

# Japanese Virtual Observatory Project

**Masatoshi Ohishi**

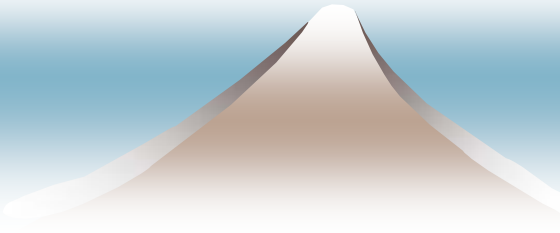
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and Sokendai**

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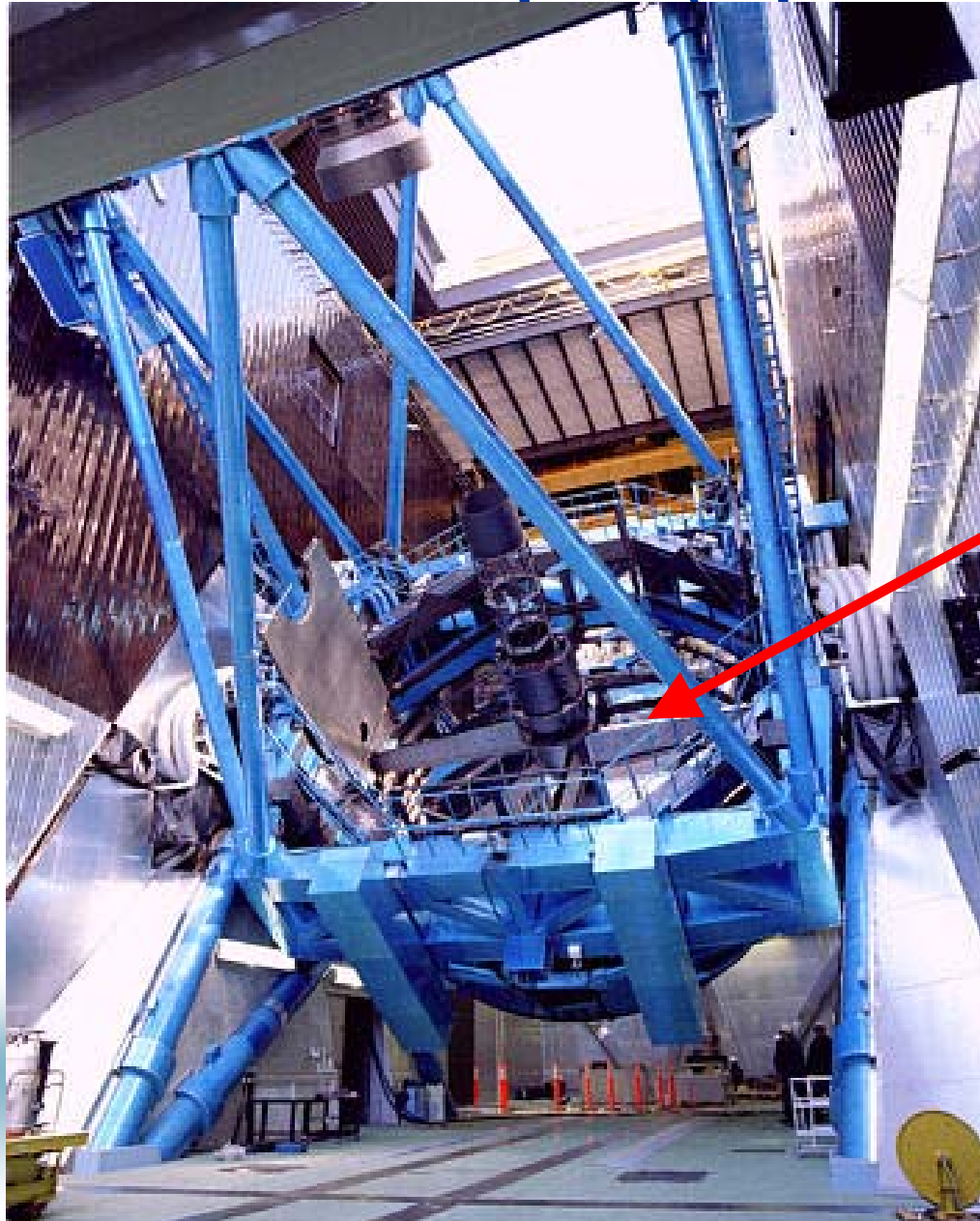


# Large Telescopes of NAOJ

- ◆ Subaru (optical & Infrared) @ Hawaii
- ◆ Nobeyama (Radio)
  - single dish :  $\phi$  45-m
  - interferometer : 6 x  $\phi$  10-m
  - solar interferometer : 84 x  $\phi$  75-cm
- ◆ HALCA – in orbit  $\phi$  8-m



# Subaru Telescope (optical & IR)



8.3-m mirror

2004/03/08



5000+ Galaxies !!

