#) through the [National Research Foundation \(NRF\)](#), and implemented and managed by the [Academy of Science of South Africa \(ASSAf\)](#), is a pan-African project for Africa by Africa. Direction is provided by [CODATA \(ISC\)](#).

- GÉANT

- GÉANT is a fundamental element of Europe's e-infrastructure, delivering the pan-European GÉANT network for scientific excellence, research, education and innovation.

- Australian Research Data Commons (ARDC)

- The **ARDC** is a transformational, sector-wide initiative, working with sector, government, and industry partners to build a coherent national and collaborative research data commons. This will deliver a world-leading data advantage, facilitate innovation, foster collaboration and enhance research translation.

- Global Open Science Cloud

- The mission of GOSC is to connect different international, national and regional open science clouds and platforms to create a global digital environment for borderless research and innovation.

- Pangeo, ...



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 Education and Public Outreach



*The first priority for the VO projects worldwide is to develop the standardized framework
---IVOA Website*

NAOC – Alibaba Cloud Partnership



计算·探索未知的价值
Computing Decodes the Unknown World

成立天文大数据研究中心
飞天系统+人工智能

海量数据上云 · 数据深度挖掘 · 虚拟天文台共享平台

“天文数字”有多大？

1000亿字节存储容量 每天: 50TB	每秒数据量 每年: 10TB	平方公里射电望远镜 每秒: 50TB
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1000 - 1,000 Megabytes (MB)
1TB - 1,000 Gigabytes (GB)
1PB - 1,000 Terabytes (TB)
1EB - 1,000 Petabytes (PB)
1ZB - 1,000 Exabytes (EB)

美国学者预测
至2025年天文数据量
为每年25ZB(2500TB)

天文大数据挖掘与研究

- 计算和数据挖掘
助力设计
- 促进数据模型
从量变到质变

天文数据
公共资源

阿里云与数据密集型学科

从中国到世界

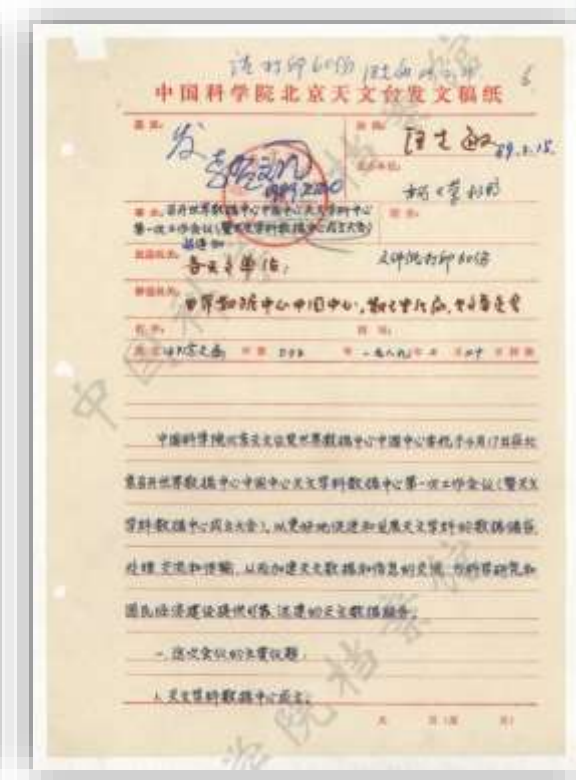
- 中国基础设施 + 中国计算能力 + 互联网

服务全球天文用户
促进基础学科发展

An infographic titled '计算·探索未知的价值' (Computing Decodes the Unknown World). It features a dark background with colorful circular patterns. The text includes '成立天文大数据研究中心' (Establishment of the National Astronomical Observatories Big Data Research Center), '海量数据上云 · 数据深度挖掘 · 虚拟天文台共享平台' (Massive data on the cloud · Deep data mining · Virtual astronomical observatory sharing platform), and '“天文数字”有多大？' (How big are astronomical numbers?). It contains a table comparing storage capacity, data volume, and telescope area. Below the table, it lists storage units from MB to ZB and a prediction that by 2025, astronomical data volume will reach 25 ZB per year. The infographic also highlights '天文大数据挖掘与研究' (Astronomical big data mining and research) and '阿里云与数据密集型学科' (Alibaba Cloud and data-intensive disciplines). At the bottom, it says '从中国到世界' (From China to the world) and lists '中国基础设施 + 中国计算能力 + 互联网' (China's infrastructure + China's computing power + Internet).

