

Japanese Virtual Observatory and Workflow



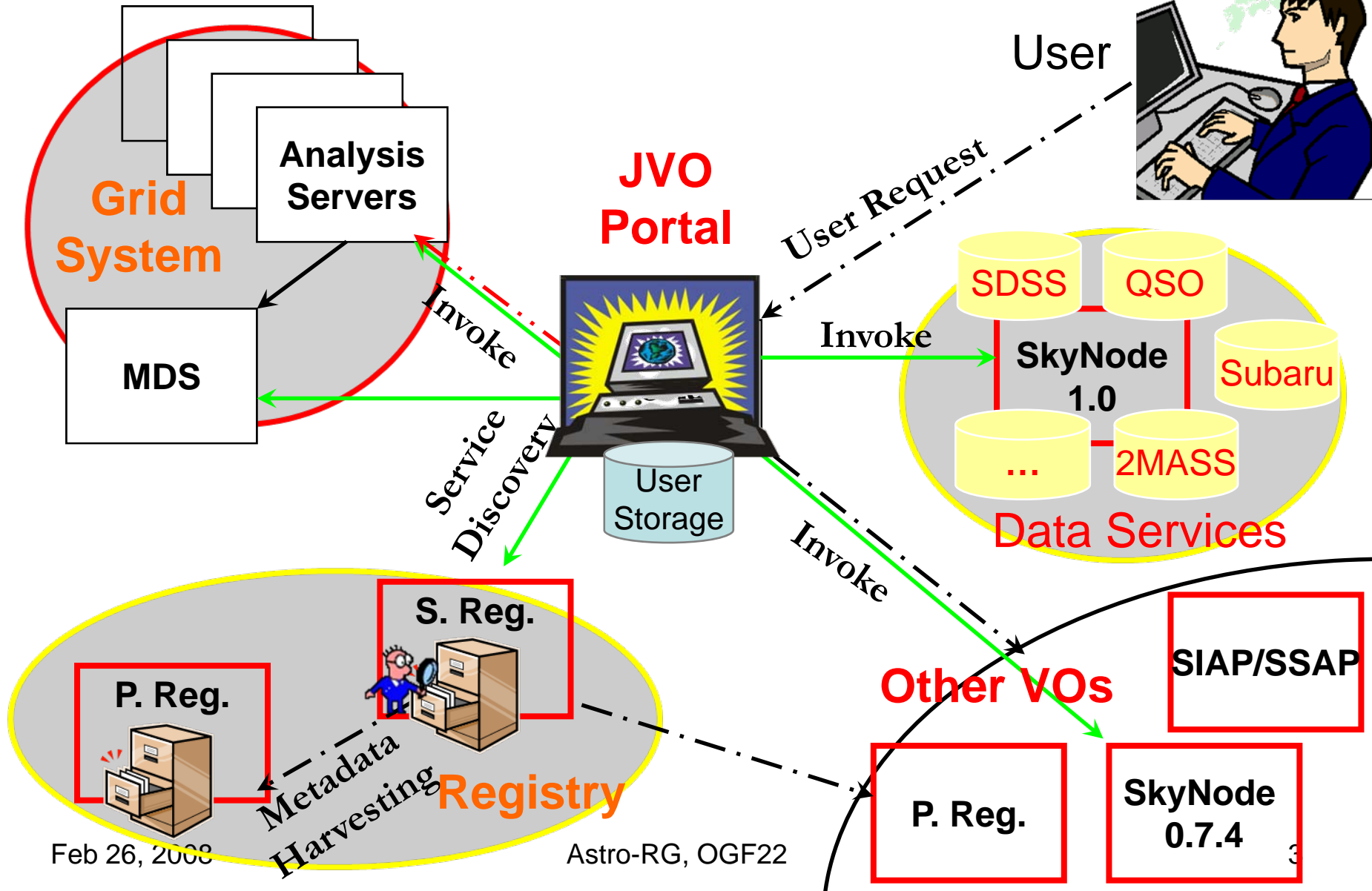
Masahiro Tanaka

National Astronomical Observatory of Japan

This talk

- Overview of JVO
- JVO Workflow system
- Investigation of GUI Workflow builder
- Services called from Workflow

JVO system : Portal and Services



JVO Portal - top page



JVO

JAPANESE VIRTUAL OBSERVATORY

ver.20070904

Masatoshi Ohishi
ohishi:jvo

About Acknowledgement

News

Version 0.2 is open since
2007-07-01

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[\[Logout\]](#)

Service Contents

Data Search

- ◆ Quick Search
- ◆ Search on a single VO Service
- ◆ Parallel search on multiple VO Services
- ◆ Xmatch Search
- ◆ JVOQL Search