# 45m Radio Telescope

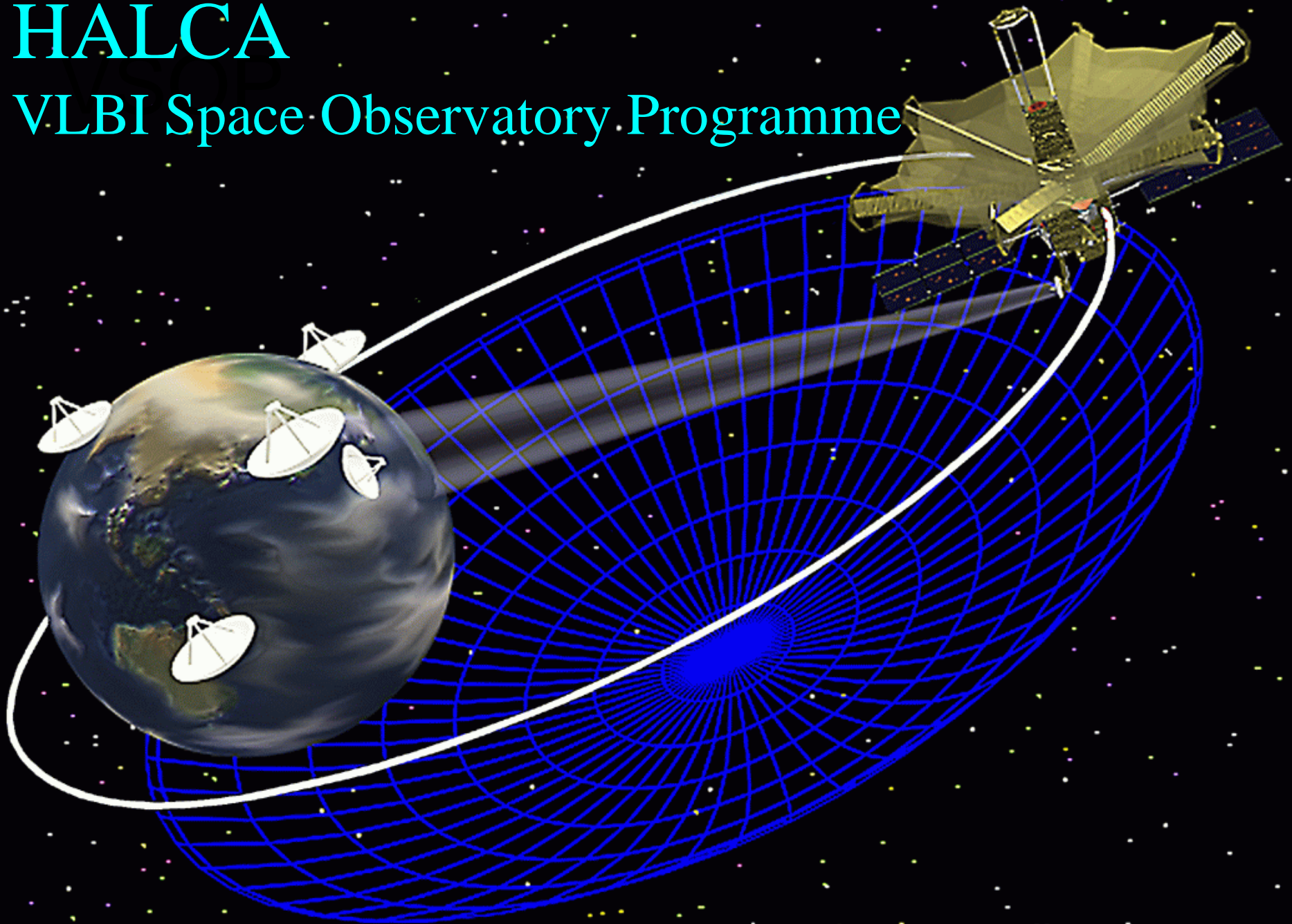


workshop in Paris



# HALCA

## VLBI Space Observatory Programme



JAXA is going to join JVO !!