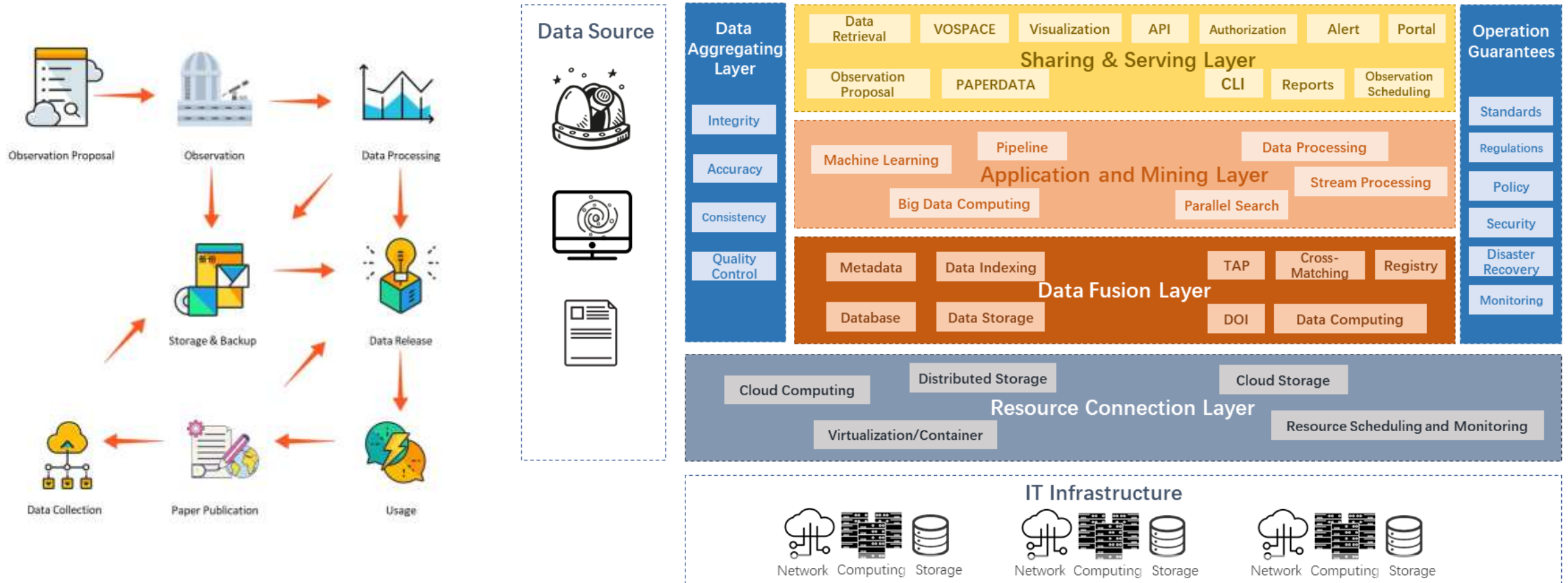
National Astronomical Data Center

National Astronomical Data Center (NADC) was announced by Chinese government in June 2019 as one of the first 20 national scientific data centers.



WDC-D for Astronomy was established in April 1989.

Whole life-cycle management



NADC will be based on the platform of the China-VO.


NADC Resources

- Data storage
- Data access
- Cloud computing and HPC
- Tools and information
- WWT tours and curriculum



LAMOST Data Access

Home Data Access Documents Help Contact Us **LAMOST DR6 v1** Sign in



Large Sky Area Multi-Object Fiber Spectroscopic Telescope

DATA RELEASE 6 V1

Observed Plates: 4,577
Total Spectra: 9,919,106

Low Resolution Search

Medium Resolution Search

Catalog Download

FITS Download

Low Resolution Statistics

	Pilot survey 2011-10-24-2012-06-17	First year survey 2012-06-29-2012-05-31	Second year survey 2013-06-15-2014-06-02	Third year survey 2014-06-16-2015-05-29	Fourth year survey 2015-06-13-2016-06-02	Fifth year survey 2016-03-09-2017-05-16	Sixth year survey 2017-06-19-2018-05-19
OBSERVED PLATES	404	612	732	738	776	893	422
TOTAL SPECTRA	958,679	1,884,724	1,636,474	1,644,200	1,702,526	1,402,454	889,947
STAR	832,886	1,538,644	1,510,053	1,520,759	1,552,325	1,230,129	781,620
STAR (SN _r or I > 10)	679,947	1,388,721	1,422,521	1,437,242	1,472,828	1,141,738	739,483
GALAXY	8,197	12,752	30,368	26,364	38,433	35,729	20,003
QSO	1,386	6,065	6,304	8,978	14,462	15,258	7,718
UNKNOWN	116,210	127,262	80,729	88,198	96,308	121,338	80,606
AFGK STAR CATALOG	404,395	911,134	1,097,740	1,055,794	1,071,279	808,420	494,336
M DWARF CATALOG	79,111	67,864	79,952	109,236	100,595	97,734	72,740
A STAR CATALOG	53,676	69,026					