Subaru

- ◆ Suprime-Cam

JVO Space

- ◆ Home

Service Search

- ◆ Keyword Search
- ◆ Category Search
- ◆ Advanced Search

Astronomical Tools

- ◆ Source Extractor
- ◆ HyperZ

Workflow

- ◆ Workflow Editor (Script)
- ◆ Workflow Editor
- ◆ Workflow Monitor

Admin

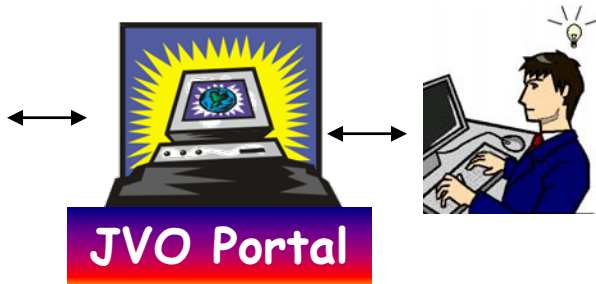
- ◆ Admin

<http://jvo.nao.ac.jp/portal/>

January 24, 2008

ADC International Review

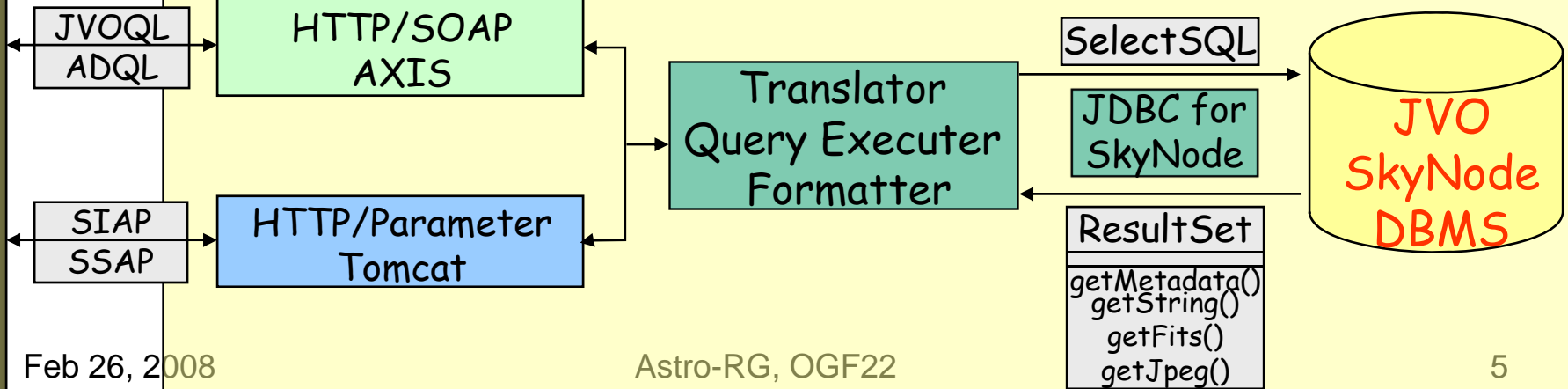
JVO SkyNode Architecture



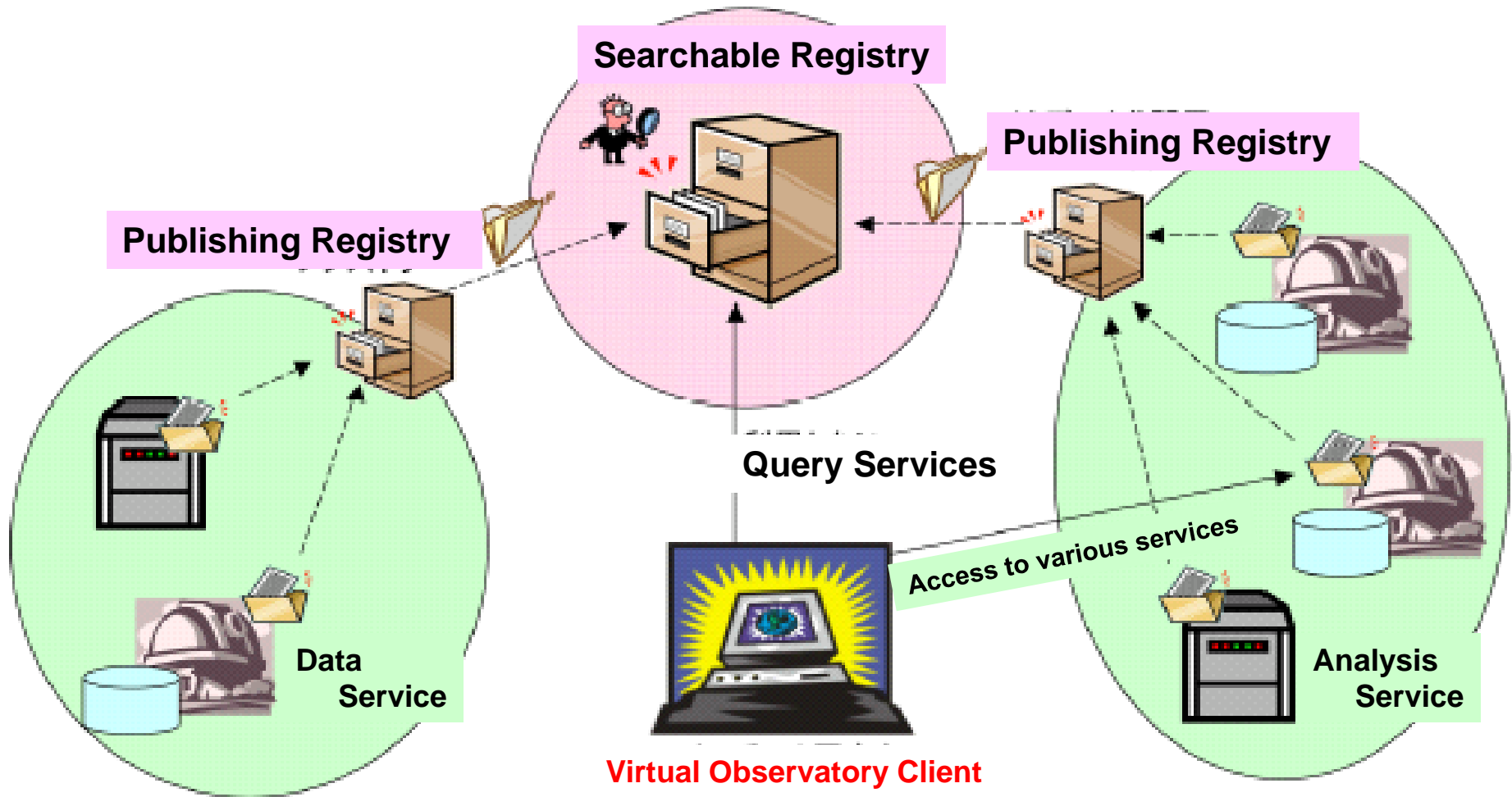
- Uses Apache **Axis** and **Tomcat**.
- Accepts Four kinds of query languages.
- Query is executed through **JDBC-like interface**.
- Query result is formatted as **VOTable** or **CSV**.