Infrared Satellite by JAXA



**ASTRO-F**

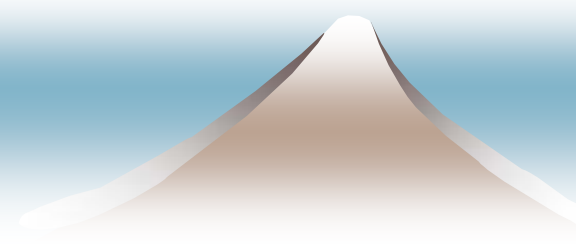
Launch : 2005 ?

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# Data Productivity





- ◆ Nobeyama Radio : ~1TB/yr
- ◆ Subaru@Hawaii : ~20TB/yr
- ◆ ALMA (planned) : ~PB/yr

Flood of excellent data (survey data)  
Digitized & Archived





# Composition Figure (Japan Map)

	Super SINET	10Gbps
	Domestics circuit	30~100Mbps
	Super SINET node	
	SINET node	

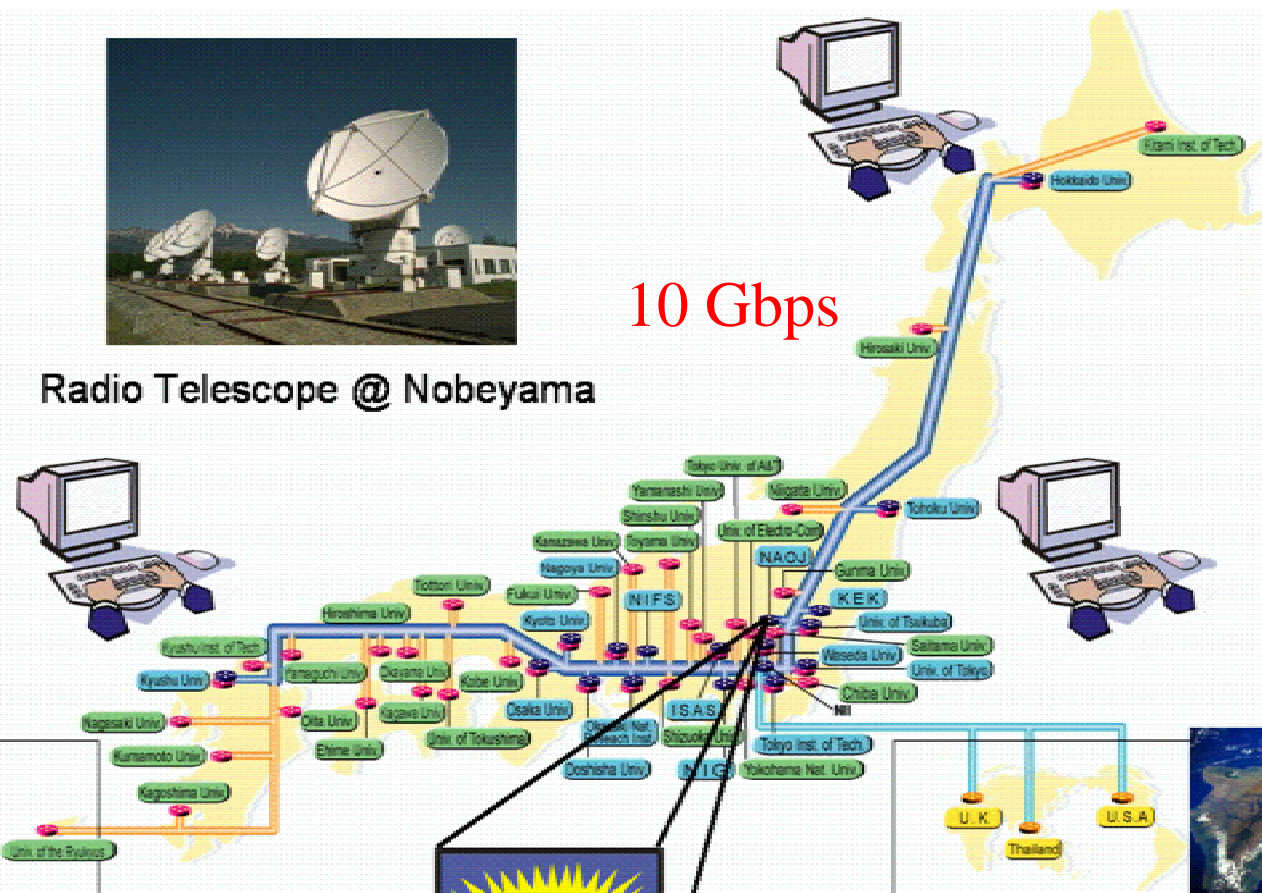