LAMOST

LAMOST

Load Selected FITS

Space

Script

Script

Package

-10-24 E5902



The largest spectrum archive with more than 10M records

Phase 1 Survey 2012-2017

Data Release	Version	Plate	Spectra	Stellar Spectra	Release Date	Footprint	Public/Internal
DR1		1202	2,204,696	1,061,918	2013-06-25		Public
DR2		1934	4,132,782	2,207,189	2016-11-07		Public
DR3		2667	5,755,126	3,177,995	2017-06-30		Public
DR4	V1	3459	7,661,651	4,339,623	2018-06-30		Public
DR4	V2	3461	7,620,512	4,537,436	2018-06-30		Public
DR5	V1	4154	9,017,844	5,344,058	2019-06-30		Public
DR5	V2	4154	9,027,634	5,348,713	2019-06-30		Public
DR5	V3	4154	9,026,365	5,348,712	2019-06-30		Public

Phase 2 Survey 2017

Data Release	Version	Plate	Low Resolution Spectra	Medium Resolution Spectra	Release Date	Footprint	Public/Internal
DR6	V1	4577	9,919,106	1,344,289	2019-03-27		Internal
DR7(Only 2018-)	V0	355	556,412	8,524,640	2019-07-20		Internal
DR7(2012-2018)	V1	5606	10608416	3,889,383	2020-04-03		Internal
DR8(Only 2019-)	V0	265	165,997	2,376,882	2020-02-20		Internal

Cloud Computing and HPC

- Based on CloudStack, we set up the cloud computing environment. It consists of 7 distributed nodes across the mainland of China. Based on GlusterFS, we built a scalable cloud storage system. Each user has a private space, which can be shared among different virtual machines and desktop systems.
- At the headquarter of NAOC, there are 2 HPC clusters.

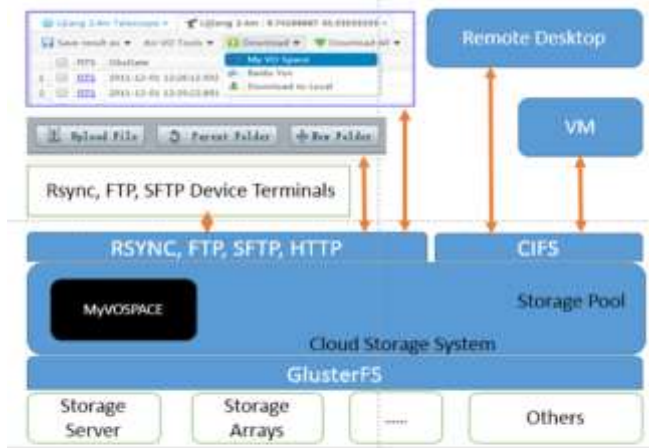


Fig. 4.1 the framework of MyVOSpace, cloud storage system and the relation with other components, technology.

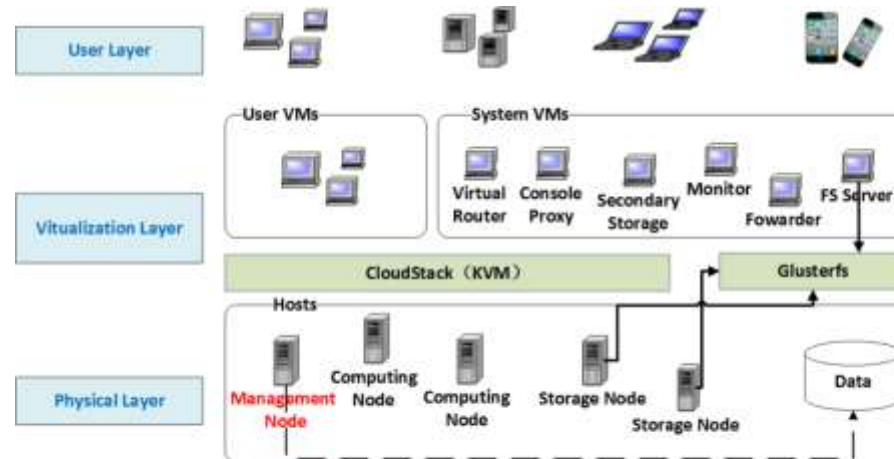


Fig. 2.1 The Architecture of Cloud Computing Environments for AstroCloud



Global Cyber-infrastructure



受益于国家天文台和阿里云战略合作，用户以战略合作名义采购阿里云资源，用户将得到所支付金额20%的云资源代金券赠送。

联系我们: support@china-vo.org, 010-64807973



Tools and Information

Astronomy Meetings 个人中心 My Meetings 会议信息 Admin Menu

Meetings Information

Welcome to the **Astronomical Conference Information System**

本天文会议信息系统由国家天文科学数据中心和中国天文学会信息化工作委员会管理和维护，旨在方便国内外天文会议信息的分享。支持会议信息提交、修改和浏览，点击左侧菜单即可操作。会议信息提交后，经管理人员核实会在一个工作日内发布。

The NADC Astronomy Meeting List is compiled and maintained by National Astronomical Data Center (NADC) and Informatization Working Committee, Chinese Astronomical Society (IWCC). To add, modify, or view a meeting, please click the relevant sections on the left panel. If the meeting form passes the format check, submissions will be approved and published by the NADC staff within one working day.