Internet

JVO SkyNode

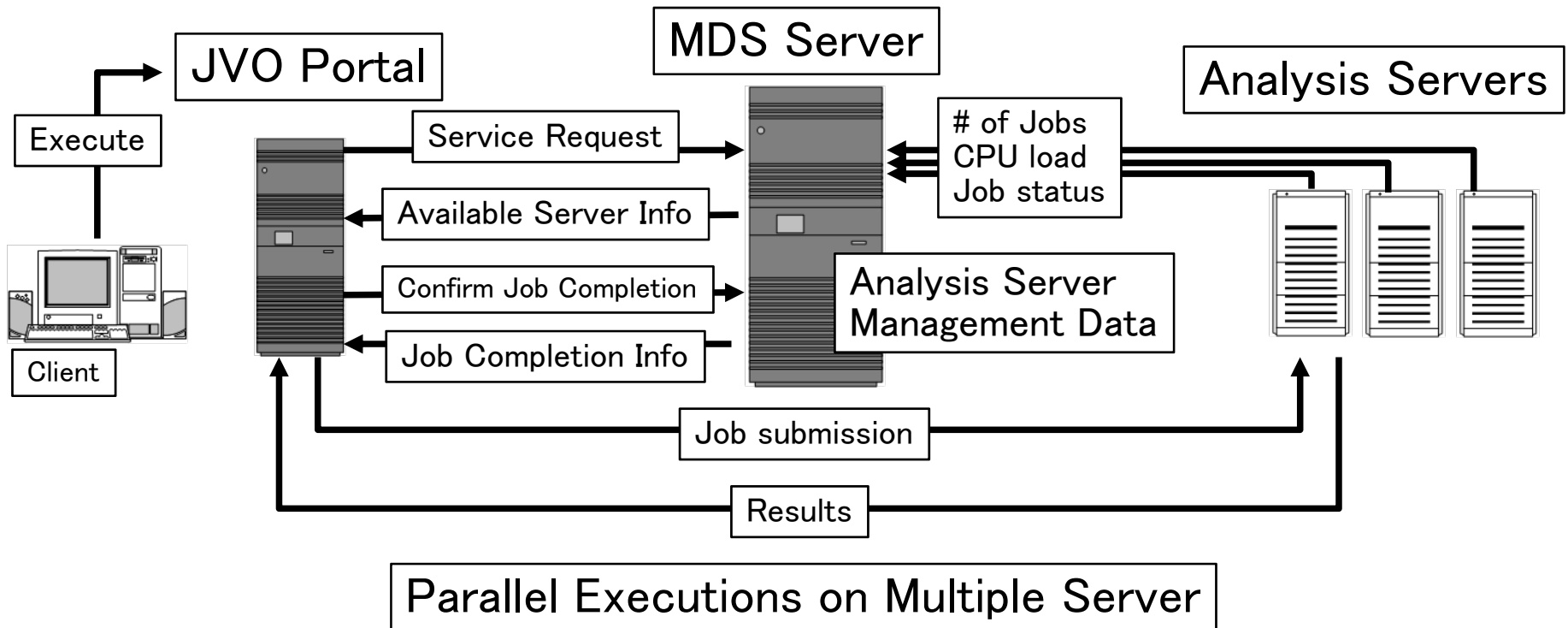


Finding Services – Registry



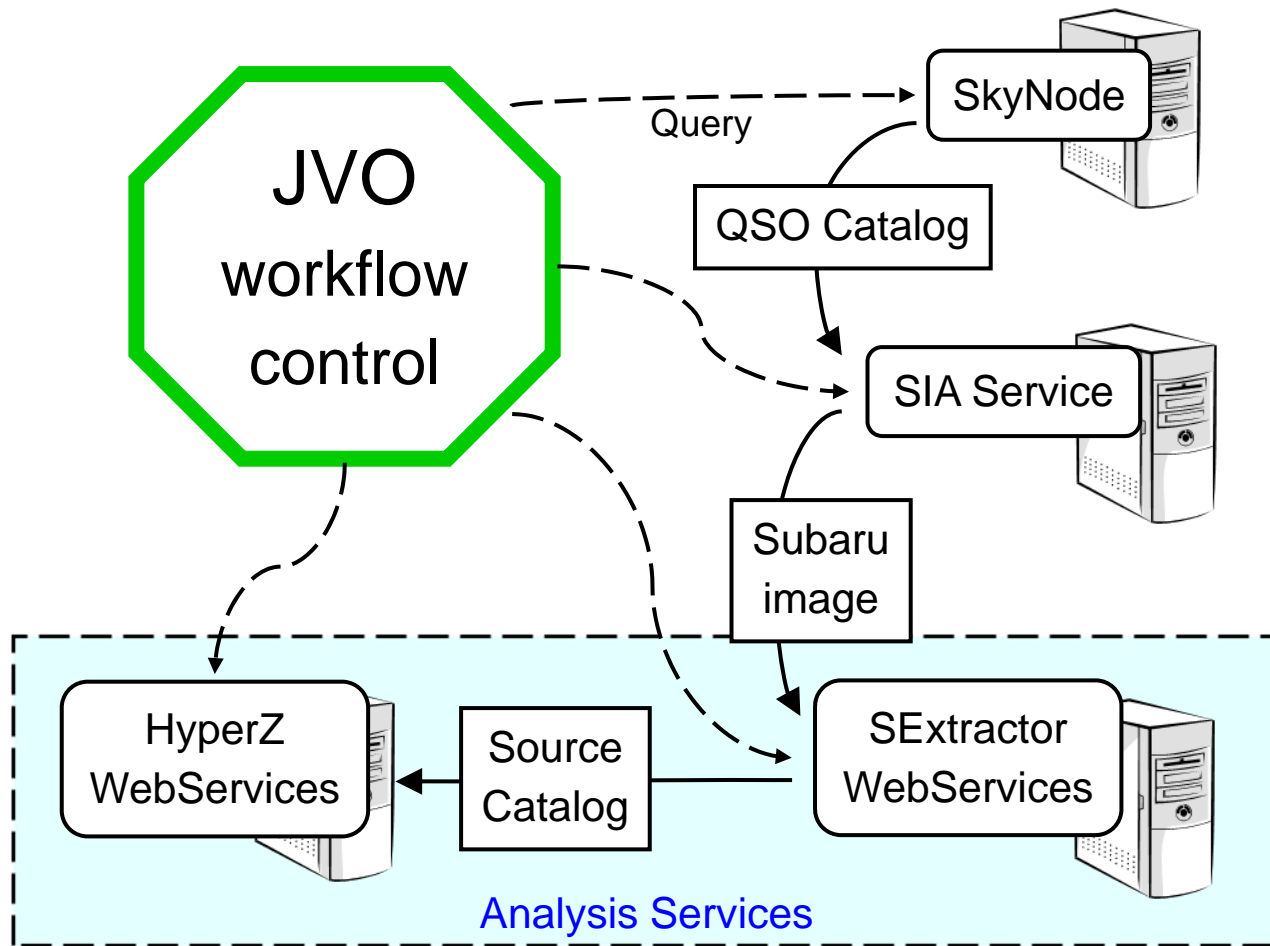
Grid service for Subaru image reduction

- Automated job assignment with Monitor and Discovery Service (MDS)