Radio Telescope @ Nobeyama

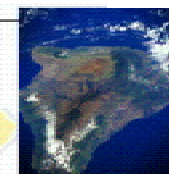
10 Gbps



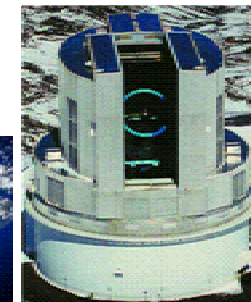
ALMA @ Chile



JVO @ NAOJ



Subaru Telescope @ Hawaii

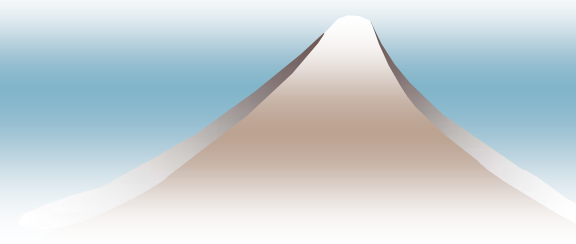


2004/03/08

Japan-France Grid Computing  
Workshop in Paris

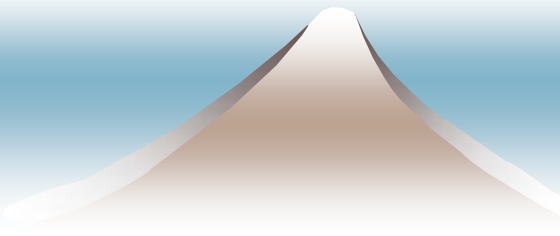
# JVO prototype : Ver. 1

- ♦ To establish seamless access to federated DBs by using the Grid technology
- ♦ To define JVO Query Language, and to implement its parser