New Meetings

Meeting Name	Meeting Date
TAP Workshop	2021-01-15 - 2021-01-16
IAU GA 2021	To Be Determined-To Be Determined

Related Links

- CADC Meetings
- IAU Meetings

更新 每日更新频率 13:30 中国标准时间 2018/2/15

状态 图像方向 图像日期 最近更新 APOD 站点

每日一天文图桌面壁纸工具

APOD CHINA-VO China-VO

国家天文科学数据中心

日食计算器

J2000d 210.6175873 -54.3453525

China-VO SKYVIEW

China-VO

恒星检索展示平台

中国虚拟天文台邀您随时随地浏览璀璨星空

欢迎加入 公众超新星搜寻项目

开始您的超新星搜寻之旅

中国科协三峡科技出版资助计划

英汉天文学名词

An English-Chinese Dictionary of Astronomy

李竞余 恒 崔辰州 编
中国天文学会天文学名词审定委员会 审定
全国科学技术名词审定委员会天文学名词审定委员会

中国科学技术出版社
CHINA SCIENCE & TECHNOLOGY PUBLISHING HOUSE

Data-driven Education and Public Outreach



China-170

Current Status (without Alibaba Cloud)

- Storage:
 - 3000TB
 - Computing:
 - 700Tflops+472 cores
 - Band width:
 - 155Mbps-300Mbps
 - 10Gbps/1Gbps
 - User support:
 - 25 py
- Registered users: 23,200+
 - Cloud nodes: 7
 - VM instances: 1000+
 - Telescope proposals: 1076
 - Domestic datasets: 24
 - Software environments: ~10

平台统计数据		更多
热门下载	平台注册用户数	数据查询次数 (万次)
南极AST3望远镜第一次数据 - 图像	23287	418.48
LAMOST光谱巡天第七次数据发布第一版		
南极AST3望远镜第一次数据 - 光变曲线	数据下载次数 (万次)	数据下载总量 (TB)
南极之星小望远镜阵2008年数据发布	2107.61	66.00

NADC Channels

- **Observation**
 - Telescope Proposal Submission and Management
 - 2.4m, 2.16m, Telescope Access Project (TAP), FAST
- **Data Discovery and Access**
 - Virtual Observatory
 - Seamless astronomy
- **Services**
 - Conferences, PaperData, Astro-term, VO tools
- **Cloud Computing**
 - VM and Containers
 - data processing and analyzing environments
 - Cloud storage
- **Public channel**
 - Public Supernova search Project (PSP)
 - Worldwide Telescope
 - Eclipse calculator
 - CosmoStation



课程中文名称: 多波段天文数据获取与处理
 课程属性: 天文学-基础课程
 学时学分: 40学时, 3学分
 随修课程: 高等天文学

软件列表:

- Python 2.7.11, Jupyter Notebook
- astropy, numpy, matplotlib
- IRAF, IRAF GUI
- IRAF
- IRAF
- IRAF
- IRAF
- IRAF
- IRAF

为50多位研究生和教师提供服务

NADC Services

- Data archiving and management
- Data release and open access
- Software/system/platform design and development
- Cluster/HPC design
- Community outreach
- Education and public outreach



Data Archiving and Management

- Metadata Management and Data Submission System (Alpha version)

国家科技资源共享服务平台 登录 退出 注册 English 全站 请输入检索关键字 搜索

NADC National Astronomical Data Center 国家天文科学数据中心 申请规则 科学数据 专题服务 资源 公众服务

项目数据在线汇交

汇交流程

创建项目 - 项目审核 - 提交元数据信息 - 元数据审核 - 数据检查 - 汇交认证 - 数据发布

开始汇交

MMDCS 项目介绍

测试 元数据

测试元数据列表 上传元数据 提高权限

编号	标题	Created	Status	操作
100304	嵩山1米宽视场望远镜数据 Nanshan 1 m wide-field telescope Data	2018-04-03 00:00:00	元数据审核中	查看元数据
100303	新疆天文台脉冲星数据 Xinjiang Astronomical Observatory Pulsar Data	2014-06-06 00:00:00	元数据审核中	查看元数据
100302	赣榆望远镜出瞳数据 Ganyu Fine Structure Telescope data	2012-10-30 00:00:00	元数据审核中	查看元数据
100301	多普勒直立式太阳望远镜 MSS	2014-07-30 00:00:00	元数据审核中	查看元数据
100300	11.7米毫米波望远镜OTF校准数据 PMO 11.7m OTF data	2011-02-01 00:00:00	元数据审核中	查看元数据
100287	LoFRE 极谱数据发布 LoFRE Data Release	2008-11-11 00:00:00	元数据审核通过	查看元数据 上传/管理数据 提交数据