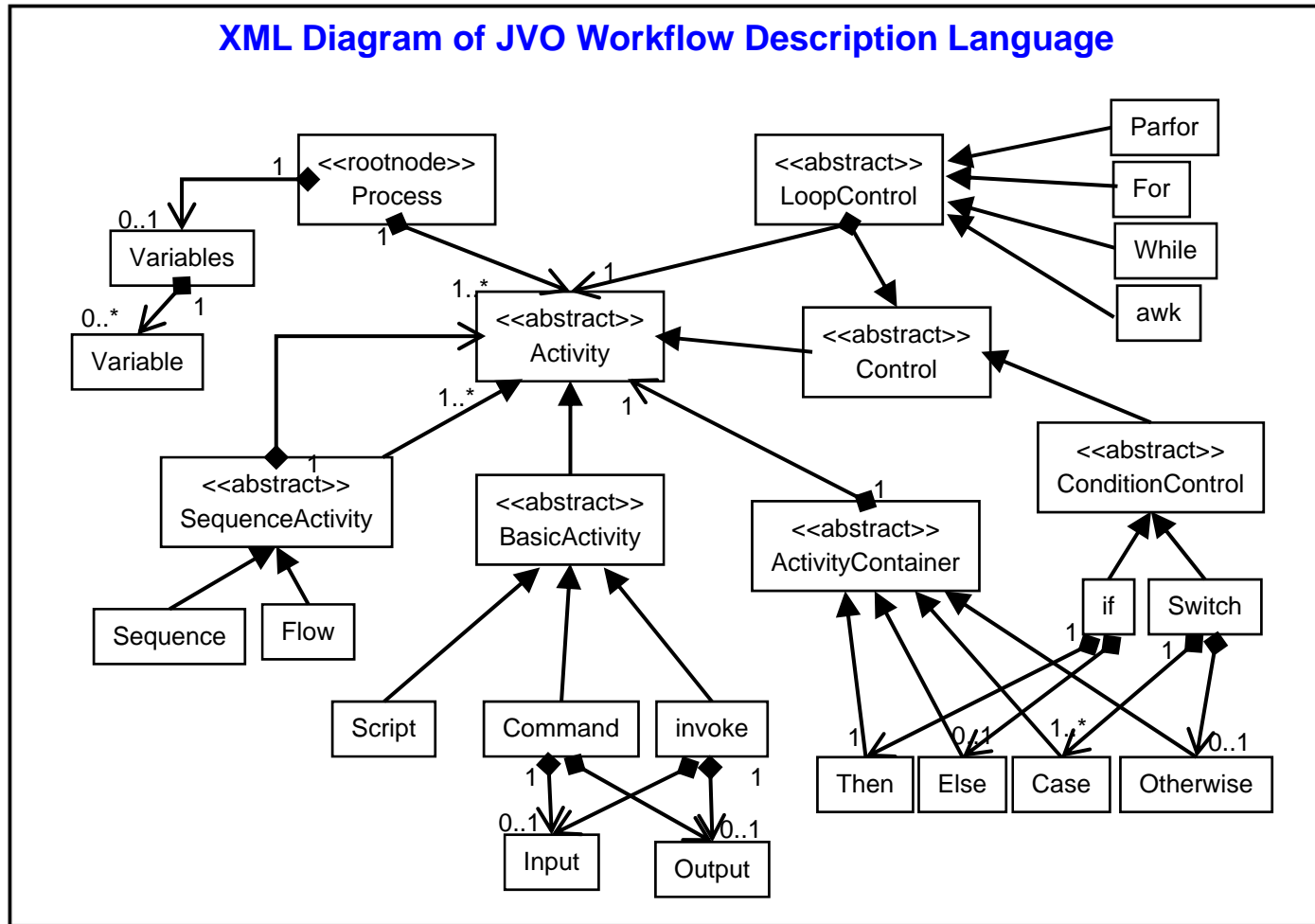


JVO Workflow system

Example of workflow

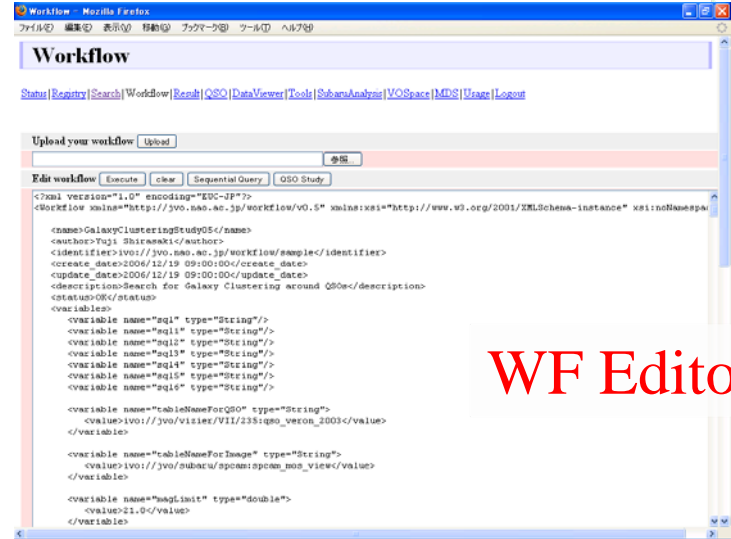


JVO Workflow Language

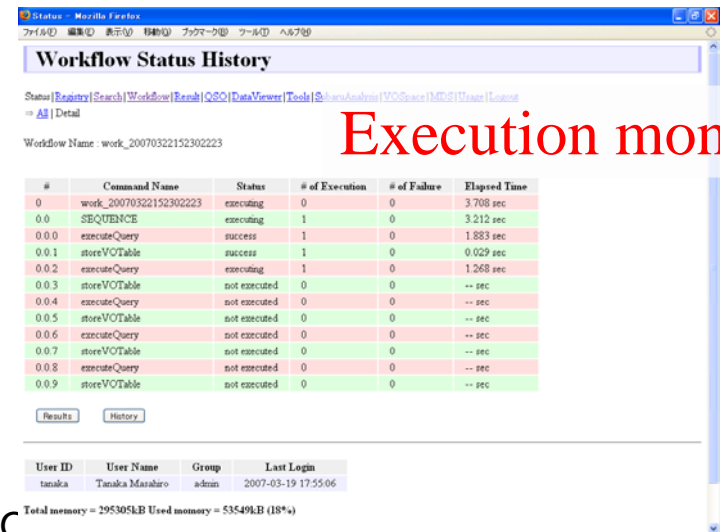


Current workflow builder for JVO

- Editing XML directly
 - Difficult to write XML
 - Use Templates
- No GUI workflow builder for JVO