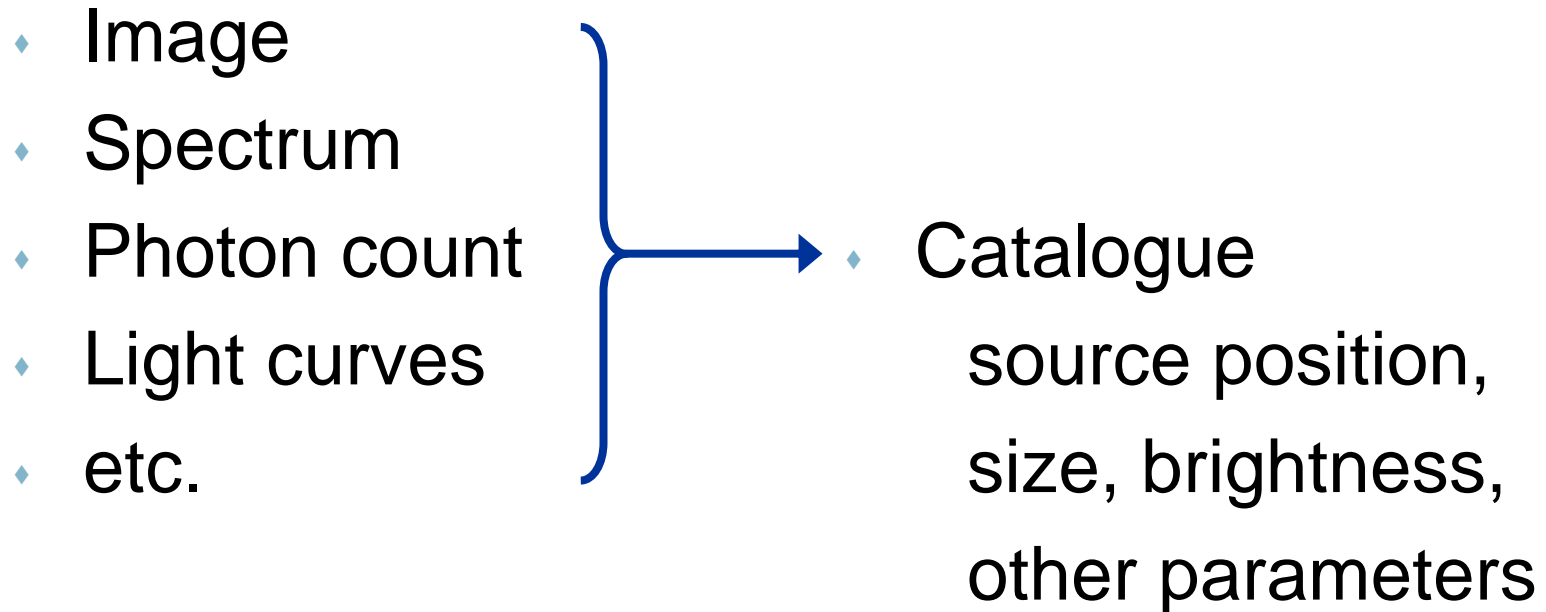


# Queries for Astronomical Data

- ◆ Need to consider the following items:
  - Searches on Spherical Coordinate
    - 1 deg west of longitude 0 is longitude 359 deg !
  - Difference of spatial resolutions
  - Pointing accuracy of telescope



# Astronomical Data



# JVO QL (ADQL) for Federated DBs

```

create view myER0table as
select s.Bmag,
       s.Rmag,
       t.Hmag,
       t.Kmag,
       ... ,
       sr.BOX(POINT(s.ra, s.dec), w, h)
         as Ri mage,
       tk.BOX(POINT(s.ra, s.dec), w, h)
         as Ki mage,
from   ...
       SUBARU s,
       2MASS t,
       ... ,
       SUBARU. R sr,
       2MASS. K tk,
where  ...
       XMATCH(s, b, ... ) < 3 arcsec
and
       (s.Rmag-t.Kmag) > 6 mag
and
       BOX(POINT(ra0, dec0), w0, h0)
and
       ...

```

← Create view with the user specified name in JVO system.

← Select attributes from each catalog server. Column names can be expressed in UCD.

← Select cutout images from each image data server. Image area can be specified by BOX or CIRCLE operand.

← Select the catalog server.

← Select the image data server.

← Cross-match distributed catalogs.

← Query condition based on distributed catalog.

← Specify search area with the same syntax as cutout image specification.