MMDCS 项目介绍

项目

创建数据汇交项目

项目编号	项目名称	项目类型	牵头单位	状态	操作
10000001	测试	国家任务/自然科学基金/国家自然科学基金面上项目	国家天文台	已审核	查看 数据汇交

已上传文件 (4 文件 178.78 kB)

选择文件 上传新文件 上传

Filename	File size	uploaded_time	uploader	actions
spec-58803-HD103402643407M01_jp01-248.fits.gz	44.80 kB	2021-01-14 03:30:36	Dongwei Fan	Delete
spec-58103-HD11064030151055M03_jp10-102.fits.gz	44.77 kB	2021-01-14 03:30:36	Dongwei Fan	Delete
spec-58707-HD131053201344M01_jp15-127.fits.gz	43.81 kB	2021-01-14 03:30:36	Dongwei Fan	Delete
spec-58138-HD09368070104639M02_jp03-176.fits.gz	43.80 kB	2021-01-14 03:30:36	Dongwei Fan	Delete

NADC PaperData

- A long-term storage and open access service for author's paper data
 - Stable storage
 - Long-term accessible URL
 - DOI support
- Recognized Persistent Repositories for AAS Journals

PaperData Repository
Powered by China-VO

China-VO Paper Data Repository provides long-term storage and open access service for your paper data, which includes but not limited tables, figures pictures, movies, source codes, models, software packages mentioned in your scientific papers. A permanent but user specified URL will be provided for each item. Furthermore, copyrights of these properties are still owned by yourself.

Recommended by AAS Journals (AJ/ApJ/ApJL/ApJ/S/RAAS) and Research in Astronomy and Astrophysics (RAA)

Getting started with China-VO Paper Data, please [click here](#).

Support DOI Apply AAS Official Recommendation Help Document

China-VO PaperData allow user to apply DOI for their data used in the AAS has officially recommended China-VO PaperData in their How to start? How to get a DOI for your data?

http://paperdata.china-vo.org/linMa/DomeA-seeing2019.zip. The weather data in 2015 have been published¹⁸ and are available in <http://sag.bao.ac.cn/lines/downloads/>. The data are also displayed on a public website, <http://sag.bao.ac.cn/site/flows/g.php>.' The 'References' section lists: '1. Skidmore, W. et al. Thirty meter telescope site testing. V. Seeing and isoplanatic angle. Publ.'."/>

Night-time measurements of astronomical seeing at Dome A in Antarctica

Data availability

The seeing and weather data at Dome A in 2019 that support the findings of this study are available in the China-VO Paper Data Repository, <http://paperdata.china-vo.org/linMa/DomeA-seeing2019.zip>. The weather data in 2015 have been published¹⁸ and are available in <http://sag.bao.ac.cn/lines/downloads/>. The data are also displayed on a public website, <http://sag.bao.ac.cn/site/flows/g.php>.

References

1. Skidmore, W. et al. Thirty meter telescope site testing. V. Seeing and isoplanatic angle. Publ.

Astronomy Specific Repositories

The following astronomy archives offer data preservation platforms that mint DOIs for specific categories of data. These archives may or may not be available for your particular project:

- Caltech/NASA IPAC; [List of all released data DOIs]
- Canadian Advanced Network for Astronomical Research (CANFAR); [List of all released data DOIs]
- China-VO Paper Data Repository; [List of all released data DOIs]
- Mikulski Archive for Space Telescopes (MAST); Contribution Guidelines for HILSP; [List of all released data DOIs]

Generic Repositories

There are a number of open "generic" data repositories that serve all fields from communities around the world. We curate collections of Journal related data in some of them:

- Zenodo (Contribute to the AAS Journals' Zenodo Community)
- Harvard Dataverse (Contribute to the AAS Journals' Dataverse)
- figshare

Data release and open access

Query Solar Broad Band Spectrometer

>>> about SBRS

Output

Format:

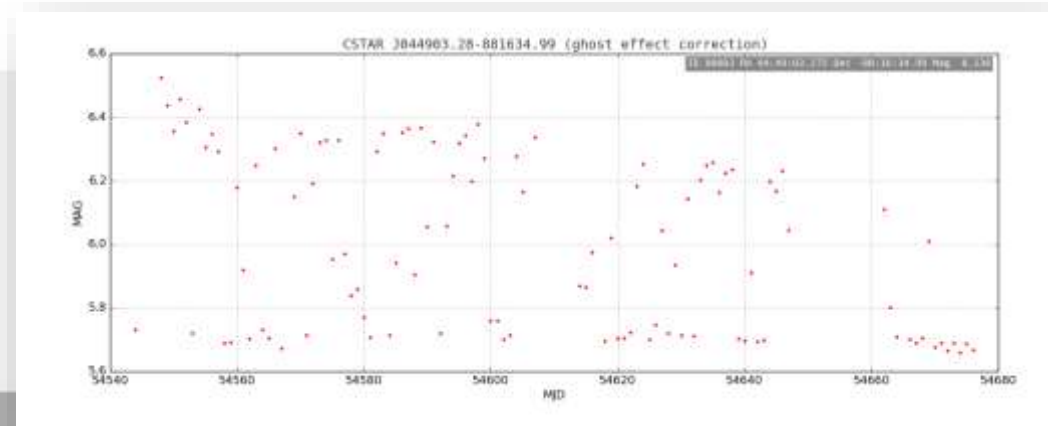
Options

Submit Query

[datafile] Search only in this table [show more columns](#)

show column <input type="checkbox"/>	sort by column	name	value:		sample	description
			min	max		
<input checked="" type="checkbox"/>	<input type="radio"/>	id	<input type="text"/>	<input type="text"/>		
<input checked="" type="checkbox"/>	<input type="radio"/>	obsdate	<input type="text"/>	<input type="text"/>		
<input checked="" type="checkbox"/>	<input type="radio"/>	band	<input type="text"/>			
<input checked="" type="checkbox"/>	<input type="radio"/>	timeres	<input type="text"/>			
<input checked="" type="checkbox"/>	<input type="radio"/>	path	<input type="text"/>			
<input checked="" type="checkbox"/>	<input type="radio"/>	filename	<input type="text"/>			
<input checked="" type="checkbox"/>	<input type="radio"/>	filesize	<input type="text"/>	<input type="text"/>		

Submit Query



DATA ACCESS DOCUMENTS HELP CONTACT US

LAMOST DR7 v1

注册 登录

Low Resolution Search

Medium Resolution Search

Position Constraints

Designation Constraints

Obsid Constraints

FITS Name Constraints

Observation Information

Imaging Constrains

Redshift

Classification

Position Constraints

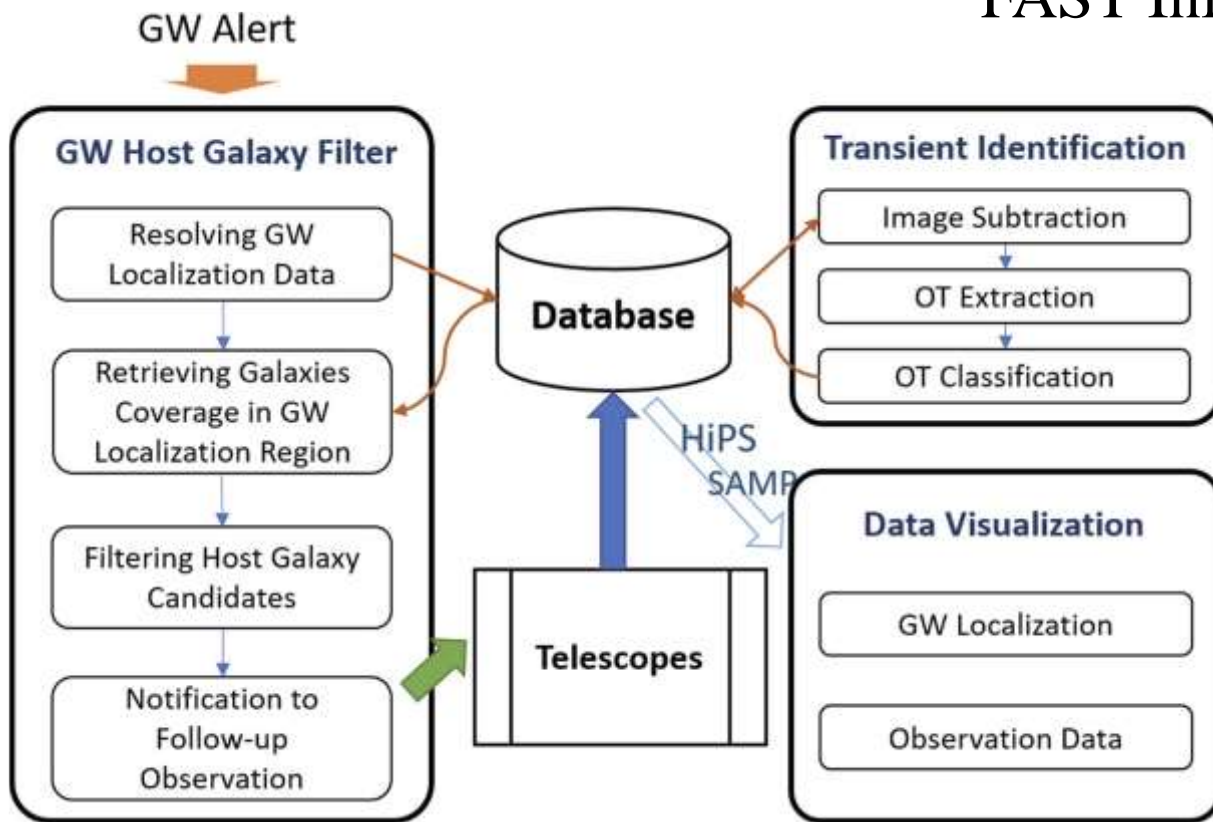
<input type="radio"/> Rectangle	min	ra <input type="text"/>	dec <input type="text"/>	(max 10 square degrees)
	max	ra <input type="text"/>	dec <input type="text"/>	
<input type="radio"/> Cone	center	ra <input type="text"/>	dec <input type="text"/>	radius <input type="text"/> arcsec (max 30°)
<input type="radio"/> Proximity	list of ra,dec[,radius] (max 100 obj) #ra, dec, sep 24. 299842, 24. 1180411, 2. 0 24. 4706932, 23. 7423442, 2. 0			or Upload File (1000000 rows max) Sample
<input checked="" type="radio"/> None	No position constraint			<input type="button" value="Browse..."/> No file selected.

