

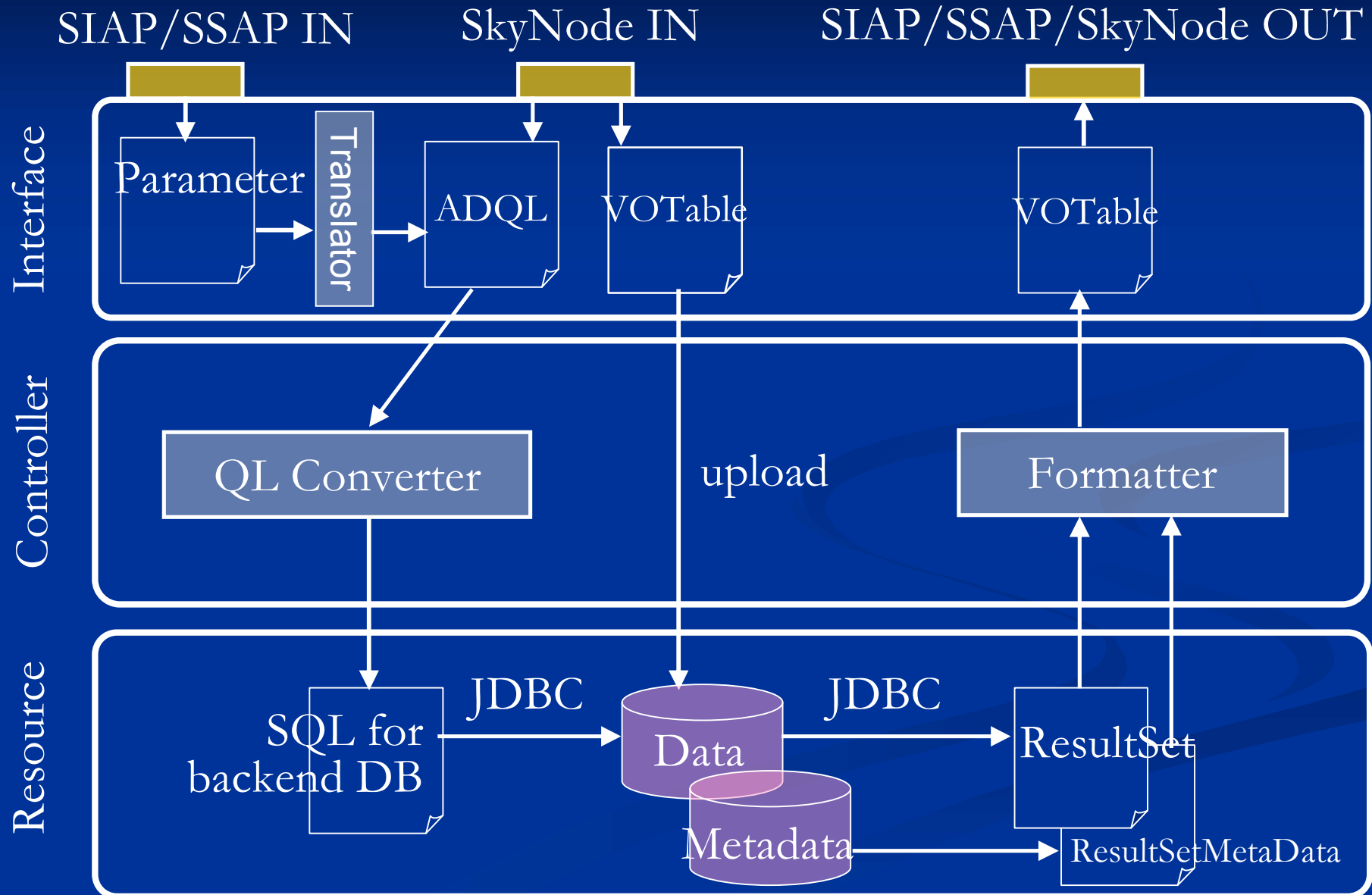
VOQL session 3

Implementation

SkyNode toolkit

- <http://jvo.nao.ac.jp/download/skynode-toolkit/>
- What this toolkit can do / provide ?
 - Basic skynode can easily be set up provided that data are already stored on DBMS and JDBC driver is available.
 - Image data service that returns a VOTable conforming to the SIAP.
 - Java SQL parser is included. ADQL-s \leftrightarrow ADQL-x.