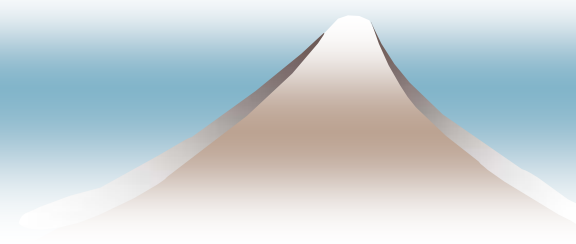
# User Interfaces

Need to know about SQL to use JVOQL

An editor to create JVOQL from GUI

Editable on screen

more flexibility for advanced users

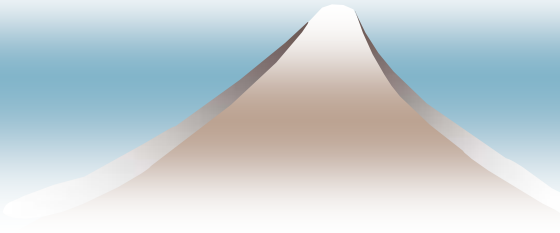


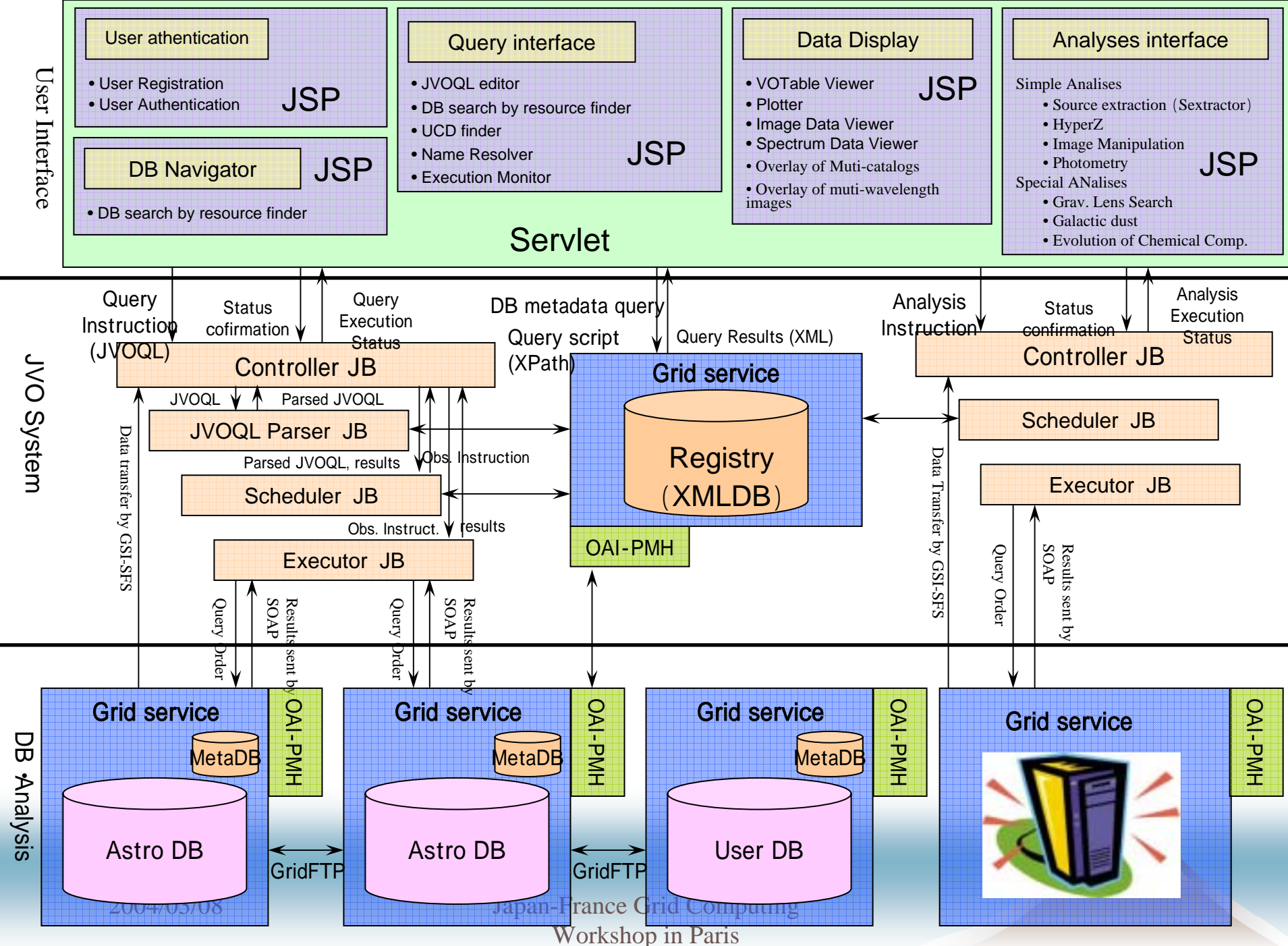
column	lower limit	upper limit
number		
ellipticity	0.8	0
N19APWGB	20	26
N19APWGR	20	24
N19APWGi	20	24
N19APWGz	20	24
foto_imageB		0
foto_imageR		0
foto_imageI		0
foto_imageZ		0
class_starB	0.7	0
class_starR	0.7	0
class_starI	0.7	0
class_starZ	0.7	0

# Development of Prototype2

For preparation of Operational System

- ◆ User registration : single sign-on
- ◆ User area over Firewall : GSI-SFS
- ◆ Adoption of GT3
- ◆ Implementation of several analysis tools