Search

Reset

software/system/platform design and development

FAST Information System

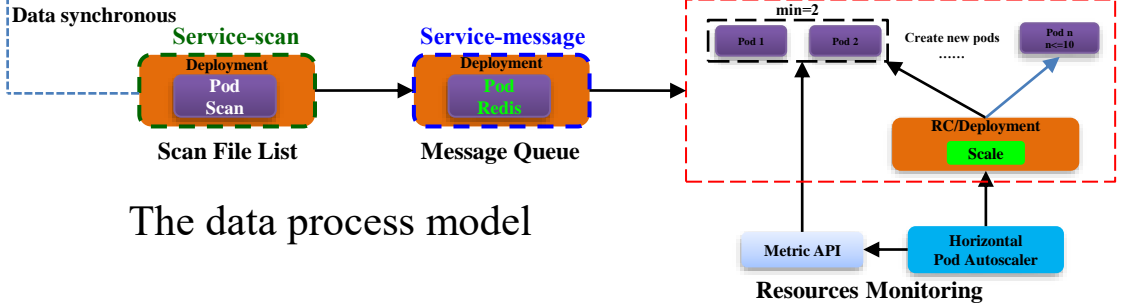


The architecture and data processing stream of GWOPS

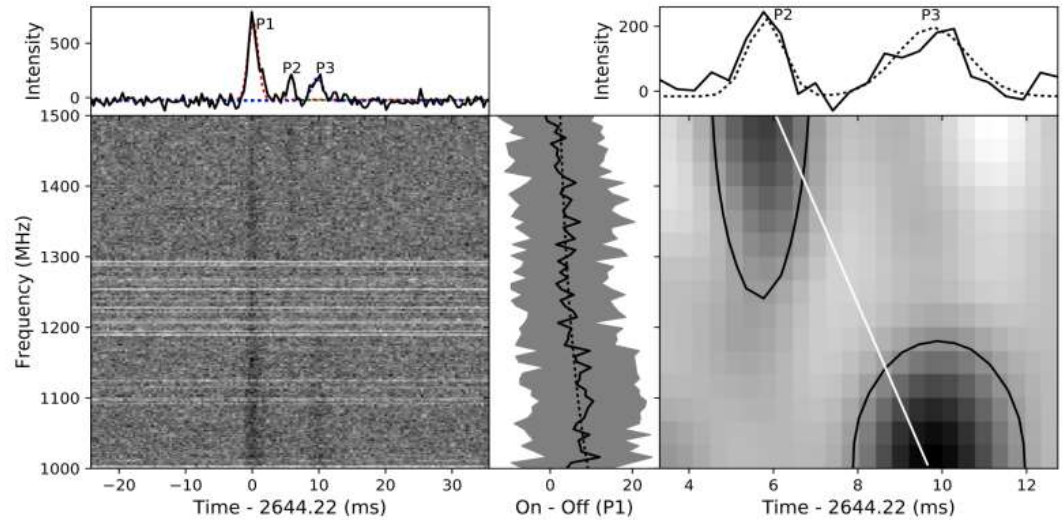


Docker-based HPC

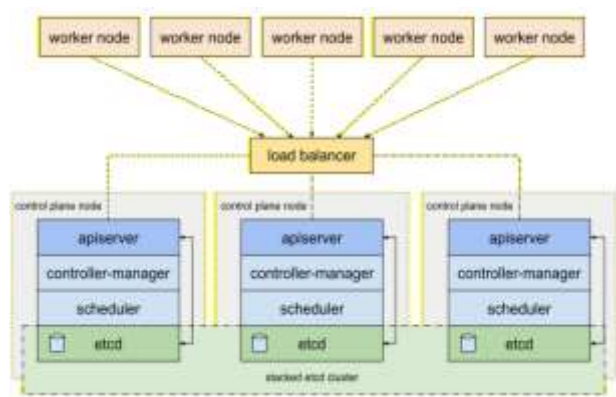
Build Data Processing Pipeline for FAST Key Project and SVOM