Architecture



SIAP compliant query

- **SIAP query parameters** are mapped to table columns.
- **Metadata** returned in a SIAP query response are mapped to table columns

- Typical query:

```
SELECT "*" or <LIST_OF_METADATA>  
FROM table  
WHERE REGION (...)  
      AND PARAM1=VALUE1  
      AND ...
```

Image data search using SQL

■ Example 1 (Simple image cutout)

- <http://jvo.nao.ac.jp/search?POS=30,10&SIZE=0.1&FORMAT=image/fits&INTERSECT=coverage>

- ```
SELECT * FROM image
WHERE REGION('CIRCLE 30 10 0.1')
AND FORMAT = 'image/fits'
AND INTERSECT = 'coverage'
```

# Image data search using SQL

## ■ Example 2 (Multiple Region Cutout)

- SIAP → not possible

- SELECT \*

```
FROM #upload vot, image img
```

```
WHERE img.region =
```

```
 BOX ((vot.ra, vot.dec) , 0.02, 0.02)
```

- SELECT \*

```
FROM image
```

```
WHERE img.region IN
```

```
(BOX ((30,10) 0.1) , BOX ((30,20) 0.1) ,
```

```
 BOX ((20,10) 0.1) , BOX ((20,20) 0.1))
```

# Implementation

- **normal-column:** static metadata of the image. FITS Keyword. (object name, filter name, observation time...)
- **function-column:** metadata calculated dynamically on each request (access\_ref, center\_ra, center\_dec, ...)
- **enumeration-column:** The enumeration query parameters (format, intersect, ...)

# Implementation (cont.)

t1

| id  | object | crpix1 | crpix2 | ... |
|-----|--------|--------|--------|-----|
| 1   | SN1009 | 300    | 150    | ... |
| ... | ...    | ...    | ...    | ... |

t2

| format     |
|------------|
| image/fits |
| image/jpg  |
| text/html  |

t3

| intersect |
|-----------|
| covers    |
| enclosed  |
| center    |
| overlaps  |

Select \*

From t1, t2, t3

Where t2.format = 'image/fits'  
and t3.intersect = 'overlaps'

t4

| id  | object | crpix1 | crpix2 | ... | format     | intersect |
|-----|--------|--------|--------|-----|------------|-----------|
| 1   | SN1009 | 300    | 150    | ... | image/fits | overlaps  |
| ... | ...    | ...    | ...    | ... | ...        | ...       |



# Implementation (cont.)

t4

| id  | object | crpix1 | crpix2 | ... | format     | intersect |
|-----|--------|--------|--------|-----|------------|-----------|
| 1   | SN1009 | 300    | 150    | ... | Image/fits | overlaps  |
| ... | ...    | ...    | ...    | ... | ...        | ...       |

(2)

t5

| id  | htm   |
|-----|-------|
| 1   | 10045 |
| 1   | 10046 |
| ... | ...   |

t6 REGION('BOX 30 10 0.1')

| rid | ra  | dec | siz1 | siz2 | low   | upp   |
|-----|-----|-----|------|------|-------|-------|
| 1   | 30  | 10  | 0.1  |      | 10045 | 10050 |
| 1   | 30  | 10  | 0.1  |      | 10055 | 10060 |
| ... | ... | ... | ...  |      | ...   | ...   |

(1)

(1) Select "id" from t5 with the condition  $htm\_low \leq htm \leq htm\_upp$

(2) Select records from t4 corresponding to the selected "id"

# Implementation (cont.)

Ra, Dec, siz1, siz2, crpix1,  
crpix2, crval1, crval2, naxis1,  
naxis2, cd11, cd12, cd21, cd22

Calculate based on the other columns  
(function columns)

| id  | object | format     | intersect | crpix | crval   | Access_URL                                                   |
|-----|--------|------------|-----------|-------|---------|--------------------------------------------------------------|
| 1   | SN1009 | Image/fits | overlaps  | 20 40 | 30. 10. | <a href="http://jvo.nao.ac.jp/">http://jvo.nao.ac.jp/...</a> |
| ... | ...    | ...        | ...       | ...   | ...     | ...                                                          |

# How to setup

- Read instruction.txt
- Minimum requirement:
  - Java, Tomcat, DBMS (PostgreSQL, MySQL), Skynode TK
- Procedure:
  - Deploy jvop3-skynode.war under webapps/skynode of tomcat.
  - Create etc, var/log, tmp under /usr/local/skynode.
  - Copy jvo.properties, log4jproperties, deploy-template.wsdd at /usr/local/skynode/etc.
  - Start tomcat.
  - **Create metadata database.**
  - Deploy the skynode web service.

# Create Metadata database

- First you need to create a database “metadb” on the DBMS.
- Create metadata tables on “metadb”
  - CUI: meta-op create
  - GUI: Web browser: just push “create tables” button.
- Insert metadata of the tables and columns
  - CUI: meta-op register -f <filename>
  - GUI: Web browser: edit the metadata on the web form and push the “register” button.