WF Editor



Execution monitor

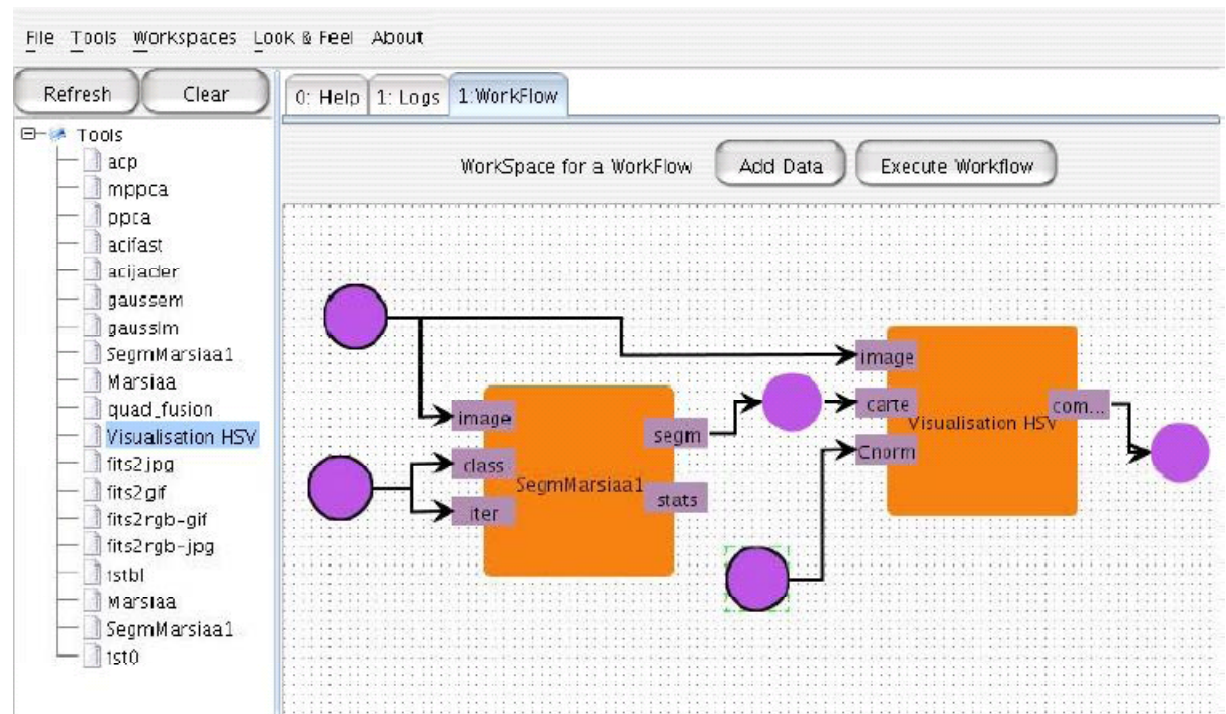
Investigation of GUI Workflow builder for JVO

JFLOW

- Developed at CDS
- Good User Interface
- Does not support flow

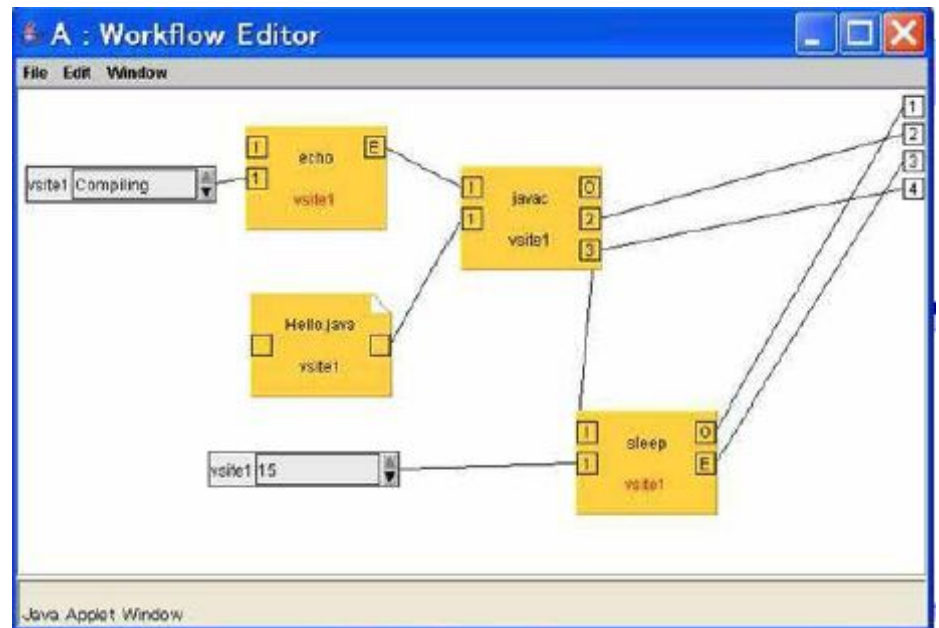
controls:

- Condition
- Loop



Workflow editor for NAREGI

- Good Graphical WF builder
- Developed for Grid workflow for NAREGI
- Applicable to VO Services??