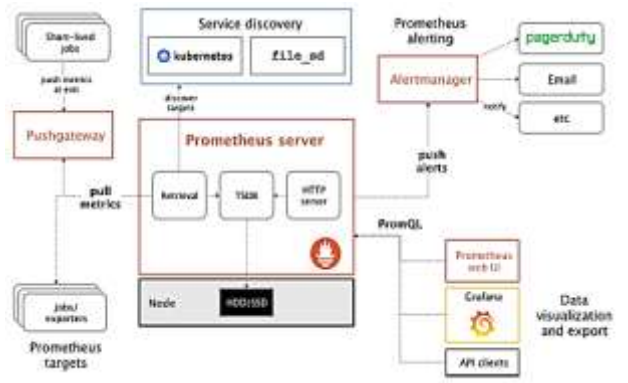
The data process model



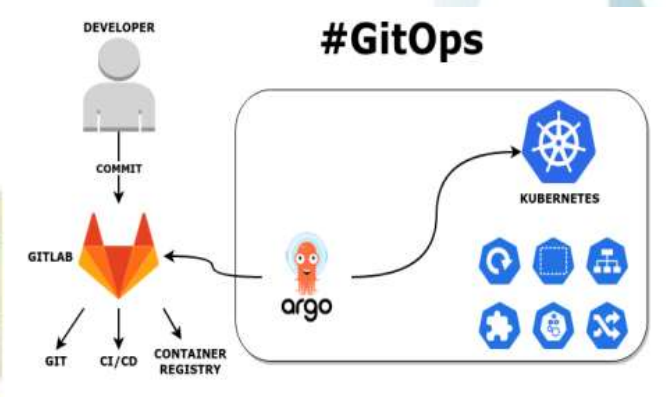
A Fast Radio Burst Discovered by FAST



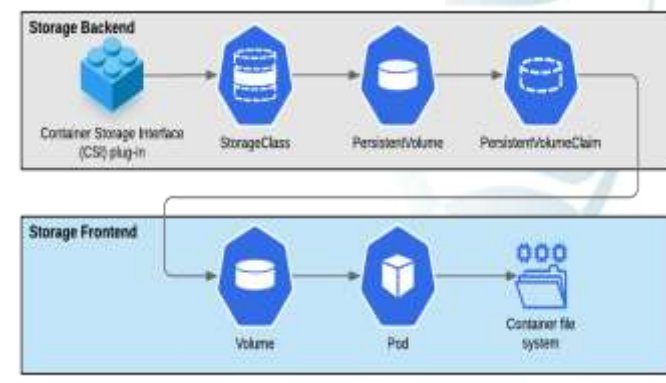
High Availability K8S Cluster



Resources Monitoring



Continuous Integration and Delivery



Distributed Storage System

Cost on Commercial Cloud Platforms

- Computing is cheap, storage is expensive, bandwidth is very expensive

业务类型	核心需求	推荐星级
具有明确时限的计算任务	短时间算力	★★★★★★
项目和团队网站	安全稳定的网络	★★★★★★
协同工作环境	安全稳定的网络	★★★★★★
大用户量但中小体量的数据发布 (<500TB)	安全稳定的网络和数据环境	★★★★★★
中小数据体量的在线服务系统 (<100TB)	安全稳定的网络和数据环境	★★★★★★
中小数据体量的算法和软件测试开发 (<100TB)	算力和平台的灵活部署	★★★★★
计算密集型的数据分析处理	算力和一定的存储能力	★★★★
大规模数据的分析挖掘 (>500TB)	算力和大规模数据存储	★★★
国际数据大规模传输	国际带宽	★★
PB+级别数据的长期存储	大规模数据存储	★
个人资料备份	安全的数据存储	★

Community Outreach



- China-VO Wechat
- NADC website



Education and Public Outreach



Big Data + Cloud Computing +  = science platform

It is not a talk about Science,
but one for Better Science

FREE is good, but not always.

- <https://nadc.china-vo.org>
- ccz@bao.ac.cn

Wechat: China-VO



Special Thanks To

- MOST, CAS
- NSDC community, CNIC
- IVOA, WDS, CODATA, RDA
- NADC builders and partners