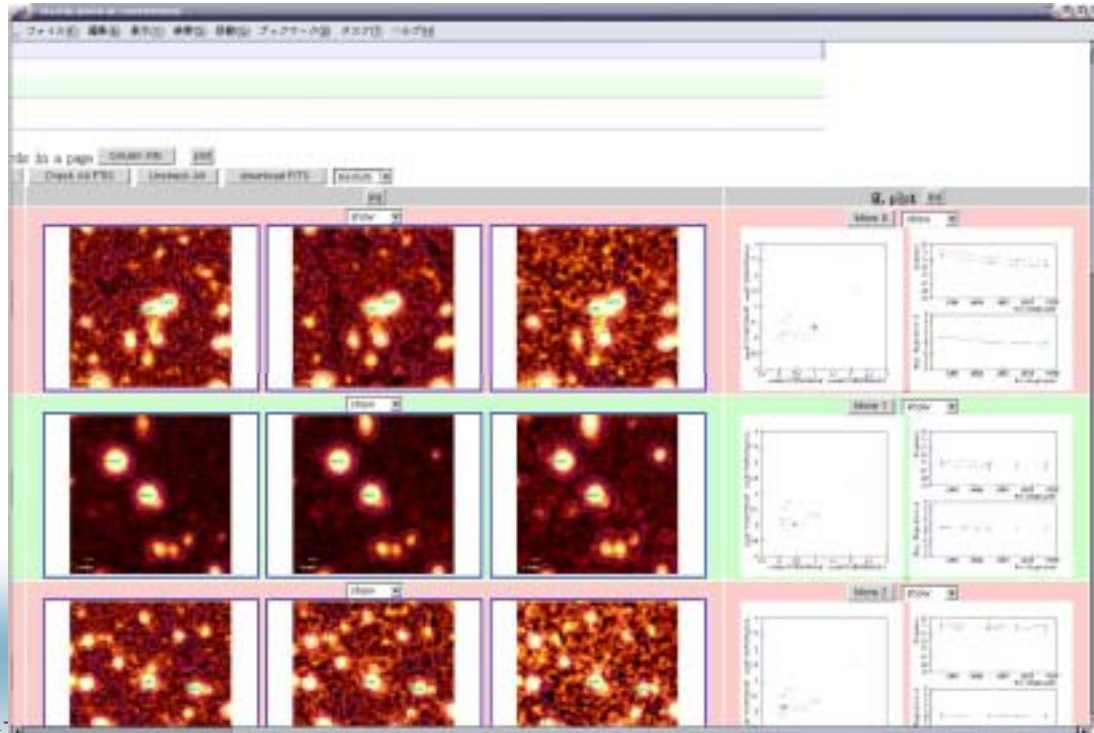
# Comparison of two Prototypes

	Prototype 1	Prototype 2
toolkit	Globus tk 2	Globus tk 3
Services used	GRAM GridFTP	Grid Services RFT
registry	UDDI	XMLDB
Commu. overhead	~20 – 30 sec	~ 30 msec



# Search for Gravitational Lenses created (?) by Cosmic Strings

- ◆ SXDS data observed by Subaru
- ◆ Query results were obtained less than **5** min., displaying SEDs
- ◆ It has been proven that VO can accelerate researches.



# Road Map

2003 Prototype 2

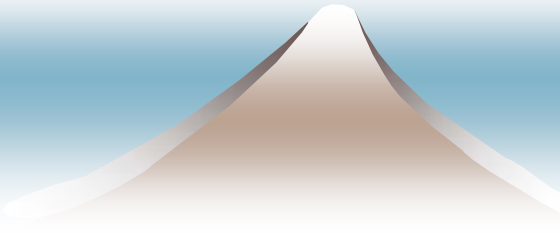
development of components for operation

2004 start to develop operational system

late 2004 ?? trial use

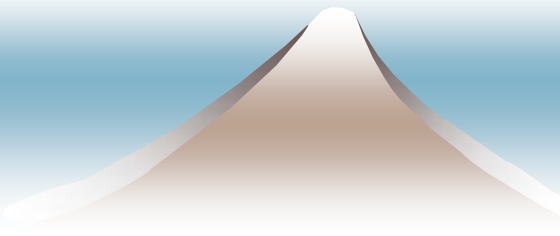
2005-2006 trial use & upgrade

2007 prepare for partial operation of  
ALMA



# Need to Solve

- ◆ How to use existing software ?
  - We want to minimize developing period.
- ◆ How to manage MY jobs in OTHER site.
  - We want to know the job status in remote site.
- ◆ How to manage distributed users' data.
  - We want to make seamless access to remote data as if they are local files.
- ◆ etc.



# Virtual Observatory Common Infrastructure for Astronomy

アプリ層

研究者

GRID  
管理層

インフラ層