NAREGI

- Building Grid environment using NAREGI Middleware β 2.0.1
- Trying Interoperability with KEK (Institute for high energy physics)
- Problems:
 - Difficult to install NAREGI middleware
 - No support for VO Protocols

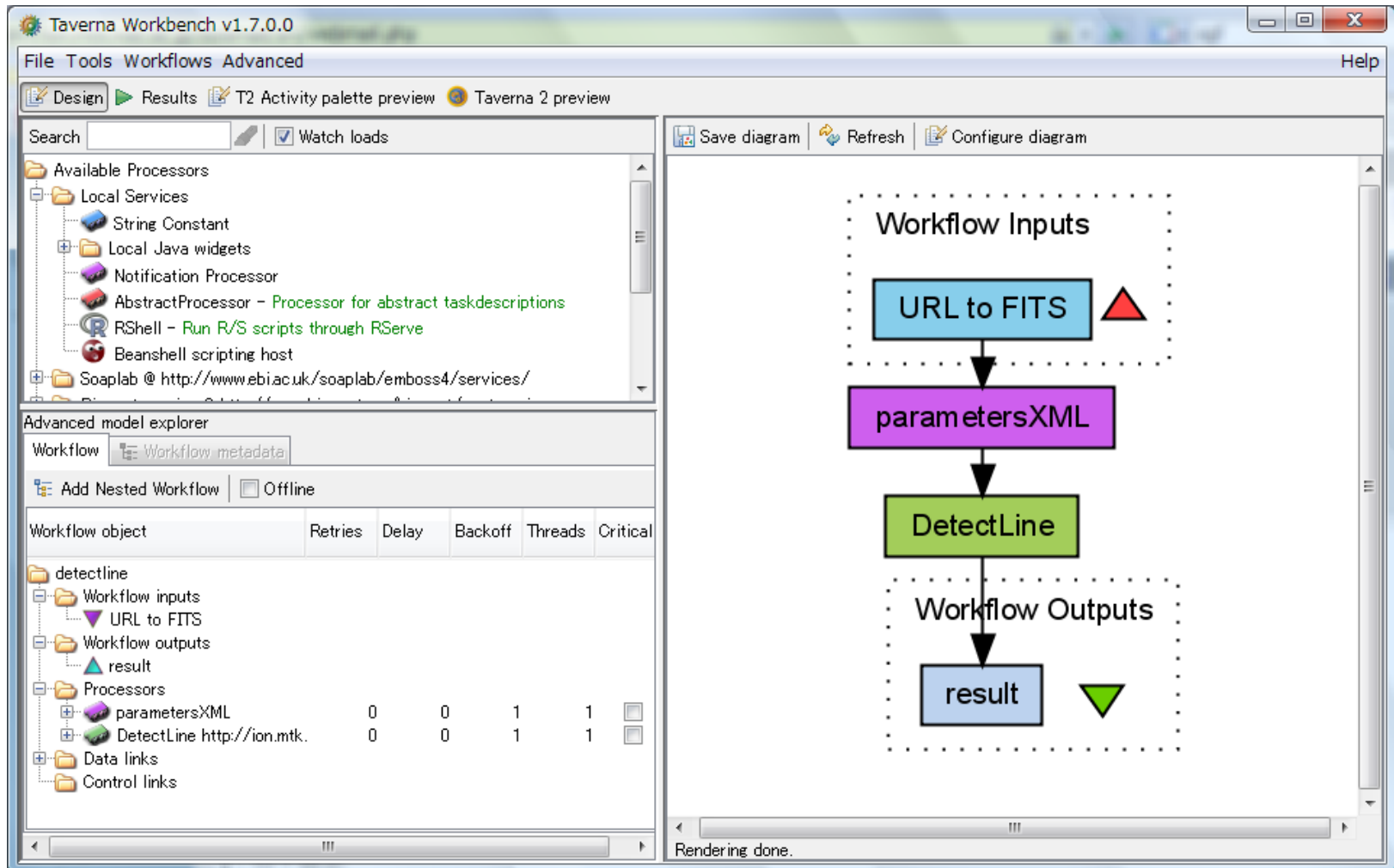
Taverna



- Developed for Biology but usable for general purposes
- Evaluated by AstroGrid
- JVO team has just started evaluation
- Client-side application
 - JVO has server-side workflow

Trying Taverna

- Workflow calling a single Web Service



Executing...

Taverna Workbench v1.7.0.0

File Tools Workflows Advanced Help



Design Results T2 Activity palette preview Taverna 2 preview

detectline 2:35

Workflow Status : **Running**

Status

Processor statuses

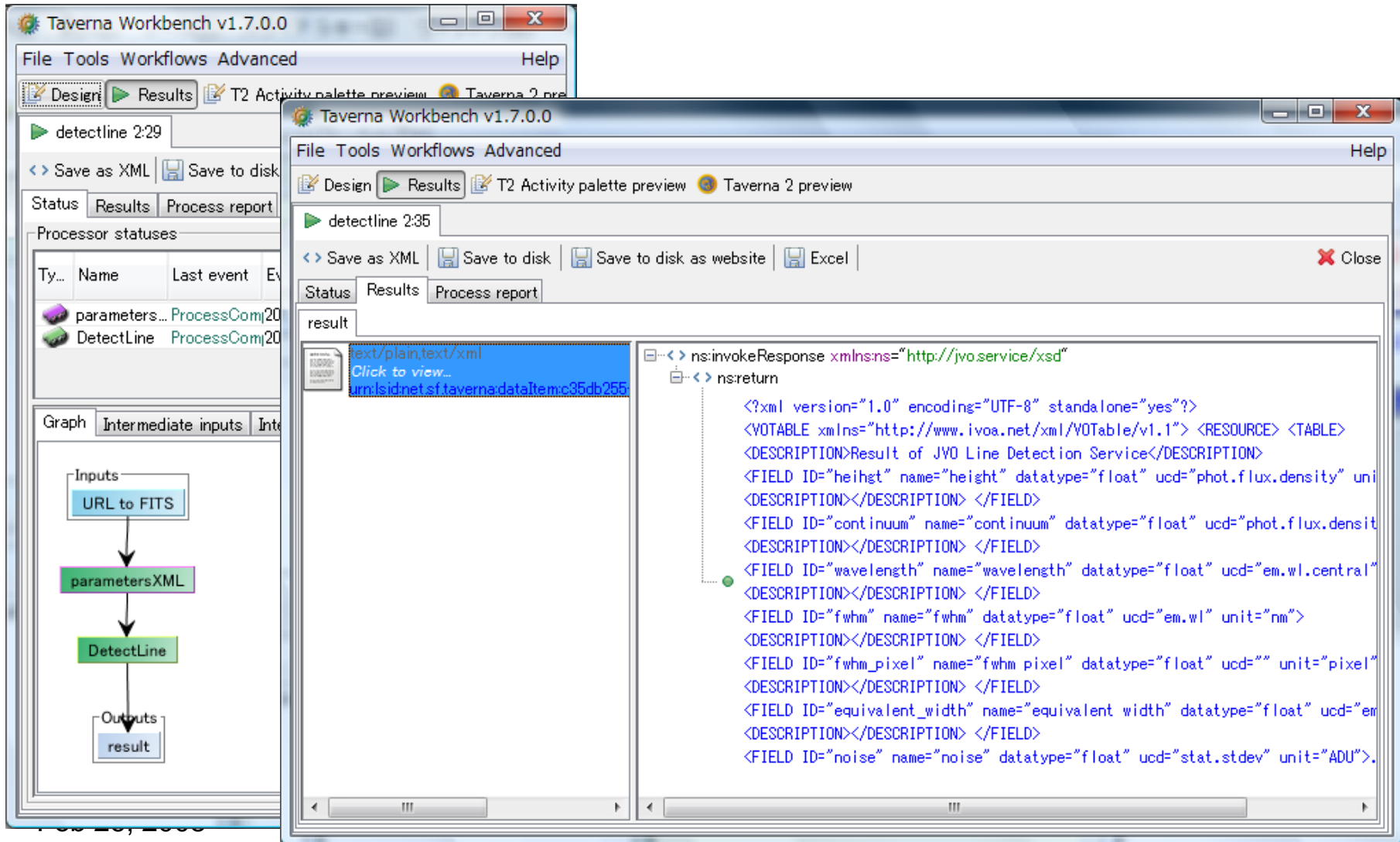
Type	Name	Last event	Event timestamp	Event detail	Breakpoint
	parametersXML	ProcessComplete	2008/02/26 2:35:14		.
	DetectLine	Invoking	2008/02/26 2:35:14		.