Firefox window: Edit DB Metadata - Mozilla Firefox

メニュー: ファイル(F) 編集(E) 表示(V) 移動(G) ブックマーク(B) ツール(T) ヘルプ(H)

## Edit DB Metadata

検索 | DB | Table | Column

|             |              |
|-------------|--------------|
| Name        | qso          |
| DBMS name   | pgsql        |
| Mode        | public       |
| Description | DB QSO. data |

Register

Firefox window: Table - Mozilla Firefox

メニュー: ファイル(F) 編集(E) 表示(V) 移動(G) ブックマーク(B) ツール(T) ヘルプ(H)

## SkyNode Table List

検索 | DB | Table | Column

|                            |                                                     |
|----------------------------|-----------------------------------------------------|
| Name                       | spcam                                               |
| Table Class                | image                                               |
| Access Mode                | public                                              |
| Query Java Class           | jp.ac.nao.jvop3.controller.skynode.QueryMulti       |
| Function Column Java Class | jp.ac.nao.jvop3.controller.skynode.FunctionForSpcam |
| Data Access URL            | http://jvo.nao.ac.jp/skynode/imageRequest.do        |
| Description                | Subaru SuprimeCam Image Data Table                  |

# SkyNode Column List

[Search](#) | [DB](#) | [Table](#) | [Column](#)

## Table: image.spcam

Register

| name       | registered | access mode | data type | array size | unit | column type | UCD               | utype        | precision | frame        | htm level | description                |
|------------|------------|-------------|-----------|------------|------|-------------|-------------------|--------------|-----------|--------------|-----------|----------------------------|
| frame_id   | true       | public      | long      | 1          |      | normal      | ID_MAIN           | id (common)  |           | not selected | -1        | FITS file ID               |
| object     | true       | public      | char      | *          |      | normal      | VOX:Image_Title   | not selected |           | not selected | -1        | Target Name                |
| filter     | true       | public      | char      | *          |      | normal      |                   | not selected |           | not selected | -1        | filter name                |
| ra2000     | true       | public      | double    | 1          | deg  | normal      | POS_EQ_RA_MAIN    | pos.ra       |           | not selected | -1        | RA J2000, image center coo |
| dec2000    | true       | public      | double    | 1          | deg  | normal      | POS_EQ_DEC_MAIN   | pos.dec      |           | not selected | -1        | DEC J2000, image center cc |
| naxes      | true       | public      | int       | 1          |      | normal      | VOX:Image_Naxes   | not selected |           | not selected | -1        |                            |
| naxis1     | true       | protected   | int       | 1          |      | normal      | VOX:Image_Naxis1  | not selected |           | not selected | -1        |                            |
| naxis2     | true       | protected   | int       | 1          |      | normal      | VOX:Image_Naxis2  | not selected |           | not selected | -1        |                            |
| scale1     | true       | protected   | float     | 1          | deg  | normal      | VOX:Image_Scale1  | not selected |           | not selected | -1        |                            |
| scale2     | true       | protected   | float     | 1          | deg  | normal      | VOX:Image_Scale2  | not selected |           | not selected | -1        |                            |
| ref_pix1   | true       | protected   | double    | 1          |      | normal      | VOX:WCS_CoordRe   | not selected |           | not selected | -1        |                            |
| ref_pix2   | true       | protected   | double    | 1          |      | normal      | VOX:WCS_CoordRe   | not selected |           | not selected | -1        |                            |
| ref_value1 | true       | protected   | double    | 1          | deg  | normal      | VOX:WCS_CoordRe   | not selected |           | not selected | -1        |                            |
| ref_value2 | true       | protected   | double    | 1          | deg  | normal      | VOX:WCS_CoordRe   | not selected |           | not selected | -1        |                            |
| cd11       | true       | protected   | double    | 1          |      | normal      | VOX:WCS_CDMatrix  | not selected |           | not selected | -1        |                            |
| cd12       | true       | protected   | double    | 1          |      | normal      | VOX:WCS_CDMatrix  | not selected |           | not selected | -1        |                            |
| center_ra  | true       | public      | double    | 1          |      | function    |                   | not selected |           | not selected | -1        |                            |
| center_dec | true       | public      | double    | 1          |      | function    |                   | not selected |           | not selected | -1        |                            |
| naxis      | true       | public      | int       | 2          |      | function    | VOX:Image_Naxis   | not selected |           | not selected | -1        |                            |
| scale      | true       | public      | float     | 2          | deg  | function    | VOX:Image_Scale   | not selected |           | not selected | -1        |                            |
| cd         | true       | public      | double    | 4          |      | function    | VOX:WCS_CDMatrix  | not selected |           | not selected | -1        |                            |
| ref_pix    | true       | public      | double    | 2          |      | function    | VOX:WCS_CoordRe   | not selected |           | not selected | -1        |                            |
| ref_value  | true       | public      | double    | 2          | deg  | function    | VOX:WCS_CoordRe   | not selected |           | not selected | -1        |                            |
| region     | true       | public      | char      | *          |      | function    | VOX:Image_Format  | not selected |           | not selected | -1        | image format               |
| access_ref | true       | public      | char      | *          |      | function    | VOX:Image_Accessf | not selected |           | not selected | -1        |                            |

Register