Graph Intermediate inputs Intermediate outputs

```

graph TD
    subgraph Inputs
        A[URL to FITS]
    end
    A --> B[parametersXML]
    B --> C[DetectLine]
    C --> subgraph Outputs
        D[result]
    end
  
```

Result



The image shows two overlapping windows of Taverna Workbench v1.7.0.0. The background window displays a workflow graph with the following components:

- Inputs:** URL to FITS
- Processors:** parametersXML, DetectLine
- Outputs:** result

The foreground window shows the 'Results' tab for the 'DetectLine' processor. The 'result' output is displayed as an XML document with the following structure:

```

ns:invokeResponse xmlns:ns="http://jvo.service/xsd"
  ns:return
    <?xml version="1.0" encoding="UTF-8" standalone="yes"?>
    <VOTABLE xmlns="http://www.ivoa.net/xml/VOTable/v1.1">
      <RESOURCE>
        <TABLE>
          <DESCRIPTION>Result of JVO Line Detection Service</DESCRIPTION>
          <FIELD ID="height" name="height" datatype="float" ucd="phot.flux.density" unit="mJy" >
            <DESCRIPTION></DESCRIPTION> </FIELD>
          <FIELD ID="continuum" name="continuum" datatype="float" ucd="phot.flux.density" unit="mJy" >
            <DESCRIPTION></DESCRIPTION> </FIELD>
          <FIELD ID="wavelength" name="wavelength" datatype="float" ucd="em.wl.central" unit="nm" >
            <DESCRIPTION></DESCRIPTION> </FIELD>
          <FIELD ID="fwhm" name="fwhm" datatype="float" ucd="em.wl" unit="nm" >
            <DESCRIPTION></DESCRIPTION> </FIELD>
          <FIELD ID="fwhm_pixel" name="fwhm pixel" datatype="float" ucd="" unit="pixel" >
            <DESCRIPTION></DESCRIPTION> </FIELD>
          <FIELD ID="equivalent_width" name="equivalent width" datatype="float" ucd="em.wl" unit="mJy" >
            <DESCRIPTION></DESCRIPTION> </FIELD>
          <FIELD ID="noise" name="noise" datatype="float" ucd="stat.stdev" unit="ADU">

```

Taverna good things

- Good User Interface
- Easy to call Web Services
- Able to save workflow and results as XML
- Good workflow engine
 - Job monitoring and control
 - Logging (intermediate results and status)

Taverna issues...

- Still need knowledge on
 - Web Services
 - Input/Output data types
 - Programming
- Need Communication with :
 - Client-side software
 - VO Registry

Scripting languages

- Define new Workflow Language easier to write than XML?
 - Not difficult to define it from XML definition
 - We have already workflow engine.
 - Need language design
 - Learning cost for users
- Use Existing language?
 - Perl, Python, Ruby, ...
 - No learning cost if user knows

SOAP call example using Scripting Language



- Ruby script :

```
require 'soap/wsdlDriver'  
wsdl = 'http://ion.mtk.nao.ac.jp:8080/axis2/services/DetectLine?wsdl'  
url = 'http://jvo.nao.ac.jp/skynode/sdss/spectrumRequest.do?' +  
      'db=sdss&table=spectrum&id=51630-0266-001&format=spectrum/fits'  
driver = SOAP::WSDLDriverFactory.new(wsdl).create_rpc_driver  
result = driver.invoke(:url=>url).return
```

- Easy to call Web Services
- Script code can be a workflow

We have choices

- We just started evaluation.
- Taverna is a promising tool.
- Need more experience.

Services called from Workflow

Services in VO

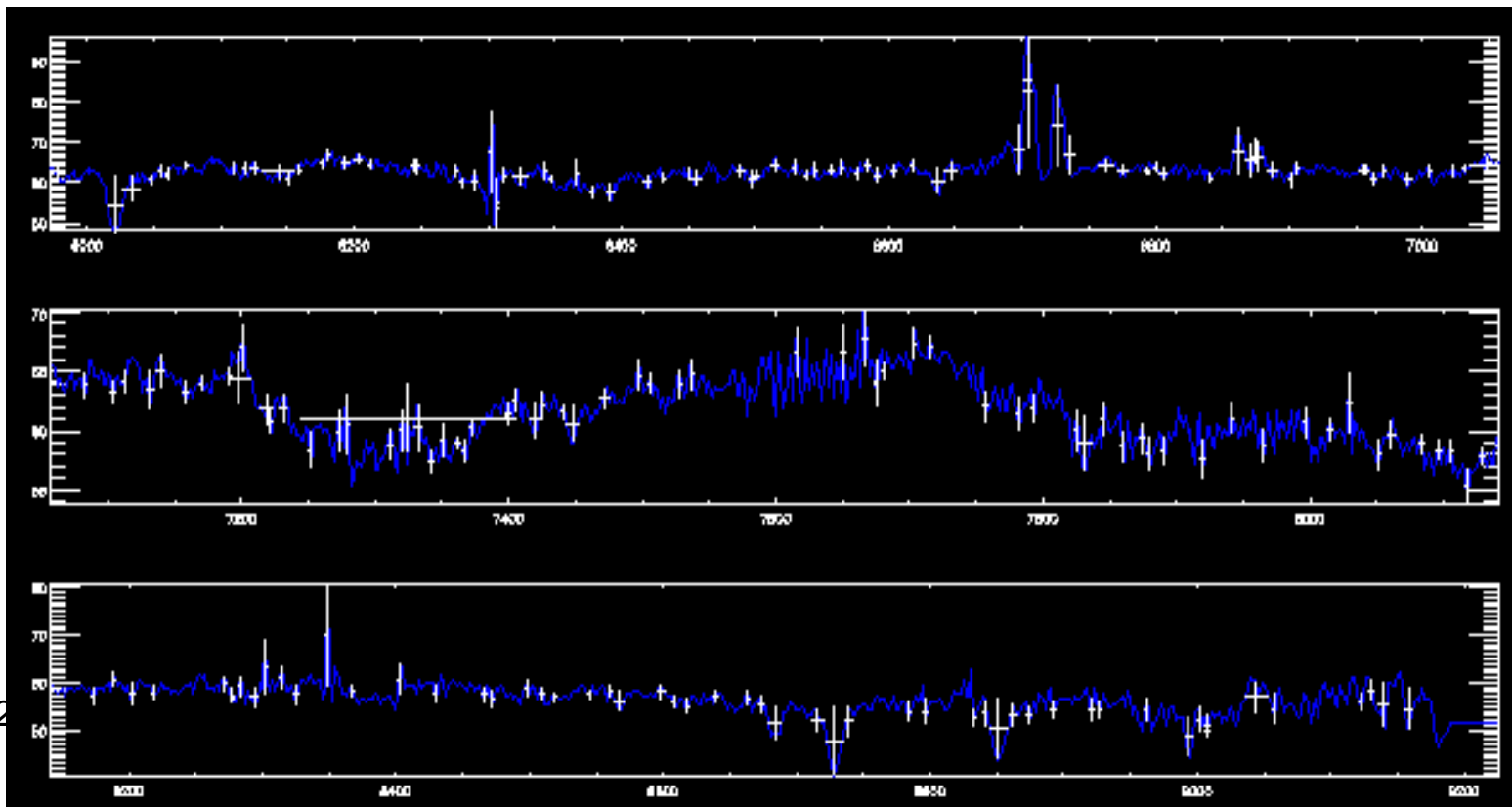
- VO framework
 - Data archives
 - Registry, SIAP, SSAP, ConeSearch, SkyNode, TAP,
 - Data storage
 - VO Space
- Need more
 - Analysis services
 - Visualization services
 - Interoperability with client tools
 - SAOImage, VOPlot, Aladin, ...

Use Cases of Workflow

- Subaru data reduction
 - Service: Parallel execution with cluster
- Study on AGN environment
 - Service: SExtractor and HyperZ
- Search for Metal-poor stars
 - Service: Line detection service

Automatic Spectral Line Detection Service

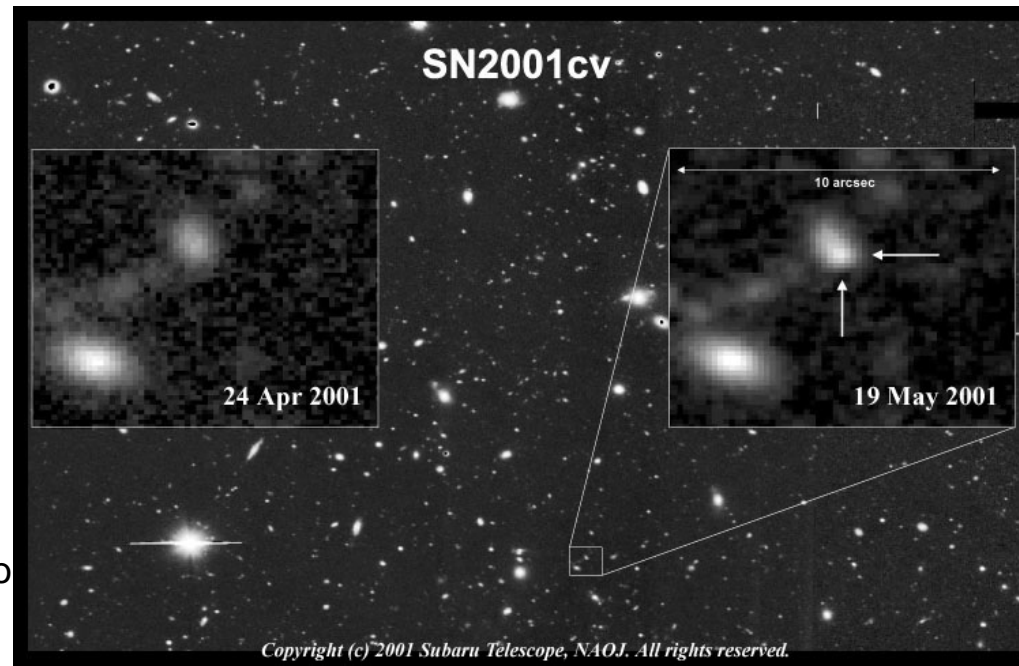
- Detect every scale of line width
- Wavelet-like algorithm



Feb 26, 2012

Grid Challenge

- Public Contest of HPC
 - Held in mid 2008 by Grid Scientists
 - JVO provides Subaru data and scientific scenario :
 - Supernova search
 - Good experience to build Grid services for Astronomy



Feb 26, 2008

Astro

Useful Services

- Re-usable, general-purpose services
- Services which require computer resources
 - CPU
 - Storage
- Services with clearly-defined interface

Issues

- Too few available services
 - Publicly available services are needed.
- WSDL can be written freely :
 - Variety of interface can be confusing.
 - Granularity of Services?
 - Need Methodology / Guideline / Standard ?

Conclusion

- JVO system and workflow are reviewed.
- GUI WF builder for JVO is evaluated :
 - Taverna is a promising tool.
- Useful services called from Workflow are needed.